

|   |   |
|---|---|
| TO:<br><br><p style="text-align: center;"><b>Mail Stop 8</b><br/> <b>Director of the U.S. Patent and Trademark Office</b><br/> <b>P.O. Box 1450</b><br/> <b>Alexandria, VA 22313-1450</b></p> | <p><b>REPORT ON THE<br/>         FILING OR DETERMINATION OF AN<br/>         ACTION REGARDING A PATENT<br/>         OR TRADEMARK</b></p> |
|---|---|

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Southern District of Texas on the following Trademarks or Patents.

|  |                                |  |        |                    |
|--|--------------------------------|--|--------|--------------------|
| Docket No.<br>4:17-cv-02194  | Date Filed:<br>7/18/2017       | U.S District Court<br>SOUTHERN DISTRICT OF TEXAS |        |                    |
| Plaintiff(s)<br>CMP Products Limited   |                                | Defendant(s)<br>Cooper Crouse-Hinds, LLC, et al. |        |                    |
| PATENT OR<br>TRADEMARK NO.   | DATE OF PATENT<br>OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK                    |        |                    |
| <b>A copy of the complaint is being mailed with this form.</b>                           |                                |  |        |                    |
| 1. 8872027   |                                |  |        |                    |
| 2. 9484133   |                                |  |        |                    |
| 3.   |                                |  |        |                    |
| 4.   |                                |  |        |                    |
| 5.   |                                |  |        |                    |
| In the above-entitled case, the following patent(s)/trademark(s) have been included:     |                                |  |        |                    |
| DATE INCLUDED  | INCLUDED BY                    | Amendment  | Answer | Cross Bill         |
|  |                                | Other Pleading                                   |        |                    |
| PATENT OR<br>TRADEMARK NO.   | DATE OF PATENT<br>OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK                    |        |                    |
| 1.   |                                |  |        |                    |
| 2.   |                                |  |        |                    |
| 3.   |                                |  |        |                    |
| 4.   |                                |  |        |                    |
| 5.   |                                |  |        |                    |
| In the above-entitled case, the following decision has been rendered or judgment issued: |                                |  |        |                    |
| DECISION/JUDGMENT  |                                |  |        |                    |
| Clerk:<br>David J. Bradley, Clerk  |                                | By Deputy Clerk:<br>Lauren Webster               |        | Date:<br>7/19/2017 |

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 8,872,027 B2  
APPLICATION NO. : 13/391539  
DATED : October 28, 2014  
INVENTOR(S) : Samuel Liam Proud

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

Col. 6, Line 36, Claim 14 "bather" should be --barrier--

Col. 6, Line 45, Claim 15 "bather" should be --barrier--

Signed and Sealed this  
Fourteenth Day of April, 2015



Michelle K. Lee  
*Director of the United States Patent and Trademark Office*

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors: Samuel Liam Proud  
Patent No.: 8,872,027 B2  
Issue Date: October 28, 2014  
Application No.: 13/391,539  
Filing Date: May 2, 2012  
For: FILLER ASSEMBLY FOR CABLE GLAND  
Confirmation No.: 6980  
Att'y Docket No.: 920257.00016

**REQUEST FOR CERTIFICATE OF CORRECTION  
PURSUANT TO 37 C.F.R. § 1.322**

Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Attached is a completed Form PTO-1050 identifying errors appearing in the above-referenced patent. The errors are the result of mistakes by the Office. A Certificate of Correction is respectfully requested.

Respectfully submitted,  
SAMUEL LIAM PROUD

Dated: January 22, 2015

/john d. franzini/  
John D. Franzini  
Reg. No. 31,356  
Quarles & Brady LLP  
411 East Wisconsin Avenue  
Milwaukee, WI 53202-4497  
Tel. No.: (414) 277-5747  
Fax No.: (414) 978-8747

QB\32633588.1

Cooper Ex. 1002

**UNITED STATES PATENT AND TRADEMARK OFFICE  
CERTIFICATE OF CORRECTION**Page 1 of 1

PATENT NO. : 8,872,027 B2

APPLICATION NO.: 13/391,539

ISSUE DATE : October 28, 2014

INVENTOR(S) : Samuel Liam Proud

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Col. 6, Line 36, Claim 14 "bather" should be --barrier--

Col. 6, Line 45, Claim 15 "bather" should be --barrier--

MAILING ADDRESS OF SENDER (Please do not use customer number below): John D. Franzini  
Quarles & Brady LLP  
411 East Wisconsin Avenue  
Milwaukee, WI 53202

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*



## Electronic Acknowledgement Receipt

|   |                                      |
|---|--------------------------------------|
| <b>EFS ID:</b>                              | 21276287                             |
| <b>Application Number:</b>                  | 13391539                             |
| <b>International Application Number:</b>    |                                      |
| <b>Confirmation Number:</b>                 | 6980                                 |
| <b>Title of Invention:</b>                  | FILLER ASSEMBLY FOR CABLE GLAND      |
| <b>First Named Inventor/Applicant Name:</b> | Samuel Liam Proud                    |
| <b>Customer Number:</b>                     | 26710                                |
| <b>Filer:</b>                               | John D. Franzini/Melanie Brunow      |
| <b>Filer Authorized By:</b>                 | John D. Franzini                     |
| <b>Attorney Docket Number:</b>              | 920257.00016                         |
| <b>Receipt Date:</b>                        | 22-JAN-2015                          |
| <b>Filing Date:</b>                         | 02-MAY-2012                          |
| <b>Time Stamp:</b>                          | 12:18:15                             |
| <b>Application Type:</b>                    | U.S. National Stage under 35 USC 371 |

### Payment information:

|                        |    |
|------------------------|----|
| Submitted with Payment | no |
|------------------------|----|

### File Listing:

| Document Number | Document Description                  | File Name                      | File Size(Bytes)/<br>Message Digest               | Multi Part /.zip | Pages (if appl.) |
|-----------------|---------------------------------------|--------------------------------|---|------------------|------------------|
| 1               | Request for Certificate of Correction | 920257-00016-req-cert-corr.pdf | 65857<br>0ab70230dde426fa4d4a2cb712bf1e2000266bc0 | no               | 1                |

### Warnings:

### Information:

|   |                                       |                            |  |        |   |
|---|---------------------------------------|----------------------------|--|--------|---|
| 2   | Request for Certificate of Correction | 920257-00016-cert-corr.pdf | 94777<br><small>57c0c382145993a4cf28e375872a201e3173108f</small> | no     | 1 |
| <b>Warnings:</b>  |                                       |                            |  |        |   |
| <b>Information:</b>   |                                       |                            |  |        |   |
| <b>Total Files Size (in bytes):</b>   |                                       |                            |  | 160634 |   |
| <p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b><br/> <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b><br/> <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b><br/> <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p> |                                       |                            |  |        |   |



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P. O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | ISSUE DATE | PATENT NO. | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|------------|------------|---------------------|------------------|
| 13/391,539      | 10/28/2014 | 8872027    | 920257.00016        | 6980             |

26710 7590 10/08/2014  
QUARLES & BRADY LLP  
Attn: IP Docket  
411 E. WISCONSIN AVENUE  
SUITE 2350  
MILWAUKEE, WI 53202-4426

**ISSUE NOTIFICATION**

The projected patent number and issue date are specified above.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**  
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Samuel Liam Proud, Tyne & Wear, UNITED KINGDOM;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit [SelectUSA.gov](http://SelectUSA.gov).

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26710 7590 06/23/2014  
**QUARLES & BRADY LLP**  
 Attn: IP Docket  
 411 E. WISCONSIN AVENUE  
 SUITE 2350  
 MILWAUKEE, WI 53202-4426

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

|                             |
|-----------------------------|
| _____<br>(Depositor's name) |
| _____<br>(Signature)        |
| _____<br>(Date)             |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 13/391,539      | 05/02/2012  | Samuel Liam Proud    | 920257.00016        | 6980             |

TITLE OF INVENTION: FILLER ASSEMBLY FOR CABLE GLAND

| APPLN. TYPE    | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE   |
|----------------|---------------|---------------|---------------------|----------------------|------------------|------------|
| nonprovisional | UNDISCOUNTED  | \$960         | \$0                 | \$0                  | \$960            | 09/23/2014 |

| EXAMINER         | ART UNIT | CLASS-SUBCLASS |
|------------------|----------|----------------|
| GRUBY, RANDALL A | 3754     | 174-076000     |

|   |  |
|---|--|
| <p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b></p> | <p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.</p> <p>1 <u>Quarles &amp; Brady LLP</u></p> <p>2 _____</p> <p>3 _____</p> |
|---|--|

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE GMP Products Limited (B) RESIDENCE: (CITY and STATE OR COUNTRY) Cramlington, United Kingdom

Please check the appropriate assignee category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

|  |   |
|--|---|
| <p>4a. The following fee(s) are submitted:</p> <p><input checked="" type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p> | <p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input checked="" type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number <u>17-0055</u> (enclose an extra copy of this form).</p> |
|--|---|

5. **Change in Entity Status** (from status indicated above)

Applicant certifying micro entity status. See 37 CFR 1.29

Applicant asserting small entity status. See 37 CFR 1.27

Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /john d. franzini/ Date September 23, 2014

Typed or printed name John D. Franzini Registration No. 31,356

## Electronic Patent Application Fee Transmittal

|   |                                 |                 |               |                             |
|---|---------------------------------|-----------------|---------------|-----------------------------|
| <b>Application Number:</b>                              | 13391539                        |                 |               |                             |
| <b>Filing Date:</b>                                     | 02-May-2012                     |                 |               |                             |
| <b>Title of Invention:</b>                              | FILLER ASSEMBLY FOR CABLE GLAND |                 |               |                             |
| <b>First Named Inventor/Applicant Name:</b>             | Samuel Liam Proud               |                 |               |                             |
| <b>Filer:</b>   | John D. Franzini/Melanie Brunow |                 |               |                             |
| <b>Attorney Docket Number:</b>                          | 920257.00016                    |                 |               |                             |
| Filed as Large Entity                                   |                                 |                 |               |                             |
| <b>U.S. National Stage under 35 USC 371 Filing Fees</b> |                                 |                 |               |                             |
| <b>Description</b>                                      | <b>Fee Code</b>                 | <b>Quantity</b> | <b>Amount</b> | <b>Sub-Total in USD(\$)</b> |
| <b>Basic Filing:</b>                                    |                                 |                 |               |                             |
| <b>Pages:</b>   |                                 |                 |               |                             |
| <b>Claims:</b>  |                                 |                 |               |                             |
| <b>Miscellaneous-Filing:</b>                            |                                 |                 |               |                             |
| <b>Petition:</b>  |                                 |                 |               |                             |
| <b>Patent-Appeals-and-Interference:</b>                 |                                 |                 |               |                             |
| <b>Post-Allowance-and-Post-Issuance:</b>                |                                 |                 |               |                             |
| Utility Appl Issue Fee                                  | 1501                            | 1               | 960           | 960                         |
| <b>Extension-of-Time:</b>                               |                                 |                 |               |                             |

| Description              | Fee Code | Quantity | Amount | Sub-Total in USD(\$) |
|--------------------------|----------|----------|--------|----------------------|
| <b>Miscellaneous:</b>    |          |          |        |                      |
| <b>Total in USD (\$)</b> |          |          |        | <b>960</b>           |

## Electronic Acknowledgement Receipt

|   |                                      |
|---|--------------------------------------|
| <b>EFS ID:</b>                              | 20214536                             |
| <b>Application Number:</b>                  | 13391539                             |
| <b>International Application Number:</b>    |                                      |
| <b>Confirmation Number:</b>                 | 6980                                 |
| <b>Title of Invention:</b>                  | FILLER ASSEMBLY FOR CABLE GLAND      |
| <b>First Named Inventor/Applicant Name:</b> | Samuel Liam Proud                    |
| <b>Customer Number:</b>                     | 26710                                |
| <b>Filer:</b>                               | John D. Franzini/Melanie Brunow      |
| <b>Filer Authorized By:</b>                 | John D. Franzini                     |
| <b>Attorney Docket Number:</b>              | 920257.00016                         |
| <b>Receipt Date:</b>                        | 23-SEP-2014                          |
| <b>Filing Date:</b>                         | 02-MAY-2012                          |
| <b>Time Stamp:</b>                          | 11:14:24                             |
| <b>Application Type:</b>                    | U.S. National Stage under 35 USC 371 |

### Payment information:

|  |                 |
|--|-----------------|
| Submitted with Payment                   | yes             |
| Payment Type                             | Deposit Account |
| Payment was successfully received in RAM | \$960           |
| RAM confirmation Number                  | 10365           |
| Deposit Account                          | 170055          |
| Authorized User                          |                 |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

**File Listing:**

| Document Number | Document Description        | File Name                  | File Size(Bytes)/ Message Digest                  | Multi Part /.zip | Pages (if appl.) |
|-----------------|-----------------------------|----------------------------|---|------------------|------------------|
| 1               | Issue Fee Payment (PTO-85B) | 920257-00016-issue-fee.pdf | 86486<br>81938d977f08d892a336f0927573ace02dd4e7f0 | no               | 1                |

**Warnings:**

**Information:**

|   |                      |              |  |    |   |
|---|----------------------|--------------|--|----|---|
| 2 | Fee Worksheet (SB06) | fee-info.pdf | 30423<br>b83dae651747600963644b306d663734e87dbd9 | no | 2 |
|---|----------------------|--------------|--|----|---|

**Warnings:**

**Information:**

**Total Files Size (in bytes):** 116909

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.





UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes contact info for Quarles & Brady LLP and examination details.

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pat-dept@quarles.com

|   |                                      |   |  |
|---|--------------------------------------|---|--|
| <b>Corrected<br/>Notice of Allowability</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|   | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   | <b>AIA (First Inventor to File) Status</b><br>No |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to the correspondence filed 04/10/14.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
2.  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
3.  The allowed claim(s) is/are 1-7 and 9-20. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).
4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some    \*c)  None of the:
  1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.  
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |   |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)   | 5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment       |
| 2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 7. <input type="checkbox"/> Other _____.                                  |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____ .                    |   |

/RANDALL GRUBY/  
Examiner, Art Unit 3754

/PAUL R DURAND/  
Supervisory Patent Examiner, Art Unit 3754

## **EXAMINER COMMENT**

### ***Examiner's Amendment***

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee. This amendment will correct the erroneous dependency of claim 5. The following examiner's amendment was agreed to telephonically by John Franzini on 08/14/14.
2. A typographical error was made in the "Corrected Notice of Allowability" mailed 08/22/14. To correct the error, please make the following change:

Change the dependency of claim 5 from claim "5" to claim "1".

### ***Conclusion***

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Gruby, whose telephone number is (571) 272-3415. The examiner can normally be reached from Monday to Friday between 8:00 AM and 5:00 PM.

If any attempt to reach the examiner by telephone is unsuccessful, the examiner's supervisor, Paul Durand, can be reached at (571) 272-4459.

Another resource that is available to applicants is the Patent Application Information Retrieval (PAIR). Information regarding the status of an application can be obtained from the (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAX. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair->

Application/Control Number: 13/391,539

Page 3

Art Unit: 3754

direct.uspto.gov. Should you have questions on access to the Private PAIR system, please feel free to contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


/RG/

Examiner, Art Unit 3754

/PAUL R DURAND/

Supervisory Patent Examiner, Art Unit 3754


August 29, 2014

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| <b>Issue Classification</b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

| CPC    |    |      |      |            |
|--------|----|------|------|------------|
| Symbol |    |      | Type | Version    |
| H02G   | 3  | 0691 | A    | 2013-01-01 |
| H02G   | 15 | 046  | I    | 2013-01-01 |
| H02G   | 3  | 0675 | A    | 2013-01-01 |
| H02G   | 15 | 013  | F    | 2013-01-01 |


| CPC Combination Sets |      |     |         |         |
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| Symbol               | Type | Set | Ranking | Version |
|                      |      |     |         |         |

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|---|--------------------------|--|----------------------------|
| /RANDALL GRUBY/<br>Examiner, Art Unit 3754<br><br>(Assistant Examiner)                  | 06/10/2014<br><br>(Date) | <b>Total Claims Allowed:</b><br><br>19 |                            |
| /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754<br><br>(Primary Examiner) | (Date)                   | O.G. Print Claim(s)<br><br>10          | O.G. Print Figure<br><br>2 |

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| <b>Issue Classification</b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

| US ORIGINAL CLASSIFICATION |                                   |          |       |  | INTERNATIONAL CLASSIFICATION |   |   |   |        |             |  |  |  |  |  |  |  |  |  |
|----------------------------|-----------------------------------|----------|-------|--|------------------------------|---|---|---|--------|-------------|--|--|--|--|--|--|--|--|--|
| CLASS                      |                                   | SUBCLASS |       |  | CLAIMED                      |   |   |   |        | NON-CLAIMED |  |  |  |  |  |  |  |  |  |
| 174                        |                                   | 76       |       |  | H                            | 0 | 2 | G | 3 / 02 |             |  |  |  |  |  |  |  |  |  |
| <b>CROSS REFERENCE(S)</b>  |                                   |          |       |  |                              |   |   |   |        |             |  |  |  |  |  |  |  |  |  |
| CLASS                      | SUBCLASS (ONE SUBCLASS PER BLOCK) |          |       |  |                              |   |   |   |        |             |  |  |  |  |  |  |  |  |  |
| 174                        | 667                               | 77R      | 653   |  |                              |   |   |   |        |             |  |  |  |  |  |  |  |  |  |
| 222                        | 1                                 | 92       | 145.1 |  |                              |   |   |   |        |             |  |  |  |  |  |  |  |  |  |
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|---|--------------------------|--|----------------------------|
| /RANDALL GRUBY/<br>Examiner, Art Unit 3754<br><br>(Assistant Examiner)                  | 06/10/2014<br><br>(Date) | <b>Total Claims Allowed:</b><br><br>19 |                            |
| /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754<br><br>(Primary Examiner) | (Date)                   | O.G. Print Claim(s)<br><br>10          | O.G. Print Figure<br><br>2 |

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|--|--|--|
| <b>Issue Classification</b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

| <input type="checkbox"/> Claims renumbered in the same order as presented by applicant |          | <input type="checkbox"/> CPA |          | <input type="checkbox"/> T.D. |          | <input type="checkbox"/> R.1.47 |          |       |          |       |          |       |          |       |          |
|--|----------|------------------------------|----------|-------------------------------|----------|---------------------------------|----------|-------|----------|-------|----------|-------|----------|-------|----------|
| Final  | Original | Final                        | Original | Final                         | Original | Final                           | Original | Final | Original | Final | Original | Final | Original | Final | Original |
| 1  | 1        | 16                           | 17       |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 2  | 2        | 17                           | 18       |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 3  | 3        | 18                           | 19       |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 4  | 4        | 19                           | 20       |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 5  | 5        |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 6  | 6        |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 7  | 7        |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
|  | 8        |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 8  | 9        |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 14   | 10       |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 15   | 11       |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 9  | 12       |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 10   | 13       |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 11   | 14       |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 12   | 15       |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 13   | 16       |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |

|   |                          |  |                            |
|---|--------------------------|--|----------------------------|
| /RANDALL GRUBY/<br>Examiner, Art Unit 3754<br><br>(Assistant Examiner)                  | 06/10/2014<br><br>(Date) | <b>Total Claims Allowed:</b><br><br>19 |                            |
| /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754<br><br>(Primary Examiner) | (Date)                   | O.G. Print Claim(s)<br><br>10          | O.G. Print Figure<br><br>2 |



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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes details for application 13/391,539, inventor Samuel Liam Proud, and attorney Quarles & Brady LLP.

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pat-dept@quarles.com



|   |                                      |   |  |
|---|--------------------------------------|---|--|
| <b>Corrected<br/>Notice of Allowability</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|   | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   | <b>AIA (First Inventor to File) Status</b><br>No |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to the correspondence filed 04/10/14.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
2.  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
3.  The allowed claim(s) is/are 1-7 and 9-20. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).
4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some    \*c)  None of the:
  1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.  
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. <input type="checkbox"/> Notice of References Cited (PTO-892)</li> <li>2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____</li> <li>3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material</li> <li>4. <input checked="" type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date <u>08/14/14</u>.</li> </ol> | <ol style="list-style-type: none"> <li>5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment</li> <li>6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance</li> <li>7. <input type="checkbox"/> Other _____.</li> </ol> |
|---|--|

/RANDALL GRUBY/  
Examiner, Art Unit 3754

/PAUL R DURAND/  
Supervisory Patent Examiner, Art Unit 3754



## **EXAMINER COMMENT**

### ***Examiner's Amendment***

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee. This amendment will correct the erroneous dependency of claim 5. The following examiner's amendment was agreed to telephonically by John Franzini on 08/14/14.
2. Change the dependency of claims 5 from claim "1" to claim "5".

### ***Conclusion***

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Gruby, whose telephone number is (571) 272-3415. The examiner can normally be reached from Monday to Friday between 8:00 AM and 5:00 PM.

If any attempt to reach the examiner by telephone is unsuccessful, the examiner's supervisor, Paul Durand, can be reached at (571) 272-4459.

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Application/Control Number: 13/391,539

Page 3

Art Unit: 3754

direct.uspto.gov. Should you have questions on access to the Private PAIR system, please feel free to contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/RG/

Examiner, Art Unit 3754

/PAUL R DURAND/

Supervisory Patent Examiner, Art Unit 3754

August 20, 2014

|   |                                      |   |  |
|---|--------------------------------------|---|--|
| <b>Examiner-Initiated Interview Summary</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|   | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   |  |

All participants (applicant, applicant's representative, PTO personnel):

(1) RANDALL GRUBY. (3)\_\_\_\_\_.

(2) JOHN FRANZINI. (4)\_\_\_\_\_.

Date of Interview: 14 August 2014.

Type:  Telephonic  Video Conference  
 Personal [copy given to:  applicant  applicant's representative]

Exhibit shown or demonstration conducted:  Yes  No.  
If Yes, brief description: \_\_\_\_\_.

Issues Discussed 101 112 102 103 Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 5.

Identification of prior art discussed: N/A.

**Substance of Interview**  
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)


John Franzini and Examiner Gruby agreed to that the erroneous dependency of claim 5 would be corrected from "claim 5" to "claim 1". The correction would be done through an examiner's amendment.

**Applicant recordation instructions:** It is not necessary for applicant to provide a separate record of the substance of interview.

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Attachment


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|--|---|
| /RANDALL GRUBY/<br>Examiner, Art Unit 3754 | /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754 |
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| <b>Issue Classification</b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

| CPC    |    |      |      |            |
|--------|----|------|------|------------|
| Symbol |    |      | Type | Version    |
| H02G   | 3  | 0691 | A    | 2013-01-01 |
| H02G   | 15 | 046  | I    | 2013-01-01 |
| H02G   | 3  | 0675 | A    | 2013-01-01 |
| H02G   | 15 | 013  | F    | 2013-01-01 |


| CPC Combination Sets |      |     |         |         |
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| Symbol               | Type | Set | Ranking | Version |
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| /RANDALL GRUBY/<br>Examiner, Art Unit 3754<br><br>(Assistant Examiner)                  | 06/10/2014<br><br>(Date) | <b>Total Claims Allowed:</b><br><br>19 |                            |
| /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754<br><br>(Primary Examiner) | (Date)                   | O.G. Print Claim(s)<br><br>10          | O.G. Print Figure<br><br>2 |

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| <b>Issue Classification</b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

| US ORIGINAL CLASSIFICATION |                                   |          |       |  | INTERNATIONAL CLASSIFICATION |   |   |   |             |  |  |  |  |
|----------------------------|-----------------------------------|----------|-------|--|------------------------------|---|---|---|-------------|--|--|--|--|
| CLASS                      |                                   | SUBCLASS |       |  | CLAIMED                      |   |   |   | NON-CLAIMED |  |  |  |  |
| 174                        |                                   | 76       |       |  | H                            | 0 | 2 | G | 3 / 02      |  |  |  |  |
| <b>CROSS REFERENCE(S)</b>  |                                   |          |       |  |                              |   |   |   |             |  |  |  |  |
| CLASS                      | SUBCLASS (ONE SUBCLASS PER BLOCK) |          |       |  |                              |   |   |   |             |  |  |  |  |
| 174                        | 667                               | 77R      | 653   |  |                              |   |   |   |             |  |  |  |  |
| 222                        | 1                                 | 92       | 145.1 |  |                              |   |   |   |             |  |  |  |  |
|                            |                                   |          |       |  |                              |   |   |   |             |  |  |  |  |
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|                            |                                   |          |       |  |                              |   |   |   |             |  |  |  |  |
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|                            |                                   |          |       |  |                              |   |   |   |             |  |  |  |  |

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|---|--------------------------|--|----------------------------|
| /RANDALL GRUBY/<br>Examiner, Art Unit 3754<br><br>(Assistant Examiner)                  | 06/10/2014<br><br>(Date) | <b>Total Claims Allowed:</b><br><br>19 |                            |
| /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754<br><br>(Primary Examiner) | (Date)                   | O.G. Print Claim(s)<br><br>10          | O.G. Print Figure<br><br>2 |

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|--|--|--|
| <b>Issue Classification</b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

| <input type="checkbox"/> <b>Claims renumbered in the same order as presented by applicant</b> |          |       |          |       |          |       |          |       |          |       |          |       |          |       |          | <input type="checkbox"/> <b>CPA</b> |  | <input type="checkbox"/> <b>T.D.</b> |  | <input type="checkbox"/> <b>R.1.47</b> |  |
|---|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------------------------------------|--|--------------------------------------|--|--|--|
| Final   | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original |                                     |  |                                      |  |  |  |
| 1   | 1        | 16    | 17       |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 2   | 2        | 17    | 18       |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 3   | 3        | 18    | 19       |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 4   | 4        | 19    | 20       |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 5   | 5        |       |          |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 6   | 6        |       |          |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 7   | 7        |       |          |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
|   | 8        |       |          |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 8   | 9        |       |          |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 14  | 10       |       |          |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 15  | 11       |       |          |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 9   | 12       |       |          |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 10  | 13       |       |          |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 11  | 14       |       |          |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 12  | 15       |       |          |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |
| 13  | 16       |       |          |       |          |       |          |       |          |       |          |       |          |       |          |                                     |  |                                      |  |  |  |

|   |                          |  |                            |
|---|--------------------------|--|----------------------------|
| /RANDALL GRUBY/<br>Examiner, Art Unit 3754<br><br>(Assistant Examiner)                  | 06/10/2014<br><br>(Date) | <b>Total Claims Allowed:</b><br><br>19 |                            |
| /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754<br><br>(Primary Examiner) | (Date)                   | O.G. Print Claim(s)<br><br>10          | O.G. Print Figure<br><br>2 |





UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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NOTICE OF ALLOWANCE AND FEE(S) DUE

26710 7590 06/23/2014
QUARLES & BRADY LLP
Attn: IP Docket
411 E. WISCONSIN AVENUE
SUITE 2350
MILWAUKEE, WI 53202-4426

EXAMINER

GRUBY, RANDALL A

ART UNIT PAPER NUMBER

3754

DATE MAILED: 06/23/2014

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

13/391,539 05/02/2012 Samuel Liam Proud 920257.00016 6980

TITLE OF INVENTION: FILLER ASSEMBLY FOR CABLE GLAND

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE

nonprovisional UNDISCOUNTED \$960 \$0 \$0 \$960 09/23/2014

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26710 7590 06/23/2014  
**QUARLES & BRADY LLP**  
 Attn: IP Docket  
 411 E. WISCONSIN AVENUE  
 SUITE 2350  
 MILWAUKEE, WI 53202-4426

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

|                             |
|-----------------------------|
| _____<br>(Depositor's name) |
| _____<br>(Signature)        |
| _____<br>(Date)             |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 13/391,539      | 05/02/2012  | Samuel Liam Proud    | 920257.00016        | 6980             |

TITLE OF INVENTION: FILLER ASSEMBLY FOR CABLE GLAND

| APPLN. TYPE    | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE   |
|----------------|---------------|---------------|---------------------|----------------------|------------------|------------|
| nonprovisional | UNDISCOUNTED  | \$960         | \$0                 | \$0                  | \$960            | 09/23/2014 |

| EXAMINER         | ART UNIT | CLASS-SUBCLASS |
|------------------|----------|----------------|
| GRUBY, RANDALL A | 3754     | 174-076000     |

|   |   |
|---|---|
| <p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b></p> | <p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively, _____ 1</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. _____ 2</p> <p>_____ 3</p> |
|---|---|

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE \_\_\_\_\_ (B) RESIDENCE: (CITY and STATE OR COUNTRY) \_\_\_\_\_

Please check the appropriate assignee category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

|   |  |
|---|--|
| <p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p> | <p>4b. Payment of Fee(s): (<b>Please first reapply any previously paid issue fee shown above</b>)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p> |
|---|--|

5. **Change in Entity Status** (from status indicated above)

Applicant certifying micro entity status. See 37 CFR 1.29

Applicant asserting small entity status. See 37 CFR 1.27

Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature \_\_\_\_\_ Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_ Registration No. \_\_\_\_\_



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26710 7590 06/23/2014
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MILWAUKEE, WI 53202-4426

EXAMINER

GRUBY, RANDALL A

ART UNIT PAPER NUMBER

3754

DATE MAILED: 06/23/2014

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

### Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

|                               |                                      |   |  |
|-------------------------------|--------------------------------------|---|--|
| <b>Notice of Allowability</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|                               | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   | <b>AIA (First Inventor to File) Status</b><br>No |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to 04/10/14.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
2.  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
3.  The allowed claim(s) is/are 1-7,9-20. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).
4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some    \*c)  None of the:
1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.  
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |  |
|--|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment                  |
| 2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date <u>04/10/14</u> | 6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material                   | 7. <input type="checkbox"/> Other _____.   |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____.                                       |  |

/RANDALL GRUBY/  
Examiner, Art Unit 3754

/PAUL R DURAND/  
Supervisory Patent Examiner, Art Unit 3754

## EXAMINER COMMENT

### *Notice of Pre-AIA or AIA Status*

1. The present application is being examined under the pre-AIA first to invent provisions.

### *Status of the Application*

2. The amendment filed on 04/10/14 has been entered. Claims 1-20 remain pending in the application. Claims 1, 10, and 11 have been amended. Claims 13-20 are new. The Information Disclosure Statement (IDS) filed on 04/10/14 has been acknowledged by the Office.

### *Reasons for Allowance*

3. Claim 1-7 and 9-20 are allowed.
4. The following is an examiner's statement of reasons for allowance:

There is no obvious combination of the closest arts of record, EP 434105 and WO 2008029165, for disclosing the invention. There is no motivation to combine the arts of record in order to establish a *prima facie* case of obviousness.

**As per claims 1 and 10**, the following limitation, in context, makes claim 1 inventive: at least one flexible barrier member having at least one respective aperture therethrough adapted to stretch to engage a plurality of cores of a cable to provide a barrier to passage of said curable liquid material along said cores.

**As per claims 17 and 18**, the following limitations, in context, makes claim 17 inventive: the aperture being smaller than the bundle of cores so that the cores stretch the aperture to fit tightly around the bundle and wherein prior to curing the curable material is a liquid when it is placed in the well that flows in between the cores.

**Claims 2-7, 9, 11-16, and 18-20**, are allowed by their dependency on allowed base claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Response to Arguments***

5. Applicant's arguments filed 04/10/14, have been fully considered and are persuasive. The rejections of claims 1-7 and 9-12 have been withdrawn.

***Conclusion***

6. The prior art made of record in FORM PTO-892 and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Gruby, whose telephone number is (571) 272-3415. The examiner can normally be reached from Monday to Friday between 8:00 AM and 5:00 PM.

If any attempt to reach the examiner by telephone is unsuccessful, the examiner's supervisor, Paul Durand, can be reached at (571) 272-4459.

Another resource that is available to applicants is the Patent Application Information Retrieval (PAIR). Information regarding the status of an application can be obtained from the (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAX. Status information for unpublished applications is available

Art Unit: 3754

through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, please feel free to contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/RG/

Examiner, Art Unit 3754

/PAUL R DURAND/  
Supervisory Patent Examiner, Art Unit 3754  
June 19, 2014



|                                   |                                       |   |             |
|-----------------------------------|---------------------------------------|---|-------------|
| <b>Notice of References Cited</b> | Application/Control No.<br>13/391,539 | Applicant(s)/Patent Under Reexamination<br>PROUD, SAMUEL LIAM |             |
|                                   | Examiner<br>RANDALL GRUBY             | Art Unit<br>3754  | Page 1 of 2 |

**U.S. PATENT DOCUMENTS**

| * | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY    | Name    | Classification           |         |
|---|--|--------------------|---------|--------------------------|---------|
| * | A  | US-2,530,381 A     | 11-1950 | DONOHUE JR BERNARD J     | 174/18  |
| * | B  | US-2,590,160 A     | 03-1952 | DIXON, H.J.              | 174/76  |
| * | C  | US-3,617,614 A     | 11-1971 | Henry, William J.        | 174/77R |
| * | D  | US-4,015,329 A     | 04-1977 | Hutchison, John Blundell | 29/858  |
| * | E  | US-4,332,975 A     | 06-1982 | Dienes, Zoltan B.        | 174/76  |
| * | F  | US-4,493,522 A     | 01-1985 | Law, Joseph P.           | 439/271 |
| * | G  | US-4,549,037 A     | 10-1985 | Bawa et al.              | 174/667 |
| * | H  | US-4,608,454 A     | 08-1986 | Lackinger, Franz         | 174/653 |
| * | I  | US-4,751,350 A     | 06-1988 | Eaton, John W.           | 174/87  |
| * | J  | US-5,113,037 A     | 05-1992 | King et al.              | 174/87  |
| * | K  | US-6,242,700 B1    | 06-2001 | Smith, Russell P.        | 174/77R |
| * | L  | US-2010/0003001 A1 | 01-2010 | Hand, Edward             | 385/138 |
| * | M  | US-7,736,165 B2    | 06-2010 | Bukovnik et al.          | 439/276 |

**FOREIGN PATENT DOCUMENTS**

| * | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Country | Name | Classification |
|---|--|-----------------|---------|------|----------------|
|   | N  |                 |         |      |                |
|   | O  |                 |         |      |                |
|   | P  |                 |         |      |                |
|   | Q  |                 |         |      |                |
|   | R  |                 |         |      |                |
|   | S  |                 |         |      |                |
|   | T  |                 |         |      |                |

**NON-PATENT DOCUMENTS**

| * | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|
|   | U   |
|   | V   |
|   | W   |
|   | X   |

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

|                                   |                                       |   |             |
|-----------------------------------|---------------------------------------|---|-------------|
| <b>Notice of References Cited</b> | Application/Control No.<br>13/391,539 | Applicant(s)/Patent Under Reexamination<br>PROUD, SAMUEL LIAM |             |
|                                   | Examiner<br>RANDALL GRUBY             | Art Unit<br>3754  | Page 2 of 2 |

**U.S. PATENT DOCUMENTS**

| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Name                    | Classification |
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| * | B | US-2012/0142207 A1                               | 06-2012         | Duval et al.            | 439/272        |
| * | C | US-8,288,667 B2                                  | 10-2012         | Chiou, Jiun-Wei         | 174/652        |
| * | D | US-2012/0292100 A1                               | 11-2012         | Thomas, David G.        | 174/652        |
| * | E | US-8,367,944 B2                                  | 02-2013         | Chiou, Jiun-Wei         | 174/520        |
| * | F | US-2013/0059469 A1                               | 03-2013         | KAWAKITA et al.         | 439/589        |
| * | G | US-2013/0112475 A1                               | 05-2013         | Magno et al.            | 174/77.R       |
| * | H | US-2013/0118803 A1                               | 05-2013         | Magno, JR., Joey D.     | 174/77.R       |
| * | I | US-2013/0129289 A1                               | 05-2013         | ROLAND, Carey S.        | 385/102        |
| * | J | US-8,490,513 B2                                  | 07-2013         | Chiou, Jiun Wei         | 74/502.4       |
| * | K | US-8,581,120 B2                                  | 11-2013         | Winship, Phillip Steven | 174/667        |
| * | L | US-2014/0030903 A1                               | 01-2014         | Magno et al.            | 439/279        |
| * | M | US-2014/0041939 A1                               | 02-2014         | Schlachter et al.       | 174/77.R       |


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| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Country | Name | Classification |
|---|---|--|-----------------|---------|------|----------------|
|   | N |  |                 |         |      |                |
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**NON-PATENT DOCUMENTS**

| * |   | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
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\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
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| <b>Issue Classification</b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

| CPC    |  |    |      |      |            |
|--------|--|----|------|------|------------|
| Symbol |  |    |      | Type | Version    |
| H02G   |  | 3  | 0691 | A    | 2013-01-01 |
| H02G   |  | 15 | 046  | I    | 2013-01-01 |
| H02G   |  | 3  | 0675 | A    | 2013-01-01 |
| H02G   |  | 15 | 013  | F    | 2013-01-01 |
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| Symbol               | Type | Set | Ranking | Version |
|                      |      |     |         |         |
|                      |      |     |         |         |

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|---|--------------------------|--|----------------------------|
| /RANDALL GRUBY/<br>Examiner, Art Unit 3754<br><br>(Assistant Examiner)                  | 06/10/2014<br><br>(Date) | <b>Total Claims Allowed:</b><br><br>19 |                            |
| /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754<br><br>(Primary Examiner) | (Date)                   | O.G. Print Claim(s)<br><br>10          | O.G. Print Figure<br><br>2 |



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| <b>Issue Classification</b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

| <input type="checkbox"/> Claims renumbered in the same order as presented by applicant |          | <input type="checkbox"/> CPA |          | <input type="checkbox"/> T.D. |          | <input type="checkbox"/> R.1.47 |          |       |          |       |          |       |          |       |          |
|--|----------|------------------------------|----------|-------------------------------|----------|---------------------------------|----------|-------|----------|-------|----------|-------|----------|-------|----------|
| Final  | Original | Final                        | Original | Final                         | Original | Final                           | Original | Final | Original | Final | Original | Final | Original | Final | Original |
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| 2  | 2        | 17                           | 18       |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 3  | 3        | 18                           | 19       |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 4  | 4        | 19                           | 20       |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 5  | 5        |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
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| 7  | 7        |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
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| 15   | 11       |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 9  | 12       |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 10   | 13       |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 11   | 14       |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
| 12   | 15       |                              |          |                               |          |                                 |          |       |          |       |          |       |          |       |          |
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|---|--------------------------|------------------------------------|------------------------|
| /RANDALL GRUBY/<br>Examiner, Art Unit 3754<br><br>(Assistant Examiner)                  | 06/10/2014<br><br>(Date) | <b>Total Claims Allowed:</b><br>19 |                        |
| /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754<br><br>(Primary Examiner) | (Date)                   | O.G. Print Claim(s)<br>10          | O.G. Print Figure<br>2 |

Receipt date: 04/10/2014

13391539 - GAU: 3754

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031  
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|   |                        |                   |            |  |
|---|------------------------|-------------------|------------|--|
| <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     |                   | 13391539   |  |
|   | Filing Date            |                   | 2012-05-02 |  |
|   | First Named Inventor   | Samuel Liam Proud |            |  |
|   | Art Unit               | 3754              |            |  |
|   | Examiner Name          | Randall A. Gruby  |            |  |
|   | Attorney Docket Number | 920257.00016      |            |  |

| U.S. PATENTS      |         |               |                        |            |   | Remove   |
|-------------------|---------|---------------|------------------------|------------|---|--|
| Examiner Initial* | Cite No | Patent Number | Kind Code <sup>1</sup> | Issue Date | Name of Patentee or Applicant of cited Document | Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear |
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| Examiner Initial*        | Cite No | Foreign Document Number <sup>3</sup> | Country Code <sup>2</sup> j | Kind Code <sup>4</sup> | Publication Date | Name of Patentee or Applicant of cited Document | Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear | T <sup>5</sup>           |
|                          | 1       | 1279707                              | CA                          | C                      | 1991-01-29       | Bisker, Richard                                 |  | <input type="checkbox"/> |
|                          | 2       | 1333192                              | CA                          | C                      | 1994-11-22       | Cooper Industries, Inc.                         |  | <input type="checkbox"/> |
|                          | 3       | 0204843                              | WO                          | A2                     | 2002-01-17       | Southwick, Mathew D.                            |  | <input type="checkbox"/> |

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| <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     |                   | 13391539   | 13391539 - GAU: 3754 |
|   | Filing Date            |                   | 2012-05-02 |                      |
|   | First Named Inventor   | Samuel Liam Proud |            |                      |
|   | Art Unit               | 3754              |            |                      |
|   | Examiner Name          | Randall A. Gruby  |            |                      |
|   | Attorney Docket Number | 920257.00016      |            |                      |

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|  | 4 | 2004047248 | WO | A1 | 2004-06-03 | Cooper Industries, Inc. | <input type="checkbox"/> |
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|--------------------|---------|---|--------------------------|
|                    | 1       | CMP PRODUCTS, Catalog page 59, September 2007, Newcastle Upon Tyne, England.  | <input type="checkbox"/> |
|                    | 2       | EGS ELECTRICAL GROUP, Instruction for Unilet Sealing Fittings Approved For Use With: Appleton Kwiko® A And Crouse-Hinds Chico® A Sealing Cement, dated 07/01/09, 4 pages.   | <input type="checkbox"/> |

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**EXAMINER SIGNATURE**

|                    |                 |                 |            |
|--------------------|-----------------|-----------------|------------|
| Examiner Signature | /Randall Gruby/ | Date Considered | 06/10/2014 |
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

|   |                        |                   |                      |
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| <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     | 13391539          | 13391539 - GAU: 3754 |
|   | Filing Date            | 2012-05-02        |                      |
|   | First Named Inventor   | Samuel Liam Proud |                      |
|   | Art Unit               | 3754              |                      |
|   | Examiner Name          | Randall A. Gruby  |                      |
|   | Attorney Docket Number | 920257.00016      |                      |

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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- See attached certification statement.
- The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- A certification statement is not submitted herewith.

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

|            |                    |                     |            |
|------------|--------------------|---------------------|------------|
| Signature  | /John d. franzini/ | Date (YYYY-MM-DD)   | 2014-04-10 |
| Name/Print | John D. Franzini   | Registration Number | 31356      |

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /R.G./

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| <b>Search Notes</b><br><br> | <b>Application/Control No.</b><br><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br><br>RANDALL GRUBY           | <b>Art Unit</b><br><br>3754  |

| CPC- SEARCHED |      |          |
|---------------|------|----------|
| Symbol        | Date | Examiner |
|               |      |          |

| CPC COMBINATION SETS - SEARCHED |      |          |
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| Symbol                          | Date | Examiner |
|                                 |      |          |

| US CLASSIFICATION SEARCHED |                                    |          |          |
|----------------------------|------------------------------------|----------|----------|
| Class                      | Subclass                           | Date     | Examiner |
| 222                        | 92,94,95,103,107,145.1,145.5,145.6 | 06/07/13 | RG       |
| 222                        | 92,94,95,103,107,145.1,145.5,145.6 | 08/14/13 | RG       |
| UPDATED                    | ALL ABOVE                          | 01/15/14 | RG       |
| Updated                    | All Above                          | 06/10/14 | RG       |
| 222                        | 1                                  | 06/10/14 | RG       |
| 439                        | 271-277,586,589,604                | 06/10/14 | RG       |

| SEARCH NOTES   |          |          |
|--|----------|----------|
| Search Notes   | Date     | Examiner |
| Performed Inventor Names Search  | 06/07/13 | RG       |
| Reviewed IDS References  | 06/07/13 | RG       |
| Consulted Primary Examiner for Field of Search                         | 06/07/13 | RG       |
| See EAST search history, attached                                      | 06/07/13 | RG       |
| Updated search. See EAST search history, attached.                     | 08/14/13 | RG       |
| Updated search. See EAST search history, attached.                     | 01/15/14 | RG       |
| Consulted primary examiner on rejection, Kevin Shaver.                 | 01/15/14 | RG       |
| Consulted primary examiner for field of search (Class 439), Hae Hyeong | 06/10/14 | RG       |
| Consulted examiner on allowability, Patrick Buechner                   | 06/10/14 | RG       |
| Performed interference search  | 06/10/14 | RG       |

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| /RANDALL GRUBY/<br>Examiner.Art Unit 3754 |  |
|---|--|

**INTERFERENCE SEARCH**

| <b>US Class/<br/>CPC Symbol</b> | <b>US Subclass / CPC Group</b> | <b>Date</b> | <b>Examiner</b> |
|---------------------------------|--------------------------------|-------------|-----------------|
| 174                             | 76,667,77R,653                 | 06/10/14    | RG              |
| 222                             | 1,92,145.1                     | 06/10/14    | RG              |

/RANDALL GRUBY/  
Examiner, Art Unit 3754

## EAST Search History

## EAST Search History (Prior Art)

| Ref # | Hits | Search Query   | DBs  | Default Operator | Plurals | Time Stamp       |
|-------|------|--|--|------------------|---------|------------------|
| L1    | 50   | (US-20120097445-\$ or US-20030226680-\$ or US-20040069522-\$ or US-20020066518-\$ or US-20100108020-\$ or US-20140030903-\$ or US-20140041939-\$ or US-20130112475-\$ or US-20130129289-\$ or US-20120292100-\$ or US-20100003001-\$ or US-20130118803-\$ or US-20110033165-\$ or US-20040157488-\$).did. or (US-6242700-\$ or US-7507105-\$ or US-6259029-\$ or US-5600094-\$ or US-4692563-\$ or US-5621191-\$ or US-5310963-\$ or US-5691505-\$ or US-3567843-\$ or US-4379204-\$ or US-6812406-\$ or US-5321205-\$ or US-5208427-\$ or US-8288667-\$ or US-8581120-\$ or US-8367944-\$ or US-8490513-\$ or US-4015329-\$ or US-4332975-\$ or US-2590160-\$ or US-4608454-\$ or US-5113037-\$ or US-7736165-\$ or US-4751350-\$).did. or (US-2957038-\$ or US-2913260-\$).did. or (KR-101304258-\$).did. or (GB-2138218-\$ or GB-2074395-\$).did. or (GB-2074395-\$ or GB-2258350-\$ or US-3833754-\$ or KR-1304258-\$ or GB-2276773-\$ or EP-434105-\$ or WO-2008029165-\$).did. | US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT | OR               | ON      | 2014/06/10 16:07 |
| L2    | 2307 | 174/76,667,77r,653.ccls.   | US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT | OR               | ON      | 2014/06/10 16:08 |
| L3    | 783  | 12 and (adhesive or epoxy or compound or harden\$4)  | US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT | OR               | ON      | 2014/06/10 16:08 |
| L4    | 943  | 12 and (adhesive or epoxy or compound or harden\$4 or curable or cur\$3)   | US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT | OR               | ON      | 2014/06/10 16:09 |
| L5    | 29   | 14 and (cable adj gland)   | US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT | OR               | ON      | 2014/06/10 16:11 |
| L6    | 2    | ("2530381").URPN.  | USPAT                                      | OR               | ON      | 2014/06/10 16:18 |
| L7    | 914  | 14 not 15  | US-PGPUB; USPAT;                           | OR               | ON      | 2014/06/10 16:19 |

EAST Search History

|     |      |  |  |    |    |                     |
|-----|------|--|--|----|----|---------------------|
|     |      |  | USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB            |    |    |                     |
| L8  | 18   | ("20020022409"   "20040058575"  <br>"3320665"   "3885380"   "4572868"  <br>"5017160"   "5151143"   "5520974"  <br>"5876528"   "5888323"   "6080334"  <br>"6291773"   "7049506"   "7230214"  <br>"7238884").PN. OR ("7960652").URPN.  | US-PGPUB;<br>USPAT;<br>USOCR                                   | OR | ON | 2014/06/10<br>16:20 |
| L9  | 0    | 222/1.ccls. and (cable adj gland)  | US-PGPUB;<br>USPAT;<br>USOCR                                   | OR | ON | 2014/06/10<br>16:39 |
| L10 | 229  | 222/1.ccls. and (core)   | US-PGPUB;<br>USPAT;<br>USOCR                                   | OR | ON | 2014/06/10<br>16:39 |
| L11 | 29   | 110 and cable  | US-PGPUB;<br>USPAT;<br>USOCR                                   | OR | ON | 2014/06/10<br>16:40 |
| L12 | 3910 | 439/271-277,586-589,604.ccls.  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>IBM_TDB | OR | ON | 2014/06/10<br>16:45 |
| L13 | 1406 | 112 and (adhesive or epoxy or compound or<br>harden\$4 or curable or cur\$3)   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO;<br>DERWENT      | OR | ON | 2014/06/10<br>16:45 |
| L14 | 10   | 113 and (cable adj gland)  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO;<br>DERWENT      | OR | ON | 2014/06/10<br>16:45 |
| L15 | 68   | 113 and (gland)  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO;<br>DERWENT      | OR | ON | 2014/06/10<br>16:45 |
| L16 | 1    | ("2012/0142207").URPN.   | USPAT  | OR | ON | 2014/06/10<br>16:46 |
| L17 | 34   | ("7275957"   "7588460"   "7635283"  <br>"RE38294"   "5561900"   "5766037"  <br>"6109964"   "7892018"   "20040259416"  <br>"3744007"   "6607398"   "5059747"  <br>"6910919"   "7435135"   "7690945"  <br>"5866853"   "2816949"   "6267621"  <br>"7189114"   "7690945"   "5756972"  <br>"5951327"   "6332808"   "20070224880"  <br>"6034325"   "6776657"   "RE41044"  <br>"5830009"   "5321205"   "5529522"  <br>"5951327"   "6089912"   "7288002"  <br>"20090221177"   "5059747"   "6705884").PN. | US-PGPUB;<br>USPAT;<br>USOCR                                   | OR | ON | 2014/06/10<br>16:46 |
| L18 | 1    | "4549037".pn.  | US-PGPUB;<br>USPAT;  | OR | ON | 2014/06/10<br>16:49 |

## EAST Search History

|     |        |  |  |    |    |                  |
|-----|--------|--|--|----|----|------------------|
|     |        |  | USOCR  |    |    |                  |
| L19 | 24     | ("1805155"   "3617614"   "3761601").PN. OR ("4549037").URPN. | US-PGPUB; USPAT; USOCR                                   | OR | ON | 2014/06/10 16:50 |
| L20 | 15     | ("3040284"   "3371150"   "3408450").PN. OR ("3617614").URPN. | US-PGPUB; USPAT; USOCR                                   | OR | ON | 2014/06/10 16:51 |
| L21 | 12     | ("3107135"   "3170748"   "4397516").PN. OR ("4493522").URPN. | US-PGPUB; USPAT; USOCR                                   | OR | ON | 2014/06/10 16:54 |
| L23 | 1326   | 113 not 115  | US-PGPUB; USPAT; USOCR                                   | OR | ON | 2014/06/10 16:56 |
| L24 | 0      | ("2013/0059469").URPN.                                       | USPAT  | OR | ON | 2014/06/10 17:01 |
| S1  | 1      | "13391539"   | US-PGPUB; USPAT  | OR | ON | 2013/06/07 13:51 |
| S2  | 4      | "4343105"  | EPO; DERWENT   | OR | ON | 2013/06/07 13:51 |
| S3  | 13     | "434105"   | EPO; DERWENT   | OR | ON | 2013/06/07 13:52 |
| S4  | 1      | 1991-186955.NRAN.  | DERWENT  | OR | ON | 2013/06/07 13:52 |
| S5  | 9      | "2074395"  | EPO; DERWENT   | OR | ON | 2013/06/07 13:53 |
| S6  | 0      | "20010109284"  | FPRS; EPO; JPO; DERWENT; IBM_TDB                         | OR | ON | 2013/06/07 13:54 |
| S7  | 131507 | (russel near2 smith)".in" and 3M                             | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/06/07 13:55 |
| S8  | 132048 | (russelL near2 smith)".in" and 3M                            | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/06/07 13:55 |
| S9  | 0      | "1020017009380"  | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/06/07 13:56 |
| S10 | 48     | "765082"   | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/06/07 13:56 |
| S11 | 11     | "765082"   | EPO;   | OR | ON | 2013/06/07       |

## EAST Search History

|     |     |                   |  |    |    |                     |
|-----|-----|-------------------|--|----|----|---------------------|
|     |     |                   | DERWENT  |    |    | 13:57               |
| S12 | 18  | "765082"          | USOCR;<br>EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:57 |
| S13 | 0   | GB765082          | USOCR;<br>EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:58 |
| S14 | 13  | "2957038"         | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:00 |
| S15 | 0   | "20010109284"     | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:01 |
| S16 | 955 | "9284"            | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:01 |
| S17 | 202 | S16 AND kr        | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:01 |
| S18 | 48  | "765082"          | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:02 |
| S19 | 0   | gb-765082-\$.did  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:03 |
| S20 | 4   | ("2957038").URPN. | USPAT  | OR | ON | 2013/06/07<br>14:09 |
| S21 | 48  | "765082"          | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:15 |
| S22 | 5   | "2258350"         | US-PGPUB;<br>USPAT   | OR | ON | 2013/06/07<br>14:49 |

## EAST Search History

|     |      |   |  |    |    |                     |
|-----|------|---|--|----|----|---------------------|
| S23 | 13   | "2258350"   | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2013/06/07<br>14:49 |
| S24 | 2    | "2001109284"  | DERWENT  | OR | ON | 2013/06/07<br>15:18 |
| S25 | 7    | "6242700"   | USPAT  | OR | ON | 2013/06/07<br>15:19 |
| S26 | 2    | "2001109284"  | DERWENT  | OR | ON | 2013/06/07<br>15:20 |
| S27 | 0    | "20010109284"   | DERWENT  | OR | ON | 2013/06/07<br>15:20 |
| S28 | 2    | "2001109284"  | DERWENT  | OR | ON | 2013/06/07<br>15:20 |
| S29 | 2    | "2001109284"  | DERWENT  | OR | ON | 2013/06/07<br>15:29 |
| S30 | 3    | "2001109284"  | JPO;<br>DERWENT  | OR | ON | 2013/06/07<br>15:30 |
| S31 | 2537 | 222/94  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:36 |
| S32 | 624  | S31 and mix   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:37 |
| S33 | 69   | S32 and clamp   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:37 |
| S34 | 60   | S33 and (flex?ble or flex?bility or elastic\$3)   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:37 |
| S35 | 1    | 1991-186955.NRAN.   | DERWENT  | OR | ON | 2013/06/07<br>16:03 |
| S37 | 228  | (cable adj gland) and ((bond\$3 or epoxy or adhesive or (two adj part) or (cure or curable)) same2 cable)                       | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>16:15 |
| S38 | 185  | (cable adj gland) and ((bond\$3 or epoxy or adhesive or (two adj part) or (cure or curable)) same (cable or core or conductor)) | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;                                     | OR | ON | 2013/06/07<br>16:17 |



## EAST Search History

|     |      |   |  |    |     |                     |
|-----|------|---|--|----|-----|---------------------|
|     |      |   | EPO; JPO;<br>DERWENT;<br>IBM_TDB   |    |     |                     |
| S39 | 48   | ("8105945"   "8106407"   "7285782"  <br>"8105691"   "20040121637"   "6623289"  <br>"6668793"   "5432301"   "4515516"  <br>"5194012"   "6812406"   "8102116"  <br>"3833754"   "7735876").PN. | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2013/06/07<br>16:33 |
| S40 | 3    | "20100003001"   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2013/06/07<br>16:41 |
| S41 | 1    | 2008-D99857.NRAN.   | DERWENT  | OR | ON  | 2013/06/07<br>16:42 |
| S42 | 2    | "12477580"  | US-PGPUB;<br>USPAT   | OR | ON  | 2013/06/07<br>17:00 |
| S43 | 1    | "20100307816"   | DERWENT  | OR | ON  | 2013/06/07<br>17:00 |
| S44 | 1    | 2010-Q10826.NRAN.   | DERWENT  | OR | ON  | 2013/06/07<br>17:00 |
| S45 | 6    | "2138218"   | DERWENT  | OR | ON  | 2013/06/07<br>17:16 |
| S46 | 1    | 1984-258752.NRAN.   | DERWENT  | OR | ON  | 2013/06/07<br>17:16 |
| S47 | 5    | "7357579"   | US-PGPUB;<br>USPAT   | OR | ON  | 2013/06/07<br>17:22 |
| S48 | 2537 | 222/94  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2013/06/08<br>11:54 |
| S49 | 7297 | 222/94,92,103,95,107,145.5,145.6,145.1.ccls.  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2013/06/08<br>11:54 |
| S50 | 5    | "2008029165"  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2013/06/08<br>14:27 |
| S51 | 1    | 2008-D99857.NRAN.   | DERWENT  | OR | OFF | 2013/08/14<br>12:04 |
| S52 | 1    | 2008-D99857.NRAN.   | DERWENT  | OR | OFF | 2013/08/14<br>12:17 |
| S53 | 1    | "8170390".pn.   | USPAT  | OR | OFF | 2013/08/14<br>12:18 |

## EAST Search History

|     |        |   |  |    |     |                     |
|-----|--------|---|--|----|-----|---------------------|
| S54 | 10     | ("20030226680"   "20040069522"   "20040074662"   "20080236861"   "5621191"   "6259029"   "6268565"   "6809263"   "7641396"   "7781685").PN. | US-PGPUB;<br>USPAT;<br>USOCR   | OR | OFF | 2013/08/14<br>12:34 |
| S55 | 21     | ("3663740"   "4629825"   "4674818"   "4692563"   "4857015"   "5310963").PN. OR ("2003/0226680"   "2004/0069522"   "5621191").URPN.          | US-PGPUB;<br>USPAT;<br>USOCR   | OR | OFF | 2013/08/14<br>12:38 |
| S56 | 437426 | S55 and epoxy or harden\$3  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | OFF | 2013/08/14<br>12:38 |
| S57 | 3      | S55 and (epoxy or harden\$3)  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | OFF | 2013/08/14<br>12:39 |
| S58 | 109    | 222/94,92,103,95,107,145.5,145.6,145.1.ccls.<br>and @pd>"20130607"  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2013/08/14<br>13:39 |
| S59 | 1      | "20020066518".pn.   | US-PGPUB;<br>USPAT   | OR | ON  | 2013/08/14<br>13:42 |
| S60 | 1      | "20080262408".pn.   | US-PGPUB;<br>USPAT   | OR | ON  | 2013/08/14<br>13:43 |
| S61 | 1      | "1335047".pn.   | US-PGPUB;<br>USPAT   | OR | ON  | 2013/08/14<br>13:44 |
| S62 | 5      | "1335047".pn.   | EPO;<br>DERWENT  | OR | ON  | 2013/08/14<br>13:44 |
| S63 | 5      | "1335047"   | EPO;<br>DERWENT  | OR | ON  | 2013/08/14<br>13:45 |
| S64 | 3      | "2011021016"  | EPO;<br>DERWENT  | OR | ON  | 2013/08/14<br>13:47 |
| S65 | 6      | "2138218"   | DERWENT  | OR | OFF | 2013/11/05<br>16:30 |
| S66 | 1      | 1984-258752.NRAN.   | DERWENT  | OR | OFF | 2013/11/05<br>16:30 |
| S67 | 0      | "2010000301"  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON  | 2014/01/15<br>10:05 |
| S68 | 2      | "20100003001"   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON  | 2014/01/15<br>10:05 |
| S69 | 2386   | 174/650-669.CCLS.   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON  | 2014/01/15<br>10:08 |
| S70 | 204    | S69 AND GLAND   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON  | 2014/01/15<br>10:08 |
| S71 | 152    | S69 AND (CABLE WITH GLAND)  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON  | 2014/01/15<br>10:09 |
| S72 | 109    | S69 AND (CABLE NEAR4 GLAND)   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON  | 2014/01/15<br>10:09 |
| S73 | 0      | ("2010/0108020").URPN.  | USPAT  | OR | ON  | 2014/01/15<br>10:10 |

EAST Search History

|     |      |   |                              |    |    |                     |
|-----|------|---|------------------------------|----|----|---------------------|
| S74 | 18   | S71 AND (((HARDEN\$4 WITH (COMPOUND OR SLUDGE OR SLURRY OR PASTE)) OR EPOXY)  | USPAT                        | OR | ON | 2014/01/15<br>10:17 |
| S75 | 1    | ("2003/0226680").URPN.  | USPAT                        | OR | ON | 2014/01/15<br>10:25 |
| S76 | 23   | S71 AND (((HARDEN\$4 or seal\$4) WITH (COMPOUND OR SLUDGE OR SLURRY OR PASTE)) OR EPOXY)  | USPAT                        | OR | ON | 2014/01/15<br>10:26 |
| S77 | 163  | ("1345473"   "1699690"   "1805155"   "1814478"   "2151096"   "2503169"   "2795641"   "2816949"   "2913260"   "2986409"   "3058762"   "3079182"   "3082470"   "3259406"   "3492410"   "3555171"   "3567843"   "3635502"   "3663740"   "3700268"   "3739076"   "3985418"   "4022966"   "4198537"   "4273405"   "4334121"   "4481697"   "4490576"   "4493522"   "4513172"   "4515991"   "4549037"   "4583811"   "4608454"   "4629825"   "4674818"   "4692561"   "4692562"   "4692563"   "4739126"   "4814547"   "4857015"   "5059747"   "5278352"   "5310359"   "5310963"   "5866853"   "6268565"   "RE38294").PN. OR ("2003/0226680"   "2004/0069522"   "2010/0108020"   "3567843"   "4379204"   "5310963"   "5321205"   "5621191"   "5691505"   "6812406").URPN. | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON | 2014/01/15<br>10:32 |
| S78 | 37   | S77 and (((hardens\$4 or seal\$4) with (compound or slurry or sludge or paste or fluid)) or epoxy)  | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON | 2014/01/15<br>10:34 |
| S79 | 93   | ("1805155"   "20030226680"   "20040069522"   "20040074662"   "20080236861"   "2788992"   "3079182"   "3485517"   "3555171"   "3567843"   "3617614"   "3700268"   "3739076"   "3761601"   "3819849"   "4022966"   "4198537"   "4225162"   "4273405"   "4293151"   "4334121"   "4481697"   "4490576"   "4493522"   "4513172"   "4515991"   "4549037"   "4580865"   "4583811"   "4606562"   "4608454"   "4629825"   "4692561"   "4692562"   "4692563"   "4738636"   "4739126"   "4953898"   "5059747"   "5621191"   "6259029"   "6268565"   "6809263"   "7641396"   "7781685").PN. OR ("2913260"   "5208427"   "5310963"   "5321205"   "8170390").URPN.  | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON | 2014/01/15<br>10:38 |
| S80 | 24   | S79 and (((hardens\$4 or seal\$4) with (compound or slurry or sludge or paste or fluid)) or epoxy)  | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON | 2014/01/15<br>10:39 |
| S81 | 10   | S80 not S78   | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON | 2014/01/15<br>10:39 |
| S82 | 12   | ("4299363"   "4944686"   "5378027"   "5545854"   "5912431"   "6162995"   "6300568").PN. OR ("2003/0226680"   "2004/0069522"   "6809263").URPN.  | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON | 2014/01/15<br>10:48 |
| S85 | 8007 | 222/92,94,95,103,107,145.1,145.5,145.6.ccls.  | US-PGPUB;<br>USPAT;          | OR | ON | 2014/01/15<br>17:56 |

|     |      |  |  |    |    |                     |
|-----|------|--|--|----|----|---------------------|
|     |      |  | USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB                        |    |    |                     |
| S86 | 458  | S85 and @pd> "20130606"  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/01/15<br>17:56 |
| S87 | 2    | S86 and (gland)  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/01/15<br>17:58 |
| S88 | 12   | ("20040069522"   "20120097445"  <br>"20020066518"   "4692563"   "8170390"  <br>"5600094"   "6259029"   "7507105"  <br>"20080262408"   "20030226680"   "5310963"<br>  "5621191").PN.  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/01/15<br>18:01 |
| S89 | 28   | (US-20100108020-\$ or US-20020066518-\$ or<br>US-20030226680-\$ or US-20040069522-\$ or<br>US-20120097445-\$).did. or (US-5691505-\$ or<br>US-3567843-\$ or US-5600094-\$ or US-<br>5621191-\$ or US-4379204-\$ or US-5208427-<br>\$ or US-4692563-\$ or US-5321205-\$ or US-<br>5310963-\$ or US-6812406-\$ or US-6259029-<br>\$ or US-6242700-\$ or US-8170390-\$ or US-<br>7507105-\$).did. or (US-2957038-\$ or US-<br>2913260-\$).did. or (GB-2138218-\$ or GB-<br>2074395-\$).did. or (EP-434105-\$ or GB-<br>2074395-\$ or GB-2258350-\$ or US-3833754-<br>\$ or WO-2008029165-\$).did. | US-PGPUB;<br>USPAT;<br>USOCR;<br>EPO;<br>DERWENT                           | OR | ON | 2014/01/15<br>18:01 |
| S90 | 10   | S89 not S88  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/01/15<br>18:01 |
| S91 | 552  | 174/76.ccls.   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/09<br>17:34 |
| S92 | 1    | "13391539"   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/09<br>17:57 |
| S93 | 5973 | (H02G15/013 OR H02G15/046).CPC.  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>17:59 |
| S94 | 649  | S93 and "174".clas.  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>17:59 |

## EAST Search History

|      |     |   |  |    |    |                     |
|------|-----|---|--|----|----|---------------------|
| S95  | 26  | ("20090215307"   "6921283"   "5556287"   "5588873"   "5780775"   "6504103"   "7976339"   "3603912"   "4902244"   "7182647"   "3552777"   "6984791"   "7568933"   "3538488"   "6561841"   "5336104"   "6836402"   "7914326"   "20110189887"   "5586917"   "7121903"   "7144279"   "7497723"   "5929383").PN. | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/09<br>18:02 |
| S96  | 0   | S94 and "222".clas.   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>18:03 |
| S97  | 2   | ("20110147081").PN.   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>18:04 |
| S98  | 56  | S94 and epoxy   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>18:08 |
| S99  | 132 | S94 and liquid  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>18:08 |
| S100 | 106 | S99 not S98   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>18:08 |
| S101 | 9   | ("20110147079"   "6210607"   "6897383"   "8039745"   "H000113").PN.   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>18:12 |
| S102 | 806 | 385/102.ccls.   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>18:14 |
| S103 | 146 | S102 and epoxy  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;                                     | OR | ON | 2014/06/09<br>18:14 |

|      |     |  |  |    |    |                     |
|------|-----|--|--|----|----|---------------------|
|      |     |  | EPO; JPO;<br>DERWENT;<br>IBM_TDB   |    |    |                     |
| S104 | 31  | ("3567843"   "6409179"   "6737584"  <br>"6809263"   "7115822"   "7408122"  <br>"8288667").PN.  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>18:18 |
| S105 | 9   | ("4739126"   "6300569"   "6409179"  <br>"7874871"   "8129633").PN. OR<br>("8288667").URPN.   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/09<br>18:19 |
| S106 | 12  | ("20090174154"   "4549037"   "5015804"  <br>"5399807"   "5621191"   "6259029"  <br>"6737584"   "6809263"   "6812406"  <br>"7781685"   "8288667"   "8367944").PN. OR<br>("8581120").URPN.   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/09<br>18:20 |
| S107 | 5   | ("4015329"   "5929383"   "7183486").PN. OR<br>("8367944").URPN.  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/09<br>18:20 |
| S108 | 10  | ("6259029"   "20040074662"   "5621191"  <br>"6809263"   "20040069522"   "20030226680"<br>"6268565"   "20080236861"   "7641396"  <br>"7781685").PN.   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/09<br>18:25 |
| S109 | 47  | ("2590160"   "2621228"   "3642308"  <br>"3692926"   "3705950"   "3903595"  <br>"3935373"   "3955043"   "3992569"  <br>"4002818"   "4061872"   "4083902").PN. OR<br>("4332975").URPN.   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/09<br>18:28 |
| S110 | 2   | ("2590160").URPN.  | USPAT  | OR | ON | 2014/06/09<br>18:29 |
| S111 | 40  | (US-20120097445-\$ or US-20030226680-\$ or<br>US-20040069522-\$ or US-20020066518-\$ or<br>US-20100108020-\$ or US-20140030903-\$ or<br>US-20140041939-\$ or US-20130112475-\$ or<br>US-20130129289-\$ or US-20120292100-\$ or<br>US-20100003001-\$).did. or (US-6242700-\$ or<br>US-7507105-\$ or US-6259029-\$ or US-<br>5600094-\$ or US-4692563-\$ or US-5621191-<br>\$ or US-5310963-\$ or US-5691505-\$ or US-<br>3567843-\$ or US-4379204-\$ or US-6812406-<br>\$ or US-5321205-\$ or US-5208427-\$ or US-<br>8288667-\$ or US-8581120-\$ or US-8367944-<br>\$ or US-8490513-\$ or US-4015329-\$ or US-<br>4332975-\$ or US-2590160-\$).did. or (US-<br>2957038-\$ or US-2913260-\$).did. or (GB-<br>2138218-\$ or GB-2074395-\$).did. or (EP-<br>434105-\$ or GB-2074395-\$ or GB-2258350-\$<br>or US-3833754-\$ or WO-2008029165-\$).did. | US-PGPUB;<br>USPAT;<br>USOCR;<br>EPO;<br>DERWENT                           | OR | ON | 2014/06/09<br>18:34 |
| S112 | 276 | h02g15/04.opc.   | US-PGPUB;<br>USPAT;<br>USOCR;<br>EPO;<br>DERWENT                           | OR | ON | 2014/06/09<br>18:35 |
| S113 | 2   | (H02G15/04 and H02G3/0641).CPC.  | US-PGPUB;<br>USPAT;<br>USOCR;<br>EPO;<br>DERWENT                           | OR | ON | 2014/06/09<br>18:36 |

## EAST Search History

|      |     |  |  |    |    |                     |
|------|-----|--|--|----|----|---------------------|
| S114 | 104 | lackinger.in.  | US-PGPUB;<br>USPAT;<br>USOCR;<br>EPO;<br>DERWENT                           | OR | ON | 2014/06/09<br>18:38 |
| S115 | 13  | (franz near2 lackinger).in.  | US-PGPUB;<br>USPAT;<br>USOCR;<br>EPO;<br>DERWENT                           | OR | ON | 2014/06/09<br>18:38 |
| S116 | 0   | ("2013/0118803").URPN.   | USPAT  | OR | ON | 2014/06/09<br>18:41 |
| S117 | 1   | "20130118803"  | DERWENT  | OR | ON | 2014/06/09<br>18:42 |
| S118 | 1   | 2013-H37425.NRAN.  | DERWENT  | OR | ON | 2014/06/09<br>18:42 |
| S119 | 45  | ("20090163064"   "20110115132"  <br>"3113284"   "4208005"   "4415604"  <br>"4544231"   "4714432"   "4797509"  <br>"4820196"   "4998894"   "5057348"  <br>"5099088"   "5166558"   "5418016"  <br>"5438080"   "5438160"   "5536758"  <br>"5809635"   "5846075"   "6306502"  <br>"6520663"   "6596787"   "6676795"  <br>"6881964"   "6943202"   "6972413"  <br>"6998425"   "7479653"   "7790094"  <br>"7915319").PN.  | DERWENT  | OR | ON | 2014/06/09<br>18:42 |
| S120 | 102 | ("20090163064"   "20110115132"  <br>"3113284"   "4208005"   "4415604"  <br>"4544231"   "4714432"   "4797509"  <br>"4820196"   "4998894"   "5057348"  <br>"5099088"   "5166558"   "5418016"  <br>"5438080"   "5438160"   "5536758"  <br>"5809635"   "5846075"   "6306502"  <br>"6520663"   "6596787"   "6676795"  <br>"6881964"   "6943202"   "6972413"  <br>"6998425"   "7479653"   "7790094"  <br>"7915319").PN.  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>18:43 |
| S121 | 21  | ("20110290520"   "5378174"   "6265670"  <br>"6362421"   "6867371"   "7355130"  <br>"7781678"   "7781684"   "8033408").PN.  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>18:45 |
| S122 | 163 | ("4814547"   "5113037"   "4894014"  <br>"5622642"   "6932639"   "2711438"  <br>"3098275"   "3761601"   "4301325"  <br>"7592545"   "20070161268"   "5310963"  <br>"5499448"   "20080121428"   "2835722"  <br>"5015804"   "6025559"   "6232554"  <br>"7014502"   "7037128"   "7431611"  <br>"7914298"   "20040121639"   "4549037"  <br>"5023402"   "6475029"   "7201596"  <br>"7717740"   "20040157448"   "20100108020"<br>  "5756972"   "7736187"   "5683273"  <br>"6854996"   "7341255"   "7736165"  <br>"6394662"   "4216349"   "5399807"  <br>"7094972").PN. | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/09<br>18:49 |
| S123 | 101 | ("1297614"   "1923073"   "2416943"  <br>"2825750"   "2870239"   "2877288"  | US-PGPUB;<br>USPAT;  | OR | ON | 2014/06/09<br>18:51 |

|      |    |   |  |    |    |                     |
|------|----|---|--|----|----|---------------------|
|      |    | "2932685"   "2939805"   "2958723"  <br>"3012219"   "3061455"   "3083260"  <br>"3109051"   "3388370"   "3483310"  <br>"3497607"   "3550765"   "3558800"  <br>"3576518"   "3597528"   "3656088"  <br>"3746068"   "3783177"   "3793611"  <br>"3793612"   "3858157"   "3869190"  <br>"3875324"   "3912356"   "3934076"  <br>"3937870"   "4039742"   "4053704"  <br>"4059136"   "4081012"   "4107453"  <br>"4295004"   "4314094"   "4446332"  <br>"4491686"   "4691079"   "4751350"  <br>"4803779"   "5023402"   "D191399").PN. OR<br>("5113037").URPN.  | USOCR  |    |    |                     |
| S124 | 46 | ("1297614"   "2416943"   "3083260"  <br>"3497607"   "3597528"   "3934076"  <br>"3937870"   "4039742"   "4053704"  <br>"4107453"   "4295004"   "4314094"  <br>"4446332"   "4751350").PN. OR<br>("5023402").URPN.   | US-PGPUB;<br>USPAT;<br>USOCR                     | OR | ON | 2014/06/09<br>18:52 |
| S125 | 1  | "8431836".pn.   | US-PGPUB;<br>USPAT;<br>USOCR                     | OR | ON | 2014/06/09<br>18:54 |
| S126 | 10 | ("20040121637"   "3833754"   "4515516"  <br>"5194012"   "5432301"   "6623289"  <br>"6668793"   "6812406"   "7285782"  <br>"7735876").PN. OR ("8431836").URPN.   | US-PGPUB;<br>USPAT;<br>USOCR                     | OR | ON | 2014/06/09<br>18:54 |
| S127 | 1  | "7736165".pn.   | US-PGPUB;<br>USPAT;<br>USOCR                     | OR | ON | 2014/06/09<br>18:56 |
| S128 | 59 | ("20020102874"   "20040121639"  <br>"20040157488"   "2311758"   "2932685"  <br>"3020260"   "3168613"   "3740692"  <br>"4214806"   "4369284"   "4425017"  <br>"4595635"   "4600261"   "4634207"  <br>"4662692"   "4680233"   "4701574"  <br>"4716183"   "4721832"   "4751350"  <br>"4777063"   "4795857"   "4846721"  <br>"4852646"   "4880676"   "4888070"  <br>"4942270"   "4963700"   "5023402"  <br>"5079300"   "5099088"   "5140476"  <br>"5149281"   "5177143"   "5357057"  <br>"5364283"   "5529508"   "5561269"  <br>"5588856"   "5741156"   "5824954"  <br>"5828005"   "5848913"   "5962811"  <br>"6025559"   "6309257"   "6730847"  <br>"6848949"   "6854996"   "6997759"  <br>"7037128"   "7056151"   "7160146"  <br>"7201596"   "RE37340").PN. OR<br>("7736165").URPN. | US-PGPUB;<br>USPAT;<br>USOCR                     | OR | ON | 2014/06/09<br>18:56 |
| S129 | 1  | "13391539"  | US-PGPUB;<br>USPAT;<br>USOCR                     | OR | ON | 2014/06/10<br>09:55 |
| S130 | 47 | (US-20120097445-\$ or US-20030226680-\$ or<br>US-20040069522-\$ or US-20020066518-\$ or<br>US-20100108020-\$ or US-20140030903-\$ or<br>US-20140041939-\$ or US-20130112475-\$ or<br>US-20130129289-\$ or US-20120292100-\$ or<br>US-20100003001-\$ or US-20130118803-\$ or<br>US-20110033165-\$ or US-20040157488-\$<br>).did. or (US-6242700-\$ or US-7507105-\$ or<br>US-6259029-\$ or US-5600094-\$ or US-  | US-PGPUB;<br>USPAT;<br>USOCR;<br>EPO;<br>DERWENT | OR | ON | 2014/06/10<br>09:57 |



|      |     |   |  |    |    |                     |
|------|-----|---|--|----|----|---------------------|
|      |     | 4692563-\$ or US-5621191-\$ or US-5310963-\$ or US-5691505-\$ or US-3567843-\$ or US-4379204-\$ or US-6812406-\$ or US-5321205-\$ or US-5208427-\$ or US-8288667-\$ or US-8581120-\$ or US-8367944-\$ or US-8490513-\$ or US-4015329-\$ or US-4332975-\$ or US-2590160-\$ or US-4608454-\$ or US-5113037-\$ or US-7736165-\$ or US-4751350-\$.did. or (US-2957038-\$ or US-2913260-\$.did. or (GB-2138218-\$ or GB-2074395-\$.did. or (EP-434105-\$ or GB-2074395-\$ or GB-2258350-\$ or US-3833754-\$ or WO-2008029165-\$.did. |  |    |    |                     |
| S132 | 6   | S130 and stretch\$4   | US-PGPUB;<br>USPAT;<br>USOCR           | OR | ON | 2014/06/10<br>09:57 |
| S133 | 2   | "12854234"  | US-PGPUB;<br>USPAT;<br>USOCR           | OR | ON | 2014/06/10<br>10:03 |
| S134 | 2   | "20120037416"   | US-PGPUB;<br>USPAT;<br>USOCR           | OR | ON | 2014/06/10<br>10:03 |
| S135 | 1   | "20120037416"   | DERWENT                                | OR | ON | 2014/06/10<br>10:03 |
| S136 | 1   | 2012-C11878.NRAN.   | DERWENT                                | OR | ON | 2014/06/10<br>10:03 |
| S137 | 5   | ("4739126"   "6300569"   "6409179"   "7874871"   "8129633").PN.   | US-PGPUB;<br>USPAT;<br>USOCR           | OR | ON | 2014/06/10<br>10:04 |
| S138 | 10  | ("6259029"   "20040074662"   "5621191"   "6809263"   "20040069522"   "20030226680"   "6268565"   "20080236861"   "7641396"   "7781685").PN.   | US-PGPUB;<br>USPAT;<br>USOCR           | OR | ON | 2014/06/10<br>10:12 |
| S139 | 19  | (US-20120205023-\$ or US-20030226680-\$ or US-20040069522-\$ or US-20100108020-\$ or US-20130112475-\$ or US-20100003001-\$).did. or (US-6259029-\$ or US-5621191-\$ or US-5310963-\$ or US-4379204-\$ or US-8288667-\$ or US-8367944-\$ or US-8490513-\$ or US-7736165-\$.did. or (GB-2138218-\$ or GB-2074395-\$.did. or (GB-2074395-\$ or GB-2258350-\$ or EP-434105-\$.did.   | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT | OR | ON | 2014/06/10<br>10:16 |
| S140 | 212 | 439/583.ccls. and (seal\$4)   | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT | OR | ON | 2014/06/10<br>10:20 |
| S141 | 46  | S140 and cores  | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT | OR | ON | 2014/06/10<br>10:21 |
| S142 | 5   | S141 and stretch\$4   | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT | OR | ON | 2014/06/10<br>10:22 |
| S143 | 293 | ("439".clas. or "174".clas. or "248".clas.) and (cable adj gland)   | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT | OR | ON | 2014/06/10<br>10:23 |
| S144 | 0   | "222".clas. and (cable adj gland)   | US-PGPUB;                              | OR | ON | 2014/06/10          |

EAST Search History

|      |       |  |  |    |    |                     |
|------|-------|--|--|----|----|---------------------|
|      |       |  | USPAT;<br>EPO;<br>DERWENT  |    |    | 10:23               |
| S145 | 1     | "222".clas. and (cable adj gland)  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/10<br>10:24 |
| S146 | 298   | ("439".clas. or "174".clas. or "248".clas. or "156".clas.) and (cable adj gland)   | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2014/06/10<br>10:25 |
| S147 | 24009 | ("439".clas. or "174".clas. or "248".clas. or "156".clas.) and (cable adj (gland or connect\$3))   | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2014/06/10<br>10:25 |
| S148 | 11508 | ("439".clas. or "174".clas. or "248".clas. or "156".clas.) and (cable adj (gland or connect? r))   | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2014/06/10<br>10:25 |
| S149 | 4513  | S148 and cur\$4  | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2014/06/10<br>10:25 |
| S150 | 302   | S149 and stretch\$4  | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2014/06/10<br>10:26 |
| S151 | 1750  | S149 and (stretch\$4 or seal\$4)   | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2014/06/10<br>10:26 |
| S152 | 426   | S151 and cores   | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2014/06/10<br>10:27 |
| S153 | 109   | S150 and S152  | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2014/06/10<br>10:27 |
| S154 | 193   | S150 not S153  | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2014/06/10<br>10:29 |
| S155 | 1     | "8170390".pn.  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:20 |
| S156 | 47    | (US-20120097445-\$ or US-20030226680-\$ or US-20040069522-\$ or US-20020066518-\$ or US-20100108020-\$ or US-20140030903-\$ or US-20140041939-\$ or US-20130112475-\$ or US-20130129289-\$ or US-20120292100-\$ or US-20100003001-\$ or US-20130118803-\$ or US-20110033165-\$ or US-20040157488-\$).did. or (US-6242700-\$ or US-7507105-\$ or US-6259029-\$ or US-5600094-\$ or US-4692563-\$ or US-5621191-\$ or US-5310963-\$ or US-5691505-\$ or US-3567843-\$ or US- | US-PGPUB;<br>USPAT;<br>USOCR;<br>EPO;<br>DERWENT                           | OR | ON | 2014/06/10<br>12:23 |

|      |     |  |  |    |    |                     |
|------|-----|--|--|----|----|---------------------|
|      |     | 4379204-\$ or US-6812406-\$ or US-5321205-\$ or US-5208427-\$ or US-8288667-\$ or US-8581120-\$ or US-8367944-\$ or US-8490513-\$ or US-4015329-\$ or US-4332975-\$ or US-2590160-\$ or US-4608454-\$ or US-5113037-\$ or US-7736165-\$ or US-4751350-\$).did. or (US-2957038-\$ or US-2913260-\$).did. or (GB-2138218-\$ or GB-2074395-\$).did. or (GB-2074395-\$ or GB-2258350-\$ or US-3833754-\$ or EP-434105-\$ or WO-2008029165-\$).did. |  |    |    |                     |
| S157 | 13  | S156 and core  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:23 |
| S158 | 13  | S157 and cores   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:24 |
| S159 | 3   | S157 and (core with plurality)   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:24 |
| S160 | 10  | S158 not S159  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:32 |
| S161 | 1   | "13280123"   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:33 |
| S162 | 2   | "12854234"   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:34 |
| S163 | 13  | ("4707200"   "4450318"   "5347090"   "5352853"   "4454381"   "4599487"   "5532436"   "7678994"   "3764728"   "20020166693"   "4626721"   "7232347"   "4329540").PN.  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:36 |
| S164 | 4   | ("4299363"   "5545854"   "5912431"   "6300568").PN.  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:38 |
| S165 | 75  | ("2420826"   "2458409"   "2545514"   "2707723"   "2948937"   "3197556"   "3351974"   "3506999"   "3516111"   "3768115"   "3788655"   "3991446").PN. OR ("4299363").URPN.   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:40 |
| S166 | 975 | dhiru.xp.  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:44 |
| S167 | 9   | S166 and (cable adj gland)   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:44 |
| S168 | 94  | (cable adj gland) same2 (explod\$4 or explos\$4)   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:48 |
| S169 | 175 | (cable adj gland) same2 (explod\$4 or explos\$4)   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/10<br>12:48 |
| S171 | 81  | S169 not S168  | US-PGPUB;  | OR | ON | 2014/06/10          |

EAST Search History

|      |      |  |  |    |    |                     |
|------|------|--|--|----|----|---------------------|
|      |      |  | USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB              |    |    | 12:48               |
| S172 | 1    | "101304258"  | DERWENT  | OR | ON | 2014/06/10<br>12:51 |
| S173 | 1    | "20120024526"  | DERWENT  | OR | ON | 2014/06/10<br>12:51 |
| S174 | 1    | "5621191".pn.  | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:54 |
| S175 | 23   | ("3663740"   "4629825"   "4674818"  <br>"4692563"   "4857015"   "5310963").FN. OR<br>("5621191").URPN. | US-PGPUB;<br>USPAT;<br>USOCR   | OR | ON | 2014/06/10<br>12:56 |
| S176 | 6    | "1304258"  | DERWENT  | OR | ON | 2014/06/10<br>12:58 |
| S177 | 1    | 2013-N37420.NRAN.  | DERWENT  | OR | ON | 2014/06/10<br>12:58 |
| S178 | 94   | S168   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/10<br>13:00 |
| S179 | 2    | "8170390".pn.  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/10<br>13:24 |
| S180 | 2291 | cable adj gland  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2014/06/10<br>13:53 |
| S181 | 1738 | cable adj gland  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>IBM_TDB             | OR | ON | 2014/06/10<br>13:53 |
| S182 | 297  | S180 and (epoxy or curing or curable or<br>compound or harden\$4 or adhesive)                          | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>IBM_TDB             | OR | ON | 2014/06/10<br>13:55 |

**EAST Search History (Interference)**

| Ref # | Hits | Search Query                     | DBs | Default Operator | Plurals | Time Stamp |
|-------|------|----------------------------------|-----|------------------|---------|------------|
| L25   | 0    | (CABLE AND GLAND AND THROUGH AND | US- | OR               | ON      | 2014/06/10 |

EAST Search History

|     |   |  |                    |    |    |                  |
|-----|---|--|--------------------|----|----|------------------|
|     |   | BUNDLE AND CORES AND EXTEND AND RESIN AND WELL AND DEFINES AND ELASTOMERIC AND CENTRAL AND FLEXIBLE AND BARRIER AND SELAING AND BOTTOM AND APERTURE AND MEMBRANE AND FIT AND TIGHTLY AND CURING AND LIQUID AND FLOWS).CLM. | PGPUB; USPAT; UPAD |    |    | 17:18            |
| L27 | 0 | (DI SPENSER AND APPARATUS AND CABLE AND GLAND AND ASSEMBLY AND CURABLE AND BODY AND FIRST AND SECOND AND CHAMBER AND LIQUID AND COMMUNICATE AND ENABLE AND MIXING AND INITIATE AND BARRIER AND APERTURE).CLM.              | USPAT; UPAD        | OR | ON | 2014/06/10 17:19 |

6/ 10/ 2014 5:19:49 PM

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BIB DATA SHEET

CONFIRMATION NO. 6980

|   |   |   |   |  |                                |
|---|---|---|---|--|--------------------------------|
| <b>SERIAL NUMBER</b><br>13/391,539  | <b>FILING or 371(c) DATE</b><br>05/02/2012<br><b>RULE</b>   | <b>CLASS</b><br>222                       | <b>GROUP ART UNIT</b><br>3754   | <b>ATTORNEY DOCKET NO.</b><br>920257.00016 |                                |
| <b>APPLICANTS</b><br><b>INVENTORS</b><br>Samuel Liam Proud, Tyne & Wear, UNITED KINGDOM;<br><b>** CONTINUING DATA *****</b><br>This application is a 371 of PCT/GB10/50989 06/14/2010<br><b>** FOREIGN APPLICATIONS *****</b><br>EUROPEAN PATENT OFFICE (EPO) 09168430.8 08/21/2009<br>EUROPEAN PATENT OFFICE (EPO) 09168429.0 08/21/2009<br>UNITED KINGDOM 1004216.6 03/15/2010<br>UNITED KINGDOM 1009450.6 06/07/2010<br><b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b><br>05/07/2012 |   |   |   |  |                                |
| Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No<br>35 USC 119(a-d) conditions met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No<br>Verified and Acknowledged <u>/RANDALL A GRUBY/</u><br>Examiner's Signature  | <input checked="" type="checkbox"/> Met after Allowance<br>RG<br>Initials   | <b>STATE OR COUNTRY</b><br>UNITED KINGDOM | <b>SHEETS DRAWINGS</b><br>2   | <b>TOTAL CLAIMS</b><br>12                  | <b>INDEPENDENT CLAIMS</b><br>1 |
| <b>ADDRESS</b><br>QUARLES & BRADY LLP<br>Attn: IP Docket<br>411 E. WISCONSIN AVENUE<br>SUITE 2350<br>MILWAUKEE, WI 53202-4426<br>UNITED STATES  |   |   |   |  |                                |
| <b>TITLE</b><br>FILLER ASSEMBLY FOR CABLE GLAND   |   |   |   |  |                                |
| <b>FILING FEE RECEIVED</b><br>1250  | FEES: Authority has been given in Paper<br>No. _____ to charge/credit DEPOSIT ACCOUNT<br>No. _____ for following: |   | <input type="checkbox"/> All Fees<br><input type="checkbox"/> 1.16 Fees (Filing)<br><input type="checkbox"/> 1.17 Fees (Processing Ext. of time)<br><input type="checkbox"/> 1.18 Fees (Issue)<br><input type="checkbox"/> Other _____<br><input type="checkbox"/> Credit |  |                                |

|  |  |  |
|--|--|--|
| <b><i>Index of Claims</i></b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

|   |                 |   |                   |   |                     |   |                 |
|---|-----------------|---|-------------------|---|---------------------|---|-----------------|
| ✓ | <b>Rejected</b> | - | <b>Cancelled</b>  | N | <b>Non-Elected</b>  | A | <b>Appeal</b>   |
| = | <b>Allowed</b>  | ÷ | <b>Restricted</b> | I | <b>Interference</b> | O | <b>Objected</b> |

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

| CLAIM |          | DATE       |            |            |            |            |  |  |  |
|-------|----------|------------|------------|------------|------------|------------|--|--|--|
| Final | Original | 03/27/2013 | 06/07/2013 | 08/14/2013 | 01/15/2014 | 06/10/2014 |  |  |  |
| 1     | 1        | ÷          | ✓          | ✓          | ✓          | =          |  |  |  |
| 2     | 2        | ÷          | ✓          | ✓          | ✓          | =          |  |  |  |
| 3     | 3        | ÷          | ✓          | ✓          | ✓          | =          |  |  |  |
| 4     | 4        | ÷          | ✓          | ✓          | ✓          | =          |  |  |  |
| 5     | 5        | ÷          | ✓          | ✓          | ✓          | =          |  |  |  |
| 6     | 6        | ÷          | ✓          | ✓          | ✓          | =          |  |  |  |
| 7     | 7        | ÷          | ✓          | ✓          | ✓          | =          |  |  |  |
|       | 8        | ÷          | ✓          | ✓          | ✓          | -          |  |  |  |
| 8     | 9        | ÷          | ✓          | ✓          | ✓          | =          |  |  |  |
| 14    | 10       | ÷          | ✓          | ✓          | ✓          | =          |  |  |  |
| 15    | 11       | ÷          | ✓          | ✓          | ✓          | =          |  |  |  |
| 9     | 12       |            | ✓          | ✓          | ✓          | =          |  |  |  |
| 10    | 13       |            |            |            |            | =          |  |  |  |
| 11    | 14       |            |            |            |            | =          |  |  |  |
| 12    | 15       |            |            |            |            | =          |  |  |  |
| 13    | 16       |            |            |            |            | =          |  |  |  |
| 16    | 17       |            |            |            |            | =          |  |  |  |
| 17    | 18       |            |            |            |            | =          |  |  |  |
| 18    | 19       |            |            |            |            | =          |  |  |  |
| 19    | 20       |            |            |            |            | =          |  |  |  |

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Samuel Liam Proud  
Application No.: 13/391,539  
Filed: May 2, 2012  
For: FILLER ASSEMBLY FOR CABLE GLAND  
Group Art Unit: 3754  
Examiner: Randall A. Gruby  
Confirmation No.: 6980  
Att'y. Docket: 920257.00016

**RESPONSE TO NON-FINAL OFFICE ACTION**

MS Amendment  
Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the non-final Office Action dated 01/27/2014, please consider the following:

Amendments to the Claims begin on page 2; and  
Remarks begin on page 6.



**In the Claims:**

Please amend the claims so that the pending claim set reads as follows:

1. (Currently Amended) A filler assembly for filling with curable liquid material a cable gland, the cable gland having a plurality of cores of at least one cable extending therethrough, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

at least one first barrier apparatus for temporarily preventing mixing of said first and second components;

at least one elongate dispenser apparatus adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

at least one second barrier apparatus for temporarily preventing passage of said curable liquid material from the or each said second chamber to at least one said dispenser apparatus; and

(b) at least one flexible barrier member having at least one respective aperture therethrough adapted to stretch to engage a plurality of ~~for engaging at least one cores of a cable to provide a barrier to passage, wherein the barrier member is adapted to restrict the extent of penetration of said curable liquid material along said cores and includes a conical portion clamped between two surfaces of the cable gland and terminating in a planar portion.~~

2. (Original) An assembly according to claim 1, wherein said body is flexible.

3. (Previously Presented) An assembly according to claim 1, wherein at least one said first barrier apparatus comprises at least one releasable clamp.

4. (Previously Presented) An assembly according to claim 1, further comprising a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

5. (Previously Presented) An assembly according to claim 5, wherein the curable liquid material is adapted to change color as a result of curing thereof.

6. (Previously Presented) An assembly according to claim 1, further comprising a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

7. (Original) An assembly according to claim 6, wherein the cover member is adapted to prevent curable liquid material from penetrating an end face of the cable gland.

8. (Cancelled)

9. (Previously Presented) An assembly according to claim 1, wherein at least one said barrier member has a respective tapering portion.

10. (Currently Amended) A method of filling a cable gland with curable liquid material, the method comprising:

using a filler assembly that includes:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

at least one first barrier apparatus for temporarily preventing mixing of said first and second components;

at least one elongate dispenser apparatus adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

at least one second barrier apparatus for temporarily preventing passage of said curable liquid material from the or each said second chamber to at least one said dispenser apparatus; and

(b) at least one flexible barrier member for having at least one respective aperture therethrough adapted to stretch to engage a plurality of ~~for engaging at least one cores~~ of a cable to provide a barrier to passage, ~~wherein the barrier member is adapted to restricting the extent of penetration of said curable liquid material along said cores and includes a conical portion clamped between two surfaces of the cable gland and terminating in a planar portion;~~

locating at least one said barrier member in the cable gland; and

locating an outlet of at least one said dispenser apparatus in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.

11. (Currently Amended) A method according to claim 10, wherein the step of locating at least one said barrier member in the cable gland comprises locating at least one said barrier member around a plurality of ~~at least one said cores~~ of at least one said cable.

12. (Previously Presented) An assembly according to claim 1, wherein at least one said second barrier apparatus comprises at least one releasable clamp.

13. (New) An assembly according to claim 1, wherein the aperture is in a planar portion of the flexible barrier member.

14. (New) An assembly according to claim 13, wherein the planar portion extends inwardly from an outer portion of the flexible barrier member that is sealed to the gland.

15. (New) An assembly according to claim 1, wherein the flexible barrier member is elastomeric and has a central membrane portion through which the aperture extends.

16. (New) An assembly according to claim 15, wherein the edges of the aperture are the thickness of the membrane portion.

17. (New) In a cable gland through which a bundle of cores of a cable extend and that is filled with a curable material so as to block the passage through the gland of gases from an explosion, the improvement wherein the gland defines a resin well at the bottom of which resides a flexible barrier member having an elastomeric membrane in a central portion thereof, the flexible barrier member sealing the bottom of the resin well except for an aperture through the membrane through which the cores extend, the aperture being smaller than the bundle of cores so that the cores stretch the aperture to fit tightly around the bundle, and wherein prior to curing the curable material is a liquid when it is placed in the well that flows in between the cores and around the bundle of cores.

18. (New) A kit for making an explosion proof cable passage comprising a gland as claimed in claim 17 and a package of uncured curable material that is placed in the resin well.

19. (New) The kit of claim 18, wherein the package includes a stiff tubular nozzle that can be inserted into the well along the cores next to the bottom of the well to dispense the curable material in proximity to the flexible barrier member at the bottom of the well so as to fill the well from the bottom.

20. (New) The kit of claim 19, wherein the package contains the curable material in two separate parts and the package can be manipulated to mix the two parts in the package and dispense the mixed material through the nozzle.

### REMARKS

Claims 1-12 stand rejected as unpatentable under Section 103 over Kaptein in view of Hand. Claim 8 is cancelled as many of its limitations are included in claim 1 as amended.

This rejection is respectfully traversed, and additional clarifying amendments are made to the claims that should make clear the distinctions over Kaptein in any combination with Hand and/or the other prior art of record. In addition new claims 13-20 are submitted herewith to more fully claim the invention in different ways with an emphasis on distinguishing Hand, and should be allowable for much the same reasons as claims 1-7 and 9-12 are.

The declarations of Messrs. Mood, Carroll and Abrass are submitted herewith in support of the patentability of the pending claims. Also enclosed is an Information Disclosure Statement citing some references referred to in Mr. Mood's declaration. Mr. Mood's declaration explains the invention and the prior art, and presents the understanding of a person of ordinary skill in the art with knowledge of the prior art prior to the invention. Mr. Mood also presents evidence of commercial success attributable to the invention, of laudatory statements by the competition of the invention and of copying of the invention by the competition. Mr. Mood's declaration statements will not be reiterated verbatim herein but are incorporated by reference as fully supporting patentability of the invention. The declarations of Messrs. Carroll and Abrass are testimonials containing additional laudatory statements of customers submitted in further support of patentability. Allowance of claims 1-7 and 9-20 is respectfully requested in view of the overwhelming weight of evidence of patentability and the clear distinctions of the claims as amended over the prior art of record.

#### Support for Claim Amendments

The claim amendments and new claims are supported by the drawings and by the following language on p. 8 of the WO publication:

"The aperture in the seal 32 is sized such that it stretches to pass around the conductors 20 to form a reasonably effective barrier to passage of the material 6 along the space defined between the conductors 20 and the compound tube 26."

Distinctions from the Prior Art

The as-amended and new claims all require a cable gland with a flexible barrier member with an aperture that stretches around the bundle of cable cores in combination with a liquid curable material. None of the prior art of record discloses or suggests this and for that reason claims 1-7 and 9-20 should be allowed.

How a person of ordinary skill in the art would understand Hand is explained well in Mr. Mood's declaration. Reference is made to the full explanation therein as paraphrasing does not do it justice. However, for purposes of discussion, Hand discloses two embodiments, one of Figs. 1-4 without curable material and the other of Figs. 5-7 with a non-liquid putty like curable material. Neither barrier is stretchy or designed to stretch around the bundle of cables. In the first embodiment, the barrier is designed to be rigid enough to itself block an explosion, and in the second embodiment, the curable material is extruded into the excess space between the end of the barrier and the bundle of cores to close it off. No stretchy aperture in combination with a liquid resin is disclosed or suggested by either of these references, or any of the other references of record.

To understand why the present invention would not have been obvious, one must understand the perspective of a person of ordinary skill in the art as set forth by Mr. Mood in his declaration. Mr. Mood's declaration is incorporated herein by reference and cannot be summarized briefly to impart the same degree of understanding. However, for purposes of discussion, suffice it to say that the first embodiment of Hand with no curable material is only for certain round cross-section cables that are of generally solid construction and is not permissible for use in the US due to more stringent safety requirements. The second embodiment is acceptable in the US at present, but suffers from difficulty in assembly, time of assembly, and the likelihood that air voids will result in the finished product because of the difficulty of initial filling or disturbance while curing. The limited range of application for the first embodiment of Hand and the difficulty of creating a good joint with the second embodiment are problems that existed prior to the invention that created a need for the invention, which need was not fulfilled for a long time until the present invention was created.

Objective Indicia of Non-Obviousness

Mr. Mood explains well the invention, the prior art and the deficiencies thereof and those explanations will not be repeated here. It is important to understand the perspective of the person of ordinary skill in the art to understand just how different the present invention is from the Hand type glands, which are representative of the closest prior art. The invention as claimed represents a radical departure both from using a rigid barrier by itself as in the first embodiment of Hand or a barrier in combination with epoxy putty as in the second embodiment of Hand. In addition, the objective evidence of non-obviousness presented - commercial success, laudatory statements by the competition and by customers and copying by competitors - should caution against a rush to judgment of obviousness and in combination with the clear distinctions from the prior art should inform and compel allowance.

Request for Personal Interview

A personal interview is requested prior to the next office action if it will be anything other than an allowance. If such an interview is deemed necessary, Mr. Mood will be personally present along with the undersigned to discuss the invention, background and prior art as applicant is committed that with sufficient understanding the USPTO will see fit to allow this application.

Conclusion

Accordingly, it is respectfully submitted that with this submission this application should be allowed, which is respectfully requested.

No fees are due for filing this response, however, the Commissioner is hereby authorized to charge any fees necessary and credit any overpayments to Deposit Account No. 17-0055.

Respectfully submitted,  
SAMUEL LIAM PROUD

Dated: April 10, 2014

/john d. franzini/  
John D. Franzini  
Reg. No. 31,356  
Attorney for Applicant  
Quarles & Brady LLP  
411 East Wisconsin Avenue  
Milwaukee, Wisconsin 53202-4497  
Tel. No. (414) 277-5747  
Fax No. (414) 978-8747

### DECLARATION OF GEOFFREY I. MOOD

1. My name is Geoffrey I. Mood, and I am the Technical Director at CMP Products, which manufactures industrial and hazardous area cable glands and accessories and is the owner of U.S. Patent Application No. 13/391,539 ("the '539 application") which is the subject of these proceedings.
2. I have been employed by CMP Products for approximately 8 years and have been working in the encapsulation field for 18 years. I have an honors degree in mechanical engineering and a doctorate degree in carbon fiber technology and am an inventor on more than 10 patent applications.
3. I have reviewed the documents in the prosecution the '539 application and have focused on the Examiner's rejections in the January 27, 2014 Office Action. I have reviewed the '593 application, including claims 1-12 that are listed as rejected, and the references used to support the rejections. I have also reviewed the reasons given for the rejections in the Office Action and the prior art relied on in them.
4. I understand that the noted claims were rejected based on obviousness, and that obviousness is established when a person of ordinary skill, having knowledge of the prior art, would have found the invention defined by each claim to be obvious at the time the invention was made. I also understand that it is not permitted to use hindsight reasoning with regards to the invention when reviewing the prior art. I understand one of ordinary skill in the art to be a person having at least about 3 years of experience in encapsulation or resin systems, and at least about 5 years of experience in the design and manufacture of cable glands or cable connectors. While I am perhaps more qualified than one of ordinary skill, my observations are based on what I believe one of ordinary skill would have understood at the time the invention was made. Based on this review, I do not believe the inventions defined by the rejected claims would have been obvious to a person of ordinary skill having knowledge of this prior art at the time the invention was made for at least the reasons noted below.
5. I have reviewed the '539 application and the prior art used in this proceeding and believe that nothing in the cited prior art would have suggested the particular solution that is disclosed and claimed in the '539 application. In my opinion, it is unclear why any of the references would have been found to be relevant to the '539 application claims, without



first knowing what the claims are. I believe it would not have been obvious to make the claimed combinations without first using the '539 application claims as a recipe.

6. A person of ordinary skill in the art would approach the design of a new cable gland with certain background information, which is important to know just prior to the time of this invention.
7. A few tenets of such a person's understanding prior to the invention would have been as follows:
  - a. An encapsulated cable gland is for use in explosive atmospheres where the gland must stop explosive gases under pressure from an explosion from migrating along interstitial spaces along side or through wires going through the gland.
  - b. Under the rules for products used in explosive atmospheres classed as 'Ex d', cable glands can be of two types. The first has a rubber seal that compresses against the cable inner sheath like in Hand WO 2008/029165 Figs. 1-4 with seal 18, and the other has a barrier material that forms a seal around the cores of the cable like in Hand Fig. 5 with hardenable material 125. Both of these cable gland types are allowed everywhere except America if the cable is essentially solid in construction. If it is not solid then a gland with a barrier material is needed. In America, a rubber seal compressing against the cable sheath is not acceptable and a gland with a barrier material is needed whether the cable is solid or not.
  - c. Traditionally the barrier material used in cable glands has been an epoxy putty material that is mixed, moulded into place and then allowed to set. This is not only slow, but it is difficult to pack into a cable gland so well that any air is expelled and displaced by the putty. It does however have the advantage that it is stiff, will bridge gaps and will not run down the conductors out of the gland while it is curing.
  - d. A rubber seal only works against a cable inner sheath where the sheath is essentially round. The barrier material is different in that it must seal against both the sheath and individual cores and work on cables that are not round. On some occasions it must seal against cable cores only. In any case where the cable construction is such that gaps exist between the cores either inside the sheath or outside of the sheath, a rubber seal cannot be relied upon to work. Attached as

Exhibit A is a page from the CMP catalogue in which cable types that cannot be used with a rubber seal are listed.

8. Prior to the invention, packing a gland with epoxy putty to act as a stopper for an explosion was time consuming if done well and ineffective if not. In addition, with the putty material, the joint had to be maintained undisturbed for a long period until the putty cured or else movement of the wires as the putty was curing would create voids in the putty which would become cast in the gland as defects.
9. The invention provides a system that represents an advance in this field, that is easier to apply to create a cable gland that is effective as an explosion stopper, to block flames and gases emanating from an explosion from migrating through the gland. This is accomplished with a liquid resin system for use as the barrier material in the cable gland. It had to be recognized that air gaps were a problem and that a liquid resin could provide a solution as it could penetrate and drive out air gaps between cable cores or between the cores and the cable inner sheath. It also had to be recognized that this could be done efficiently and effectively without permitting liquid resin to penetrate into areas of the cable gland that it is not supposed to reach or run down the cables.
10. Even if a person of ordinary skill would have thought to use a liquid filler material to fill the gaps in a gland, such a person would have looked for ways of avoiding excessive penetration in similar applications where a barrier material has to seal around cable cores. This situation exists in conduit sealing fittings used extensively in America. Conduit sealing fittings are large relative to cable glands and the amount of the device that can be filled with cables is a maximum of 40% by volume (80% for a cable gland). This means that there is typically a larger gap between cores and more room for displaced air to escape. Conduit sealing fittings typically use a cement based barrier material and this is prevented from penetrating too far by the use of mineral wool, which is manually packed between the cable cores and the cores and the conduit sealing fitting. This is disclosed in the attached Exhibit B fitting instructions and in patent applications CA1333192, WO0204843, and CA1279707, which cover alternatives. The packing material and method is also disclosed in WO2004047248 which discusses special tools for inserting and packing the mineral wool.

11. The use of mineral wool packed into any gaps has been the accepted method of preventing a liquid barrier material from penetrating too far, and so this would be the obvious thing to use with a liquid resin system. It would not be obvious to use a seal like the seal 18 in Hand Fig. 1 that is designed for fitting around a cable inner sheath for use only with cables that do not have any gaps in their construction and are round. This also would not work around a bundle of cables to act as a barrier as it would not conform to the irregular lobed outer shape of the bundle sufficiently to block a liquid material from running between the bundle and the seal.
12. In the embodiment of Fig. 5 in Hand, where the hardenable material is used, a barrier sleeve 105 has an inwardly extending lip at its left end, with an annular gap 127 between the inside diameter of the lip and the outside of the conductor cores 23, "through which any excess hardenable compound 125 can exude." P. 25, lines 17-18. This is a very different solution than the one of the present invention. Hand seeks to block the gaps between the seal and the hardenable compound by filling them with the hardenable compound exuded into the gaps. The invention seeks to block the gaps with the seal and prevent the hardenable compound from flowing into or past the blockage created by the seal. A liquid resin could not be used with the barrier 105 in the embodiment of Figs. 5-7 of Hand because it would flow through the gap 127. A person skilled in the art would not look to the seal embodiment of Figs. 1-4 because that embodiment is not designed to be used with any hardenable compound, and from the teachings of Hand if it was tried the conventional wisdom would have been to fill the volume between the seal and the conductor bundle like the gap 127 is filled.
13. In the invention and as stated on page 8 of the application, the aperture in the seal 32 is sized such that it stretches to pass around the conductors 20 to form a reasonably effective barrier to passage of the material 6 along the space defined between the conductors 20 and the compound tube 26. The seal 18 and barrier 105 of Hand are not intended or designed to stretch so as to pass around multiple conductors to form a barrier to passage of liquid material and would not function for that purpose.
14. The barrier of the invention, because of its planar structure with a small aperture and ability to stretch, forms a seal against multiple conductors because it stretches to bridge the gaps between their outer surfaces. There is no teaching or suggestion to use a barrier

such as Hand with multiple conductors and in fact such a barrier would not be approved if used alone. Hand itself teaches that when a hardenable compound is used, the barrier should have form a gap with the conductors so the compound can exude into the gap between the smallest diameter of the barrier and the conductors. This is unlike the present invention where the conductors touch the seal and the seal stretches from conductor to conductor to block flow of the hardenable compound from flowing outside of the well in the gland where the compound is injected.

15. It is my opinion that a person of ordinary skill in the art would believe that neither the seal nor barrier of Hand would work to contain a liquid resin, and I am also of that opinion for the reasons stated above. I do not believe there is any disclosure or suggestion in Hand or the other prior art I have reviewed to use a stretchy barrier with a hole sized so that it stretches around multiple conductors to form a barrier to the progression of resin filler along the outer surfaces of multiple conductors, and that this contribution to the art would not have been obvious to a person of ordinary skill in the art at the time it was invented.
16. The two-part resin bag as disclosed by Kaptein is also well known, but in the form described by Kaptein it would not work with a resin system used with cable glands. This is because the bag described by Kaptein has a large opening and is used to fill a void that also has a large opening. The enclosure to be filled is relatively large and the resin is introduced from the top. As the enclosure is relatively large it will be easy for air to displace from it, but in any case the resin material is used there to protect the cable joint and it will not matter if air is trapped in the cured material. In the case of a cable gland for use in explosive atmospheres, it is essential that no air is trapped. Also the cavity in the gland that has to be filled with resin is relatively small and packed with cables (up to 80% of the void is filled with cable cores), so any system where resin is poured from the top surface will not work as air will be trapped and/or the resin will not penetrate far enough. The solution is to have a bag with a thin nozzle that can be pushed between the cores of the cable to fill it from the bottom up, so driving out any air. This also by default means that the resin is being introduced at the very point at which there may be voids in the cable, making a suitable means of preventing excessive penetration of the resin vitally important.

17. I understand the Examiner's objection is that it would be obvious to modify the arrangement of Kaptein by incorporating the seal of Hand. In comparison to Kaptein, the advantages of the invention are that the invention can be used to seal a cable gland for use in explosive atmospheres by being able to use a more flowable resin for expelling air from the gaps between the cable cores and to make the assembly more compact. Kaptein would not be suitable for this application because the filling method from the top would not work for an explosion proof gland and the assembly is too big for that application.
18. Therefore, starting from Kaptein, in trying to modify the arrangement of Kaptein to make it suitable for sealing a cable gland for use in explosive atmospheres and to make it more compact, if the skilled person were to seek a solution in Hand, he would first of all look at the embodiment of Figs 5 to 8, in which a hardenable compound 125 is used to fill the gaps between the cores, since he is starting from Kaptein, which uses a settable material. This embodiment teaches the skilled person to use a material of putty like consistency, and teaches away from using a runnier resin material, since this would flow out of gap 127.
19. It is my opinion that the skilled person would not consider the embodiment of Figs. 1 to 4 of Hand at all, since he is starting from Kaptein, which uses a settable material, and the embodiment of Figs 5 to 8 of Hand addresses the use of settable material, whereas the embodiment of Figs 1 to 4 of Hand does not. However, if he did consider the embodiment of Figs 1 to 4 of Hand, there is nothing to suggest that the seal 18 of that embodiment is suitable for use as a resin dam. Why use the seal 18 of the embodiment of Figs 1 to 4 as a resin dam when there is no suggestion of this in that embodiment and the embodiment of Figs 5 to 8 does describe how to make a barrier from settable material? In addition, the seal 18 of the embodiment of Figs 1 to 4 of Hand necessarily has two tubular parts separated by a conical part, since it must form a strong seal (i.e. strong enough to withstand an explosion) at its inner and outer diameters. If he tried to use the seal 18 as a resin dam, he would find that it did not adequately close the gaps between the cable cores, because of the inner tubular part (second cylindrical portion 24) being of material strong enough to withstand an explosion. He would therefore not be able to use a more flowable resin, and would therefore have air voids in the resin, and would not be

able to make the gland more compact because of the cylindrical portions 20, 24 interconnected by a conical portion 22.

20. The existence in a single document (Hand) of an embodiment (Figs. 1 to 4) using a strong seal to withstand explosions in close proximity to an embodiment (Figs. 5 to 8) in which a hardenable barrier material is used suggests that it was not obvious to use the seal 18 of the embodiment of Figs. 1 to 4 as a resin dam for the hardenable material of the embodiment of Figs. 5 to 8, given the additional benefit of then being able to make the resin dam from weaker material that then better filled the gaps between the cores and could extend perpendicularly to the cable cores. The embodiment of Figs. 1 to 4 of Hand suggests that the seal 18 has to be of strong enough construction to withstand an explosion, and the embodiment of Figs. 5 to 8 has a barrier sleeve 105 strong enough to enable excess hardenable compound 125 to exude through gap 127 (see page 25, lines 14 – 18 of Hand). There is no disclosure or suggestion of providing a resin dam of stretchy material or of using liquid curable material.
21. The resin dam disclosed in the '539 application differs from other cable gland seals in construction in that it forms a thin membrane that sits essentially perpendicular to the cable or cable cores. It has a central small hole that can be stretched open easily whilst the seal remains essentially perpendicular to the cable/cable cores. This is important because the resin dam sits at the base of a tubular section that is filled with the barrier material. The length of barrier material must be a minimum of 20mm to satisfy certification requirements and if the seal opens up in a manner that protrudes into this tube it will either compromise the barrier or the whole assembly would need to be longer to compensate for this (See attached Exhibit C, sketches 1 and 3). The resin dam is also weak in construction because it is important that it fills the gaps between cable cores, but does not necessarily squeeze them together too hard (Exhibit C, sketch 2). This is because the ideal barrier is one in which the barrier material has penetrated between the cable cores, not one where the cores have been squeezed together as this may have left gaps that are too small for the barrier resin to penetrate, but along which gas driven by an explosion could pass.
22. CMP's product that embodies this invention is the RapidEX cable gland product line. The RapidEX has enjoyed much commercial success as it has cannibalized sales of

glands like the first and second embodiments of Hand. The commercial success attributed to the invention indicates a substantial need for the invention and that previously the invention was not obvious. Since the launch of the liquid resin system in 2010 the sales of units using it have rapidly increased as follows:

| Year                 | Sales - units  | Sales - value     |
|----------------------|----------------|-------------------|
| 2010                 | 4,000          | £58,000           |
| 2011                 | 32,000         | £578,000          |
| 2012                 | 197,000        | £3,139,000        |
| 2013 (Year to date)  | 291,000        | £4,923,000        |
| <b>TOTAL to date</b> | <b>524,000</b> | <b>£8,699,000</b> |

23. This product has won so much business away from traditional epoxy putty type barrier glands that there is now at least one competing product on the market copying the thin stretchable barrier in combination with a liquid resin that did not exist before. The reason the product is so successful is because of this combination and the advantages that result from it. Those are that this combination provides a faster, easier, cleaner and more reliable solution to providing an explosion proof gland because of the design of the barrier in conjunction with the liquid resin as claimed and is evidence of fulfilling a long felt but unsolved need to support the unobviousness of the invention.
24. The commercial success is not due to other factors, as there have been no unusual price concessions made, marketing pushes, distribution factors or other factors that have resulted in the success. The main thing that has resulted in this success is the combination of the stretchy barrier in combination with the liquid resin in my opinion. That is why customers prefer this product over the prior products that used a less flowable putty material as the filler or used a self supporting barrier.
25. Exhibit D is a copy of printed materials of Crouse-Hinds advertising the "Terminator™ II TMCX Cable Glands and states "Gland contains integral dam to facilitate liquid pour" and "Its unique design features, coupled with our new fast curing "Chico® LiquidSeal compound, make the Terminator™ II TMCX Cable Gland the easiest and safest solution available." This is referring to the dam and liquid resin combination as being unique and new, and the easiest and fastest solution available for making an explosion proof gland. There is also a youtube video at <http://www.youtube.com/watch?v=-0GRwRUpZMI> of Crouse-Hinds that shows a gland with a stretchy resin dam and the liquid resin being

poured into it. What it doesn't say is that these features were copied from CMP. These laudatory statements, and the copying in itself, suggest that the liquid resin system in combination with the stretchy barrier that is the subject of the claims of the '539 application made a significant advance in the field to satisfy a previously unfulfilled need and was not previously obvious.

26. I find no teachings prior to the invention that would have disclosed or suggested the invention to a person of ordinary skill in the art. For the above reasons, it is my opinion that there is no disclosure or suggestion in any of the prior art I've reviewed that would have made any of the claims of the '539 application obvious to a person of ordinary skill in the art at the time the invention was made. It is clear to me that it would have required inventiveness to create the claimed combinations from my experience and the prior art I have discussed above. Only in hindsight, which is not allowed, could a person go back and find various teachings peppered within the prior art, and put them together using the claims as a template. But prior to the invention of the '539 application, it is clear to me that it would not have been obvious to a person of ordinary skill in the art to make this combination.

All statements made herein are of my own knowledge and are true to the best of my personal knowledge, and all statements made on information and belief are believed to be true. I understand that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. § 1001), and may jeopardize the validity of the '539 application.

Executed this 18<sup>th</sup> day of March, 2014, in CRAMLINGTON, UK.



\_\_\_\_\_  
Geoffrey I. Mood



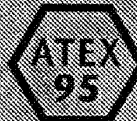
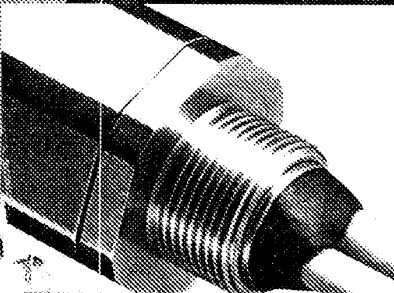


CMP Products - Industrial and Hazardous Area Cable Glands and Accessories



# CMP PRODUCTS

*Incorporating Triple Certified Products*



## SEPTEMBER 2007

**Industrial and Hazardous Area Cable Glands and Accessories**

EXHIBIT  
    A    

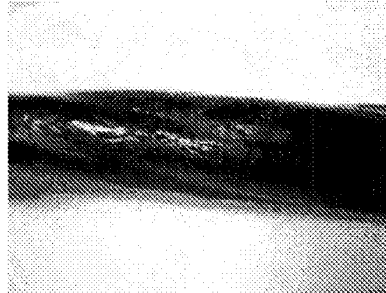
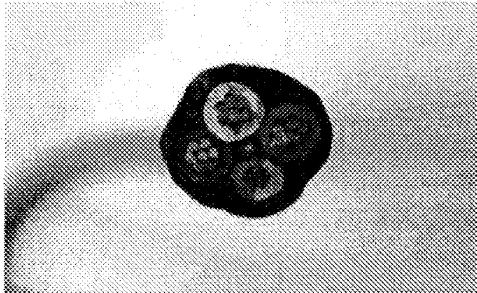
*Single Solution  
Three Forms of Protection  
Ex d / Ex e / Ex nR*



**Cable Construction – Should be Round**

In order to comply with IEC installation standards, cable glands using elastomeric sealing rings as a means of maintaining the Flameproof protection method can only be used if the cable selected is :-

“Substantially compact and circular with an extruded bedding, and if any fillers are used they are Non-Hygroscopic”



This is clearly not always the case with cables used in hazardous areas.

e.g., where cables run across two zones, or indeed from a hazardous area into a safe area.

But the cable must play a part in the safety of the installation, even in the case of indirect cable entry, when gas migration must be avoided

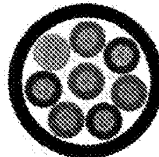
**Sample IEC Cable Configurations**

Which type is suitable for use with Flameproof Ex d equipment when a cable gland with an elastomeric sealing ring would be considered ?

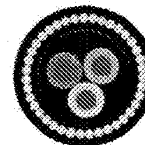
**Cable A**



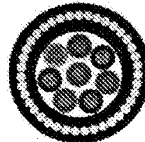
**Cable B**



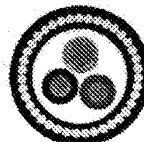
**Cable C**



**Cable D**



**Cable E**



**Cable A** is not suitable to apply a Flameproof sealing ring as this cable is the incorrect shape, and unless the cable is round the sealing ring will not be able to make an effective seal on the cable.

has an extruded inner cable bedding and there is no gas migration path between the conductors.

**Cables B, D & E** are not suitable to apply a Flameproof sealing ring, as the white areas represent a gap or void in the cable whereby there is either no inner cable sheath, or extruded bedding, or suitable fillers are absent. In this case no protection to the interstices of the cable can be offered by a sealing ring.

Equally, if the cable is not adequately filled, and allows the passage of air or gas to flow along the cable length then there would be no protection to the inner part of the cable when an elastomeric sealing ring is used. In this case a compound barrier type cable gland is the only safe solution and this is needed to maintain the integrity of the equipment as explained above, and prevent gas migration from equipment to equipment, or hazardous areas to safe areas.

**Cable C** is the only one of the five sample cables illustrated which could be selected as correctly meeting the IEC 60079-14 criteria, as it

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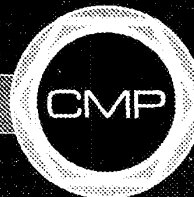
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TPC 2007 - Issue 09/07

Cooper Ex. 1002

# INSTRUCTION FOR UNILET SEALING FITTINGS APPROVED FOR USE WITH: APPLETON Kwiko® A AND CROUSE-HINDS Chico® A SEALING CEMENT

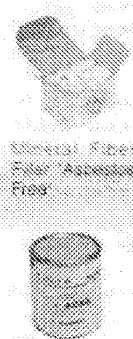
\* The National Electrical Code in Article 501 Section 501.15 Class I, Division 1 and 2, requires that seals be installed in specific locations. This is to prevent the passage of gases, vapors or flames through the conduit from one portion of the electrical installation to another portion.

\* Appleton sealing unilets are UL listed for use in hazardous locations with Appleton Kwiko A compound or Crouse Hinds Chico A compound only. These compounds, when properly mixed and poured, hardens into a dense and strong mass which is insoluble in water, is not attacked by petroleum products and is not softened by heat.

\* The following sealing fitting series are UL listed for use with Appleton Kwiko A or Chico A sealing compounds:  
EYF, EYF-AL, EYM, EYM-AL, EYDM, EYDM-AL, EYD, EYS, EYSF, EYSF-AL, EYSM, EYSM-AL, ESUF, ESUM

**WARNING:**

*Failure to follow safety instructions may cause ignition of hazardous atmosphere resulting in serious personal injury and / or property damage.*



**STEP 1**  
Install unilet and pull conductors through.  
\* Remove plug(s) from sealing fitting and use fiber filler to make dam (s) in hub(s).

**STEP 2.**  
**DAMMING:** Separate each conductor and pack fiber filler tightly into hub(s) behind conductors and around each conductor.  
\* These conductors must not touch each other nor the sealing fitting wall.  
\* Clean fiber shreds away from walls or conductors to prevent them from causing flame and / or leakage of gases. Finished dam must be flush with conduit hub bushing.

**CAUTION**

Refer to Table 1 to determine the maximum number and size of conductors allowed in a seal. (Page 4)

**STEP 3.**  
**Mixing:** Prepare sealing compound using a completely clean mixing vessel in each batch. Shake the sealing cement thoroughly in all directions. Mix sealing cement with correct proportion of clean water as noted below.

**APPLETON Kwiko A and CROUSE-HINDS Chico A CEMENT.** Add one (1) part water to two (2) parts cement by volume. Use cold water, warm water increases setting speed. Add water and stir immediately and thoroughly.  
\* **DO NOT** mix more than can be poured in 15 minutes after adding water.  
\* These cements are **NOT INSULATING COMPOUNDS** and **MUST NOT** be used for such purposes.

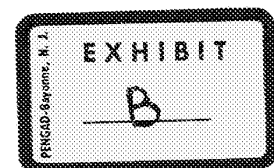
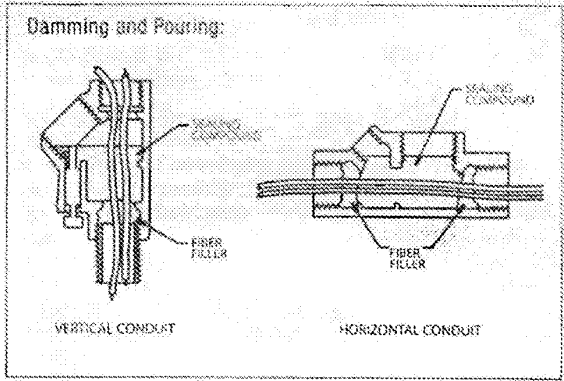
**CAUTION: TEMPERATURE/CURE TIME**  
**APPLETON Kwiko A and CROUSE-HINDS Chico A CEMENT**

**FOR GROUPS C AND D APPLICATIONS:** Sealing compound to be mixed **ONLY** at temperatures above 35° F (1.7° C) and **ONLY** poured into fittings that have been brought to a temperature above 35° F (1.7° C). Seals must **NOT** be exposed to temperatures below 35° F (1.7° C) for a least 8 hours. Compound must be allowed 8 hours to cure to full strength before energizing system.

**FOR GROUPS A AND B APPLICATIONS:** Sealing compound to be mixed **ONLY** at temperatures above 40° F (4.4° C) and **ONLY** poured into fittings that have been brought to a temperature above 40° F (4.4° C). Seals must **NOT** be exposed to temperatures below 40° F (4.4° C) for a least 72 hours. Compound must be allowed 72 hours to cure to full strength before energizing system.

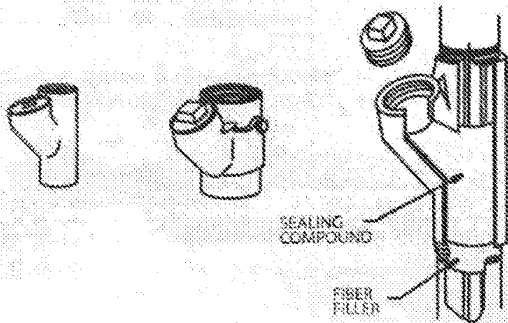
**STEP 4**  
**VERTICAL CONDUIT RUN.** Pour sealing cement mixture into the small pipe opening until the cement is level with the last thread of the opening. Replace and tighten small pipe plug.

**HORIZONTAL CONDUIT RUN.** Pour sealing cement mixture into the unilet through the large opening until two (2) to three (3) threads are covered with the cement.  
\* Replace and tighten in sequence the large pipe plug or cover the small pipe plug into the unilet and the small pipe plug into the cover.



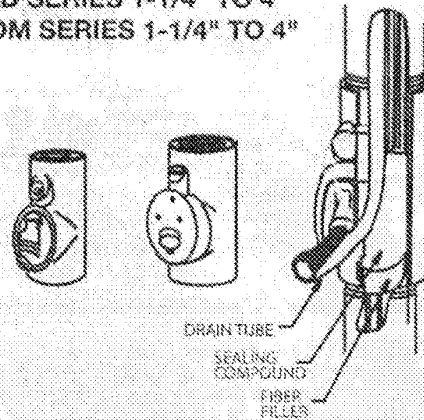
## SEALING UNILETS, EXPLOSION-PROOF, DUST-IGNITION-PROOF FOR USE IN VERTICAL CONDUIT RUNS.

### EYSF AND EYSM SERIES 1/2" TO 4" EYS 1/2" TO 1"



1. Install Unilet and pull conductors through.
2. Remove the large pipe plug. Tighten the small pipe plug on side of 3" and 4" Unilet sizes.
3. Dam the lower hub opening with Fiber Filler. (Page 1, Steps 1 & 2)
4. Mix sealing cement with the correct proportion of water per instructions provided with the cement. (Page 1, Step 3).
5. Pour Sealing Cement mixture into the Unilet opening until the cement is level with the last thread.
6. Replace and tighten pipe plug.

### EYD SERIES 1-1/4" TO 4" EYDM SERIES 1-1/4" TO 4"



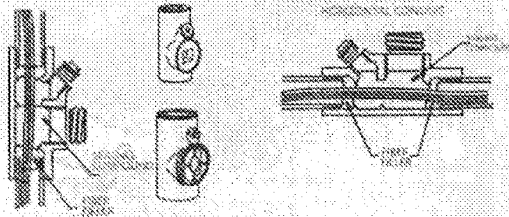
1. Install Unilet and pull conductors through.
2. Remove the large threaded cover from the Unilet.
3. Dam the lower hub opening with fiber filler. (Page 1, Step 2).
4. Replace the large threaded cover so that the threaded hole is facing downward.
5. Insert the tube and wire drain core into the opening of the large threaded cover so that the end being inserted will be above the compound in a completed seal. (See illustration above).
6. Be sure that the tube and wire drain core do not touch any of the conductors. Otherwise, this will expose the conductors in the completed and hardened seal. (See illustration above).
7. Mix Sealing Cement with the correct proportion of water per instructions provided with the cement. (Page 1, Step 3).
8. Pour Sealing Cement mixture into the Unilet through the opening located above the large cover until the last thread is covered with cement.
9. After cement has cured, (See page 1, "Caution: Temperature / Cure Time") pull out the old tube and wire drain core and discard.
10. Thread the small pipe plug into this opening and tighten.
11. Thread ECDB drain-breather fitting into large cover threaded hole and tighten secure.



## SEALING UNILETS EXPLOSION PROOF, DUST IGNITION PROOF FOR USE IN VERTICAL AND/OR HORIZONTAL CONDUIT RUNS

### EYS, EYF AND EYM SERIES 1/2" TO 6"

VERTICAL CONDUIT



**NOTE:** On sizes 3-1/2" and 6" the cover should be tightened down with the small pipe plug removed from it. This will allow excess cement or air to escape but rather than seeping through or pushing the dam into the conduit. When the large cover has been tightened fully, replace pipe plug.

#### Vertical conduit

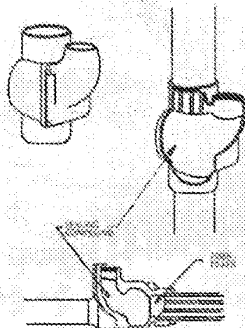
1. Install Unilet and pull conductors through.
2. Remove the pipe plug where the cement will be poured through and the large pipe plug or cover with the small pipe plug for size 3-1/2" - 6" at the center of the Unilet.
3. Dam the lower hub with fiber filler. (Page 1, Steps 1 & 2.)
4. Replace the large pipe plug or cover with the small pipe plug for 3-1/2" thru 6" and tighten all threaded joints securely.
5. Mix Sealing Cement with the correct proportion of water per instructions provided with the cement. (Page 1, Step 3).
6. Pour Sealing Cement mixture into the small pipe plug opening until the cement is level with the last thread of the opening.
7. Replace and tighten small pipe plug.

#### Horizontal conduit

1. Install Unilet and pull conductors through.
2. Remove all pipe plugs and / or cover from the Unilet.
3. Dam both hubs with fiber filler. (Page 1, Steps 1 & 2)
4. Mix Sealing Cement with the correct proportion of water per instructions provided with the cement. (Page 1, Step 3).
5. Pour Sealing Cement mixture into the Unilet through the large opening until 2-3 threads are covered with the cement. Fill hole must be oriented in the upright position.
6. Replace and tighten in sequence the large pipe plug or cover, the small pipe plug into the Unilet and the small pipe plug into the cover.

### ESUF AND ESUM SERIES 1/2" TO 1"

VERTICAL CONDUIT



HORIZONTAL CONDUIT

#### Vertical Conduit

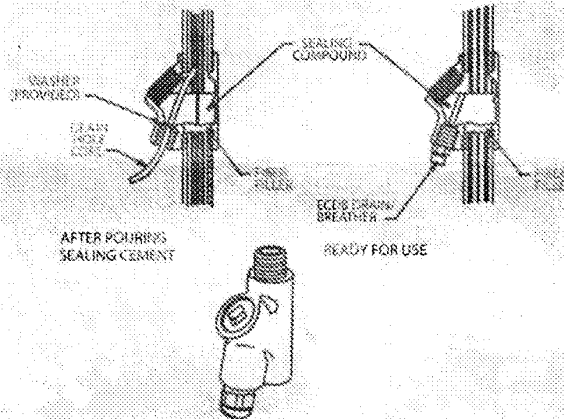
1. Install Unilet and pull conductors through.
2. Remove flanged cover and the pipe plug from the Unilet.
3. Dam the lower hub opening with fiber filler (Page 1, Steps 1 & 2).
4. Replace the flanged cover.
5. Mix Sealing Cement with the correct proportion of water per instructions provided with the cement (Page 1, Step 3).

6. Pour Sealing Cement mixture into the flanged cover opening until the cement level is equal to the last thread of the opening.
7. Replace and tighten the small pipe plug.

#### Horizontal Conduit

1. Install Unilet and pull conductors through.
2. Remove the flanged cover.
3. Dam both hub openings with fiber filler. (Page 1, Steps 1 & 2).
4. Mix Sealing Cement with the correct proportion of water -- per instructions provided with the cement. (Page 1, Step 3).
5. Pour Sealing Cement mixture into the Unilet opening until the cement level is equal to the bottom of the cover mounting flange. Fill hole must be oriented in the upright position.
6. Replace the flanged cover, tighten the small pipe plug.

### EYD AND EYDM SERIES 1/2" TO 1" DRAIN AND SEALING UNILETS EXPLOSION-PROOF, DUST-IGNITION-PROOF FOR USE IN VERTICAL CONDUIT RUNS



1. Install Unilet and pull conductors through.
2. Remove the pipe plug.
3. Dam the lower hub opening with fiber filler (See page 1, Steps 1 and 2).
4. Insert rubber drain-hole core through drain opening and washer (provided) high enough so inner end of core will be above sealing compound in completed seat.

**Note:** Washer (provided) must be inserted to last thread to form dam for sealing compound.

5. Be sure that the rubber drain - hole - core does not touch any of the conductors.
6. Mix Sealing Cement with the correct proportion of water per instructions provided with the cement (Page 1 Step 3).
7. Pour Sealing Cement mixture into the Unilet opening until the cement is level with the last thread of the opening.
8. Replace and tighten pipe plug.
9. When cement has cured (see page 1, "Caution: Temperature / Cure Time") remove drain - hole - core.
10. Thread ECCB drain - breather fitting into threaded hole and tighten securely.

**TABLE 1**

**THE MAXIMUM NUMBER OF CONDUCTORS THAT CAN BE SEALED IN A SEALING FITTING**

- The maximum number of No. 4 Type THHN Conductors (Column B) in a 1-1/2" size sealing fitting is 6.
- The six (6) No. 4 THHN conductors represent the maximum wire fill of 25% or less for sealing fittings.
- Increasing the sealing fitting to a 2" trade size will provide space for the 40% wire fill, or nine (9) No. 4 conductors.

The Maximum number of wires that can be sealed in a fitting are as follows:

**Example On How To Use Table 1**

| Trade Size | Conductor Size | Type          | Max. No. Permitted For 25% Fill | Max. No. Permitted For 40% Fill (Trace Size Sealing Fitting Allowed) |
|------------|----------------|---------------|---------------------------------|--|
| 1-1/2"     | No. 4          | THHN (Col. B) | 6                               | (9)  |

In our example, use an EYM / EYF300 for 2" size EYSF / ESUM, EYD, EYDM,

| Size<br>AWG or<br>Kcmil | 1/2" Seal<br>(EYM/EYF Seal) |           | 3/4" Seal<br>(EYM/EYF Seal) |            | 1" Seal<br>(EYM/EYF Seal) |          | 1-1/4" Seal<br>(EYM/EYF Seal) |            | 1-1/2" Seal<br>(EYM/EYF Seal) |            | 2" Seal<br>(EYM/EYF Seal) |            | 2-1/2" Seal<br>(EYM/EYF Seal) |            | 3" Seal<br>(EYM/EYF Seal) |            | 3-1/2" Seal<br>(EYM/EYF Seal) |            | 4" Seal<br>(EYM/EYF Seal) |            | 5" Seal<br>(EYM/EYF Seal) |            | 6" Seal<br>(EYM/EYF Seal) |             |            |
|-------------------------|-----------------------------|-----------|-----------------------------|------------|---------------------------|----------|-------------------------------|------------|-------------------------------|------------|---------------------------|------------|-------------------------------|------------|---------------------------|------------|-------------------------------|------------|---------------------------|------------|---------------------------|------------|---------------------------|-------------|------------|
|                         | A                           | B         | A                           | B          | A                         | B        | A                             | B          | A                             | B          | A                         | B          | A                             | B          | A                         | B          | A                             | B          | A                         | B          | A                         | B          | A                         | B           |            |
| 18                      | 7                           | 11        | 12                          | 20         | 23                        | 35       | 37                            | 50         | 62                            | 76         | 105                       | 128        | 176                           |            |                           |            |                               |            |                           |            |                           |            |                           |             |            |
| 16                      | 5                           | 9         | 10                          | 18         | 17                        | 27       | 35                            | 45         | 55                            | 68         | 92                        | 115        | 155                           |            |                           |            |                               |            |                           |            |                           |            |                           |             |            |
| 14                      | 3                           | 6(10 1/2) | 6                           | 12(20 7/8) | 10                        | 24       | 19                            | 30(27 7/8) | 29                            | 37(28 7/8) | 47                        | 60(34 7/8) | 78                            | 102        | 141                       |            |                               |            |                           |            |                           |            |                           |             |            |
| 12                      | 3                           | 6(10 1/2) | 3                           | 11(18 1/2) | 6(11 1/2)                 | 12       | 15                            | 20(21 1/2) | 21                            | 27(28 1/2) | 35                        | 45(48 1/2) | 58                            | 76         | 101                       |            |                               |            |                           |            |                           |            |                           |             |            |
| 10                      | 1(2-1/4)                    | 1(6 1/2)  | 1                           | 7(14 1/2)  | 2                         | 11       | 13                            | 17(20 1/2) | 17(18 1/2)                    | 22(24 1/2) | 29                        | 37(41 1/2) | 48                            | 62         | 82                        | 107        | 141                           | 185        | 241                       | 311        |                           |            |                           |             |            |
| 8                       | 1                           | 2(7 1/2)  | 2                           | 4(8 1/2)   | 4                         | 6(8 1/2) | 7                             | 11         | 13                            | 17(20 1/2) | 22                        | 28         | 37                            | 48         | 62                        | 82         | 107                           | 141        | 185                       | 241        | 311                       | 401        | 511                       | 651         |            |
| 6                       | 1                           | 1         | 1                           | 2(4 1/2)   | 2                         | 4(8 1/2) | 5(11 1/2)                     | 7(11 1/2)  | 9                             | 13(20 1/2) | 17                        | 22         | 28                            | 37         | 48                        | 62         | 82                            | 107        | 141                       | 185        | 241                       | 311        | 401                       | 511         |            |
| 4                       | 1                           | 1         | 1                           | 1(4 1/2)   | 1                         | 2(8 1/2) | 3                             | 4(8 1/2)   | 5                             | 7(20 1/2)  | 10                        | 13         | 17                            | 22         | 28                        | 37         | 48                            | 62         | 82                        | 107        | 141                       | 185        | 241                       | 311         |            |
| 3                       |                             |           | 1                           | 1          | 1                         | 2(8 1/2) | 3                             | 4(8 1/2)   | 5                             | 7(20 1/2)  | 10                        | 13         | 17                            | 22         | 28                        | 37         | 48                            | 62         | 82                        | 107        | 141                       | 185        | 241                       | 311         |            |
| 2                       |                             |           | 1                           | 1          | 1                         | 1(8 1/2) | 3                             | 3(8 1/2)   | 4(8 1/2)                      | 6          | 7(20 1/2)                 | 9          | 11(20 1/2)                    | 14         | 17                        | 22         | 28                            | 37         | 48                        | 62         | 82                        | 107        | 141                       | 185         |            |
| 1                       |                             |           | 1                           | 1          | 1                         | 1        | 1                             | 1(8 1/2)   | 3                             | 3(8 1/2)   | 4(8 1/2)                  | 6(8 1/2)   | 7                             | 9(20 1/2)  | 11                        | 14(20 1/2) | 18                            | 22(20 1/2) | 28                        | 37(20 1/2) | 48                        | 62(20 1/2) | 92                        | 115(20 1/2) |            |
| 1/0                     |                             |           | 1                           | 1          | 1                         | 1        | 1                             | 2(8 1/2)   | 3                             | 3(8 1/2)   | 4                         | 6(8 1/2)   | 8                             | 10(20 1/2) | 13                        | 17(20 1/2) | 22                            | 28(20 1/2) | 37                        | 48(20 1/2) | 62                        | 76(20 1/2) | 105                       | 128(20 1/2) |            |
| 2/0                     |                             |           |                             |            | 1                         | 1        | 1                             | 1(8 1/2)   | 3                             | 3(8 1/2)   | 4                         | 6(8 1/2)   | 8                             | 10(20 1/2) | 13                        | 17(20 1/2) | 22                            | 28(20 1/2) | 37                        | 48(20 1/2) | 62                        | 76(20 1/2) | 105                       | 128(20 1/2) |            |
| 3/0                     |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 2(8 1/2)   | 3                             | 4(20 1/2)  | 5                         | 7(20 1/2)  | 9                             | 11(20 1/2) | 14                        | 17(20 1/2) | 22                        | 28(20 1/2) | 37                        | 48(20 1/2)  |            |
| 4/0                     |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 250                     |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 300                     |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 350                     |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 400                     |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 500                     |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 600                     |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 750                     |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 900                     |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 1000                    |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 1250                    |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 1500                    |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 1750                    |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |
| 2000                    |                             |           |                             |            | 1                         | 1        | 1                             | 1          | 1                             | 1          | 1                         | 1          | 2(8 1/2)                      | 3          | 4(20 1/2)                 | 5          | 7(20 1/2)                     | 9          | 11(20 1/2)                | 14         | 17(20 1/2)                | 22         | 28(20 1/2)                | 37          | 48(20 1/2) |

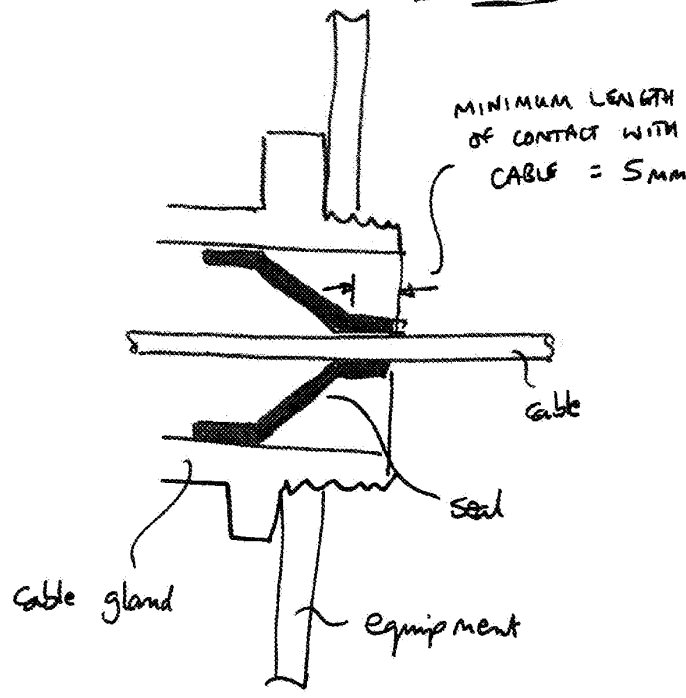
\* COL. A = Wire Types: RFH-2, RH, RHH, THW, TH, XHHW (AWG 14-6).

\* COL. B = FEP, THHN, THWN, TFM, PF, PGFF, XHHW (AWG4-2000 MCM), FEPBV (AWG 14-8).

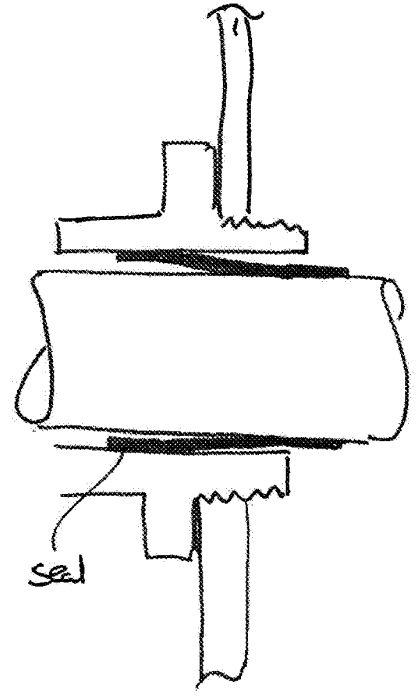
NOTE: For all other conductor sizes and types, wire fill is based on maximum 40% fill or less depending on conduit size and conductor type per the NEC Code.  
 • For all other conductor sizes and types, wire fill is based on maximum 25% fill or less.



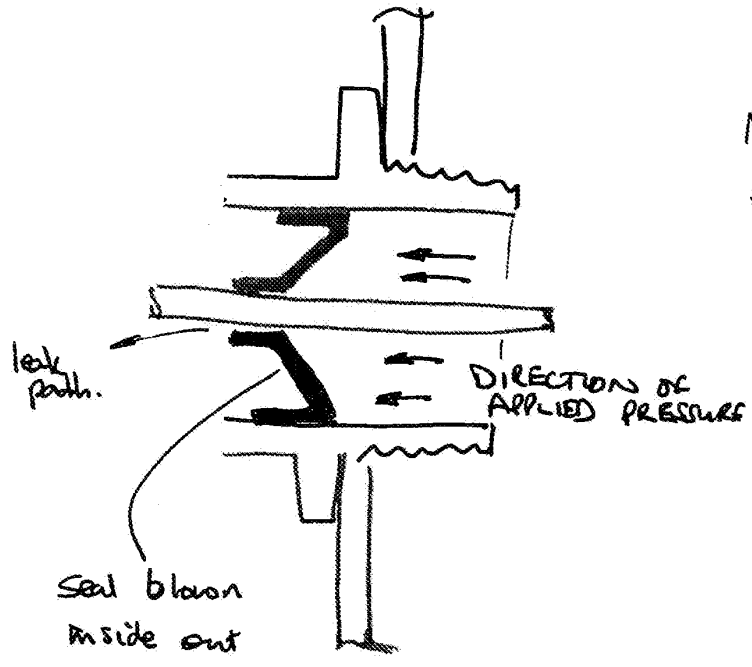
SKETCH 1



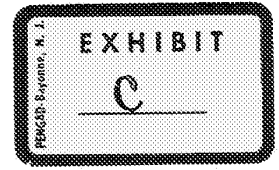
SEAL FITTED TO MINIMUM SIZE OF CABLE



SEAL FITTED TO MAXIMUM SIZE OF CABLE

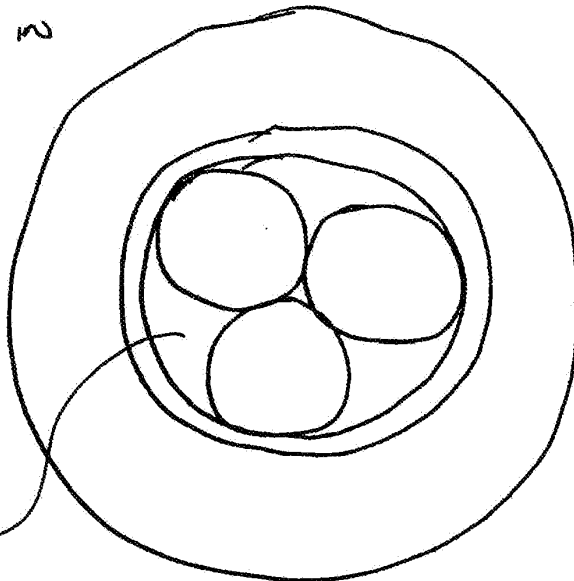


N.B. THIS TYPE OF SEAL ACTS ON THE CABLE INNER SHEATH.



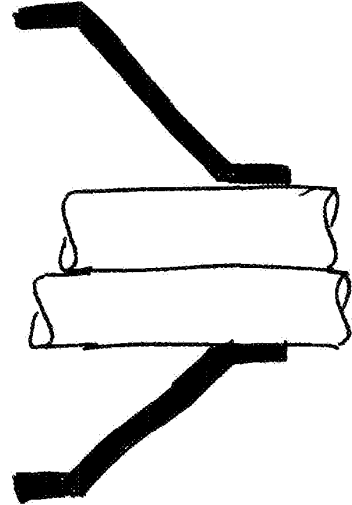
# SKETCH 2

SEAL AS  
DISCLOSED IN  
HAND



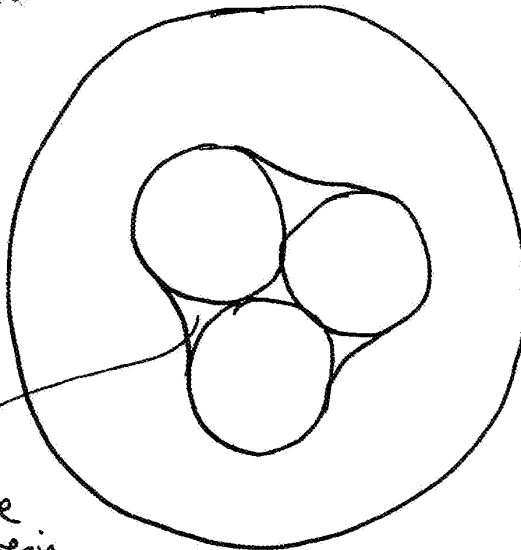
large gaps  
between  
cores

END VIEW



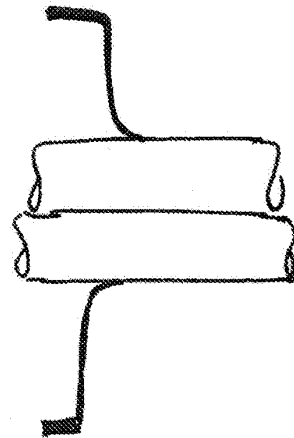
SIDE VIEW

PLANAR RESIN  
DAM.



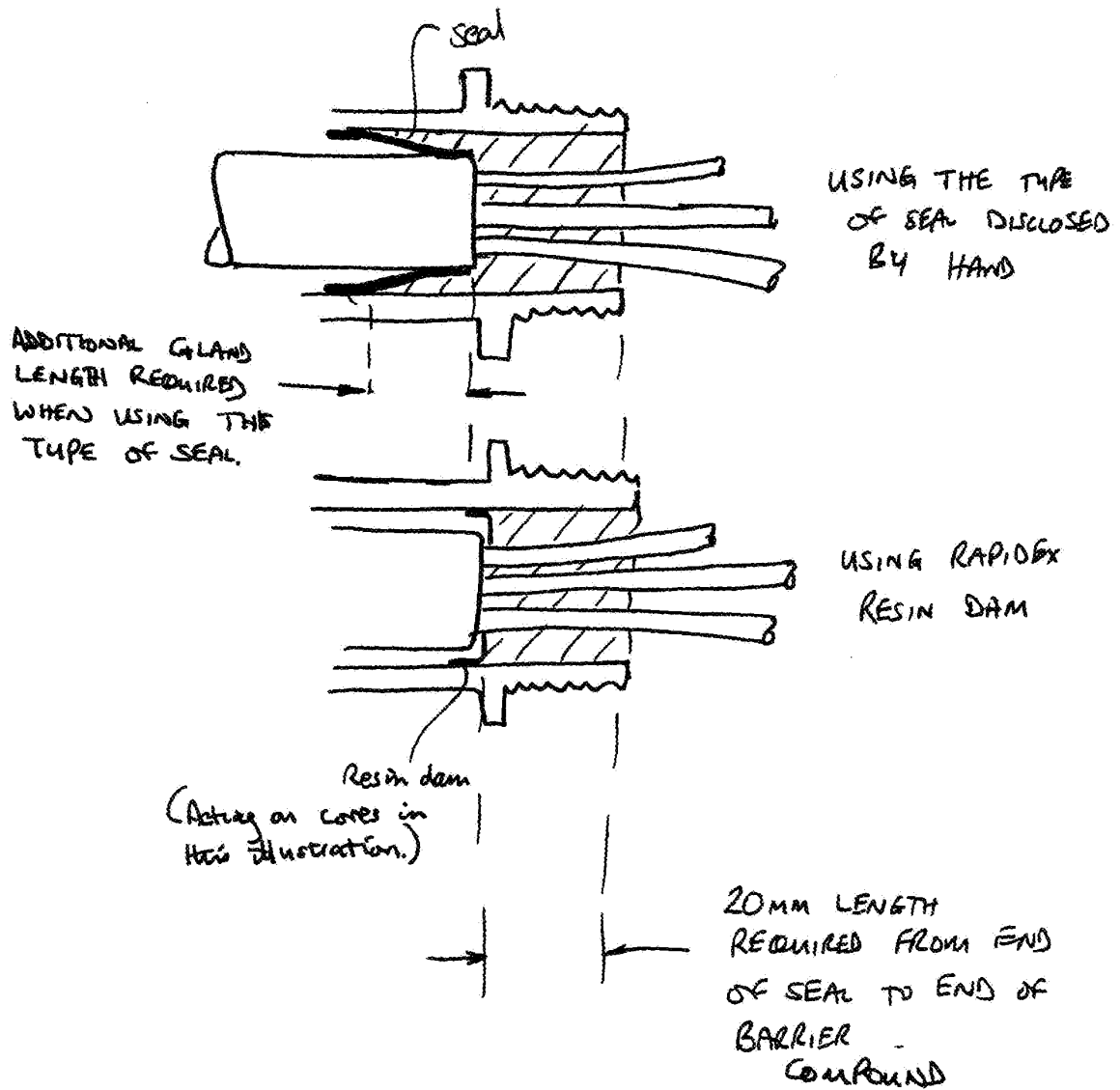
Thin membrane  
nature of the resin  
dam allows it to  
fill gaps between  
the cable cores.

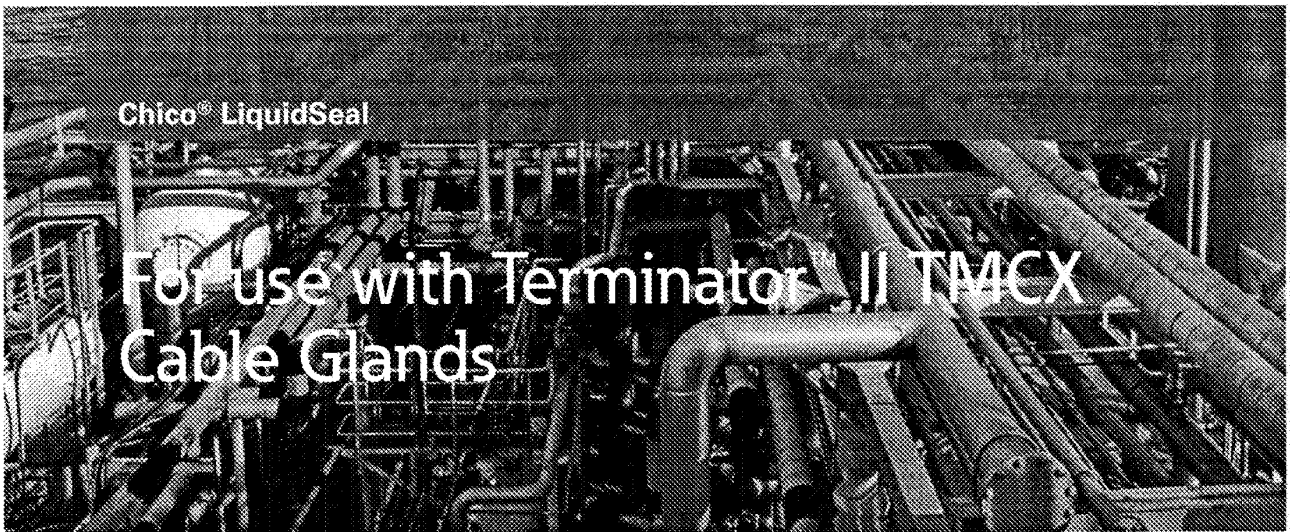
END VIEW



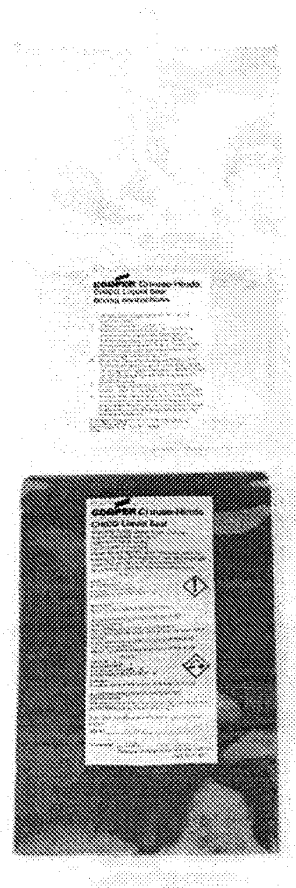
SIDE VIEW

SKETCH 3





Get your machine back up and running in 2 hours\*



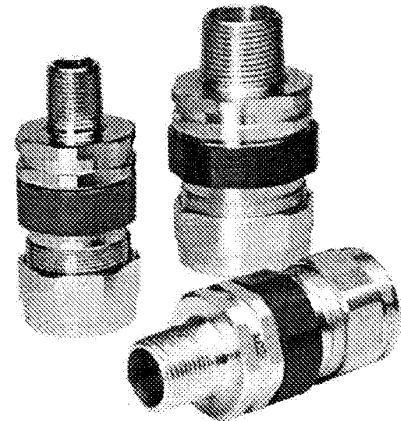
**Features:**

- Highly engineered rapid curing compound
- Mixing time: 2 minutes
- Application: pour/gun
- Gel time: 15-30 minutes\*
- Full cure/return to service time: 2 hours\*
- Available for installation in vertical position
- \* Gland contains integral dam to facilitate liquid pour

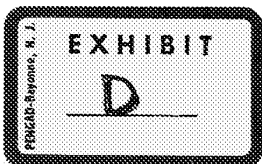
\*At 20°C ambient temperature.

**Ordering Information:**

| Catalog Number | Size (ml.) | Standard Carton Quantity |
|----------------|------------|--------------------------|
| LSC 10         | 10 ml.     | 10                       |
| LSC 20         | 20 ml.     | 10                       |
| LSC 50         | 50 ml.     | 5                        |



For more information, please view our installation video at: [www.crouse-hinds.com/videos](http://www.crouse-hinds.com/videos)



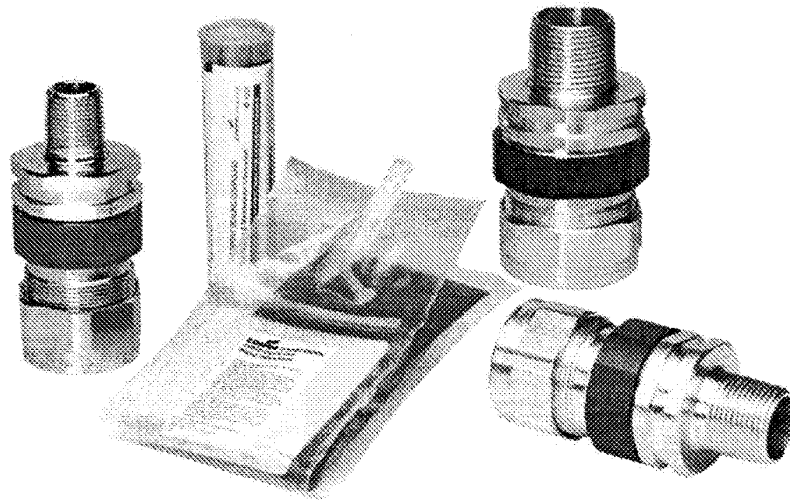
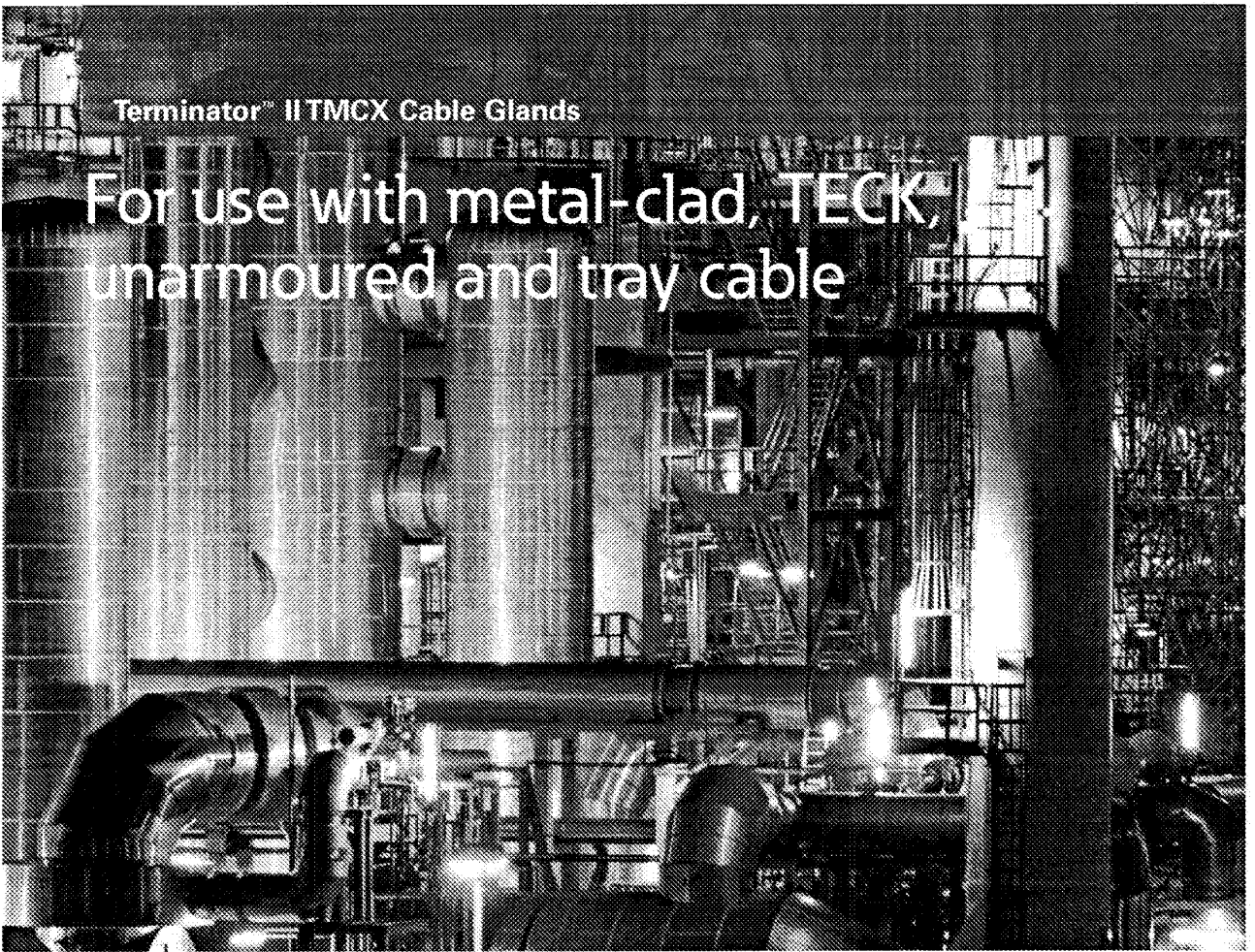
**Crouse-Hinds**  
by **EATON**

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June 2013

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Terminator™ II TMCX Cable Glands

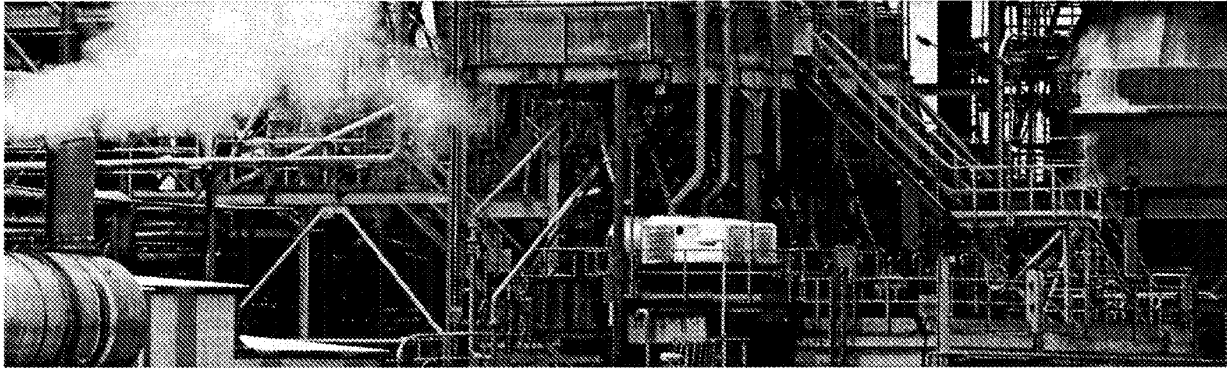
For use with metal-clad, TECK,  
unarmoured and tray cable



**Crouse-Hinds**  
by **ET•N**

Cooper Ex. 1002

# Terminator™ II TMCX Cable Glands



## The ideal gland for terminating cable in hazardous locations

The Terminator™ II TMCX Cable Gland is an armoured barrier, non-armoured barrier and TECK armoured gland used to terminate cable in hazardous locations. Its unique design features, coupled with our new fast curing Chico® LiquidSeal compound, make the Terminator™ II TMCX Cable Gland the easiest and safest solution available.

### Cable Types:

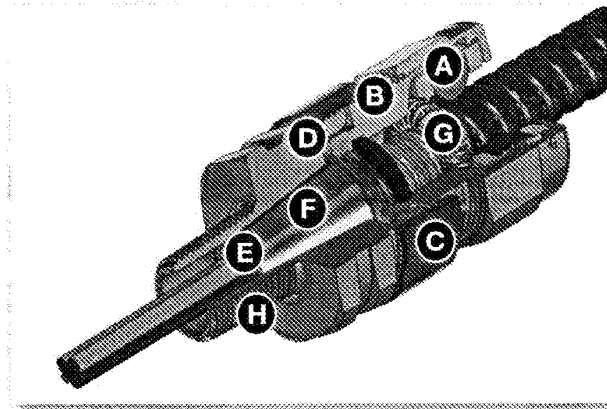
- Metal-clad and TECK (interlocked and continuously welded corrugated armoured) cable
- Unarmoured and tray cable

### Certifications and Compliances:

- Class I, Division 1, Groups A, B, C, D
- Class II, Groups E, F, G
- Class III
- NEMA 6P
- UL/cULus Listed - File No. E122485
- IECEx/ATEX (Pending)

### Features and Benefits:

- Designed to minimize the opportunity for incorrect assembly
- Simple selection process and field preparation aids to ensure the right gland is selected every time
- Full coverage of all popular cables and hub sizes, ensuring a perfect seal in all instances
- Use of nickel-plated brass and stainless steel to increase corrosion resistance and maintain integrity in the harshest environments
- Chico® LiquidSeal, an innovative liquid compound with fast gel and cure times, reduces waiting times
- Complete with integral dam to facilitate liquid pour
- Integral union design reduces the number of times the gland has to be assembled and disassembled during installation
- Mating components have generous lead-ins to ensure that assembly is as trouble-free as possible, even with the heaviest cables
- Use of neoprene seal allows use in temperatures from -40°C to +60°C; for specific temperature information, please contact your local sales representative
- Metric size threads allow interfacing to European machinery
- Wide range of global certifications and approvals



### Design Features:

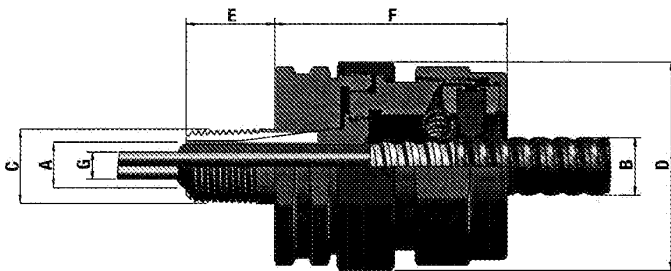
- (A) Captive sealing and back nut - the use of slip rings with snap-in features enables the TMCX to retain all of the components in the entry end of the gland.
- (B) Integral union - the design allows for a two-piece assembly gland, minimizing tightening and loosening of nuts.
- (C) Red anodized nut - this hard-wearing, permanent, consistent coating is standard on all units.
- (D) Anti-rotation feature - for single tool assembly; the splined shaft ensures that the two assemblies lock together and do not rotate during assembly.
- (E) Barrier compounds - Chico® LiquidSeal or standard TSC epoxy compound options allow for rapid curing and assembly in any orientation.
- (F) Conical compound chamber - ensures that double the misalignment can be accepted without the risk of binding.
- (G) Captive garter spring - copper flashed stainless steel ensures good connectivity, strength and corrosion resistance.
- (H) NPT and ISO threads - entire range of cable glands are available with either NPT or metric threads in all materials.

# Multiple cable ranges per hub size for simplified selection

Selection Table:

| Entry Thread 'C' | NPT Catalog No. | Entry Thread 'C' (Metric Option) | Metric Catalog No. | Over Conductors O.D. Max. Inches 'G' | 'A' Armour O.D. |              | 'B' Cable O.D.† |              | Across Corners 'D' | Thread Length NPT 'E' (Metric mm.) | Length 'F'   |
|------------------|-----------------|----------------------------------|--------------------|--------------------------------------|-----------------|--------------|-----------------|--------------|--------------------|------------------------------------|--------------|
|                  |                 |                                  |                    |                                      | Min.            | Max.         | Min.            | Max.         |                    |                                    |              |
| ½"               | TMCX050 1       | M20                              | TMCXM20 1          | 0.480                                | 0.40 (10.16)    | 0.86 (21.84) | 0.49 (12.45)    | 0.90 (22.86) | 1.56 (39.62)       | 1.00 (25.40)                       | 3.05 (77.47) |
| ½"               | TMCX050 2       | M20                              | TMCXM20 2          | 0.480                                | 0.58 (14.22)    | 1.14 (28.96) | 0.65 (16.51)    | 1.18 (29.97) | 1.99 (50.55)       | 1.00 (25.40)                       | 3.18 (80.77) |
| ¾"               | TMCX075 1       | M25                              | TMCXM25 1          | 0.713                                | 0.40 (10.16)    | 0.86 (21.84) | 0.49 (12.45)    | 0.90 (22.86) | 1.56 (39.62)       | 1.00 (25.40)                       | 3.05 (77.47) |
| ¾"               | TMCX075 2       | M25                              | TMCXM25 2          | 0.713                                | 0.98 (14.22)    | 1.14 (28.96) | 0.65 (16.51)    | 1.18 (29.97) | 1.99 (50.55)       | 1.00 (25.40)                       | 3.18 (80.77) |
| 1"               | TMCX100 1       | M32                              | TMCXM32 1          | 0.939                                | 0.56 (14.22)    | 1.14 (28.96) | 0.65 (16.51)    | 1.18 (29.97) | 1.99 (50.55)       | 1.08 (27.40)                       | 3.18 (80.77) |
| 1"               | TMCX100 2       | M32                              | TMCXM32 2          | 0.939                                | 0.78 (19.81)    | 1.35 (34.29) | 0.87 (22.10)    | 1.39 (35.31) | 2.24 (56.90)       | 1.08 (27.40)                       | 3.30 (83.82) |
| 1-¼"             | TMCX125 1       | M40                              | TMCXM40 1          | 1.172                                | 0.78 (19.81)    | 1.35 (34.29) | 0.87 (22.10)    | 1.39 (35.31) | 2.24 (56.90)       | 1.08 (27.40)                       | 3.30 (83.82) |

\*All dimensions in inches; metric millimeters shown in parenthesis. Sizes 1-½" and above will be available soon.  
†When making your cable gland selection based on Cable O.D., be sure to also observe the Over Conductors O.D. dimension.



## Catalog Numbering System:

# TMCX

# 050

# 1

# NP

# L

| Hub Size |           |        |           |
|----------|-----------|--------|-----------|
| NPT      | Hub (in.) | Metric | Hub (mm.) |
| 050      | ½"        | M20    | 20        |
| 075      | ¾"        | M25    | 25        |
| 100      | 1"        | M32    | 32        |
| 125      | 1-¼"      | M40    | 40        |

### Cable Sealing Range

| Hub Size Code | Thread   | Sealing Range Code | Standard Cable Sealing Range |
|---------------|----------|--------------------|------------------------------|
| 050           | ½" NPT   | 1                  | 0.49" - 0.90"                |
|               |          | 2                  | 0.65" - 1.18"                |
| 075           | ¾" NPT   | 1                  | 0.49" - 0.90"                |
|               |          | 2                  | 0.65" - 1.18"                |
| 100           | 1" NPT   | 1                  | 0.65" - 1.18"                |
|               |          | 2                  | 0.87" - 1.39"                |
| 125           | 1-¼" NPT | 1                  | 0.87" - 1.39"                |
|               |          | 2                  | 1.14" - 1.72"                |
| M20           | M20 ISO  | 1                  | 12.4 mm - 22.8 mm            |
|               |          | 2                  | 16.5 mm - 29.9 mm            |
| M25           | M25 ISO  | 1                  | 12.4 mm - 22.8 mm            |
|               |          | 2                  | 16.5 mm - 29.9 mm            |
| M32           | M32 ISO  | 1                  | 16.5 mm - 29.9 mm            |
|               |          | 2                  | 22.0 mm - 35.3 mm            |
| M40           | M40 ISO  | 1                  | 22.0 mm - 35.3 mm            |
|               |          | 2                  | 28.0 mm - 42.0 mm            |

| Material |                     |
|----------|---------------------|
| BLANK    | Aluminum            |
| SS       | 316 Stainless Steel |
| NP       | Nickel-plated Brass |

| Compound Type |        |
|---------------|--------|
| BLANK         | TSC    |
| L             | Liquid |

**Chico® LiquidSeal** NEW!

- Mixing time: 2 minutes
- Application: pour/gun
- Gel time: 15-30 minutes†
- Full cure/return to service time: 2 hours†
- Available for installation in vertical position
- Integral dam means no packing or taping to prevent liquid leakage

**TSC Epoxy Compound**

- Mixing time: 5 minutes
- Application: by hand
- Full cure time: 24 hours
- Available for installation in any orientation

| Chico® LiquidSeal Cat. No. | Size (ml.) | Std. Carton Qty. |
|----------------------------|------------|------------------|
| LSC 10                     | 10 ml.     | 10               |
| LSC 20                     | 20 ml.     | 10               |
| LSC 50                     | 50 ml.     | 5                |

| TSC Epoxy Compound Cat. No. | Tube Size (oz.) | Std. Carton Qty. |
|-----------------------------|-----------------|------------------|
| TSC05                       | 0.5 oz.         | 10               |
| TSC1                        | 1.0 oz.         | 10               |
| TSC4                        | 4.0 oz.         | 5                |

†At 20°C ambient temperature.

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**Crouse-Hinds**  
by **EAT-N**

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Syracuse, NY 13208  
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crouse.customerctr@cooperindustries.com



**DECLARATION OF JACK CARROLL**

1. My name is Jack Carroll, and I am the Contracts Manager for Balfour Beatty.
2. My employer is a customer of CMP Products and we have used the RapidEX product, which is a cable gland with a liquid resin filler and stretchy resin barrier that seals off the bottom of the resin well.
3. The operatives, who are our employees who actually install the cable glands, commented on the ease of use especially regarding the filling procedure. The new resin allows the installer a greater degree of confidence that all air pockets have been removed and the fill chamber is fully sealed. The reduced time to carry out the installation and curing process is also advantageous especially in this application as it was a site outage. It is certainly a product we will use again.

All statements made herein are of my own knowledge and are true to the best of my personal knowledge, and all statements made on information and belief are believed to be true. I understand that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. § 1001), and may jeopardize the validity of U.S. Patent Application No. 13/391,539.

Executed this 14 day of March, 2014, in Grangemouth.

  
\_\_\_\_\_  
Jack Carroll

**DECLARATION OF RAYMOND ABRAAS**

1. My name is Raymond Abraas, and I am employed at Ingenieursbureau De Raaij en Datema B.V. ( INRADA ).
2. My employer is a customer of CMP Products and we have used the RapidEX product, which is a cable gland with a liquid resin filler and stretchy resin barrier that seals off the bottom of the resin well.
3. Following our good experience with the RapidEX cable glands on our last 4 projects, we will continue with this type of cable gland on our current and future projects. The RapidEX cable glands with the liquid resin and stretchy barrier are faster and easier to use than the conventional compound barrier glands and, due to the liquid nature of the resin, prevent any air inclusions in the barrier.

All statements made herein are based on my own knowledge and experience and are true to the best of my personal knowledge, and all statements made on information and belief are believed to be true. I understand that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. § 1001), and may jeopardize the validity of U.S. Patent Application No. 13/391,539.

Executed this 17<sup>th</sup> day of March, 2014, in Schiedam Netherlands

  
Raymond Abraas

|   |                        |                   |            |  |
|---|------------------------|-------------------|------------|--|
| <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     |                   | 13391539   |  |
|   | Filing Date            |                   | 2012-05-02 |  |
|   | First Named Inventor   | Samuel Liam Proud |            |  |
|   | Art Unit               | 3754              |            |  |
|   | Examiner Name          | Randall A. Gruby  |            |  |
|   | Attorney Docket Number | 920257.00016      |            |  |

| U.S. PATENTS      |         |               |                        |            |   |  | Remove |
|-------------------|---------|---------------|------------------------|------------|---|--|--------|
| Examiner Initial* | Cite No | Patent Number | Kind Code <sup>1</sup> | Issue Date | Name of Patentee or Applicant of cited Document | Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear |        |
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|                          | 1       | 1279707                              | CA                          | C                      | 1991-01-29       | Bisker, Richard                                 |  | <input type="checkbox"/> |
|                          | 2       | 1333192                              | CA                          | C                      | 1994-11-22       | Cooper Industries, Inc.                         |  | <input type="checkbox"/> |
|                          | 3       | 0204843                              | WO                          | A2                     | 2002-01-17       | Southwick, Mathew D.                            |  | <input type="checkbox"/> |

|  |                        |                   |
|--|------------------------|-------------------|
| <b>INFORMATION DISCLOSURE<br/>STATEMENT BY APPLICANT<br/>( Not for submission under 37 CFR 1.99)</b> | Application Number     | 13391539          |
|  | Filing Date            | 2012-05-02        |
|  | First Named Inventor   | Samuel Liam Proud |
|  | Art Unit               | 3754              |
|  | Examiner Name          | Randall A. Gruby  |
|  | Attorney Docket Number | 920257.00016      |

|  |   |            |    |    |            |                         |  |                          |
|--|---|------------|----|----|------------|-------------------------|--|--------------------------|
|  | 4 | 2004047248 | WO | A1 | 2004-06-03 | Cooper Industries, Inc. |  | <input type="checkbox"/> |
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|                    | 1       | CMP PRODUCTS, Catalog page 59, September 2007, Newcastle Upon Tyne, England.  | <input type="checkbox"/> |
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|   | First Named Inventor   | Samuel Liam Proud |
|   | Art Unit               | 3754              |
|   | Examiner Name          | Randall A. Gruby  |
|   | Attorney Docket Number | 920257.00016      |

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

|            |                    |                     |            |
|------------|--------------------|---------------------|------------|
| Signature  | /John d. franzini/ | Date (YYYY-MM-DD)   | 2014-04-10 |
| Name/Print | John D. Franzini   | Registration Number | 31356      |

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|------|-----|------------------|
| (11) | (C) | <b>1,279,707</b> |
| (21) |     | 540,956          |
| (22) |     | 1987/06/30       |
| (45) |     | 1991/01/29       |
| (52) |     | 337-35           |

(51) INTL.CL.<sup>5</sup> H02G-15/013

(19) (CA) **CANADIAN PATENT** (12)

(54) Multi-Wire Conduit Dam

(72) Bisker, Richard G. , U.S.A.

(73) Dresser Industries, Inc. , U.S.A.

(30) (US) U.S.A. 026,766 1987/03/17

(57) 7 Claims

**Canada**

CCA 3254 (10-89) 41

540956

ABSTRACT

A multi-wire conduit dam consisting of a molded strip of closed cell sponge rubber or equivalent that is shaped like a timing belt having recesses on at least one side with the recessed surface coated with adhesive or double sided adhesive tape after wires are placed in the recesses. The strip is then rolled together to form a cylindrical dam which may then be installed in an appropriate conduit.

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BACKGROUND OF THE INVENTION

The present invention relates to a multi-wire conduit dam to provide a dam, when installed in a conduit having multiple wires, that would separate each wire  
5 from the other and, when the dam is inserted in a conduit, prevent sealing compound from entering the conduit below the dam.

In particular, the multi-wire conduit dam consists of a molded strip of closed cell sponge rubber or  
10 equivalent that is shaped like a timing belt with a plurality of notches or grooves formed therein. The wires are placed in the grooves of the dam and either liquid adhesive or double sided adhesive tape is placed over the wires and the dam. The dam is then rolled  
15 together forming a cylinder which holds its shape because of the adhesive. The wire assembly and dam are then installed in an appropriate conduit.

It is important in the electrical cable art to be able to seal wire harnesses which are installed in con-  
20 duits, each of which may have from one to forty wires passing through the conduit. This is accomplished in the prior art by putting a disk of some type, such as cork, in the end of the conduit and putting each wire in the conduit through an individual orifice in the  
25 disk. Thus the disk has at least as many orifice as there are wires. The wires can then have electrical



plugs or connectors attached to the ends thereof and the dam can be sealed in the conduit with a sealant of any well-known type by filling the end of the conduit with the sealant to the point at which the disk is  
5 located within the conduit.

There are obviously several disadvantages to this apparatus and process. In the first place, a difference size diameter dam must be used to seal each different size diameter conduit. Secondly, the dam  
10 must be assembled with the wire harness before the plugs and/or connectors can be put on the ends of the wires since the wires have to be inserted in the orifices in the disk. Thirdly, dams with the exact number of orifices required for the exact number of wires must  
15 be used or extra orifices must be sealed or plugged inasmuch as any unused, unplugged orifices would allow the sealing compound to pass through the orifices into the space behind the dam into the conduit.

The present invention overcomes the disadvantages  
20 of the prior art by forming the dam from a molded strip of closed cell sponge rubber such as neoprene closed cell sponge, or equivalent, and forming grooves or notches on at least one side of the molded strip so that it is shaped like a timing belt. The harness  
25 wires can be separated and each wire placed in a

1279707

3

corresponding groove or notch with an adhesive or a double sided adhesive tape placed over the wires and the strip. The strip can then be rolled together forming a cylindrical dam with the adhesive maintaining the cylindrical shape. The wire assembly and cylindrical dam are then installed in an appropriate conduit. The molded strip consists of equally spaced recesses or notches molded on at least one side, but preferably only one side of the strip to a depth of the wire diameter which will be less than half the thickness of the strip. As stated, the strips are molded of an elastic material such a neoprene which is soft enough to compress and seal any recess that does not have a wire in it to eliminate the necessity of plugs for unused recesses or notches.

The diameter of the conduit does not have to change with the present invention because a varied number of wires might be sealed in a particular conduit. The molded strip can be trimmed or simply cut to the proper length for small conduits or variations in the number of wires required to be sealed.

An adhesive or a double sided adhesive tape can be applied to the open recessed side of the molded strip to allow the strip with the wire harness, when rolled into a cylindrical shape, to hold its shape until it is

installed in a conduit. A smooth surface tape such as electricians tape may be applied to the outside of the cylindrical assembly to allow for easy insertion into the conduit. Because the elastic molded strip is  
5 formed of a compressible material, it will allow the cylindrical dam to be compressed for installation in a conduit where it will then expand to seal the inside of the conduit to prevent sealant from getting past the cylindrical dam into the conduit behind the dam.

10 Thus it is an object of the present invention to provide a multi-wire conduit dam formed of a molded strip of compressible material having a plurality of recesses on at least one side of the strip, with at least one electrical conductor positioned in a respec-  
15 tive one of the recesses and an adhesive placed over the recess and the at least one conductor to cause the strip to hold its shape when the strip is rolled into a cylinder.

It is also an object of the present invention to  
20 provide the multi-wire conduit dam formed from a molded strip of compressible material having a plurality of equally spaced recesses on at least one side of the strip for receiving the wires.

It is yet another object of the present invention  
25 to provide a multi-wire conduit dam formed from a

molded strip of compressible material having a plurality of equally spaced recesses on at least one side of the strip for receiving the wires and having a double sided adhesive tape placed over the recesses and the wires in the recesses to cause a strip to hold its shape when the strip is rolled into a cylinder.

SUMMARY OF THE INVENTION

Thus the present invention relates to a multi-wire conduit dam comprising a molded strip of compressible material having a plurality of recesses on at least one side of the strip, at least one electrical conductor positioned in a respective one of the recesses, an adhesive placed over the recesses and the at least one conductor to cause the strip to hold its shape when the strip is rolled into a cylinder, and a smooth surface tape applied to the outside of the rolled cylinder for allowing easy insertion of the cylinder with the at least one conductor into a conduit to form a conduit dam.

The invention also relates to method of forming a multi-wire conduit dam comprising the steps of forming a molded strip of compressible material having a plurality of recesses on at least one side of the strip, positioning at least one electrical conductor in the respective one of the recesses, placing an adhesive

over the recesses and the at least one conductor to cause the strip to hold its shape when the strip is rolled into a cylinder, and applying a smooth surface tape to the outside of the rolled cylinder to allow easy insertion of the cylinder with the at least one conductor into a conduit to form a conduit dam.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the present invention will be disclosed more fully in conjunction with the accompanying drawings in which like numbers represent like components, and in which:

FIG. 1 is a plan view of a neoprene strip having a plurality of recesses therein into each of which a corresponding one of a plurality of wire conductors may be placed to form a conduit dam;

FIG. 2 is a side view of the neoprene strip in FIG. 1 illustrating the timing belt effect or shape of the belt caused by the recesses or grooves equally spaced on at least one side thereof;

FIG. 3 is a plan view of the neoprene strip with wires from multiple cables being placed in respective ones of the recesses in the strip;

FIG. 4 is a cross-sectional view of the neoprene strip in FIG. 3 taken along lines A-A and illustrating an adhesive placed over the conductors and the strip to

allow the strip to be rolled into a cylinder with the adhesive holding the cylinder in its cylindrical shape;

FIG. 5 is cross-sectional view of the rolled up dam with the wires therein; and

5 FIG. 6 is cross-section view of a conduit with the dam installed therein and sealing compound placed in the end of the conduit to seal the conduit shut.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a neoprene closed cell  
10 sponge strip 10 which has a plurality of teeth-like portions 12 formed by a plurality of equally spaced recesses 14 on one side of the belt. This can be seen more clearly in FIG. 2 which is a side view of the strip shown in FIG. 1. Strip 10 is molded of an  
15 elastic material such as neoprene which is soft enough to compress and seal any recess that does not have a wire in it to eliminate the necessity of plugs for those individual recesses as will be explained hereafter. Further, the equally spaced recesses 14 are  
20 molded, preferably, on only one side of the strip 10 to a depth of the wire diameter which will be less than half the thickness of the strip 10. The strip may have a width 15 in the plan view as shown in FIG. 1 of any desired size but typically may be 7/16 of an inch. In  
25 like manner, the thickness 17 of the strip 10 shown in

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FIG. 2 may be of any desired thickness but again typically could be .250/inch with the depth 19 of the groove being less than half that or approximately .100/inch. Also, the thickness of the teeth 12 and the width of the grooves 14 as shown in the plan view in FIG. 2 could be of any desired dimensions but, again, would typically approximate .100/inches in thickness of both the teeth 12 and the width of grooves 14.

As shown in FIG. 3, a plurality of wire bundles 16, 18 and 20, each having a plurality of wires forming the bundle, may already be connected to plugs 22, 24 and 26. Typically, these wires will come from a single conduit 28. It would be desirable to place a dam near the end of the conduit 28 with a sealant placed in the end of the conduit in front of the dam to prevent moisture and other contaminants from entering the conduit 28.

Such a dam can be easily made with the strip 10 of the present invention as in FIG. 3. The wires in each of the bundles 16, 18 and 20 are separated and are placed with an individual wire in each of the recesses 14 and in as many of the recesses 14 as is necessary to hold all the wires 30. Then an adhesive 32, as shown in FIG. 4, either in the form of a fast setting liquid or paste or a double sided adhesive tape can be placed



across the teeth-like portions 12 of strip 10 over the conductors 16 in recesses 14 for purposes as will be described in reference to FIG. 5. It will be noted in FIG. 4, that not all of the recesses 14 contain one of the wires 30. Thus, the molded strip 10 can be trimmed or cut off as necessary where it is not used to form a dam for a particular size conduit.

The strip 10 can then be rolled with the wires 30 in place in recesses 14 into a spiral shape as shown in FIG. 5 to form a cylinder 36 with the wires sticking out of the ends thereof. FIG. 5 represents a cross-section of the dam illustrating the wires 30 in the respective recesses 14. Because the adhesive 32 has been applied to the open recess side of the molded strip, when it is rolled into a cylindrical shape, the adhesive 32 holds and maintains the strip in the cylindrical shape as shown in FIG. 5. A smooth surface tape 34 such as electrical tape can then be applied to the outside of the cylinder assembly to form a smooth surface to allow easy insertion into the conduit 28. Because the strip 10 is compressible, the cylinder can be compressed to allow it to fit inside the conduit where it then expands to extend to and conform with the conduit walls.

As can be seen in FIG. 6, the completed wire dam 36

can be compressed and slipped inside the conduit 28 a predetermined distance with the wires 30 extending out of the conduit 28. A sealing compound 38 can be then inserted in the end of conduit 28 from the wire dam 36 outwardly to the end of the conduit 28 thereby sealing the conduit. Because the wire dam 36 has been compressed and then installed in the conduit and has expanded, it has sealed the inside of the conduit to prevent the sealing compound 38 from getting past the dam 36.

With the present dam assembly, one assembly can be used for sealing wire harnesses that vary in size from one wire up to forty wires depending upon the length the strip is cut and the diameter conduit used. The wire harnesses can be assembled with connectors and plugs already attached before using the dam whereas in the prior art, the dam has to be assembled first and then the plugs can be attached the wires.

Thus there has been disclosed a novel multi-wire dam which comprises a molded strip having equally spaced recesses molded preferably on only one side of the strip to a depth of the wire diameter which would be less than one-half the thickness of the strip. The strips are molded of an elastic material soft enough to compress and seal any recess that does not have a wire

in it to eliminate the necessity of plugs in those unused recesses. The diameter of the conduit does not have to change because of varying number of wires that might have to be sealed in the conduit. The molded strip can be trimmed to cut off excess material and allow it to be used as a dam for a small conduit or can be trimmed to accommodate variations of the number of wires required to be sealed. By placing an adhesive or a double sided adhesive tape on the open recess side of the molded strip, it allows the wire harness and strip when rolled into a cylindrical shape to hold its shape until it is installed in the conduit. A smooth surface tape can be applied to the outside of the assembly to allow for easy insertion into the conduit. The compressibility of the elastic molded strip will allow the wire dam to be installed in a conduit where it can expand to seal the inside of the conduit to prevent sealant from getting past the wire dam.

Although a preferred embodiment of the invention has been described in detail herein, those skilled in the art will recognize that various substitutions and modifications may be made to the specific instructions and function of the elements illustrated without departing from the scope and spirit of the invention as recited in the appended claims.

## I Claim:

1. A multi-wire conduit dam comprising:
  - a. a molded strip of compressible material rolled into a cylinder and having a plurality of recesses on at least one side of said strip,
  - 5 b. at least one electrical conductor positioned in a respective one of said recesses prior to the formation of said cylinder,
  - c. an adhesive placed over said recesses and said at least one conductor to cause said strip to hold  
10 its shape when said strip is rolled into said cylinder, and
  - d. a smooth surface tape applied to the outside of said rolled cylinder for allowing easy insertion of said cylinder with said at least one conductor  
15 into a conduit to form a conduit dam.
2. A multi-wire conduit dam as in Claim 1 wherein said plurality of recesses are equally spaced along said at least one side of said strip.
3. A multi-wire conduit dam as in Claim 2 wherein said adhesive is a double sided adhesive tape.
4. A method of forming a multi-wire conduit dam comprising the steps of:
  - a. rolling a molded strip of compressible material into a cylinder, said strip having a plurality

5 of recesses on at least one side of said strip,

b. positioning at least one electrical conductor in a respective one of said recesses,

c. placing an adhesive over said recesses and said at least one conductor to cause said strip to hold  
10 its shape when said strip is rolled into said cylinder,  
and

d. applying a smooth surface tape to the outside of said rolled cylinder for allowing easy insertion of said cylinder with at least one conductor into  
15 a conduit to form a conduit dam.

5. A method as in Claim 4 further comprising the step of equally spacing said plurality of recesses on said at least one side of said strip.

6. A method as in Claim 5 further comprising the step of using a double sided adhesive tape as said adhesive.

7. A method of forming a multi-wire conduit dam comprising the steps of:

a. forming a molded strip of compressible material having a plurality of recesses on at least one  
5 side of said strip,

b. placing at least one electrical conductor in a respective one of said recesses,

c. covering said strip and said at least one

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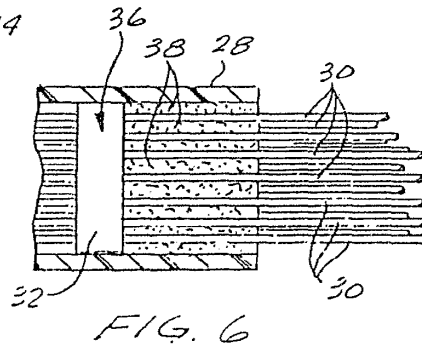
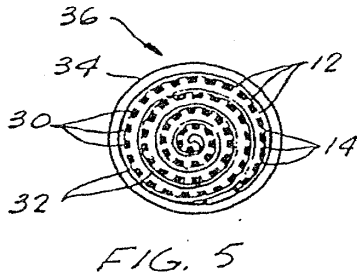
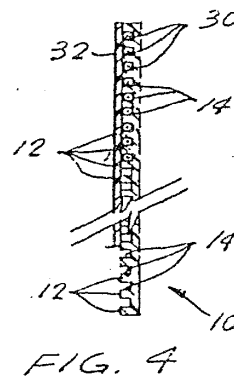
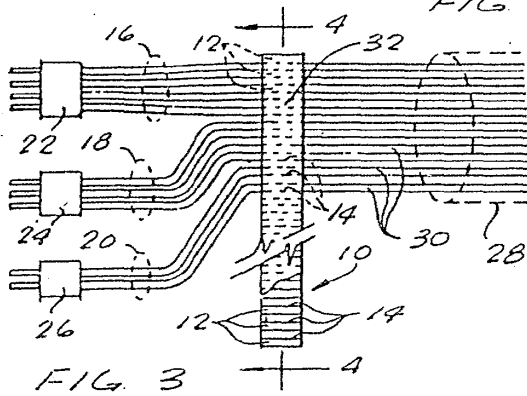
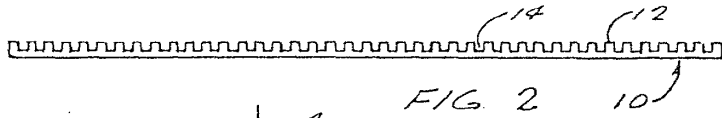
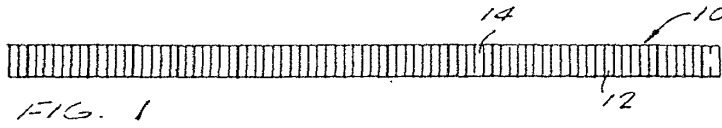
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conductor with double sided adhesive tape,

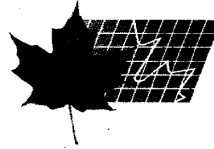
10           d. rolling said strip with said conductor in  
said recess into a cylinder which is held in shape by  
said double sided adhesive tape, and

          e. wrapping a smooth surface tape around the  
outside of said cylinder for allowing easy insertion of  
15   said cylinder with said at least one conductor into a  
conduit to form a conduit dam.





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(52) 317-31

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(73) Cooper Industries, Inc. , U.S.A.  
(30) (US) U.S.A. 143,871 1988/01/14  
(57) 1 Claim





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ABSTRACT

NOV 22 1994

An explosion-proof electrical conduit sealing fitting for threadedly engaging at least two threaded conduits and surrounding at least one conductor running through said at least two threaded conduits includes a first element having a portion threadedly engaging at least one of at least two threaded conduits; a second element having a portion threadedly engaging at least one of the at least two threaded conduits, and means for connecting the first element and the second element. When properly connected and screwed into place, the sealing fitting of the present invention completely surrounds the at least one conductor and threadedly engages all of at least two threaded conduits.

## SEALING FITTING

## BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to seals and, more particularly, to electrical conduit sealing fittings.

Description of Related Art

Seals are provided in conduit and cable systems to minimize the passage of gases and vapors and prevent the passage of flames therethrough.

10           Various requirements concerning seals are set forth in Article 501, Section 501-5, of the National Electric Code. One such requirement is that all fittings in Class 1, Division 1 (hazardous) applications must have threaded engagement with its mating conduit. Another requirement is that the seal be filled with a sealing compound. The compounds used in explosion-proof sealing fittings must resist the force of an explosion in the conduit system that could reach several thousand psi. The compounds must also be dense enough to minimize the passage of gases from one part of the conduit system to another. Still  
20 further, they must be highly resistant to a great variety of solvents and chemicals. Typically, sealing compound is poured into place, whereupon it solidifies and becomes very hard.

The various requirements discussed above for sealing fittings in Class 1, Division 1 (hazardous) applications make them

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very difficult to remove. When an occasion arises which requires such a seal to be removed (such as adding or replacing the wires in the conduit) it is common to break or cut open the sealing fitting, crumple the hard compound, pull all the wires out of the conduit, install a new fitting, repull the wires and pour new compound. Often more than one seal is involved in a single run of conduit. This type of work is very time consuming and expensive in direct labor and materials, as well as being costly in terms of system down time. Based on the foregoing, it should be clear that a need has developed for a sealing fitting that would allow a seal to be replaced in location such as hazardous Class 1, Division 1, locations without removing all the electrical conductors or deenergizing the electrical system.

#### SUMMARY OF THE INVENTION

Such an explosion proof electrical conduit sealing fitting is supplied by the present invention which comprises an explosion-proof electrical conduit sealing fitting for threadedly engaging at least two threaded conduits and surrounding at least one conductor running through said at least two threaded conduits, said fitting comprising:

a first sub-element having a portion threadedly engaging a portion of at least one of said at least two threaded conduits;

a second sub-element having a portion threadedly engaging at least a portion of one of said at least two threaded conduits;

means for connecting said first sub-element to said second sub-element;

a third sub-element having a portion threadingly engaging a

portion of at least one of said at least two threaded conduits;  
a fourth sub-element having a portion threadingly engaging a  
portion of at least one of said at least two threaded conduits;  
means for connecting said third sub-element to said fourth  
sub-element;

said first, second, third and fourth sub-elements being  
substantially identical;

means for connecting said first sub-element to said third  
sub-element; and

10 means for connecting said second sub-element to said fourth  
sub-element;

whereby said connected first, second, third and fourth sub-  
elements completely surround said at least one conductor and  
threadedly engage all of said at least two threaded conduits.

The fitting is split crosswise as well as lengthwise  
which allows fit up with only one thread at a time which makes it  
a preferred embodiment.

The described sealing fitting enables rapid replacement  
of a removed seal, and does not require that conductors be  
20 disconnected or pulled out of the system prior to effecting  
replacement. The sealing fitting is suitable for Division 1,  
Class 1 (hazardous) applications.

The present invention provides a means for seal  
replacement that does not necessarily necessitate power  
disconnection.

Other advantages and new features of the invention will  
become apparent from the following detailed description of the

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invention when considered in conjunction with the accompanying drawings wherein:

**BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a perspective view of a sealing fitting according to the present invention

Figure 2 is an exploded view of the sealing fitting of Figure 1;

Figure 3 is a partial cross-sectional view of an environment in which a sealing fitting according to the present invention may operate; and

Figures 4, 5 and 6 show the sealing fitting of Figure 1 in various stages of assembly in an environment for operation.

#### DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings and, in particular, to  
10 Figure 3, it can be seen that a typical environment in which it is frequently desired to employ a sealing fitting comprises a first conduit section 10 having a threaded portion 12 and a second conduit section 14 having a threaded portion 16. Assuming, as in the present invention, portions 12 and 16 can threadedly engage a sealing fitting, such an arrangement could satisfy the requirements for Class 1, Division 1 (hazardous) applications as set forth in the National Electric Code. Referring still further to Figure 2, it can also be seen that at least one conductor 18 (a  
20 second conductor 20 is also shown) runs through and between conduits sections 10, 14.

Referring now to Figure 1, a preferred sealing fitting 22 according to the present invention is shown therein. Fitting 22 comprises four sub-elements 24, 26, 28, 30 which are connected by suitable means such as bolts 32. In the specific embodiment illustrated, each of the four sub-elements 24, 26, 28, 30 are virtually identical. This facilitates manufacture of the fitting 22. Also in the specific embodiment illustrated, each sub-element

is directly connected to only two of the other sub-elements (e.g., sub-element 24 is directly connected to sub-elements 26 and 28 but not sub-element 30) but, as should be readily apparent, the totality of such connections forms a single fitting 22.

An important aspect of the present invention is that it can be threadedly engaged to at least two conduits without requiring that any action be taken with respect to any conductor running through and between the conduits. Only two elements are required to accomplish this. For example, with reference to the  
10 embodiment of the present invention shown in the drawing, sub-elements 24 and 28, suitably connected, could be considered to be a single element. Likewise, sub-elements 26 and 30, suitably connected, could be considered to be a single element. As should be readily apparent to those skilled in the art, a fitting comprising an element 24/28 and an element 26/30 could be threadedly engaged to at least two conduits so as to completely surround a conductor running therethrough. Of course, the fitting of the present invention may comprise any number of elements and/or sub-elements (e.g. two as described above, four, as shown in the  
20 drawings; or virtually any other number greater than two) limited only by the requirement that the important aspect mentioned above is exhibited by a constructable fitting.

The present invention further comprises means for connecting the elements and/or sub-elements described above. Bolts 32 are one such means. Those skilled in the art are well aware of other possibilities and the present invention should be held to encompass all such possibilities.

Referring to Figure 3, damming material such as CHICO\* material which is produced by the Assignee of the present invention, is shown installed in conduit 14. Recognized that it is standard, if not NEC prescribed, practice to fill sealing fittings with damming material, a refinement of the present invention is the presence of openings, such as openings 36 in one or more of the sub-elements to allow damming material to be poured therethrough. Other holes, such as holes 38, may be created for other purposes, such as holding a set screw for electrical bonding.

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It should be obvious to those skilled in the art how to produce the various elements of the present invention. Properties of the materials used may have to meet NEC standards. Paths through which flames could pass could not be tolerated in fittings for use in hazardous locations. Machining techniques for preparing such portions as threaded bolt 32 receiving holes 40 are also well known to those skilled in the relevant art.

Installation of an embodiment of the sealing fitting of the present invention is progressively shown in Figures 4, 5, and 6. In Figure 4, one of the four sub-elements is shown installed in a two conduit/two conductor environment. In Figure 5, three of the four sub-elements, in cross-sections, are shown installed. In Figure 6, a sealing fitting according to the present invention is shown completely connected and installed. As the embodiment of the present invention is split crosswise as well as lengthwise, it should be readily apparent to those skilled in the art that fit up

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with only one thread at a time is possible. This characteristic of the present invention makes it much better than any fitting which requires fit up of more than one thread at a time, which in environments such as the environment of Figure 3, wherein the conduits 14, 10 are frequently immobile, is virtually impossible.

Obviously, numerous modifications and variations of the present invention are possible in light of the above teachings.

It is therefore to be understood that, within the scope of the appended claims, the present invention may be practiced otherwise

10 than as specifically described hereinabove.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An explosion-proof electrical conduit sealing fitting for threadedly engaging at least two threaded conduits and surrounding at least one conductor running through said at least two threaded conduits, said fitting comprising:

a first sub-element having a portion threadedly engaging a portion of at least one of said at least two threaded conduits;

a second sub-element having a portion threadedly engaging at least a portion of one of said at least two threaded conduits;

means for connecting said first sub-element to said second sub-element;

a third sub-element having a portion threadingly engaging a portion of at least one of said at least two threaded conduits;

a fourth sub-element having a portion threadingly engaging a portion of at least one of said at least two threaded conduits;

means for connecting said third sub-element to said fourth sub-element;

said first, second, third and fourth sub-elements being substantially identical;

means for connecting said first sub-element to said third sub-element; and

means for connecting said second sub-element to said fourth sub-element;

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whereby said connected first, second, third and fourth sub-  
elements completely surround said at least one conductor and  
threadedly engage all of said at least two threaded conduits.

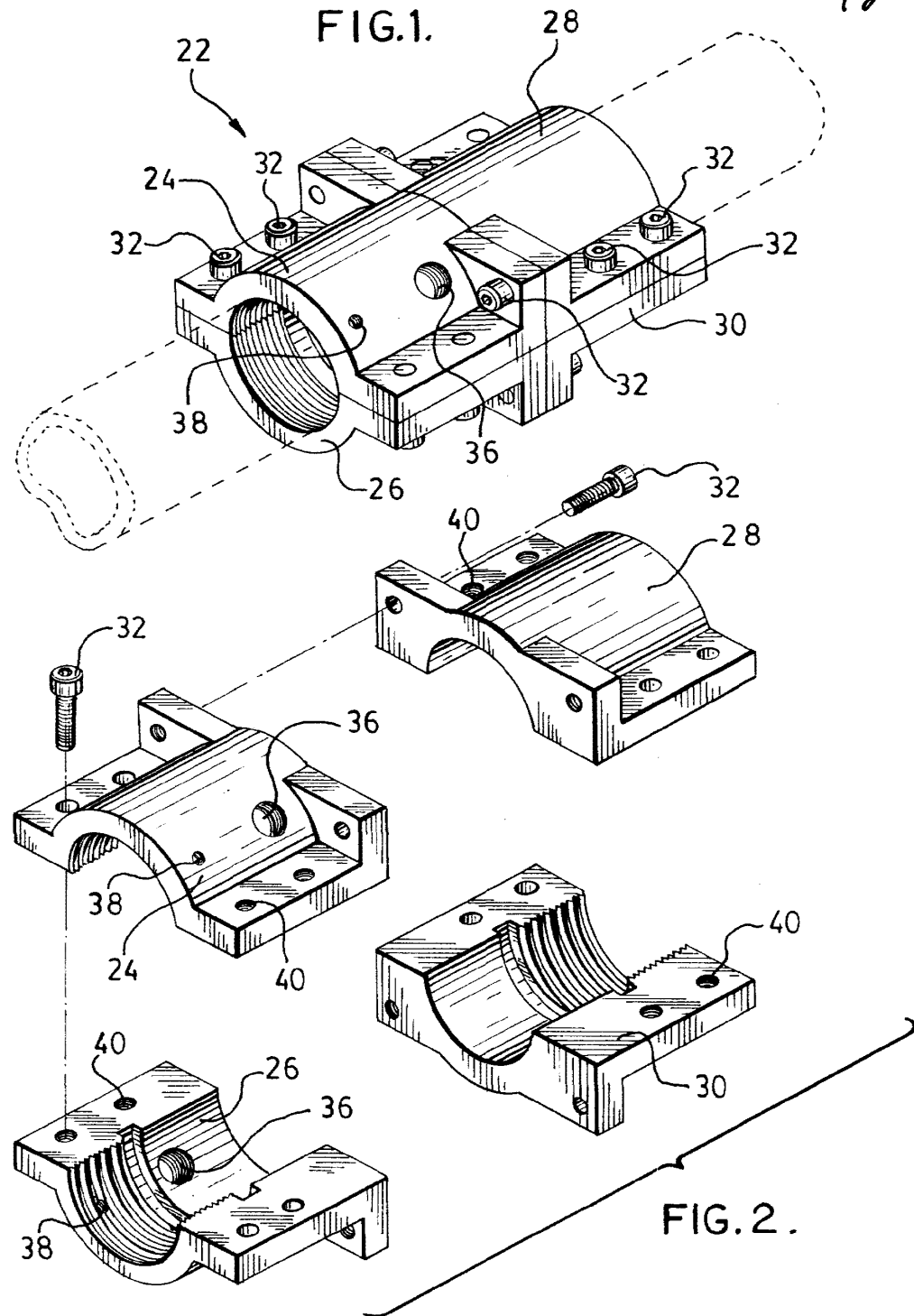
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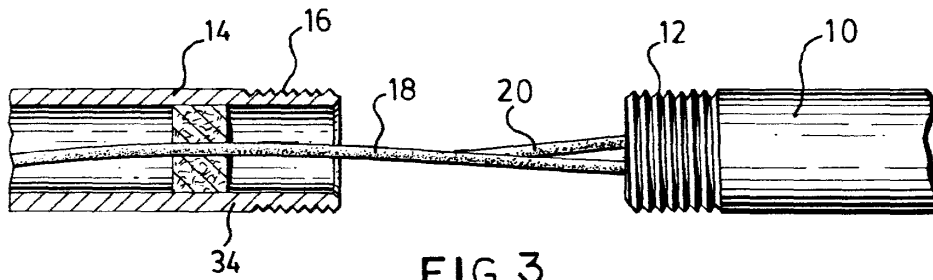


FIG. 3.

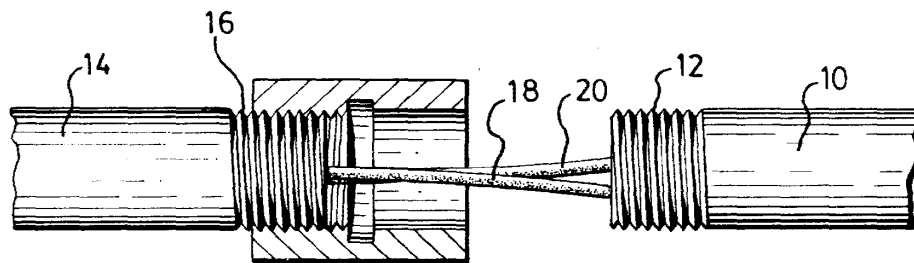


FIG. 4.

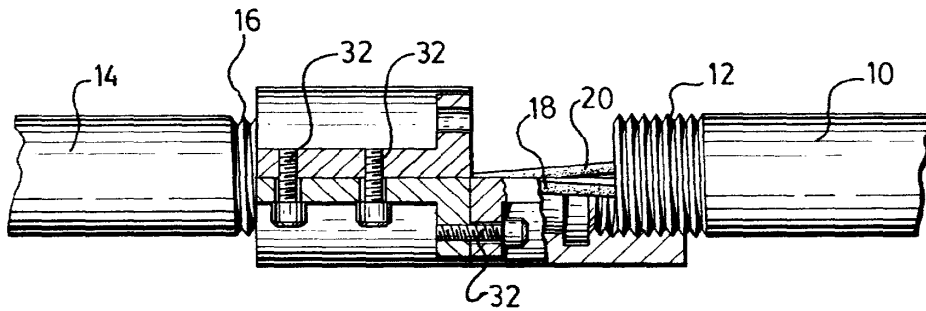


FIG. 5.

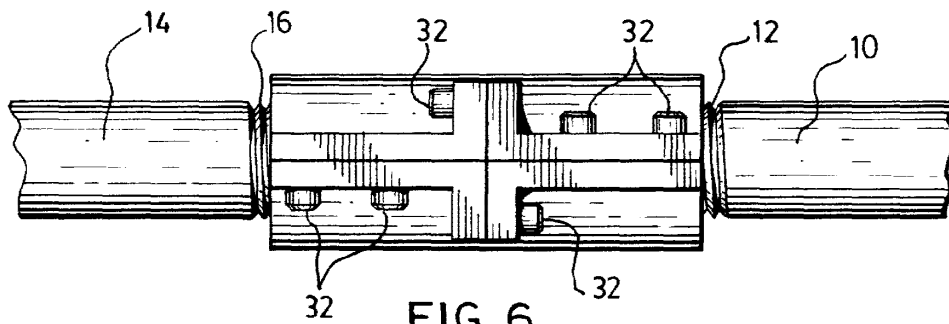


FIG. 6.

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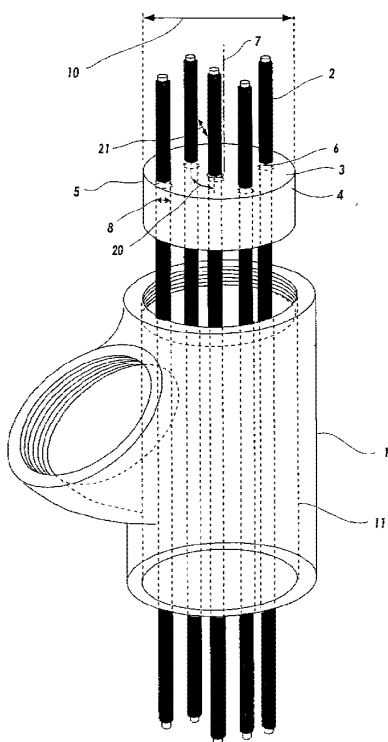
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- (71) Applicant and  
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- (74) Agent: **NELSON, J., David**; Nelson, Snuffer, Dahle & Poulsen, P.C., 10885 South State Street, Sandy, UT 84070 (US).
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[Continued on next page]

(54) Title: SEAL DAM APPARATUS AND METHOD FOR ELECTRICAL CONDUIT



WO 02/04843 A2



(57) **Abstract:** A multi-wire conduit dam for constructing seals in electrical conduits to prevent migration of flammable and explosive gases and liquids to potential ignition sources. This invention is designed to provide a practical, convenient and economical alternative to conventional methods of sealing off electrical conduits from flammable and explosive gases and liquids, including particularly the conventional methods of providing a dam by stuffing a fibrous insulation material around the wire bundle and between the wires. The device of the present invention consists of a cylindrical dam of resilient material cut or molded to snugly fit the interior diameter of a vertical electrical conduit seal-off fitting, the cylindrical dam having a wire orifice for each wire which is aligned with the axis of the dam and which has a diameter providing for a tight fit around the wire. The wire orifices may be molded or punched in the dam or may be formed by a heated probe inserted through the dam at the desired positions. The wire orifices are located to provide for the desired or required clearance between the wires. Two dams are used for horizontal seal-off fittings. Each wire is passed through a respective wire orifice and the dam or dams are slid along the wires into a conduit seal-off fitting. A time-curing sealant compound is then poured through the seal-off fitting access port on top of the dam, for vertical fittings, or between the dams, for horizontal fittings, where it is allowed to cure. The seal prevents flammable or explosive gases and liquids from traveling through the electrical conduit to an ignition source consistent with code requirements.

**WO 02/04843 A2**



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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**SEAL DAM APPARATUS AND METHOD FOR ELECTRICAL CONDUIT****FIELD OF THE INVENTION**

This invention relates to apparatuses and methods for sealing electrical conduits to prevent flammable or explosive gases and liquids from passing through the conduits, and in particular relates to apparatuses and methods for spacing electrical conductors and damming electrical conduit for the pouring and setting of a conduit seal.

**BACKGROUND OF THE INVENTION**

The need for preventing the migration of flammable and explosive gases and liquids inside an electrical conduit to potential ignition sources, such as electrical junction and circuit breaker boxes, is longstanding and the numbers and types of installations where this is necessary continues to increase. Electrical codes in the United States and other countries typically require a seal of time-curing sealant material be poured in a seal-off fitting which is located in electrical conduit, to prevent passage of flammable or explosive gases and liquids through the conduit at gas stations, petroleum bulk plants, petroleum refineries, factories, granaries and similar installations. The time-curing sealant material is commonly a slurry type of cementitious material referred to as "chico". For some conduit configurations, it is poured on a horizontal dam in a seal-off fitting designed for vertical conduit installations and for others it is poured between two vertical dams in a seal-off fitting designed for horizontal conduit installations..

Each of the wires must be separated by a specified minimum clearance in order for the sealant material to seal completely around each wire. The sealant material adheres to each wire and to the interior surface of the seal-off fitting while solidifying to form an impervious barrier to the passage of gases and liquids through the conduit to an ignition source.



A number of prior art devices and methods have been developed to provide a dam for the sealant material. One of the common deficiencies noted with the prior art devices and methods is a tendency for the devices to allow sealant material to seep beyond the dam. Another of the common deficiencies is the time and consequent expense of  
5 preparing a dam to adequately hold the sealant material. Another common deficiency is an inability or difficulty in establishing or maintaining a desired or required clearance between the wires.

The device disclosed in U.S. Patent No. 4,723,055 to Bisker attempts to deal with each of the foregoing concerns. This device comprises a molded strip of closed cell  
10 sponge rubber such as neoprene or equivalent with grooves or notches on one side, similar in appearance to a timing belt. Each wire is placed in a groove and covered with an adhesive tape which, when wound into a bundle, adheres to and dams the cylindrical conduit seal-off fitting. The strip of neoprene can be trimmed or cut to the proper length for application in smaller conduits. This device is cumbersome and difficult to use, and  
15 is not tailored to a specific number of wires. Typically, there will be notches or grooves which do not contain wires. While the device is purportedly designed to self seal these unused notches or grooves by contact between the unused notches or grooves and the successive belt roll, the penetrations are still present and constitute a potential for leakage of the sealant material. There is also limited flexibility in the size of wire that can be  
20 used with a specific groove size and the circumferential and radial spacing of adjacent wires is fixed for each device. This device would also be relatively expensive to manufacture. The deficiencies noted for this device are most likely the reason that it apparently has not met with commercial success since the issue date for the patent in 1988.

The failure of prior art devices to effectively meet the requirements of these conduit installations is clearly manifested by the method which is used almost exclusively in the industry. A loose fibrous material is typically hand packed through the access opening on the seal-off fittings around the wire bundle and between each wire.

5 The fibrous material is packed between the wire bundle and the inside surface of the conduit, and between each of the wires through the use of the installer's fingers and hand tools. With the very confined access, especially for the smaller conduits, it is very difficult to get the packing material in place as needed to provide the minimum clearance between the wires and to provide a leak free dam for the sealant material. Uniformity in

10 the thickness and density of the dam is very difficult to achieve, as is getting a proper seal and a proper spacing between the wires. The placement of this fibrous material must be accomplished with the wires in place. Yet, this is the standard method in use in the industry and it is used because no practical alternative has been developed before the present invention.

15 One object of the present invention is to provide a sealant dam which is matched to the diameter of the conduit seal-off fitting and is matched to the size and number of wires passing through the conduit.

A further object of the present invention is to provide a sealant dam that maintains a minimum desired or required clearance between the wires.

20 A still further object of the present invention is to provide a sealant dam that will reliably support the uncured sealant material and will reliably block leakage of the sealant material while that material solidifies.

A still further object of the present invention is to provide a sealant dam that is very economical.

A still further object of the present invention is to provide a sealant dam that is easy to use and requires less time to install.

A still further object of the present invention is to provide a sealant dam that can be fitted on each of the wires of the wire bundle before being fitted in the conduit,  
5 thereby greatly simplifying installation.

### SUMMARY OF THE INVENTION

The conduit sealant dam ("sealant dam") of the present invention is comprised of a cylindrical disk of resilient material, such as polyethylene foam, with one or more wire orifices for the passage of electrical wires through the dam. The inventor has found that  
10 polyethylene foam with a density of approximately four pounds per cubic foot works particularly well for the sealant dam, but many other types of resilient material may be used. The thickness of the sealant dam will depend on the diameter of the conduit and the material used for the sealant dam. With the four pounds per cubic foot polyethylene foam, the inventor has found that a sealant dam thickness approximately equal to one-  
15 half the diameter of the conduit works particularly well.

The sealant dam can be manufactured to the required dimensions by molding, cutting, punching or other methods known to persons skilled in the art. Alternatively the sealant dam may be punched in the desired diameter by the installer from a bat of resilient material of the required thickness.

20 The wire orifices can be molded, punched or heat penetrated into the sealant dam, or may be formed in other ways known to persons skilled in the art. The number of wire orifices and the diameter of the wire orifices are selected based upon the number and diameter of the wires to be passed and the minimum clearance required between the wires. Friction between the wires and the inside surface of the respective wire orifices is

a primary stabilizing force used to hold the sealant dam in place in the seal-off fitting as the sealant is poured and cured and therefore the diameter of the wire orifices is selected to provide a tight fit with the wires being passed. The wire orifices may be created by the user by passing a heated probe at a temperature consistent with melting the sealant dam  
5 material.

Some additional stabilizing force is provided by the friction between the sealant dam and the inside surface of the seal-off fitting and therefore the diameter of the sealant dam must be selected to provide for a tight fit between the sealant dam and the inside surface of the seal-off fitting. This is also important to prevent leakage of the sealant  
10 material as it cures.

Electrical conduit installations requiring gas and liquid migration prevention will incorporate one or more seal-off fittings. As electrical wires are brought through the electrical conduit they are extended through the seal-off fitting. A sealant dam of the present invention having a selected diameter and a selected number of wire orifices of a  
15 selected diameter is slipped onto the wires and slid into the seal-off fitting to the correct position for receiving the sealant material slurry. When the sealant material cures, the seal is complete.

#### BRIEF DESCRIPTION OF DRAWINGS

FIG. 1. A side perspective elevation view of a vertical electrical conduit seal-off fitting with wires passing and a preferred embodiment of the present invention being  
20 inserted on the wires.

FIG. 2. A side perspective elevation view of a vertical electrical conduit seal-off fitting with wires passing and a preferred embodiment of the present invention in the installation position and sealant material placed thereon.

FIG. 3. A side perspective view of a preferred embodiment of the present invention with a heated probe inserted to form a wire orifice.

FIG. 4. A side perspective elevation view of a horizontal electrical conduit seal-off fitting with wires passing and a pair of sealant dams of the present invention with a sealant dam in each of the respective installation positions and sealant material placed therein.

### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring first to FIG. 1, a typical vertical electrical conduit seal-off fitting **1** is illustrated with insulated electrical wires **2** passing through. A preferred embodiment of the sealant dam **3** of the present invention, which is constructed of resilient material in the form of a cylindrical disk **4**, is shown inserted on the wires to the pre-installation position **5**. Each of the wires is passed through a respective wire orifice **6** in the sealant dam, the wire orifices being aligned with the axis **7** of the cylindrical disk. Each of the wire orifices has an inside diameter **8** which provides for a tight fit on the wire passing through the wire orifice. If the sealant dam is pre-manufactured with a specific number of wire orifices, then a dam will be selected with the required number of orifices. Alternatively, the wire orifices may be formed by the installer, using the method of the present invention.

The sealant dam is then slid along the wires from the pre-installation position **5** shown in Fig. 1 to the installation position **9** shown on Fig. 2. The sealant dam diameter **10** is selected to fit tightly against the inside surface **11** of the seal-off fitting. Also, friction between the outside surface of the wires and the inside surface of the respective orifices is a major force in retaining the sealant dam in the installation position. Time-

curing sealant material **13** is poured through the access portal **14** upon the sealant dam in a desired thickness **15**. The tight fit between the outside surface of the sealant dam and the inside surface of the seal off fitting and the tight fit between the inside surface of the wire orifices and the outside surface of the wires minimizes problems with leakage of the sealant material past the dam.

The cylindrical disk of the sealant dam may be manufactured by molding, cutting or punching or by some other process known to persons skilled in the art, or may be formed by the installer through the use of a common circular punch of the desired diameter by punching the disk from a bat of the selected resilient material of the desired thickness. Similarly, the wire orifices can be formed during the manufacturing process by molding, punching or by other methods known to persons skilled in the art, or maybe formed by the installer at the time of installation by punching or by other methods known to person skilled in the arts. However, the method of the present invention illustrated in Fig. 3 for forming wire orifices in the sealant dam has been found by the present inventor to be superior to known methods.

Referring to Fig. 3, a probe **16** which is heated to a temperature above the melting temperature of the resilient material from which the disk is made is inserted through the disk to create a wire orifice with a desired diameter **17** at a location **18** desired by the installer, with the wire orifice aligned with the axis **7** of the sealant dam. This process is repeated until the desired number of wire orifices have been created in the sealant dam, matching the number of wires. Referring also again to Fig. 1, the spacing **20** of the wire orifices is controlled by the installer to provide for minimum desired clearance **21** between the wires.

Fig. 4 illustrates an alternative embodiment of the present invention which is

utilized for a conduit installation where a horizontal seal-off fitting **22** is required. For this embodiment, two sealant dams, a first sealant dam **23** and a second sealant dam **24** are utilized.

If the seal-off fitting is not already in place in the conduit, each of the wires is  
5 passed through a respective wire orifice **25** of the first sealant dam prior to passing the wires through the horizontal seal-off fitting. The wires are then passed through the first wire portal **26** of the seal-off fitting and the first sealant dam is fitted through the first wire portal into the first installation position **27**. Each of the wires is then inserted into a  
10 respective wire orifice **28** of the second sealant dam, and the second sealant dam is slid along the wires through the second wire portal **29** of the seal-off fitting into the second installation position **30**.

Alternatively, if the seal-off fitting is already in place in the conduit, each of the wires is passed through a respective wire orifice **25** of the first sealant dam and the first sealant dam is slid along the wires through the second wire portal **29** of the seal-off  
15 fitting and through the seal-off fitting space **33** to the first installation position **27**. Each of the wires is then inserted into a respective wire orifice **28** of the second sealant dam, and the second sealant dam is slid along the wires through the second wire portal **29** of the seal-off fitting into the second installation position **30**.

Sealant material **31** can then be poured through the access portal **32**, filling the  
20 space **33** in the seal-off fitting between the first sealant dam and the second sealant dam. The friction between the outside surfaces **34**, **35** of the respective sealant dams and the interior surface of the seal-off fitting **36** and friction between the outside surface of the wires **37** and the inside surface of the wire orifices **38** of the respective sealant dams hold

the dams in position as the sealant material is poured into the seal off fitting and allowed to cure.

Other embodiments of the invention and other variations and modifications of the embodiments described above will be obvious to a person skilled in the art. Therefore,  
5 the foregoing is intended to be merely illustrative of the invention and the invention is limited only by the following claims.



**CLAIMS**

What is claimed is:

1. Apparatus for forming and supporting time curing sealant material in a  
5 electrical conduit seal-off fitting, the sealant material being formed and cured to prevent  
the migration of flammable or explosive gases or liquids along the electrical conduit to a  
potential ignition source, the apparatus comprising one or more sealant dams, each  
sealant dam being in the form of a cylindrical disk of resilient material having one or  
more wire orifices through the disk, the orifices being aligned with the axis of the disk  
10 and the orifices being separated to provide a desired clearance between the respective  
wires which are to be passed through the orifices, the diameter of each orifice providing  
for a tight fit between the inside surface of the orifice and the outside surface of the  
respective wire passing through the orifice, and the diameter of the disk providing for a  
tight fit between the disk and the inside surface of the conduit seal-off fitting.  
15
2. Apparatus as recited in Claim 1 wherein the resilient material is  
polyethylene foam.
3. Apparatus as recited in Claim 2 wherein the polyethylene foam has a  
20 density of approximately four pounds per cubic foot.
4. Apparatus as recited in Claim 1 wherein the wire orifices of each disk are  
molded into the disk at the time that the disk is made.

5. Apparatus as recited in Claim 1 wherein the wire orifices of each disk are punched into the disk.

6. Apparatus as recited in Claim 1 wherein the wire orifices of each disk are formed by passing a heated probe through the disk at each position that an orifice is desired.

7. Apparatus as recited in claim 1 wherein the seal-off fitting is a vertical seal-off fitting and the apparatus comprises one sealant dam.

10

8. Apparatus as recited in claim 1 wherein the seal-off fitting is a horizontal seal-off fitting and the apparatus comprises two sealant dams.

9. A sealant dam for forming and supporting time curing sealant material in a vertical electrical conduit seal-off fitting, the sealant material being formed to prevent the migration of flammable or explosive gases or liquids along the electrical conduit to a potential ignition source, the sealant dam comprising a cylindrical disk of resilient material having one or more wire orifices through the disk, the orifices being aligned with the axis of the disk and the orifices being separated to provide a desired clearance between the respective wires which are to be passed through the orifices, the diameter of each orifice providing for a tight fit between the inside surface of the orifice and the outside surface of the respective wire passing through the orifice, and the diameter of the disk providing for a tight fit between the disk and the inside surface of the conduit seal-off fitting.

10. Sealant dam as recited in Claim 9 wherein the resilient material is polyethylene foam.

11. Sealant dam as recited in Claim 10 wherein the polyethylene foam has a density of approximately four pounds per cubic foot.

12. Sealant dam as recited in Claim 9 wherein the wire orifices are molded into the disk at the time that the disk is made.

13. Sealant dam as recited in Claim 9 wherein the wire orifices are punched into the disk.

14. Sealant dam as recited in Claim 9 wherein the wire orifices are formed by passing a heated probe through the disk at each position that a orifice is desired.

15. A pair of sealant dams for forming and supporting a time curing sealant material in a horizontal electrical conduit seal-off fitting, the sealant material being formed to prevent the migration of flammable or explosive gases or liquids along the electrical conduit to a potential ignition source, each sealant dam comprising a  
5 cylindrical disk of resilient material having one or more wire orifices through the disk, the orifices being aligned with the axis of the disk and the orifices being separated to provide a desired clearance between the respective wires which are to passed through the orifices, the diameter of each orifice providing for a tight fit between the inside surface of the orifice and the outside surface of the respective wire passing through the orifice, and  
10 the diameter of each disk providing for a tight fit between the disk and the inside surface of the conduit seal-off fitting.

16. A pair of sealant dams as recited in Claim 15 wherein the resilient material is polyethylene foam.

15

17. A pair of sealant dams as recited in Claim 16 wherein the polyethylene foam has a density of approximately four pounds per cubic foot.

18. A pair of sealant dams as recited in Claim 15 wherein the wire orifices are  
20 molded into each disk at the time that the disk is made.

19. A pair of sealant dams as recited in Claim 15 wherein the wire orifices are punched into each disk.

20. A pair of sealant dams as recited in Claim 15 wherein the wire orifices are formed by passing a heated probe through the disk at each position that a orifice is desired.

- 5           21. Method for sealing electrical conduit with one or more wires therein to prevent the migration of flammable or explosive gases or liquids through the electrical conduit to a potential ignition source, the method comprising:
- 10           a) a step of passing each of the wires through a respective wire orifice in one or more cylindrical dams of resilient material, each wire orifice of each cylindrical dam being aligned with the axis of the cylindrical dam, the wire orifices being separated by a desired clearance, and the orifices being of a diameter to fit tightly on the wires;
- 15           b) a step of sliding each dam along the wires into a seal-off fitting until it is situated securely in a respective desired dam position, the diameter of each dam being such to provide for the dam to press tightly upon the interior surface of the seal-off fitting when it is positioned in the respective desired dam position; and
- 20           c) a step of pouring time curing sealant material through an access port on the seal-off fitting until the sealant material is of a desired thickness or occupies a desired space in the seal-off fitting; and
- d) allowing the sealant material to cure, thereby forming a seal against gas or liquid migration through the conduit or around the wires.

22. A method as recited in Claim 21 wherein the resilient material is a polyethylene foam.

23. Method as recited in Claim 22 wherein the polyethylene foam has a  
5 density of approximately four pounds per cubic foot.

24. Method as recited in Claim 22 wherein the wire orifices are formed in the dam by a molding process at the time that the dam is formed.

10 25. Method as recited in Claim 22 wherein the wire orifices are made by punching the dam in the desired locations.

26. Method as recited in Claim 22 wherein the wire orifices are made by passing a heated probe through the dam at the desired locations.

15 27. Method as recited in Claim 22 wherein the seal-off fitting is a vertical seal-off fitting and one sealant dam is utilized.

28. Method as recited in Claim 22 wherein the seal-off fitting is a horizontal  
20 seal-off fitting and two sealant dams are utilized.

29. Method for sealing electrical conduit with one or more wires therein to prevent the migration of flammable or explosive gases or liquids through the electrical conduit to a potential ignition source, the method comprising:

- 5 a) a step of passing each of the wires through a respective wire orifice in a cylindrical dam of resilient material, each wire orifice being aligned with the axis of the cylindrical dam, the wire orifices being separated by a desired clearance, and the orifices being of a diameter to fit tightly on the wires;
- 10 b) a step of sliding the dam along the wires into a vertical seal-off fitting until it is situated securely in the desired dam position, the diameter of the dam being such to provide for the dam to press tightly upon the interior surface of the seal-off fitting when it is positioned in the desired dam position; and
- 15 c) a step of pouring time curing sealant material through an access port on the seal-off fitting on top of the dam in a desired thickness; and
- d) allowing the sealant material to cure, thereby forming a seal against gas or liquid migration through the conduit or around the wires.

20 30. Method as recited in Claim 29 wherein the resilient material is a polyethylene foam.

31. Method as recited in Claim 30 wherein the polyethylene foam has a density of approximately four pounds per cubic foot.

32. Method as recited in Claim 29 wherein the wire orifices are formed in the dam by a molding process at the time that the dam is formed.

33. Method as recited in Claim 29 wherein the wire orifices are made by  
5 punching the dam in the desired locations.

34. Method as recited in Claim 29 wherein the wire orifices are made by passing a heated probe through the dam at the desired locations.



35. Method for sealing electrical conduit with one or more wires therein to prevent the migration of flammable or explosive gases or liquids through the electrical conduit to a potential ignition source, the method comprising:

- 5 a) a step of passing each of the wires through a respective wire orifice in a first cylindrical dam of resilient material, each wire orifice being aligned with the axis of the cylindrical dam, the wire orifices being separated by a desired clearance, and the orifices being of a diameter to fit tightly on the wires;
- 10 b) a step of sliding the first cylindrical dam along the wires into a horizontal seal-off fitting until it is situated securely in a first installation position, the diameter of the first cylindrical dam being such to provide for the first cylindrical dam to press tightly upon the interior surface of the seal-off fitting when it is positioned in the first installation position;
- 15 c) a step of passing each of the wires through a respective wire orifice in a second cylindrical dam of resilient material, each wire orifice being aligned with the axis of the cylindrical dam, the wire orifices being separated by a desired clearance, and the orifices being of a diameter to fit tightly on the wires;
- 20 d) a step of sliding the second cylindrical dam along the wires into the horizontal seal-off fitting until it is situated securely in a second installation position, the diameter of the second cylindrical dam being such to provide for the second cylindrical dam to press tightly upon the interior surface of the seal-off fitting when it is positioned in the second installation position;

- e) a step of pouring time curing sealant material through an access port into seal-off fitting space between the first cylindrical dam and the second cylindrical dam; and
- f) allowing the sealant material to cure, thereby forming a seal against gas or liquid migration through the conduit or around the wires.
- 5

36. Method as recited in Claim 35 wherein the resilient material is a polyethylene foam.

10 37. Method as recited in Claim 36 wherein the polyethylene foam has a density of approximately four pounds per cubic foot.

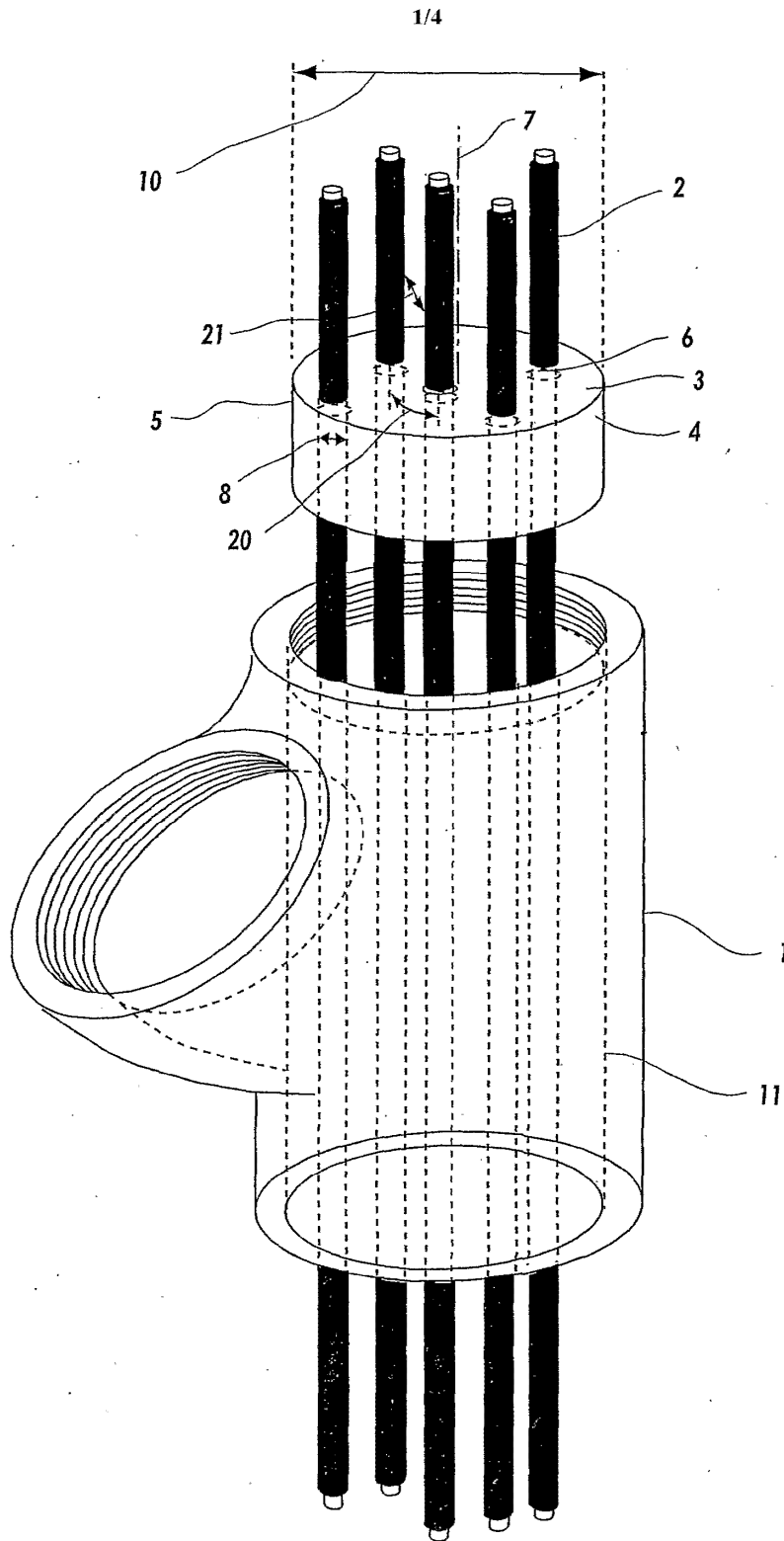
38. Method as recited in Claim 35 wherein the wire orifices are formed in the first cylindrical dam and the second cylindrical dam by a molding process at the time that the dams are formed.

15

39. Method as recited in Claim 35 wherein the wire orifices are made by punching the first cylindrical dam and the second cylindrical dam in the desired locations.

20

40. Method as recited in Claim 35 wherein the wire orifices are made by passing a heated probe through the first cylindrical dam and the second cylindrical dam in the desired locations.



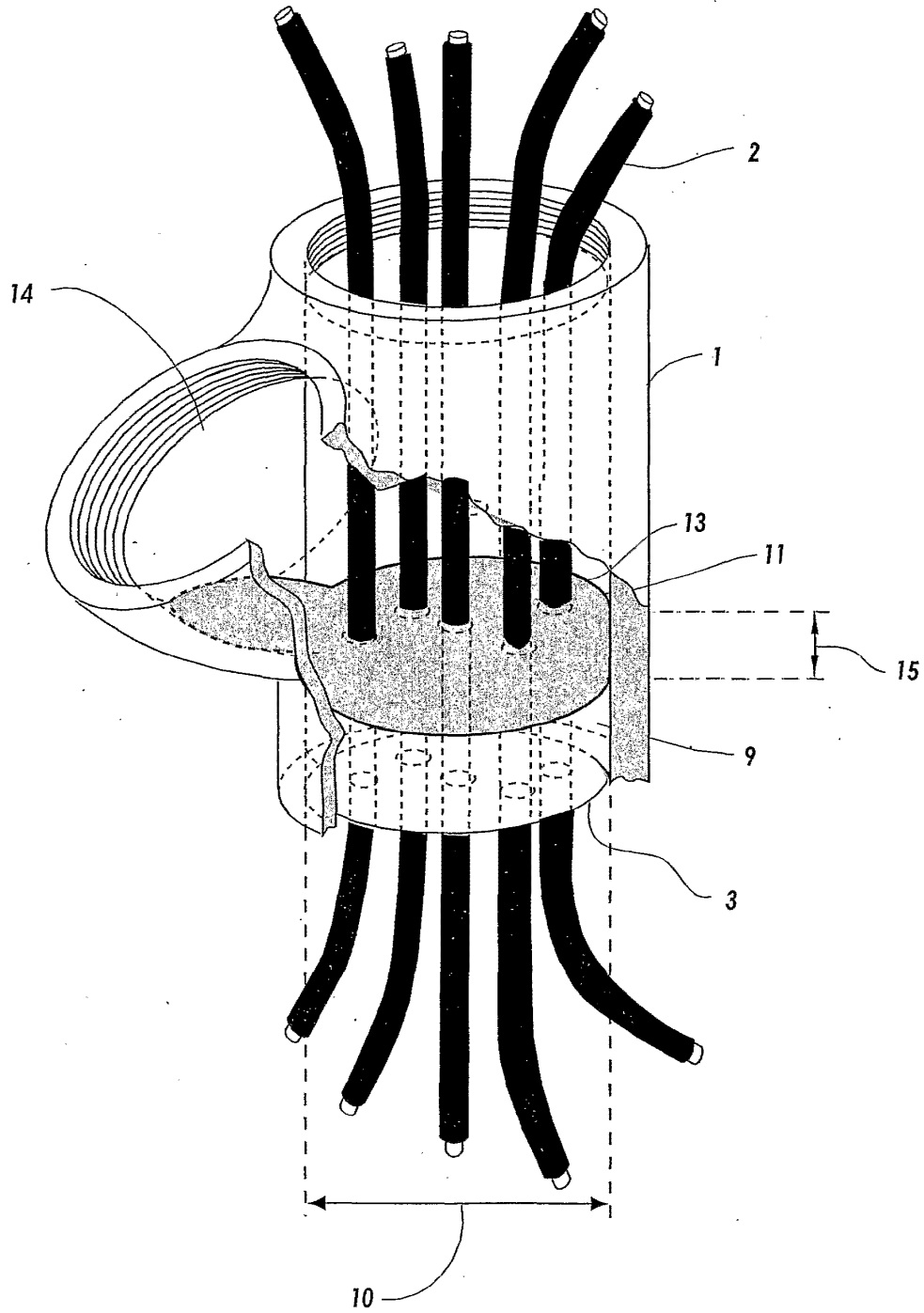


Fig. 2

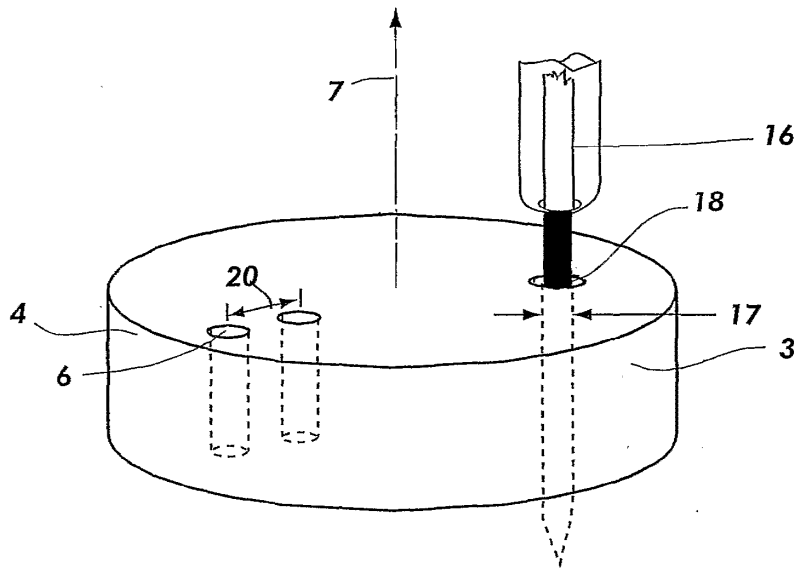


Fig. 3

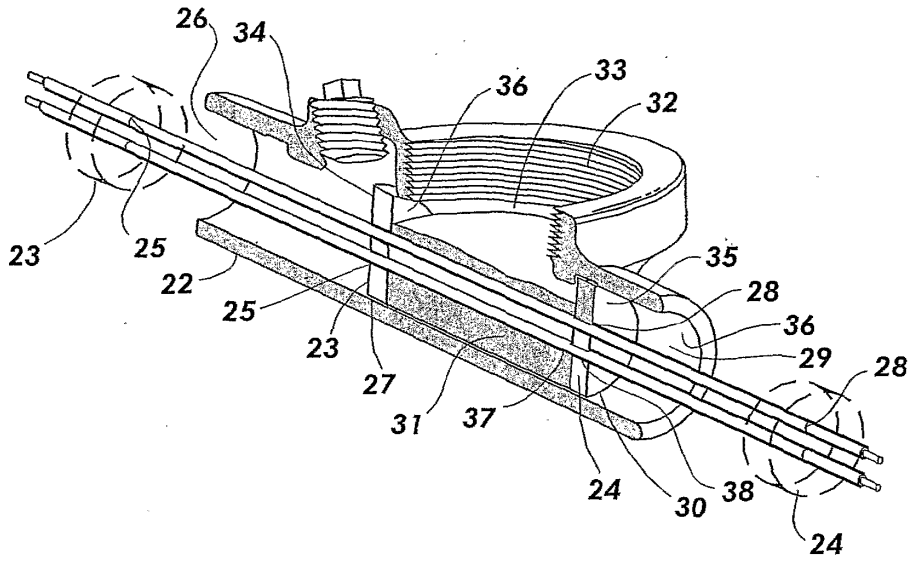


Fig. 4

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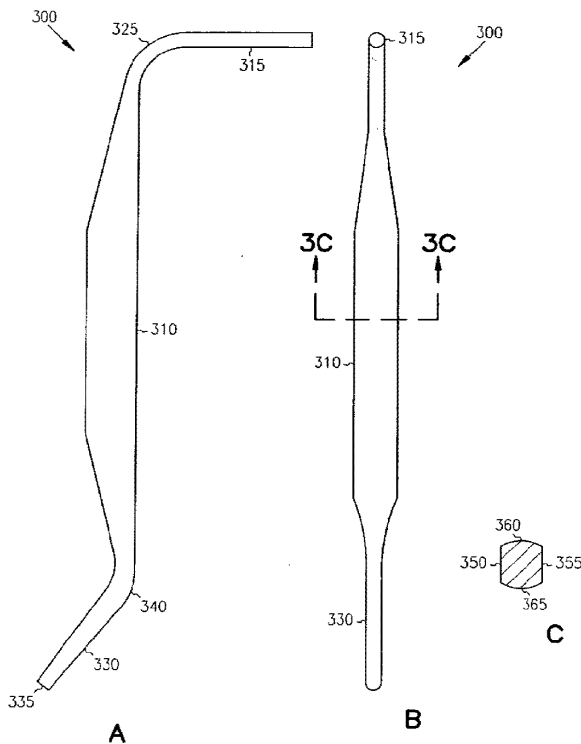
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[Continued on next page]

(54) Title: CONDUIT SEAL PACKING TOOLS



(57) Abstract: A packing tool or set of tools having a handle and one packing end that is formed to perform various tasks involved with packing fiber into conduits without damaging insulation on wires in the conduits. The tools are made of a non-conductive material that has a smooth surface on the packing end or ends with no sharp edges. In one embodiment the tools are made of injection molded plastic and are lightweight. One tool has a hook for picking up a single wire on one end, and a larger hook on the other end for picking up multiple wires. A further tool has a first end for packing and a second end with a mirror that is angled to facilitate inspection of the packing.

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## Conduit Seal Packing Tools

### Field of the Invention

5           The present invention relates to tools for packing conduit seals, and in particular to tools designed specifically for such packing.

### Background of the Invention

10           When electrical conduits are joined in hazardous locations, they should be sealed to prevent gas from traveling between the joined conduits. There may be several insulated electrical wires in the conduits, and a packing material is used to seal the wires in the conduits. Two examples of joined conduits are illustrated in Prior Art FIG.s 1 and 2. FIG. 1 shows a horizontal fitting 110 for joining two horizontally disposed conduits, 115 and 120 via mating sets of  
15           threads. Multiple wires are disposed within the conduits. Two plugs 125 and 130 provide access to fitting 110. Plug 130 provides access to pack each of the conduits with fiber at 135 and 140. Plug 125 provides access for adding a compound between the fiber plugs. It is desired that when packed, a dam is created, and none of the wires are touching either themselves, or sides of the  
20           seals. FIG. 2 shows a vertical fitting 210 connecting two vertically disposed conduits 215 and 220. A single plug 225 provides access to pack conduit 220 which is below conduit 215 to create a single dam having similar characteristics.

            Prior methods of packing the seals involved the use of various ad lib tools, such as pencils, screw drivers, welding rods, and whatever else might  
25           provide some access through the plug or plugs to form the fiber dams. There is a need for a tool or set of tools that provides easy access through the various plugs for packing fiber in conduit seals to create dams. There is a further need for such tools that don't damage insulation on wires in the conduits. There is yet a further need for such tools that provide the ability to pack the fibers in a solid  
30           homogenous pack.

### Summary of the Invention

            A packing tool or set of tools have a handle, and at least one packing end that is formed to perform various tasks involved with packing fiber into conduit

seals without damaging insulation on wires in the conduits. The tools are made of a non-conductive material that has a smooth surface on the packing end or ends with no sharp edges. In one embodiment the tools are made of injection molded plastic and are lightweight.

5 One such tool has a first packing end that is formed at approximately a 90 degree angle from the handle and is generally cylindrical in shape, ending in a substantially flat or slightly convex surface. The diameter of the first packing end allows insertion through a plug in a fitting between the conduits. The first packing end fits between and over the tops of wires within the conduits. A  
10 second end of the tool has a similar cylidrically shaped form, and is angled at approximately 37 degrees from the handle to provide easier access for vertically oriented conduits. Other angles may also be provided.

A second tool is similar to the first tool, but has heavier, larger sized heads on the packing ends. The tips are in the shape of a ball in one  
15 embodiment, or a cone with rounded edge to provide a larger surface area for packing in larger conduits.

A third tool has handle with a hook for picking up a single wire on one end, and a larger hook on the other end for picking up multiple wires. A forth tool has first end for packing similar to that of the first tool, and a second end  
20 with a mirror that is angled to facilitate inspection of the packing. A fifth tool has at least one angled end with an even further enlarged head for heavier packing tasks.

#### **Brief Description of the Drawings**

25 FIG. 1 is a prior art cross section of two conduits joined by a horizontal fitting.

FIG. 2 is a prior art cross section of two conduits joined by a vertical fitting.

FIG.s 3A, 3B and 3C are views of a tool for packing fibers in joined conduit seals.

30 FIG.s 4A and 4B are views of a further tool for packing fibers in joined conduit seals.

FIG.s 5A and 5B are views of a further tool for packing fibers in joined conduit seals.

FIG.s 6A and 6B are views of a tool for packing and inspecting fibers in joined conduit seals.

FIG.s 7A and 7B are views of an alternative tool for packing and inspecting fibers in joined conduit seals.

FIG.s 8A and 8B are views of a further tool for packing fibers in joined conduit seals.

5 FIG. 9 is a cross section of a horizontal conduit and fitting combination identifying locations for using various tools to pack fibers around wires in the conduit seal.

FIG. 10 is a cross section of a vertical conduit and fitting combination identifying locations for using various tools to pack fibers around  
10 wires in the conduit seal.

### **Detailed Description of the Invention**

In the following description, reference is made to the accompanying drawings that form a part hereof, and in which is shown by way of illustration  
15 specific embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that structural, logical and electrical changes may be made without departing from the scope of the present invention. The following description is,  
20 therefore, not to be taken in a limited sense, and the scope of the present invention is defined by the appended claims.

A first tool 300 for packing wadding, such as fibers into a conduit is illustrated in a plan view in FIG. 3A and side view in FIG. 3B. Typical conduits joined by a fitting are shown in FIG.s 1 and 2 and described in the background  
25 section herein. Tool 300 is used for packing the fibers into a portion of the conduit at a point where it joins with the fitting by use of mating threaded portions. The packed fiber may be mostly in the conduit, or partially in the conduit and a hub of the fitting where the conduit attaches to the fitting, creating a seal. Tool 300 has a handle 310 for conveniently gripping, and a first packing  
30 end 315 having a packing head or tip 320. In one embodiment, the first packing end has a circular cross section, but may also be other shapes. It is smooth with minimal sharp edges that can damage insulation on wires in the conduits during use such that even those unskilled may use the tool without damaging the wires. In alternative embodiments, tip 320 is planar, or slightly convex. The first

packing end is fairly straight in one embodiment, and curves away from handle 310 at approximately 90 degrees. The angle may vary as desired, and is convenient for packing fibers through an access hole that is perpendicular to the fitting as shown at plug 130 on a horizontal fitting of FIG. 1. The 90 degree  
5 angle of the first end to the handle allows packing in both conduits through the access hole corresponding to plug 130.

A second packing end 330 has a tip 335, and extends at approximately a 37 degree angle from handle 310 as indicated at 340. The angle is substantially less than 90 degrees to provide an ability to pack different portions of the  
10 conduit seal. The angle may vary dependent on the size of the conduit and size of openings for the tool. Packing end 330 has an approximately circular cross section similar to that of the first packing end 315. The tip of the packing end 340 is also either flat or convex, similar to tip 320.

FIG. 3C is a cross section of the handle. It is generally rectangular in  
15 shape in one embodiment, with opposed flat sides 350, 355 that are approximately co-planar with the packing ends, and opposed convex sides 360, 365 for the other sides of the rectangular shape. Other shapes and side structures may also be used as desired. The opposed flat sides 350, 355 provide a keying mechanism in one embodiment so the user knows the orientation of the tool 300.

Some typical dimensions for tool 300 are dependent on the sizes of the  
20 conduits and fittings. For 0.75 inches and 1 inch conduits, packing end 315 is approximately 2.562 inches in length, with the tips 320 and 335 having a diameter of approximately 1.87. The total length of the tool is approximately 8.25 inches with typical handle dimensions of 0.625 and 0.5 inches for the  
25 opposed convex and flat sides respectively. In one embodiment, the tools are formed of non-conductive injection molded plastic or other polymer such as Plexiglas® or nylon. The packing ends of the tools have dimensions that enable it to be somewhat flexible during use.

In one embodiment, the fiber is a mineral fiber, such as Chico X®  
30 sealing compound provided by Crouse-Hinds. The fittings comprise hubs where the sealing compound is packed, and the sealing compound may be ordered by specifying the fitting to be sealed. Hub sizes range from ½ inch to 6 inches, with the amount of compound varying from 1/32 ounces to 8 and ¼ ounces respectively. In use, the fiber is first packed behind the conductors. The

conductors are forced away from the hub opening and forced apart. The fiber is then packed between and around conductors in the hub. Temporary wooden wedges are sometimes used between conductors to hold them apart so that sealing compound surrounds each conductor.

5           FIG.s 4A and 4C show a second packing tool generally at 400. The relative size of tool 400 is approximately the same as that of the first tool, however, the second tool 400 has larger tips 410 and 420. The larger tips are in the form of a ball in one embodiment, but may also be other shapes, such as a flared cone or other type of structure that provides a larger surface area for  
10 packing fiber in larger areas. Further, many embodiment of the tip do not have sharp edges, to minimize the potential for damaging wire insulation. The second packing tool 400 includes a handle 430, a first packing end 440 and a second packing end 450. The first packing end curves away from the handle at a 25 degree angle, while the second packing end curves away in an opposite direction  
15 from the first packing end at an angle of about 90 degrees with a radius of curvature of approximately 0.75 inches. The cross sections of the packing ends is approximately circular in one embodiment, but may be varied as desired.

Packing tool 400 is generally useful in packing larger radius conduit, and in packing in the middle of a group of wires in the conduit.

20           FIG.s 5A and 5B show different views of a third tool 500, which is used to perform lifting functions. It also comprises a handle 510, referred to as a lifting tool. Each end of the tool comprises a different hook portion 520 and 530. Hook portion 520 is shaped in the form of a semicircle, resembling a hook with a diameter of approximately .562 inches. This hook portion 520 is formed  
25 to facilitate picking up a single wire in the conduit, and is used in conjunction with the first and second tools to hold or move wires for packing the conduit/fitting with fibers. Hook portion 520 is approximately 0.187 inches in diameter in one embodiment. The tool handle 510 is approximately 0.5 inches in diameter, and begins an approximately 15 degree single taper toward hook  
30 portion 520 at 535. A tip 540 of hook portion 520 is rounded in one embodiment to minimize insulation damage during use.

Second hook portion 530 is larger, and is used to lift several if not all of the wires in the conduit to allow packing of fiber by other tools under the wires. Hook portion 530 has a diameter of curvature of approximately 1 inch, and

tapers to a smaller rounded tip, 550. A single taper also begins a distance up the handle 510 from hook portion 530 at an approximately 30 degree angle as indicated at 555. As seen in the side view of FIG. 5B, both sides of the handle taper as opposed to a single side from the front view of FIG. 5A. The angle of  
5 tapers at 535 is approximately 8 degrees, while the angle of tapers at 555 is approximately 10 degrees. In one embodiment, the tapers are formed such that a center of radius of curvature of the hooks is approximately co-radial with the center of the handle. With respect to hook portion 530, the side of the handle opposite the inward taper portion starting at 555 extends out away from the  
10 handle to achieve such co-radial structure.

FIG. 6A is a front view of a fourth tool 600, having a similar handle 610 and pairs of 6 degree tapers to a first end 620 and a second end 630. First end 620 comprises a packing end similar to the first end 315 of the first tool 300. The second end 630 has a rectangular mirror 640, and is shaped to fit into the fitting  
15 to inspect the dam of fibers and assist in the packing of the fibers. At the end of the taper toward the second end, the handle curves to the mirror portion of the second end. Also, as seen in side view 6B, the mirror portion 630 is angled at approximately 30 degrees from the handle. In one embodiment, the mirror portion is approximately 1.125 inches in length and approximately 0.432 inches  
20 in width. Other dimensions and shapes of mirrors may also be utilized. The mirror is recessed in the end in one embodiment, and is shatter proof. In one embodiment, the second end of the fourth with recessed mirror tapers from the handle end to the tip.

FIG.s 7A and 7B show an alternative fourth tool 700, with a mirror 710  
25 recessed in a mirror end of the tool. One side 720 of the mirror end of the tool comprises a portion extending straight from the handle, while a second side 730 containing the recessed mirror angles away from the handle at approximately 12 degrees. A second end of the alternative fourth tool comprises a portion 740 that is a substantially straight rod at a 90 degree angle from the handle of the tool.  
30 The second end of the fourth tool also comprises a portion that extends oppositely from the portion 740 away from the handle, then curves back into the portion 740. Thus, the portion 740 is offset in one direction from the handle, and extends oppositely from such offset direction. In one embodiment, if the handle were continued, it would intersect about the middle of the portion 740 used for

packing fibers into the conduit seal. When viewed from the side as in FIG. 7B, there is no visible taper toward the mirror 730 end, while there is a dual taper of approximately 6 degrees toward the second end.

5 A fifth tool is shown generally at 800 in FIG.s 8A and 8B. This tool has a handle 810, and a packing end 820 extending at an angle of approximately 40 degrees starting at 830. The packing end 820 ends at a tip 840, which is ball shaped in one embodiment with a diameter of approximately 0.5 inches. This is a larger diameter than other tools, and the size may be varied to facilitate packing of larger conduit seals, such as 4 inch fittings. The handle is 0.5 by 10 0.625, again with one pair of opposite sides flat, and the other convex.

FIG.s 9 and 10 show cross sections of conduit and fitting combinations, with locations identifying areas where the previously described tools may be used. Each tool may be used in many different areas beyond those identified, and such areas may be determined by individual users of the tools.

15 FIG. 9 shows a horizontal fitting 910 for joining two horizontally disposed conduits, 915 and 920 via mating sets of threads. Multiple wires are disposed within the conduits. Two plugs 925 and 930 are provided in the fitting 910. Plug 930 allows access to the fitting when removed to pack each of the conduit seals with fiber at 935 and 940. Plug 925 allows access to add a 20 compound between the fiber plugs. It is desired that when packed, a dam is created, and none of the wires are touching either themselves, or sides of the conduits. The first packing end 315 of first tool 300 is used to pack fibers in the top end of the conduit seals as indicated at 945 and 950. The top end is closest to openings normally plugged by plugs 925 and 930. The second end 330 of 25 first tool 300 is used to pack fibers between the wires as indicated at 955 and below the wires as indicated at 960 as is end 440 of second tool 400.

FIG. 10 shows a vertical fitting 1010 connecting two vertically disposed conduits 1015 and 1020. A single plug 1025 provides access to pack a seal for conduit 1020, which is below conduit 1015, creating a single dam. The second 30 end 330 of first tool 300 is used to pack fibers 1040 opposite the single plug 1025 as in the horizontally disposed conduits. The second packing end 450 of second tool 400 is used to pack fibers for the seal of conduit 1020 as indicated at 1030. End 440 of tool 400 is used to pack fibers at 1040 opposite the single plug 1025.

**Claims**

1. A tool for packing material in a combination of a fitting coupling electrical conduits, the tool comprising:
  - a handle;
  - a first end of the handle angled from the handle for insertion through a hole in the fitting;
  - a packing end on the first end of the handle, wherein the tool is formed of a flexible material and lack of sharp edges to minimize damage to wires and wherein the angle between the handle and first end facilitates insertion and packing of material in selected locations within a conduit and fitting.
2. The tool of claim 1 wherein the packing end is formed in the shape of a ball.
3. The tool of claim 1 wherein the angle between the first end and the packing end is approximately 90 degrees.
4. The tool of claim 1 wherein the angle between the first end and the packing end is between approximately 25 degrees and 37 degrees.
5. The tool of claim 1 and further comprising a second end having a packing end, wherein an angle between the second end and the handle is different than the angle between the first end and the handle.
6. The tool of claim 5 wherein the angle between the first end and the handle is approximately 90 degrees, and the angle between the second end and the handle is substantially less than 90 degrees.
7. A tool for use in packing material in a combination of a fitting coupling electrical conduits, the tool comprising:
  - a handle;
  - a first end having a hook sized to pick up a single wire in a conduit;

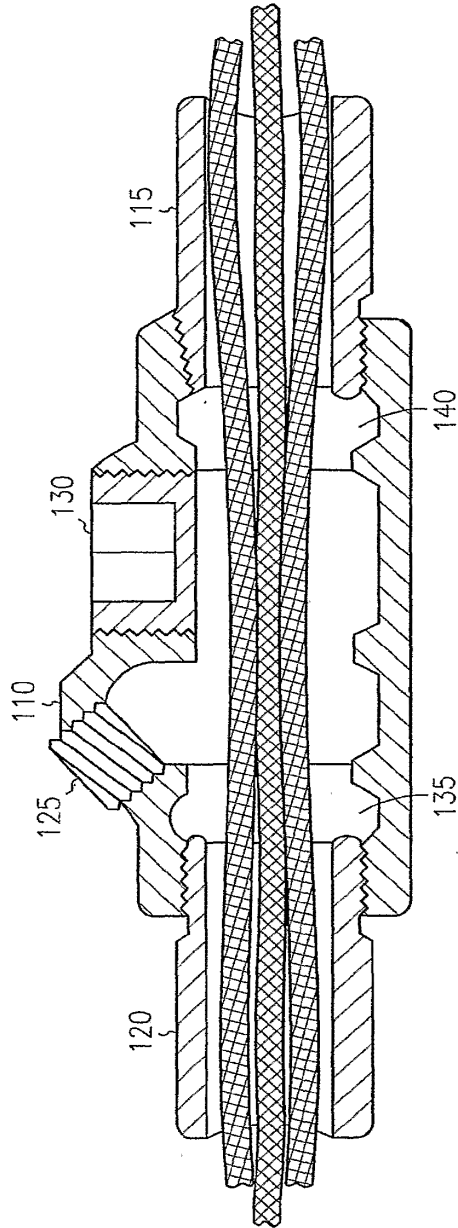


a second end having a hook sized to pick up multiple wires in a conduit, wherein the ends of the tool are formed of a flexible material and lack of sharp edges to minimize damage to wires within the fitting and conduit.

8. The tool of claim 7 wherein the center of radius of curvature of the hooks is approximately co-radial with the center of the handle.
9. The tool of claim 8 wherein the handle comprises tapers.
10. The tool of claim 9 wherein a first taper extends inward, toward the handle, and a second taper extends outward, away from the handle.
11. The tool of claim 9 wherein a third taper extends inward from the handle toward the first end.
12. A tool for use in packing material in a combination of a fitting coupling electrical conduits, the tool comprising:
  - a handle;
  - a first end of the handle;
  - a mirror recessed in the first end of the handle and angled with respect to an axis of the handle, wherein the tool is formed of a flexible material and lack of sharp edges to minimize damage to wires within a conduit and fitting.
13. The tool of claim 12 wherein the first end of the handle is tapered to a smaller cross section at its end opposite the handle.
14. The tool of claim 12 and further comprising:
  - a second end of the handle, wherein the second end comprises a first portion extending in a first direction away from the handle, and a second portion extending back, opposite the direction of the first direction to form a packing end that is substantially straight and extending on both sides of the handle.
15. The tool of claim 12, wherein the tool is formed of a polyethelene glass material.

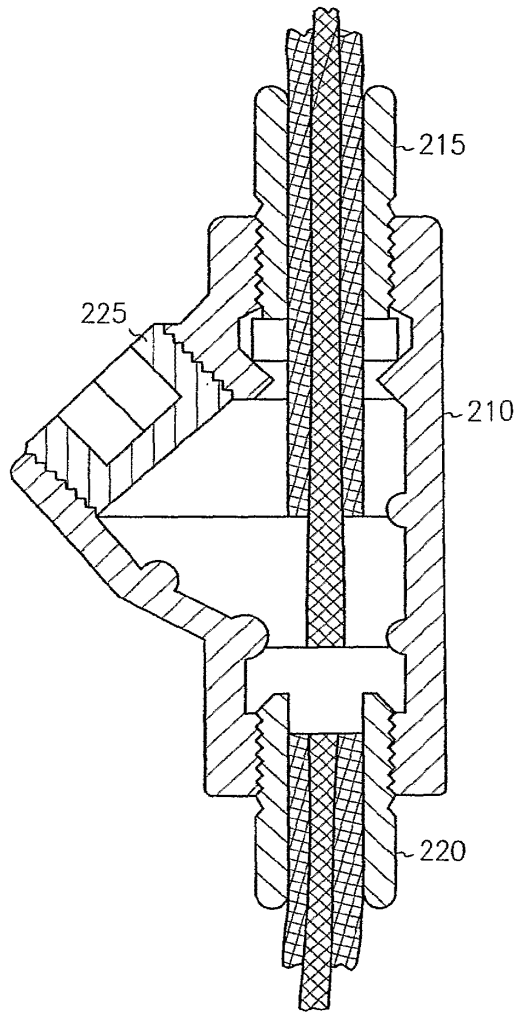
16. The tool of claim 12 wherein the mirror is shatter proof.
17. A set of tools for packing material in a combination of a fitting coupling electrical conduits, the tools comprising:
- a first tool having a handle and a packing end on a first end of the handle, wherein the tool is formed of a flexible material and lack of sharp edges to minimize damage to wires and wherein an angle between the handle and first end facilitates insertion and packing of material in selected locations within a conduit and fitting;
  - a second tool having a handle with a first end having a hook sized to pick up a single wire in a conduit and a second end having a hook sized to pick up multiple wires in a conduit, wherein the ends of the tool are formed of a flexible material and lack of sharp edges to minimize damage to wires within the fitting and conduit; and
  - a third tool having a handle and a mirror recessed in a first end of the handle and angled with respect to an axis of the handle, wherein the tool is formed of a flexible material and lack of sharp edges to minimize damage to wires within a conduit and fitting.
18. The tool set of claim 17 wherein the packing end of the first tool is formed in the shape of a ball.
19. The tool set of claim 17 and wherein at least one of the tools further comprises a second end having a packing end, wherein an angle between the second end and the handle is different than the angle between the first end and the handle of the first tool.
20. The tool set of claim 17 wherein the center of radius of curvature of the hooks of the second tool is approximately co-radial with the center of the handle.
21. The tool set of claim 17 wherein the second tool has a first taper extending inward, toward the handle, and a second taper extends outward, away from the handle.

22. The tool set of claim 17, wherein the tools are formed of a polyethelene glass material.
23. The tool set of claim 17 wherein the mirror is shatter proof.
24. A method of using a set of tools for packing material in a combination of a fitting coupling electrical conduits, the method comprising:  
using a first tool to pack material in one end of the fitting, wherein the tool has a handle and a packing end on a first end of the handle and the tool is formed of a flexible material and lack of sharp edges to minimize damage to wires and wherein an angle between the handle and first end facilitates insertion and packing of material in selected locations within a conduit and fitting; and  
using a second tool for manipulating wires in the fitting, wherein the second tool has a handle with a first end having a hook sized to pick up a single wire in a conduit and a second end having a hook sized to pick up multiple wires in a conduit, wherein the ends of the tool are formed of a flexible material and lack of sharp edges to minimize damage to wires within the fitting and conduit.
25. The method of claim 24 and further comprising:  
using a third tool to view the packing material in the fitting, wherein the first tool has a handle and a mirror recessed in a first end of the handle and angled with respect to an axis of the handle, wherein the tool is formed of a flexible material and lack of sharp edges to minimize damage to wires within a conduit and fitting.
26. The method of claim 24 and further comprising using a second end of one of the tools having larger packing end than the first end of the first tool to facilitate packing of larger fittings.



**FIG. 1**  
(PRIOR ART)

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**FIG. 2**  
(PRIOR ART)

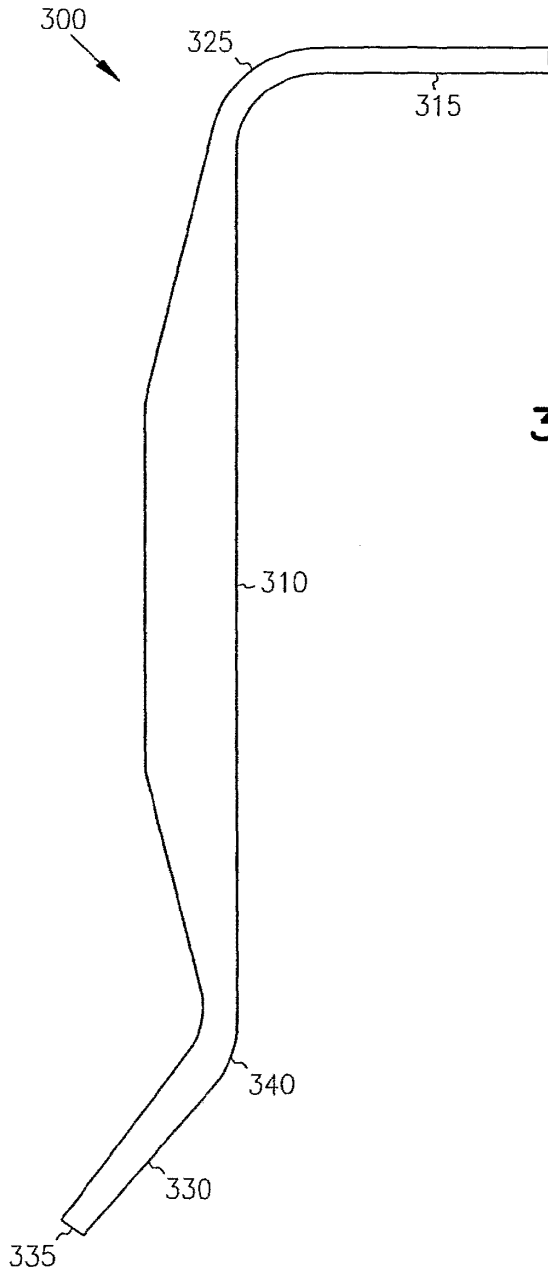


FIG. 3A

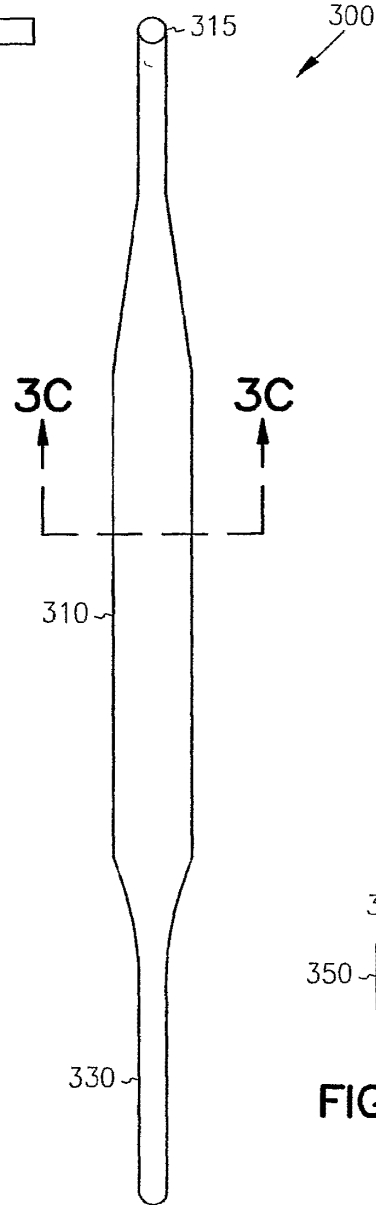


FIG. 3B

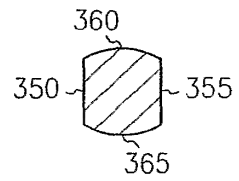


FIG. 3C

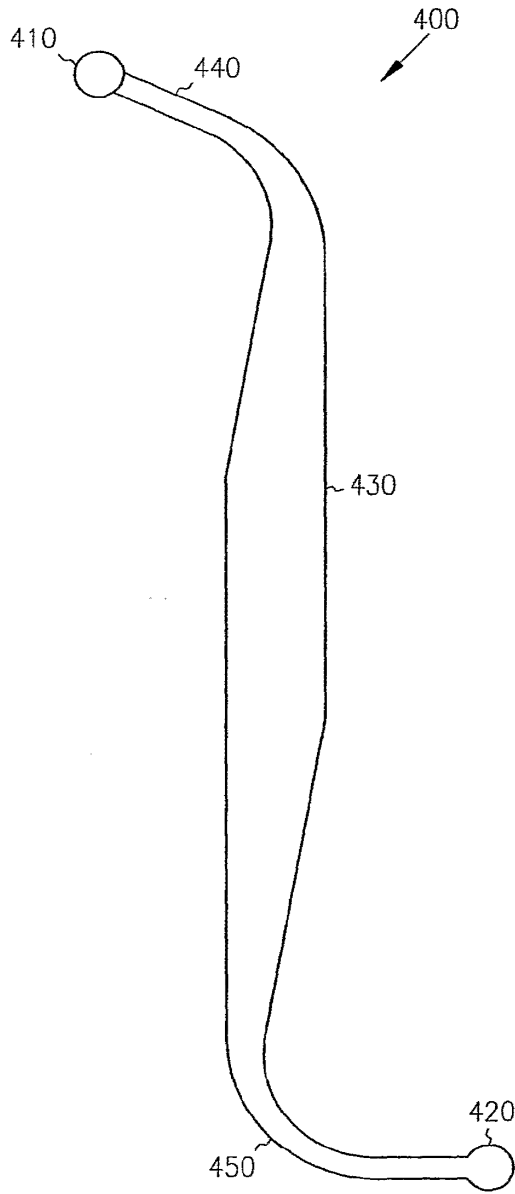


FIG. 4A

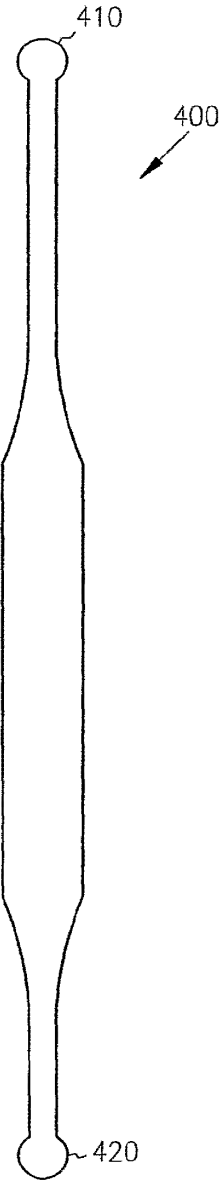


FIG. 4B

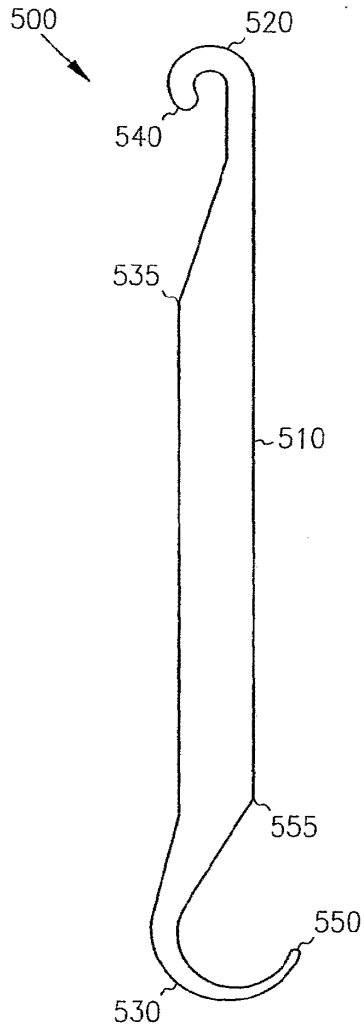


FIG. 5A

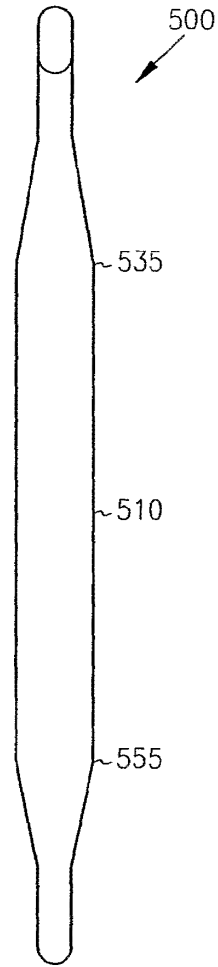


FIG. 5B



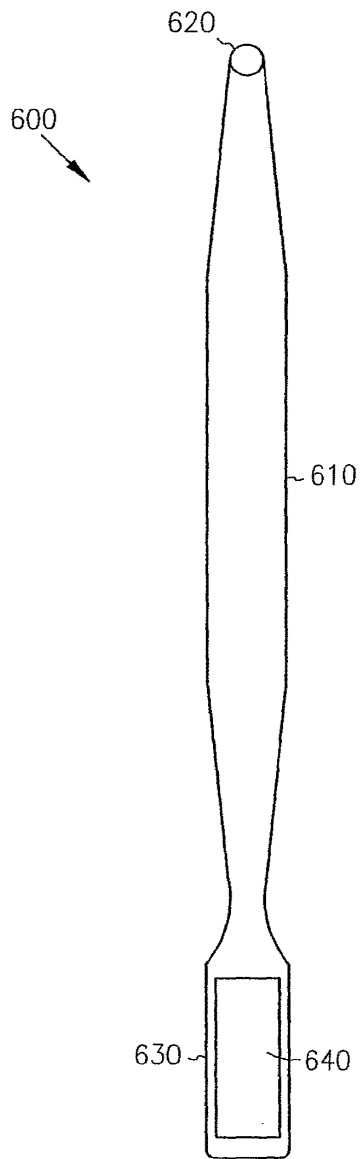


FIG. 6A

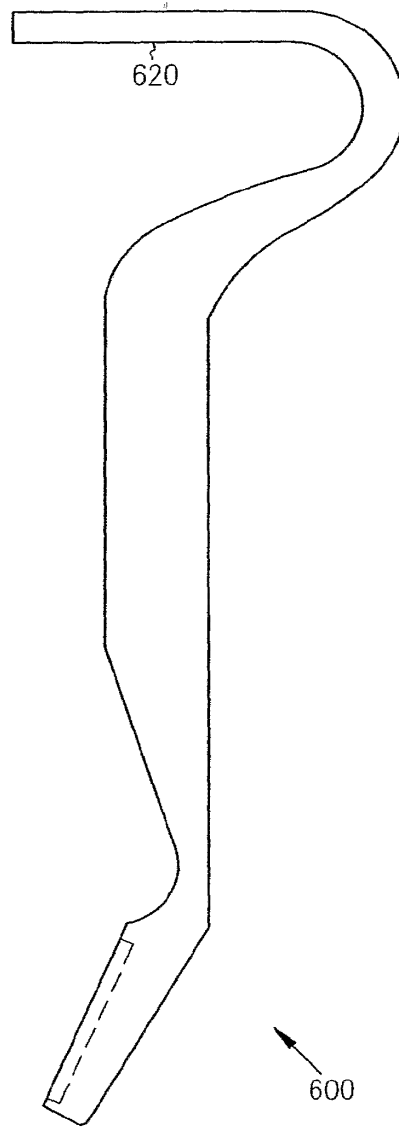


FIG. 6B

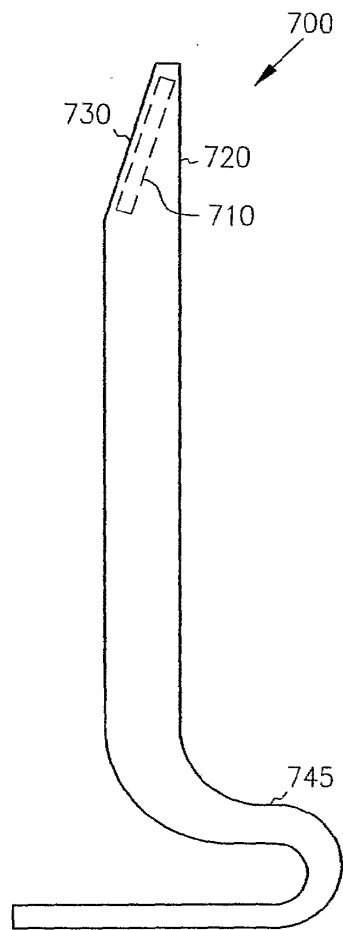


FIG. 7A

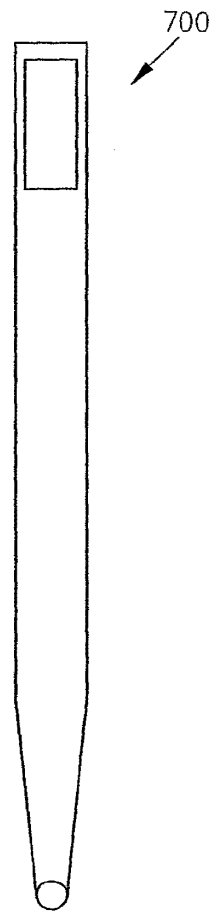


FIG. 7B

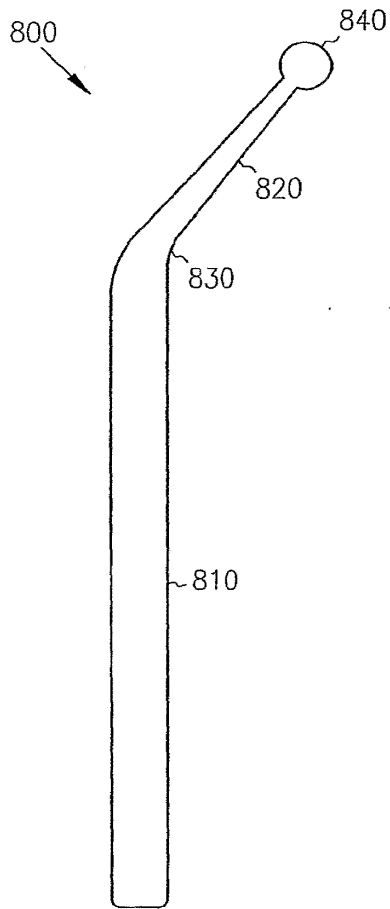


FIG. 8A

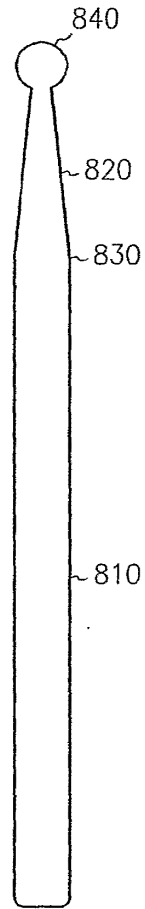


FIG. 8B

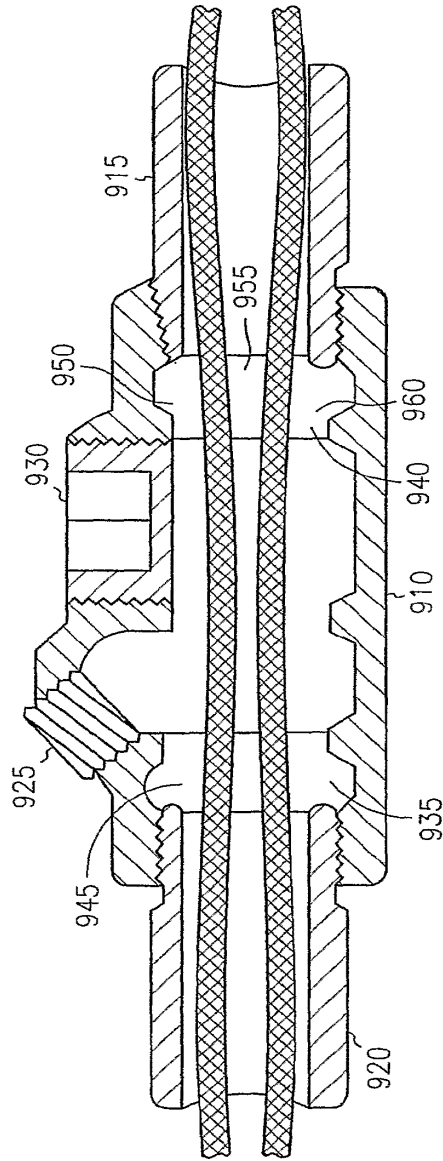


FIG. 9

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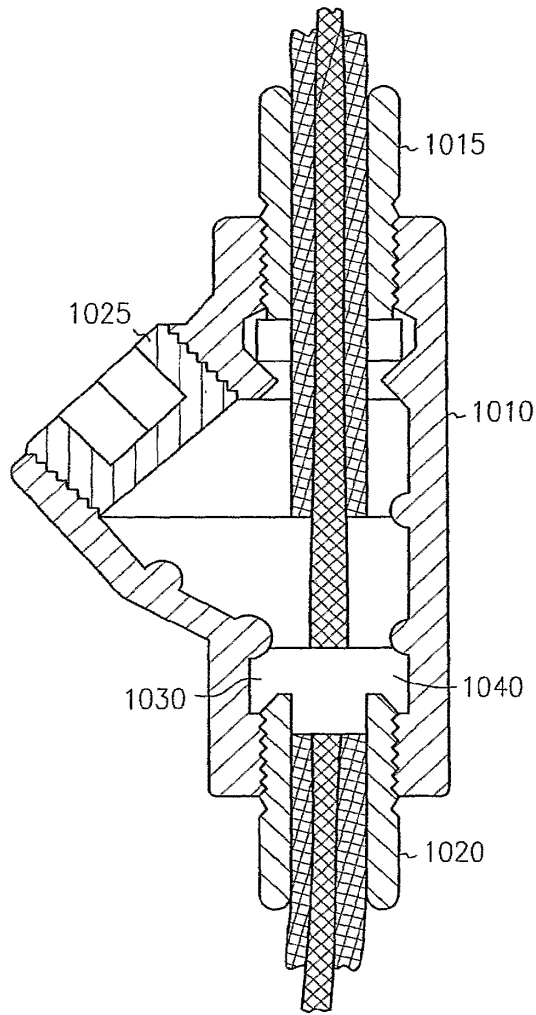


FIG. 10

**INTERNATIONAL SEARCH REPORT**

International Application No  
PCT/US 03/37276

| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>IPC 7 H02G3/08 H02G1/00  |   |  |
|--|---|--|
| According to International Patent Classification (IPC) or to both national classification and IPC  |   |  |
| <b>B. FIELDS SEARCHED</b><br>Minimum documentation searched (classification system followed by classification symbols)<br>IPC 7 H02G B25B A61C   |   |  |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  |   |  |
| Electronic data base consulted during the international search (name of data base and, where practical, search terms used)<br>EPO-Internal   |   |  |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>  |   |  |
| Category   | Citation of document, with indication, where appropriate, of the relevant passages                              | Relevant to claim No.  |
| A  | GB 815 759 A (WILLIAM CHARLES GOLDACRE)<br>1 July 1959 (1959-07-01)<br>the whole document<br>---                | 1, 7, 12,<br>17, 24  |
| A  | US 5 718 583 A (FLANAGAN DENNIS F)<br>17 February 1998 (1998-02-17)<br>the whole document<br>---                | 1, 7, 12   |
| A  | US 4 640 978 A (KILBANE GEORGE J ET AL)<br>3 February 1987 (1987-02-03)<br>column 2, line 26 - line 30<br>----- | 7  |
| <input type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.   |   |  |
| * Special categories of cited documents :  |   |  |
| *A* document defining the general state of the art which is not considered to be of particular relevance<br>*E* earlier document but published on or after the international filing date<br>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>*O* document referring to an oral disclosure, use, exhibition or other means<br>*P* document published prior to the international filing date but later than the priority date claimed<br>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.<br>*&* document member of the same patent family |   |  |
| Date of the actual completion of the international search<br><br>21 April 2004   |   | Date of mailing of the international search report<br><br>29/04/2004 |
| Name and mailing address of the ISA<br>European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax: (+31-70) 340-3016   |   | Authorized officer<br><br>Moeza, A                                   |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No  
PCT/US 03/37276

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|--|------------------|-------------------------|------------------|
| GB 815759                              | A                | 01-07-1959              | NONE             |
| US 5718583                             | A                | 17-02-1998              | NONE             |
| US 4640978                             | A                | 03-02-1987              | NONE             |

Form PCT/ISA/210 (patent family annex) (January 2004)

## Electronic Patent Application Fee Transmittal

|   |                                 |                 |               |                             |
|---|---------------------------------|-----------------|---------------|-----------------------------|
| <b>Application Number:</b>                              | 13391539                        |                 |               |                             |
| <b>Filing Date:</b>                                     | 02-May-2012                     |                 |               |                             |
| <b>Title of Invention:</b>                              | FILLER ASSEMBLY FOR CABLE GLAND |                 |               |                             |
| <b>First Named Inventor/Applicant Name:</b>             | Samuel Liam Proud               |                 |               |                             |
| <b>Filer:</b>   | John D. Franzini/Melanie Brunow |                 |               |                             |
| <b>Attorney Docket Number:</b>                          | 920257.00016                    |                 |               |                             |
| Filed as Large Entity                                   |                                 |                 |               |                             |
| <b>U.S. National Stage under 35 USC 371 Filing Fees</b> |                                 |                 |               |                             |
| <b>Description</b>                                      | <b>Fee Code</b>                 | <b>Quantity</b> | <b>Amount</b> | <b>Sub-Total in USD(\$)</b> |
| <b>Basic Filing:</b>                                    |                                 |                 |               |                             |
| <b>Pages:</b>   |                                 |                 |               |                             |
| <b>Claims:</b>  |                                 |                 |               |                             |
| <b>Miscellaneous-Filing:</b>                            |                                 |                 |               |                             |
| <b>Petition:</b>  |                                 |                 |               |                             |
| <b>Patent-Appeals-and-Interference:</b>                 |                                 |                 |               |                             |
| <b>Post-Allowance-and-Post-Issuance:</b>                |                                 |                 |               |                             |
| <b>Extension-of-Time:</b>                               |                                 |                 |               |                             |



| Description                             | Fee Code | Quantity | Amount | Sub-Total in USD(\$) |
|---|----------|----------|--------|----------------------|
| <b>Miscellaneous:</b>                   |          |          |        |                      |
| Submission- Information Disclosure Stmt | 1806     | 1        | 180    | 180                  |
| <b>Total in USD (\$)</b>                |          |          |        | <b>180</b>           |

## Electronic Acknowledgement Receipt

|   |                                      |
|---|--------------------------------------|
| <b>EFS ID:</b>                              | 18726161                             |
| <b>Application Number:</b>                  | 13391539                             |
| <b>International Application Number:</b>    |                                      |
| <b>Confirmation Number:</b>                 | 6980                                 |
| <b>Title of Invention:</b>                  | FILLER ASSEMBLY FOR CABLE GLAND      |
| <b>First Named Inventor/Applicant Name:</b> | Samuel Liam Proud                    |
| <b>Customer Number:</b>                     | 26710                                |
| <b>Filer:</b>                               | John D. Franzini/Melanie Brunow      |
| <b>Filer Authorized By:</b>                 | John D. Franzini                     |
| <b>Attorney Docket Number:</b>              | 920257.00016                         |
| <b>Receipt Date:</b>                        | 10-APR-2014                          |
| <b>Filing Date:</b>                         | 02-MAY-2012                          |
| <b>Time Stamp:</b>                          | 13:08:27                             |
| <b>Application Type:</b>                    | U.S. National Stage under 35 USC 371 |

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|--|-----------------|
| Submitted with Payment                   | yes             |
| Payment Type                             | Deposit Account |
| Payment was successfully received in RAM | \$180           |
| RAM confirmation Number                  | 10975           |
| Deposit Account                          | 170055          |
| Authorized User                          |                 |

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|--|---------------------------|---|---|------------------|------------------|
| 1  |                           | 920257-00016-response.pdf                             | 376544<br>5bec5f8e5ec89ce3483a7fe499faa30ba0dbdd4c  | yes              | 8                |
| <b>Multipart Description/PDF files in .zip description</b>   |                           |   |   |                  |                  |
|  |                           | Document Description                                  | Start   | End              |                  |
|  |                           | Amendment/Req. Reconsideration-After Non-Final Reject | 1   | 1                |                  |
|  |                           | Claims  | 2   | 5                |                  |
|  |                           | Applicant Arguments/Remarks Made in an Amendment      | 6   | 8                |                  |
| <b>Warnings:</b>   |                           |   |   |                  |                  |
| <b>Information:</b>  |                           |   |   |                  |                  |
| 2  | Oath or Declaration filed | 920257-00016-Mood-Dec.PDF                             | 91095<br>1a626947b17488ff92e5081592505e64d6fab98    | no               | 10               |
| <b>Warnings:</b>   |                           |   |   |                  |                  |
| The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing |                           |   |   |                  |                  |
| <b>Information:</b>  |                           |   |   |                  |                  |
| 3  | Oath or Declaration filed | 920257-00016-Exhibit-A-Mood-Dec.PDF                   | 2058624<br>f93007df9d4365b1888ce15f4b13df22e0a5ae16 | no               | 3                |
| <b>Warnings:</b>   |                           |   |   |                  |                  |
| <b>Information:</b>  |                           |   |   |                  |                  |
| 4  | Oath or Declaration filed | 920257-00016-Exhibit-B-Mood-Dec.PDF                   | 4170892<br>657a4a715fe8bcba3461f2a9816bb050e961316d | no               | 4                |
| <b>Warnings:</b>   |                           |   |   |                  |                  |
| <b>Information:</b>  |                           |   |   |                  |                  |
| 5  | Oath or Declaration filed | 920257-00016-Exhibit-C-Mood-Dec.PDF                   | 924015<br>7dfd704804b02b52a332ba5403aa3faf04aca022  | no               | 3                |
| <b>Warnings:</b>   |                           |   |   |                  |                  |
| <b>Information:</b>  |                           |   |   |                  |                  |
| 6  | Oath or Declaration filed | 920257-00016-Exhibit-D-Mood-Dec.PDF                   | 3706395<br>37bf7a5a32c67d709b88a1a4453f92b5d1082168 | no               | 5                |

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|--|--|--------------------------------|---|----|----|
| <b>Warnings:</b>   |  |                                |   |    |    |
| <b>Information:</b>  |  |                                |   |    |    |
| 7  | Oath or Declaration filed                          | 920257-00016-Carroll-Dec.PDF   | 38481<br>5a52e0be486ad6f05073a8950d57e00453ced316   | no | 1  |
| <b>Warnings:</b>   |  |                                |   |    |    |
| <b>Information:</b>  |  |                                |   |    |    |
| 8  | Oath or Declaration filed                          | 920257-00016-Abraas-Dec.PDF    | 466422<br>f55702b95a1808bd1e6f1526e8328095f485a7eb  | no | 1  |
| <b>Warnings:</b>   |  |                                |   |    |    |
| <b>Information:</b>  |  |                                |   |    |    |
| 9  | Information Disclosure Statement (IDS) Form (SB08) | 920257-00016-IDS-3.PDF         | 528252<br>24cb32233f57c3affb7fd424fb1a113f4fb66d8   | no | 4  |
| <b>Warnings:</b>   |  |                                |   |    |    |
| <b>Information:</b>  |  |                                |   |    |    |
| A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems. |  |                                |   |    |    |
| 10   | Foreign Reference                                  | CA1279707C.PDF                 | 596669<br>3523838d0f77ba1990fd0702f0acabec2fb2e40   | no | 17 |
| <b>Warnings:</b>   |  |                                |   |    |    |
| <b>Information:</b>  |  |                                |   |    |    |
| 11   | Foreign Reference                                  | CA1333192C.PDF                 | 417883<br>0db94ea1ffc4860ad6a94f47a63129421e4c78a   | no | 14 |
| <b>Warnings:</b>   |  |                                |   |    |    |
| <b>Information:</b>  |  |                                |   |    |    |
| 12   | Foreign Reference                                  | WO204843A2.PDF                 | 848557<br>13d66e453457ae1b599fe8c8b8c33bc0f077424a  | no | 25 |
| <b>Warnings:</b>   |  |                                |   |    |    |
| <b>Information:</b>  |  |                                |   |    |    |
| 13   | Foreign Reference                                  | WO2004047248A1.PDF             | 857960<br>aaa05da4a154ef1e88a255f16113b0cf85cab48   | no | 25 |
| <b>Warnings:</b>   |  |                                |   |    |    |
| <b>Information:</b>  |  |                                |   |    |    |
| 14   | Non Patent Literature                              | 920257-00016-Exhibit-A-CMP.PDF | 2058624<br>f93007df9d4365b1888ce15f4b13df22e0a5ae16 | no | 3  |
| <b>Warnings:</b>   |  |                                |   |    |    |

| Information:   |                       |                                    |  |          |   |
|--|-----------------------|------------------------------------|--|----------|---|
| 15   | Non Patent Literature | 920257-00016-Exhibit-B-EGS.<br>PDF | 4170892<br><small>657a4a715fe8bcb3461f2a9816bb050e96<br/>1316d</small> | no       | 4 |
| Warnings:  |                       |                                    |  |          |   |
| Information:   |                       |                                    |  |          |   |
| 16   | Fee Worksheet (SB06)  | fee-info.pdf                       | 30536<br><small>cb831557b3f1b65b53dffe1acad82c19da1d<br/>43b4</small>  | no       | 2 |
| Warnings:  |                       |                                    |  |          |   |
| Information:   |                       |                                    |  |          |   |
| <b>Total Files Size (in bytes):</b>  |                       |                                    |  | 21341841 |   |
| <p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b><br/> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b><br/> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b><br/> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p> |                       |                                    |  |          |   |

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|   |   |                                    |   |                                  |                                       |                     |  |
|---|---|------------------------------------|---|----------------------------------|---------------------------------------|---------------------|--|
| <b>PATENT APPLICATION FEE DETERMINATION RECORD</b><br>Substitute for Form PTO-875   |   |                                    | Application or Docket Number<br><b>13/391,539</b> | Filing Date<br><b>05/02/2012</b> | <input type="checkbox"/> To be Mailed |                     |  |
| ENTITY: <input checked="" type="checkbox"/> LARGE <input type="checkbox"/> SMALL <input type="checkbox"/> MICRO   |   |                                    |   |                                  |                                       |                     |  |
| <b>APPLICATION AS FILED – PART I</b>  |   |                                    |   |                                  |                                       |                     |  |
| (Column 1)  |   | (Column 2)                         |   |                                  |                                       |                     |  |
| FOR   | NUMBER FILED  | NUMBER EXTRA                       | RATE (\$)   | FEE (\$)                         |                                       |                     |  |
| <input type="checkbox"/> BASIC FEE<br><small>(37 CFR 1.16(a), (b), or (c))</small>  | N/A   | N/A                                | N/A   |                                  |                                       |                     |  |
| <input type="checkbox"/> SEARCH FEE<br><small>(37 CFR 1.16(k), (i), or (m))</small>   | N/A   | N/A                                | N/A   |                                  |                                       |                     |  |
| <input type="checkbox"/> EXAMINATION FEE<br><small>(37 CFR 1.16(o), (p), or (q))</small>  | N/A   | N/A                                | N/A   |                                  |                                       |                     |  |
| TOTAL CLAIMS<br><small>(37 CFR 1.16(j))</small>   | minus 20 =  | *                                  | X \$ =  |                                  |                                       |                     |  |
| INDEPENDENT CLAIMS<br><small>(37 CFR 1.16(h))</small>   | minus 3 =   | *                                  | X \$ =  |                                  |                                       |                     |  |
| <input type="checkbox"/> APPLICATION SIZE FEE<br><small>(37 CFR 1.16(s))</small>  | If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). |                                    |   |                                  |                                       |                     |  |
| <input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT<br><small>(37 CFR 1.16(j))</small>  |   |                                    |   |                                  |                                       |                     |  |
| * If the difference in column 1 is less than zero, enter "0" in column 2.   |   |                                    | TOTAL   |                                  |                                       |                     |  |
| <b>APPLICATION AS AMENDED – PART II</b>   |   |                                    |   |                                  |                                       |                     |  |
| (Column 1)  |   | (Column 2)                         | (Column 3)  |                                  |                                       |                     |  |
| <b>AMENDMENT</b>  | <b>04/10/2014</b>   | CLAIMS REMAINING AFTER AMENDMENT   | HIGHEST NUMBER PREVIOUSLY PAID FOR                | PRESENT EXTRA                    | RATE (\$)                             | ADDITIONAL FEE (\$) |  |
|   | Total (37 CFR 1.16(i))  | * 19                               | Minus   | ** 20                            | = 0                                   | X \$80 = 0          |  |
|   | Independent (37 CFR 1.16(h))  | * 3                                | Minus   | *** 3                            | = 0                                   | X \$420 = 0         |  |
|   | <input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))  |                                    |   |                                  |                                       |                     |  |
|   | <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))  |                                    |   |                                  |                                       |                     |  |
| TOTAL ADD'L FEE   |   |                                    |   |                                  | <b>0</b>                              |                     |  |
| (Column 1)  |   | (Column 2)                         | (Column 3)  |                                  |                                       |                     |  |
| <b>AMENDMENT</b>  | CLAIMS REMAINING AFTER AMENDMENT  | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA                                     |                                  | RATE (\$)                             | ADDITIONAL FEE (\$) |  |
|   | Total (37 CFR 1.16(i))  | *                                  | Minus   | **                               | =                                     | X \$ =              |  |
|   | Independent (37 CFR 1.16(h))  | *                                  | Minus   | ***                              | =                                     | X \$ =              |  |
|   | <input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))  |                                    |   |                                  |                                       |                     |  |
|   | <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))  |                                    |   |                                  |                                       |                     |  |
| TOTAL ADD'L FEE   |   |                                    |   |                                  |                                       |                     |  |
| * If the entry in column 1 is less than the entry in column 2, write "0" in column 3.<br>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".<br>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".<br>The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1. |   |                                    |   |                                  |                                       |                     |  |

LIE  
/DEBORAH SCOTT/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes contact information for Quarles & Brady LLP and examination details.

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pat-dept@quarles.com

|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|                              | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   | <b>AIA (First Inventor to File) Status</b><br>No |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 12/17/13.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims\***

- 5)  Claim(s) 1-12 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) 1-12 is/are rejected.
- 8)  Claim(s) \_\_\_\_\_ is/are objected to.
- 9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on 07/23/13 is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some\*\*    c)  None of the:
1.  Certified copies of the priority documents have been received.
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 3)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 4)  Other: \_\_\_\_\_.



## DETAILED ACTION

### *Notice of Pre-AIA or AIA Status*

1. The present application is being examined under the pre-AIA first to invent provisions.

### *Status of the Application*

2. Claims 1-12 have been examined in this application. This communication is the first action on the merits.

### *Priority*

3. Acknowledgment is made of applicant's claim for foreign priority based on an application(s) filed in the European Patent Office on 08/21/09. All certified copies of the priority documents have been received.

### *Claim Rejections - 35 USC § 103*

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 1-12 rejected under 35 U.S.C. 103(a) as being unpatentable over EP 434105 to Kaptein in view of WO 2008029165 to Hand.**

**As per claim 1**, Kaptein discloses a filler assembly comprising: a body adapted to define at least a first chamber (23), a second chamber (24) said second chamber adapted to communicate with said first chamber to enable mixing of the contents of the respective chambers (Col 4, ¶ 4); a first barrier apparatus (21); one elongate dispenser apparatus (17); a second barrier apparatus (22);

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Kaptein does not disclose a barrier member. Hand teaches a barrier member (**4**) having one aperture and a conical portion clamped between two surfaces of the cable gland (**Figs. 1 & 3: Items 42 & 2d**).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to employ the use of the barrier member for providing a seal between the gland structure and the hardenable compound (**Hand: Page 10, ¶ 4-5**).

Moreover and in regard to the functional recitations preceded by the phrase "adapted to", claim scope is not limited by claim language that suggests or makes optional but does not require steps to be performed, or by claim language that does not limit a claim to a particular structure. Examples of claim language that may raise a question as to the limiting effect of the language in a claim are: "adapted to" or "adapted for" clauses, "wherein" clauses, and "whereby" clauses (**MPEP §2111.04**). Therefore, although these limitations are considered, they are afforded no patentable weight.

**As per claim 2**, Kaptein discloses the body being flexible (**Col 1, Line 34**).

**As per claim 3**, Kaptein discloses the first barrier apparatus comprising a releasable clamp (**Col 4, Lines 19-21**).

**As per claim 4**, Kaptein discloses a first component of a curable liquid material in the first chamber and a second component of said curable liquid material in the second chamber (**Col 4, Lines 5-9**).

**As per claim 5**, Kaptein discloses all the structural limitations of the claim and is capable of dispensing a two-part curable liquid that changes color upon mixing the components.

**As per claim 6**, the disclosure from Kaptein combined Hand teach the invention according to claim 1. Hand further teaches a cover (**10**) covering the external screw thread of a

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cable gland (*Page 17, ¶ 2*). At the time of the invention, it would have been obvious to one of ordinary skill in the art to employ the aforementioned teaching from Hand for the purpose of being able to compress a seal (**13**) to engage the outer sheath of a cable extending through the gland for the purpose of fixing the position of the cable relative to the gland.

**As per claim 7**, the disclosure from Kaptein combined Hand teach the invention according to claim 6. Hand further teaches said cover (**10**) cover a portion of an end face of the cable gland (*Figure 1*). At the time of the invention, it would have been obvious to one of ordinary skill in the art to employ the aforementioned teaching from Hand for the purpose of being able to compress a seal (**13**) to engage the outer sheath of a cable extending through the gland for the purpose of fixing the position of the cable relative to the gland.

**As per claim 8**, the disclosure from Kaptein combined Hand teach the invention according to claim 1. Hand further teaches said barrier member being flexible (*Page 10, ¶ 1*). At the time of the invention it would have been obvious to employ the use of a flexible seal taught by Hand with the dispenser disclosed by Kaptein for the purpose of allowing the seal to resiliently deform during bonding to the two-part curable liquid material—thereby minimizing air pockets and ensuring integrity of the bondline therewith.

**As per claim 9**, the disclosure from Kaptein combined Hand teach the invention according to claim 1. Hand further teaches the seal having a tapering portion (*Page 8, ¶ 3-5*). At the time of the invention, it would have been obvious to one of ordinary skill to employ the use of a conically-shaped seal taught by Hand with the dispenser disclosed by Kaptein for the purpose of enhancing sealing performance during bonding to the two-part curable liquid material.

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**As per claim 10**, Kaptein discloses a method for filling a cable gland with a curable liquid material comprising:

- a dispenser apparatus comprising: a body adapted to define at least a first chamber (23), a second chamber (24) said second chamber adapted to communicate with said first chamber to enable mixing of the contents of the respective chambers (*Col 4, ¶ 4*); a first barrier apparatus (21); one elongate dispenser apparatus (17); a second barrier apparatus (22);
- a step of locating an outlet of said dispenser in said cable gland and dispensing curable liquid therefrom (*Figure 6*).

Kaptein does not disclose a barrier member and located a barrier member in the cable gland. Hand teaches a barrier member (4) having one aperture and a conical portion clamped between two surfaces of the cable gland (*Figs. 1 & 3: Items 42 & 2d*) and a step of locating the barrier member in the cable gland (*Page 7, ¶ 4*).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to employ the use of the barrier member for providing a seal between the gland structure and the hardenable compound (*Page 10, ¶ 4-5*).

**As per claim 11**, the disclosure from Kaptein combined Hand teach the invention according to claim 10. Hand further discloses the barrier member being located around at least one said core of at least one said cable (*Page 10, ¶ 4*). At the time of the invention it would have been obvious to one of ordinary skill in the art to incorporate the aforementioned teaching from Hand with the filling method disclosed by Kaptein for the purpose of providing a seal between the gland structure and the hardenable compound (*Page 10, ¶ 4-5*).

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**As per claim 12**, the disclosure from Kaptein combined Hand teach the invention according to claim 1. Kaptein further discloses the second barrier apparatus comprising a releasable clamp (*Col 4, Lines 1-5*).

***Conclusion***

6. The prior art made of record in FORM PTO-892 and not relied upon is considered pertinent to applicant's disclosure.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Gruby, whose telephone number is (571) 272-3415. The examiner can normally be reached from Monday to Friday between 8:00 AM and 5:00 PM.

If any attempt to reach the examiner by telephone is unsuccessful, the examiner's supervisor, Paul Durand, can be reached at (571) 272-4459.

Another resource that is available to applicants is the Patent Application Information Retrieval (PAIR). Information regarding the status of an application can be obtained from the (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAX. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, please feel free to contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/RG/  
Examiner, Art Unit 3754

/PAUL R DURAND/  
Supervisory Patent Examiner, Art Unit 3754  
January 18, 2014

|                                   |                                       |   |             |
|-----------------------------------|---------------------------------------|---|-------------|
| <b>Notice of References Cited</b> | Application/Control No.<br>13/391,539 | Applicant(s)/Patent Under Reexamination<br>PROUD, SAMUEL LIAM |             |
|                                   | Examiner<br>RANDALL GRUBY             | Art Unit<br>3754  | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY    | Name    | Classification             |           |
|---|--|--------------------|---------|----------------------------|-----------|
| * | A  | US-2,913,260 A     | 11-1959 | GIVENS GLENN G             | 285/151.1 |
| * | B  | US-2,957,038 A     | 10-1960 | GREENIDGE RALPH M C et al. | 174/23R   |
| * | C  | US-3,567,843 A     | 03-1971 | Collins et al.             | 174/51    |
| * | D  | US-4,379,204 A     | 04-1983 | Perrault et al.            | 174/653   |
| * | E  | US-5,208,427 A     | 05-1993 | Couto et al.               | 174/653   |
| * | F  | US-5,321,205 A     | 06-1994 | Bawa et al.                | 174/655   |
| * | G  | US-5,691,505 A     | 11-1997 | Norris, Trevor William     | 174/51    |
| * | H  | US-6,812,406 B2    | 11-2004 | Hand, Edward               | 174/667   |
| * | I  | US-2010/0108020 A1 | 05-2010 | Miretti, Angelo            | 123/198.D |
|   | J  | US-                |         |                            |           |
|   | K  | US-                |         |                            |           |
|   | L  | US-                |         |                            |           |
|   | M  | US-                |         |                            |           |


**FOREIGN PATENT DOCUMENTS**

| * | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Country | Name | Classification |
|---|--|-----------------|---------|------|----------------|
|   | N  |                 |         |      |                |
|   | O  |                 |         |      |                |
|   | P  |                 |         |      |                |
|   | Q  |                 |         |      |                |
|   | R  |                 |         |      |                |
|   | S  |                 |         |      |                |
|   | T  |                 |         |      |                |

**NON-PATENT DOCUMENTS**

| * | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|
|   | U   |
|   | V   |
|   | W   |
|   | X   |


\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

|  |  |  |
|--|--|--|
| <b><i>Index of Claims</i></b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

|   |                 |   |                   |   |                     |   |                 |
|---|-----------------|---|-------------------|---|---------------------|---|-----------------|
| ✓ | <b>Rejected</b> | - | <b>Cancelled</b>  | N | <b>Non-Elected</b>  | A | <b>Appeal</b>   |
| = | <b>Allowed</b>  | ÷ | <b>Restricted</b> | I | <b>Interference</b> | O | <b>Objected</b> |

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

| CLAIM |          | DATE       |            |            |            |  |  |  |  |
|-------|----------|------------|------------|------------|------------|--|--|--|--|
| Final | Original | 03/27/2013 | 06/07/2013 | 08/14/2013 | 01/15/2014 |  |  |  |  |
|       | 1        | ÷          | ✓          | ✓          | ✓          |  |  |  |  |
|       | 2        | ÷          | ✓          | ✓          | ✓          |  |  |  |  |
|       | 3        | ÷          | ✓          | ✓          | ✓          |  |  |  |  |
|       | 4        | ÷          | ✓          | ✓          | ✓          |  |  |  |  |
|       | 5        | ÷          | ✓          | ✓          | ✓          |  |  |  |  |
|       | 6        | ÷          | ✓          | ✓          | ✓          |  |  |  |  |
|       | 7        | ÷          | ✓          | ✓          | ✓          |  |  |  |  |
|       | 8        | ÷          | ✓          | ✓          | ✓          |  |  |  |  |
|       | 9        | ÷          | ✓          | ✓          | ✓          |  |  |  |  |
|       | 10       | ÷          | ✓          | ✓          | ✓          |  |  |  |  |
|       | 11       | ÷          | ✓          | ✓          | ✓          |  |  |  |  |
|       | 12       |            | ✓          | ✓          | ✓          |  |  |  |  |

|  |  |  |
|--|--|--|
| <b>Search Notes</b><br><br> | <b>Application/Control No.</b><br><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br><br>RANDALL GRUBY           | <b>Art Unit</b><br><br>3754  |

| CPC- SEARCHED |      |          |
|---------------|------|----------|
| Symbol        | Date | Examiner |
|               |      |          |

| CPC COMBINATION SETS - SEARCHED |      |          |
|---------------------------------|------|----------|
| Symbol                          | Date | Examiner |
|                                 |      |          |

| US CLASSIFICATION SEARCHED |                                    |          |          |
|----------------------------|------------------------------------|----------|----------|
| Class                      | Subclass                           | Date     | Examiner |
| 222                        | 92,94,95,103,107,145.1,145.5,145.6 | 06/07/13 | RG       |
| 222                        | 92,94,95,103,107,145.1,145.5,145.6 | 08/14/13 | RG       |
| UPDATED                    | ALL ABOVE                          | 01/15/14 | RG       |

| SEARCH NOTES   |          |          |
|--|----------|----------|
| Search Notes   | Date     | Examiner |
| Performed Inventor Names Search                        | 06/07/13 | RG       |
| Reviewed IDS References                                | 06/07/13 | RG       |
| Consulted Primary Examiner for Field of Search         | 06/07/13 | RG       |
| See EAST search history, attached                      | 06/07/13 | RG       |
| Updated search. See EAST search history, attached.     | 08/14/13 | RG       |
| Updated search. See EAST search history, attached.     | 01/15/14 | RG       |
| Consulted primary examiner on rejection, Kevin Shaver. | 01/15/14 | RG       |

| INTERFERENCE SEARCH     |                         |      |          |
|-------------------------|-------------------------|------|----------|
| US Class/<br>CPC Symbol | US Subclass / CPC Group | Date | Examiner |
|                         |                         |      |          |

|   |  |
|---|--|
| /RANDALL GRUBY/<br>Examiner.Art Unit 3754 |  |
|---|--|



## EAST Search History

## EAST Search History (Prior Art)

| Ref # | Hits | Search Query  | DBs  | Default Operator | Plurals | Time Stamp          |
|-------|------|---|--|------------------|---------|---------------------|
| L3    | 8007 | 222/92,94,95,103,107,145.1,145.5,145.6.ccls.  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR               | ON      | 2014/01/15<br>17:56 |
| L4    | 458  | l3 and @pd> "20130606"  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR               | ON      | 2014/01/15<br>17:56 |
| L5    | 2    | l4 and (gland)  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR               | ON      | 2014/01/15<br>17:58 |
| L6    | 12   | ("20040069522"   "20120097445"   "20020066518"   "4692563"   "8170390"   "5600094"   "6259029"   "7507105"   "20080262408"   "20030226680"   "5310963"   "5621191").PN.   | US-PGPUB;<br>USPAT;<br>USOCR   | OR               | ON      | 2014/01/15<br>18:01 |
| L7    | 28   | (US-20100108020-\$ or US-20020066518-\$ or US-20030226680-\$ or US-20040069522-\$ or US-20120097445-\$).did. or (US-5691505-\$ or US-3567843-\$ or US-5600094-\$ or US-5621191-\$ or US-4379204-\$ or US-5208427-\$ or US-4692563-\$ or US-5321205-\$ or US-5310963-\$ or US-6812406-\$ or US-6259029-\$ or US-6242700-\$ or US-8170390-\$ or US-7507105-\$).did. or (US-2957038-\$ or US-2913260-\$).did. or (GB-2138218-\$ or GB-2074395-\$).did. or (EP-434105-\$ or GB-2074395-\$ or GB-2258350-\$ or US-3833754-\$ or WO-2008029165-\$).did. | US-PGPUB;<br>USPAT;<br>USOCR;<br>EPO;<br>DERWENT                           | OR               | ON      | 2014/01/15<br>18:01 |
| L8    | 10   | l7 not l6   | US-PGPUB;<br>USPAT;<br>USOCR   | OR               | ON      | 2014/01/15<br>18:01 |
| S1    | 1    | "13391539"  | US-PGPUB;<br>USPAT   | OR               | ON      | 2013/06/07<br>13:51 |
| S2    | 4    | "4343105"   | EPO;<br>DERWENT  | OR               | ON      | 2013/06/07<br>13:51 |
| S3    | 13   | "434105"  | EPO;<br>DERWENT  | OR               | ON      | 2013/06/07<br>13:52 |
| S4    | 1    | 1991-186955.NRAN.   | DERWENT  | OR               | ON      | 2013/06/07<br>13:52 |

## EAST Search History

|     |        |                                  |  |    |    |                     |
|-----|--------|----------------------------------|--|----|----|---------------------|
| S5  | 9      | "2074395"                        | EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:53 |
| S6  | 0      | "20010109284"                    | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB                                  | OR | ON | 2013/06/07<br>13:54 |
| S7  | 131507 | (russel near2 smith)".in" and 3M | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>13:55 |
| S8  | 132048 | (russel near2 smith)".in" and 3M | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>13:55 |
| S9  | 0      | "1020017009380"                  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>13:56 |
| S10 | 48     | "765082"                         | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>13:56 |
| S11 | 11     | "765082"                         | EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:57 |
| S12 | 18     | "765082"                         | USOCR;<br>EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:57 |
| S13 | 0      | GB765082                         | USOCR;<br>EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:58 |
| S14 | 13     | "2957038"                        | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:00 |
| S15 | 0      | "20010109284"                    | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:01 |
| S16 | 955    | "9284"                           | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;                                     | OR | ON | 2013/06/07<br>14:01 |

|     |      |                   |  |    |    |                     |
|-----|------|-------------------|--|----|----|---------------------|
|     |      |                   | EPO; JPO;<br>DERWENT;<br>IBM_TDB   |    |    |                     |
| S17 | 202  | S16 AND kr        | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:01 |
| S18 | 48   | "765082"          | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:02 |
| S19 | 0    | gb-765082-\$.did  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:03 |
| S20 | 4    | ("2957038").URPN. | USPAT  | OR | ON | 2013/06/07<br>14:09 |
| S21 | 48   | "765082"          | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:15 |
| S22 | 5    | "2258350"         | US-PGPUB;<br>USPAT   | OR | ON | 2013/06/07<br>14:49 |
| S23 | 13   | "2258350"         | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2013/06/07<br>14:49 |
| S24 | 2    | "2001109284"      | DERWENT  | OR | ON | 2013/06/07<br>15:18 |
| S25 | 7    | "6242700"         | USPAT  | OR | ON | 2013/06/07<br>15:19 |
| S26 | 2    | "2001109284"      | DERWENT  | OR | ON | 2013/06/07<br>15:20 |
| S27 | 0    | "20010109284"     | DERWENT  | OR | ON | 2013/06/07<br>15:20 |
| S28 | 2    | "2001109284"      | DERWENT  | OR | ON | 2013/06/07<br>15:20 |
| S29 | 2    | "2001109284"      | DERWENT  | OR | ON | 2013/06/07<br>15:29 |
| S30 | 3    | "2001109284"      | JPO;<br>DERWENT  | OR | ON | 2013/06/07<br>15:30 |
| S31 | 2537 | 222/94            | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;                        | OR | ON | 2013/06/07<br>15:36 |

|     |     |   |  |    |    |                     |
|-----|-----|---|--|----|----|---------------------|
|     |     |   | DERWENT;<br>IBM_TDB  |    |    |                     |
| S32 | 624 | S31 and mix   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:37 |
| S33 | 69  | S32 and clamp   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:37 |
| S34 | 60  | S33 and (flex?ble or flex?bility or elastic\$3)   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:37 |
| S35 | 1   | 1991-186955.NRAN.   | DERWENT  | OR | ON | 2013/06/07<br>16:03 |
| S37 | 228 | (cable adj gland) and ((bond\$3 or epoxy or adhesive or (two adj part) or (cure or curable)) same2 cable)   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>16:15 |
| S38 | 185 | (cable adj gland) and ((bond\$3 or epoxy or adhesive or (two adj part) or (cure or curable)) same (cable or core or conductor))   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>16:17 |
| S39 | 48  | ("8105945"   "8106407"   "7285782"   "8105691"   "20040121637"   "6623289"   "6668793"   "5432301"   "4515516"   "5194012"   "6812406"   "8102116"   "3833754"   "7735876").PN. | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>16:33 |
| S40 | 3   | "20100003001"   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>16:41 |
| S41 | 1   | 2008-D99857.NRAN.   | DERWENT  | OR | ON | 2013/06/07<br>16:42 |
| S42 | 2   | "12477580"  | US-PGPUB;<br>USPAT   | OR | ON | 2013/06/07<br>17:00 |
| S43 | 1   | "20100307816"   | DERWENT  | OR | ON | 2013/06/07<br>17:00 |
| S44 | 1   | 2010-Q10826.NRAN.   | DERWENT  | OR | ON | 2013/06/07          |

## EAST Search History

|     |        |  |  |    |     |                     |
|-----|--------|--|--|----|-----|---------------------|
|     |        |  |  |    |     | 17:00               |
| S45 | 6      | "2138218"  | DERWENT  | OR | ON  | 2013/06/07<br>17:16 |
| S46 | 1      | 1984-258752.NRAN.  | DERWENT  | OR | ON  | 2013/06/07<br>17:16 |
| S47 | 5      | "7357579"  | US-PGPUB;<br>USPAT   | OR | ON  | 2013/06/07<br>17:22 |
| S48 | 2537   | 222/94   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2013/06/08<br>11:54 |
| S49 | 7297   | 222/94,92,103,95,107,145.5,145.6,145.1.ccls.   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2013/06/08<br>11:54 |
| S50 | 5      | "2008029165"   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2013/06/08<br>14:27 |
| S51 | 1      | 2008-D99857.NRAN.  | DERWENT  | OR | OFF | 2013/08/14<br>12:04 |
| S52 | 1      | 2008-D99857.NRAN.  | DERWENT  | OR | OFF | 2013/08/14<br>12:17 |
| S53 | 1      | "8170390".pn.  | USPAT  | OR | OFF | 2013/08/14<br>12:18 |
| S54 | 10     | ("20030226680"   "20040069522"  <br>"20040074662"   "20080236861"   "5621191"<br>  "6259029"   "6268565"   "6809263"  <br>"7641396"   "7781685").FN. | US-PGPUB;<br>USPAT;<br>USOCR   | OR | OFF | 2013/08/14<br>12:34 |
| S55 | 21     | ("3663740"   "4629825"   "4674818"  <br>"4692563"   "4857015"   "5310963").FN. OR<br>("2003/0226680"   "2004/0069522"  <br>"5621191").URPN.          | US-PGPUB;<br>USPAT;<br>USOCR   | OR | OFF | 2013/08/14<br>12:38 |
| S56 | 437426 | S55 and epoxy or harden\$3   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | OFF | 2013/08/14<br>12:38 |
| S57 | 3      | S55 and (epoxy or harden\$3)   | US-PGPUB;<br>USPAT;<br>USOCR   | OR | OFF | 2013/08/14<br>12:39 |
| S58 | 109    | 222/94,92,103,95,107,145.5,145.6,145.1.ccls.<br>and @pd>"20130607"   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2013/08/14<br>13:39 |
| S59 | 1      | "20020066518".pn.  | US-PGPUB;<br>USPAT   | OR | ON  | 2013/08/14<br>13:42 |
| S60 | 1      | "20080262408".pn.  | US-PGPUB;  | OR | ON  | 2013/08/14          |

|     |      |   |                              |    |     |                     |
|-----|------|---|------------------------------|----|-----|---------------------|
|     |      |   | USPAT                        |    |     | 13:43               |
| S61 | 1    | "1335047".pn.   | US-PGPUB;<br>USPAT           | OR | ON  | 2013/08/14<br>13:44 |
| S62 | 5    | "1335047".pn.   | EPO;<br>DERWENT              | OR | ON  | 2013/08/14<br>13:44 |
| S63 | 5    | "1335047"   | EPO;<br>DERWENT              | OR | ON  | 2013/08/14<br>13:45 |
| S64 | 3    | "2011021016"  | EPO;<br>DERWENT              | OR | ON  | 2013/08/14<br>13:47 |
| S65 | 6    | "2138218"   | DERWENT                      | OR | OFF | 2013/11/05<br>16:30 |
| S66 | 1    | 1984-258752.NRAN.   | DERWENT                      | OR | OFF | 2013/11/05<br>16:30 |
| S67 | 0    | "2010000301"  | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON  | 2014/01/15<br>10:05 |
| S68 | 2    | "20100003001"   | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON  | 2014/01/15<br>10:05 |
| S69 | 2386 | 174/650-669.CCLS.   | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON  | 2014/01/15<br>10:08 |
| S70 | 204  | S69 AND GLAND   | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON  | 2014/01/15<br>10:08 |
| S71 | 152  | S69 AND (CABLE WITH GLAND)  | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON  | 2014/01/15<br>10:09 |
| S72 | 109  | S69 AND (CABLE NEAR4 GLAND)   | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON  | 2014/01/15<br>10:09 |
| S73 | 0    | ("2010/0108020").URPN.  | USPAT                        | OR | ON  | 2014/01/15<br>10:10 |
| S74 | 18   | S71 AND ((HARDEN\$4 WITH (COMPOUND OR SLUDGE OR SLURRY OR PASTE)) OR EPOXY)   | USPAT                        | OR | ON  | 2014/01/15<br>10:17 |
| S75 | 1    | ("2003/0226680").URPN.  | USPAT                        | OR | ON  | 2014/01/15<br>10:25 |
| S76 | 23   | S71 AND (((HARDEN\$4 or seal\$4) WITH (COMPOUND OR SLUDGE OR SLURRY OR PASTE)) OR EPOXY)  | USPAT                        | OR | ON  | 2014/01/15<br>10:26 |
| S77 | 163  | ("1345473"   "1699690"   "1805155"  <br>"1814478"   "2151096"   "2503169"  <br>"2795641"   "2816949"   "2913260"  <br>"2986409"   "3058762"   "3079182"  <br>"3082470"   "3259406"   "3492410"  <br>"3555171"   "3567843"   "3635502"  <br>"3663740"   "3700268"   "3739076"  <br>"3985418"   "4022966"   "4198537"  <br>"4273405"   "4334121"   "4481697"  <br>"4490576"   "4493522"   "4513172"  <br>"4515991"   "4549037"   "4583811"  <br>"4608454"   "4629825"   "4674818"  <br>"4692561"   "4692562"   "4692563"  <br>"4739126"   "4814547"   "4857015"  <br>"5059747"   "5278352"   "5310359"  <br>"5310963"   "5866853"   "6268565"  <br>"RE38294").PN. OR ("2003/0226680"  <br>"2004/0069522"   "2010/0108020" | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON  | 2014/01/15<br>10:32 |

EAST Search History

|     |    |   |                              |    |    |                     |
|-----|----|---|------------------------------|----|----|---------------------|
|     |    | "3567843"   "4379204"   "5310963"  <br>"5321205"   "5621191"   "5691505"  <br>"6812406").URPN.  |                              |    |    |                     |
| S78 | 37 | S77 and (((harden\$4 or seal\$4) with<br>(compound or slurry or sludge or paste or<br>fluid)) or epoxy)   | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON | 2014/01/15<br>10:34 |
| S79 | 93 | ("1805155"   "20030226680"  <br>"20040069522"   "20040074662"  <br>"20080236861"   "2788992"   "3079182"  <br>"3485517"   "3555171"   "3567843"  <br>"3617614"   "3700268"   "3739076"  <br>"3761601"   "3819849"   "4022966"  <br>"4198537"   "4225162"   "4273405"  <br>"4293151"   "4334121"   "4481697"  <br>"4490576"   "4493522"   "4513172"  <br>"4515991"   "4549037"   "4580865"  <br>"4583811"   "4606562"   "4608454"  <br>"4629825"   "4692561"   "4692562"  <br>"4692563"   "4738636"   "4739126"  <br>"4953898"   "5059747"   "5621191"  <br>"6259029"   "6268565"   "6809263"  <br>"7641396"   "7781685").PN. OR ("2913260"  <br>"5208427"   "5310963"   "5321205"  <br>"8170390").URPN. | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON | 2014/01/15<br>10:38 |
| S80 | 24 | S79 and (((harden\$4 or seal\$4) with<br>(compound or slurry or sludge or paste or<br>fluid)) or epoxy)   | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON | 2014/01/15<br>10:39 |
| S81 | 10 | S80 not S78   | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON | 2014/01/15<br>10:39 |
| S82 | 12 | ("4299363"   "4944686"   "5378027"  <br>"5545854"   "5912431"   "6162995"  <br>"6300568").PN. OR ("2003/0226680"  <br>"2004/0069522"   "6809263").URPN.   | US-PGPUB;<br>USPAT;<br>USOCR | OR | ON | 2014/01/15<br>10:48 |

**EAST Search History (Interference)**

<This search history is empty>

**1/ 15/ 2014 6:04:07 PM**

**C:\Users\rgruby\Documents\EAST\Workspaces\13391539.wsp**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Samuel Liam Proud  
Application No.: 13/391,539  
Filed: May 2, 2012  
For: FILLER ASSEMBLY FOR CABLE GLAND  
Group Art Unit: 3754  
Examiner: Randall A. Gruby  
Confirmation No.: 6980  
Att'y. Docket: 920257.00016

**REQUEST FOR CONTINUED EXAMINATION AND AMENDMENT**

MS RCE  
Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Advisory Action dated 11/14/2013, please consider the following:

Amendments to the Claims begin on page 2; and

Remarks begin on page 5.



**In the Claims:**

Please amend the claims so that the pending claim set reads as follows:

1. (Currently Amended) A filler assembly for filling with curable liquid material a cable gland, the cable gland having a plurality of cores of at least one cable extending therethrough, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:

at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

at least one first barrier apparatus for temporarily preventing mixing of said first and second components;

at least one elongate dispenser apparatus adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

at least one second barrier apparatus for temporarily preventing passage of said curable liquid material from the or each said second chamber to at least one said dispenser apparatus; and

(b) at least one barrier member having at least one respective aperture therethrough for engaging at least one core of a cable, wherein the barrier member is adapted to restrict the extent of penetration of said curable liquid material along said cores and includes a conical portion clamped between two surfaces of the cable gland and terminating in a planar portion.

2. (Original) An assembly according to claim 1, wherein said body is flexible.

3. (Previously Presented) An assembly according to claim 1, wherein at least one said first barrier apparatus comprises at least one releasable clamp.

4. (Previously Presented) An assembly according to claim 1, further comprising a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

5. (Previously Presented) An assembly according to claim 5, wherein the curable liquid material is adapted to change color as a result of curing thereof.

6. (Previously Presented) An assembly according to claim 1, further comprising a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

7. (Original) An assembly according to claim 6, wherein the cover member is adapted to prevent curable liquid material from penetrating an end face of the cable gland.

8. (Previously Presented) An assembly according to claim 1, wherein at least one said barrier member comprises a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.

9. (Previously Presented) An assembly according to claim 1, wherein at least one said barrier member has a respective tapering portion.

10. (Currently Amended) A method of filling a cable gland with curable liquid material, the method comprising:

using a filler assembly that includes:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

at least one first barrier apparatus for temporarily preventing mixing of said first and second components;

at least one elongate dispenser apparatus adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

at least one second barrier apparatus for temporarily preventing passage of said curable liquid material from the or each said second chamber to at least one said dispenser apparatus; and

(b) at least one barrier member for having at least one respective aperture therethrough for engaging at least one core of a cable, wherein the barrier member is adapted to restricting the extent of penetration of said curable liquid material along said cores and includes a conical portion clamped between two surfaces of the cable gland and terminating in a planar portion;

locating at least one said barrier member in the cable gland; and

locating an outlet of at least one said dispenser apparatus in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.

11. (Original) A method according to claim 10, wherein the step of locating at least one said barrier member in the cable gland comprises locating at least one said barrier member around at least one said core of at least one said cable.

12. (Previously Presented) An assembly according to claim 1, wherein at least one said second barrier apparatus comprises at least one releasable clamp.

**REMARKS**

The undersigned thanks Examiner Gruby for the courtesy of the telephone interview conducted December 3, 2013, in which the invention and Kaptein EP 0434105 were discussed. Agreement was reached that adding language to the claims like that added herein would make the subject matter of claims 1-12 patentably distinguishable over EP 0434105 and the other prior art of record was discussed. It was determined that further searching and consideration would be required to continue the prosecution. Accordingly, an RCE accompanies this amendment.

Accordingly, it is respectfully submitted that this Amendment places this application into condition for allowance, which is respectfully requested. If that is determined to not be the case, a telephone interview is requested prior to the next Office Action to discuss the reasons and further proceedings that may be helpful to further this application.

A petition for a one-month extension is also submitted herewith. Please charge the extension fee, the RCE fee and any additional fees due to Deposit Account No. 17-0055. The Commissioner is hereby authorized to charge any other fees deemed necessary and credit any overpayments to Deposit Account No. 17-0055.

Respectfully submitted,

SAMUEL LIAM PROUD

Dated: December 17, 2013

/john d. franzini/  
John D. Franzini  
Reg. No. 31,356  
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Milwaukee, Wisconsin 53202-4497  
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Fax No. (414) 978-8747

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| <b>PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)</b>   |                                     | Docket Number (Optional)<br>920257.00016 |                  |                  |                  |                  |  |   |       |       |      |                  |   |       |       |       |          |   |         |       |       |          |  |         |         |       |          |  |         |         |       |          |
|---|-------------------------------------|--|------------------|------------------|------------------|------------------|--|---|-------|-------|------|------------------|---|-------|-------|-------|----------|---|---------|-------|-------|----------|--|---------|---------|-------|----------|--|---------|---------|-------|----------|
| Application Number<br><b>13/391,539</b>   | Filed<br><b>May 2, 2012</b>         |  |                  |                  |                  |                  |  |   |       |       |      |                  |   |       |       |       |          |   |         |       |       |          |  |         |         |       |          |  |         |         |       |          |
| For<br><b>Filler Assembly for Cable Gland</b>   |                                     |  |                  |                  |                  |                  |  |   |       |       |      |                  |   |       |       |       |          |   |         |       |       |          |  |         |         |       |          |  |         |         |       |          |
| Art Unit<br><b>3754</b>   | Examiner<br><b>Randall A. Gruby</b> |  |                  |                  |                  |                  |  |   |       |       |      |                  |   |       |       |       |          |   |         |       |       |          |  |         |         |       |          |  |         |         |       |          |
| <p>This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.</p> <p>The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="text-align: center; border-bottom: 1px solid black;">Fee</th> <th style="text-align: center; border-bottom: 1px solid black;">Small Entity Fee</th> <th style="text-align: center; border-bottom: 1px solid black;">Micro Entity Fee</th> <th style="width: 10%;"></th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/> One month (37 CFR 1.17(a)(1))</td> <td style="text-align: center;">\$200</td> <td style="text-align: center;">\$100</td> <td style="text-align: center;">\$50</td> <td style="text-align: right;">\$ <u>200.00</u></td> </tr> <tr> <td><input type="checkbox"/> Two months (37 CFR 1.17(a)(2))</td> <td style="text-align: center;">\$600</td> <td style="text-align: center;">\$300</td> <td style="text-align: center;">\$150</td> <td style="text-align: right;">\$ _____</td> </tr> <tr> <td><input type="checkbox"/> Three months (37 CFR 1.17(a)(3))</td> <td style="text-align: center;">\$1,400</td> <td style="text-align: center;">\$700</td> <td style="text-align: center;">\$350</td> <td style="text-align: right;">\$ _____</td> </tr> <tr> <td><input type="checkbox"/> Four months (37 CFR 1.17(a)(4))</td> <td style="text-align: center;">\$2,200</td> <td style="text-align: center;">\$1,100</td> <td style="text-align: center;">\$550</td> <td style="text-align: right;">\$ _____</td> </tr> <tr> <td><input type="checkbox"/> Five months (37 CFR 1.17(a)(5))</td> <td style="text-align: center;">\$3,000</td> <td style="text-align: center;">\$1,500</td> <td style="text-align: center;">\$750</td> <td style="text-align: right;">\$ _____</td> </tr> </tbody> </table> <p><input type="checkbox"/> Applicant asserts small entity status. See 37 CFR 1.27.</p> <p><input type="checkbox"/> Applicant certifies micro entity status. See 37 CFR 1.29.<br/> <small>Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.</small></p> <p><input type="checkbox"/> A check in the amount of the fee is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director has already been authorized to charge fees in this application to a Deposit Account.</p> <p><input checked="" type="checkbox"/> The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to<br/>         Deposit Account Number <u>17-0055</u>.</p> <p><input type="checkbox"/> Payment made via EFS-Web.</p> <p><b>WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</b></p> <p>I am the</p> <p><input type="checkbox"/> applicant.</p> <p><input type="checkbox"/> attorney or agent of record. Registration number <u>31,356</u></p> <p><input type="checkbox"/> attorney or agent acting under 37 CFR 1.34. Registration number _____</p> <p><u>/John d. franzini/</u> <span style="float: right;"><u>December 17, 2013</u></span><br/> <small>Signature <span style="float: right;">Date</span></small></p> <p><u>John D. Franzini</u> <span style="float: right;"><u>414-277-5747</u></span><br/> <small>Typed or printed name <span style="float: right;">Telephone Number</span></small></p> <p><b>NOTE:</b> This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.</p> |                                     |  |                  | Fee              | Small Entity Fee | Micro Entity Fee |  | <input checked="" type="checkbox"/> One month (37 CFR 1.17(a)(1)) | \$200 | \$100 | \$50 | \$ <u>200.00</u> | <input type="checkbox"/> Two months (37 CFR 1.17(a)(2)) | \$600 | \$300 | \$150 | \$ _____ | <input type="checkbox"/> Three months (37 CFR 1.17(a)(3)) | \$1,400 | \$700 | \$350 | \$ _____ | <input type="checkbox"/> Four months (37 CFR 1.17(a)(4)) | \$2,200 | \$1,100 | \$550 | \$ _____ | <input type="checkbox"/> Five months (37 CFR 1.17(a)(5)) | \$3,000 | \$1,500 | \$750 | \$ _____ |
|   | Fee                                 | Small Entity Fee                         | Micro Entity Fee |                  |                  |                  |  |   |       |       |      |                  |   |       |       |       |          |   |         |       |       |          |  |         |         |       |          |  |         |         |       |          |
| <input checked="" type="checkbox"/> One month (37 CFR 1.17(a)(1))   | \$200                               | \$100                                    | \$50             | \$ <u>200.00</u> |                  |                  |  |   |       |       |      |                  |   |       |       |       |          |   |         |       |       |          |  |         |         |       |          |  |         |         |       |          |
| <input type="checkbox"/> Two months (37 CFR 1.17(a)(2))   | \$600                               | \$300                                    | \$150            | \$ _____         |                  |                  |  |   |       |       |      |                  |   |       |       |       |          |   |         |       |       |          |  |         |         |       |          |  |         |         |       |          |
| <input type="checkbox"/> Three months (37 CFR 1.17(a)(3))   | \$1,400                             | \$700                                    | \$350            | \$ _____         |                  |                  |  |   |       |       |      |                  |   |       |       |       |          |   |         |       |       |          |  |         |         |       |          |  |         |         |       |          |
| <input type="checkbox"/> Four months (37 CFR 1.17(a)(4))  | \$2,200                             | \$1,100                                  | \$550            | \$ _____         |                  |                  |  |   |       |       |      |                  |   |       |       |       |          |   |         |       |       |          |  |         |         |       |          |  |         |         |       |          |
| <input type="checkbox"/> Five months (37 CFR 1.17(a)(5))  | \$3,000                             | \$1,500                                  | \$750            | \$ _____         |                  |                  |  |   |       |       |      |                  |   |       |       |       |          |   |         |       |       |          |  |         |         |       |          |  |         |         |       |          |

\* Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

24434619

## Electronic Patent Application Fee Transmittal

|   |                                 |                 |               |                             |
|---|---------------------------------|-----------------|---------------|-----------------------------|
| <b>Application Number:</b>                              | 13391539                        |                 |               |                             |
| <b>Filing Date:</b>                                     | 02-May-2012                     |                 |               |                             |
| <b>Title of Invention:</b>                              | FILLER ASSEMBLY FOR CABLE GLAND |                 |               |                             |
| <b>First Named Inventor/Applicant Name:</b>             | Samuel Liam Proud               |                 |               |                             |
| <b>Filer:</b>   | John D. Franzini/Melanie Brunow |                 |               |                             |
| <b>Attorney Docket Number:</b>                          | 920257.00016                    |                 |               |                             |
| Filed as Large Entity                                   |                                 |                 |               |                             |
| <b>U.S. National Stage under 35 USC 371 Filing Fees</b> |                                 |                 |               |                             |
| <b>Description</b>                                      | <b>Fee Code</b>                 | <b>Quantity</b> | <b>Amount</b> | <b>Sub-Total in USD(\$)</b> |
| <b>Basic Filing:</b>                                    |                                 |                 |               |                             |
| <b>Pages:</b>   |                                 |                 |               |                             |
| <b>Claims:</b>  |                                 |                 |               |                             |
| <b>Miscellaneous-Filing:</b>                            |                                 |                 |               |                             |
| <b>Petition:</b>  |                                 |                 |               |                             |
| <b>Patent-Appeals-and-Interference:</b>                 |                                 |                 |               |                             |
| <b>Post-Allowance-and-Post-Issuance:</b>                |                                 |                 |               |                             |
| <b>Extension-of-Time:</b>                               |                                 |                 |               |                             |
| Extension - 1 month with \$0 paid                       | 1251                            | 1               | 200           | 200                         |

| Description                       | Fee Code | Quantity | Amount | Sub-Total in USD(\$) |
|-----------------------------------|----------|----------|--------|----------------------|
| <b>Miscellaneous:</b>             |          |          |        |                      |
| Request for Continued Examination | 1801     | 1        | 1200   | 1200                 |
| <b>Total in USD (\$)</b>          |          |          |        | <b>1400</b>          |

## Electronic Acknowledgement Receipt

|   |                                      |
|---|--------------------------------------|
| <b>EFS ID:</b>                              | 17683187                             |
| <b>Application Number:</b>                  | 13391539                             |
| <b>International Application Number:</b>    |                                      |
| <b>Confirmation Number:</b>                 | 6980                                 |
| <b>Title of Invention:</b>                  | FILLER ASSEMBLY FOR CABLE GLAND      |
| <b>First Named Inventor/Applicant Name:</b> | Samuel Liam Proud                    |
| <b>Customer Number:</b>                     | 26710                                |
| <b>Filer:</b>                               | John D. Franzini/Melanie Brunow      |
| <b>Filer Authorized By:</b>                 | John D. Franzini                     |
| <b>Attorney Docket Number:</b>              | 920257.00016                         |
| <b>Receipt Date:</b>                        | 17-DEC-2013                          |
| <b>Filing Date:</b>                         | 02-MAY-2012                          |
| <b>Time Stamp:</b>                          | 14:59:42                             |
| <b>Application Type:</b>                    | U.S. National Stage under 35 USC 371 |

### Payment information:

|  |                 |
|--|-----------------|
| Submitted with Payment                   | yes             |
| Payment Type                             | Deposit Account |
| Payment was successfully received in RAM | \$1400          |
| RAM confirmation Number                  | 1668            |
| Deposit Account                          | 170055          |
| Authorized User                          |                 |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

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Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)



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 Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)  
 Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

**File Listing:**

| Document Number | Document Description | File Name                      | File Size(Bytes)/ Message Digest                  | Multi Part /.zip | Pages (if appl.) |
|-----------------|----------------------|--------------------------------|---|------------------|------------------|
| 1               |                      | 920257-00016-RCE-amendment.pdf | 250482<br>d285aa4c26b28ed98fe776614f4221522c7c61a | yes              | 6                |

**Multipart Description/PDF files in .zip description**

| Document Description                               | Start | End |
|--|-------|-----|
| Amendment Submitted/Entered with Filing of CPA/RCE | 1     | 1   |
| Claims   | 2     | 4   |
| Applicant Arguments/Remarks Made in an Amendment   | 5     | 5   |
| Extension of Time                                  | 6     | 6   |

**Warnings:**

**Information:**

|   |                      |              |   |    |   |
|---|----------------------|--------------|---|----|---|
| 2 | Fee Worksheet (SB06) | fee-info.pdf | 32281<br>df7b3ceb69d56561ab2ed514c251990176c247b2 | no | 2 |
|---|----------------------|--------------|---|----|---|

**Warnings:**

**Information:**

**Total Files Size (in bytes):** 282763

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**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

Approved for use through 07/31/2012. OMB 0651-0031  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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**REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL  
(Submitted Only via EFS-Web)**

|                      |                   |             |            |                               |                  |          |      |
|----------------------|-------------------|-------------|------------|-------------------------------|------------------|----------|------|
| Application Number   | 13/391,539        | Filing Date | 2012-05-02 | Docket Number (if applicable) | 920257.00016     | Art Unit | 3754 |
| First Named Inventor | Samuel Liam Proud |             |            | Examiner Name                 | Randall A. Gruby |          |      |

**This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.**  
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

**SUBMISSION REQUIRED UNDER 37 CFR 1.114**

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

Consider the arguments in the Appeal Brief or Reply Brief previously filed on \_\_\_\_\_

Other \_\_\_\_\_

Enclosed

Amendment/Reply

Information Disclosure Statement (IDS)

Affidavit(s)/ Declaration(s)

Other Petition for Extension of Time

**MISCELLANEOUS**

Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months \_\_\_\_\_  
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

Other \_\_\_\_\_

**FEES**

**The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**

The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to  
Deposit Account No 170055

**SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED**

Patent Practitioner Signature

Applicant Signature

Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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| Signature of Registered U.S. Patent Practitioner |                    |                     |            |
|--|--------------------|---------------------|------------|
| Signature  | /john d. franzini/ | Date (YYYY-MM-DD)   | 2013-12-17 |
| Name   | John D. Franzini   | Registration Number | 31356      |

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

## Electronic Acknowledgement Receipt

|   |                                      |
|---|--------------------------------------|
| <b>EFS ID:</b>                              | 17683279                             |
| <b>Application Number:</b>                  | 13391539                             |
| <b>International Application Number:</b>    |                                      |
| <b>Confirmation Number:</b>                 | 6980                                 |
| <b>Title of Invention:</b>                  | FILLER ASSEMBLY FOR CABLE GLAND      |
| <b>First Named Inventor/Applicant Name:</b> | Samuel Liam Proud                    |
| <b>Customer Number:</b>                     | 26710                                |
| <b>Filer:</b>                               | John D. Franzini/Melanie Brunow      |
| <b>Filer Authorized By:</b>                 | John D. Franzini                     |
| <b>Attorney Docket Number:</b>              | 920257.00016                         |
| <b>Receipt Date:</b>                        | 17-DEC-2013                          |
| <b>Filing Date:</b>                         | 02-MAY-2012                          |
| <b>Time Stamp:</b>                          | 15:03:23                             |
| <b>Application Type:</b>                    | U.S. National Stage under 35 USC 371 |

### Payment information:

|                        |    |
|------------------------|----|
| Submitted with Payment | no |
|------------------------|----|

### File Listing:

| Document Number | Document Description                    | File Name            | File Size(Bytes)/<br>Message Digest                 | Multi Part /.zip | Pages (if appl.) |
|-----------------|---|----------------------|---|------------------|------------------|
| 1               | Request for Continued Examination (RCE) | 920257-00016-RCE.PDF | 1323602<br>093b86bf4ee427b0513a2c26fb0d9d665c892ba6 | no               | 2                |

### Warnings:

### Information:

Total Files Size (in bytes):

1323602

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

|   |   |              |   |                                  |                                       |
|---|---|--------------|---|----------------------------------|---------------------------------------|
| <b>PATENT APPLICATION FEE DETERMINATION RECORD</b><br>Substitute for Form PTO-875                               |   |              | Application or Docket Number<br><b>13/391,539</b> | Filing Date<br><b>05/02/2012</b> | <input type="checkbox"/> To be Mailed |
| ENTITY: <input checked="" type="checkbox"/> LARGE <input type="checkbox"/> SMALL <input type="checkbox"/> MICRO |   |              |   |                                  |                                       |
| <b>APPLICATION AS FILED – PART I</b>  |   |              |   |                                  |                                       |
| (Column 1)  |   | (Column 2)   |   |                                  |                                       |
| FOR   | NUMBER FILED  | NUMBER EXTRA | RATE (\$)   | FEE (\$)                         |                                       |
| <input type="checkbox"/> BASIC FEE<br>(37 CFR 1.16(a), (b), or (c))   | N/A   | N/A          | N/A   |                                  |                                       |
| <input type="checkbox"/> SEARCH FEE<br>(37 CFR 1.16(k), (l), or (m))  | N/A   | N/A          | N/A   |                                  |                                       |
| <input type="checkbox"/> EXAMINATION FEE<br>(37 CFR 1.16(o), (p), or (q))                                       | N/A   | N/A          | N/A   |                                  |                                       |
| TOTAL CLAIMS<br>(37 CFR 1.16(j))  | minus 20 =  | *            | X \$ =  |                                  |                                       |
| INDEPENDENT CLAIMS<br>(37 CFR 1.16(h))  | minus 3 =   | *            | X \$ =  |                                  |                                       |
| <input type="checkbox"/> APPLICATION SIZE FEE<br>(37 CFR 1.16(s))   | If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). |              |   |                                  |                                       |
| <input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))                                      |   |              |   |                                  |                                       |
| * If the difference in column 1 is less than zero, enter "0" in column 2.                                       |   |              | TOTAL   |                                  |                                       |

|   |  |                                  |       |                                    |               |                 |                     |  |
|---|--|----------------------------------|-------|------------------------------------|---------------|-----------------|---------------------|--|
| <b>APPLICATION AS AMENDED – PART II</b> |  |                                  |       |                                    |               |                 |                     |  |
| (Column 1)                              |  | (Column 2)                       |       | (Column 3)                         |               |                 |                     |  |
| <b>AMENDMENT</b>                        | <b>12/17/2013</b>  | CLAIMS REMAINING AFTER AMENDMENT |       | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | RATE (\$)       | ADDITIONAL FEE (\$) |  |
|   | Total (37 CFR 1.16(i))   | * 12                             | Minus | ** 20                              | = 0           | X \$80 =        | 0                   |  |
|   | Independent (37 CFR 1.16(h))   | * 2                              | Minus | ***3                               | = 0           | X \$420 =       | 0                   |  |
|   | <input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))                           |                                  |       |                                    |               |                 |                     |  |
|   | <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) |                                  |       |                                    |               |                 |                     |  |
|   |  |                                  |       |                                    |               | TOTAL ADD'L FEE | <b>0</b>            |  |

|                  |  |                                  |       |                                    |               |                 |                     |  |
|------------------|--|----------------------------------|-------|------------------------------------|---------------|-----------------|---------------------|--|
| (Column 1)       |  | (Column 2)                       |       | (Column 3)                         |               |                 |                     |  |
| <b>AMENDMENT</b> |  | CLAIMS REMAINING AFTER AMENDMENT |       | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | RATE (\$)       | ADDITIONAL FEE (\$) |  |
|                  | Total (37 CFR 1.16(i))   | *                                | Minus | **                                 | =             | X \$ =          |                     |  |
|                  | Independent (37 CFR 1.16(h))   | *                                | Minus | ***                                | =             | X \$ =          |                     |  |
|                  | <input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))                           |                                  |       |                                    |               |                 |                     |  |
|                  | <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) |                                  |       |                                    |               |                 |                     |  |
|                  |  |                                  |       |                                    |               | TOTAL ADD'L FEE |                     |  |

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".  
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE  
/RUBY JOHNSON/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes contact information for Quarles & Brady LLP and examination details.

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pat-dept@quarles.com

|  |                                      |   |  |
|--|--------------------------------------|---|--|
| <b>Applicant-Initiated Interview Summary</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|  | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   |  |

All participants (applicant, applicant's representative, PTO personnel):

(1) RANDALL GRUBY. (3) \_\_\_\_\_.

(2) JOHN FRANZINI. (4) \_\_\_\_\_.

Date of Interview: 03 December 2013.

Type:  Telephonic  Video Conference  
 Personal [copy given to:  applicant  applicant's representative]

Exhibit shown or demonstration conducted:  Yes  No.  
If Yes, brief description: \_\_\_\_\_.

Issues Discussed 101 112 102 103 Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 1 and 10.

Identification of prior art discussed: US 5310963; US 6809263; WO 2008029165.

**Substance of Interview**  
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

A proposed amendment to independent claims 1 and 10 was discussed in light of the prior art of record. Randy Gruby advised that the prior art of record (with specific reference to: US 5310963, US 6809263, and WO 2008029165) does not explicitly disclose the proposed amendment but may be used in a rejection under §103 pending further search and consideration.

Attorney John Franzini was advised that prosecution is currently closed and that further amendments would be considered under an RCE.

**Applicant recordation instructions:** The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Attachment

|  |   |
|--|---|
| /RANDALL GRUBY/<br>Examiner, Art Unit 3754 | /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754 |
|--|---|



## Summary of Record of Interview Requirements

### Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

### Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

#### Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

#### 37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

### Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.



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Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

13/391,539 05/02/2012 Samuel Liam Proud 920257.00016 6980

26710 7590 11/14/2013
QUARLES & BRADY LLP
Attn: IP Docket
411 E. WISCONSIN AVENUE
SUITE 2350
MILWAUKEE, WI 53202-4426

Table with 1 column: EXAMINER

GRUBY, RANDALL A

Table with 2 columns: ART UNIT, PAPER NUMBER

3754

Table with 2 columns: NOTIFICATION DATE, DELIVERY MODE

11/14/2013 ELECTRONICELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pat-dept@quarles.com

|   |                                      |   |  |
|---|--------------------------------------|---|--|
| <b>Examiner-Initiated Interview Summary</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|   | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   |  |

All participants (applicant, applicant's representative, PTO personnel):

(1) RANDALL GRUBY. (3) JOHN FRANZINI.  
(2) PAUL DURAND. (4) \_\_\_\_\_.

Date of Interview: 07 November 2013.

Type:  Telephonic  Video Conference  
 Personal [copy given to:  applicant  applicant's representative]

Exhibit shown or demonstration conducted:  Yes  No.  
If Yes, brief description: \_\_\_\_\_.

Issues Discussed 101 112 102 103 Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 1 and 10.

Identification of prior art discussed: GB 2138218, US 2003/0226680, EP 0434105, WO 2008/029165.

Substance of Interview  
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The amended limitations in the amendment filed 10/23/13 were discussed in light of GB 2138218 and US 2003/0226680. John Franzini was notified that these references could be used in a rejection of the claims under §103. An agreement was not reached regarding patentability and no suggestions were made for amendments to overcome the art of record.

**Applicant recordation instructions:** It is not necessary for applicant to provide a separate record of the substance of interview.

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Attachment

|  |   |
|--|---|
| /RANDALL GRUBY/<br>Examiner, Art Unit 3754 | /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754 |
|--|---|

|   |                                      |   |  |
|---|--------------------------------------|---|--|
| <b>Advisory Action<br/>Before the Filing of an Appeal Brief</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|   | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   | <b>AIA (First Inventor to File) Status</b><br>No |

**--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

THE REPLY FILED \_\_\_\_\_ FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

**NO NOTICE OF APPEAL FILED**

1.  The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:
- a)  The period for reply expires \_\_\_\_\_ months from the mailing date of the final rejection.
- b)  The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
- c)  A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection. The current period for reply expires \_\_\_\_\_ months from the mailing date of the prior Advisory Action or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.

*Examiner Note:* If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANT'S FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**NOTICE OF APPEAL**

2.  The Notice of Appeal was filed on \_\_\_\_\_. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

**AMENDMENTS**

3.  The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
- a)  They raise new issues that would require further consideration and/or search (see NOTE below);
- b)  They raise the issue of new matter (see NOTE below);
- c)  They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
- d)  They present additional claims without canceling a corresponding number of finally rejected claims.
- NOTE: See *continuation sheet*. (See 37 CFR 1.116 and 41.33(a)).
4.  The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5.  Applicant's reply has overcome the following rejection(s): \_\_\_\_\_.
6.  Newly proposed or amended claim(s) \_\_\_\_\_ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7.  For purposes of appeal, the proposed amendment(s): (a)  will not be entered, or (b)  will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

**AFFIDAVIT OR OTHER EVIDENCE**

8.  A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
9.  The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
10.  The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
11.  The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

**REQUEST FOR RECONSIDERATION/OTHER**

12.  The request for reconsideration has been considered but does NOT place the application in condition for allowance because:  
See continuation sheet.
13.  Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). \_\_\_\_\_
14.  Other: \_\_\_\_\_

**STATUS OF CLAIMS**

15. The status of the claim(s) is (or will be) as follows:
- Claim(s) allowed: .
- Claim(s) objected to: .
- Claim(s) rejected: 1-12.
- Claim(s) withdrawn from consideration: .

/RANDALL GRUBY/  
Examiner, Art Unit 3754

Continuation of 3. and 12. NOTE: UK Patent Application Publication GB 2138218 appears to read on the amended subject matter of the independent claims.

|   |                                      |   |  |
|---|--------------------------------------|---|--|
| <b>Examiner-Initiated Interview Summary</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|   | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   |  |

All participants (applicant, applicant's representative, PTO personnel):

(1) RANDALL GRUBY. (3) JOHN FRANZINI.  
(2) PAUL DURAND. (4) \_\_\_\_\_.

Date of Interview: 07 November 2013.

Type:  Telephonic  Video Conference  
 Personal [copy given to:  applicant  applicant's representative]

Exhibit shown or demonstration conducted:  Yes  No.  
If Yes, brief description: \_\_\_\_\_.

Issues Discussed 101 112 102 103 Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 1 and 10.

Identification of prior art discussed: GB 2138218, US 2003/0226680, EP 0434105, WO 2008/029165.

Substance of Interview  
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The amended limitations in the amendment filed 10/23/13 were discussed in light of GB 2138218 and US 2003/0226680. John Franzini was notified that these references could be used in a rejection of the claims under §103. An agreement was not reached regarding patentability and no suggestions were made for amendments to overcome the art of record.

**Applicant recordation instructions:** It is not necessary for applicant to provide a separate record of the substance of interview.

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Attachment

|  |   |
|--|---|
| /RANDALL GRUBY/<br>Examiner, Art Unit 3754 | /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754 |
|--|---|

Doc Code: A.NE.AFCP

Document Description: After Final Consideration Pilot Program Request

PTO/SB/434 (05-13)

| CERTIFICATION AND REQUEST FOR CONSIDERATION UNDER THE<br>AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0   |   |                                    |
|--|---|------------------------------------|
| Practitioner Docket No.:<br><b>920257.00016</b>  | Application No.:<br><b>13/391,539</b>             | Filing Date:<br><b>May 2, 2012</b> |
| First Named Inventor:<br><b>Samuel Liam Proud</b>  | Title:<br><b>Filler Assembly for Cable Gland</b>  |                                    |
| <p>APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0 (AFCP 2.0) OF THE ACCOMPANYING RESPONSE UNDER 37 CFR 1.116.</p> <ol style="list-style-type: none"><li>The above-identified application is (i) an original utility, plant, or design nonprovisional application filed under 35 U.S.C. 111(a) [a continuing application (<i>e.g.</i>, a continuation or divisional application) is filed under 35 U.S.C. 111(a) and is eligible under (i)], or (ii) an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).</li><li>The above-identified application contains an outstanding final rejection.</li><li>Submitted herewith is a response under 37 CFR 1.116 to the outstanding final rejection. The response includes an amendment to at least one independent claim, and the amendment does not broaden the scope of the independent claim in any aspect.</li><li>This certification and request for consideration under AFCP 2.0 is the only AFCP 2.0 certification and request filed in response to the outstanding final rejection.</li><li>Applicant is willing and available to participate in any interview requested by the examiner concerning the present response.</li><li>This certification and request is being filed electronically using the Office's electronic filing system (EFS-Web).</li><li>Any fees that would be necessary consistent with current practice concerning responses after final rejection under 37 CFR 1.116, <i>e.g.</i>, extension of time fees, are being concurrently filed herewith. [There is no additional fee required to request consideration under AFCP 2.0.]</li><li>By filing this certification and request, applicant acknowledges the following:<ul style="list-style-type: none"><li>Reissue applications and reexamination proceedings are not eligible to participate in AFCP 2.0.</li><li>The examiner will verify that the AFCP 2.0 submission is compliant, <i>i.e.</i>, that the requirements of the program have been met (see items 1 to 7 above). For compliant submissions:<ul style="list-style-type: none"><li>The examiner will review the response under 37 CFR 1.116 to determine if additional search and/or consideration (i) is necessitated by the amendment and (ii) could be completed within the time allotted under AFCP 2.0. If additional search and/or consideration is required but cannot be completed within the allotted time, the examiner will process the submission consistent with current practice concerning responses after final rejection under 37 CFR 1.116, <i>e.g.</i>, by mailing an advisory action.</li><li>If the examiner determines that the amendment does not necessitate additional search and/or consideration, or if the examiner determines that additional search and/or consideration is required and could be completed within the allotted time, then the examiner will consider whether the amendment places the application in condition for allowance (after completing the additional search and/or consideration, if required). If the examiner determines that the amendment does not place the application in condition for allowance, then the examiner will contact the applicant and request an interview.<ul style="list-style-type: none"><li>The interview will be conducted by the examiner, and if the examiner does not have negotiation authority, a primary examiner and/or supervisory patent examiner will also participate.</li><li>If the applicant declines the interview, or if the interview cannot be scheduled within ten (10) calendar days from the date that the examiner first contacts the applicant, then the examiner will proceed consistent with current practice concerning responses after final rejection under 37 CFR 1.116.</li></ul></li></ul></li></ul></li></ol> |   |                                    |
| Signature<br><b>/john d. franzini/</b>   | Date<br><b>October 23, 2013</b>                   |                                    |
| Name<br>(Print/Typed)<br><b>John D. Franzini</b>   | Practitioner<br>Registration No.<br><b>31,356</b> |                                    |
| <p><i>Note: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.</i></p>  |   |                                    |
| <input checked="" type="checkbox"/> * Total of <u>1</u> forms are submitted.   |   |                                    |

23415541

Cooper Ex. 1002

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Samuel Liam Proud  
Application No.: 13/391,539  
Filed: May 2, 2012  
For: FILLER ASSEMBLY FOR CABLE GLAND  
Group Art Unit: 3754  
Examiner: Randall A. Gruby  
Confirmation No.: 6980  
Att'y. Docket: 920257.00016

**RESPONSE TO FINAL OFFICE ACTION UNDER AFCP 2.0**

MS AF  
Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the final Office Action dated 08/26/2013, please consider the following:

Amendments to the Claims begin on page 2; and

Remarks begin on page 5.



**In the Claims:**

Please amend the claims so that the pending claim set reads as follows:

1. (Currently Amended) A filler assembly for filling with curable liquid material a cable gland, the cable gland having a plurality of cores of at least one cable extending therethrough, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

at least one first barrier apparatus for temporarily preventing mixing of said first and second components;

at least one elongate dispenser apparatus adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

at least one second barrier apparatus for temporarily preventing passage of said curable liquid material from the or each said second chamber to at least one said dispenser apparatus; and

(b) at least one barrier member having at least one respective aperture therethrough for engaging at least one core of a cable, wherein the barrier member is adapted to restrict the extent of penetration of said curable liquid material along said cores and includes a conical portion terminating in a planar portion.

2. (Original) An assembly according to claim 1, wherein said body is flexible.

3. (Previously Presented) An assembly according to claim 1, wherein at least one said first barrier apparatus comprises at least one releasable clamp.

4. (Previously Presented) An assembly according to claim 1, further comprising a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

5. (Previously Presented) An assembly according to claim 5, wherein the curable liquid material is adapted to change color as a result of curing thereof.

6. (Previously Presented) An assembly according to claim 1, further comprising a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

7. (Original) An assembly according to claim 6, wherein the cover member is adapted to prevent curable liquid material from penetrating an end face of the cable gland.

8. (Previously Presented) An assembly according to claim 1, wherein at least one said barrier member comprises a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.

9. (Previously Presented) An assembly according to claim 1, wherein at least one said barrier member has a respective tapering portion.

10. (Currently Amended) A method of filling a cable gland with curable liquid material, the method comprising:

using a filler assembly that includes:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

at least one first barrier apparatus for temporarily preventing mixing of said first and second components;

at least one elongate dispenser apparatus adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

at least one second barrier apparatus for temporarily preventing passage of said curable liquid material from the or each said second chamber to at least one said dispenser apparatus; and

(b) at least one barrier member for having at least one respective aperture therethrough for engaging at least one core of a cable, wherein the barrier member is adapted to restricting the extent of penetration of said curable liquid material along said cores and includes a conical portion terminating in a planar portion;

locating at least one said barrier member in the cable gland; and

locating an outlet of at least one said dispenser apparatus in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.

11. (Original) A method according to claim 10, wherein the step of locating at least one said barrier member in the cable gland comprises locating at least one said barrier member around at least one said core of at least one said cable.

12. (Previously Presented) An assembly according to claim 1, wherein at least one said second barrier apparatus comprises at least one releasable clamp.

**REMARKS**

The undersigned thanks Examiners Gruby and Durand for the courtesy of the telephone interview conducted October 9, 2013, in which the invention and the prior art references EP 0434105 and WO2008/029165 were discussed. Agreement was reached that adding language to the claims like that added herein would make the subject matter of claims 1-12 allowable over the prior art of record.

Accordingly, it is respectfully submitted that this amendment places this application into condition for allowance, which is respectfully requested. No fees are believed due for filing this response, however, the Commissioner is hereby authorized to charge any fees deemed necessary to Deposit Account No. 17-0055.

Respectfully submitted,

SAMUEL LIAM PROUD

Dated: October 23, 2013

/john d. franzini/  
John D. Franzini  
Reg. No. 31,356  
Attorney for Applicant  
Quarles & Brady LLP  
411 East Wisconsin Avenue  
Milwaukee, Wisconsin 53202-4497  
Tel. No. (414) 277-5747  
Fax No. (414) 978-8747

## Electronic Acknowledgement Receipt

|   |                                      |
|---|--------------------------------------|
| <b>EFS ID:</b>                              | 17202519                             |
| <b>Application Number:</b>                  | 13391539                             |
| <b>International Application Number:</b>    |                                      |
| <b>Confirmation Number:</b>                 | 6980                                 |
| <b>Title of Invention:</b>                  | FILLER ASSEMBLY FOR CABLE GLAND      |
| <b>First Named Inventor/Applicant Name:</b> | Samuel Liam Proud                    |
| <b>Customer Number:</b>                     | 26710                                |
| <b>Filer:</b>                               | John D. Franzini/Melanie Brunow      |
| <b>Filer Authorized By:</b>                 | John D. Franzini                     |
| <b>Attorney Docket Number:</b>              | 920257.00016                         |
| <b>Receipt Date:</b>                        | 23-OCT-2013                          |
| <b>Filing Date:</b>                         | 02-MAY-2012                          |
| <b>Time Stamp:</b>                          | 11:05:42                             |
| <b>Application Type:</b>                    | U.S. National Stage under 35 USC 371 |

### Payment information:

|                        |    |
|------------------------|----|
| Submitted with Payment | no |
|------------------------|----|

### File Listing:

| Document Number | Document Description | File Name                           | File Size(Bytes)/<br>Message Digest               | Multi Part /.zip | Pages (if appl.) |
|-----------------|----------------------|-------------------------------------|---|------------------|------------------|
| 1               |                      | 920257-00016-amendment-AF-pilot.pdf | 248206<br>b787f3163914bec4c421a857045d44cd81c3696 | yes              | 6                |

| <b>Multipart Description/PDF files in .zip description</b> |              |            |  |
|--|--------------|------------|--|
| <b>Document Description</b>                                | <b>Start</b> | <b>End</b> |  |
| After Final Consideration Program Request                  | 1            | 1          |  |
| Response After Final Action                                | 2            | 2          |  |
| Claims   | 3            | 5          |  |
| Applicant Arguments/Remarks Made in an Amendment           | 6            | 6          |  |

**Warnings:**

**Information:**

**Total Files Size (in bytes):**

248206

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

|  |   |                                  |   |                                  |                                       |                     |  |
|--|---|----------------------------------|---|----------------------------------|---------------------------------------|---------------------|--|
| <b>PATENT APPLICATION FEE DETERMINATION RECORD</b><br>Substitute for Form PTO-875  |   |                                  | Application or Docket Number<br><b>13/391,539</b> | Filing Date<br><b>05/02/2012</b> | <input type="checkbox"/> To be Mailed |                     |  |
| ENTITY: <input checked="" type="checkbox"/> LARGE <input type="checkbox"/> SMALL <input type="checkbox"/> MICRO  |   |                                  |   |                                  |                                       |                     |  |
| <b>APPLICATION AS FILED – PART I</b>   |   |                                  |   |                                  |                                       |                     |  |
| (Column 1)   |   | (Column 2)                       |   |                                  |                                       |                     |  |
| FOR  | NUMBER FILED  | NUMBER EXTRA                     | RATE (\$)   | FEE (\$)                         |                                       |                     |  |
| <input type="checkbox"/> BASIC FEE<br><small>(37 CFR 1.16(a), (b), or (c))</small>   | N/A   | N/A                              | N/A   |                                  |                                       |                     |  |
| <input type="checkbox"/> SEARCH FEE<br><small>(37 CFR 1.16(k), (i), or (m))</small>  | N/A   | N/A                              | N/A   |                                  |                                       |                     |  |
| <input type="checkbox"/> EXAMINATION FEE<br><small>(37 CFR 1.16(o), (p), or (q))</small>   | N/A   | N/A                              | N/A   |                                  |                                       |                     |  |
| TOTAL CLAIMS<br><small>(37 CFR 1.16(j))</small>  | minus 20 =  | *                                | X \$ =  |                                  |                                       |                     |  |
| INDEPENDENT CLAIMS<br><small>(37 CFR 1.16(h))</small>  | minus 3 =   | *                                | X \$ =  |                                  |                                       |                     |  |
| <input type="checkbox"/> APPLICATION SIZE FEE<br><small>(37 CFR 1.16(s))</small>   | If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). |                                  |   |                                  |                                       |                     |  |
| <input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT<br><small>(37 CFR 1.16(j))</small>   |   |                                  |   |                                  |                                       |                     |  |
| * If the difference in column 1 is less than zero, enter "0" in column 2.  |   |                                  | TOTAL   |                                  |                                       |                     |  |
| <b>APPLICATION AS AMENDED – PART II</b>  |   |                                  |   |                                  |                                       |                     |  |
| (Column 1)   |   | (Column 2)                       | (Column 3)  |                                  |                                       |                     |  |
| <b>AMENDMENT</b>   | <b>10/23/2013</b>   | CLAIMS REMAINING AFTER AMENDMENT | HIGHEST NUMBER PREVIOUSLY PAID FOR                | PRESENT EXTRA                    | RATE (\$)                             | ADDITIONAL FEE (\$) |  |
|  | Total (37 CFR 1.16(i))  | * 12                             | Minus   | ** 20 = 0                        | X \$80 =                              | 0                   |  |
|  | Independent (37 CFR 1.16(h))  | * 2                              | Minus   | ***3 = 0                         | X \$420 =                             | 0                   |  |
|  | <input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))  |                                  |   |                                  |                                       |                     |  |
|  | <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))  |                                  |   |                                  |                                       |                     |  |
|  |   |                                  | TOTAL ADD'L FEE                                   |                                  | <b>0</b>                              |                     |  |
| (Column 1)   |   | (Column 2)                       | (Column 3)  |                                  |                                       |                     |  |
| <b>AMENDMENT</b>   |   | CLAIMS REMAINING AFTER AMENDMENT | HIGHEST NUMBER PREVIOUSLY PAID FOR                | PRESENT EXTRA                    | RATE (\$)                             | ADDITIONAL FEE (\$) |  |
|  | Total (37 CFR 1.16(i))  | *                                | Minus   | ** =                             | X \$ =                                |                     |  |
|  | Independent (37 CFR 1.16(h))  | *                                | Minus   | *** =                            | X \$ =                                |                     |  |
|  | <input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))  |                                  |   |                                  |                                       |                     |  |
|  | <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))  |                                  |   |                                  |                                       |                     |  |
|  |   |                                  | TOTAL ADD'L FEE                                   |                                  |                                       |                     |  |
| <p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.<br/>                 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".<br/>                 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".<br/>                 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p> |   |                                  |   |                                  |                                       |                     |  |
| LIE<br>/ANGELONA JONES/  |   |                                  |   |                                  |                                       |                     |  |

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**  
 If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



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Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes contact information for Quarles & Brady LLP and examination details.

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pat-dept@quarles.com



|  |                                      |   |  |
|--|--------------------------------------|---|--|
| <b>Applicant-Initiated Interview Summary</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|  | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   |  |

All participants (applicant, applicant's representative, PTO personnel):

(1) RANDALL GRUBY. (3) JOHN FRANZINI.  
(2) PAUL DURAND. (4) \_\_\_\_\_.

Date of Interview: 09 October 2013.

Type:  Telephonic  Video Conference  
 Personal [copy given to:  applicant  applicant's representative]

Exhibit shown or demonstration conducted:  Yes  No.  
If Yes, brief description: \_\_\_\_\_.

Issues Discussed 101 112 102 103 Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 1.

Identification of prior art discussed: EP 434105 & WO 2008029165.

**Substance of Interview**  
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The interview included a discussion of the Applicant's invention in contrast to references EP 434105 & WO 2008029165. A proposed amendment was discussed. Examiner's Gruby and Durand acknowledged that a modification of the structure of the barrier member to include "a conical protrusion terminating in a planar portion", or the like, would overcome the art of record.

**Applicant recordation instructions:** The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Attachment

|  |   |
|--|---|
| /RANDALL GRUBY/<br>Examiner, Art Unit 3754 | /PAUL R DURAND/<br>Supervisory Patent Examiner, Art Unit 3754 |
|--|---|

## Summary of Record of Interview Requirements

### Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

### Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

### Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.



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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes details for application 13/391,539, inventor Samuel Liam Proud, and attorney Quarles & Brady LLP.

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pat-dept@quarles.com

|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|                              | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   | <b>AIA (First Inventor to File) Status</b><br>No |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 23 July 2013.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 5)  Claim(s) 1-12 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) 1-12 is/are rejected.
- 8)  Claim(s) \_\_\_\_\_ is/are objected to.
- 9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on 23 July 2013 is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some \*    c)  None of the:
1.  Certified copies of the priority documents have been received.
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 07/23/13
- 3)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 4)  Other: \_\_\_\_\_

## DETAILED ACTION

### *Status of the Application*

1. Claims 1-12 have been examined in this application. This communication is a Final Rejection in response to the "Amendment" and Remarks" filed on 07/29/13. Claim 1 has been amended. The Information Disclosure Statement (IDS) filed on 07/23/13 has been acknowledged by the Office.

### *Priority*

2. Acknowledgment is made of applicant's claim for foreign priority based on an application(s) filed in the European Patent Office on 08/21/09. All certified copies of the priority documents have been received.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-12 rejected under 35 U.S.C. 103(a) as being unpatentable over EP 434105 to Kaptein in view of WO 2008029165 to Hand.

As per claim 1, Kaptein discloses a filler assembly comprising: a body adapted to define at least a first chamber (23), a second chamber (24) said second chamber adapted to communicate with said first chamber to enable mixing of the contents of the respective chambers (Col 4, ¶ 4); a first barrier barrier apparatus (21); one elongate dispenser apparatus (17); a second barrier apparatus (22);

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Kaptein does not disclose a barrier member. Hand teaches a barrier member (**4**) having one aperture.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to employ the use of the barrier member for providing a seal between the gland structure and the hardenable compound (**Page 10, ¶ 4-5**).

Moreover and in regard to the functional recitations preceded by the phrase "adapted to", claim scope is not limited by claim language that suggests or makes optional but does not require steps to be performed, or by claim language that does not limit a claim to a particular structure. Examples of claim language that may raise a question as to the limiting effect of the language in a claim are: "adapted to" or "adapted for" clauses, "wherein" clauses, and "whereby" clauses (**MPEP §2111.04**). Therefore, although these limitations are considered, they are afforded no patentable weight.

As per claim 2, Kaptein discloses the body being flexible (**Col 1, Line 34**).

As per claim 3, Kaptein discloses the first barrier apparatus comprising a releasable clamp (**Col 4, Lines 19-21**).

As per claim 4, Kaptein discloses a first component of a curable liquid material in the first chamber and a second component of said curable liquid material in the second chamber (**Col 4, Lines 5-9**).

As per claim 5, Kaptein discloses all the structural limitations of the claim and is capable of dispensing a two-part curable liquid that changes color upon mixing the components.

As per claim 6, the disclosure from Kaptein combined Hand teach the invention according to claim 1. Hand further teaches a cover (**10**) covering the external screw thread of a

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cable gland (*Page 17, ¶ 2*). At the time of the invention, it would have been obvious to one of ordinary skill in the art to employ the aforementioned teaching from Hand for the purpose of being able to compress a seal (**13**) to engage the outer sheath of a cable extending through the gland for the purpose of fixing the position of the cable relative to the gland.

As per claim 7, the disclosure from Kaptein combined Hand teach the invention according to claim 6. Hand further teaches said cover (**10**) cover a portion of an end face of the cable gland (*Figure 1*). At the time of the invention, it would have been obvious to one of ordinary skill in the art to employ the aforementioned teaching from Hand for the purpose of being able to compress a seal (**13**) to engage the outer sheath of a cable extending through the gland for the purpose of fixing the position of the cable relative to the gland.

As per claim 8, the disclosure from Kaptein combined Hand teach the invention according to claim 1. Hand further teaches said barrier member being flexible (*Page 10, ¶ 1*). At the time of the invention it would have been obvious to employ the use of a flexible seal taught by Hand with the dispenser disclosed by Kaptein for the purpose of allowing the seal to resiliently deform during bonding to the two-part curable liquid material—thereby minimizing air pockets and ensuring integrity of the bondline therewith.

As per claim 9, the disclosure from Kaptein combined Hand teach the invention according to claim 1. Hand further teaches the seal having a tapering portion (*Page 8, ¶ 3-5*). At the time of the invention, it would have been obvious to one of ordinary skill to employ the use of a conically-shaped seal taught by Hand with the dispenser disclosed by Kaptein for the purpose of enhancing sealing performance during bonding to the two-part curable liquid material.

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As per claim 10, Kaptein discloses a method for filling a cable gland with a curable liquid material comprising:

- a dispenser apparatus comprising: a body adapted to define at least a first chamber (23), a second chamber (24) said second chamber adapted to communicate with said first chamber to enable mixing of the contents of the respective chambers (*Col 4, ¶ 4*); a first barrier barrier apparatus (21); one elongate dispenser apparatus (17); a second barrier apparatus (22);
- a step of locating an outlet of said dispenser in said cable gland and dispensing curable liquid therefrom (*Figure 6*).

Kaptein does not disclose a barrier member and located a barrier member in the cable gland. Hand teaches a barrier member (4) having one aperture and a step of locating the barrier member in the cable gland (*Page 7, ¶ 4*).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to employ the use of the barrier member for providing a seal between the gland structure and the hardenable compound (*Page 10, ¶ 4-5*).

As per claim 11, the disclosure from Kaptein combined Hand teach the invention according to claim 10. Hand further discloses the barrier member being located around at least one said core of at least one said cable (*Page 10, ¶ 4*). At the time of the invention it would have been obvious to one of ordinary skill in the art to incorporate the aforementioned teaching from Hand with the filling method disclosed by Kaptein for the purpose of providing a seal between the gland structure and the hardenable compound (*Page 10, ¶ 4-5*).



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As per claim 12, the disclosure from Kaptein combined Hand teach the invention according to claim 1. Kaptein further discloses the second barrier apparatus comprising a releasable clamp (*Col 4, Lines 1-5*).

***Response to Arguments***

5. In regards to the objections to the drawings, specification, and claims, the amendment filed 07/23/13 is recognized as addressing all. Therefore, all are withdrawn accordingly.

6. In regards to the claim rejections under 35 U.S.C. §103, Applicant's arguments filed 07/23/13 have been fully considered but they are not persuasive. Applicant request the withdrawal of the rejections by providing the following arguments:

- a. EP 0434105 is not suitable for dispensing liquid between the individual cores of a cable.
- b. EP 0434105 does not disclose a barrier member having at least one respective aperture therethrough for engaging at least one core of a cable for restricting the extent of penetration of the curable liquid material along the cores of the cable.
- c. WO 2008/029165 does not disclose an elongate dispenser apparatus provided for dispensing curable liquid material between a plurality of cores.
- d. The combination of EP 0434105 with WO 2008/029165 would not be obvious because of the difference in viscosity of the hardenable compound disclosed in each of the references.

As per Applicant's argument (A), EP 0434105 to Kaptein discloses a dispenser for delivering a two-part mixture into a cavity (*Kaptein: Col. 1, Lines 46-47*), the cavity comprising a cable sleeve (*Kaptein: Col. 1, Lines 31-33*). While Kaptein does not explicitly disclose the

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cable sleeve comprising multiple cable cores, WO 2008/029165 to Hand cures this deficiency (*see: Fig. 5, Items 123 & 125*). Furthermore, “[i]nclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims.” *In re Young*, 75 F.2d \* > 996 <, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963)). See MPEP §2115. The dispenser disclosed by Kaptein is capable of delivering mixtures of varying viscosities—the viscosity of the mixture being responsible for expelling air and settling in voids about the structure contained within the cable sleeve.

As per Applicant’s argument (B), the examiner recognizes that EP 0434105 does not disclose a barrier member for engaging cable cores. Hand cures this deficiency in his disclosure of a barrier member (**4**) having an aperture (**24**) for engaging at least one core of the cable for restricting the extend of penetration of the curable liquid material along the cores of the cable (*Page 10, ¶ 4*).

In response to Applicant’s argument (C), the examiner recognizes that WO 2008/029165 to Hand does not disclose an elongate dispenser apparatus. Kaptein cures this deficiency (*see: Kaptein: Fig. 3-6, 19*).

In response to applicant’s argument (D) that there is no teaching, suggestion, or motivation to combine the references, the examiner recognizes that obviousness may be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), and *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82

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USPQ2d 1385 (2007). In this case, it would have been obvious to combine the barrier member taught by Hand with the dispenser disclosed by Kaptein to provide a seal between the gland structure and the hardenable compound and thereby ensure the integrity of the gland is maintained (*Page 10, ¶ 4-5*).

### *Conclusion*

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

The prior art made of record in FORM PTO-892 and not relied upon is considered pertinent to applicant's disclosure.

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(A) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Gruby, whose telephone number is (571) 272-3415. The examiner can normally be reached from Monday to Friday between 8:00 AM and 5:00 PM.

If any attempt to reach the examiner by telephone is unsuccessful, the examiner's supervisor, Paul Durand, can be reached at (571) 272-4459.

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Another resource that is available to applicants is the Patent Application Information Retrieval (PAIR). Information regarding the status of an application can be obtained from the (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAX. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, please feel free to contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/RG/

Examiner, Art Unit 3754

/PAUL R DURAND/

Supervisory Patent Examiner, Art Unit 3754

August 21, 2013

|                                   |                                       |   |             |
|-----------------------------------|---------------------------------------|---|-------------|
| <b>Notice of References Cited</b> | Application/Control No.<br>13/391,539 | Applicant(s)/Patent Under Reexamination<br>PROUD, SAMUEL LIAM |             |
|                                   | Examiner<br>RANDALL GRUBY             | Art Unit<br>3754  | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Name              | Classification |
|---|---|--|-----------------|-------------------|----------------|
| * | A | US-4,692,563 A                                   | 09-1987         | Lackinger, Franz  | 174/654        |
| * | B | US-5,310,963 A                                   | 05-1994         | Kennelly, Richard | 174/667        |
| * | C | US-5,600,094 A                                   | 02-1997         | McCabe, Neil E.   | 174/653        |
| * | D | US-5,621,191 A                                   | 04-1997         | Norris et al.     | 174/653        |
| * | E | US-6,259,029 B1                                  | 07-2001         | Hand, Edward      | 174/74R        |
| * | F | US-2003/0226680 A1                               | 12-2003         | Jackson, Carl     | 174/65.0SS     |
| * | G | US-2004/0069522 A1                               | 04-2004         | Jackson, Carl     | 174/065.0SS    |
| * | H | US-7,507,105 B1                                  | 03-2009         | Peters et al.     | 439/374        |
| * | I | US-2012/0097445 A1                               | 04-2012         | Gadda, Walter     | 174/84.R       |
| * | J | US-8,170,390 B2                                  | 05-2012         | Hand, Edward      | 385/134        |
|   | K | US-  |                 |                   |                |
|   | L | US-  |                 |                   |                |
|   | M | US-  |                 |                   |                |


**FOREIGN PATENT DOCUMENTS**

| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Country | Name | Classification |
|---|---|--|-----------------|---------|------|----------------|
|   | N |  |                 |         |      |                |
|   | O |  |                 |         |      |                |
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|   | Q |  |                 |         |      |                |
|   | R |  |                 |         |      |                |
|   | S |  |                 |         |      |                |
|   | T |  |                 |         |      |                |

**NON-PATENT DOCUMENTS**

| * |   | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
|   | U |   |
|   | V |   |
|   | W |   |
|   | X |   |

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

|  |  |  |
|--|--|--|
| <b><i>Index of Claims</i></b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

|   |                 |   |                   |   |                     |   |                 |
|---|-----------------|---|-------------------|---|---------------------|---|-----------------|
| ✓ | <b>Rejected</b> | - | <b>Cancelled</b>  | N | <b>Non-Elected</b>  | A | <b>Appeal</b>   |
| = | <b>Allowed</b>  | ÷ | <b>Restricted</b> | I | <b>Interference</b> | O | <b>Objected</b> |

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

| CLAIM |          | DATE       |            |            |  |  |  |  |  |
|-------|----------|------------|------------|------------|--|--|--|--|--|
| Final | Original | 03/27/2013 | 06/07/2013 | 08/14/2013 |  |  |  |  |  |
|       | 1        | ÷          | ✓          | ✓          |  |  |  |  |  |
|       | 2        | ÷          | ✓          | ✓          |  |  |  |  |  |
|       | 3        | ÷          | ✓          | ✓          |  |  |  |  |  |
|       | 4        | ÷          | ✓          | ✓          |  |  |  |  |  |
|       | 5        | ÷          | ✓          | ✓          |  |  |  |  |  |
|       | 6        | ÷          | ✓          | ✓          |  |  |  |  |  |
|       | 7        | ÷          | ✓          | ✓          |  |  |  |  |  |
|       | 8        | ÷          | ✓          | ✓          |  |  |  |  |  |
|       | 9        | ÷          | ✓          | ✓          |  |  |  |  |  |
|       | 10       | ÷          | ✓          | ✓          |  |  |  |  |  |
|       | 11       | ÷          | ✓          | ✓          |  |  |  |  |  |
|       | 12       |            | ✓          | ✓          |  |  |  |  |  |

## EAST Search History

## EAST Search History (Prior Art)

| Ref # | Hits   | Search Query  | DBs  | Default Operator | Plurals | Time Stamp          |
|-------|--------|---|--|------------------|---------|---------------------|
| L3    | 1      | 2008-D99857.NRAN.   | DERWENT  | OR               | OFF     | 2013/08/14<br>12:04 |
| L7    | 1      | 2008-D99857.NRAN.   | DERWENT  | OR               | OFF     | 2013/08/14<br>12:17 |
| L8    | 1      | "8170390".pn.   | USPAT  | OR               | OFF     | 2013/08/14<br>12:18 |
| L9    | 10     | ("20030226680"   "20040069522"   "20040074662"   "20080236861"   "5621191"   "6259029"   "6268565"   "6809263"   "7641396"   "7781685").PN. | US-PGPUB;<br>USPAT;<br>USOCR   | OR               | OFF     | 2013/08/14<br>12:34 |
| L10   | 21     | ("3663740"   "4629825"   "4674818"   "4692563"   "4857015"   "5310963").PN. OR ("2003/0226680"   "2004/0069522"   "5621191").URPN.          | US-PGPUB;<br>USPAT;<br>USOCR   | OR               | OFF     | 2013/08/14<br>12:38 |
| L11   | 437426 | l10 and epoxy or harden\$3  | US-PGPUB;<br>USPAT;<br>USOCR   | OR               | OFF     | 2013/08/14<br>12:38 |
| L12   | 3      | l10 and (epoxy or harden\$3)  | US-PGPUB;<br>USPAT;<br>USOCR   | OR               | OFF     | 2013/08/14<br>12:39 |
| L13   | 109    | 222/94,92,103,95,107,145.5,145.6,145.1.ccls.<br>and @pd>"20130607"  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR               | ON      | 2013/08/14<br>13:39 |
| L14   | 1      | "20020066518".pn.   | US-PGPUB;<br>USPAT   | OR               | ON      | 2013/08/14<br>13:42 |
| L15   | 1      | "20080262408".pn.   | US-PGPUB;<br>USPAT   | OR               | ON      | 2013/08/14<br>13:43 |
| L16   | 1      | "1335047".pn.   | US-PGPUB;<br>USPAT   | OR               | ON      | 2013/08/14<br>13:44 |
| L17   | 5      | "1335047".pn.   | EPO;<br>DERWENT  | OR               | ON      | 2013/08/14<br>13:44 |
| L18   | 5      | "1335047"   | EPO;<br>DERWENT  | OR               | ON      | 2013/08/14<br>13:45 |
| L19   | 3      | "2011021016"  | EPO;<br>DERWENT  | OR               | ON      | 2013/08/14<br>13:47 |
| S1    | 1      | "13391539"  | US-PGPUB;<br>USPAT   | OR               | ON      | 2013/06/07<br>13:51 |
| S2    | 4      | "4343105"   | EPO;<br>DERWENT  | OR               | ON      | 2013/06/07<br>13:51 |
| S3    | 13     | "434105"  | EPO;<br>DERWENT  | OR               | ON      | 2013/06/07<br>13:52 |
| S4    | 1      | 1991-186955.NRAN.   | DERWENT  | OR               | ON      | 2013/06/07          |

## EAST Search History

|     |        |                                  |  |    |    |                     |
|-----|--------|----------------------------------|--|----|----|---------------------|
|     |        |                                  |  |    |    | 13:52               |
| S5  | 9      | "2074395"                        | EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:53 |
| S6  | 0      | "20010109284"                    | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB                                  | OR | ON | 2013/06/07<br>13:54 |
| S7  | 131507 | (russel near2 smith)".in" and 3M | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>13:55 |
| S8  | 132048 | (russel near2 smith)".in" and 3M | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>13:55 |
| S9  | 0      | "1020017009380"                  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>13:56 |
| S10 | 48     | "765082"                         | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>13:56 |
| S11 | 11     | "765082"                         | EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:57 |
| S12 | 18     | "765082"                         | USOCR;<br>EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:57 |
| S13 | 0      | GB765082                         | USOCR;<br>EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:58 |
| S14 | 13     | "2957038"                        | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:00 |
| S15 | 0      | "20010109284"                    | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:01 |
| S16 | 955    | "9284"                           | US-PGPUB;<br>USPAT;<br>USOCR;  | OR | ON | 2013/06/07<br>14:01 |



## EAST Search History

|     |      |                   |  |    |    |                     |
|-----|------|-------------------|--|----|----|---------------------|
|     |      |                   | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB                                  |    |    |                     |
| S17 | 202  | S16 AND kr        | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:01 |
| S18 | 48   | "765082"          | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:02 |
| S19 | 0    | gb-765082-\$.did  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:03 |
| S20 | 4    | ("2957038").URPN. | USPAT  | OR | ON | 2013/06/07<br>14:09 |
| S21 | 48   | "765082"          | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:15 |
| S22 | 5    | "2258350"         | US-PGPUB;<br>USPAT   | OR | ON | 2013/06/07<br>14:49 |
| S23 | 13   | "2258350"         | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2013/06/07<br>14:49 |
| S24 | 2    | "2001109284"      | DERWENT  | OR | ON | 2013/06/07<br>15:18 |
| S25 | 7    | "6242700"         | USPAT  | OR | ON | 2013/06/07<br>15:19 |
| S26 | 2    | "2001109284"      | DERWENT  | OR | ON | 2013/06/07<br>15:20 |
| S27 | 0    | "20010109284"     | DERWENT  | OR | ON | 2013/06/07<br>15:20 |
| S28 | 2    | "2001109284"      | DERWENT  | OR | ON | 2013/06/07<br>15:20 |
| S29 | 2    | "2001109284"      | DERWENT  | OR | ON | 2013/06/07<br>15:29 |
| S30 | 3    | "2001109284"      | JPO;<br>DERWENT  | OR | ON | 2013/06/07<br>15:30 |
| S31 | 2537 | 222/94            | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;                                     | OR | ON | 2013/06/07<br>15:36 |


|     |     |   |  |    |    |                     |
|-----|-----|---|--|----|----|---------------------|
|     |     |   | EPO; JPO;<br>DERWENT;<br>IBM_TDB   |    |    |                     |
| S32 | 624 | S31 and mix   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:37 |
| S33 | 69  | S32 and clamp   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:37 |
| S34 | 60  | S33 and (flex?ble or flex?bility or elastic\$3)   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:37 |
| S35 | 1   | 1991-186955.NRAN.   | DERWENT  | OR | ON | 2013/06/07<br>16:03 |
| S37 | 228 | (cable adj gland) and ((bond\$3 or epoxy or adhesive or (two adj part) or (cure or curable)) same2 cable)   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>16:15 |
| S38 | 185 | (cable adj gland) and ((bond\$3 or epoxy or adhesive or (two adj part) or (cure or curable)) same (cable or core or conductor))   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>16:17 |
| S39 | 48  | ("8105945"   "8106407"   "7285782"   "8105691"   "20040121637"   "6623289"   "6668793"   "5432301"   "4515516"   "5194012"   "6812406"   "8102116"   "3833754"   "7735876").FN. | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>16:33 |
| S40 | 3   | "20100003001"   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>16:41 |
| S41 | 1   | 2008-D99857.NRAN.   | DERWENT  | OR | ON | 2013/06/07<br>16:42 |
| S42 | 2   | "12477580"  | US-PGPUB;<br>USPAT   | OR | ON | 2013/06/07<br>17:00 |
| S43 | 1   | "20100307816"   | DERWENT  | OR | ON | 2013/06/07<br>17:00 |

EAST Search History

|     |      |  |  |    |    |                     |
|-----|------|--|--|----|----|---------------------|
| S44 | 1    | 2010-Q10826.NRAN.                            | DERWENT  | OR | ON | 2013/06/07<br>17:00 |
| S45 | 6    | "2138218"                                    | DERWENT  | OR | ON | 2013/06/07<br>17:16 |
| S46 | 1    | 1984-258752.NRAN.                            | DERWENT  | OR | ON | 2013/06/07<br>17:16 |
| S47 | 5    | "7357579"                                    | US-PGPUB;<br>USPAT   | OR | ON | 2013/06/07<br>17:22 |
| S48 | 2537 | 222/94                                       | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/08<br>11:54 |
| S49 | 7297 | 222/94,92,103,95,107,145.5,145.6,145.1.ccls. | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/08<br>11:54 |
| S50 | 5    | "2008029165"                                 | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/08<br>14:27 |

8/ 14/ 2013 1:55:33 PM

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| <b>Search Notes</b><br><br> | <b>Application/Control No.</b><br><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br><br>RANDALL GRUBY           | <b>Art Unit</b><br><br>3754  |

| CPC- SEARCHED |      |          |
|---------------|------|----------|
| Symbol        | Date | Examiner |
|               |      |          |

| CPC COMBINATION SETS - SEARCHED |      |          |
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| Symbol                          | Date | Examiner |
|                                 |      |          |

| US CLASSIFICATION SEARCHED |                                    |          |          |
|----------------------------|------------------------------------|----------|----------|
| Class                      | Subclass                           | Date     | Examiner |
| 222                        | 92,94,95,103,107,145.1,145.5,145.6 | 06/07/13 | RG       |
| 222                        | 92,94,95,103,107,145.1,145.5,145.6 | 08/14/13 | RG       |

| SEARCH NOTES                                       |          |          |
|--|----------|----------|
| Search Notes                                       | Date     | Examiner |
| Performed Inventor Names Search                    | 06/07/13 | RG       |
| Reviewed IDS References                            | 06/07/13 | RG       |
| Consulted Primary Examiner for Field of Search     | 06/07/13 | RG       |
| See EAST search history, attached                  | 06/07/13 | RG       |
| Updated search. See EAST search history, attached. | 08/14/13 | RG       |

| INTERFERENCE SEARCH     |                         |      |          |
|-------------------------|-------------------------|------|----------|
| US Class/<br>CPC Symbol | US Subclass / CPC Group | Date | Examiner |
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Receipt date: 07/23/2013

13391539 - GAU: 3754

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| <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     |                   | 13391539   |  |
|   | Filing Date            |                   | 2012-05-21 |  |
|   | First Named Inventor   | Samuel Liam Proud |            |  |
|   | Art Unit               | 3754              |            |  |
|   | Examiner Name          | Randall A. Gruby  |            |  |
|   | Attorney Docket Number | 920257.00016      |            |  |

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|                                      | 1       | 20020066518        | A1                     | 2002-06-06       | Bukovnik et al.                                 |  |
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|                          | 1       | 1335047                              | GB                          |                        | 1973-10-24       | George W. Gilemot                               |  | <input type="checkbox"/> |
|                          | 2       | 20 2005 000854                       | DE                          | U1                     | 2005-06-16       | Kemper System GmbH & Co. KG                     |  | <input type="checkbox"/> |

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|   | Filing Date            |                   | 2012-05-21 |                      |
|   | First Named Inventor   | Samuel Liam Proud |            |                      |
|   | Art Unit               | 3754              |            |                      |
|   | Examiner Name          | Randall A. Gruby  |            |                      |
|   | Attorney Docket Number | 920257.00016      |            |                      |

|  |   |                |    |    |            |                                     |                                     |
|--|---|----------------|----|----|------------|-------------------------------------|-------------------------------------|
|  | 3 | 20 2005 004135 | DE | U1 | 2005-06-23 | Klocke Verpackungs-Service GmbH     | <input checked="" type="checkbox"/> |
|  | 4 | 1958608        | EP | A1 | 2008-08-20 | Otsuka Pharmaceutical Factory, Inc. | <input checked="" type="checkbox"/> |
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|                    | 1       | European Patent Office; European Search Report; Appln. No. EP 09168429.0; dated 28.01.10  | <input type="checkbox"/> |
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|   | Filing Date            | 2012-05-21        |                      |
|   | First Named Inventor   | Samuel Liam Proud |                      |
|   | Art Unit               | 3754              |                      |
|   | Examiner Name          | Randall A. Gruby  |                      |
|   | Attorney Docket Number | 920257.00016      |                      |

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|------------|--------------------|---------------------|------------|
| Signature  | /John d. franzini/ | Date (YYYY-MM-DD)   | 2013-07-23 |
| Name/Print | John D. Franzini   | Registration Number | 31,356     |

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For the President of the European Patent Office

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R.C. van Dijk

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Anmeldung Nr:  
Application no.: 09168429.0  
Demande no :

Anmeldetag:  
Date of filing: 21.08.09  
Date de dépôt :

Anmelder / Applicant(s) / Demander(s):

**CMP Products**  
36 Nelson Way  
East Cramlington  
Northumberland NE23 1WH/GB

Bezeichnung der Erfindung / Title of the invention / Titre de l'invention:  
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If no title is shown please refer to the description.  
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**Filler Assembly for Cable Gland**

In Anspruch genommene Priorität(en) / Priority(Priorities) claimed / Priorité(s) revendiquée(s)  
Staat/Tag/Aktenzeichen / State/Date/File no. / Pays/Date/Numéro de dépôt:

Internationale Patentklassifikation / International Patent Classification / Classification internationale de brevets:

H02G3/00

Am Anmeldetag benannte Vertragsstaaten / Contracting States designated at date of filing / Etats contractants désignées lors du dépôt:

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT  
RO SE SI SK SM TR

FILLER ASSEMBLY FOR CABLE GLAND

The present invention relates to a filler assembly for filling a cable gland with curable liquid material and  
5 relates particularly, but not exclusively, to such a filler assembly for filling cable glands for use in hazardous areas.

Many cable glands for use in connecting a cable to an enclosure in hazardous areas need to be filled with a  
10 compound which provides a barrier against the effects of an explosion occurring within the enclosure to which the cable gland is attached. The barrier is typically formed from a two-part clay-filled epoxy compound. The two component parts of the compound need to be thoroughly mixed with each other  
15 prior to fitting into the gland, and the resulting putty like material needs to be packed between the individual conductors in the cable. Such an arrangement is disclosed in GB 2258350.

20 This known arrangement suffers from a number of drawbacks. Firstly, the cure time of the putty like material is chosen to be relatively long, in order to enable it to be manipulated into the spaces between the individual conductors before curing becomes advanced. As a result, the filled  
25 cable assembly must be left undisturbed for a significant period, usually several hours, especially if mixed at low temperatures. Also, the components of the filler material sometimes contain hazardous materials which become harmless when the filler material is mixed. Persons mixing the  
30 components of the putty like filler material may come into contact with these hazardous materials during mixing, and air can become trapped within the cable gland by the filler material which may cause the barrier formed by the filler

material to fail in the event of an explosion. Filling of the cable gland is also relatively difficult, especially in the case of small cable glands.

5 Preferred embodiments of the present invention seek to overcome one or more of the above disadvantages of the prior art.

According to an aspect of the present invention, there  
10 is provided a filler assembly for a cable gland, the assembly comprising:-

at least one flexible barrier member having at least one respective aperture therethrough for engaging at least one conductor of a cable; and

15 a dispenser apparatus for a curable liquid material, the dispenser apparatus comprising:-

(i) a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material and at least one second chamber for accommodating a  
20 second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material; and

(ii) barrier means for temporarily preventing mixing of  
25 said first and second components.

By providing a filler assembly having a flexible barrier member an aperture therethrough for engaging at least one conductor of a cable, and a dispenser apparatus for a  
30 curable material comprising first and second chambers and barrier means for temporarily preventing mixing of the first and second components, this provides the advantage of controlling penetration of the curable liquid material into a

cable gland being filled with the curable liquid material. This in turn enables a more flowable and faster curing liquid material to be used than in the prior art, as a result of which more rapid formation of a filled cable gland  
5 incorporating the material is possible. In addition, with the present invention, the curable material can be dispensed into the assembled gland, i.e. the cable gland can be filled with the conductors of the cable in a connected state, as a result of which the electrical integrity of the joint can be  
10 ensured, whereas the putty like compound of the known arrangement must be moulded around the conductors of the cable with the gland disassembled, as a result of which the cable cores can not be electrically connected.

15 The dispenser apparatus may further comprise elongate dispenser means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom.

20 By providing elongate dispenser means, dispensing of the curable liquid can be more carefully controlled, as a result of which less viscous and faster curing liquid material can be used than in the prior art. This therefore provides the advantage of enabling more rapid formation of a  
25 filled cable gland incorporating the material.

At least one said flexible barrier member may have a respective tapering portion.

30 The body may be flexible.

This provides the advantage of making the apparatus easier and less expensive to manufacture.

The barrier means may comprise at least one releasable clamp.

5           The apparatus may further comprise a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

10           The curable liquid material may be adapted to change colour as a result of curing thereof.

          This provides the advantage of providing a visual indicator to the user when the cable gland filling process is  
15 complete.

          The curable liquid material may include polyurethane.

          The assembly may further comprise a cover member for  
20 covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

          The cover member may be adapted to prevent curable  
25 liquid material from penetrating an end face of the cable gland.

          According to another aspect of the present invention, there is providing a method of filling a void between at  
30 least one conductor of a cable and a cable gland, the method comprising:-

mounting at least one flexible barrier member having at least one respective aperture therethrough to at least one conductor of a cable;

5 mixing first and second components of a curable liquid material to initiate curing of said curable liquid material; and

10 injecting said curable liquid material into a space between at least one said conductor and said cable gland such that said barrier member restricts movement of said curable liquid material along at least one said conductor.

A preferred embodiment of the invention will now be described, by way of example only and not in any limitative sense, with reference to the accompanying drawings in which:-  
15

Figure 1 is a perspective view of a dispensing apparatus embodying the present invention;

20 Figure 2 is a partially cut away perspective view of a cable gland having a filler formed using the apparatus of Figure 1; and

25 Figure 3 is a cross sectional view of the filled cable gland of Figure 2 with a thread protector in place.

Referring to Figure 1, a dispenser apparatus 2 embodying the present invention and for use in filling a cable gland 4 (Figure 2) with curable liquid material 6 comprises a body of suitable transparent flexible plastics material defining a flexible bag 8 having a first compartment 10 for accommodating a first component of a polyurethane-based liquid curable material 6, and a second compartment 12 for accommodating a second component of the material 6. A

first clamp 14 temporarily separates the first compartment 10 and second compartment 12 to thereby prevent mixing of the first and second components of the material 6. The first and second components are coloured differently (for example blue and yellow) so that thorough mixing of the first and second components produces a green liquid, thereby providing a visual indication when thorough mixing of the first and second components has occurred. Mixing of the first and second components together causes gelling of the material and initiates curing of the curable liquid material 6.

The dispenser apparatus 2 is also provided with an elongate hollow nozzle 16 extending from the second compartment 12 such that dispensing of the mixed curable liquid material can be carefully controlled. In particular, the nozzle 16 can be inserted a considerable distance into the cable gland 4 and between individual conductors 20 of the core of a cable 22 attached to the cable gland 4 (Figure 2) so that the liquid material 6 can be highly flowable and fast-curing, as a result of which the cable gland 4 can be rapidly filled and air entrapment by the liquid material 6 minimised. A second clamp 18 temporarily prevents material flowing from the second compartment 12 into the nozzle 16, so that dispensing of the material 6 can be prevented until thorough mixing together of the first and second components has occurred.

The flexible bag 8 is formed from two sheets of material welded together along all but one of their edges to form a bag having an open mouth, which is then mounted to the nozzle 16. The second clamp 18 is then mounted to the bag adjacent to the nozzle 16, and the second component of the material 6 is dispensed into the second compartment 12. The



first clamp 14 is then mounted to the bag to seal the second component in the second compartment 12, and the first component is then dispensed into the first compartment 10. The open edge of the bag is then sealed to seal the first component in the first compartment 10.

Referring to Figures 2 and 3, the cable gland 4 to be filled by means of the dispenser apparatus 2 of Figure 1 comprises a threaded outer connector 24 for threaded connection to an enclosure (not shown) and a compound tube 26 rotatably mounted within the outer connector 24. A cable connector 28 is mounted to the end of the cable 22 and is connected to the outer connector 24 by means of cooperating screw threads (not shown).

A ring 30 abuts the cable connector 28 and a flexible seal 32 is located around the inner conductors 20 of the cable 22 and compressed between the compound tube 26 and ring 30 for limiting the extent of penetration of resin material 6 into the cable gland 4 before curing of the resin material 6. The flexible seal 32 comprises a generally frusto-conical body of elastomeric material having an aperture (not shown) therethrough for engaging the central conductors 20 of the cable 22. The aperture in the seal 32 is sized such that it stretches to pass around the conductors 20 to tightly engage the conductors 20 to form a reasonably effective barrier to passage of the material 6 along the space defined between the conductors 20 and the compound tube 26.

Referring to Figure 3, a thread protector 34 formed of elastomeric material such as rubber is located over the external screw thread of the outer connector 24 of the cable gland 4 prior to filling of the cable gland with resin

material 6. The thread protector 34 has a hollow rim 36 for catching excess resin material 6 which may flow out of end 40 of the cable gland 4 during the filling procedure, and an inner circular rim 38 which prevents penetration of resin material 6 into the gap between the outer connector 24 and the compound tube 26. This ensures that the compound tube 24 complete with cable connectors 20 can be removed from the outer connector 24 after curing of the resin material 6.

10           The process of filling the cable gland 4 of Figures 2 and 3 by means of the dispenser apparatus 2 of Figure 1 will now be described.

          In order to fill the core of the cable gland 4 with resin material, the flexible seal 32 initially placed over the core conductors 20 of the cable 22 so that the seal 32 tightly grips the conductors 20. The outer connector 24 with compound tube 26 are then mounted to the ring 30 and cable connector 28 to compress the seal 32 between the ring 30 and compound tube 26. As a result, the flexible seal 32 acts as a barrier to penetration of the liquid resin 6 material into the interior of the cable gland 4.

          The first clamp 14 is then removed from the dispenser apparatus 2 and the second clamp 18 left in place, to enable thorough mixing of the first and second components of the liquid resin material 6. The first and second components are coloured blue and yellow respectively, a result of which the liquid resin material 6 is bright green when it is thoroughly mixed. The second clamp 18 is then removed, and the liquid resin 6 material dispensed through the nozzle 16 into the space between the conductors 20 of the cable 22 and into the space around the conductors 20 inside the compound tube 26 of

the cable gland 4, where its movement along the axis of the cable gland 4 is restricted by the flexible seal 32. The seal 32 provides a sufficient barrier to penetration of the resin material 6 to hold back the resin material until it  
5 begins to gel and support itself. At the same time, the thread protector 34 protects the external thread of the outer connector 24 from excess resin material and prevents penetration of the liquid resin material between the outer connector 24 and the compound tube 26. The resin material 6  
10 is arranged to change colour to dark green when it is cured, so that a visual indication is provided when the curing process is completed.

It will be appreciated by persons skilled in the art  
15 that the above embodiment has been described by way of example only, and not in any limitative sense, and that various alterations and modifications are possible without departure from the scope of the invention as defined by the appended claims. For example, the filler assembly can be used  
20 to fill spaces in items other than cable glands, and for sufficiently large spaces, no elongate dispenser means is necessary, the mixed curable resin material being dispensed simply by puncturing the dispenser apparatus.

CLAIMS

1. A filler assembly for a cable gland, the assembly comprising:-

5           at least one flexible barrier member having at least one respective aperture therethrough for engaging at least one conductor of a cable; and

          a dispenser apparatus for a curable liquid material, the dispenser apparatus comprising:-

10           (i) a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable  
15 mixing of said first and second components to initiate curing of said curable liquid material; and

          (ii) barrier means for temporarily preventing mixing of said first and second components.

20 2. An assembly according to claim 1, further comprising elongate dispenser means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom.

25 3. An assembly according to claim 1 or 2, wherein at least one said flexible barrier member has a respective tapering portion.

4. An assembly according to any one of the preceding claims,  
30 wherein the body is flexible.

5. An assembly according to any one of the preceding claims, wherein the barrier means comprises at least one releasable clamp.

5 6. An assembly according to any one of the preceding claims, wherein the apparatus further comprises a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

10

7. An assembly according to claim 6, wherein the curable liquid material is adapted to change colour as a result of curing thereof.

15 8. An assembly according to claim 6 or 7, wherein the curable liquid material includes polyurethane.

9. An assembly according to any one of the preceding claims, further comprising a cover member for covering an external  
20 screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

10. An assembly according to claim 9, wherein the cover member is adapted to prevent curable liquid material from  
25 penetrating an end face of the cable gland.

11. A method of filling a void between at least one conductor of a cable and a cable gland, the method comprising:-  
mounting at least one flexible barrier member having at  
30 least one respective aperture therethrough to at least one conductor of a cable;

mixing first and second components of a curable liquid material to initiate curing of said curable liquid material; and

5 injecting said curable liquid material into a space between at least one said conductor and said cable gland such that said barrier member restricts movement of said curable liquid material along at least one said conductor.

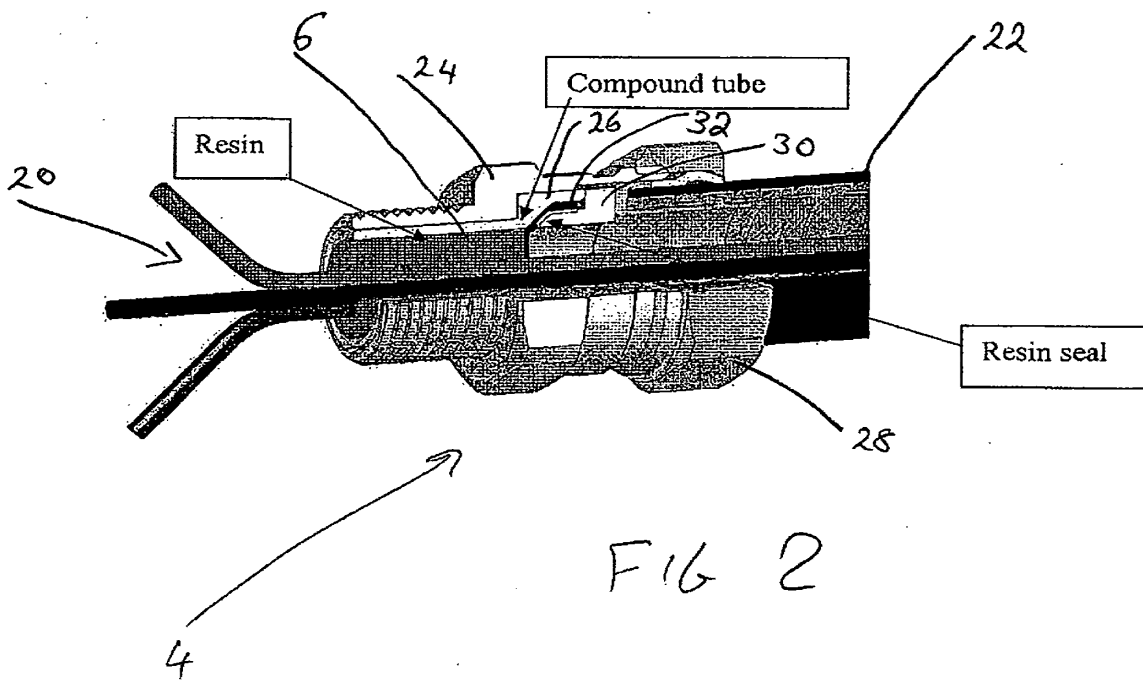
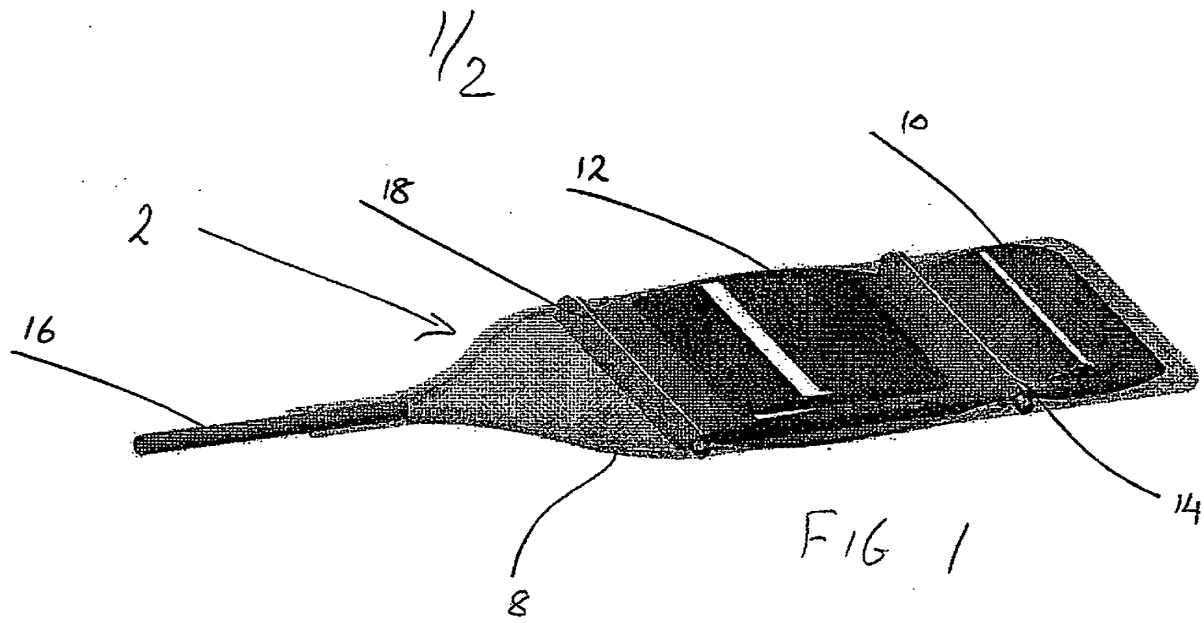
ABSTRACT

FILLER ASSEMBLY FOR CABLE GLAND

5 A filler assembly for a cable gland is disclosed. The  
assembly comprise a flexible seal (32) having an aperture  
therethrough for engaging at least one conductor of a cable,  
and a dispenser apparatus (2) for a curable liquid material.  
The dispenser apparatus comprises a flexible bag (8) defining  
10 a first compartment (10) for accommodating a first component  
of a curable liquid material and a second compartment (12)  
for accommodating a second component of the curable liquid  
material and adapted to communicate with the first chamber to  
enable mixing of the first and second components to initiate  
15 curing of the curable liquid material. A first clamp (14)  
temporarily prevents mixing of the first and second  
components.

[Figure 2]

20





2/2

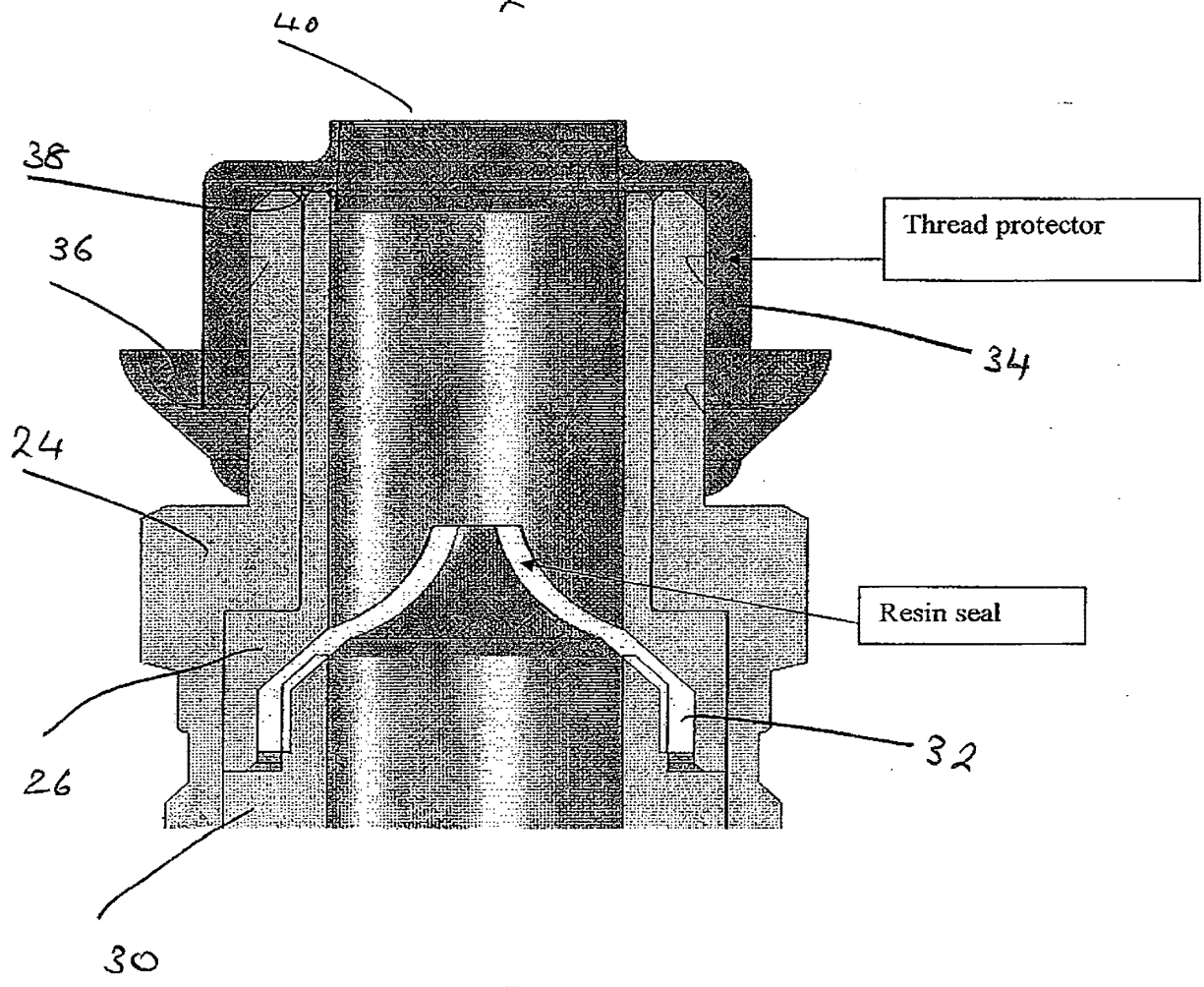


FIG 3



Bescheinigung

Certificate

Attestation

Die angehefteten  
Unterlagen stimmen mit der  
als ursprünglich eingereicht  
geltenden Fassung der auf  
dem nächsten Blatt  
bezeichneten europäischen  
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la page suivante.

Patentanmeldung Nr.

Patent application No.

Demande de brevet n°

09168430.8 / EP09168430

The organization code and number of your priority application, to be used for filing abroad under the Paris Convention, is EP09168430.

Der Präsident des Europäischen Patentamts;  
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets  
p.o.

R.C. van Dijk

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Anmeldung Nr:  
Application no.: 09168430.8  
Demande no :

Anmeldetag:  
Date of filing: 21.08.09  
Date de dépôt :

Anmelder / Applicant(s) / Demandeur(s):

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Bezeichnung der Erfindung / Title of the invention / Titre de l'invention:  
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.  
If no title is shown please refer to the description.  
Si aucun titre n'est indiqué se référer à la description.)

**Dispenser apparatus for curable liquid material**

In Anspruch genommene Priorität(en) / Priority(Priorities) claimed / Priorité(s) revendiquée(s)  
Staat/Tag/Aktenzeichen / State/Date/File no. / Pays/Date/Numéro de dépôt:

Internationale Patentklassifikation / International Patent Classification / Classification internationale de brevets:

**B05B**

Am Anmeldetag benannte Vertragsstaaten / Contracting States designated at date of filing / Etats contractants désignées lors  
du dépôt:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT  
RO SE SI SK SM TR**

DISPENSER APPARATUS FOR CURABLE LIQUID MATERIAL

The present invention relates to a dispenser apparatus for dispensing curable liquid material, and relates particularly, but not exclusively, to such a dispenser apparatus for filling cable glands for use in hazardous areas.

Many cable glands for use in connecting a cable to an enclosure in hazardous areas need to be filled with a compound which provides a barrier against the effects of an explosion occurring within the enclosure to which the cable gland is attached. The barrier is typically formed from a two-part clay-filled epoxy compound. The two component parts of the compound need to be thoroughly mixed with each other prior to fitting into the gland, and the resulting putty like material needs to be packed between the individual conductors in the cable. Such an arrangement is disclosed in GB 2258350.

This known arrangement suffers from a number of drawbacks. Firstly, the cure time of the putty like material is chosen to be relatively long, in order to enable it to be manipulated into the spaces between the individual conductors before curing becomes advanced. As a result, the filled cable assembly must be left undisturbed for a significant period, usually several hours, especially if mixed at low temperatures. Also, the components of the filler material sometimes contain hazardous materials which become harmless when the filler material is mixed. Persons mixing the components of the putty like filler material may come into contact with these hazardous materials during mixing, and air can become trapped within the cable gland by the filler

material which may cause the barrier formed by the filler material to fail in the event of an explosion. Filling of the cable gland is also relatively difficult, especially in the case of small cable glands.

5

Preferred embodiments of the present invention seek to overcome one or more of the above disadvantages of the prior art.

10

According to an aspect of the present invention, there is provided a dispenser apparatus for a curable liquid material, the apparatus comprising:-

15 a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

20 first barrier means for temporarily preventing mixing of said first and second components;

elongate dispenser means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom; and

25 second barrier means for temporarily preventing passage of said curable liquid material from the or each said second chamber to said dispenser means.

30 By providing elongate dispenser means to dispense mixed curable liquid material and second barrier means for temporarily preventing passage of the curable liquid material to said dispenser means, this provides the advantage that the first and second components of the curable liquid material

can be mixed in a sealed container comprising the first and second compartments, thus enabling the user to avoid coming into contact with harmful components of the curable liquid material. As a result of the provision of elongate dispenser means, dispensing of the curable liquid can be more carefully controlled, as a result of which less viscous and faster curing liquid material can be used than in the prior art. This therefore provides the advantage of enabling more rapid formation of a filled cable gland incorporating the material. In addition, with the present invention, the curable material can be dispensed into the assembled gland, i.e. the cable gland can be filled with the conductors of the cable in a connected state, as a result of which the electrical integrity of the joint can be ensured, whereas the putty like compound of the known arrangement must be moulded around the conductors of the cable with the gland disassembled, as a result of which the cable cores can not be electrically connected.

20           The body may be flexible.

          This provides the advantage of making the apparatus easier and less expensive to manufacture.

25           The first and/or second barrier means may comprise at least one releasable clamp.

          The apparatus may further comprise a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

The curable liquid material may be adapted to change colour as a result of curing thereof.

This provides the advantage of providing a visual  
5 indicator to the user when the cable gland filling process is complete.

The curable liquid material may include polyurethane.

10 According to another aspect of the present invention, there is provided a filler assembly for a cable gland, the assembly comprising an apparatus as defined above, and a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into  
15 contact with said screw thread.

The cover member may be adapted to prevent curable liquid material from penetrating an end face of the cable gland.

20

A preferred embodiment of the invention will now be described, by way of example only and not in any limitative sense, with reference to the accompanying drawings in which:-

25 Figure 1 is a perspective view of a dispensing apparatus embodying the present invention;

Figure 2 is a partially cut away perspective view of a cable gland having a filler formed using the apparatus of  
30 Figure 1; and

Figure 3 is a cross sectional view of the filled cable gland of Figure 2 with a thread protector in place.

Referring to Figure 1, a dispenser apparatus 2 embodying the present invention and for use in filling a cable gland 4 (Figure 2) with curable liquid material 6  
5 comprises a body of suitable transparent flexible plastics material defining a flexible bag 8 having a first compartment 10 for accommodating a first component of a polyurethane-based liquid curable material 6, and a second compartment 12 for accommodating a second component of the material 6. A  
10 first clamp 14 temporarily separates the first compartment 10 and second compartment 12 to thereby prevent mixing of the first and second components of the material 6. The first and second components are coloured differently (for example blue and yellow) so that thorough mixing of the first and second  
15 components produces a green liquid, thereby providing a visual indication when thorough mixing of the first and second components has occurred. Mixing of the first and second components together causes gelling of the material and initiates curing of the curable liquid material 6.

20

The dispenser apparatus 2 is also provided with an elongate hollow nozzle 16 extending from the second compartment 12 such that dispensing of the mixed curable liquid material can be carefully controlled. In particular,  
25 the nozzle 16 can be inserted a considerable distance into the cable gland 4 and between individual conductors 20 of the core of a cable 22 attached to the cable gland 4 (Figure 2) so that the liquid material 6 can be highly flowable and fast-curing, as a result of which the cable gland 4 can be  
30 rapidly filled and air entrapment by the liquid material 6 minimised. A second clamp 18 temporarily prevents material flowing from the second compartment 12 into the nozzle 16, so that dispensing of the material 6 can be prevented until



thorough mixing together of the first and second components has occurred.

The flexible bag 8 is formed from two sheets of material welded together along all but one of their edges to form a bag having an open mouth, which is then mounted to the nozzle 16. The second clamp 18 is then mounted to the bag adjacent to the nozzle 16, and the second component of the material 6 is dispensed into the second compartment 12. The first clamp 14 is then mounted to the bag to seal the second component in the second compartment 12, and the first component is then dispensed into the first compartment 10. The open edge of the bag is then sealed to seal the first component in the first compartment 10.

15

Referring to Figures 2 and 3, the cable gland 4 to be filled by means of the dispenser apparatus 2 of Figure 1 comprises a threaded outer connector 24 for threaded connection to an enclosure (not shown) and a compound tube 26 rotatably mounted within the outer connector 24. A cable connector 28 is mounted to the end of the cable 22 and is connected to the outer connector 24 by means of cooperating screw threads (not shown).

25 A ring 30 abuts the cable connector 28 and a flexible seal 32 is located around the inner conductors 20 of the cable 22 and compressed between the compound tube 26 and ring 30 for limiting the extent of penetration of resin material 6 into the cable gland 4 before curing of the resin material 6. 30 The flexible seal 32 comprises a generally frusto-conical body of elastomeric material having an aperture (not shown) therethrough for engaging the central conductors 20 of the cable 22. The aperture in the seal 32 is sized such that it

stretches to pass around the conductors 20 to tightly engage the conductors 20 to form a reasonably effective barrier to passage of the material 6 along the space defined between the conductors 20 and the compound tube 26.

5

Referring to Figure 3, a thread protector 34 formed of elastomeric material such as rubber is located over the external screw thread of the outer connector 24 of the cable gland 4 prior to filling of the cable gland with resin material 6. The thread protector 34 has a hollow rim 36 for catching excess resin material 6 which may flow out of end 40 of the cable gland 4 during the filling procedure, and an inner circular rim 38 which prevents penetration of resin material 6 into the gap between the outer connector 24 and the compound tube 26. This ensures that the compound tube 24 complete with cable connectors 20 can be removed from the outer connector 24 after curing of the resin material 6.

The process of filling the cable gland 4 of Figures 2 and 3 by means of the dispenser apparatus 2 of Figure 1 will now be described.

In order to fill the core of the cable gland 4 with resin material, the flexible seal 32 initially placed over the core conductors 20 of the cable 22 so that the seal 32 tightly grips the conductors 20. The outer connector 24 with compound tube 26 are then mounted to the ring 30 and cable connector 28 to compress the seal 32 between the ring 30 and compound tube 26. As a result, the flexible seal 32 acts as a barrier to penetration of the liquid resin 6 material into the interior of the cable gland 4.

The first clamp 14 is then removed from the dispenser apparatus 2 and the second clamp 18 left in place, to enable thorough mixing of the first and second components of the liquid resin material 6. The first and second components are  
5 coloured blue and yellow respectively, a result of which the liquid resin material 6 is bright green when it is thoroughly mixed. The second clamp 18 is then removed, and the liquid resin 6 material dispensed through the nozzle 16 into the space between the conductors 20 of the cable 22 and into the  
10 space around the conductors 20 inside the compound tube 26 of the cable gland 4, where its movement along the axis of the cable gland 4 is restricted by the flexible seal 32. The seal 32 provides a sufficient barrier to penetration of the resin material 6 to hold back the resin material until it  
15 begins to gel and support itself. At the same time, the thread protector 34 protects the external thread of the outer connector 24 from excess resin material and prevents penetration of the liquid resin material between the outer connector 24 and the compound tube 26. The resin material 6  
20 is arranged to change colour to dark green when it is cured, so that a visual indication is provided when the curing process is completed.

It will be appreciated by persons skilled in the art  
25 that the above embodiment has been described by way of example only, and not in any limitative sense, and that various alterations and modifications are possible without departure from the scope of the invention as defined by the appended claims.

CLAIMS

1. A dispenser apparatus for a curable liquid material, the apparatus comprising:-

5 a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable  
10 mixing of said first and second components to initiate curing of said curable liquid material;

first barrier means for temporarily preventing mixing of said first and second components;

elongate dispenser means adapted to communicate with at  
15 least one said second chamber and to dispense said mixed curable liquid material therefrom; and

second barrier means for temporarily preventing passage of said curable liquid material from the or each said second chamber to said dispenser means.

20

2. An apparatus according to claim 1, wherein said body is flexible.

3. An apparatus according to claim 1 or 2, wherein the first  
25 and/or second barrier means comprises at least one releasable clamp.

4. An apparatus according to any one of the preceding claims, further comprising a first component of a curable liquid  
30 material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

5. An apparatus according to claim 5, wherein the curable liquid material is adapted to change colour as a result of curing thereof.

5 6. An apparatus according to claim 4 or 5, wherein the curable liquid material includes polyurethane.

7. A filler assembly for a cable gland, the assembly comprising an apparatus according to any one of the preceding  
10 claims, and a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

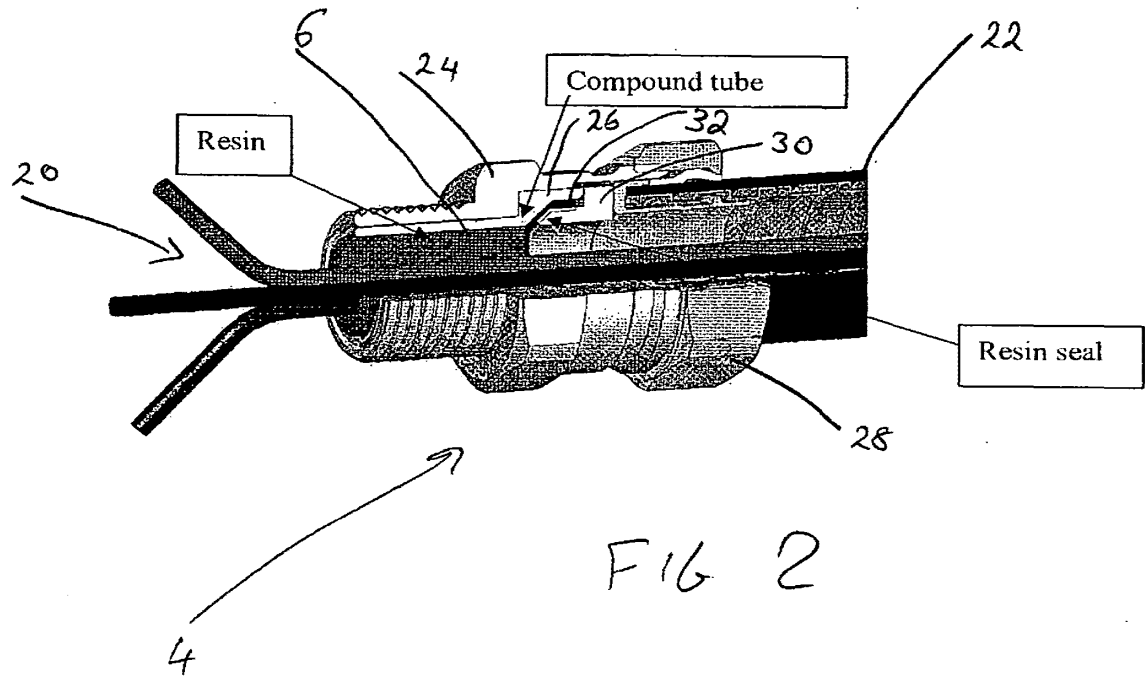
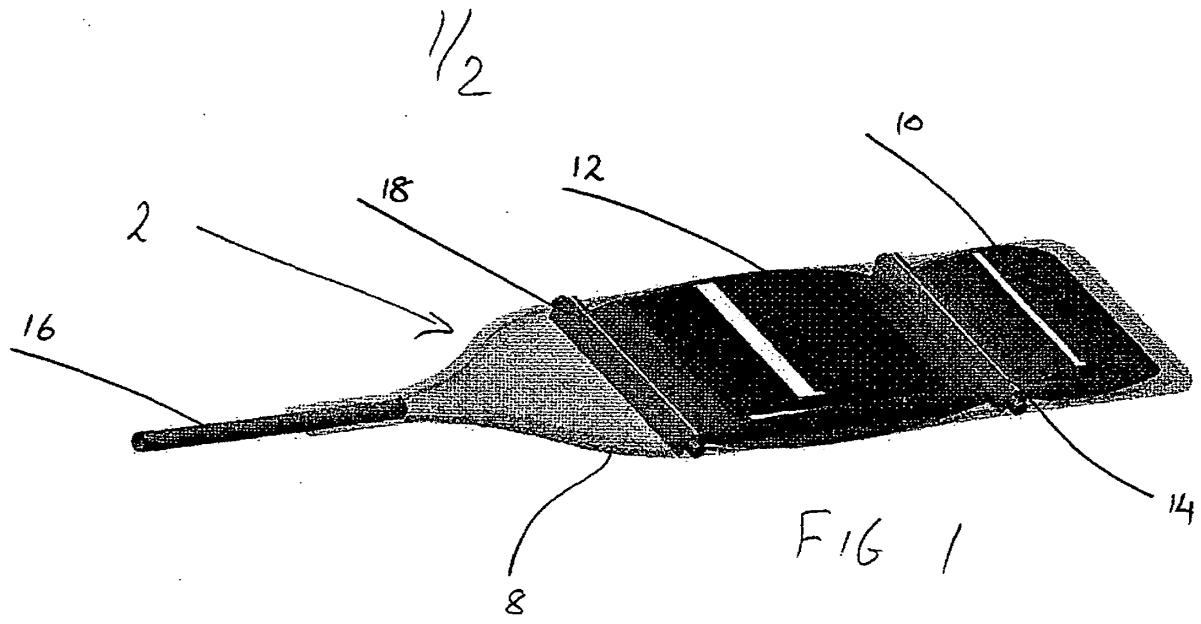
8. An assembly according to claim 7, wherein the cover member  
15 is adapted to prevent curable liquid material from penetrating an end face of the cable gland.

ABSTRACT

DISPENSER APPARATUS FOR CURABLE LIQUID MATERIAL

5 A dispenser apparatus (2) for a curable liquid material is disclosed. The apparatus comprises a flexible bag (8) defining a first compartment (10) for accommodating a first component of a curable liquid material, and a second compartment (12) for accommodating a second component of the  
10 curable liquid material and adapted to communicate with the first chamber to enable mixing of the first and second components to initiate curing of the curable liquid material. A first clamp (14) temporarily prevents mixing of the first and second components, and an elongate nozzle (16)  
15 communicates with the second compartment to dispense the mixed curable liquid material therefrom. A second clamp (18) temporarily prevents passage of the curable liquid material from the second compartment to the nozzle.

20 [Figure 1]



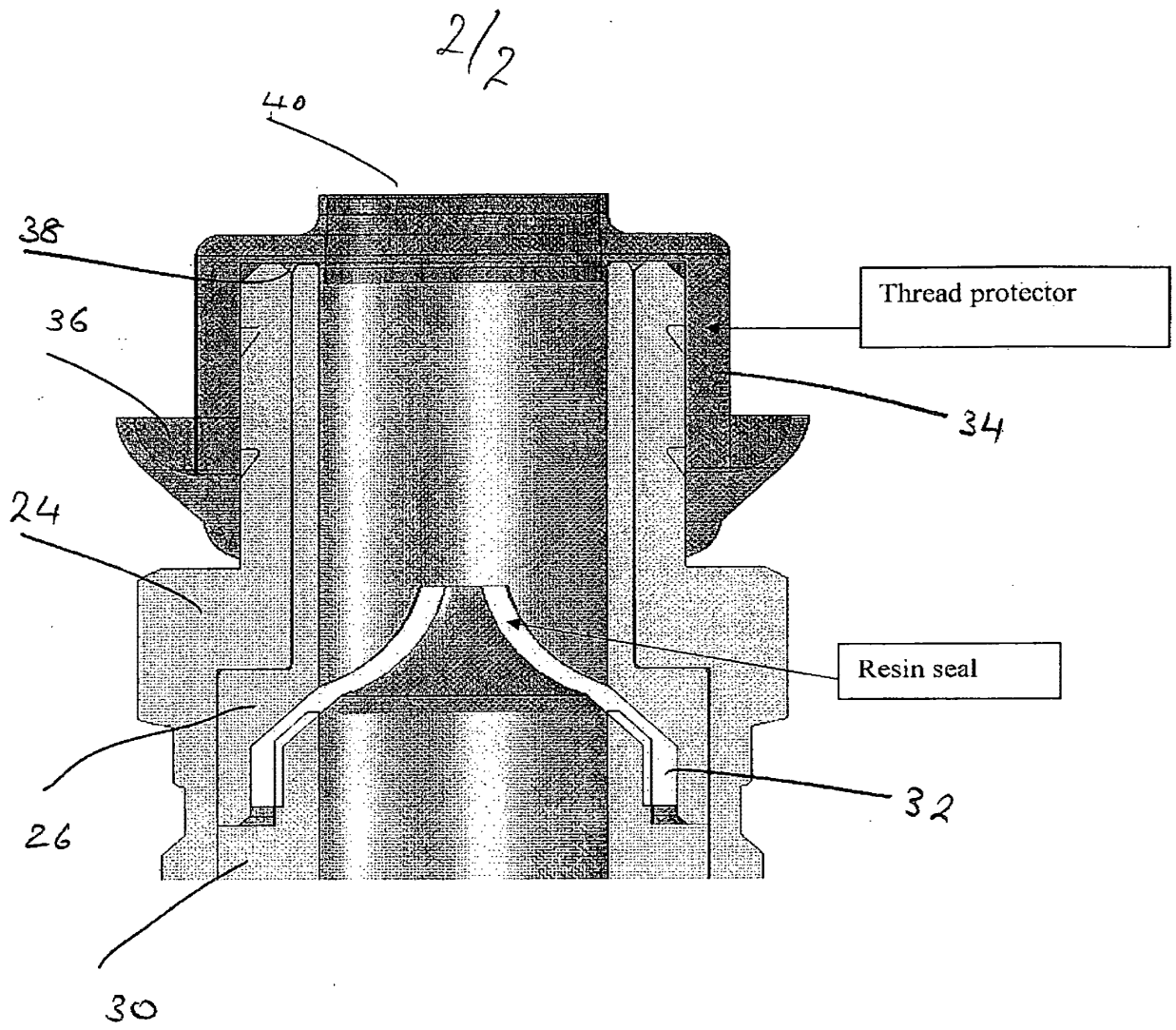


FIG 3



IFJ



PATENT

I hereby certify that this correspondence is being deposited with the United States Postal Service on the date set forth below as First Class Mail in an envelope addressed to: Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.

Date of Signature and Deposit: July 23, 2013 John D. Franzini  
John D. Franzini, Reg. No. 31,356

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Samuel Liam Proud  
Application No.: 13/391,539  
Filed: May 2, 2012  
For: FILLER ASSEMBLY FOR CABLE GLAND  
Group Art Unit: 3754  
Examiner: Randall A. Gruby  
Confirmation No.: 6980  
Att'y Docket No.: 920257.00016

**SUBMISSION OF CERTIFIED COPY OF FOREIGN PRIORITY APPLICATION AND CLAIM FOR PRIORITY UNDER 35 U.S.C. §119 BASED ON SAID APPLICATION**

Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Enclosed please find certified copies of European Patent Application Nos. 09168429.0 and 09168430.8 which were filed in the European Patent Office on August 21, 2009. As stated in the Declaration for this patent application, Applicant claims priority under 35 U.S.C. §119 of European Patent Application Nos. 09168429.0 and 09168430.8.

No additional fees for filing this paper are believed to be due. However, if such fees are due, the Commissioner is hereby authorized to charge them to Deposit Account No. 17-0055.

Respectfully submitted,  
SAMUEL LIAM PROUD

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QB\920257.00016\21972376.1

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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**RESPONSE TO NON-FINAL OFFICE ACTION**

MS Amendment  
Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the non-final Office Action dated 06/17/2013, please consider the following:

Amendments to the Specification begin on page 2;

Amendments to the Claims begin on page 4; and

Remarks begin on page 7.

**In the Specification:**

**Please amend the first full paragraph of page 7 of the application as follows:**

The dispenser apparatus 2 is also provided with an elongate hollow nozzle 16 extending from the second compartment 12 such that dispensing of the mixed curable liquid material can be carefully controlled. In particular, the nozzle 16 can be inserted a considerable distance into the cable gland 4 and between individual core conductors 20 of the core of a cable 22 attached to the cable gland 4 (Figure 2) so that the liquid material 6 can be highly flowable and fast-curing, as a result of which the cable gland 4 can be rapidly filled and air entrapment by the liquid material 6 minimised. A second clamp 18 temporarily prevents material flowing from the second compartment 12 into the nozzle 16, so that dispensing of the material 6 can be prevented until thorough mixing together of the first and second components has occurred.

**Please amend the first full paragraph of page 8 of the application as follows:**

A ring 30 abuts the cable connector 28 and a flexible seal 32 is located around the ~~inner~~ core conductors 20 of the cable 22 and compressed between the compound tube 26 and ring 30 for limiting the extent of penetration of curable material 6 into the cable gland 4 before curing of the curable material 6. The flexible seal 32 comprises a generally frusto-conical body of elastomeric material having an aperture (not shown) therethrough for engaging the ~~central~~ core conductors 20 of the cable 22. The aperture in the seal 32 is sized such that it stretches to pass around the core conductors 20 to tightly engage the core conductors 20 to form a reasonably effective barrier to passage of the material 6 along the space defined between the core conductors 20 and the compound tube 26.

**Please amend the penultimate paragraph beginning on page 8 and ending on page 9 as follows:**

Referring to Figure 3, a thread protector 34 formed of elastomeric material such as rubber is located over the external screw thread of the outer connector 24 of the cable gland 4 prior to filling of the cable gland with curable material 6. The thread protector 34 has a hollow rim 36 for catching excess curable material 6 which may flow out of end 40 of the cable gland 4 during the filling procedure, and an inner circular rim 38 which prevents penetration of curable material

6 into the gap between the outer connector 24 and the compound tube 26. This ensures that the compound tube ~~[[24]]~~ 26 complete with cable connectors 20 can be removed from the outer connector 24 after curing of the material 6.

**Please amend the second full paragraph of page 9 as follows:**

In order to fill the core of the cable gland 4 with curable material, the flexible seal 32 initially placed over the core conductors 20 of the cable 22 so that the seal 32 tightly grips the core conductors 20. The outer connector 24 with compound tube 26 are then mounted to the ring 30 and cable connector 28 to compress the seal 32 between the ring 30 and compound tube 26. As a result, the flexible seal 32 acts as a barrier to penetration of the curable liquid material 6 into the interior of the cable gland 4.

**Please amend the penultimate paragraph beginning on page 9 and ending on page 10 as follows:**

The first clamp 14 is then removed from the dispenser apparatus 2 and the second clamp 18 left in place, to enable thorough mixing of the first and second components of the curable liquid material 6. The first and second components are coloured blue and yellow respectively, a result of which the curable liquid material 6 is bright green when it is thoroughly mixed. The second clamp 18 is then removed, and the outlet of the nozzle 16 is placed at a location near the seal 32. The liquid material 6 is then dispensed through the nozzle 16 into the space between the core conductors 20 of the cable 22 and into the space around the core conductors 20 inside the compound tube 26 of the cable gland 4, where its movement along the axis of the cable gland 4 is restricted by the flexible seal 32. The location of the outlet of the nozzle 16 near the seal 32 causes air to be expelled from the cable gland when the curable liquid material 6 is dispensed from the nozzle 16. The seal 32 provides a sufficient barrier to penetration of the material 6 to hold back the curable material until it begins to gel and support itself. At the same time, the thread protector 34 protects the external thread of the outer connector 24 from excess curable material and prevents penetration of the liquid curable material between the outer connector 24 and the compound tube 26. The material 6 is arranged to change colour to dark green when it is cured, so that a visual indication is provided when the curing process is completed.

**In the Claims:**

Please amend the claims so that the pending claim set reads as follows:

1. (Currently Amended) A filler assembly for filling with curable liquid material a cable gland, the cable gland having a plurality of cores of at least one cable extending therethrough, ~~with curable liquid material~~, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

at least one first barrier apparatus for temporarily preventing mixing of said first and second components;

at least one elongate dispenser apparatus adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

at least one second barrier apparatus for temporarily preventing passage of said curable liquid material from the or each said second chamber to at least one said dispenser apparatus; and

(b) at least one barrier member having at least one respective aperture therethrough for engaging at least one core of a cable, wherein the barrier member is adapted to restrict the extent of penetration of said curable liquid material along said cores.

2. (Original) An assembly according to claim 1, wherein said body is flexible.

3. (Previously Presented) An assembly according to claim 1, wherein at least one said first barrier apparatus comprises at least one releasable clamp.

4. (Previously Presented) An assembly according to claim 1, further comprising a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

5. (Previously Presented) An assembly according to claim 5, wherein the curable liquid material is adapted to change color as a result of curing thereof.

6. (Previously Presented) An assembly according to claim 1, further comprising a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

7. (Original) An assembly according to claim 6, wherein the cover member is adapted to prevent curable liquid material from penetrating an end face of the cable gland.

8. (Previously Presented) An assembly according to claim 1, wherein at least one said barrier member comprises a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.

9. (Previously Presented) An assembly according to claim 1, wherein at least one said barrier member has a respective tapering portion.

10. (Previously Presented) A method of filling a cable gland with curable liquid material, the method comprising:

using a filler assembly that includes:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

at least one first barrier apparatus for temporarily preventing mixing of said first and second components;

at least one elongate dispenser apparatus adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

at least one second barrier apparatus for temporarily preventing passage of said curable liquid material from the or each said second chamber to at least one said dispenser apparatus; and

(b) at least one barrier member for having at least one respective aperture therethrough for engaging at least one core of a cable, wherein the barrier member is adapted to restricting the extent of penetration of said curable liquid material along said cores;

locating at least one said barrier member in the cable gland; and

locating an outlet of at least one said dispenser apparatus in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.

11. (Original) A method according to claim 10, wherein the step of locating at least one said barrier member in the cable gland comprises locating at least one said barrier member around at least one said core of at least one said cable.

12. (Previously Presented) An assembly according to claim 1, wherein at least one said second barrier apparatus comprises at least one releasable clamp.

## REMARKS

In response to the Patent Office Action dated 06/17/2013,

### Priority:

The certified copies of EP 09168429.0 and EP 09168430.8 are being submitted via U.S. Mail on even date herewith.

### Drawings:

In response to the drawing objections, replacement sheets 1/2 and 2/2 are attached herewith correcting Figs. 2 and 3.

We do not understand the Examiner's objection to reference numeral 38 in Fig. 3. This is an inner circular rim for preventing curable material from penetrating into the gap between parts 24 and 26 at the upper end of those parts, and is therefore believed to be consistent with the description.

### Specification

The Examiner's two objections have been addressed by the amendments to the detailed description made herein.

### Claim Objections

The Examiner's objection to claim 1 has been addressed by the amendment to claim 1 made herein.

### Claim Rejections – 35 U.S.C. 103

EP 0434105 discloses a flexible tube for filling a tray of a cable sleeve. The tube 17 has an end 16 which connects to a wedge piece 18. However, the arrangement of EP 0434105 can only direct liquid via the wedge piece 18 and is therefore not suitable for dispensing liquid between the individual cores of a cable. EP 0434105 also does not disclose a barrier member having at least one respective aperture therethrough for engaging at least one core of a cable for restricting the extent of penetration of the curable liquid material along the cores of the cable.

As a result of this difference, the present invention has the advantage over EP 0434105 that highly flowable liquid material can be quickly dispensed between individual cores of the cable, such that air can be expelled from the spaces between the cores of the cable. As a result, the formation of air voids in the cured flowable material, which could otherwise form paths for



flames or pressure in the event of an explosion, is minimised. The barrier member restricts the extent of penetration of the liquid material along the cores of the cable, thereby enabling the curable liquid material to be held in position to set between the cores of the cable, even if highly flowable liquid material is used. This enables a cable gland to be more rapidly sealed by means of the present invention than the arrangement of EP 0434105 and to be used in hazardous environments.

The objective problem associated with EP 0434105 can therefore be seen to be to enable a cable gland to be rapidly sealed for use in hazardous environments.

The person skilled in the art, in seeking to solve the objective problem of EP 0434105, i.e. to enable a cable gland to be rapidly sealed for use in hazardous environments, would not seek a solution in WO 2008/029165, which uses a hardenable compound 125 such as an epoxy resin having the consistency of putty or plasticine (see page 25, line 2 to 5 of WO 2008/029165), which is therefore not effective for rapidly removing substantially all of the air from the voids between the cores of the cable.

However, even if the skilled person were to seek a solution in WO 2008/029165, no solution would be found, since WO 2008/029165 does not disclose an arrangement in which an elongate dispenser apparatus is provided for dispensing curable liquid material between a plurality of cores of the cable. In particular, Fig. 2 of WO 2008/029165 discloses a seal 18 designed to perform a sealing function in a cable gland. The seal 18 has a frusto-conical portion 22 which allows a range of cable sizes to be accommodated. This seal 18, when used to perform the sealing function in the cable gland, would be much less effective in a hazardous environment than a seal formed from curable liquid material, but is also unsuitable for use as a barrier member for limiting the flow of curable liquid material intended to subsequently perform the sealing function in the cable gland, since the frusto-conical nature of the seal 18 would either not permit sufficient length of cured material for the cable gland to be effective in a hazardous environment, or would cause the cable gland to be excessively long if an effective seal were to be achieved.

In addition, Fig. 5 of WO 2008/029165 discloses an arrangement in which before the compound 125 hardens (see page 25, line 8 to 12 of WO 2008/029165), the barrier sleeve 105 is slid onto the end of the cable 119 and pushed over the cable cores 123 with the hardenable compound 125 packed therearound. As stated at page 25, line 15 to 18, the end of the barrier

sleeve 105 remote from the insert adaptor 107 is a clearance fit around the cores 123 to leave an annular gap 127 through which any excess hardenable compound 125 can exude. This means that highly flowable material suitable for expelling substantially all of the air from between the cores of the cable could not be used, since it would be insufficiently viscous to enable it to be packed around the cable cores and would also escape from the annular gap 127 before an effective seal could be formed. The skilled person would therefore not combine the teaching of EP 0434105 with that of WO 2008/029165 to arrive at the present invention, and it is therefore submitted that the present invention would not have been obvious to a person of ordinary skill in the art.

**Information Disclosure Statement**

An information disclosure statement is being filed herewith citing search reports in relation to corresponding European Patent Application Nos. 09168429.0 and 09168430.8 and an examination report in relation to corresponding UK Patent Application No. 1202969.0.

**Conclusion**

Allowance of claims 1-12 is respectfully requested. No fees are believed due for consideration of this response, however, the Commissioner is hereby authorized to charge any fees deemed necessary to Deposit Account No. 17-0055.

Respectfully submitted,  
SAMUEL LIAM PROUD

Dated: July 23, 2013

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REPLACEMENT SHEET

-1/2-

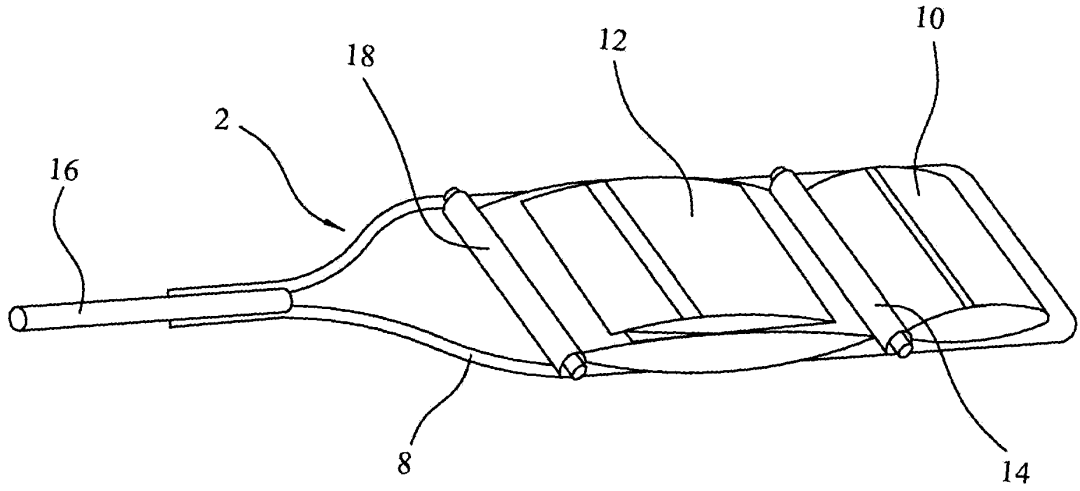


FIG. 1

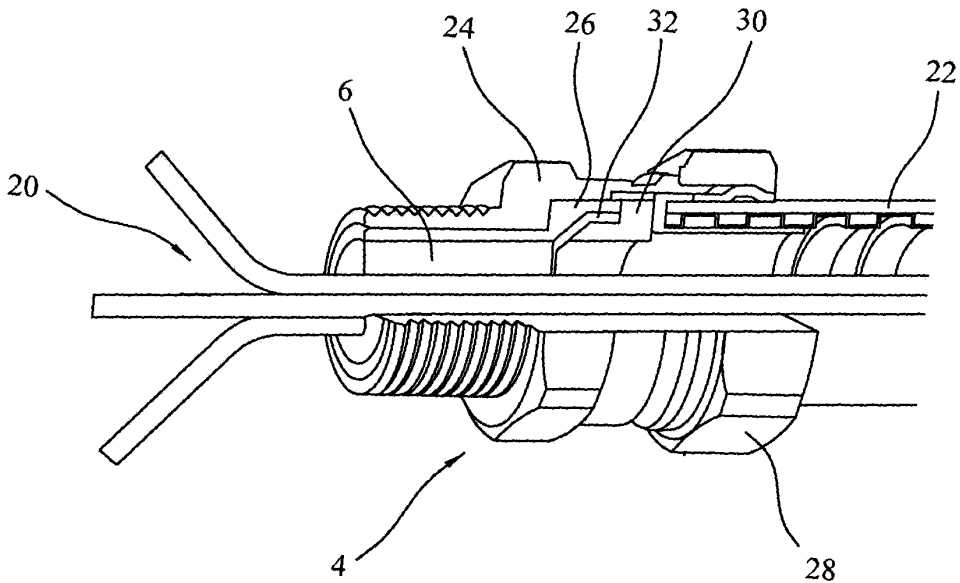


FIG. 2

REPLACEMENT SHEET

-2/2-

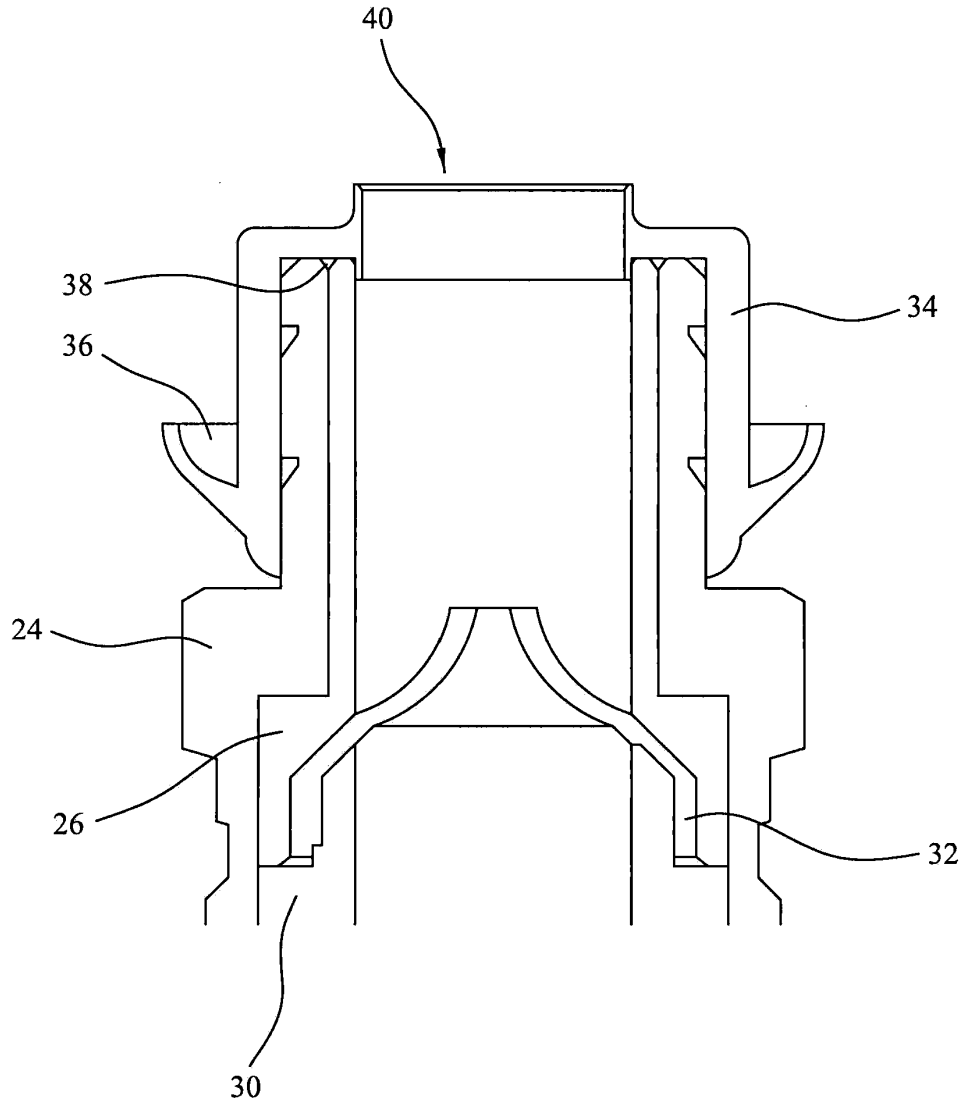


FIG. 3

|   |                        |                   |
|---|------------------------|-------------------|
| <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     | 13391539          |
|   | Filing Date            | 2012-05-21        |
|   | First Named Inventor   | Samuel Liam Proud |
|   | Art Unit               | 3754              |
|   | Examiner Name          | Randall A. Gruby  |
|   | Attorney Docket Number | 920257.00016      |

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|                                      | 1       | 20020066518        | A1                     | 2002-06-06       | Bukovnik et al.                                 |  |
|                                      | 2       | 20080262408        | A1                     | 2008-10-23       | Krauss et al.                                   |  |

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|                          | 1       | 1335047                              | GB                          |                        | 1973-10-24       | George W. Gilemot                               |  | <input type="checkbox"/> |
|                          | 2       | 20 2005 000854                       | DE                          | U1                     | 2005-06-16       | Kemper System GmbH & Co. KG                     |  | <input type="checkbox"/> |

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| <b>INFORMATION DISCLOSURE<br/>STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     | 13391539          |
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|  |   |                |    |    |            |                                     |                                     |
|--|---|----------------|----|----|------------|-------------------------------------|-------------------------------------|
|  | 3 | 20 2005 004135 | DE | U1 | 2005-06-23 | Klocke Verpackungs-Service GmbH     | <input checked="" type="checkbox"/> |
|  | 4 | 1958608        | EP | A1 | 2008-08-20 | Otsuka Pharmaceutical Factory, Inc. | <input checked="" type="checkbox"/> |
|  | 5 | 2007073526     | WO | A2 | 2007-06-28 | Baxter International Inc.           | <input type="checkbox"/>            |

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|--------------------|---------|---|--------------------------|
|                    | 1       | European Patent Office; European Search Report; Appln. No. EP 09168429.0; dated 28.01.10  | <input type="checkbox"/> |
|                    | 2       | European Patent Office; European Search Report; Appln. No. EP 09168430.8; dated 09.02.10  | <input type="checkbox"/> |
|                    | 3       | United Kingdom Intellectual Property Office; Examination Report; Appln. No. GB1202969.0; dated 8 May 2013.  | <input type="checkbox"/> |

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|   |                        |                   |
|---|------------------------|-------------------|
| <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     | 13391539          |
|   | Filing Date            | 2012-05-21        |
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|   | Art Unit               | 3754              |
|   | Examiner Name          | Randall A. Gruby  |
|   | Attorney Docket Number | 920257.00016      |

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

|            |                    |                     |            |
|------------|--------------------|---------------------|------------|
| Signature  | /John d. franzini/ | Date (YYYY-MM-DD)   | 2013-07-23 |
| Name/Print | John D. Franzini   | Registration Number | 31,356     |

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PATENT SPECIFICATION (11)

1 335 047

DRAWINGS ATTACHED

1 335 047

(21) Application No. 49556/70 (22) Filed 19 Oct. 1970

(44) Complete Specification published 24 Oct. 1973

(51) International Classification H02G 15/00

(52) Index at acceptance

H2E 21 25 33 35A 35H 9A  
B8C 15D 24B4 29F 29N

(72) Inventors GEORGE W. GILEMOT  
and JOHN T. THOMPSON

(19)



(54) APPARATUS AND METHOD FOR ENCAPSULATING ELECTRICAL CABLE CONNECTIONS

(71) We, GEORGE WARREN GILLEMOT, of 2615, Naple, Venice, California, United States of America, and JOHN THOMAS THOMPSON, of 19201, Wells Drive, Tarzana, California, United States of America, both Citizens of the United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to apparatus and a method for encapsulating electrical connections between electrical cables, such as multi-conductor cables.

It is often required that multi-conductor cables, such as telephone and other electrical cables, be spliced for repair or modification purposes after they have been placed in service. Such splicing must often be done outdoors, in the field, under adverse conditions. In addition, a wide variety of cable sizes and shapes must be spliced and a wide variety of splice configurations exist. Furthermore, it is usually a requirement that a splice closure of good durable quality be achieved rapidly, inexpensively and with portable equipment.

One method of preparing a splice closure in multi-conductor cables is to encapsulate the joined filaments in some fluid encapsulating compound or agent which is hardened in situ. The advantages of such a closure are that by completely covering the splice area, it is protected with a solid, tough, waterproof, flexible, insulating covering. Preferred encapsulating materials are initially in the form of two or more separate components. When uniformly mixed together, these components are at first a thin liquid; but on standing for a short time, a reaction occurs and the mixture is converted to a solid, cured form which provides positive and complete protection of the cable splice.

According to one aspect of the present invention, there is provided apparatus for use in providing encapsulated electrical connections between the conductors and shields of shielded electrical cables in a fluid-tight protective enclosure of non-conductive material, said apparatus comprising: a connector having a pair of screw-threadably engageable members one of which has a threaded shank which has an axially extending slot open at one end to receive the cables and the other of which members is a ring threadable on the shank, said members being threadably engageable and tightenable by the user's thumbs and forefingers without recourse to a spanner or wrench to urge such cables to the other end of the slot to hold their shields in electrical connection; and a flexible-walled container containing polymerizable potting compound ingredients and having barrier means holding the ingredients segregated until ready for use, said barrier means being removable to permit intermixing of the ingredients and the container being openable to permit an electrical connection between conductors and the associated shield connector to be covered by the ingredients so as to encapsulate both the connections and the connector. The same container which houses the encapsulating material may be used as the enclosure for the resultant encapsulated splice and the barrier which was previously used to separate the two components may be used to seal the enclosure. In addition, locating of the connection within the encapsulating compound can be achieved by providing a porous, flexible, spacer member, e.g. in the form of a boot, i.e. a preformed hollow, e.g. tubular, member having a single opening for insertion of an electrical connection. Also, an in-line closure can be provided with an end sealing technique which allows for a custom fit around one or more cables and wires of varying diameters.

According to a second aspect of the invention, there is provided a method of providing encapsulated electrical connections between the conductors and shields of shielded electrical cables using the aforesaid apparatus of the first aspect, comprising making an electrical connection between the conductors, mechanically and electrically joining the shields by inserting the cables in the slot of the shank of the connector and by tightening the ring of the connector, removing the barrier means and intermixing the potting ingredients together, opening the container, and causing the electrical connections and the connector to be covered by the mixed ingredients so as to encapsulate the connections and the connector.

One embodiment of the present invention involves preparing a splice bundle of two multi-filament cables, positioning an open-pore, flexible spacer member around the splice bundle, enclosing the splice bundle and flexible spacer member in a flexible container containing, or having subsequently placed into it, a fluid encapsulating material. The splice bundle is held from the walls of the container by the spacer member. The encapsulating material flows freely through the spacer member and thoroughly saturates the member. The splice bundle is automatically spaced from the enclosure formed by the container. The quantity of encapsulating material required is thus less than it would otherwise be by the volume of the material in the spacer member. On the other hand, this is achieved without sacrificing the electrical and strength properties of the splice closure walls because the encapsulating material thoroughly saturates the spacer member.

According to one embodiment of the present invention, the container for the connections and connector is formed from the flexible-walled container which initially contains the ingredients from which the encapsulating material is formed. The ingredients may be held separated in the container by means of an elongated cylindrical inner member which has a length which is at least as great as the width of the container, the inner member being applied against the midportion of the container between the separate components to divide the container into two compartments. A stiff but flexible elongated clip member, having a length which is approximately equal to the length of the inner member, is adapted to be pressed over the inner member to hold the midportion of the container walls snugly pressed against each other. In this manner, a tight seal is provided between the two sides of the container. Furthermore, this barrier between the two sides may be readily removed by simply removing the clip and the inner member to

permit mixing of the two or more separated components.

After such mixing, and in the case of a butt-end splice, one end of the container may be opened to receive the splice bundle to be encapsulated. Before insertion, the splice bundle is enclosed within a flexible spacer member such as a boot or such as a diaper with three tabs which may be folded over the splice bundle. In the case of an in-line splice, a closure in the form of a rectangular sheet with an integral rectangular spacer attached to one side thereof and a suitable sealing mastic positioned in strips along opposite ends thereof may be folded around the splice bundle so that the mastic seals the ends of the closure. The encapsulating material is then poured into the closure through the remaining open side and the closure is sealed.

The invention will now be described by way of example only and with particular reference to the accompanying drawings wherein:

Figure 1 is a perspective view of a portion of a container for use in encapsulating butt-end splices in sheathed cables showing the technique of separating the individual components of a two-part encapsulating material;

Figure 2 is an enlarged, end elevation view of the container of Figure 1;

Figure 3 is a plan view of a first embodiment of an open-cell flexible spacer member for locating the cable splice within the encapsulating material;

Figure 4 is a plan view of a second embodiment of a flexible spacer member;

Figure 5 is a plan view, partly in section, of a completed butt-end encapsulated splice;

Figure 6 is a plan view of an in-line closure which incorporates means for locating the cable splice within the encapsulating material;

Figure 7 is a plan view of a finished in-line closure;

Figure 8 is an alternative form of split-bolt connector; and

Figure 9 is a further alternative form of split-bolt connector.

The described embodiments deal with the encapsulating of splices in various types of shielded or screened cables, which usually have insulating sheaths. These cables contain a plurality of bundles of filaments, i.e. insulated electrical conductors inside the conductive shield. Many industries use such cables, one of the major users being the communications industry.

In general, splices are prepared in multi-conductor cables by joining together individual groups of two or more filaments or conductors from different cables. Each of the individual groups is joined together in turn until the splice is completed. As illustrated in Figure 3, the ends of the filaments

are joined together with connectors. A splice is usually prepared so that there will be a bundle of connectors disposed symmetrically around the exposed bundle of filaments. By

5 evenly distributing the connectors around the splice in this manner, the diameter of the splice is kept to a minimum. This exposed bundle of filaments and connectors is generally called the splice bundle.

10 Referring now to the drawings and, more particularly, to Figures 1 and 2 thereof, there is illustrated an apparatus for separating two components which, when mixed, react to form an encapsulating material, the apparatus comprising a flexible-walled, elongated, tubular single-compartment container, generally designated 1, which is preferably formed of an impervious, tough material and which is sealed along edges 2 and 3 at

15 opposite ends thereof by bonding, heat sealing, or other method known to those skilled in the art. A first component 4 for the encapsulating material is located in a first sub-compartment 2<sup>1</sup> of container 1 and the other component for the encapsulating material 5 is located in another sub-compartment 3<sup>1</sup> of container 1. Components 4 and 5 are held apart in the sub-compartments of the container 1 by means of a barrier comprising

20 an elongated, cylindrical, member 6, which may be a splined rubber cord, which has a length which is at least as great as the width of container 1, and a stiff, but flexible, U-shaped, clip member 7 whose length is substantially equal to the length of member 6 and which is adapted to be pressed over container 1 and member 6, as shown in Figures 1 and 2.

25 The barrier members 6 and 7 are of substantially equal length adequate to project beyond the opposite lateral edges of the flattened tubular containers 4 and 5.

30 Clip 7 is generally U-shaped in cross section and the outer ends 10, 11 of its legs flare away from one another and have rounded outer edges. The interior surfaces of legs 10, 11 are provided with a plurality of integral sharp-edged ribs 190 extending parallel to one another and to the axis of barrier member 6 when the latter is properly and fully seated within the bight portion of the clip.

35 As herein illustrated, the innermost pair of ribs 190 are positioned to apply light to moderate pressure against the compressed and flattened side walls of container 1. However, if member 6 is not fully seated then it will be apparent that the inner pair of ribs 190 to either side of member 6 will press the side walls of the container against member 7 with greater pressure and that the adjacent pair of ribs 190 will then be in a position to press the flattened side walls of the container against member 6, and supplement the sealing action and as well as to

apply pressure resisting further disassembly of member 6 from its fully seated position. It will likewise be understood that the third and fourth pairs of ribs 190 will be brought into restraining operation should member 6

70 continue its escape movement toward the outer ends of the legs of clip member 17.

75 From the foregoing it will be evident that the described barrier is so proportioned that the innermost pair of ribs 190 are normally effective to apply clamping pressure between their outer sharp edge and the layers of the container to hold the latter firmly compressed against the relatively soft, inner cylindrical member 6 thereby to hold the latter fully internested under pressure against the bight portion of the resilient and relatively stiff clip 7. Since the transverse spacing or air gap between the sharp edges of related pairs of ribs 190 progressively decreases toward the outer ends of legs 10, 11, it will be readily evident that should there be any tendency for the barrier members 6 and 7 to move out of their fully nested positions, ribs 190 become increasingly effective to cam member 6 back into its proper fully nested position.

80 Although members 6 and 7 may be made of either metallic or non-metallic materials, highly satisfactory results have been achieved when both members are made of elastomeric material including both rubber and thermoplastic compositions. Preferably, cylindrical member 6 is formed of relatively soft low resiliency elastomeric material whereas the

85 clip member 7 is formed of relatively stiff highly resilient materials.

90 Container 1 and the barrier members 6 and 7 can be assembled by placing the flattened mid portion of container 1 on the edges of legs 10 and 11 of clip member 7. Member 6 is then placed against the mid portion opposite and between the legs 10 and 11 and then forcibly pressed between the legs until fully seated in the position

95 shown in Figure 2. For clarity of illustration, it will be recognized that the thickness of the container walls is shown greatly exaggerated.

100 As will be apparent, sub-compartments 2<sup>1</sup> and 3<sup>1</sup> of container 1 may be filled with components 4 and 5 in various ways. For example, tubular container 1 may be cut to the desired length and members 6 and 7 positioned across the flattened midportion thereof. Ends 2 and 3, which are now open, may then be filled with appropriate quantities of component parts 4 and 5 whereupon ends 2 and 3 may be sealed. The fluid-tight separation provided by members 6 and 7 is

105 so reliable that there is no possibility of components 4 and 5 intermingling prior to their removal. Even if considerable pressure is applied to container 1, the walls thereof

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will rupture before failure of the barrier occurs by spreading of clip member 7.

It should be apparent that with the present configuration, it is a simple matter to break the barrier between the sub-compartments 2<sup>1</sup> and 3<sup>1</sup> to form a single, continuous container whereby components 4 and 5 may be mixed. More specifically, clip member 7 may be readily removed to free member 6 which, when also removed, permits free flow of components 4 and 5 between the sub-compartments 2<sup>1</sup> and 3<sup>1</sup> of container 1. Subsequently, on a flat surface, or over the user's knee in the field, components 4 and 5 may be mixed by running the smooth side of clip 7 back and forth over one or both sides of container 1.

The two-part encapsulating compound is generally a dielectric resinous liquid which, when properly mixed for one minute, will sufficiently harden to bury or clamp in approximately 10 minutes or less. Suitable materials include polyesters, polyurethanes, epoxy compounds and the like. These materials may or may not contain fillers, wetting agents or other additives as desired. Such encapsulating materials are commercially available and well known to those skilled in the art.

Referring now to Figure 3, there is shown all of the remaining equipment required to provide a butt-end splice. In the present case, assume it is required to splice a plurality of filaments contained in first and second sheathed cables 12 and 13. Individual groups of two or more filaments from the cables are joined together using a plurality of suitable connectors, whilst the conductive shields of the cables are mechanically and electrically joined by connector 14.

Connector 14 comprises a split bolt 42 and a radially narrow ring nut 43. The bolt 42 is provided with a deep but narrow slot having a width snugly receiving the cables 12 and 13 after a short length of insulating sheath has been removed from each of the cables. The inner end of the slot is semi-circular and seats directly against the similarly contoured surface of the electrical shields of the cables. The exterior of bolt 42 is provided with threads mating with the threads of ring nut 43. The exterior of this nut is circular but roughened as by shallow axial grooves.

The closed end of the split bolt 42 is provided with an annular flange 49 and this likewise is roughened by axial grooves similar to the grooves on the nut ring. These grooves enable the operator to obtain a firm finger grip with both the nut and the flanged end of the split bolt while grasping these components between the thumb and forefinger to tighten the parts. Since both the nut ring and the end of the split bolt are circular they cannot be engaged by a spanner and

tightened excessively so as to cause damage to the thin foil shielding. Over-tightening is very difficult to avoid if a spanner or wrench is used owing to the thinness and low strength of the shielding foil or braid.

The connector can also be employed to secure a grounding wire to the shield. This grounding wire desirably includes a plurality of annealed wires twisted together and are inserted against one of the shielding layers, in an area underlying the inner face end of ring nut 43. Tightening of the parts then compresses the shield compactly together and in firm contact with the wires of grounding conductor. A surprising amount of pressure is applied between the contacting metal surfaces of the foil connector parts and the grounding wire using only finger strength to tighten the connector.

Referring to Figure 8, there is shown a second preferred embodiment of the electrical connector 14. In this embodiment only the split bolt proper 42<sup>1</sup> is illustrated, it being understood that the ring nut usable with this shank may be identical with that illustrated at 43 in Figure 3. Threaded shank 42<sup>1</sup> differs in that in lieu of the roughened annular flange 49 the closed end of the shank is formed with a generally semi-circular smooth surface 54. The shank is formed of ductile metal of good electrical conductivity and head portion 54 is provided with an opening 55 sized to snugly receive a grounding wire. This wire may be locked in assembled position by using a prick punch or other suitable tool to upset the rim edge of opening 55 after the ground wire has been inserted therein.

The Figure 8 connector is particularly suited for use in smaller sizes, it being found that a large roughened flange may be dispensed with since the user can grasp the opposite lateral sides of the overlapped ends of the cable in one hand while grasping the nut ring between the thumb and forefinger of his other hand while performing the tightening operation.

A third embodiment of the split bolt connector is illustrated in Figure 9 and differs from that just described primarily in the provision of a threaded stud 58 projecting from the centre of the rounded end portion 54<sup>1</sup>. A clamping nut 59 is threaded over shank 58 and used to clamp a grounding wire to the split bolt. This nut, along with a thumb nut corresponding to nut 43, are held tightened in the assembled condition of the connector by embedding the same in potting compound held in place about the connector in any suitable manner.

Referring back to Figures 1 to 3, when the splice bundle is ready for encapsulation there is provided means for ensuring that an adequate wall of solidified encapsulating compound surrounds the splice.

According to the embodiment of Figure 3, locating of the splice bundle within the encapsulating material is guaranteed by providing a flexible spacer member in the form of an elongated boot 15. The boot 15 is closed, except at side 19 which is open to form a passageway 19<sup>a</sup> into which the splice bundle may be introduced. By surrounding the splice bundle in this rapid and efficient manner, the splice bundle will be automatically located when placed in the mixed encapsulating compound.

According to the embodiment of Figure 4, an alternative flexible spacer member is formed in the shape of a diaper 20 having a central portion 21 and a plurality of tabs 22, 23 and 24. Diaper 20 has the added advantage that it can accommodate a wide variety of sizes and numbers of cables. After the splice bundle is positioned as shown in Figure 4, tabs 22, 23 and 24 may be folded over to surround the splice bundle.

Both flexible spacer members are preferably composed of an elastomeric material which absorbs the shock of the expanding encapsulating compound as it cures. This avoids placing an undue strain on the encapsulation closure which might result in its rupture. Absorbing the shock in the spacer member also avoids the excessive flow of encapsulating material down the interior of the sheathed cables. The structure of the flexible spacer member is such that even viscous fluids readily flow through it. The flexible spacer member is generally composed of porous foam, synthetic, polymeric material which is resilient and somewhat compressible. Suitable materials include, for example, polyurethane, butadiene-styrene, co-polymers, polyethylene, foam rubber, and various vinyl foams. An open-cell polyurethane foam which is uniformly coated with polyethylene for high resistance to deterioration or swelling is desirable. Such foam products are generally available commercially.

After the splice bundle is prepared and positioned in the flexible spacer member and the encapsulating compound is mixed, there is provided a suitable mould or enclosure for the terminals to be encapsulated. According to one embodiment of the present invention, container 1 serves the dual purpose of containing the compound and providing such an enclosure. In other words, after components 4 and 5 in container 1 have been thoroughly mixed, the compound may be pushed towards one end, such as end 3, thereof and the other end 2 cut off, to provide an opening. The splice bundle, surrounded by the foam centering boot or diaper, is then inserted through this opening until the foam boot or diaper contacts edge 3 of container 1. The encapsulating compound will flow freely through the open-pore

spacer member and thoroughly saturate this member.

Referring now to Figure 5, after this is achieved, the excess bag material around cables 12 and 13 may be folded, crimped or gathered, and member 6 and clip member 7 applied to hold the excess material gathered about the cabling. In other words, after the splice bundle has been inserted in container 1 and the excess girth of the bag tightly crimped around cables 12 and 13, member 6 is applied to hold the bag snugly gathered adjacent cables 12 and 13 in contact with container 1. Clip member 7 is then positioned over member 6 with container 1 therebetween to provide a tight seal. Or clip member 7 may be positioned directly over cable 12 or 13 to serve the same purpose.

It is apparent that container 1 is used to serve the dual purpose of containing the encapsulating compound and providing an enclosure where a butt-end splice is to be made. However, when an in-line splice is required, a different type of closure is required.

Referring now to Figure 6, there is illustrated a form of closure, generally designated 32, which may be used when it is necessary to join the ends of a first sheathed cable 30 and a second sheathed cable 31. Such a splice is often required for in-line repairs of buried service wire, for repairs to small sheath cuts in cable and for encapsulation of coaxial connectors. Such a connection may also be made where it is necessary to splice buried service wire directly into a cable such as in the case of by-passing a bad pair in an encapsulation splice. This type of connection is prepared using the connectors 14 described earlier and as shown in Figure 6.

In-line closure 32 consists of a rectangular, film-like support member 33 which may be made of a suitable thermoplastic material. In this case, a flexible spacer member is made integral with member 33. In other words, a substantially rectangular flexible spacer member 34 is secured on one side of member 33. Spacer member 34 is also generally rectangular but is smaller in size than member 33 so as to leave four elongated strips 35, 36, 37 and 38 around the outside edges thereof. Strips 35 and 37 are left free of any material whereas strips 36 and 38 are covered with a suitable sealing mastic 39. In packaging closure 32, a suitable protective paper backing may be placed in contact with mastic 39 to prevent its sticking to the packaging material.

In operation, after service wires 30 and 31 have been spliced to form a suitable splice bundle 40, member 33 is positioned as shown in Figure 6 and the protective paper backing is removed from sealing mastic 39.

Splice bundle 40 is then positioned approximately in the centre of flexible spacer member 34 as shown in Figure 6. Member 33 is then folded around splice bundle 40, with flexible spacer member 34 on the inside, until strips 35 and 37 are in contact. After strips 35 and 37 have been properly aligned so as to be substantially parallel, and after checking that splice bundle 40 is properly positioned approximately in the bottom of closure member 33, the outside surface of member 33 is firmly pressed together adjacent strips 36 and 38 so that the mastic on opposite sides of member 33 adhere together. This end sealing technique allows for a custom fit around one or more cables and wires of varying diameters and ensures a leak-proof container in a rapid and efficient manner.

At this point, member 33 will be closed on three sides thereof with an opening remaining between strips 35 and 37. The encapsulating material is preferably in a container identical to that of Figure 1 except that it will be of a size such that member 6 and clip member 7 are at least as long as strips 35 and 37, for reasons which will become clearer hereinafter. At this point, clip member 7 and member 6 may be removed from container 1 and components 4 and 5 thoroughly mixed using clip member 7 in the same manner as described above. After the compound is suitably mixed, a corner of container 1 may be clipped off to provide a pouring spout. The encapsulating compound may then be poured through the opening in closure 32 between strips 35 and 37. In this instance, container 1 may then be discarded.

Referring now to Figure 7, after all of the encapsulating material has been poured into closure member 33, the splice closure is complete with the exception that an opening still remains between strips 35 and 37. This opening may be conveniently closed in substantially the same manner as in Figure 5. In other words, member 6 may be positioned along the outside edge of closure 33 adjacent strips 35 and 37 and clip member 7 may be positioned therearound to securely fasten strips 35 and 37 between member 6 and clip member 7. The finished in-line closure will appear as shown in Figure 7.

It can therefore be seen that through proper use and application of the present system for encapsulating splices in sheathed multi-filament cables, a more efficient and faster work operation can be developed in outside plant and construction and maintenance operations. In one embodiment of the present invention, the same container is used for the encapsulating material and as the finished enclosure. In another embodiment, a simple closure is provided with sealing means for permitting a custom fit around

one or more cables and wires of varying diameter.

The use of the above-described connectors 14 is also the subject of our copending Application No. 11099/73 (Serial No. 1,335,048).

WHAT WE CLAIM IS:—

1. Apparatus for use in providing encapsulated electrical connections between the conductors and shields of shielded electrical cables in a fluid-tight protective enclosure of non-conductive material, said apparatus comprising: a connector having a pair of screw-threadably engageable members one of which has a threaded shank which has an axially extending slot open at one end to receive the cables and the other of which members is a ring threadable on the shank, said members being threadably engageable and tightenable by the user's thumbs and forefingers without recourse to a spanner or wrench to urge such cables to the other end of the slot to hold their shields in electrical connection; and a flexible-walled container containing polymerizable potting compound ingredients and having barrier means holding the ingredients segregated until ready for use, said barrier means being removable to permit intermixing of the ingredients and the container being openable to permit an electrical connection between conductors and the associated shield connector to be covered by the ingredients so as to encapsulate both the connections and the connector.
2. Apparatus as claimed in claim 1, wherein said barrier means for said container comprises an elongate member and a U-shaped resilient clip engageable about said elongate member to clamp the walls of said container against one another between said elongate member and said clip.
3. Apparatus as claimed in claim 1 or 2, and including a flexible, open-pored, spacer member for surrounding the electrical connection prior to encapsulation for impregnation by the mixed ingredients.
4. Apparatus as claimed in claim 3, wherein the spacer member is a preformed boot for receiving the electrical connection prior to the covering by said potting compound ingredients.
5. Apparatus as claimed in claim 3, wherein the spacer member is a flexible member of open-pored material shaped as a diaper having three tabs adapted to be folded about the electrical connection prior to the covering by said potting compound ingredients.
6. Apparatus as claimed in claim 3, wherein said spacer member is supported on a flexible support member also bearing adhesive for joining together one pair of opposite edge regions of the support member so that said support member can be

folded around the electrical connection and connector and said opposite edge regions secured together by the adhesive to leave one side of the resulting closure open to receive the potting compound ingredients.

7. Apparatus as claimed in claim 6, wherein the other pair of opposite edges is free of adhesive and of the spacer member.

8. A method of providing encapsulated electrical connections between the conductors and shields of shielded electrical cables using the apparatus of any one of the preceding claims, comprising making an electrical connection between the conductors, mechanically and electrically joining the shields by inserting the cables in the slot of the shank of the connector and by tightening the ring of the connector, removing the barrier means and intermixing the potting ingredients together, opening the container, and causing the electrical connections and the connector to be covered by the mixed ingredients so as to encapsulate the connections and the connector.

9. A method as claimed in claim 8, wherein the connections and the connector are inserted in the container to achieve the covering by the mixed ingredients.

10. A method as claimed in claim 9, for a butt-end connection using the apparatus of claim 2, comprising removing said clip temporarily while intermixing said ingredients together, opening said container, inserting the connections and connector through the opening and re-applying said clip to hold the container closed as the potting ingredients react and take a set.

11. A method as claimed in claim 10, using the apparatus of claim 3, and including the step of embracing the assembly to be encapsulated with the spacer member and submerging the spacer member in said potting ingredients with the connections and connector to utilize the spacer member to hold the container spaced from the connection.

12. A method as claimed in claim 8, for an in-line connection using the apparatus as claimed in claim 6, wherein the in-line connection, including the connector, has the support member folded around it with the spacer member facing inwardly, the one pair of opposite edges are joined by the adhesive leaving the resulting closure open at the other pair of opposite edges, and the mixed ingredients are introduced from the container into the closure.

13. A method as claimed in claim 12, using the apparatus as claimed in claims 2 and 6, and comprising the step of closing the closure, after introducing the mixed ingredients, by means of the elongate member and the clip.

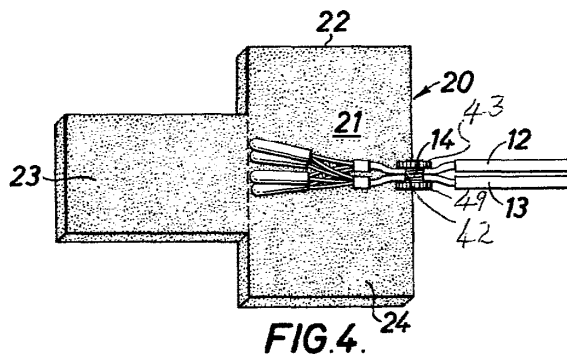
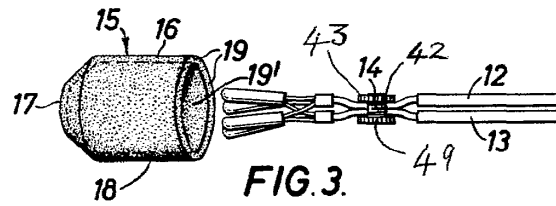
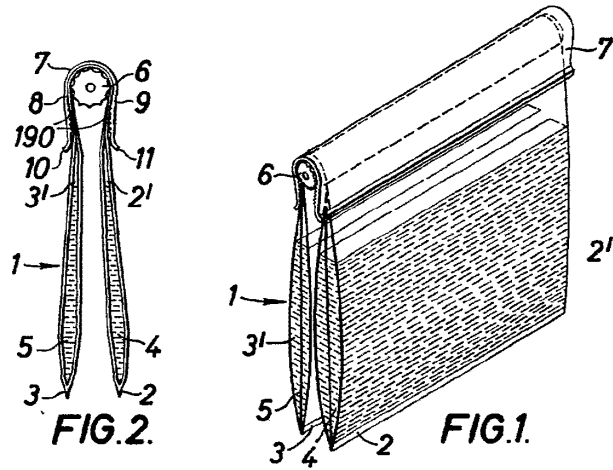
14. An apparatus as claimed in any one of claims 1 to 7 or a method as claimed in any one of claims 8 to 13, wherein the connector has no spanner engaging flats.

15. Apparatus for use in encapsulating cable connections as claimed in claim 1 and substantially as hereinbefore described with reference to Figures 1 to 3 and 5, or Figures 1 to 4, or Figures 6 and 7, or any of those groups of figures as modified by Figure 7 or 8 of the accompanying drawings.

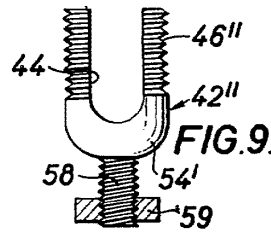
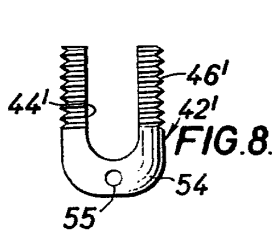
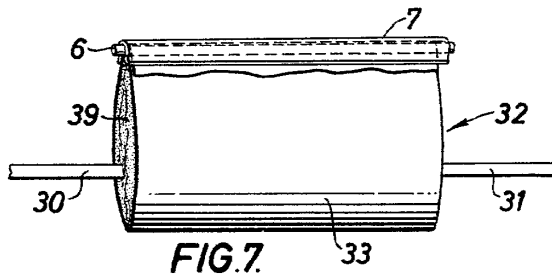
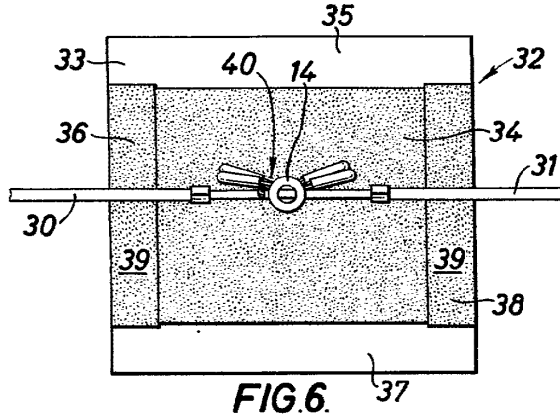
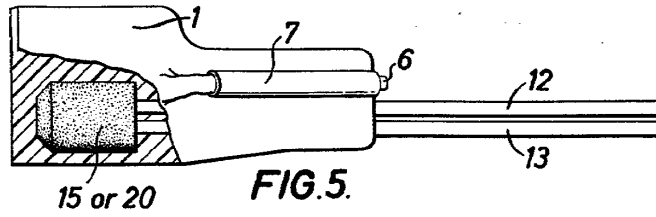
16. A method as claimed in claim 8 and substantially as hereinbefore described with reference to Figures 1 to 3 and 5, or Figures 1 to 4, or Figures 6 and 7, or any one of those groups of figures as modified by Figure 7 or 8 of the accompanying drawings.

17. An electrical connection between shielded cables encapsulated by the method claimed in any one of claims 8 to 13 and 16.

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**Espacenet****Bibliographic data: DE202005000854 (U1) — 2005-05-12**

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**Repair kit for repairing damage to especially flat roofs, floors, consists of closed film bag forming chambers separated by clamping points, 2 stored separately repair components including liquid component(s), soakable or wettable product**

No documents available for this priority number.

**Inventor(s):**

**Applicant(s):** KEMPER SYSTEM GMBH & CO KG [DE]

**Classification:** - international: **B65D81/32; E04D13/147; E04D15/00; E04D5/14;**  
(IPC1-7): B65D25/08; B65D81/32; E04B1/62;  
E04D15/00; E04G23/02; E04G23/03  
- cooperative: **B65D81/3266; E04D13/1476; E04D15/00; E04D5/148**

**Application number:** DE20052000854U 20050119

**Priority number (s):** DE20052000854U 20050119

**Abstract of DE202005000854 (U1)**

The repair kit consists of a closed film bag forming at least two chambers (A-C) that are separated by clamping points (20) and two repair components that are stored separately, whereby the repair components include at least one liquid component and a soakable or wettable product (T).

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 B65D 25/08, B65D 81/32

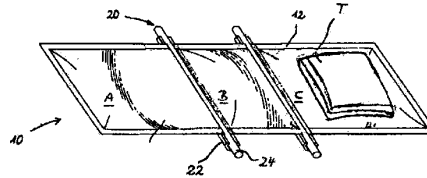
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Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: **Reparaturset zur Ausbesserung von Schäden an Flächen, insbesondere von Flachdächern, deren Durchdringungen und von Böden**

(57) Hauptanspruch: Reparaturset zur Ausbesserung von Schäden an Flächen insbesondere von Flachdächern, deren Durchdringungen und von Böden, bestehend aus einem mindestens zwei Kammern (B, C) bildenden geschlossenen Folienbeutel (10), dessen Kammern (B, C) durch Klemmstellen (20) getrennt sind, sowie aus zwei Reparaturkomponenten (KB, T), die getrennt aufzubewahren sind, wobei die Reparaturkomponenten mindestens eine flüssige Komponente (KB) und ein tränkbares oder benetzbares Erzeugnis (T) umfassen.



**Beschreibung**

**[0001]** Die vorliegende Erfindung betrifft ein Reparaturset zur Ausbesserung von Schäden an Flächen insbesondere von Flachdächern, deren Durchdringungen und von Böden.

**[0002]** Flächendachabdichtungssysteme können aus einem Verbund von Flüssigkunststoff und Vliesmaterial bestehen. Die Verlegung erfolgt großflächig und die Gebindegrößen sind entsprechend angepaßt. Auch das Vliesmaterial wird in Bahnen geliefert. Müssen Ausbesserungen vorgenommen werden, werden stets größere Gebindeverpackungen eingesetzt, um eine Reparatur zuverlässig auszuführen. Dies ist in der Regel sehr kostspielig und zeitaufwendig.

**[0003]** Für die Aufbewahrung und Mischung von miteinander reagierenden Komponenten wird in der DE 76 06 374 U ein Behältnis beschrieben, das als geschlossener Beutel mit einem Verschuß ausgebildet ist, wobei der Beutel über wenigstens ein von außen entfernbares, abdichtendes Trennmittel in je eine Kammer für jede Komponente aufgeteilt ist. Nach Entfernung der Trennmittel werden die in den einzelnen Kammern eingefüllten, mengenmäßig genau aufeinander abgestimmten Komponenten zusammengeführt und durch Walken des Beutels vermischt. Als Trennmittel kann ein geschlitztes Rohr verwendet werden, in das ein Stab eingeschoben ist, wobei der Beutel zwischen Rohrrinnenwand und Stab eingeklemmt ist.

**[0004]** Aus der DE 38 36 464 A1 ist ein Portionsbehälter für Injektionsmörtel oder Verbundmasse zum Einfüllen von Mörtelmaterial in ein Bohrloch bekannt. Dieser Behälter enthält eingefüllte Trockenmörtelmasse und eine kleine eingeschweißte Tasche oder einen Beutel mit einer Sollbruchstelle oder Aufreißnaht, der bei Ausübung von äußerem Druck reißt, ohne daß dabei der äußere Behälter zerstört wird. In diesem Beutel enthaltenes Wasser oder dergleichen tritt dann mit der Trockenmörtelmasse in Verbindung und wird durch Walkbewegungen mit dem Mörtel vermischt, wonach der so fertiggestellte Injektionsmörtel in das Bohrloch eingebracht werden kann.

**[0005]** Bei einem Fleckentferner-Beutelset gemäß DE 83 25 132 U wird ein in einer Kammer Flüssigkeit enthaltender Beutel verwendet, in dem sich in einer weiteren Kammer ein Bearbeitungstuch und Aufsaugtuch in Form von angesiegelten Stücken auf Folienteilen befinden. Das Tuch kann auch lose in der zweiten Kammer liegen. Die beiden Folienteile befinden sich beidseitig am Beutel angesiegelt und bilden jeweils eine Kammer. Für die Bearbeitung wird das hierzu vorgesehene Tuch mit der im Beutel enthaltenen Flüssigkeit getränkt.

**[0006]** Der Erfindung liegt die Aufgabe zugrunde, ein Reparaturset für Flüssigkunststoff zu schaffen, das Ausbesserungs- und Reparaturarbeiten insbesondere an Flachdächern mit wenig Material- und Zeitaufwand ermöglicht.

**[0007]** Diese Aufgabe ist erfindungsgemäß bei einem Reparaturset mit den Merkmalen des Anspruchs 1 gelöst. Vorteilhafte Weiterbildungen des erfindungsgemäßen Reparatursets sind Gegenstand der Unteransprüche.

**[0008]** Ein erfindungsgemäßes Reparaturset zur Ausbesserung von Schäden an Flächen insbesondere von Flachdächern, deren Durchdringungen und von Böden besteht somit aus einem mindestens zwei Kammern bildenden geschlossenen Folienbeutel, dessen Kammern durch Klemmstellen getrennt sind, sowie aus zwei Reparaturkomponenten, die getrennt aufzubewahren sind. Die Reparaturkomponenten umfassen mindestens eine flüssige Komponente und ein tränkbares oder benetzbares Erzeugnis, meist ein Flächenerzeugnis.

**[0009]** Das erfindungsgemäße Reparaturset ermöglicht die sichere und kostengünstige Aufbewahrung und Verarbeitung der Reparaturkomponenten, einschließlich Tuchmaterial, enthaltenden Auftragsmaterials in kleineren Gebindegrößen. Durch eine derartige Portionierung der Reparaturkomponenten müssen für von Zeit zu Zeit anfallende Reparaturarbeiten beispielsweise an Dächern nicht unnötig die für Neuverlegungen ausgelegte Gebinde gekauft oder angebrochen werden und Tuch- oder Vliesmaterial in Rollenform bevorratet, sondern können in Form eines Dach-Reparatursets in einer für die Reparatur nötigen oder diese nicht wesentlich übersteigenden Menge bzw. Größe gelagert werden. Unmittelbar beim Tuch- oder Vliesstück befindet sich der Flüssigkunststoff in einer Menge, die zum Tränken und Verkleben des Tucherzeugnisses benötigt wird. Es reicht im Einsatzfall aus, das tränkbare Tuchstück im Folienbeutel mit dem Flüssigkunststoff zu tränken. Ist das dann einsatzbereite Tuchstück zu groß, braucht es nur mit der Schere oder einem Messer oder dergleichen nach Bedarf zurechtgeschnitten zu werden. Diese Werkzeuge sind stets zur Hand.

**[0010]** Die Anwendung des Reparatursets ist, wie erwähnt, sehr einfach. Der Folienbeutel wird in der Gestalt mit getrennten Kammern belassen, bis es zum Einsatzfall kommt, d.h. auf einem Dach oder auch einem abgedichteten Boden ein Riß oder Loch oder eine kleine Undichtigkeit gefunden worden ist. Dann wird die Trennung der Kammer mit der Flüssigkeit und der das Tucherzeugnis enthaltenden Kammer aufgehoben, so daß die Flüssigkeit mit dem Tucherzeugnis in Kontakt treten kann. Das Vermischen der Flüssigkunststoffanteile mit dem Tucherzeugnis, beispielsweise einem Vliesgewebe, erfolgt durch

Kneten mit den Händen. Anschließend wird der Folienbeutel mit der Schere aufgeschnitten, und der durchtränkte Vlies- oder Textilzuschnitt kann dem Folienbeutel entnommen und auf die schadhafte Stelle aufgetragen werden.

**[0011]** In der Regel wird der Flüssigkunststoff für ein Dach-Reparaturset ein Zwei-Komponenten-Flüssigkunststoff sein, dessen Komponenten miteinander reagieren. In diesem Fall sind zwei getrennte Kammern des Folienbeutels für die flüssige Komponente vorgesehen und die beiden Folienkammern sind ebenfalls durch Klemmstellen getrennt. Wenn das in der Reparaturset enthaltene Tuch mit dem Flüssigkunststoff getränkt werden soll, wird dieser zunächst aufbereitet. Zu diesem Zweck wird die Trennstelle zwischen den beiden Kammern der Flüssigkunststoffkomponenten gelöst, woraufhin die Komponenten miteinander in Kontakt gelangen und reagieren. Die sich mischenden Kunststoffkomponenten werden von Hand geknetet, bis sie ausreichend vermischt sind. Anschließend wird die Trennstelle zum Tuch gelöst und das Tuch mit dem Flüssigkunststoff getränkt und gewalkt. Ist dies beendet, wird der Folienbeutel geöffnet und das Tuch für den Einsatz zugeschnitten. Das durchtränkte Tuchstück wird dann wie ein Pflaster auf der schadhafte Stelle aufgebracht.

**[0012]** Falls das Tuchmaterial sehr durchlässig ist und die Mischbarkeit der beiden Flüssigkeitskomponenten dies zulässt, können auch die Verbindungen der drei Kammern auf einmal gelöst werden und der Misch- und Tränkvorgang in einem durchgeführt werden.

**[0013]** Vorzugsweise sind die Trennstellen durch Klemmschienen oder -streifen mit einem Klemmstrang oder -stab ausgebildet. Zum Lösen der Trennstelle ist es dann lediglich erforderlich, den Klemmstrang bzw. -stab aus dem Klemmstreifen zu ziehen. Zweckmäßig ist der Klemmstrang oder -stab aus Gummi, etwa ein Gummilitzenabschnitt. Er läßt sich leicht handhaben und kann bedarfsweise umgebogen werden.

**[0014]** Die Folie kann aus Kunststoff sein. Metall oder Verbundmaterial können ebenso eingesetzt werden. Dies hängt von der Zusammensetzung der Flüssigkeitskomponenten und beispielsweise auch deren Lichtempfindlichkeit ab. Um der letzteren Rechnung zu tragen, kann eine lichtundurchlässige Umverpackung vorgesehen sein.

**[0015]** Das Tucherzeugnis ist zweckmäßig aus Vlies oder Textilgewebe. Wesentlich sind sein Tränkvermögen und seine Verarbeitbarkeit.

**[0016]** Die Erfindung wird im folgenden anhand eines bevorzugten Ausführungsbeispiels und der Zeichnung beschrieben. Die Beschreibung dient in-

dessen lediglich zu Veranschaulichungszwecken und soll die Erfindung nicht auf die konkret angegebenen Merkmalskombinationen einschränken. Es zeigen:

**[0017]** **Fig. 1** eine perspektivische Ansicht eines erfindungsgemäßen Drei-Kammer-Folienbeutels und

**[0018]** **Fig. 2** bis **Fig. 6** eine Veranschaulichung der Verwendung dieses Drei-Kammer-Folienbeutels zur Ausbesserung einer schadhafte Stelle an einem Dach.

**[0019]** Im folgenden wird anhand **Fig. 1** der Aufbau eines erfindungsgemäßen Reparatursets am Beispiel eines Drei-Kammer-Folienbeutels beschrieben. Der Folienbeutel **10** dieses Ausführungsbeispiels umfaßt drei Kammern A, B und C für die Komponenten KA und KB eines für die Verarbeitung benötigten Flüssigkunststoffs und für einen dazugehörigen Tuchzuschnitt T, hier einen Vlieszuschnitt. Der fest verschlossene Folienbeutel **10** besteht aus zwei Lagen, die unter Bildung eines Randstreifens **12** zusammengeschweißt oder geklebt sind.

**[0020]** Die Kammern A, B und C sind jeweils durch als Trennstellen **20** vorgesehene Klemmschienen **22** voneinander getrennt, in die jeweils eine Gummilitze **24** eingeschoben ist. Die Gummilitze **24** klemmt die Folie in der jeweiligen Klemmschiene **22** fest abdichtend ein.

**[0021]** Dieses Reparaturset für Dachabdichtungsmaterial, die für den Einsatz in kleinen Mengen, d.h. im wesentlichen für Reparaturen, dient, kann in mehreren Größen bevorratet werden und ist damit entsprechend handlich. Die Abmessungen des Tuches T sind so gewählt, daß dieses jeweils zugeschnitten werden kann. Entsprechend viel Flüssigkunststoff ist vorhanden, wobei die Mengen der Komponenten KA und KB derart sind, wie sie die Zumischung des Flüssigkunststoffs benötigt werden. Auf diese Weise entsteht bei der Abdichtung einer kleinen Fläche nicht viel Abfall.

**[0022]** Soll eine Stelle S unter Verwendung des in dem beschriebenen Reparaturset enthaltenen Tuches T und Flüssigkunststoffs KA, KB abgedichtet werden, so wird als erstes die Trennstelle **20** zwischen den Kammern A und B aufgehoben, indem die Gummilitze **24** aus der Trennschiene **22** gezogen wird. Die Komponenten KA und KB werden zusammengeführt und in den nun verbundenen Kammern A und B geknetet, wie in **Fig. 2** dargestellt ist. Die Kammer C ist noch vom Flüssigkunststoff abgetrennt.

**[0023]** Die sich vermischenden Kunststoffkomponenten KA und KB werden gründlich durchgeknetet und vermischt, siehe **Fig. 3**. Anschließend wird die Trennstelle **20** zur dritten Kammer C entfernt. Der Flüssigkunststoff wird auf und in das Tuch T gestri-

chen und dann alles intensiv durchgewalkt und geknetet, bis das Tuch T vollständig getränkt ist, wie in **Fig. 4** und **Fig. 5** gezeigt ist.

**[0024]** Als letzter Schritt wird dann das Tuch T so zurechtgeschnitten, wie es notwendig ist (vgl. **Fig. 6**), und auf die schadhafte Stelle aufgetragen. Das Zuschneiden ist nicht nötig, wenn das Pflaster von vornherein auf die abzudichtende Stelle paßt.

**[0025]** Selbstverständlich kann das erfindungsgemäße Reparaturset auch für andere Anwendungen eingesetzt werden. Es muß sich beispielsweise nicht um ein Textilerzeugnis handeln, sondern um ein Blech oder eine Kunststoffplatte. Auch kann das Erzeugnis partikelförmig sein. Wesentlich ist, daß der Flüssigkunststoff komponentenweise und ebenso das andere Teil (die anderen Teile) separat und dennoch zusammen in einem einzigen Reparaturset bis zur Anwendung bevorratet werden können.

**[0026]** Auch müssen beispielsweise keine Klemmschienen vorhanden sein, sondern es können dichte Schweißnähte zwischen den Kammern vorgesehen werden, die durch Druck oder Verschiebung der Lagen, d.h. Scherkräfte, aufgerissen werden können.

#### **Schutzansprüche**

1. Reparaturset zur Ausbesserung von Schäden an Flächen insbesondere von Flachdächern, deren Durchdringungen und von Böden, bestehend aus einem mindestens zwei Kammern (B, C) bildenden geschlossenen Folienbeutel (10), dessen Kammern (B, C) durch Klemmstellen (20) getrennt sind, sowie aus zwei Reparaturkomponenten (KB, T), die getrennt aufzubewahren sind, wobei die Reparaturkomponenten mindestens eine flüssige Komponente (KB) und ein tränkbares oder benetzbares Erzeugnis (T) umfassen.

2. Reparaturset nach Anspruch 1, dadurch gekennzeichnet, daß zwei getrennte Kammern (A, B) des Folienbeutels (10) für die flüssige Reparaturkomponente vorgesehen sind, die durch zwei miteinander reagierende Reparaturkomponenten (KA, KB) gebildet wird, und die beiden Folienkammern (A, B) durch Klemmstellen (20) am Folienbeutel (10) getrennt sind.

3. Reparaturset nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Klemmstellen (20) durch Klemmschienen (22) oder -streifen mit einem Klemmstrang (24) oder -stab ausgebildet sind.

4. Reparaturset nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Folie aus Kunststoff ist.

5. Reparaturset nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die Folie aus Metall oder Verbundmaterial ist.

6. Reparaturset nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß das Erzeugnis ein Tucherzeugnis (T) ist.

7. Reparaturset nach Anspruch 6, dadurch gekennzeichnet, daß das Tucherzeugnis (T) aus Vlies oder Textilgewebe ist.

8. Reparaturset nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, daß eine lichtundurchlässige Umverpackung vorgesehen ist.

Es folgen 6 Blatt Zeichnungen

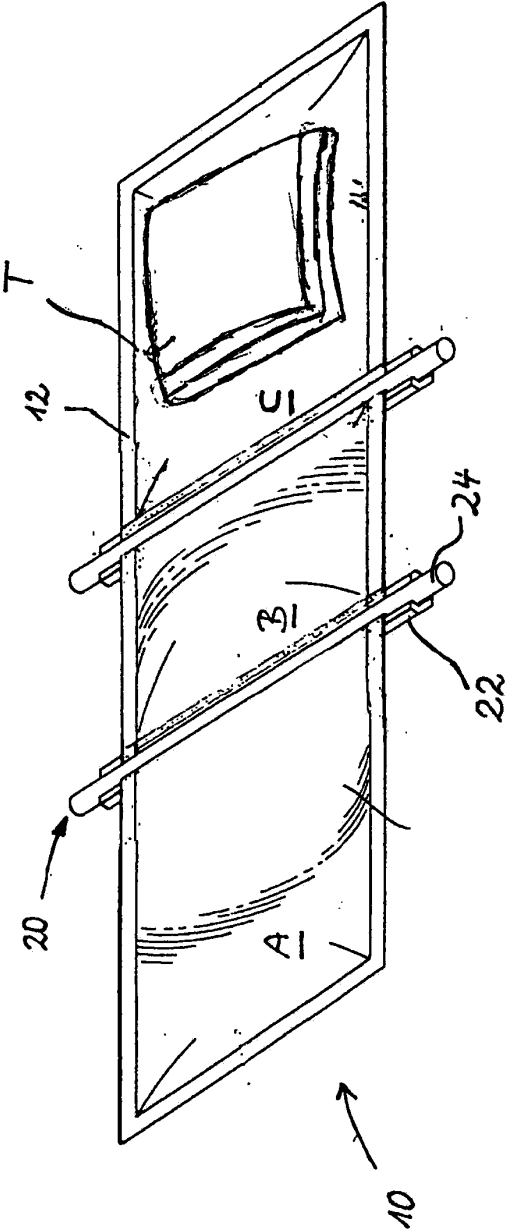
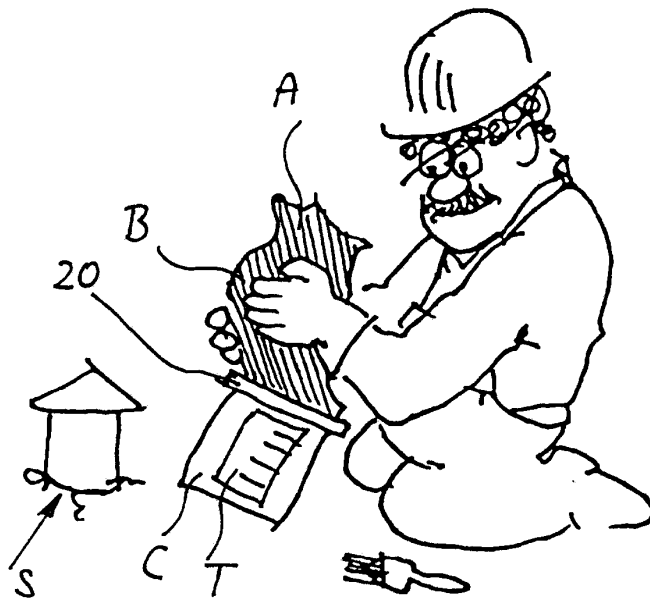


Fig. 1



Fig. 2





**Fig. 3**

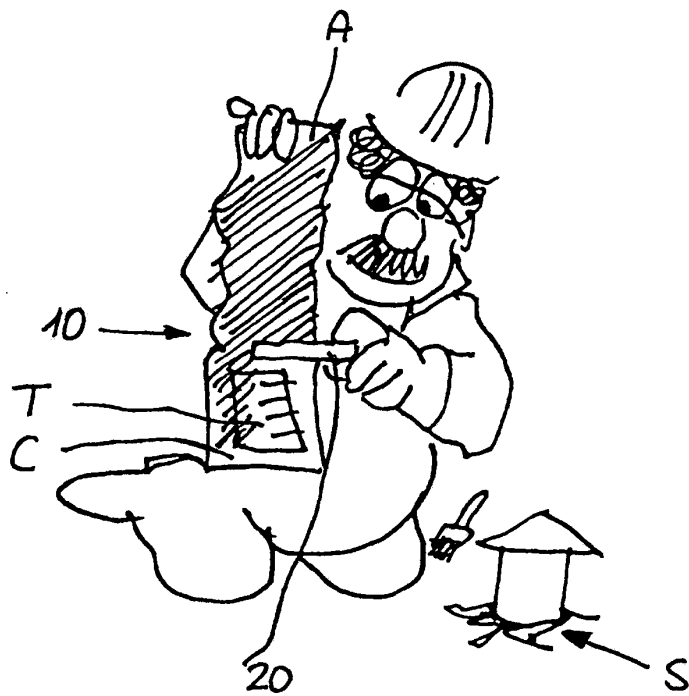


Fig. 4

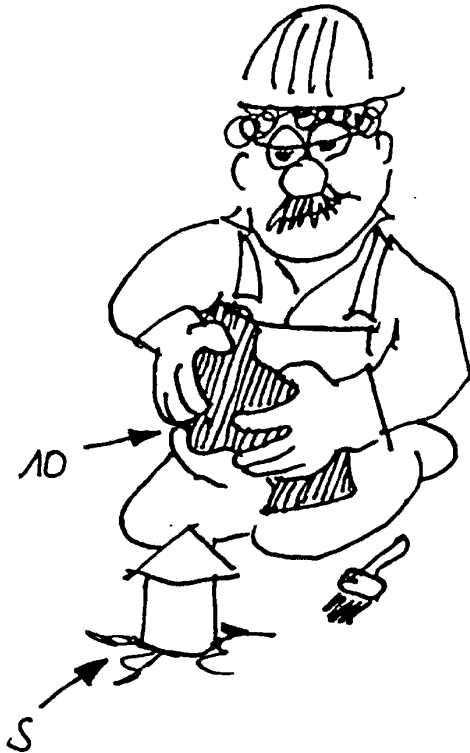


Fig. 5



**Fig. 6**



(19)  
Bundesrepublik Deutschland  
Deutsches Patent- und Markenamt

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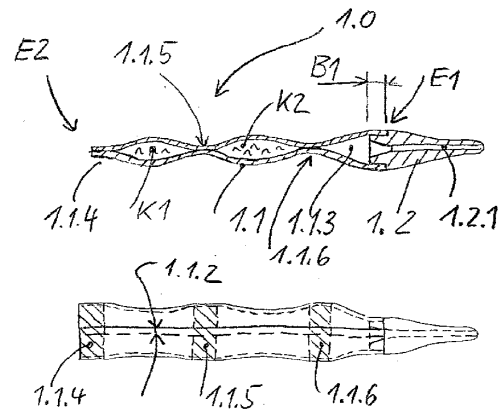
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Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: **Mehrkomponentenverpackung mit Applikator**

(57) Hauptanspruch: Verpackung für mindestens zwei Komponenten, gekennzeichnet durch ein schlauch- oder beutelförmiges Verpackungselement (1.1, 3.1, 4.1, 5.1, 6.1, 7.1, 8.1, 9.1) und einen Applikator (1.2, 2.2, 3.2, 4.2, 5.2, 6.2, 7.2, 8.2, 9.2) mit einem Abgabekanal für die gemischten Komponenten, der mit dem Verpackungselement verbindbar ist, wobei das Verpackungselement zur Aufbewahrung mindestens einer Komponente und zur Mischung der mindestens zwei Komponenten ausgestaltet ist.



**Beschreibung**

## Technischer Hintergrund

**[0001]** Viele Stoffe oder Stoffgemenge entfalten erst durch deren Kombination oder durch Mischen mit anderen Stoffen oder Stoffgemengen ihre Wirkung oder lassen sich erst in gemischter Form in geeigneter Weise zuführen. In vielen Anwendungsfällen stellt sich dabei das Problem, dass solche Produkte in gemischtem Zustand nicht lagerfähig sind oder z.B. ihre Wirksamkeit verlieren. Deshalb ist es angezeigt, solche Stoffe / Stoffgemenge zunächst getrennt voneinander zu lagern und erst kurz vor der Anwendung zu mischen.

**[0002]** Probleme kann hierbei die Einhaltung des richtigen Mischungsverhältnisses bereiten, was gerade bei pharmazeutischen und chemischen Produkten von großer Wichtigkeit ist. Der offene Umgang mit den zu mischenden Komponenten kann sich vor allem dann nachteilig auswirken, wenn eine Komponente allein z.B. toxische Wirkung zeigt, ist aber auch oft deshalb nicht angezeigt, weil bestimmte Stoffe mit dem Gasgemisch der Luft reagieren und so leicht verderben können, gerade wenn die Komponenten aus größeren Gebinden entnommen werden, die nach dem Öffnen über einen längeren Zeitraum gelagert werden.

**[0003]** Ein weiterer Problempunkt ist die anwendungsgerechte Applikation. So müssen z.B. bei der Anwendung im medizinischen Bereich Wirkstoffe im innen liegenden Körperbereich wie z.B. Nase, Scheide oder After gezielt versorgt werden, wobei ein auf den Anwendungsbereich abgestimmter Applikator das Einbringen des Wirkstoffes oder den in einem Trägerstoff eingebetteten Wirkstoff erleichtern.

**[0004]** Aber auch in anderen Bereichen, wie z.B. Auftragen eines 2-Komponenten Klebstoffes, erleichtert das Auftragen mittels eines Applikators die Handhabung.

## Darstellung der Erfindung

**[0005]** Aufgabe der Erfindung ist die Schaffung einer Verpackung für zwei oder mehr Komponenten, die in portionierter Darreichungsform einfach miteinander mischbar und applizierbar sein sollen, wozu ein integrierter oder leicht integrierbarer Applikator eine anwendungsgerechte Handhabung erleichtern soll.

**[0006]** Diese Aufgabe wird mit den Merkmalen des Schutzanspruchs 1 gelöst.

**[0007]** Eine flexible Verpackung aus Kunststoff, Aluminium oder deren Verbundmaterialien beinhaltet eine oder mehrere Komponenten, die zunächst ge-

gen eine oder mehrere weitere Komponenten abgetrennt ist, wobei sich durch einfache Handhabung eine Verbindung zwischen den Komponenten herstellen lässt, um diese ohne größeren Kontakt mit dem Umfeld zu mischen. Ein Applikator, der direkt in die Packung integriert ist, oder als Aufnahmebehälter für eine der Komponenten dient, oder auch als separates Teil, welches leicht an die Packung angefügt werden kann ausgeführt ist, erleichtert das Applizieren der gemischten Komponenten.

**[0008]** Mehrere bevorzugte Ausgestaltungen der Erfindung sind in den Unteransprüchen angegeben, wobei insbesondere folgende Varianten hervorgehoben werden sollen:

**[0009]** Die beiden Komponenten (oder mehrere Komponenten) können bei einer bevorzugten Ausgestaltung gemeinsam in der flexiblen (schlauch- oder beutelartigen) Verpackung untergebracht sein, wogegen der Applikator lediglich seine ursprüngliche Funktion als Anwendungshilfe erfüllt.

**[0010]** Gemäß einer weiteren vorteilhaften Ausbildung kann der Applikator aber auch darüber hinausgehende Funktionen ausüben, er kann nämlich einerseits selbst als Aufnahmevolumen für eine Komponente dienen (so dass die schlauch- oder beutelähnliche Verpackung ggf. nur eine Komponente enthalten muss). In diesem bevorzugten Ausführungsbeispiel ist der Applikator vorzugsweise spritzenähnlich ausgebildet, wobei sein Innenvolumen einerseits zur anfänglichen Aufnahme einer Komponente dient, bei dem Handhabungsablauf bis zur Anwendung des gemischten Produktes aber auch als Mischkammer Verwendung findet, indem mittels des Spritzenstößels ein mehrfacher Produktwechsel bzw. Gemischwechsel zwischen dem Innenraum des derart ausgebildeten Applikators einerseits und dem Innenraum der flexiblen Verpackung stattfindet.

**[0011]** Für beide Varianten zeigen die nachfolgend beschriebenen Ausführungsbeispiele wiederum eine Vielzahl von Kombinationen konstruktiver Art, sowohl was die Ausgestaltung des schlauch- oder beutelförmigen Verpackungselements einerseits, als auch des Applikators andererseits angeht.

**[0012]** Beispielsweise kann der Applikator auch mehrstückig aufgebaut sein, um die oben beschriebenen Funktionen zur Verbindung mit der flexiblen Verpackung, ggf. zur Aufnahme einer Komponente und zur Mischung der Komponenten, als auch zur Abgabe des gemischten Produktes in der jeweils produktspezifischen optimalen Form zu gewährleisten.

## Kurzbeschreibung der Bilder

**[0013]** Mehrere Ausführungsbeispiele der erfindungsgemäßen Mehrkomponentenpackung werden

anhand von Zeichnungen näher erläutert:

**[0014]** Bild 1 zeigt ein erstes Ausführungsbeispiel der Mehrkomponentenpackung mit Applikator,

**[0015]** Bild 2 zeigt die Aktivierung und Anwendung der Mehrkomponentenpackung nach dem ersten Ausführungsbeispiel,

**[0016]** Bild 3 zeigt Schnitte durch das schlauchförmige Verpackungselement mit möglichen Ausführungsformen,

**[0017]** Bilder 4 bis 11 zeigen verschiedene Ausbildungen des Verbindungsbereiches zwischen Applikator und schlauchförmigem Verpackungselement,

**[0018]** Bild 12 bis Bild 19 zeigen Variationen des Applikators im Schnitt,

**[0019]** Bild 20 zeigt ein zweites Ausführungsbeispiel der Mehrkomponentenpackung mit Applikator im Vollschnitt,

**[0020]** Bild 21 zeigt ein drittes Ausführungsbeispiel der Mehrkomponentenpackung mit Applikator im Vollschnitt,

**[0021]** Bild 22 zeigt ein viertes Ausführungsbeispiel der Mehrkomponentenpackung mit Applikator im Vollschnitt,

**[0022]** Bild 23 zeigt ein fünftes Ausführungsbeispiel der Mehrkomponentenpackung mit Applikator im Vollschnitt,

**[0023]** Bild 24 zeigt ein sechstes Ausführungsbeispiel der Mehrkomponentenpackung im Vollschnitt,

**[0024]** Bild 25 zeigt ein siebtes Ausführungsbeispiel der Mehrkomponentenpackung im Vollschnitt, und

**[0025]** Bild 26 und Bild 27 zeigen zwei Ausgestaltungen des Verbindungsbereiches des Applikators mit dem schlauchförmigen Verpackungselement im Teilschnitt und einer Ansicht.

#### Beschreibung der Ausführungsbeispiele

**[0026]** Bild 1A zeigt ein erstes Ausführungsbeispiel, eine Mehrkomponentenpackung 1.0 im Vollschnitt und in der Draufsicht. In Bild 1B ist ein Ausgangsformat für das schlauchförmige Verpackungselement dargestellt. Die Bilder 2A,2B,2C zeigen die Aktivierung und Anwendung der Mehrkomponentenpackung 1.0.

**[0027]** Die Mehrkomponentenpackung 1.0 besteht aus einem schlauchförmigen Verpackungselement 1.1 als Grundelement und einem Applikator 1.2.

Grundlage für das schlauchförmige Verpackungselement 1.1 ist eine flexible Folie 1.1.1 (ein schlauchförmig extrudiertes Teil ist ebenfalls einsetzbar), aus Kunststoff, Al, oder deren Verbundmaterialien, die je nach Verwendungszweck kaschiert oder beschichtet sein kann.

**[0028]** Beim ersten Ausführungsbeispiel ist das Verpackungselement durch Überlappung ÜL1 der Längsseiten der Folie 1.1.1 hergestellt. Die Folie 1.1.1 kann sowohl auf ihrer Seite S1 als auch auf ihrer Seite S2 siegelfähig beschichtet sein, wobei sich bei Einhaltung bestimmter Parameter wie z.B. Wärme oder Druck bei Überlappung oder Schichtung der Folie 1.1.1 ein fester oder auch ein peelfähiger Verbund an den Kontaktflächen erreichen lässt.

**[0029]** Das Verpackungselement 1.1 ist im ersten Ausführungsbeispiel somit aus einer einzigen flächigen Folie 1.1.1 hergestellt, die durch einen in Hauptausrichtung verlaufenden festen Verbindungsbereich 1.1.2 (Überlappung ÜL) ihre schlauchartige Form annimmt.

**[0030]** Das zunächst an den Endbereichen E1 und E2 offene schlauchförmige Verpackungselement 1.1 ist an seinem Ende E1 mit einem vorzugsweise aus Kunststoff bestehenden Applikator 1.2 im Bereich B1 z.B. durch Siegeln oder Schweißen fest verbunden, wobei Material und Form des Applikators 1.2 auf die Verbindungstechnik und den Anwendungsbereich ausgerichtet sind.

**[0031]** Der Applikator 1.2 hat vorzugsweise zentrisch einen durchgehenden Abgabekanal 1.2.1, der eine Verbindung zum Innenbereich 1.1.3 des vorderen Endbereichs E1 des schlauchförmigen Verpackungselements 1.1 bildet. Der hintere Endbereich E2 des schlauchförmigen Verpackungselements ist im Bereich 1.1.4 flächig z.B. durch Siegeln fest verschlossen. Zwischen dem festen Verbindungsbereich 1.1.4 am Endbereich E2 und dem Bereich des Applikators 1.2 erstreckt sich zumindest eine lösbare Verbindungsfläche 1.1.5 zur Trennung der zu mischenden Komponenten K1 und K2 und optional eine weitere lösbare Verbindungsfläche 1.1.6 in Applikatornähe. Die Verbindungsfläche 1.1.6 grenzt den Bereich der Komponente K2 ein, so dass diese nicht ungewollt in den Applikator 1.2 oder nach außen gelangen kann. Die Komponenten K1 und K2 können sowohl flüssig, pastös, pulverförmig oder granuliert sein, auch deren Kombination wie z.B. eine flüssige Komponente kombiniert mit einer pulverförmigen Komponente sind möglich.

**[0032]** Zur Mischung der Komponenten K1 und K2 wird über das schlauchförmige Verpackungselement 1.1 Druck auf eine der Komponenten in Richtung der anderen Komponente ausgeübt, wodurch sich die Verbindungsfläche 1.1.5 zwischen den beiden Kom-

ponenten K1 und K2 öffnet. Durch wechselseitiges Drücken des schlauchförmigen Verpackungselementes 1.1 im Bereich der Komponenten K1 und K2 erreicht man deren Mischung.

**[0033]** Durch weiteren Druck oder Ausstreifen der gemischten Komponenten in Richtung des Applikators 1.2 wird die Verbindungsfläche 1.1.6 gelöst. Das Füllgut gelangt über den Abgabekanal 1.2.1 des Applikators 1.2 nach außen und wird mittels des Applikators 1.2 an vorgesehener Stelle platziert.

**[0034]** Bild 3 zeigt Schnitte durch das schlauchförmige Verpackungselement mit möglichen Ausprägungen:

**[0035]** In Bild 3A ist ein schlauchförmiges Verpackungselement ohne Überlappung dargestellt, wie es bei der Herstellung aus einer extrudierten Röhre der Fall ist.

**[0036]** Bild 3B zeigt einen Schnitt durch ein schlauchförmiges Verpackungselement mit einfacher Überlappung ÜL2, wie bereits im ersten Anwendungsbeispiel beschrieben, wobei die Innenseite IS2 mit der Außenseite AS2 der Folie 1.1.1 in Kontakt kommt.

**[0037]** Bild 3C zeigt einen Schnitt durch ein schlauchförmiges Verpackungselement, wobei zur Verbindung die Längskanten der späteren Innenseite IS3 der Folie 1.1.1 aneinandergelegt und in Hauptausrichtung der Mehrkomponentenpackung fest verbunden werden.

**[0038]** Bild 3D zeigt je einen Schnitt durch ein weiteres schlauchförmiges Verpackungselement im Füllgutbereich und im Bereich des flächigen Siegelverbundes. Die Folie 1.1.1 ist hier stumpf aneinandergestoßen, die dichte Verbindung wird durch ein zusätzliches siegelbares Band 1.1.7 mit der Bandbreite BB an der späteren Innenseite IS5 des Grundelementes realisiert. Das Band 1.1.7 wird vorzugsweise durch Schweißen oder Siegeln mit der Folie 1.1.1 in Hauptausrichtung der Packung verbunden. Optional kann das Band 1.1.4 auch an der Außenseite AS5 der Folie 1.1.1 angebracht sein.

**[0039]** Bild 3E zeigt einen Schnitt durch ein schlauchförmiges Verpackungselement, die Folie besteht hier aus zwei Einzelfolien 1.1.8 und 1.1.9, so dass das schlauchförmige Verpackungselement mit zwei in Hauptausrichtung der Packung verlaufenden Verbindungsbereichen V1 und V2 versehen ist.

**[0040]** Die Bilder 4 bis 11 zeigen verschiedene Ausbildungen des Verbindungsbereiches zwischen Applikator 1.2 und schlauchförmigem Verpackungselement 1.0:

**[0041]** In Bild 4A ist der Außendurchmesser DA des schlauchförmigen Verpackungselementes 1.1 etwa gleich dem Außendurchmesser DB des Applikators im Verbindungsbereich, wobei der Applikator 1.2 mit einer Ringschulter versehen ist, deren Durchmesser DI um etwa das Doppelte der Foliendicke FD1 kleiner ist als der Außendurchmesser DA des schlauchförmigen Verpackungselementes 1.1.

**[0042]** In Bild 4B ist der Außendurchmesser DA des schlauchförmigen Verpackungselementes 1.1 wesentlich kleiner als der Außendurchmesser DB des Applikators 1.2 im Verbindungsbereich,

**[0043]** in Bild 4C ist der Innendurchmesser D1 des Verpackungselementes 1.1 gleich dem Außendurchmesser DA des Applikators 1.2 im Verbindungsbereich,

**[0044]** in Bild 5 ist der Applikator 1.2 so ausgeführt, dass er sich in Richtung des schlauchförmigen Verpackungselementes 1.1 in Form einer Schulter SCH ausdehnt, so dass die Innenseite IS7 des schlauchförmigen Verpackungselementes 1.1 über den Schulterbereich SCH des Applikators 1.2 gebördelt und vorzugsweise durch Siegeln oder Schweißen mit diesem verbunden werden kann,

**[0045]** in Bild 6 ist der Applikator 1.2 so ausgeführt, dass sich der Abgabekanal in Richtung des schlauchförmigen Verpackungselementes 1.1 in Kegelform KF erweitert, so dass sich die Außenseite AS8 des schlauchförmigen Grundelementes darin einbördeln und vorzugsweise durch Siegeln oder Schweißen mit dem Applikator 1.2 verbinden lässt.

**[0046]** In Bild 7 ist das schlauchförmige Verpackungselement 1.1 durch den Verbund von zwei Folien 1.1.8 und 1.1.9 dargestellt, kann aber auch mit schlauchförmigen Grundelementen, die in Hauptausrichtung in den bisher beschriebenen Varianten verbunden sind, realisiert werden. Der Querschnitt SF9 des Verbindungsabschnitts VB9 des Applikators 1.2 ist hier in Form eines beidseitig spitz zulaufenden Schiffchens gestaltet, wobei die Folien 1.1.8 und 1.1.9 beidseits über den Verbindungsabschnitt SF9 um das Maß M9 hinausragen, so dass deren überstehende Innenflächen IS9A und IS9B z.B. durch Siegeln miteinander verbunden werden können.

**[0047]** In Bild 8 ist der Applikator durch einen im Querschnitt schiffchenförmigen Applikatoransatz 1.3 mit einer kegelförmigen Öffnung 1.3.1 ersetzt, welche sich in Richtung des schlauchförmigen Verpackungselementes 1.1 verjüngt. Diese Öffnung dient zum Andocken einer (hier nicht dargestellten) Entnahmevorrichtung. Der Applikatoransatz 1.3 ist mit einem Originalitätsverschluss z.B. in Form einer abpeelbaren Folie 1.3.4 verschlossen.



**[0048]** In Bild 9 ist der Applikatoransatz 1.3 rotativsymmetrisch aufgebaut.

**[0049]** In Bild 10 hat die Öffnung 1.3.1 des Applikatoransatzes ein Innengewinde 1.3.2.

**[0050]** In Bild 11 hat der Applikatoransatz 1.3 einen durch ein Außengewinde 1.3.5 verlängerten Bereich 1.3.6 wodurch der Verschluss auch mittels eines Hütchens 1.3.7 mit entsprechend korrespondierender Ausgestaltung realisiert werden kann.

**[0051]** Bild 12 bis Bild 19 zeigen Variationen des Endbereiches des Applikators 1.2 im Schnitt. Alle Applikatoren weisen im Zentrum einen durchgehenden Abgabekanal zur Durchführung des Füllgutes auf.

**[0052]** In Bild 12 verjüngt sich der Applikator in Richtung der Produktaustrittsöffnung PA1 und ist an der Produktaustrittsöffnung PA1 durch einen abgerundeten Knoten K1 erweitert, was die Verletzungsgefahr beim Einführen in Körperöffnungen vermindert.

**[0053]** In Bild 13 verjüngt sich der Applikator in Richtung Produktaustrittsöffnung PA2 und endet in einer Rundung R2.

**[0054]** In Bild 14 verjüngt sich der Applikator in Richtung seines Endes und läuft in einer Rundung R3 aus. Die Produktaustrittsöffnung ist in der Wandung WA3 des Applikators in Form von mehreren Produktaustrittsöffnungen PAX vorgesehen.

**[0055]** In Bild 15 verjüngt sich der Applikator in Richtung seines Endes und läuft in einer flachen Form in der Art eines Spatels SP4 aus.

**[0056]** In Bild 16 ist der Applikator als separates Teil ausgestaltet, mit einem Innengewinde 1.2.2 zum Andocken an eine Verpackung 1.8 mit Gewindeansatz.

**[0057]** In Bild 17 ist der Applikator ebenfalls als separates Teil ausgestaltet, mit einem Außengewinde 1.2.3 zum Andocken an eine Verpackung mit Gewindeansatz.

**[0058]** In Bild 18 und 19 ist im Applikator in Richtung Produktaustrittsöffnung durch eine Materialschwächung eine Sollbruchstelle SB7 geformt. Das Ende des Applikators zu einem flügelartigen Endstück 1.2.4 erweitert. Der Kanal 1.2.1 im Innern des Applikators endet im flügelartigen Endstück 1.2.4, welches vor dem Applizieren abgebrochen wird, so dass der Kanal 1.2.1 geöffnet wird und der Inhalt der Packung im Anwendungsbereich appliziert werden kann.

**[0059]** Bild 20 zeigt ein zweites Ausführungsbeispiel, eine Mehrkomponentenpackung 2.0 mit Applikator im Vollschnitt. In Bild 20A ist die nicht aktivierte Packung dargestellt. Bild 20B zeigt den Applikator

nach dem Einsaugen der gemischten Komponenten. Bild 20C zeigt das Applizieren der gemischten Komponenten.

**[0060]** Die Mehrkomponentenpackung 2.0 besteht aus einem Applikatoransatz 2.1 mit kegelförmiger Andockfläche 2.1.1, wie unter Bild 8 beschrieben, und einem Applikator 2.2. Der Grundaufbau des Applikators 2.2 entspricht dem Grundaufbau einer Spritze und wird nicht näher beschrieben. Der Endbereich 2.2.1 des Applikators ist gerundet und auf die kegelförmige Andockfläche 2.1.1 des Applikatoransatzes 2.1 abgestimmt.

**[0061]** Nach dem Mischen der Komponenten K3 und K4 der Mehrkomponentenpackung in bereits beschriebener Weise (nicht dargestellten) im Verpackungselement 1.0 wird der Originalitätsverschluss 2.1.2 vom Applikatoransatz 2.1 abgezogen und der Applikator 2.2 angedockt. Durch Zurückziehen des Stößels 2.2.2 werden die gemischten Komponenten K3 und K4 in den Applikator 2.2 eingezogen und durch Einschieben des Stößels 2.2.2 an der Anwendungsstelle platziert.

**[0062]** Bild 21 zeigt ein drittes Ausführungsbeispiel; eine Mehrkomponentenpackung 3.0 mit Applikator im Vollschnitt. In Bild 21A ist die nicht aktivierte Packung dargestellt. Bild 21B zeigt den Applikator beim Einsaugen der gemischten Komponenten K5 und K6. Bild 21C zeigt das Aufsetzen eines Applikatoraufsatzes. Bild 21D zeigt das Applizieren der gemischten Komponenten.

**[0063]** Die Mehrkomponentenpackung 3.0 besteht aus einem Verpackungselement 3.1 mit einem Innengewinde 3.1.1 als Andockmöglichkeit, wie es vorab beschrieben wurde, und dem Applikator 3.2. Der Grundaufbau des Applikators entspricht dem Grundaufbau einer Spritze und wird nicht näher beschrieben. Der Endbereich 3.2.1 des Applikators ist mit einem Außengewinde versehen.

**[0064]** Nach dem Mischen der Komponenten K5 und K6 der Mehrkomponentenpackung in bereits beschriebener Weise wird der Applikator 3.2 angedockt. Durch Zurückziehen des Stößels 3.2.2 werden die gemischten Komponenten K5 und K6 in den Applikator eingezogen. Je nach Anwendungsbereich kann nun direkt oder mittels eines der Anwendung gerecht werdenden Applikator-Aufsatzes 3.3. appliziert werden.

**[0065]** Bild 22 zeigt ein viertes Ausführungsbeispiel, eine Mehrkomponentenpackung 4.0 im Vollschnitt. Die Mehrkomponentenpackung 4.0 besteht aus einem Verpackungselement 4.1 mit Außengewinde 4.1.1 als Andockmöglichkeit, wie es vorab beschrieben wurde, und dem Applikator 4.2. Der Grundaufbau des Applikators 4.2 entspricht dem Grundaufbau

einer Spritze und wird nicht näher beschrieben. Der Endbereich **4.2.1** des Applikators ist anwendungsspezifisch geformt und mit einem Innengewinde **4.2.2** versehen. Die Anwendung entspricht der beim Ausführungsbeispiel **2.0**.

**[0066]** Bild 23 zeigt ein fünftes Ausführungsbeispiel, eine Mehrkomponentenpackung **5.0** im Vollschnitt. Bild 23A zeigt die nicht aktivierte Packung. In Bild 23B ist das Einsaugen der gemischten Komponenten dargestellt. Bild 23C zeigt die aufgetrennte Verpackung. In Bild 23D ist das Applizieren des Inhaltes dargestellt.

**[0067]** Die Mehrkomponentenpackung **5.0** besteht aus einem vorzugsweise schlauchförmigen Verpackungselement **5.1** zur Aufnahme der zu mischenden Komponenten K7 und K8, wie unter dem ersten Ausführungsbeispiel beschrieben, und dem Applikator **5.2**. Der Verbindungsbereich **5.2.1** zwischen schlauchförmigem Verpackungselement **5.1** und Applikator **5.2** kann in den schon beschriebenen Varianten gestaltet sein. Der Applikator **5.2** ist in Form einer Spritze gestaltet und im Endbereich in Form des Verbindungsbereiches **5.2.1** ausgeprägt. Der Verbindungsbereich **5.2.1** weist als Sollbruchstelle eine Materialschwächung **5.2.2** auf. Der Spritzenhohlraum **5.2.4** ist durch einen durch den Verbindungsbereich **5.2.1** führenden, röhrenförmigen Hohlraum **5.2.5** mit dem schlauchförmigen Verpackungselement **5.1** verbunden.

**[0068]** Nach dem Mischen der Komponenten K7 und K8 in bereits beschriebener Weise wird das Füllgut durch Zurückziehen des Spritzenstößels **5.2.6** in den Applikator **5.2** eingesogen und der Applikator im Verbindungsbereich **5.2.1** durch Brechen an der Materialschwächung **5.2.2** aufgetrennt, so dass die gemischten Füllgüter K7 und K8 durch den verbleibenden röhrenförmigen Hohlraum **5.2.5** appliziert werden können.

**[0069]** Bild 24 zeigt ein sechstes Ausführungsbeispiel, eine Mehrkomponentenpackung **6.0**. In Bild 24A ist die verschlossene Verpackung im Vollschnitt und in der Draufsicht dargestellt. Bild 24B zeigt einen Vollschnitt durch die Verpackung beim Mischen der Komponenten. In Bild 24C ist das Applizieren des Inhaltes der Packung dargestellt.

**[0070]** Die Mehrkomponentenpackung **6.0** besteht aus einem beutelförmigen Verpackungselement **6.1** zur Aufnahme der Komponente K9 und dem Applikator **6.2** in Form einer Spritze, der hier auch zur Aufnahme einer weiteren Komponente K10 sowie zur Mischung der Komponenten dient. Das Verpackungselement **6.1** besteht aus vorzugsweise einseitig siegelfähigen Folien **6.1.1** und **6.1.2**, die umlaufend im Bereich **6.1.3** vorzugsweise durch Siegeln miteinander verbunden sind. Die Außenkontur KA1

kann dabei in jeder geeigneten Form gestaltet sein. Die Folie **6.1.2** ist mit einer Stanzung **6.1.2.1** zur Aufnahme eines Nippels **6.1.4** mit Außengewinde aus siegelfähigem Material versehen. Der Nippel **6.1.4** ist im Endbereich in Form eines Flansches **6.1.4.1** vergrößert und in der Weise in die Stanzung **6.1.2.1** eingelegt, dass er durch das Verpackungselement **6.1** nach außen ragt, wobei der Flansch **6.1.4.1** an der siegelfähigen Fläche der Folie **6.1.2** anliegt und mit dieser im Bereich **6.1.2.2** vorzugsweise durch Siegeln verbunden werden kann. Das Verpackungselement **6.1** kann z.B. durch Aufsiegeln einer peelfähigen Folie **6.1.5** im Bereich des Gewindenippels **6.1.4** oder mit Hilfe eines Hütchens verschlossen sein.

**[0071]** Der Applikator **6.2** zur Aufnahme der Komponente K10 ist an seiner späteren Applikationsseite APS1 mit einem Innengewinde **6.2.1** versehen und z.B. durch eine angesiegelte peelfähige Folie **6.2.2** oder ein schraubenartiges Element verschlossen. Zum Mischen der beiden Komponenten K9 und K10 werden die peelfähigen Folien **6.1.5** und **6.2.2** vom Endbereich des Applikators **6.2** bzw. Nippel **6.1.4** des Verpackungselements **6.1** abgezogen. Danach werden Verpackungselement **6.1** und Applikator **6.2** im Bereich ihrer Gewinde zusammengeführt. Durch Einpressen der Komponenten K10 in das Verpackungselement **6.1** bzw. Herausziehen der Komponente K9 in den Hohlraum **6.2.3** des Applikators **6.2** mit mehrmaligem Wechsel der teilgemischten Komponenten vom Verpackungselement **6.1** in den Applikator **6.2** bzw. vom Applikator **6.2** in das Verpackungselement **6.1**, erfolgt das Mischen der Komponenten K9 und K10. Nach dem Mischen werden die Komponenten K9 und K10 in den Applikator **6.2** eingesogen und Verpackungselement **6.1** und Applikator **6.2** getrennt, so dass der Inhalt appliziert werden kann.

**[0072]** Bild 25 zeigt ein siebtes Ausführungsbeispiel, eine Mehrkomponentenpackung **7.0**. In Bild 25A ist die verschlossene Verpackung im Vollschnitt und in der Draufsicht dargestellt. Bild 25B zeigt einen Vollschnitt durch die Verpackung beim Mischen der Komponenten. In Bild 25C ist die Verpackung vor dem Applizieren des Inhaltes dargestellt.

**[0073]** Die Mehrkomponentenpackung **7.0** besteht aus einem Verpackungselement **7.1** in Form eines Beutels zur Aufnahme der Komponente K11 und einem Applikator **7.2** in Form einer Spritze zur Aufnahme einer weiteren Komponente K12. Das Verpackungselement **7.1** besteht aus vorzugsweise einseitig siegelfähigen Folien **7.1.1** und **7.1.2**, die umlaufend im Bereich **7.1.3** vorzugsweise durch Siegeln miteinander verbunden sind. Die Außenkontur KA2 kann dabei in jeder geeigneten Form gestaltet sein. Die Folie **7.1.2** ist mit einer Stanzung **7.1.2.1** zur Aufnahme eines Nippels mit Innengewinde **7.1.4** aus siegelfähigem Material versehen. Der Nippel **7.1.4** ist in seinem Endbereich in Form eines Flansches **7.1.4.1**

vergrößert und in der Weise in die Stanzung 7.1.2.1 eingelegt, dass er durch das Verpackungselement 7.1 nach außen ragt und sein Flansch 7.1.4.1 an der siegelfähigen Fläche der Folie 7.1.2 anliegt und so mit dieser im Bereich 7.1.2.2 vorzugsweise durch Siegeln verbunden werden kann.

**[0074]** Das Verpackungselement 7.1 kann z.B. durch Aufsiegeln einer peelfähigen Folie 7.1.5 im Bereich des Nippels 7.1.4 oder mit Hilfe eines Schraubenelementes verschlossen sein. Der Applikator 7.2 zur Aufnahme der Komponente K12 ist an der späteren Applikationsseite APS2 mit einem Außengewinde 7.2.1 versehen und z.B. durch eine angesiegelte peelfähige Folie 7.2.2 oder ein Hütchen verschlossen.

**[0075]** Zum Mischen der beiden Komponenten K11 und K12 werden die peelfähigen Folien 7.2.2 und 7.1.5 vom Applikator 7.2 bzw. vom Nippel 7.1.4 des Verpackungselements 7.1 abgezogen. Danach werden Verpackungselement 7.1 und Applikator 7.2 im Bereich ihrer Gewinde zusammengeführt. Durch Einpressen der Komponenten K12 in das Verpackungselement 7.1 bzw. Herausziehen der Komponente K11 in den Applikator 7.2 mit mehrmaligem Wechsel der teilgemischten Komponenten vom Verpackungselement 7.1 in den Applikatorhohlkörper 7.2.3 bzw. vom Applikatorhohlkörper 7.2.3 in das Verpackungselement 7.1, erfolgt das Mischen der Komponenten K11 und K12. Nach dem Mischen werden die Komponenten K11 und K12 in den Applikator 7.2 eingesogen und Verpackungselement 7.1 und Applikator 7.2 getrennt, so dass der Inhalt eventuell durch Aufsetzen eines anwendungsspezifischen Formstückes 7.3 appliziert werden kann.

**[0076]** Bild 26 und Bild 27 zeigen Ausgestaltungen des Verbindungsbereichs des Applikators mit dem schlauchförmigen Verpackungselement in Teilansicht im Schnitt, sowie die Untersicht.

**[0077]** Für alle Packungsveriationen, bei denen der Applikator in Längsausrichtung mit dem schlauchförmigen Bereich verbunden ist, kann das schlauchförmige Verpackungselement 8.1 in seinen Maßen so gewählt sein, dass es mit dem Verbindungsbereich 8.2.1 des Applikators 8.2 ohne seitlichen Überstand zusammengefügt sein kann (Bild 26), oder wie in Ausführungsbeispiel 9.0, dass es größer ist als der Verbindungsbereich 9.2.1 des Applikators 9.2, so dass es im Bereich SÜ über den Verbindungsbereich 9.2.1 mit der Ausdehnung BAP ein- oder beidseitig hinausragt. Hierbei kann die Lage eines eventuell in Hauptausrichtung verlaufenden Verbindungsbereiches (dargestellt im ersten Ausführungsbeispiel) des schlauchförmigen Verpackungselementes je nach Verbindungstechnik und späterer Funktion unterschiedliche Positionen einnehmen.

## Schutzansprüche

1. Verpackung für mindestens zwei Komponenten, gekennzeichnet durch ein schlauch- oder beutelförmiges Verpackungselement (1.1, 3.1, 4.1, 5.1, 6.1, 7.1, 8.1, 9.1) und einen Applikator (1.2, 2.2, 3.2, 4.2, 5.2, 6.2, 7.2, 8.2, 9.2) mit einem Abgabekanal für die gemischten Komponenten, der mit dem Verpackungselement verbindbar ist, wobei das Verpackungselement zur Aufbewahrung mindestens einer Komponente und zur Mischung der mindestens zwei Komponenten ausgestaltet ist.

2. Verpackung nach Anspruch 1, dadurch gekennzeichnet, dass das Verpackungselement aus einem Schlauch gebildet ist, dessen eines Ende (E2) mit einem flächigen Fest-Verbindungsbereich (1.1.4) verschlossen ist, dessen anderes Ende (E1) zur Aufnahme des Applikators (1.2) offen ist, und über dessen Länge mindestens zwei weitere Verbindungsbereiche (1.1.5, 1.1.6) zur Erzeugung von mindestens zwei Kammern für mindestens zwei Komponenten (K1, K2) angeordnet sind, die durch Druckanwendung selektiv geöffnet werden können, um die Mischung der mindestens zwei Komponenten und deren Abgabe an den Applikator zu bewirken.

3. Verpackung nach Anspruch 1, dadurch gekennzeichnet, dass das Verpackungselement (1.1) aus einem entlang seiner Längsseiten miteinander verbundenen Zuschnitt (1.1.1) aus einer Kunststoffolie, einer Metallfolie oder einer Folie aus Verbundmaterialien besteht.

4. Verpackung nach Anspruch 1, dadurch gekennzeichnet, dass das Verpackungselement (1.1) aus zwei randseitig verbundenen Zuschnitten (1.1.8, 1.1.9) aus einer Kunststoffolie, einer Metallfolie oder einer Folie aus Verbundmaterialien besteht.

5. Verpackung nach Anspruch 1 und 2, dadurch gekennzeichnet, dass der Applikator (1.2) aus mindestens einem rotationssymmetrischen Formkörper besteht, dessen eines Ende zur Verbindung mit dem offenen, zweiten Ende (E1) des Verpackungselements (1.1) gestaltet ist, und dessen anderes Ende zur Einführung in ein Organ vorzugsweise konisch ausgebildet ist, und in dessen Zentrum der Abgabekanal (1.2.1) verläuft.

6. Verpackung nach Anspruch 5, dadurch gekennzeichnet, dass das erste Ende des Applikators (1.2) mit dem offenen Ende des Verpackungselements (1.1) fest, insbesondere durch Siegeln oder Schweißen, verbunden ist.

7. Verpackung nach Anspruch 5, dadurch gekennzeichnet, dass der Applikator (1.2) aus einem Kopplungselement (1.8) zur Verbindung mit dem Verpackungselement (1.1) besteht, das das erste Ende

des Applikators beinhaltet, und einem Abgabeelement (1.2.2), das das zweite Ende zur Einführung in ein Organ beinhaltet, und dass Kopplungselement (1.8) und Abgabeelement (1.2.2) form- oder kraftschlüssig verbindbar sind.

8. Verpackung nach Anspruch 5 oder 7, dadurch gekennzeichnet, dass der Abgabekanal (1.2.1) im zweiten Ende des Applikators verschlossen ist, und eine Sollbruchstelle (SB7) im Bereich des Abgabekanalns vorgesehen ist, um eine Abgabeöffnung freizulegen.

9. Verpackung nach Anspruch 1 und 2, dadurch gekennzeichnet, dass der Applikator (2.2–7.2) aus mindestens einem rotationssymmetrischen Formkörper besteht, dessen erstes Ende den Abgabekanal zur Zufuhr der gemischten Komponenten aus dem Verpackungselement (2.1–7.1) und zur Abgabe beinhaltet, und dessen zweites Ende mit einem Kolben (2.2.2, 3.2.2) verschlossen ist, der in einem Kolbenraum verschiebbar ist, der im Abgabekanal endet.

10. Verpackung nach Anspruch 9, dadurch gekennzeichnet, dass der Applikator (3.2, 6.2, 7.2) mit einem Kopplungselement (3.1.4; 6.1.4; 7.1.4) zur Verbindung mit dem Verpackungselement (3.1, 6.1, 7.1) kraft- oder formschlüssig verbindbar ist.

11. Verpackung nach Anspruch 1, dadurch gekennzeichnet, dass das schlauch- oder beutelförmige Verpackungselement mindestens eine Kammer zur Aufnahme einer Komponente aufweist, und dass der Applikator (2.2, 3.2, 4.2, 5.2, 6.2, 7.2) in Form einer Spritze ausgebildet ist, deren Kolbenraum eine weitere Kammer für eine der Komponenten bildet, und selektiv mit dem Verpackungselement (2.1–7.1) zur Mischung und Entnahme der Komponenten verbindbar ist, oder zur Abgabe der gemischten Komponenten dient.

12. Verpackung nach Anspruch 11, dadurch gekennzeichnet, dass die äußere Öffnung des Verpackungselements (6.1,7.1) und/oder der Abgabekanal des Applikators (6.2,7.2) mittels peelfähiger Folien (6.1.5, 6.2.2; 7.1.5, 7.2.2) verschlossen sind.

13. Verpackung nach Anspruch 12, dadurch gekennzeichnet, dass der Applikator (3.2, 7.2) mit einem Formstück (3.3, 7.3) zur Einführung in ein Organ kraft- oder formschlüssig verbindbar ist.

Es folgen 12 Blatt Zeichnungen

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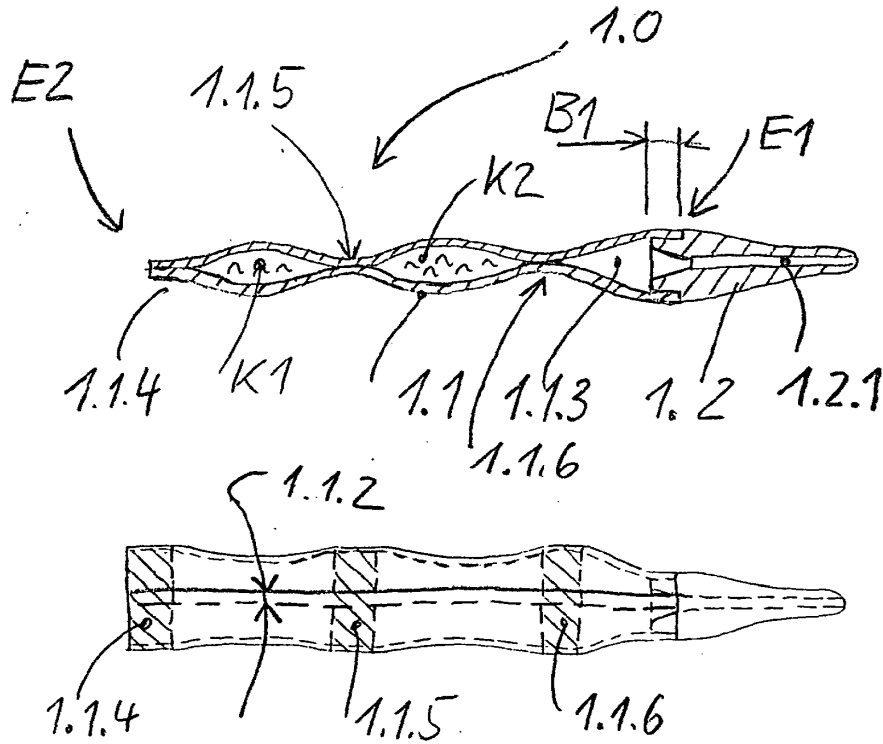


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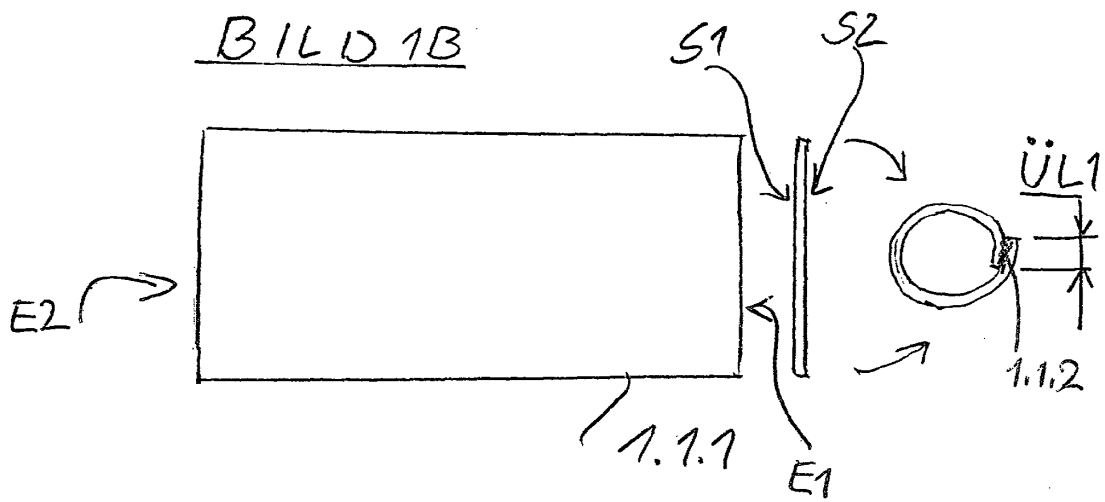


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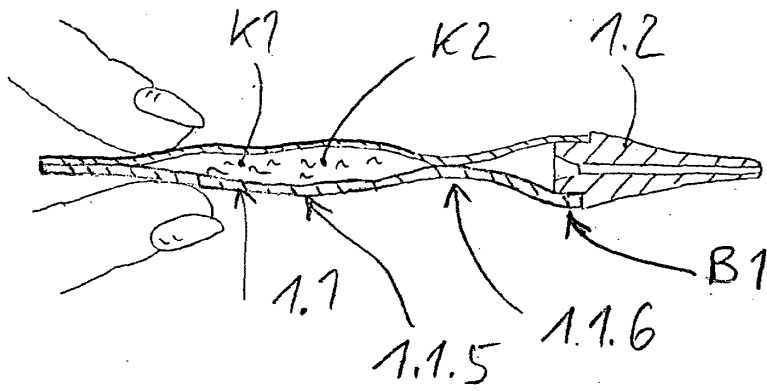


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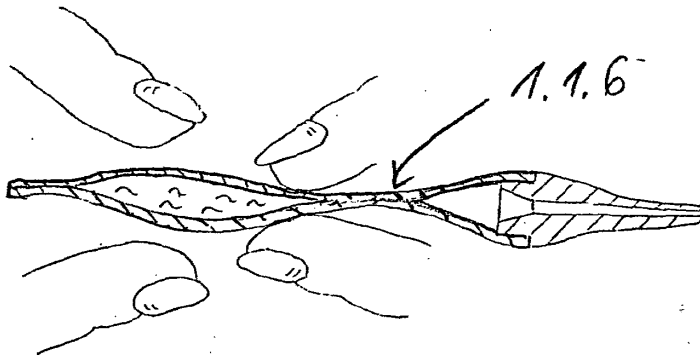


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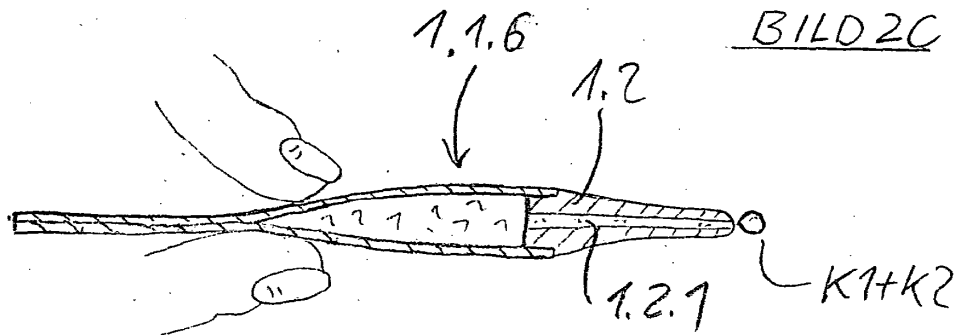


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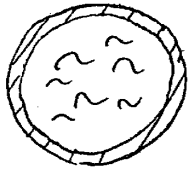


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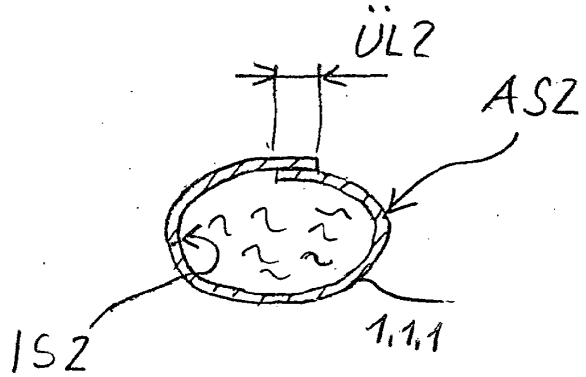


BILD 3C



BILD 3E

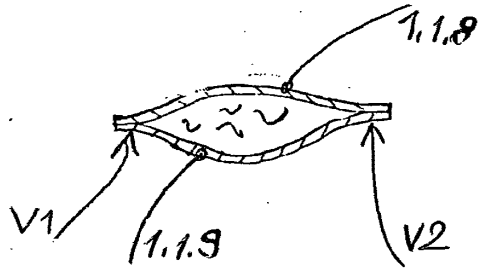
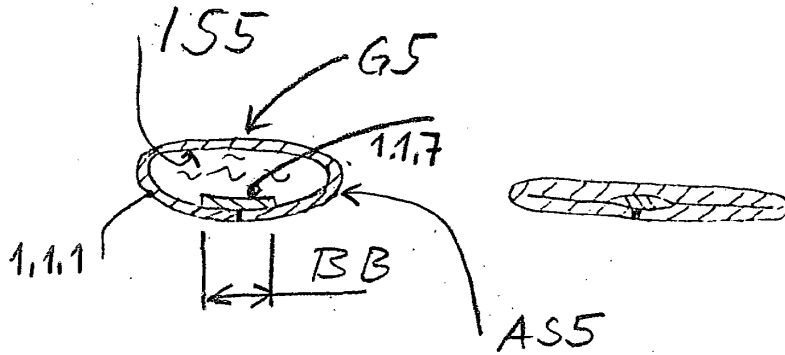


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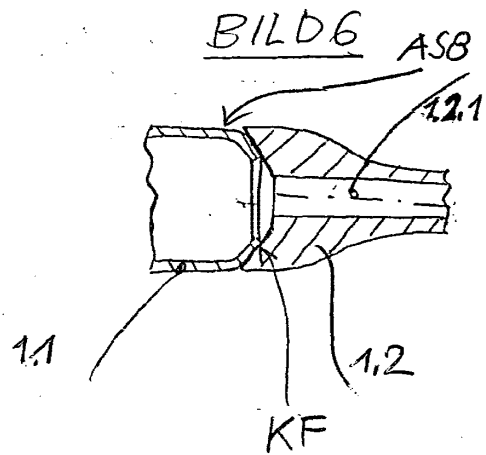
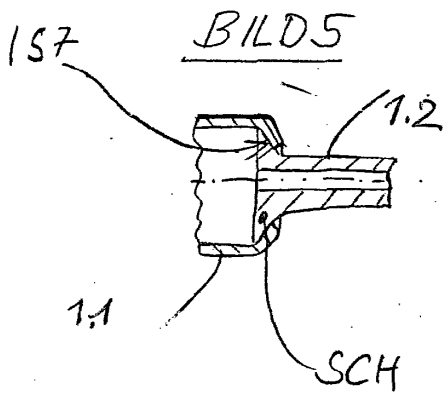
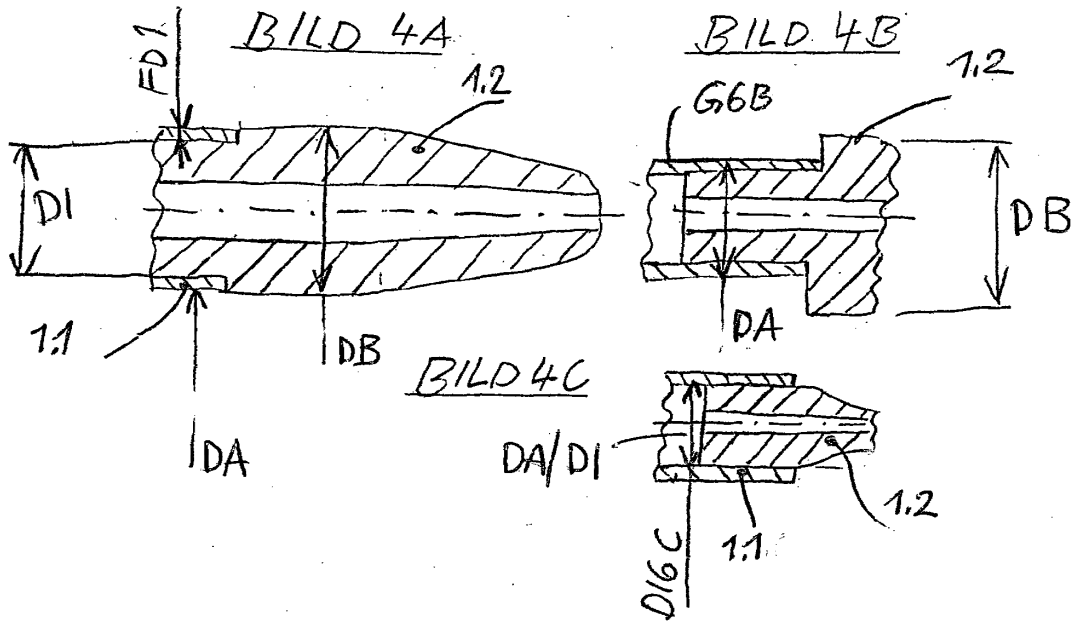




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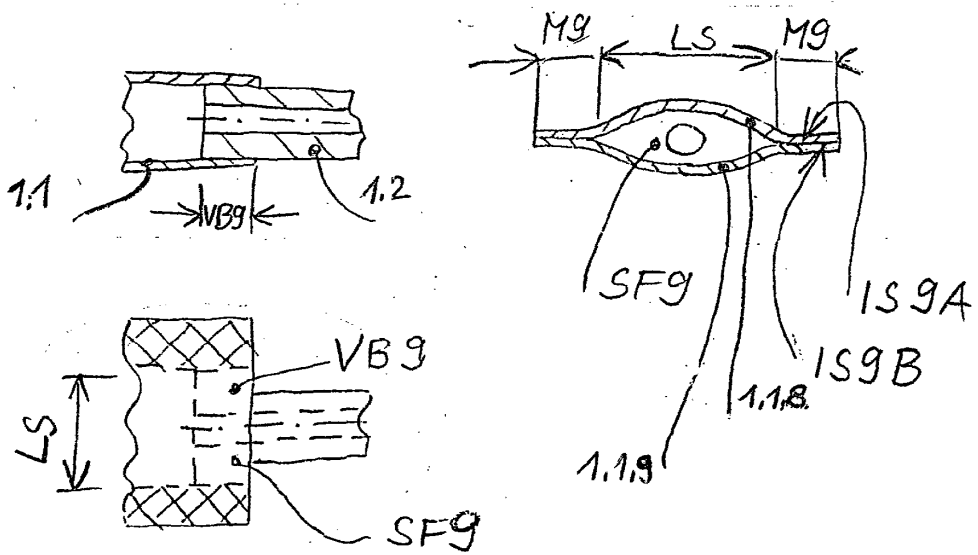


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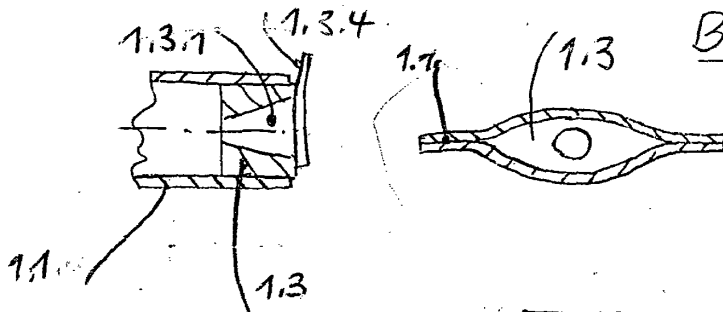


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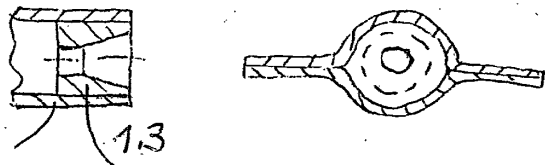


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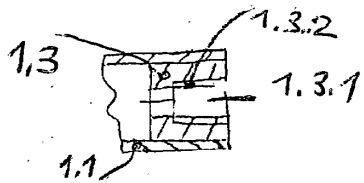


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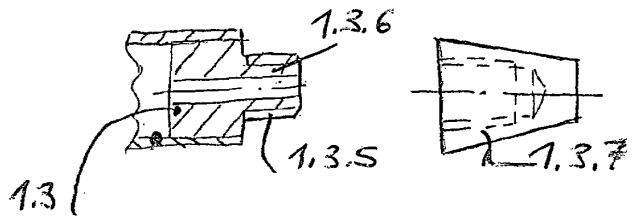


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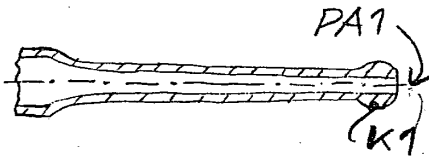


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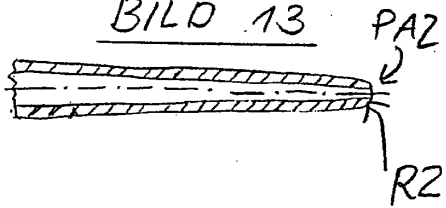


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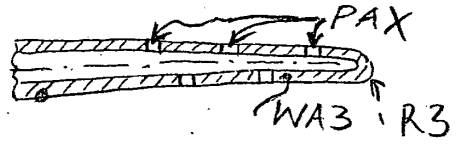


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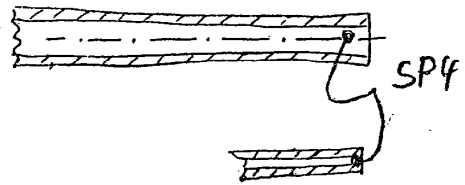


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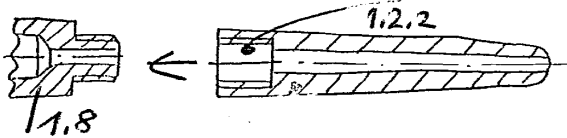


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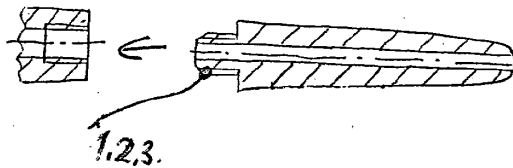


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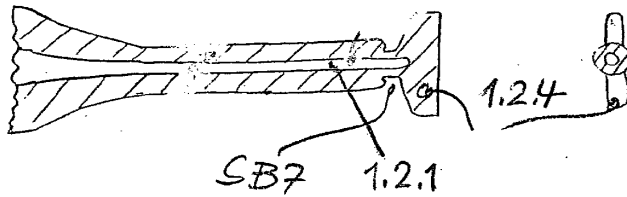


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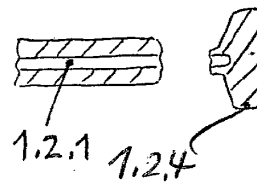


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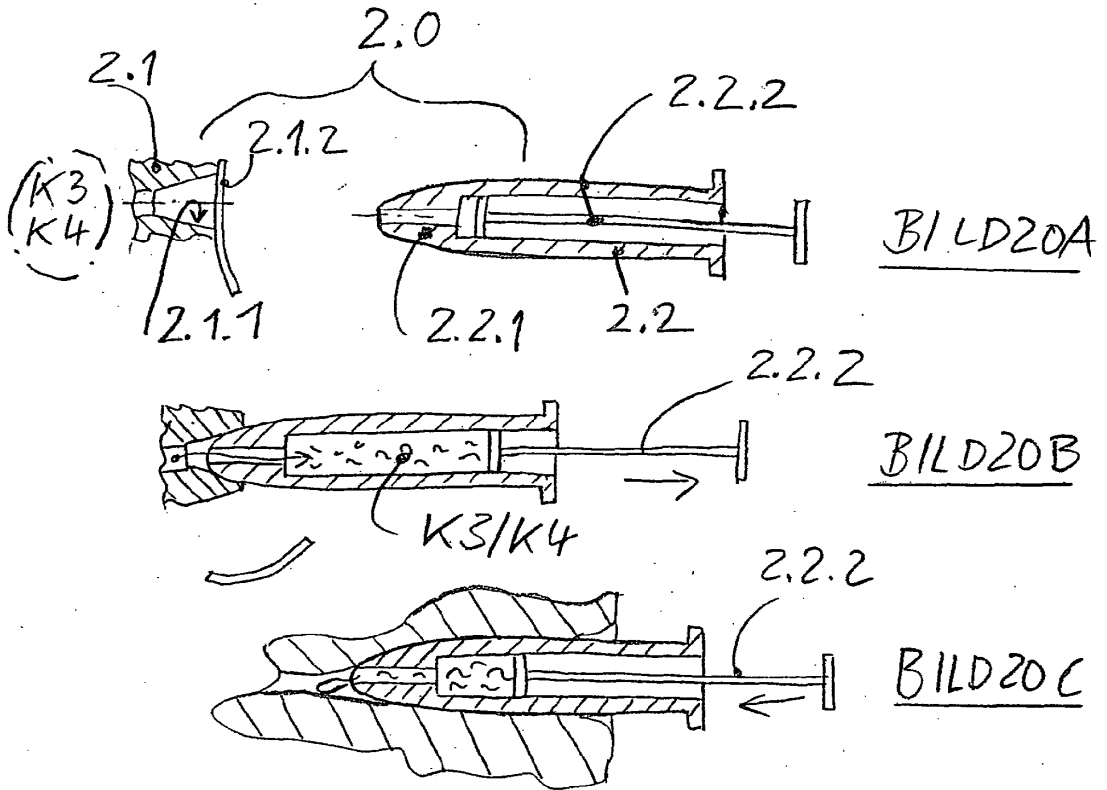


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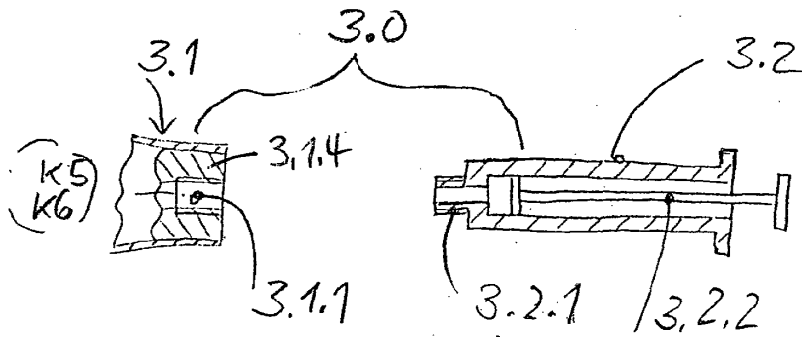


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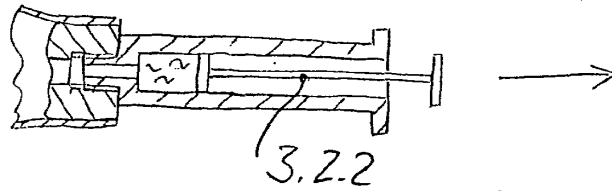


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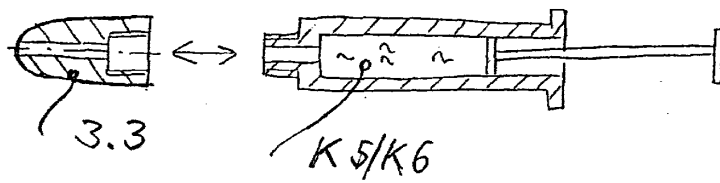


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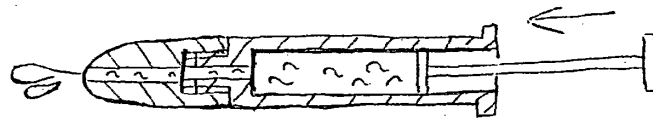


BILD 21D

BILD 22

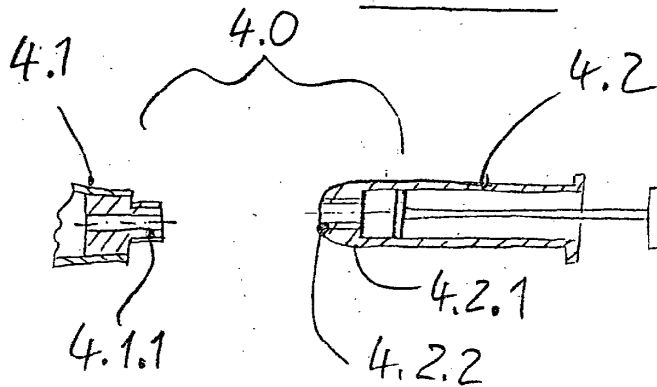


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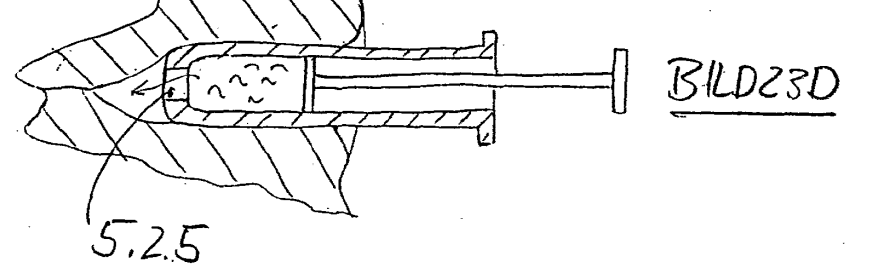
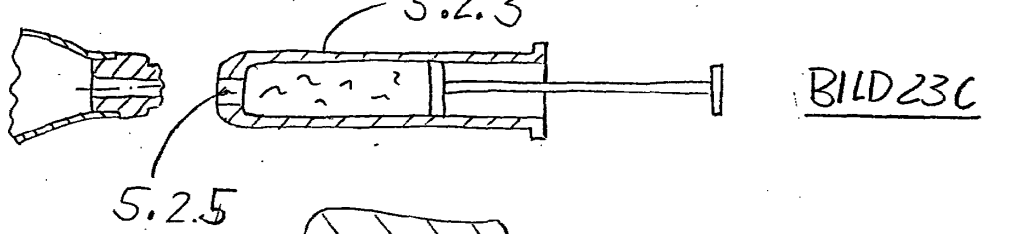
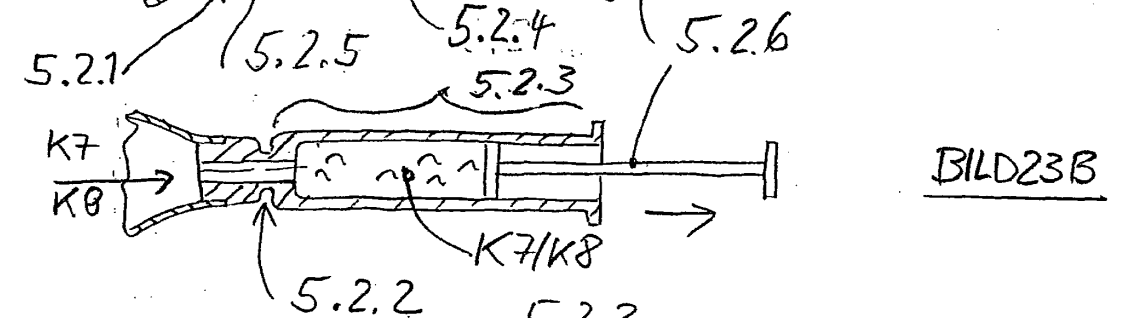
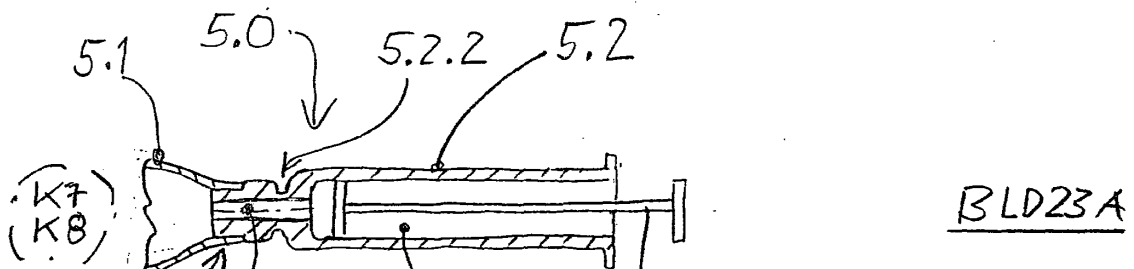


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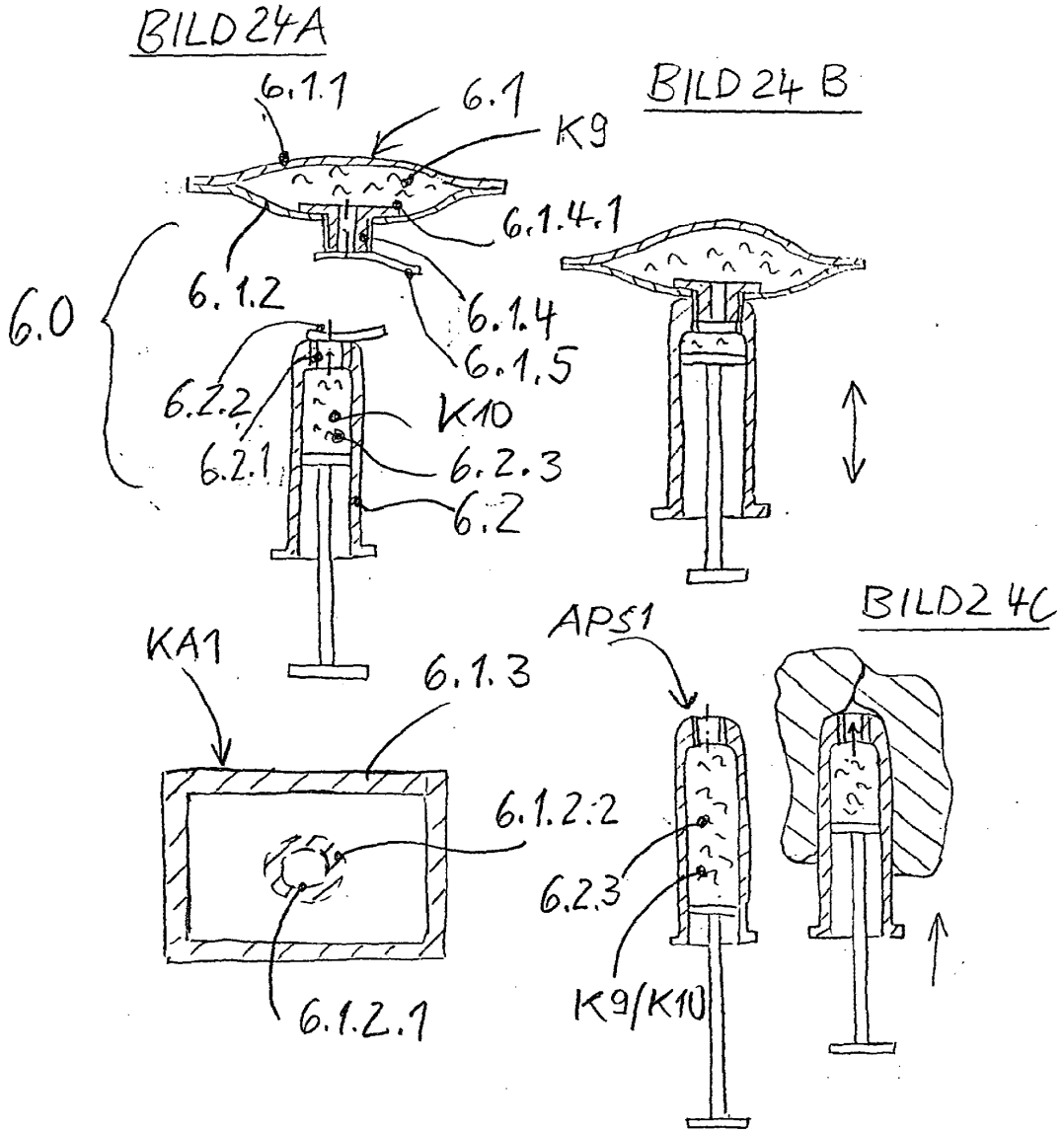


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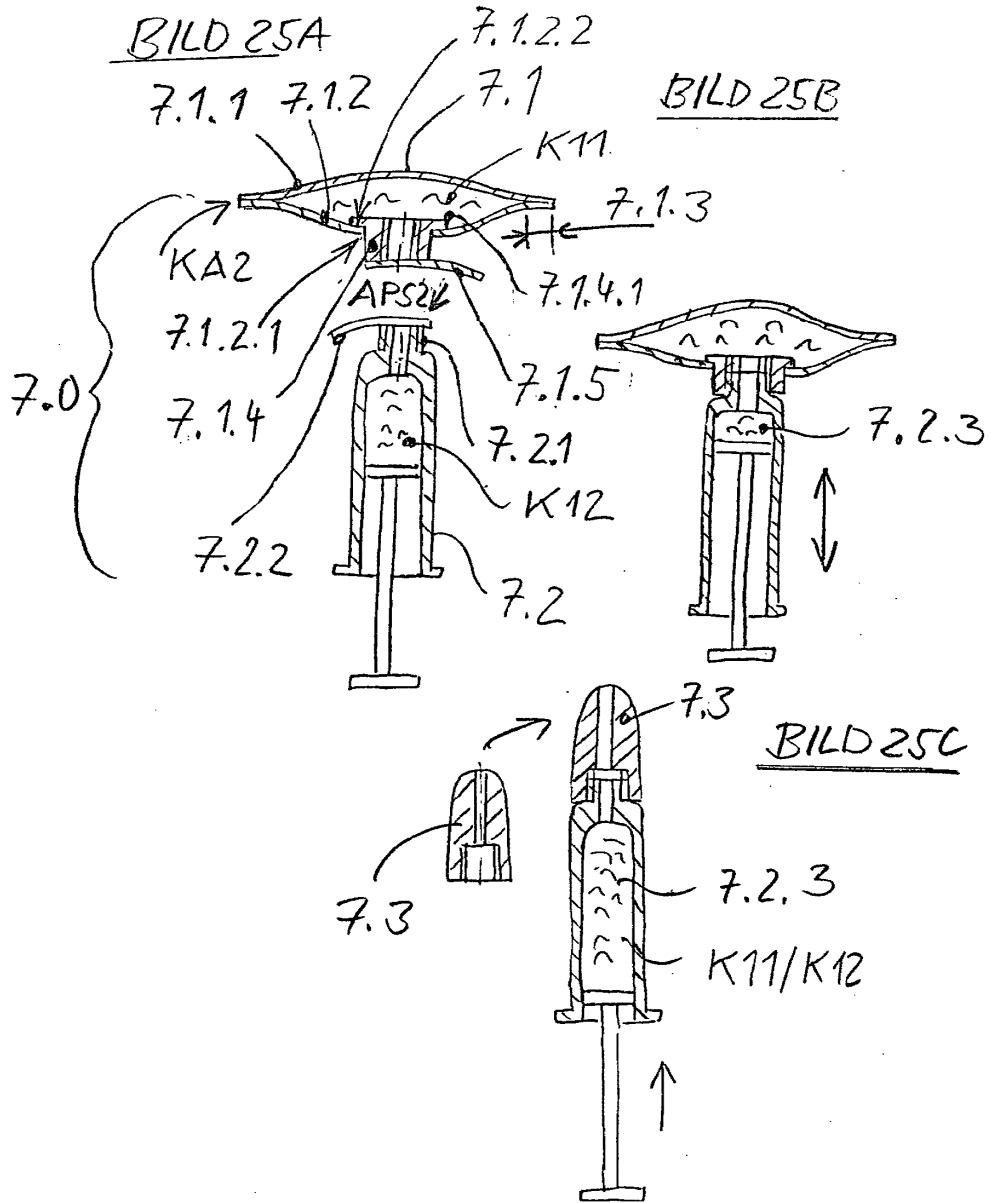


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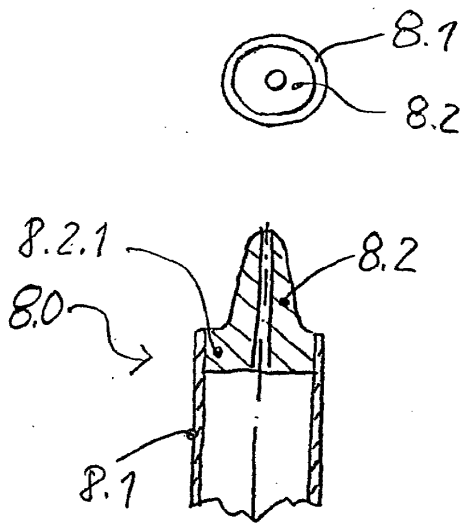
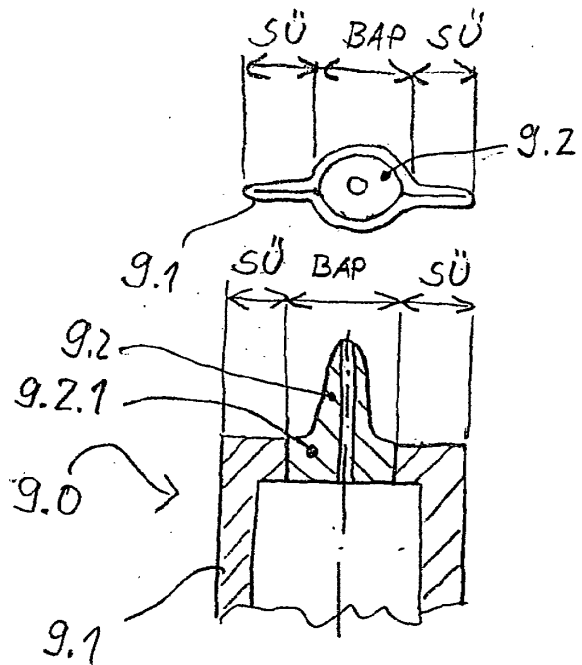


BILD 27







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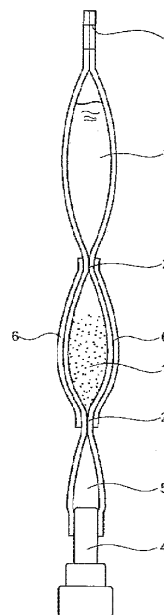
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(54) **MULTICHAMBER BAG AND GAS BARRIER FILM**

(57) An environment friendly and inexpensive gas barrier film that allows a medicine to be clearly visible from outside and prevents erroneous administration is provided. A multichamber bag having a diluting solution chamber 3 jointed to one end side of a medicine-accommodation chamber 1 via a weak sealing part 2 and an unoccupied chamber 5 having an opening part 4 jointed to the other end side of the medicine-accommodation chamber 1 via a weak sealing part 2, wherein the medicine-accommodation chamber 1, the diluting solution chamber 3 and the unoccupied chamber 5 are made of a transparent film material and the outside of the medicine-accommodation chamber 1 is covered with a transparent gas barrier film 6, is provided.

FIG. 2



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**Description**

## TECHNICAL FIELD

**[0001]** The present invention relates to a multichamber bag, in which a medicine and a diluting solution are held with the medicine separated from the diluting solution and mixed at the time of use, and more particularly to a multichamber bag, in which a mixed state of the medicine and the diluting solution is clearly visible from outside, and a gas barrier film used for the multichamber bag.

## BACKGROUND ART

**[0002]** A multichamber bag, in which a weak sealing part is provided between a medicine-accommodation chamber and a diluting solution chamber, the medicine and the diluting solution are mixed at the time of use, and a medicine having a hygroscopic property or a susceptibility to oxidation, or the like, can be held in the medicine-accommodation chamber without using a desiccant or a deoxidizer, is proposed (for example, Patent Document 1). In this example, but not shown, the multichamber bag has such a structure that both sides of the medicine-accommodation chamber are covered with, for example, a multilayer film including an aluminum processing film, an aluminum processing film on the front side can be peeled off, and a diluted medicine is administered with the diluting solution chamber having an opening part placed under and hung from the medicine-accommodation chamber.

Patent Document 1: Japanese Kokai Publication Hei-11-276547

## DISCLOSURE OF THE INVENTION

## Problems to be Solved by the Invention

**[0003]** However, when the medicine-accommodation chamber is covered with the multilayer film including an aluminum processing film as described above, there is a drawback that the medicine is not visible from outside. Further, in order to confirm a mixed state of the medicine and the diluting solution when the medicine is diluted with the diluting solution, an operation of peeling the aluminum processing film on the front side is troublesome. Furthermore, in the case where the diluting solution chamber is provided with the opening part, there is apprehension that the trouble of administering the medicine without mixing it in the diluting solution may occur. In addition, there has been an environmental problem that since this multichamber bag includes the aluminum processing film, not only it becomes expensive, but also it cannot be disposed of as-is.

**[0004]** The present invention has been made in view of the above circumstance, and it is an object of the present invention to provide an environment friendly and inexpensive multichamber bag that allows a medicine to

be clearly visible from outside and prevents erroneous administration, and provide an environment friendly inexpensive gas barrier film that is transparent and has a high gas barrier property.

## Means for Solving the Problems

**[0005]** A multichamber bag of the present invention is characterized in that it has a diluting solution chamber that is jointed to one end side of a medicine-accommodation chamber via a weak sealing part and an unoccupied chamber having an opening part that is jointed to the other end side of the medicine-accommodation chamber via a weak sealing part, wherein the medicine-accommodation chamber, the diluting solution chamber and the unoccupied chamber are made of a transparent film material and the medicine-accommodation chamber is covered with a transparent gas barrier film that substantially prevents permeation of gas and liquid there-through.

**[0006]** Further, the multichamber bag of the present invention is characterized in that it has a medicine-accommodation chamber and a diluting solution chamber having an opening part that are jointed to each other via a weak sealing part, wherein the medicine-accommodation chamber and the diluting solution chamber are made of a transparent film material and the medicine-accommodation chamber is covered with a transparent gas barrier film that substantially prevents permeation of gas and liquid therethrough.

**[0007]** In the above structures, by covering the medicine-accommodation chamber with a transparent gas barrier film that substantially prevents permeation of gas and liquid therethrough, it is possible to protect the medicine from the influence of oxygen or moisture without using a desiccant or a deoxidizer. Further, since the gas barrier film is transparent, the inside of the medicine-accommodation chamber can be seen externally and it is possible to clearly check the state of the accommodated medicine and the presence or absence of insoluble foreign substances after rupturing the weak sealing part to introduce the diluting solution from the diluting solution chamber into the medicine-accommodation chamber to mix it in the medicine.

**[0008]** Also in a production step, the contamination of the foreign substances, or the like, can be clearly detected. Further, since the medicine-accommodation chamber is covered with such a transparent gas barrier film, for example, if a label printed on both sides is attached to one side of the diluting solution chamber, there is an advantage that the label can be seen externally and read even in a state where the multichamber bag is folded into two along the weak sealing part.

**[0009]** In the structure, in which the medicine-accommodation chamber and the unoccupied chamber having an opening part are jointed to each other via the weak sealing part, since the medicine is necessarily administered through the unoccupied chamber in a state of being

diluted with the diluting solution, the occurrence of the erroneous administration can be prevented. Further, since the medicine-accommodation chamber covered with the gas barrier film and the unoccupied chamber having an opening part are jointed to each other via the weak sealing part, it is not required that the opening part and its periphery have a barrier property, and therefore material cost can be reduced more. Furthermore, since a conventional aluminum processing film is not used, there is also an advantage that the multichamber bag can be inexpensively provided and the environmental interrelationship is improved and disposal is facilitated.

**[0010]** The gas barrier film may be formed by attaching a substance prepared by vapor-depositing silica or alumina on polyethylene terephthalate (PET) to an olefin resin such as polyethylene (PE), or may include a barrier film layer formed by vapor-depositing silica or alumina on polyethylene terephthalate (PET), polyvinyl alcohol (PVA) and/or an ethylene-vinyl alcohol copolymer (EVOH).

**[0011]** The gas barrier film preferably includes a sealant layer formed by kneading a moisture absorbent into a transparent resin material. Since the gas barrier film including such a sealant layer has high moisture absorption capacity, for example, by covering the medicine-accommodation chamber with this film, it is possible to protect the medicine from the influence of moisture or oxygen without using a desiccant or a deoxidizer. In particular, since a moisture barrier property is remarkably improved, the number of laminated layers of the barrier film layer can be reduced and the multichamber bag can be inexpensively provided. Further, since the sealant layer is transparent, the inside of the medicine-accommodation chamber can be seen externally and it is possible to clearly check the state of the accommodated medicine and the presence or absence of insoluble foreign substances in introducing the diluting solution into the medicine-accommodation chamber to mix it in the medicine, and therefore the occurrence of the erroneous administration can be inhibited.

**[0012]** The above-mentioned moisture absorbent may be any one selected from among one of inorganic substances, one of organic substances, one of derivatives thereof, a combination of two or more of the inorganic substances, a combination of two or more of the organic substances, and a combination of the inorganic substances and the organic substances, wherein the inorganic substances consist of calcium oxide, aluminum oxide (AlO<sub>x</sub>), zeolite, silica gel, dried alum, magnesium sulfate, calcium chloride, potassium sulfate, phosphorus pentoxide, sodium carbonate and potassium carbonate, and the organic substances consist of poly(meth)acrylate, carboxymethylcellulose and polyethylene glycol. By kneading such a moisture absorbent into a resin material, a stable sealant layer can be formed.

**[0013]** The above-mentioned resin material may comprise one material selected from linear low-density polyethylene (LLDPE), low-density polyethylene (LDPE),

polypropylene (PP), ethylene-vinyl acetate copolymer (EVA), acid copolymer, acid ester copolymer and ionomer, or a combination of the materials. Since a sealant film formed by kneading powder of the moisture absorbent such as calcium oxide (CaO) and/or aluminum oxide (AlO<sub>x</sub>) into such a resin material can attain a good adhesive property (heat seal, adhesion, or the like), this sealant film can be readily laminated on another film material.

**[0014]** The above-mentioned sealant layer may be structured so as to have a two-layer structure or a three-layer structure having another transparent resin material that has the moisture absorbent not kneaded therein and is disposed on one side or on each of both sides of the transparent resin material that has the moisture absorbent kneaded therein. Thus, the sealant layer can be protected and the lamination on another film material is facilitated. When the sealant layer has a two-layer structure, the transparent resin is preferably used for the layer to come into contact with the content of the multichamber bag (the layer that has the moisture absorbent not kneaded).

**[0015]** The gas barrier film may have the sealant layer disposed as the innermost layer of the gas barrier film and a barrier film layer disposed on the outer side of the sealant layer. When such an arrangement is employed, moisture absorption capacity is remarkably improved by the sealant layer, and therefore the number of laminated layers of the barrier film layer can be reduced and thereby cost reduction becomes possible.

**[0016]** The number of laminated layers of the barrier film layer disposed on the outer side of the sealant layer may be set to 1 to 10. By selecting the appropriate number of laminated layers according to the types of medicines within such a wide range, a desired gas barrier property can be secured.

**[0017]** According to the present invention, there is also provided a gas barrier film (for covering a medicine-accommodation chamber) to be used for a multichamber bag that has a diluting solution chamber that is jointed to one end side of a medicine-accommodation chamber via a weak sealing part and an unoccupied chamber having an opening part that is jointed to the other end side of the medicine-accommodation chamber via a weak sealing part, or a multichamber bag that has a medicine-accommodation chamber and a diluting solution chamber having an opening part that are jointed to each other via a weak sealing part, characterized by that the gas barrier film is formed by attaching a substance prepared by vapor-depositing silica or alumina on polyethylene terephthalate (PET) to an olefin resin such as polyethylene (PE).

**[0018]** According to the present invention, there is also provided a gas barrier film (for covering a medicine-accommodation chamber) to be used for a multichamber bag that has a diluting solution chamber that is jointed to one end side of a medicine-accommodation chamber via a weak sealing part and an unoccupied chamber having an opening part that is jointed to the other end side of the medicine-accommodation chamber via a weak seal-

ing part, or a multichamber bag that has a medicine-accommodation chamber and a diluting solution chamber having an opening part that are jointed to each other via a weak sealing part, characterized by that the gas barrier film includes a barrier film layer formed by vapor-depositing silica and/or alumina on polyethylene terephthalate (PET), polyvinyl alcohol (PVA) and/or ethylene-vinyl alcohol copolymer (EVOH).

**[0019]** When the gas barrier film includes such a barrier film layer, it can protect the medicine from the influence of oxygen or moisture without using a desiccant or a deoxidizer in a state of covering the medicine-accommodation chamber with this film. Further, since the gas barrier film is transparent, the inside of the medicine-accommodation chamber can be seen externally and it is possible to clearly check the state of the accommodated medicine and the presence or absence of insoluble foreign substances after rupturing the weak sealing part to introduce the diluting solution from the diluting solution chamber into the medicine-accommodation chamber to mix it in the medicine.

**[0020]** It is preferable that the above-mentioned gas barrier film further includes a sealant layer formed by kneading a moisture absorbent into a transparent resin material. If the gas barrier film includes such a sealant layer, it has high moisture absorption capacity. Therefore, for example, by covering the medicine-accommodation chamber with this film, it is possible to protect the medicine from the influence of moisture or oxygen without using a desiccant or a deoxidizer. Further, since the sealant layer is transparent, the inside of the medicine-accommodation chamber can be seen externally and it is possible to clearly check the state of the accommodated medicine and the presence or absence of insoluble foreign substances in introducing the diluting solution into the medicine-accommodation chamber to mix it in the medicine, and therefore the occurrence of the erroneous administration can be inhibited. In the gas barrier film including such a sealant layer, particularly, since a moisture barrier property is remarkably improved, the number of laminated layers of the barrier film layer can be reduced and the multichamber bag can be inexpensively provided.

**[0021]** The above-mentioned moisture absorbent may be any one selected from among one of inorganic substances, one of organic substances, one of derivatives thereof, a combination of two or more of the inorganic substances, a combination of two or more of the organic substances, and a combination of the inorganic substances and the organic substances, wherein the inorganic substances consist of calcium oxide, aluminum oxide (AlO<sub>x</sub>), zeolite, silica gel, dried alum, magnesium sulfate, calcium chloride, potassium sulfate, phosphorus pentoxide, sodium carbonate and potassium carbonate, and the organic substances consist of poly(meth)acrylate, carboxymethylcellulose and polyethylene glycol. By kneading such a moisture absorbent into a resin material, a stable sealant layer can be formed.

**[0022]** The above-mentioned resin material may comprise one material selected from linear low-density polyethylene (LLDPE), low-density polyethylene (LDPE), polypropylene (PP), ethylene-vinyl acetate copolymer (EVA), acid copolymer, acid ester copolymer and ionomer, or a combination of the materials. Since a sealant film formed by kneading powder of the moisture absorbent such as calcium oxide (CaO) and/or aluminum oxide (AlO<sub>x</sub>) into such a resin material can attain a good adhesive property (heat seal, adhesion, or the like), this sealant film can be readily laminated on another film material.

**[0023]** The above-mentioned sealant layer may be structured so as to have a two-layer structure or a three-layer structure having another transparent resin material that has said moisture absorbent not kneaded therein and is disposed on one side or on each of both sides of the transparent resin material that has the moisture absorbent kneaded therein. Thus, the sealant layer can be protected and the lamination on another film material is facilitated. When the sealant layer has a two-layer structure, the transparent resin is preferably used for the layer to come into contact with the content of the multichamber bag (the layer that has the moisture absorbent not kneaded).

#### EFFECT OF THE INVENTION

**[0024]** In the multichamber bag of the present invention, since the medicine-accommodation chamber is covered with a transparent gas barrier film that substantially prevents permeation of gas and liquid therethrough, the barrier property is improved and it is possible to prevent the medicine from being affected by oxygen or moisture without using a desiccant or a deoxidizer.

**[0025]** The inside of the medicine-accommodation chamber can be seen externally and it is possible to clearly check the state of the accommodated medicine and the presence or absence of insoluble foreign substances in mixing the diluting solution in the medicine. Also in a production step, the contamination of the foreign substances, or the like, can be clearly detected. Further, for example, if a label printed on both sides is attached to the diluting solution chamber, there is an advantage that that label can be seen externally and read even in a state where the multichamber bag is folded in two along the weak sealing part.

**[0026]** Since the medicine is necessarily administered through the unoccupied chamber in a state of being diluted with the diluting solution, the occurrence of the erroneous administration can be prevented. Further, since it is not required that the opening part and its periphery have a barrier property, material cost can be reduced more. Further, since a conventional aluminum processing film is not used, there is also an advantage that the multichamber bag can be inexpensively provided and the environmental interrelationship is improved and disposal is facilitated.

**[0027]** Since the gas barrier film of the present inven-

tion includes a barrier film layer formed by vapor-depositing silica and/or alumina on polyethylene terephthalate (PET), polyvinyl alcohol (PVA) and/or ethylene-vinyl alcohol copolymer (EVOH), it can protect the medicine from the influence of oxygen or moisture without using a desiccant or a deoxidizer in a state of covering the medicine-accommodation chamber with this film. Further, since the gas barrier film is transparent, the inside of the medicine-accommodation chamber can be seen externally and it is possible to clearly check the state of the accommodated medicine and the presence or absence of insoluble foreign substances after rupturing the weak sealing part to introduce the diluting solution from the diluting solution chamber into the medicine-accommodation chamber to mix it in the medicine. Furthermore, since a conventional aluminum processing film is not used, there is also an advantage that the multichamber bag can be inexpensively provided and the environmental interrelationship is improved and disposal is facilitated.

#### BRIEF DESCRIPTIONS OF THE DRAWINGS

##### [0028]

FIG. 1 is a front view of a multichamber bag of a first embodiment of the present invention.

FIG. 2 is a sectional view of the above multichamber bag.

FIGS. 3 are sectional views of a gas barrier film constituting the multichamber bag of the first embodiment of the present invention, in which FIG. 3(a) is a sectional view showing the layer structure of the gas barrier film material, FIG. 3(b) is a sectional view showing the layer structure of the gas barrier film having a single-layer silica vapor deposition layer, and FIGS. 3(c), 3(d), 3(e), 3(f) and 3(g) are sectional views showing the layer structure of the gas barrier films having a three-layer silica vapor deposition layer, a six-layer silica vapor deposition layer, a two-layer alumina vapor deposition layer, a four-layer alumina vapor deposition layer and an eight-layer alumina vapor deposition layer, respectively.

FIGS. 4 are sectional views of a gas barrier film constituting a multichamber bag of a second embodiment of the present invention, in which FIG. 4(a) is a sectional view showing the layer structure of the gas barrier film material, FIG. 4(b) is a sectional view showing the layer structure of the gas barrier film and FIG. 4(c) is a sectional view showing the layer structure of another gas barrier film.

#### DESCRIPTION OF THE REFERENCE NUMERALS AND SYMBOLS

##### [0029]

1 medicine-accommodation chamber

2 weak sealing part  
 3 diluting solution chamber  
 4 opening part  
 5 unoccupied chamber  
 6 gas barrier film  
 6A sealant layer  
 6B barrier film layer  
 61 olefin resin  
 62 polyethylene terephthalate (PET)

#### BEST MODE FOR CARRYING OUT THE INVENTION

[0030] Hereinafter, a multichamber bag of a first embodiment of the present invention will be described in detail referring to drawings.

[0031] FIG. 1 is a front view of a multichamber bag, FIG. 2 is a sectional view of the multichamber bag, and FIGS. 3 are sectional views of a film material and a gas barrier film. In FIGS. 1 and 2, a reference numeral 1 indicates a medicine-accommodation chamber for accommodating various medicines such as antibiotic, a reference numeral 2 indicates a weak sealing part, 3 indicates a diluting solution chamber, 4 indicates an opening part, 5 indicates an unoccupied chamber, 6 indicates a gas barrier film, and 7 indicates a hole for suspending. In this multichamber bag, the diluting solution chamber 3 is jointed to one end side of the medicine-accommodation chamber 1 via the weak sealing part 2 and on the other hand; the unoccupied chamber 5 having the opening part 4 is jointed to the other end side of the medicine-accommodation chamber 1 via the weak sealing part 2; the medicine-accommodation chamber 1, the diluting solution chamber 3 and the unoccupied chamber 5 are made of a transparent film material; and the outside of the medicine-accommodation chamber 1 is covered with the transparent gas barrier film 6.

[0032] A film material forming the medicine-accommodation chamber 1, the diluting solution chamber 3 and the unoccupied chamber 5, as shown in FIG. 3(a), has a multilayer structure composed of a mixed resin layer (thickness: 20  $\mu\text{m}$ ) 11 of polyethylene (PE) and polypropylene (PP) on the inner surface side, a polyethylene (PE) layer (thickness: 60  $\mu\text{m}$ ) 12, a cycloolefin copolymer (COC) layer or a cycloolefin polymer (COP) layer (thickness: 20  $\mu\text{m}$ ) 13, and a polyethylene (PE) layer (thickness: 50  $\mu\text{m}$ ) 12, and peripheries of two film materials are fused together by means of melting, and a weak seal is provided between the medicine-accommodation chamber 1 and the diluting solution chamber 3 and between the medicine-accommodation chamber 1 and the unoccupied chamber 5, respectively, to form weak sealing parts 2, 2, respectively.

[0033] On the other hand, the transparent gas barrier film 6 covering the outside of the medicine-accommodation chamber 1 is formed, for example, by attaching a substance prepared by vapor-depositing a silica vapor deposition layer 6a on polyethylene terephthalate (PET) (thickness: 15  $\mu\text{m}$ ) 62 to an olefin resin layer 61 of poly-

ethylene (PE) (thickness: 30  $\mu\text{m}$ ) on the inner side of the gas barrier film via an adhesive layer 63, as shown in FIG. 3(b). Its layer structure, as shown in FIGS. 3(c) and 3(d), may be multilayer. Specifically, in the structure shown in FIG. 3(c), the silica vapor deposition layer 6a is structured so as to have a three-layer structure, and in the structure shown in FIG. 3(d), the silica vapor deposition layer 6a is structured so as to have a six-layer structure. An alumina vapor deposition layer 6b may be formed in place of the silica vapor deposition layer 6a, and for example, a two-layer alumina vapor deposition layer 6b is formed in FIG. 3(e), a four-layer alumina vapor deposition layer 6b is formed in FIG. 3(f), and an eight-layer alumina vapor deposition layer 6b is formed in FIG. 3(g).

**[0034]** Such a gas barrier film 6 preferably has oxygen permeability of  $1 \text{ cc/m}^2 \cdot \text{day} \cdot \text{atm}$  or less and water permeability of  $1 \text{ g/m}^2 \cdot \text{day}$  (40°C, 90% RH) or less. By covering the outside of the medicine-accommodation chamber 1 with such a transparent gas barrier film 6, it is possible to prevent the medicine from being affected by oxygen or moisture without using a desiccant or a deoxidizer. In addition, the gas barrier film 6 may be fused to the periphery of the medicine-accommodation chamber 1 by means of melting.

**[0035]** Since the gas barrier film 6 is transparent, the inside of the medicine-accommodation chamber 1 can be seen externally and it is possible to clearly check the state of the accommodated medicine and the presence or absence of insoluble foreign substances after rupturing the weak sealing part 2 to introduce the diluting solution from the diluting solution chamber 3 into the medicine-accommodation chamber 1 to mix it in the medicine. Further, also in a production step, the contamination of the foreign substances, or the like, can be clearly detected. Further, since the medicine-accommodation chamber 1 is covered with such a transparent gas barrier film 6, for example, if a label printed on both sides is attached to one side of the diluting solution chamber 3, there is an advantage that that label can be seen externally and read in either of a state where the multichamber bag is folded into two along the weak sealing part 2 or a state where the medicine-accommodation chamber is suspended during administering the medicine.

**[0036]** Since the medicine-accommodation chamber 1 and the unoccupied chamber 5 having an opening part 4 are jointed to each other via the weak sealing part 2, the medicine is necessarily administered through the unoccupied chamber 5 in a state of being diluted with the diluting solution, and therefore the occurrence of the erroneous administration can be prevented. Further, since the medicine-accommodation chamber 1 covered with the gas barrier film 6 and the unoccupied chamber 5 having an opening part 4 are jointed to each other via the weak sealing part 2, it is not required that the opening part 4 and its periphery have a barrier property, and therefore material cost can be reduced more. Further, since a conventional aluminum processing film

is not used, there is also an advantage that the multichamber bag can be offered inexpensively, the environmental interrelationship is improved and disposal is facilitated.

**[0037]** Now, a multichamber bag of a second embodiment of the present invention will be described. A basic structure of the multichamber bag of the present embodiment is similar to that of the first embodiment. Accordingly, in the following description, the same structure as the first embodiment or a structure equivalent to that of the first embodiment is given the same name and the same symbol while referencing to FIGS. 1 and 2, thereby omitting the description thereof. Thus, only the different structures will be described.

**[0038]** In this embodiment, a film material forming the medicine-accommodation chamber 1, the diluting solution chamber 3 and the unoccupied chamber 5, as shown in FIG. 4(a), has a multilayer structure composed of a mixed resin layer (thickness: 20  $\mu\text{m}$ ) 11 of polyethylene (PE) and polypropylene (PP) on the inner surface side, a polyethylene (PE) layer (thickness: 60  $\mu\text{m}$ ) 12, a cycloolefin copolymer (COC) layer or a cycloolefin polymer (COP) layer (thickness: 20  $\mu\text{m}$ ) 13, and a polyethylene (PE) layer (thickness: 50  $\mu\text{m}$ ) 12, and peripheries of two film materials are fused together by means of melting, and weak sealing parts 2, 2 are provided between the medicine-accommodation chamber 1 and the diluting solution chamber 3 and between the medicine-accommodation chamber 1 and the unoccupied chamber 5, respectively.

**[0039]** In the multichamber bag of the present embodiment, the transparent gas barrier film 6 covering the outside of the medicine-accommodation chamber 1 is formed, for example, so as to dispose a sealant layer 6A on the inner side of the gas barrier film and a barrier film layer 6B on the outer side of the sealant layer, as shown in FIG. 4(b). The sealant layer 6A has a three-layer structure formed by interposing a layer 64, formed by kneading powder such as calcium oxide (CaO) and/or aluminum oxide ( $\text{AlO}_x$ ) into linear low-density polyethylene (LLDPE), between linear low-density polyethylene (LLDPE) (a resin material of the present invention) layers 65, 65, and the barrier film layer 6B is formed by laminating two layers, each being prepared by vapor-depositing a silica vapor deposition layer 6a on polyethylene terephthalate (PET) (thickness: 12  $\mu\text{m}$ ) 62, on the sealant layer 6A with an adhesive layer 63 for dry-laminating interposed therebetween.

**[0040]** The above-mentioned barrier film layer 6B may be a six-layer as shown in FIG. 4(c), and otherwise the number of laminated layers may be appropriately selected within a range of 1 to 10. Further, the lamination of the barrier film layer 6B on the sealant layer 6A can be performed by the above-mentioned dry-laminating method or a sandwich lamination method, in which a melted resin by heating is sandwiched between layers to be laminated together. In this case, as a resin sandwiched between the barrier film layer 6B and the sealant layer 6A,

a polyolefin resin having an excellent adhesive property is preferably used, and it is preferable to use a resin similar to a resin used in the sealant layer 6A from the viewpoint of an adhesive property. Furthermore, a film having an excellent gas barrier property such as polyvinyl alcohol (PVA) or an ethylene-vinyl alcohol copolymer (EVOH) may be further laminated on the gas barrier film 6 for the purpose of improving a gas barrier property.

**[0041]** Thus, by covering the medicine-accommodation chamber 1 with the transparent gas barrier film 6 that has the sealant layer 6A having high moisture absorption capacity as the innermost layer, it is possible to protect the medicine from the influence of moisture or oxygen without using a desiccant or a deoxidizer, and the number of laminated layers of the barrier film layer 6B, disposed on the outer side of the sealant layer 6A, can also be reduced and thereby cost reduction becomes possible. Incidentally, such a gas barrier film 6 including the sealant layer 6A preferably has oxygen permeability of 1 cc/m<sup>2</sup> · day · atm or less and water permeability of 1 g/m<sup>2</sup> · day (40°C, 90% RH) or less.

**[0042]** Since the gas barrier film 6 is transparent, the inside of the medicine-accommodation chamber 1 can be seen externally and it is possible to clearly check the state of the accommodated medicine and the presence or absence of insoluble foreign substances after rupturing the weak sealing part 2 to introduce the diluting solution from the diluting solution chamber 3 into the medicine-accommodation chamber 1 to mix it in the medicine, and therefore the occurrence of the erroneous administration can be inhibited. Further, since the medicine-accommodation chamber 1 is covered with the transparent gas barrier film 6, the contamination of the foreign substances, or the like, can be clearly detected also in a production step. For example, if a label printed on both sides is attached to one side of the diluting solution chamber 3, there is an advantage that that label can be seen externally and read even in a state where the multichamber bag is folded into two along the weak sealing part 2.

**[0043]** Furthermore, since the medicine-accommodation chamber 1 and the unoccupied chamber 5 having the opening part 4 are jointed to each other via the weak sealing part 2, the medicine is necessarily administered through the unoccupied chamber 5 in a state of being diluted with the diluting solution, and therefore the occurrence of the erroneous administration can be prevented. Since the medicine-accommodation chamber 1 covered with the gas barrier film 6 and the unoccupied chamber 5 having the opening part 4 are jointed to each other with the weak sealing part 2, it is not required that the opening part 4 and its periphery have a barrier property, and therefore material cost can be reduced more. Further, since a conventional aluminum processing film is not used, there is also an advantage that the multichamber bag can be inexpensively provided and the environmental interrelationship is improved and disposal is facilitated.

**[0044]** Either of the CaO powder or the AlO<sub>x</sub> powder is kneaded into linear low-density polyethylene (LLDPE)

to form the above-mentioned sealant layer 6A, while it is possible to knead a mixture of the CaO powder and the AlO<sub>x</sub> powder. Further, the CaO powder and/or the AlO<sub>x</sub> powder may be kneaded into low-density polyethylene (LDPE), polypropylene (PP), ethylene-vinyl acetate copolymer (EVA), acid copolymer, acid ester copolymer, and/or ionomer, in place of the linear low-density polyethylene (LLDPE).

**[0045]** Further, in examples of FIGS. 4(b) and 4(c), the sealant layer 6A is arranged as the innermost layer of the gas barrier film 6, but the present invention is not limited to this, and a protective film layer or a barrier film layer may be laminated inside the sealant layer 6A. Further, in the examples of FIGS. 4(b) and 4(c), the sealant layer 6A has a three-layer structure, but it may be composed of only the layer 6A formed by kneading the powder of CaO and/or AlO<sub>x</sub> into linear low-density polyethylene (LLDPE), or may be of a sealant layer 6A having a two-layer structure formed by laminating the linear low-density polyethylene (LLDPE) layer 65 on the layer 6A.

**[0046]** Furthermore, the moisture absorbent may be the following substances in place of CaO or AlO<sub>x</sub>. That is, the moisture absorbent may be any one of one material selected from inorganic substances such as zeolite, silica gel, dried alum, magnesium sulfate, calcium chloride, potassium sulfate, phosphorus pentoxide, sodium carbonate and potassium carbonate, and organic substances such as poly(meth)acrylate, carboxymethylcellulose, polyethylene glycol and derivatives thereof, a combination of two or more of the above-mentioned inorganic substances, a combination of two or more of the above-mentioned organic substances, and a combination of the above-mentioned inorganic substances and organic substances.

**[0047]** Further, the present invention is not limited to any embodiment described above, and various modifications or variations in design may be appropriately made without limitation according to needs and circumstances without departing from the scope of the present invention, and diversions or conversions between the embodiments may also be made without limitation.

**[0048]** In the above-mentioned first embodiment, the gas barrier film 6 itself is adapted to function as a barrier film layer without providing the sealant layer 6A, but the present invention is not limited to this, and for example, a sealant layer 6A may be provided in the gas barrier film 6 (the barrier film layer) in the same manner as in the second embodiment.

**[0049]** Further, in the second embodiment, the gas barrier film 6 is composed of the sealant layer 6A and the barrier film layer 6B, but the structure is not limited to this, and for example, the gas barrier film 6 may be composed of a single barrier film layer 6B in the same manner as in the first embodiment. However, needless to say, it is preferable to provide the sealant layer 6A for enhancing a gas barrier property.

**[0050]** Further, but not shown, the gas barrier films 6 of the first and second embodiments can also be applied

to, for example, a multichamber bag having a two-chamber structure, in which a medicine-accommodation chamber and a diluting solution chamber having an opening part are jointed to each other via the weak sealing part, and this medicine-accommodation chamber can be covered with the gas barrier film 6.

#### Claims

1. A multichamber bag **characterized in that** it has a diluting solution chamber that is jointed to one end side of a medicine-accommodation chamber via a weak sealing part and an unoccupied chamber having an opening part that is jointed to the other end side of said medicine-accommodation chamber via a weak sealing part, wherein said medicine-accommodation chamber, said diluting solution chamber and said unoccupied chamber are made of a transparent film material and said medicine-accommodation chamber is covered with a transparent gas barrier film that substantially prevents permeation of gas and liquid therethrough.
2. A multichamber bag **characterized in that** it has a medicine-accommodation chamber and a diluting solution chamber having an opening part that are jointed to each other via a weak sealing part, wherein said medicine-accommodation chamber and said diluting solution chamber are made of a transparent film material and said medicine-accommodation chamber is covered with a transparent gas barrier film that substantially prevents permeation of gas and liquid therethrough.
3. The multichamber bag according to any one of claims 1 and 2, wherein said gas barrier film is formed by attaching a substance prepared by vapor-depositing silica or alumina on polyethylene terephthalate (PET) to an olefin resin such as polyethylene (PE).
4. The multichamber bag according to any one of claims 1 and 2, wherein said gas barrier film includes a barrier film layer formed by vapor-depositing silica or alumina on polyethylene terephthalate (PET), polyvinyl alcohol (PVA) and/or an ethylene-vinyl alcohol copolymer (EVOH).
5. The multichamber bag according to any one of claims 1 to 4, wherein said gas barrier film includes a sealant layer formed by kneading a moisture absorbent into a transparent resin material.
6. The multichamber bag according to any one of claims 4 and 5, wherein said moisture absorbent is any one selected from among one of inorganic substances, one of organic substances, one of derivatives thereof, a combination of two or more of the organic substances, and a combination of the inorganic substances and the organic substances, wherein said inorganic substances consist of calcium oxide, aluminum oxide, zeolite, silica gel, dried alum, magnesium sulfate, calcium chloride, sodium sulfate, potassium sulfate, phosphorus pentoxide, sodium carbonate and potassium carbonate, and said organic substances consist of poly(meth)acrylate, carboxymethylcellulose and polyethylene glycol.
7. The multichamber bag according to any one of claims 4 to 6, wherein said resin material comprises one material selected from linear low-density polyethylene (LLDPE), low-density polyethylene (LDPE), polypropylene (PP), ethylene-vinyl acetate copolymer (EVA), acid copolymer, acid ester copolymer and ionomer, or a combination of the materials.
8. The multichamber bag according to any one of claims 4 to 7, wherein said sealant layer is structured so as to have a two-layer structure or a three-layer structure having another transparent resin material that has said moisture absorbent not kneaded therein and is disposed on one side or on each of both sides of the transparent resin material that has said moisture absorbent kneaded therein.
9. The multichamber bag according to any one of claims 4 to 8, wherein said gas barrier film has said sealant layer disposed as the innermost layer of the gas barrier film and a barrier film layer disposed on the outer side of the sealant layer.
10. The multichamber bag according to claim 9, wherein the number of laminated layers of the barrier film layer disposed on the outer side of said sealant layer is set to 1 to 10.
11. A gas barrier film used for the multichamber bag according to any one of claims 1 and 2, wherein said gas barrier film is formed by attaching a substance prepared by vapor-depositing silica or alumina on polyethylene terephthalate (PET) to an olefin resin such as polyethylene (PE).
12. A gas barrier film used for the multichamber bag according to any one of claims 1 and 2, wherein said gas barrier film includes a barrier film layer formed by vapor-depositing silica and/or alumina on polyethylene terephthalate (PET), polyvinyl alcohol (PVA) and/or ethylene-vinyl alcohol copolymer (EVOH).
13. The gas barrier film according to any one of claims 11 and 12, wherein said gas barrier film further includes a sealant layer formed by kneading a mois-



ture absorbent into a transparent resin material.

14. The gas barrier film according to claim 13, wherein said moisture absorbent is any one selected from among one of inorganic substances, one of organic substances, one of derivatives thereof, a combination of two or more of the inorganic substances, a combination of two or more of the organic substances, and a combination of the inorganic substances and the organic substances, wherein said inorganic substances consist of calcium oxide, aluminum oxide, zeolite, silica gel, dried alum, magnesium sulfate, calcium chloride, sodium sulfate, potassium sulfate, phosphorus pentaoxide, sodium carbonate and potassium carbonate, and said organic substances consist of poly(meth)acrylate, carboxymethylcellulose and polyethylene glycol.

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15. The gas barrier film according to any one of claims 13 and 14, wherein said resin material comprises one material selected from linear low-density polyethylene (LLDPE), low-density polyethylene (LDPE), polypropylene (PP), ethylene-vinyl acetate copolymer (EVA), acid copolymer, acid ester copolymer and ionomer, or a combination of the materials.

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16. The gas barrier film according to any one of claims 13 to 15, wherein said sealant layer is structured so as to have a two-layer structure or a three-layer structure having another transparent resin material that has said moisture absorbent not kneaded therein and is disposed on one side or on each of both sides of the transparent resin material that has said moisture absorbent kneaded therein.

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FIG. 1

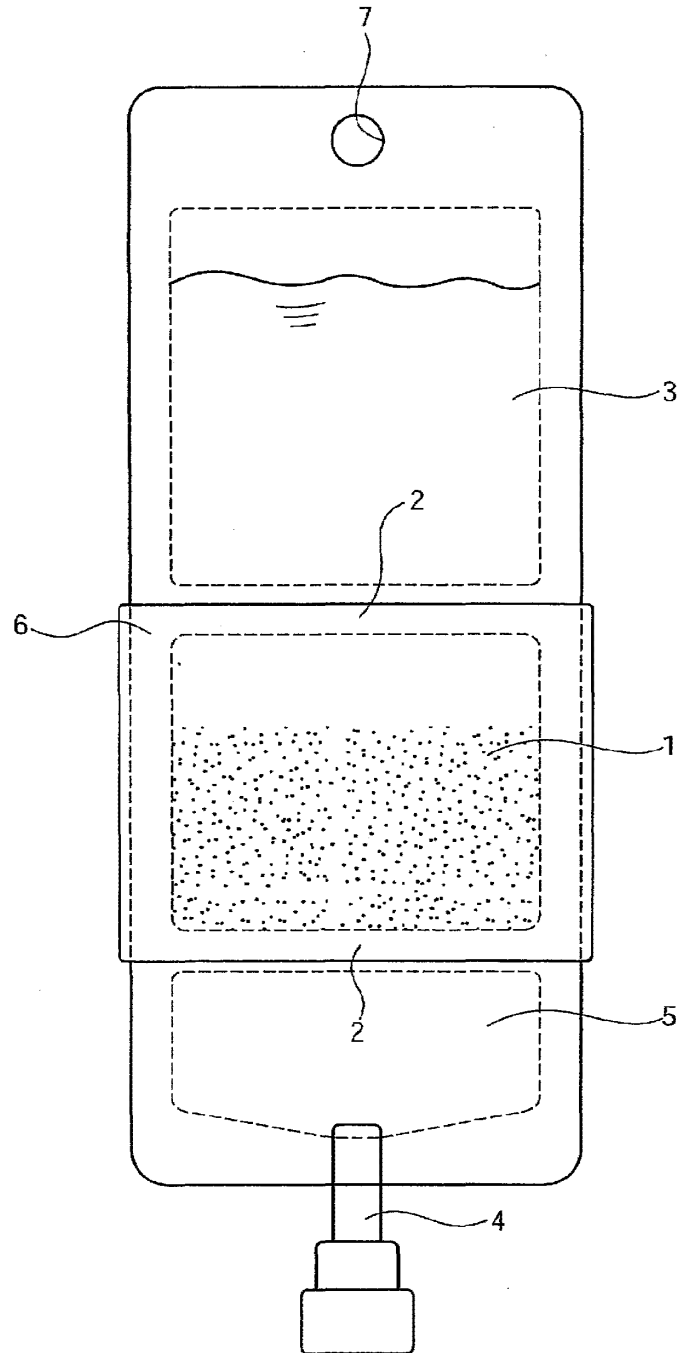


FIG. 2

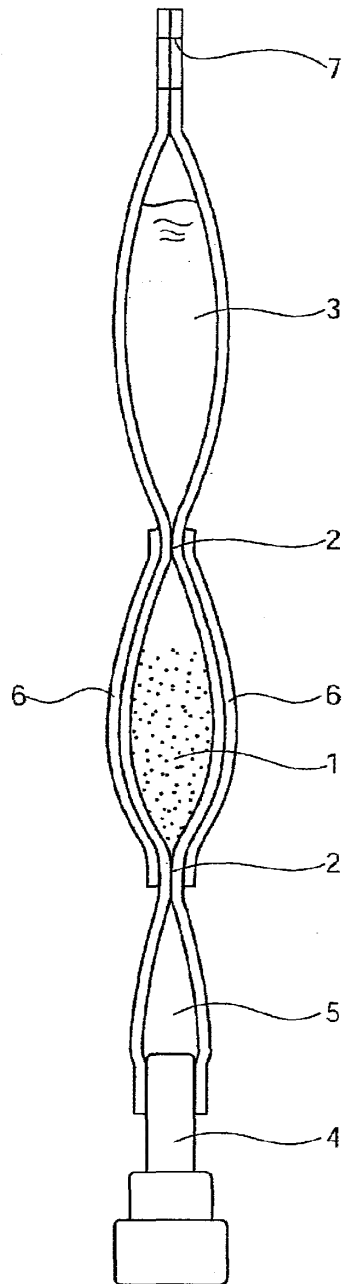
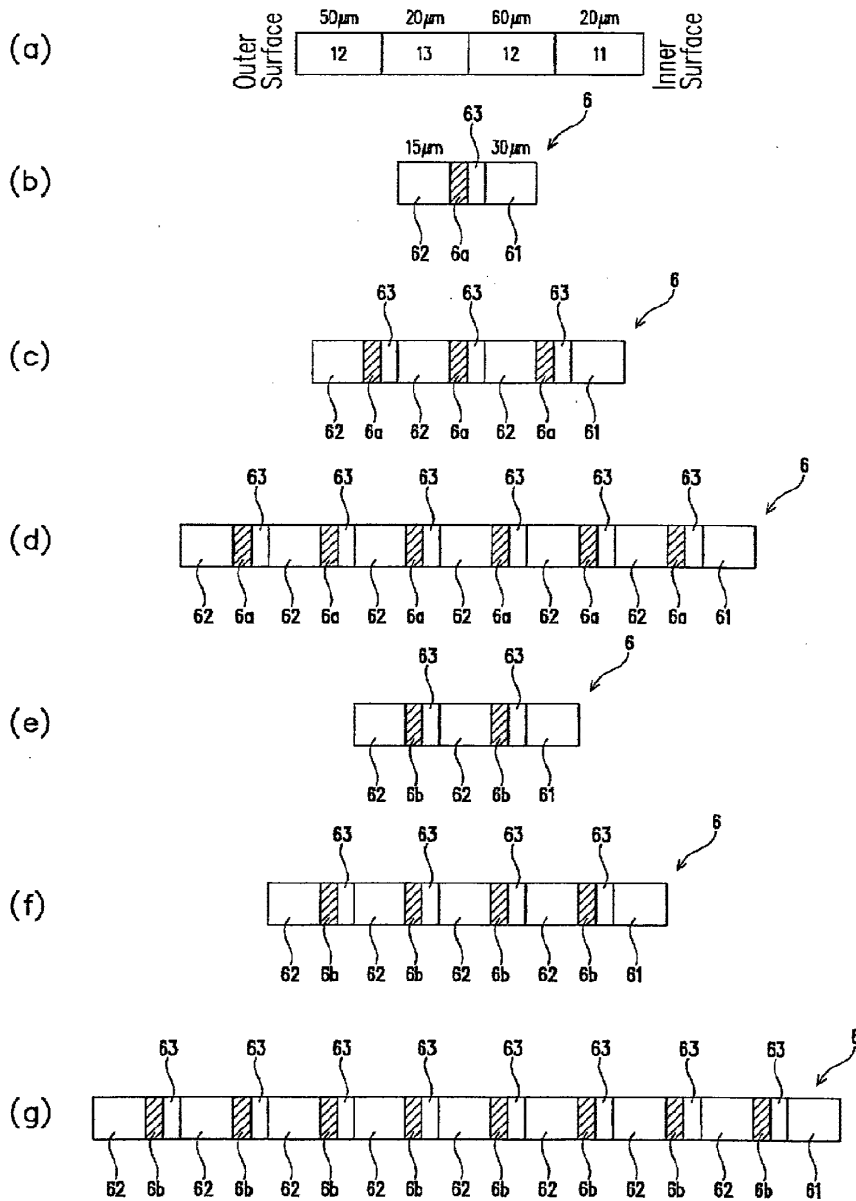
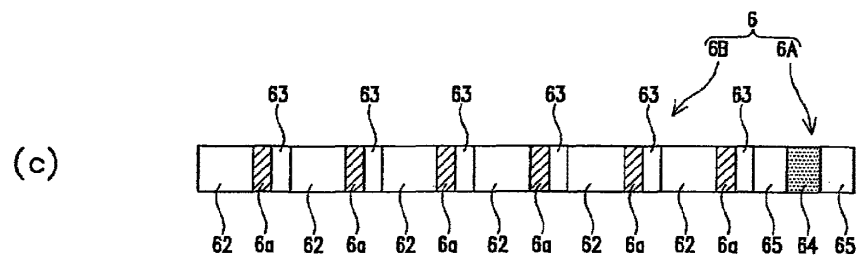
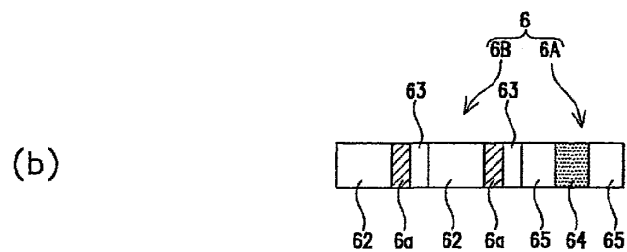
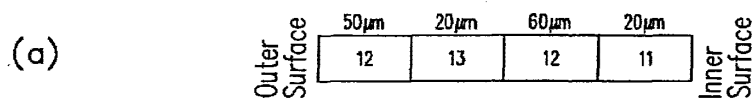


FIG. 3



# FIG. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/319318

| <p>A. CLASSIFICATION OF SUBJECT MATTER<br/>                 A61J1/05(2006.01)1, A61J1/10(2006.01)1</p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>   |  |   |           |  |                       |        |   |                       |        |  |                |        |   |                            |  |   |  |  |   |  |   |   |  |  |  |  |
|---|--|---|-----------|--|-----------------------|--------|---|-----------------------|--------|--|----------------|--------|---|----------------------------|--|---|--|--|---|--|---|---|--|--|--|--|
| <p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols)<br/>                 A61J1/00, A61J1/05, A61J1/10, B65D81/32, B32B15/08</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br/>                 Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2006<br/>                 Kokai Jitsuyo Shinan Koho 1971-2006 Toroku Jitsuyo Shinan Koho 1994-2006</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)</p>   |  |   |           |  |                       |        |   |                       |        |  |                |        |   |                            |  |   |  |  |   |  |   |   |  |  |  |  |
| <p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X<br/>Y</td> <td>JP 2003-159310 A (Otsuka Pharmaceutical Factory, Inc.),<br/>03 June, 2003 (03.06.03),<br/>Par. Nos. [0017] to [0041]<br/>&amp; US 2005/0087456 A1 &amp; EP 1475067 A1<br/>&amp; WO 2003/068136 A1</td> <td>1, 2<br/>3, 4-7, 8-10,</td> </tr> <tr> <td>X<br/>Y</td> <td>JP 2003-104391 A (Nipro Corp.),<br/>09 April, 2003 (09.04.03),<br/>Par. No. [0010]<br/>(Family: none)</td> <td>11<br/>3, 13-16</td> </tr> <tr> <td>X<br/>Y</td> <td>JP 2004-154558 A (Nipro Corp.),<br/>03 June, 2004 (03.06.04),<br/>Par. No. [0016]<br/>(Family: none)</td> <td>12<br/>4, 7, 8-10,<br/>13-16</td> </tr> </tbody> </table> <p><input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.</p> <table border="1"> <tr> <td>* Special categories of cited documents:</td> <td>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"&amp;" document member of the same patent family</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td></td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table> |  |   | Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. | X<br>Y | JP 2003-159310 A (Otsuka Pharmaceutical Factory, Inc.),<br>03 June, 2003 (03.06.03),<br>Par. Nos. [0017] to [0041]<br>& US 2005/0087456 A1 & EP 1475067 A1<br>& WO 2003/068136 A1 | 1, 2<br>3, 4-7, 8-10, | X<br>Y | JP 2003-104391 A (Nipro Corp.),<br>09 April, 2003 (09.04.03),<br>Par. No. [0010]<br>(Family: none) | 11<br>3, 13-16 | X<br>Y | JP 2004-154558 A (Nipro Corp.),<br>03 June, 2004 (03.06.04),<br>Par. No. [0016]<br>(Family: none) | 12<br>4, 7, 8-10,<br>13-16 | * Special categories of cited documents: | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention | "A" document defining the general state of the art which is not considered to be of particular relevance | "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone | "E" earlier application or patent but published on or after the international filing date | "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art | "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | "&" document member of the same patent family | "O" document referring to an oral disclosure, use, exhibition or other means |  | "P" document published prior to the international filing date but later than the priority date claimed |  |
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| X<br>Y  | JP 2003-159310 A (Otsuka Pharmaceutical Factory, Inc.),<br>03 June, 2003 (03.06.03),<br>Par. Nos. [0017] to [0041]<br>& US 2005/0087456 A1 & EP 1475067 A1<br>& WO 2003/068136 A1  | 1, 2<br>3, 4-7, 8-10,   |           |  |                       |        |   |                       |        |  |                |        |   |                            |  |   |  |  |   |  |   |   |  |  |  |  |
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| <p>Date of the actual completion of the international search<br/>                 12 December, 2006 (12.12.06)</p>  |  | <p>Date of mailing of the international search report<br/>                 26 December, 2006 (26.12.06)</p> |           |  |                       |        |   |                       |        |  |                |        |   |                            |  |   |  |  |   |  |   |   |  |  |  |  |
| <p>Name and mailing address of the ISA/<br/>                 Japanese Patent Office</p>   |  | <p>Authorized officer</p>   |           |  |                       |        |   |                       |        |  |                |        |   |                            |  |   |  |  |   |  |   |   |  |  |  |  |
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INTERNATIONAL SEARCH REPORT

International application No.  
PCT/JP2006/319318

| C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |   |                       |
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| Category*   | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
| Y   | JP 2004-296174 A (Toppan Printing Co., Ltd.),<br>21 October, 2004 (21.10.04),<br>Par. Nos. [0021] to [0023]<br>(Family: none) | 5, 6, 8-10,<br>13-16  |

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/319318

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| <b>Box No. II</b>  | <b>Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)</b> |
| <p>This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:</p> <p>1. <input type="checkbox"/> Claims Nos.:<br/>because they relate to subject matter not required to be searched by this Authority, namely:</p> <p>2. <input type="checkbox"/> Claims Nos.:<br/>because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:</p> <p>3. <input type="checkbox"/> Claims Nos.:<br/>because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).</p>   |  |
| <b>Box No. III</b>   | <b>Observations where unity of invention is lacking (Continuation of item 3 of first sheet)</b>          |
| <p>This International Searching Authority found multiple inventions in this international application, as follows:<br/>                 The matter common to claims 1 to 10, claim 11 and claim 12 resides exclusively in "a gas barrier film" and there is no other special technical feature common thereto. Thus, it does not appear that the inventions according to claims 1 to 10, 11 and 12 are so linked as to form a single general inventive concept. As the results of the search, it is found out that the matter common to claim 11 and claims 13 to 16 is not novel because of having been disclosed by document JP 2003-104391 A and, therefore, falls within the category of prior art. Thus, it cannot be regarded as a special technical feature. As the results of the search, it is also found out that the matter common to claim 12 and claims 13 to 16 (continued to extra sheet)</p> <p>1. <input checked="" type="checkbox"/> As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.</p> <p>2. <input type="checkbox"/> As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.</p> <p>3. <input type="checkbox"/> As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:</p> <p>4. <input type="checkbox"/> No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:</p> <p><b>Remark on Protest</b><br/>                 the <input type="checkbox"/> The additional search fees were accompanied by the applicant's protest and, where applicable, payment of a protest fee.<br/> <input type="checkbox"/> The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.<br/> <input checked="" type="checkbox"/> No protest accompanied the payment of additional search fees.</p> |  |

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/319318

Continuation of Box No.III of continuation of first sheet (2)

is not novel because of having been disclosed by document JP 2004-154558 A and, therefore, falls within the category of prior art. Thus, it cannot be regarded as a special technical feature too. Such being the case, the claims have four invention groups (i.e., the inventions according to claims 1 to 10, the invention according to claim 11, the invention according to claim 12 and the inventions according to claims 13 to 16) which have no single general inventive concept.

**EP 1 958 608 A1**

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- JP HEI11276547 B [0002]

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60/740,391 29 November 2005 (29.11.2005) US
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- (72) **Inventors; and**
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WO 2007/073526 A2

(54) **Title:** UNIT DOSE FLEXIBLE CONTAINER

(57) **Abstract:** A pliable single use liquid container and dispensing device for delivery of a precise amount of orally administered liquids across a broad range of viscosities is provide with the container being formed of generally opposed pliable sheets, a first seal joining the first and second pliable sheets and partially defining a liquid-containing chamber, a second seal joining the first and second pliable sheets and partially defining a pressure relieving chamber adjacent to the liquid-containing chamber, a boundary seal joining the first and second pliable sheets between the liquid containing chamber and the pressure relieving chamber, a precisely measured single dose volume of fluent liquid disposed within the liquid containing chamber, the boundary seal being lighter than the first and second seals so that upon application of pressure to the liquid in the liquid-containing chamber the fluid transfer region seal opens to permit the liquid to flow from the liquid- containing chamber into the pressure relieving chamber, a sealed outlet adapted for fluid communication with the pressure relieving chamber for flow of the liquid from the pressure relieving chamber out of the liquid container and sized based on the viscosity of the liquid and the geometry of the dispensing device, the outlet seal adapted to open upon application of fluid pressure from liquid in the pressure relieving chamber for dispensing the liquid from the liquid container and prevent spilling and splashing of the liquid prior to delivery, control the delivery rate of the liquid to the recipient, and provide tactile force flow rate information feedback to the administrator.

## UNIT DOSE FLEXIBLE CONTAINER

## Field of Invention

**[1]** The present invention generally relates to liquid containers and more particularly to a pliable single use liquid container and dispensing device for delivery of an orally administered fluent liquid. Liquid containers are prevalent in numerous areas such as medicines, nutritional supplements, and confections to name a few.

## Background of Invention

**[2]** Many orally administered medicines are available in liquid or otherwise fluent or flow able formulations. For example, children's oral medicines are commonly formulated to be liquid because it is easier for children to swallow the medicine in liquid form than in a solid form, such as pills. Of course, many adult medicines are also available in liquid or fluent form.

**[3]** These liquid formulations are formulated to be administered with a predetermined unit dose. However, economic packaging for unit doses has been difficult to develop. Thus the liquid formulations are packaged in bulk container and options are also supplied for administering a unit dose from these bulk containers. There are a number of conventional options for measuring a proper dose of liquid oral medicine. For example, a person could to pour the medicine into a measuring spoon. Another option is to provide the person with a graduated cylinder that has a spoon integrally formed at its open end. Medicine is poured into the cylinder until the level of the medicine rises to meet a mark corresponding to the proper dose. The dose is administered by tipping the cylinder so the medicine runs out onto the spoon that is then taken into the mouth. Fluent oral medicines are also sometimes sold

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in bottles that have a cap that can function as a dosing cup into which the medicine can be poured. It is also common, particularly with children's medicines, to provide a dual- purpose cap having an eyedropper or syringe extending into a bottle of medicine to draw a dose of the medicine from a container and squirt it into the mouth. Another alternative is an oral syringe. These conventional dosing devices have several drawbacks.

**[4]** Dosing errors can occur when a patient measures his or her own dose or it is measured by a parent or other family member. Patient- or parent-administered doses are often measured under less than ideal circumstances. A patient's ability to measure an accurate dose may be compromised by symptoms of an illness or the environment. In the case of a parent measuring a dose for a child, the parent may be distracted by the conduct of the child, who may be upset, hurting, or crying. The administrator may be tired or the administration may be given in environmental conditions which impede accurate measuring. Similarly, the person may use the measuring cup from a different medicine, either inadvertently or out of convenience.

**[5]** Several of the devices available to deliver a dose of medicine to another person have little in the way of flow rate control. In addition, they provide no sensory cue that the flow rate is appropriate for the receiver. This leads to a "gushing" of medicine out of the mouths of the patient. Caregivers concerned that the lost volume due to the gushing may try to supplement an additional volume without knowing the volume actually lost. This can lead to inadvertent under dosing or over dosing the patient. Some elderly people may not always remember what the proper dose is, especially if they have to keep track of the proper dose for many different medicines they are taking at the

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same time. Furthermore, a portion of the measured dose could spill out of the dosing device on its way to the mouth.

**[6]** Another problem with conventional dosing methods from a bulk container is that many consumers may feel that it is not convenient to measure an accurate dose and either overdose or under dose. For example a consumer may not want to measure out an accurate dose and instead just take a small drink from a bottle. Even over the counter medicines may need to be accurately measured.

**[7]** Some conventional dosing devices can also be unsanitary. For example, a residue of medicine and saliva is likely to remain on the dosing device. A thorough washing could remove this residue, but this is often inconvenient, especially if a person has just self-administered medicine to combat illness and there is no healthy person available to wash the device. If more than one person uses the same dosing device, failure to wash the device thoroughly after each, may lead to the people spreading germs to each other.

**[8]** Accordingly, there is a need for a product that allows convenient accurate unit dosing of fluent oral medicines and that avoids the aforementioned problems.

**[9]** Similar issues are found in administering nutritional supplement continue to gain in popularity. Historically, nutritional supplements consisted of vitamins in pill format. Today, there are various formulations of vitamins, minerals, and protein supplements. Many formulations are being provided in liquid form for convenient use during activity, and for those who prefer liquid delivery to pills.

**[10]** Nutritional supplements also represent an area of greatest over dose potential. Many supplements are

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formulated many times higher than the government's daily nutritional requirements because the FDA does not regulate nutritional supplements as they would a medication. The "more is better" perception is quite strong among those that take nutritional supplements.

**[11]** Similarly the nutraceutical field is an area in which nutritional supplements are expanding into. Designed for both competitive athletes and very busy persons who do not have time to eat proper meals, nutraceuticals provides a fast, convenient means for delivering calories and depleted vitamins and minerals. Many athletes like runners and skiers compete with nutraceutical products attached to their jerseys. The products are inconvenient, as they require tearing in order to open them. In addition, the torn off portion of the package becomes an environmental issue requiring the athlete to carefully store the tiny tear off pieces until completion of the event.

**[12]** Accordingly, there is a need for a product that allows economical, convenient accurate unit dosing of fluent oral nutritional supplements and nutraceuticals that avoids the aforementioned problems.

**[13]** Another area where one may find someone receiving an oral single unit dose is in the confections industry which is becoming more and more competitive. Aimed primarily at youth, manufacturers are increasingly considering unique packaging as a means of differentiating themselves from their competitors. Packaging that adds an element of fun while delivering the confection is being sought after.

**[14]** It is conceivable that a provider of a confection such as a chocolate confections might want to package a liquid chocolate in this delivery system and utilize a powder separated from a liquid which is then mixed immediately prior to administration.

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**[15]** Accordingly, there is a need for a packaging product that allows convenient accurate dosing of fluent oral liquids, whether initially packaged as a fluent or mixed just prior to administration. In addition this packaging must not add an appreciable expense to the cost of manufacture.

**[16]** Whiting, patent number 4,268,531, teaches of a condiment package containing a single use of ketchup, mustard, etc. However, Whiting requires a tearing open of the package for dispensing. If one were to try to open the package by just squeezing the package, the pressure that would need to be generated to separate the seal would cause the liquid to gush or splatter upon separation of the seal. Conversely if one attempts to make the seal such that a slight pressure will separate the seal then premature actuation of the seal may occur from routine handling.

**[17]** Redmond, patent number 6,415,939, teaches a reclosable outlet on a disposable package. Redmond also incorporates folding in the design of his invention. O'Reilly, patent number 5,373,966, teaches a bag in a bag method incorporating 3 plies of film in the design. In addition, O'Reilly uses baffles to prevent spilling and splashing from occurring during delivery of the liquid. Finally, Staar, patent number 4,331,264, teaches thermoforming the package to dispense pasty liquids at a constant rate. Staar incorporates a blocking wall to achieve a constant flow rate. Such a construction would add an unacceptable expense to many packaged products.

**[18]** None of the aforementioned patents teach a method for providing an adjustable flow rate based on tactile information feedback to the administrator, across a range of fluid viscosities, in an economic package. None of the aforementioned patents teach how to prevent inadvertent

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discharge of the fluid without the use of a baffle or blocking wall. None of the aforementioned patents teach a method for preserving the cleanliness of the fluid path prior to dispensing. None of the disclosures describe a device which can economically package a unit dose, prevent premature rupture during routine shipping and handling and provide for the accurate, controlled administration at the desired time.

#### Summary of the Invention

[19] A pliable single use liquid container and dispensing device for delivery of a precise amount of orally administered liquids across a broad range of viscosities, the container is provided with the container including a first and second generally opposed pliable sheets, a first seal joining the first and second pliable sheets and partially defining a liquid-containing chamber, a second seal joining the first and second pliable sheets and partially defining a pressure relieving chamber adjacent to the liquid-containing chamber, a boundary seal joining the first and second pliable sheets between the liquid-containing chamber and the pressure relieving chamber and partially defining the liquid-containing chamber and the pressure relieving chamber, a precisely measured single dose volume of fluent liquid disposed within the liquid-containing chamber, the boundary seal including a fluid transfer region seal forming at least a portion of the boundary seal which is lighter than the first and second seals so that upon application of pressure to the liquid in the liquid-containing chamber the fluid transfer region seal opens to permit the liquid to flow from the liquid-containing chamber into the pressure relieving chamber, the geometry of the portion based on the viscosity of the

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liquid, an outlet adapted for fluid communication with the pressure relieving chamber for flow of the liquid from the pressure relieving chamber out of the liquid container and sized based on the viscosity of the liquid and the geometry of the dispensing device, and a lighter outlet seal adapted to open upon application of fluid pressure from liquid in the pressure relieving chamber for dispensing the liquid from the liquid container, the lighter outlet seal being located in the outlet at the periphery of the liquid container for closing the outlet and the pressure relieving chamber, and inhibiting ingress of foreign matter into the outlet and pressure relieving chamber prior to administering the liquid, and for working in combination with the dispensing device to prevent spilling and splashing of the liquid prior to delivery, control the delivery rate of the liquid to the recipient, provide tactile force flow rate information feedback to the administrator.

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## Brief Description of the Drawings

- [20]** Fig. 1A is a front elevation of one embodiment of a container of the present invention;
- [21]** Fig. 1B is a side elevation thereof;
- [22]** Fig. 2A is a section taken through the cutting plane 2A-2A shown on Fig. 1A;
- [23]** Fig. 2B is the section of Fig. 2A except that the shape of the container is deformed as if someone were squeezing the container;
- [24]** Fig. 2C is the section of Fig. 2B except that a fluid transfer seal of the container has opened;
- [25]** Fig. 2D is a sectional view similar to the sectional views of Figs. 2A-2C except that both the fluid transfer seal and outlet seal have opened and liquid is flowing out of the container;
- [26]** Fig. 3 is a schematic view of a person administering a dose of liquid from the single use container of the present invention to a recipient's mouth;
- [27]** Fig. 4A is a front elevation of a single use liquid container of the present invention which is particularly suited for viscous liquids and has an untapered dispensing device;
- [28]** Fig. 4B is a section taken through the cutting plane 4B--4B shown on Fig. 4A;
- [29]** Fig. 5A is a front elevation of a single use liquid container of the present invention having a dispensing device which is particularly suited for liquids with low viscosity and has a short tapered region separating two untapered regions;
- [30]** Fig. 5B is a section taken through the cutting plane 5B--5B shown in Fig. 5A;
- [31]** Fig. 6A is a front elevation of a single use liquid container of the present invention having a dispensing

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device that has a short tapered region adjacent an outlet;  
This embodiment would likely be used for more viscous  
fluids

**[32]** Fig. 6B is a section taken through the cutting plane  
6B--6B shown in Fig. 6A;

**[33]** Fig. 7A is a front elevation of a single use liquid  
container of the present invention which is particularly  
suited for viscous liquids and has two spaced apart  
boundary seals separating the liquid-containing chamber  
from the fluid dispensing device;

**[34]** Fig. 7B is a section taken through the cutting plane  
7B--7B which is shown on Fig. 7A;

**[35]** Fig. 8A is a front elevation of a single use liquid  
container of the present invention having a liquid chamber  
dividing seal that separates the liquid/powder-containing  
chamber into two chambers;

**[36]** Fig. 8B is a section taken through the cutting plane  
8B--8B which is shown on Fig. 8A;

**[37]** Fig. 8C is a section similar to the section shown in  
Fig. 8B except that the container has been deformed as if  
someone were squeezing it;

**[38]** Fig. 8D is a section similar to the sections shown  
in Figs. 8B and 8C except that the liquid chamber dividing  
seal has opened as if someone had squeezed the container;

**[39]** Fig. 9 is a perspective of a package of single use,  
pliable liquid box containers with a piece of a box of the  
package broken away to show the liquid containers held  
therein;

**[40]** Fig. 10 is a schematic, fragmentary section of a  
sheet of cardstock laminated to a gas and/or water vapor  
barrier film;

**[41]** Fig. 11 is a perspective package including a of a box containing an overpouch which in turn holds a plurality of liquid containers;

**[42]** Fig. 12 is a perspective of a package of single use liquid containers including a box having a piece of the box broken away to show two different groups of single use liquid containers hold different doses of liquid ;

**[43]** Fig. 13 is a front elevation of a set of two different groups of single use liquid containers illustrating the different sizes of the containers;

**[44]** Fig. 14 is a perspective of a ribbon of single use liquid containers of the present invention;

**[45]** Fig. 15 is a perspective of a package of single use liquid containers including a box showing one overpouch containing liquid containers that hold a first type of liquid and a second overpouch holding liquid containers that contain a different type of liquid.

#### Detailed Description of the Invention

**[46]** Referring to Figs. 1A and 1B, for example, a first embodiment of a single use pliable container (generally indicated at 1) includes a single dose volume of liquid 2. The container further comprises first and second generally opposed pliable sheets designated at 3 and 5, respectively. A first seal 7 extends around a lower perimeter of the sheets 3, 5 and joins the sheets to partially define a liquid-containing chamber 9. A second seal 13 extends along most of an upper perimeter of the sheets 3, 5 and joins the sheets to partially define a pressure relieving chamber 15 adjacent the liquid-containing chamber 9. A boundary seal 17 joins the first and second sheets 3, 5 between the liquid-containing chamber 9 and the pressure relieving chamber 15. In the embodiment shown in Figs. 1A

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and 1B the entire boundary seal 17 constitutes a fluid transfer region seal. However, it will be understood that the extent of the fluid transfer region seal may be limited to only a portion of the boundary seal 17 without departing from the scope of this invention. The liquid-containing chamber 9 is defined by the first seal 7, the boundary seal 17, and the first and second pliable sheets 3, 5. The pressure relieving chamber 15 is defined by the second seal 13, the boundary seal 17, an outlet seal 33, and the first and second pliable sheets 3, 5.

**[47]** The volume of liquid 2 corresponding to a single dose is sealed within the liquid-containing chamber 9. The liquid 2 may be over-the-counter or prescription medicine, nutritional supplements, confections, or other liquids one might consume orally. Although a "liquid" is described herein, the present invention is suitable for any substance in a flow able or "fluent" form, whether liquid or solid across a range of viscosities. The second seal 13 is discontinuous in an end portion 25 of the pressure relieving chamber 15 to define an outlet (generally indicated at 27) from the pressure relieving chamber 15 to the outside of the container 1. The outlet seal 33 joins the first and second sheets 3, 5 at the outlet 27 to sealingly close the outlet and separate the pressure relieving chamber 15 from the exterior of the container 1, thereby preventing contaminants from entering the pressure relieving chamber 15 prior to use.

**[48]** In the embodiment shown in Figs. 1A and 1B, the first and second seals 7, 13 form part of a perimeter seal joining the first and second pliable sheets 3, 5 substantially around their perimeters. The first and second seals 7, 13 need not be located at the perimeter of the container 1. However, the arrangement makes an

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efficient use of the material forming the first and second sheets 3, 5. The outlet seal 33 is a continuation of the second seal 13 around the perimeter, but as described below, is a lighter seal.

**[49]** The fluid transfer region seal 17 and outlet seal 33 are lighter than the first and second seals 7, 13. For purposes of this application, the strength of a seal is defined by the force that is required to separate the first and second sheets 3, 5 at the seal or to rupture the seal. Thus, lighter seals separate or rupture upon application of a smaller separating force than stronger seals. For example, the first and second seals 7, 13 may comprise conventional permanent heat welds. The fluid transfer region seal 17 and outlet seal 33 may comprise peel seals. Instruction on how to form a peel seal may be found in many references including U.S. Patent Nos. 6,309,673; 6,319,243; 5,865,793; 5,577,369 and 5,209,347 which are hereby incorporated by reference. As noted in the foregoing patents, it is possible to vary the strength of a peel seal by varying the materials selected, seal geometry, temperature, pressure and/or time used to form the seal. It is also noted that the width of any seal can be increased to increase the strength of the seal, and vice-versa. Those skilled in the art will recognize that various adhesives could also be used to form the seals 7, 13, 17, 33. It is preferable, for reasons to be described later, for the outlet seal 33 to be lighter or rupture at a lower pressure than the fluid transfer region seal 17. For example, the outlet seal 33 may comprise a seal formed by the heat and pressure associated with the shearing action of a knife or other cutting tool used to cut the first and second sheets (not shown). Those skilled in the art will recognize that a variety of sealing technologies can be

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applied to form the various seals 7, 13, 17, 33 in the pliable single dose container 1 without departing from the scope of this invention.

**[50]** It is contemplated that a variety of single- or multi-layer films or film laminates could be used to form the sheets 3, 5. The first and second sheets 3, 5 should be made of materials (e.g., polymers) that are compatible with the technologies used to form the various seals 7, 13, 17, 33. For example the realm of single and multiple layer polyolefins like polyethylene and polypropylene, or the realm of foils and foil/polyolefin laminates. Those skilled in the art will know how to select or design films that are suitable for use with any of the conventional sealing technologies.

**[51]** The sheets 3, 5 also have to be chemically and physically compatible with the particular liquid 2 in the container 1. The oral liquid 2 should not leach undesirable chemicals out of the sheets 3, 5 or otherwise react chemically with the sheets 3, 5. It may be desirable for the first and second sheets 3, 5 to be transparent to allow viewing of the contents of the liquid containing chamber 9 prior to use. On the other hand, the first and second sheets 3, 5 may be opaque if needed to protect the liquid 2 from exposure to light, which can degrade some liquids. In some cases, it may be necessary or desirable to include a gas barrier and/or a water vapor barrier layer (not shown) in the first and second sheets to prevent water vapor from escaping the liquid-containing chamber. A gas vapor barrier may also be necessary or desirable to prevent oxidation of the liquid. Information regarding the construction of films having gas vapor barrier properties is provided references such as in U.S. Patent Nos. 4,692,361; 5,098,202; and 6,083,587. Films that include

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water vapor barriers are described in such references as U.S. Patent Nos. 4,912,101; 6,541,087 and 6,410,124. The materials used in the sheets 3, 5 may also be selected to block light or other electromagnetic radiation if this is necessary or desirable to protect the liquid. Such films are described in such references as U.S. Patent Nos. 6,455,161; 6,391,946; and 6,306,936.

**[52]** As shown in Figs. 1A and 1B, the volume of the liquid-containing chamber 9, is selected in coordination with the volume of the liquid 2 to be contained so that the fluid pressure from the dose of liquid in the liquid-containing chamber 9 presses the first and second sheets 3, 5 outwardly, as shown in Figs. 1A and 1B. Film resins are selected specifically with a certain amount of stiffness so that fluid pressure can increase when the first and second sheets 3, 5 are pressed by the user. Should the film be too elastic, upon seeking to apply pressure to the fluid within the chamber 9, the film may stretch and the administrator would have difficulty in creating sufficient fluid pressure to cause the fluid transfer region seal to open. The volume of liquid 2 in the chamber 9 may be closely the same as the volume of the chamber (i.e., the chamber is substantially filled by the liquid). This will facilitate dispensing of the liquid 2, as will be described later. At the same time, care must be taken so the fluid pressure created in the liquid-containing chamber 9 during handling prior to use is maintained below the level that will rupture fluid transfer region seal 17.

**[53]** In the embodiment shown Figs. 1A and 1B, the pressure relieving chamber 15 has a geometry that generally tapers from the boundary seal 17 to the outlet 27. The taper is formed by the shape of the second seal 13, which runs along both sides 47 of the pressure relieving chamber.

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The particular geometry of the pressure-relieving chamber may be tailored to suit the fluid properties of the oral liquid 2. As will be described later, the geometry of the pressure relieving chamber 15, and the size of outlet 27 are important because they moderates the flow of the liquid 2 out of the container 1 upon rupture of the outlet seal 33 and forms the flow into a controlled stream 63 (Fig. 3) during dispensing of the liquid. When the geometry of the pressure relieving chamber 15 and the size of outlet 27 are selected based on the viscosity of the oral fluid, the administrator will receive a sensory feedback of the tactile force required to control the flow rate of the liquid exiting outlet 27. A higher tactile force feedback is associated with a high flow rate and conversely a lower tactile force feedback reflects a low flow rate. One feature of the present invention is that the geometry of the pressure relieving chamber 15 may be varied to suit oral liquids having different fluid properties (e.g., different viscosities). Accordingly, the pressure relieving chamber 15 may be shaped differently from the shapes described herein without departing from the scope of this invention.

**[54]** The perimeter of the container 1 may be sized and configured such that the container fits in the palm of the user (Fig. 3) The perimeter of the container 1 is also tapered at the end portion 25 so that it has a shape that fits comfortably into a person's mouth especially the mouth of a child. In the embodiment shown in Figs. 1A and 1B, for example, the end portion 25 is tapered. The shape of the liquid containing chamber 9 is designed to fit comfortably between the thumb and fingers of the administrator's hand thus allowing the generation of fluid pressure sufficient enough to cause the fluid transfer

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region seal 17 to open naturally. The shape of the end portion 25 is related to the geometry of the pressure relieving chamber 15, but may be unrelated without departing from the scope of the present invention.

**[55]** Basic operation of a pliable single dose liquid container of the type shown in Figs. 1A and 1B, is shown in Figs. 2A-2D in conjunction with Fig. 3. By squeezing the container 1, person can deform the container 1 as illustrated in Fig. 2B. Increased fluid pressure in the liquid-containing chamber 9 from the squeezing results in separating forces (indicated by arrows 53) being applied to the fluid transfer region seal 17. As shown in Fig. 2C, the separating forces 53 can eventually cause the fluid transfer region seal 17 to open which, in the case of a peel seal, takes the form of the first and second sheets 3, 5 peeling apart at the fluid transfer region seal 17. Generally, it is desirable for the fluid transfer seal 17 to open in a way that is predetermined in size and direction. Consequently, the oral liquid 2 flows into the pressure relieving chamber 15 and the person squeezing the container 1 can feel a drop in resistance to squeezing. This reduces the pressure in the fluid and signals the user to reduce the pressure applied by squeezing before any of the liquid 2 is expelled from the container 1.

**[56]** Moreover when properly configured the volume of the pressure reducing chamber is supplied so that the pressure of the fluid falls below the pressure which is necessary to separate the outlet seal and expel the fluid from the device. As shown in Fig. 2D, additional squeezing of the container 1 causes separating forces (indicated by arrows 55) on the outlet seal 33 to open in a similar controlled manner. Because the outlet seal 33 is lighter than the fluid transfer region seal 17, fluid pressure does

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not build up as much in the opening of the outlet seal as it did during in the opening of the fluid transfer region seal. Consequently, there is less of a tendency for the oral liquid 2 to spurt out upon rupture of the outlet seal 33 as there would be if the outlet seal 33 were made stronger. The person squeezing the container 1 will also feel a drop in resistance to squeezing upon rupture of the outlet seal 33. This will signal the user that fluid liquid 2 has begun to flow through the outlet 27. As shown in Fig. 3, a person 51 can dispense the single dose of oral liquid 2 from the container 1 to a person's mouth 61 by continuing to squeeze the container 1. Although Fig. 3 shows a person 51 administering a dose of liquid 2 to another person's mouth 61, it is understood that a person could also administer a dose of liquid to himself or herself without departing from the scope of this invention.

**[57]** During the dispensing of the oral liquid 2, the pressure relieving chamber 15 throttles the flow from the liquid-containing chamber 9 to the person's mouth 61. The person 51 squeezing the container is provided continuous tactile feedback about the dispensing from the resistance to the squeezing. In this way, the person 51 administering the dose can feel whether there is still liquid 2 in the container 1 and can feel how fast the liquid is flowing from the outlet 27. The shape of the pressure relieving chamber 15 also forms the flow of liquid 2 into a controlled stream 63, as shown in Fig. 3. The tactile feedback and directional control provided by the container 1 are especially advantageous when a parent administers a dose of medicine to a child at night because these features allow the parent to successfully and reliably administer an accurate dose of medicine in the dark.

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**[58]** Figures 4A-8D show a number of additional exemplary embodiments which will be described to illustrate some of the ways the basic single use oral liquid container could be modified to suit a variety of needs. The embodiments are intended to be representative of the design flexibility and adaptability of containers of the present invention. The embodiments are not intended to be an exhaustive list of containers that are within the scope of this invention. Each of the embodiments shown in Figs. 4A-8D is substantially the same as the embodiment shown in Figs. 1A and 1B except as noted. Reference numbers used to identify parts of the embodiments shown in Figs. 4A-8D correspond to the reference numbers used to describe the embodiment shown in Figs. 1A and 1B except that the 100s digit will be indexed from one embodiment to the next.

**[59]** Figures 4A and 4B show a container 101 having a pressure relieving chamber 115 that is not tapered. This construction permits a highly efficient use of materials in the manufacture of the container 101. In addition, this embodiment would be utilized for liquids that are extremely viscous in nature. The container 101 is otherwise the same in construction and operation as container 1.

**[60]** Figures 5A and 5B show a container 201 having a pressure relieving chamber 215 that has a short tapered region 265 between a boundary seal 217 and an outlet 227 of the container 201. The short tapered region 265 separates a first, wider untapered portion 267 from a second narrower untapered portion 269 including the outlet 227. The outlet 227 is sealed by an outlet seal 233 as in the previous embodiments. This embodiment is particularly suitable for relatively non-viscous fluids.

**[61]** Figures 6A and 6B show a container 301 having a dispensing device 315 including an untapered portion 371

and a short tapered portion 373 adjacent an outlet 327 of the container 301. The untapered portion 371 extends roughly 60% of the length of the dispensing device 315. The tapered portion 373 curves sharply to its intersection with the outlet 327. This embodiment is particularly suitable to very viscous liquids.

**[62]** Figures 7A and 7B show a container 401 having first boundary seal 479 forming a first fluid transfer region seal and a second boundary seal 475 forming a second fluid transfer region seal 477. The first and second boundary seals 479, 475 are similar to the first boundary seal 17 of the container 1 shown in Figs. 1A and 1B except that the first and second boundary seals 479, 475 are more narrow in width in comparison to the boundary seal 17 of the container 1 shown in Figs. 1A and 1B. Each fluid transfer region seal 481, 477 is co-extensive with the respective boundary seal 479, 475. However, the fluid transfer region seals 481, 477 could easily be limited (for example) to aligned portions of the first and second boundary seals 479, 475. It is also contemplated that the first and second boundary seals 479, 475 could have different strengths. This embodiment could be ideal for applications where the environmental forces surrounding the container are harsher. For instance, should someone place a single use liquid container into a brief case or shaving kit where that container may feel pressure from other items resting on it during the course of travel then seal 475 would provide an added safety precaution against premature dispensing. In addition, this embodiment could provide an additional level of child proofing to the invention

**[63]** The container 501 shown in Figs. 8A and 8B has a liquid chamber dividing seal 585. The liquid chamber dividing seal 585 divides the liquid-containing chamber

into a primary liquid-containing chamber 589 and a secondary liquid or powder-containing chamber 591. As illustrated the entire dividing seal 585 is formed more lightly than a perimeter seal 507, 513 to facilitate a controlled opening. However, it is only necessary for a portion of the dividing seal 585 to be formed for such a controlled opening. The container 501 further includes a boundary seal 517 separating the liquid container chambers 589, 591 from a dispensing device 515. To provide controlled activation it is preferred that the dividing seal 585 is lighter than the boundary seal 517. The primary chamber 589 may hold one liquid component 593 and the secondary chamber 591 may hold a different liquid or powder component 595. This container 501 is suited for use when there is a need to maintain the liquids as separate components 593, 595 until use. For example, the individual components 593, 595 may be more stable than the combination of the components so that the shelf life of the product can be increased by keeping the components 593, 595 separate.

**[64]** As shown in Figs. 8C-8D, when a person squeezes the container 501, the liquid chamber dividing seal 585, which is lighter than the first and second seals 507, 513 opens to establish fluid communication between the primary and secondary chambers 589, 591 and to allow mixing of the components 593, 595. After mixing, further squeezing of the container 1, boundary seal 517 opens. Once boundary seal 517 has opened, continued squeezing opens the outlet seal 533 of container 501 as has been previously described for other embodiments. Additional mixing of the components 593, 595 will occur throughout the opening process.

**[65]** Referring back to Figs 2A-2D, for convenience, a liquid container 1 of the present invention may be designed to allow one-handed opening as shown in Fig. 3. This can

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be done by making the fluid transfer region seal 17 sufficiently weak that an adult having average hand strength can squeeze the container 1 hard enough in one hand to cause the fluid transfer region seal 17 to open (and any other open able seals) in that container as well as the outlet seal 33. At the same time the fluid transfer region seal 17 should be strong enough to prevent accidental opening of fluid transfer region (e.g., during transport and handling) seal. Furthermore, the fluid transfer region seal 17 should also be strong enough that it is difficult for children to open the container 1 to provide adequate childproofing.

**[66]** In contrast, the outlet seal 33 may be substantially lighter because with little or no fluid in the pressure relieving chamber 15, the outlet seal 33 should not be subjected to any fluid pressure except during the opening sequence (shown in Figs. 2A-2D). Furthermore, it is anticipated that a weak outlet seal 33 will be desirable for most applications because the weakness of the outlet seal 33 facilitates opening of the outlet 27 without much buildup of fluid pressure in the dispensing device, which decreases the tendency for the liquid material 2 to spurt out upon opening of the outlet seal 33. For example, an outlet seal strength of only one pound per inch is sufficient to prevent the spurting out of liquid upon opening of the fluid transfer region seal and can adequately prevent ingress of soil and microbes. It is also contemplated that the outlet seal 33 may be as strong as or stronger than the fluid transfer region seal 17, in circumstances in which additional protection against unintended opening is desired for example, without departing from the scope of this invention. Permanent seals will have a minimum seal strength of 12 pounds per inch.

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It is not uncommon to have permanent seal strengths in the 25 to 30 pound per inch range. In the cases of permanent seals, the strength of the film determines the failure strength as the film breaks before the seal peels. In a preferred embodiment the strength of the fluid transfer region seal will be in the 3 to 7 pounds per inch range. This is sufficient strength for the seal to resist peeling during shipping and handling, and yet the average human hand can generate internal pressures sufficient to cause this seal to peel.

**[67]** As shown in Fig. 9, a package (generally indicated at 602) includes a plurality of single use pliable liquid or otherwise fluent oral liquid containers (generally indicated at 601) may be packaged together in a box 604 (broadly, "a receptacle") for sale to consumers. Thus, instead of a bottle containing a single volume of liquid for multiple doses to be measured by the user, a box 604 of single dose containers 601 is provided. The single dose containers 601 require no measuring in use and may have particular benefit for over-the-counter liquids. The box 604 has a gas and/or water vapor barrier 606 to increase shelf life of the containers. The box 604 may be formed out of laminated sheets of material having gas and /or water vapor barrier properties. As shown in Fig. 10 for example, laminated sheets 635 may be formed of a barrier film 606 having gas vapor barrier properties laminated to cardstock 618 (or cardboard). United States Patent No. 5,147,480, which is incorporated herein by reference, teaches how to construct a corrugated cardboard laminate having a vapor barrier film.

**[68]** Referring to Fig. 1, it is not essential to the present invention that the box 604 comprises a gas and/or water vapor barrier 606. As noted earlier, it may be

desirable for the first and second sheets 3, 5 of each container 1 to comprise a gas and/or water vapor barrier to increase shelf life by reducing the flow of water vapor out of the container 1 or by reducing the flow of oxygen into the container 1. If the containers 601 already have enough of a gas and/or water vapor barrier to provide the desired shelf life, the gas and/or water vapor barrier 606 may be omitted from the box 604. However, it may be difficult or expensive to obtain sheets having gas and/or water vapor barriers that can be made into a container 601 and that are also compatible with the particular oral liquid in the container. A gas and/or water vapor barrier 606 may be provided in the box 604 as an alternative to or in combination with a gas and/or water vapor barrier in the containers 601 themselves. Because the box 604 will not come in direct contact with the liquid, a wider range of materials may be used to form the gas and/or water vapor barrier 606 in the box 604 without concern about compatibility of the gas and/or water vapor barrier with the liquid. The gas vapor barrier 606, if provided, completely surrounds an interior 616 of the box 604 until the consumer opens the box. Thus, the box 604 is resistant to the transmission of water vapor and oxygen between the interior 616 and exterior of the box. Accordingly, the containers 601 are maintained in a protective environment that is conducive to long shelf life.

**[69]** Furthermore, a packet 608 containing an oxygen scavenger, such as iron oxide or a similar oxygen scavenging chemical, may be placed inside the box 604 to eliminate oxygen from the interior 616 of the box 604 and to maintain a low-oxygen environment for the containers 601. The box 604 may also be designed to be less pliable than the containers 601 to shield the containers from the

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physical abuse of rough handling. For example, the cardstock 618 is selected to be durable enough to protect the containers 601 from damage if someone drops the box 604. Likewise, the box can be opaque to protect the containers 601 from exposure to light, including ultraviolet light, which may degrade the liquid in each container.

[70] In order to allow printing to be placed on the exterior of the box 604, the laminated sheets 635 may be positioned so the cardstock layer 618 faces outward. Thus, printing on the cardstock 618 will be visible on the exterior of the box 604. The exterior surface of the box 604 may be designed to receive printed brand names 626, product logos 632, and directions and precautions 628 for use of the containers 601.

[71] Figure 11 shows an alternative package 702 containing a plurality of single use pliable oral liquid containers 701. The containers 701 are first placed in an overpouch 724. The overpouch may be formed by partially sealing two sheets of gas and/or water vapor blocking film together leaving an opening for receiving the containers 701 therein. Then the containers 701 may be sealed within the overpouch 742. For additional protection, the overpouch 742 may be placed inside a cardboard or cardstock box 704. Any directions 728, brand names 726, or the like can be printed on the box 704. The overpouch 742 is resistant to transmission of water vapor or oxygen through the overpouch. Accordingly, the containers 701 are in a protective environment that is conducive to long shelf life. Packet 708 of oxygen scavenging material may be sealed inside the overpouch 742 with the containers 701 for additional protection.

**[72]** Different single use containers may be packaged together in the same package, whether it be a gas and/or water vapor barrier package or otherwise. As shown in Fig. 12, for example, the contents of a single package 802 could comprise a plurality of containers 801 containing a first (smaller) dose of oral liquid and a second plurality of containers 801A containing a second (larger) dose of the liquid together in a single box 804. Figure 13 shows a set of containers 899 including a plurality of containers 801 containing a smaller dose and a plurality of containers 801A containing a larger dose that would be suitable for packaging together. Referring again to Fig. 12, the package 802 could include containers (801, 801A, etc.) holding any number of different doses. Thus, a family including multiple children of different ages and/or sizes could meet all its needs by purchasing one package 802 of single use liquid oral containers 801, 801A notwithstanding the fact that different children require different doses of the oral medicines, nutritional supplements, or confections.

**[73]** As one variation, the package 602, 702, 802 could include two or more different liquids. These liquids might include two or more groups of single use containers, each group containing one of the following: a pain reliever; an allergy medicine; an anti-motion sickness drug; and an antacid. The drugs could be packaged together for convenience of travelers, who may not have room to pack a full package of each medicine separately. Other combinations of drugs could be packaged together in a similar manner. In order to allow the consumer to easily and reliably distinguish the containers containing different drugs in the same package the liquid oral medicines could be formulated to have distinct appearances.

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For example, the color or concentration of the liquid oral medicine may be altered so the different containers have a different color.

**[74]** As shown in Fig. 14, a plurality of single use containers 901 may be provided in a continuous ribbon 962 of detachably connected containers. The ribbon 962 may comprise a series of individual containers 901 connected along a portion of their perimeter seals 907, 913. Perforations 954 between individual containers 901 may be provided to allow easy detachment of containers 901 from the ribbon 967. Those skilled in the art will recognize that conventional form-fill-seal processes can be modified to produce a ribbon 962 of containers 901. Several advantages may be obtained by packaging a plurality of containers 901 as ribbon 962. The ribbon helps maintain the containers 901 in organized relation to one another, which facilitates packing the containers in a smaller package. Referring to Figs. 11 and 12 for example, ribbons of containers 701, 801, 801A have been packed in each box 704, 804. Furthermore, in packages having more than one type (i.e., having a different liquid or different dosage) of container, each group of containers may be integrated in a separate ribbon as shown in Fig. 12. Connecting all containers of each specific type within the package also allows consumers to more readily and reliably ascertain what dose and what liquid is contained within any particular container.

**[75]** When packages contain more than one type of container, each type of container may be enclosed in its own sub-package. As shown in Fig. 15, for example, a package 1002 includes a first group of containers 1001 sealed within a flexible pouch 1041 and a second group of flexible containers 1001A sealed in second flexible pouch

1088. Both pouches 1041, 1088 may be packaged in the same box 1004, which may or may not comprise a gas and/or water vapor barrier. One or more of the sub-packages could comprise a box. If desired, the pouches 1041, 1088 (or boxes) could be provided with a gas and/or water vapor barrier as described above. Packaging the different containers in sub-packages makes it less likely that a consumer will grab the wrong type of container by mistake. Also if the sub-packages comprise gas and/or water vapor barriers, the consumer can open only the sub-package of the container that is needed, thereby maintaining the protective environment for other containers until they are needed.

**[76]** When introducing elements of the present invention or the preferred embodiments thereof, the articles "a," "an," "the," and "said" are intended to mean that there are one or more of the elements. The terms "comprising," "including," and "having" are intended to be inclusive and mean that there may be additional elements other than the listed elements.

**[77]** In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

**[78]** As various changes could be made in the above constructions, products, and methods without departing from the scope of the invention, it is intended that all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. A pliable single use liquid container and dispensing device for delivery of a precise amount of orally administered liquids across a broad range of viscosities, the container comprising a first and second generally opposed pliable sheets, a first seal joining the first and second pliable sheets and partially defining a liquid-containing chamber, a second seal joining the first and second pliable sheets and partially defining a pressure relieving chamber adjacent to the liquid-containing chamber, a boundary seal joining the first and second pliable sheets between the liquid-containing chamber and the pressure relieving chamber and partially defining the liquid-containing chamber and the pressure relieving chamber, a precisely measured single dose volume of fluent liquid disposed within the liquid-containing chamber, the boundary seal including a fluid transfer region seal forming at least a portion of the boundary seal which is lighter than the first and second seals so that upon application of pressure to the liquid in the liquid-containing chamber the fluid transfer region seal opens to permit the liquid to flow from the liquid-containing chamber into the pressure relieving chamber, the geometry of the portion based on the viscosity of the liquid, an outlet adapted for fluid communication with the pressure relieving chamber for flow of the liquid from the pressure relieving chamber out of the liquid container and sized based on the viscosity of the liquid and the geometry of the dispensing device, and a lighter outlet seal adapted to open upon application of fluid pressure from liquid in the pressure relieving chamber for dispensing the liquid from the liquid container, the lighter outlet seal being located in the outlet at the periphery of the liquid container for

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closing the outlet and the pressure relieving chamber, and inhibiting ingress of foreign matter into the outlet and pressure relieving chamber prior to administering the liquid, and for working in combination with the dispensing device to prevent spilling and splashing of the liquid prior to delivery, control the delivery rate of the liquid to the recipient, provide tactile force flow rate information feedback to the administrator.

2. A pliable single use liquid container as set forth in claim 1 further comprising a perimeter seal joining the first and second pliable sheets at their perimeters, the outlet seal defining a portion of the perimeter seal.

3. A pliable single use liquid container as set forth in claim 2 wherein the first and second seals form at least a portion of the perimeter seal of the first and second pliable sheets.

4. A pliable single use liquid container as set forth in claim A1 wherein the outlet seal is lighter than the fluid transfer region seal.

5. A pliable single use liquid container as set forth in claim 4 wherein the fluid transfer region seal and the outlet seal are formed for peeling release of the first pliable sheet from the second pliable sheet upon application of selected separating forces to the respective seals.

6. A pliable single use liquid container as set forth in claim 1 further comprising a liquid chamber

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dividing seal separating the liquid-containing chamber into a first liquid-containing sub-chamber and a second liquid-containing sub-chamber, at least a portion of said liquid chamber dividing seal comprising a liquid chamber fluid transfer region seal, a first component of said fluent oral liquid contained within the first liquid-containing sub-chamber, and a second component of said fluent oral liquid contained with the second liquid-containing sub-chamber, said liquid chamber fluid transfer region seal being lighter than said first and second seals.

7. A pliable single use liquid container as set forth in claim 1 wherein the boundary seal constitutes a first boundary seal and the fluid transfer region seal constitutes a first fluid transfer region seal, the container further comprising a second boundary seal located between the dispensing device and liquid-containing chamber, the second boundary seal including a second fluid transfer region seal forming at least a portion of the second boundary seal in which the seal joining the first and second pliable sheets is formed lighter than the first and second seals so that upon application of pressure to the liquid-containing chamber both the first and second fluid transfer region seals are adapted to rupture in sequence to permit the liquid to flow from the liquid-containing chamber into the dispensing device.

8. A pliable single use liquid container as set forth in claim 7 wherein the outlet seal is lighter than the first and second fluid transfer region seals.

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FIG. 1A

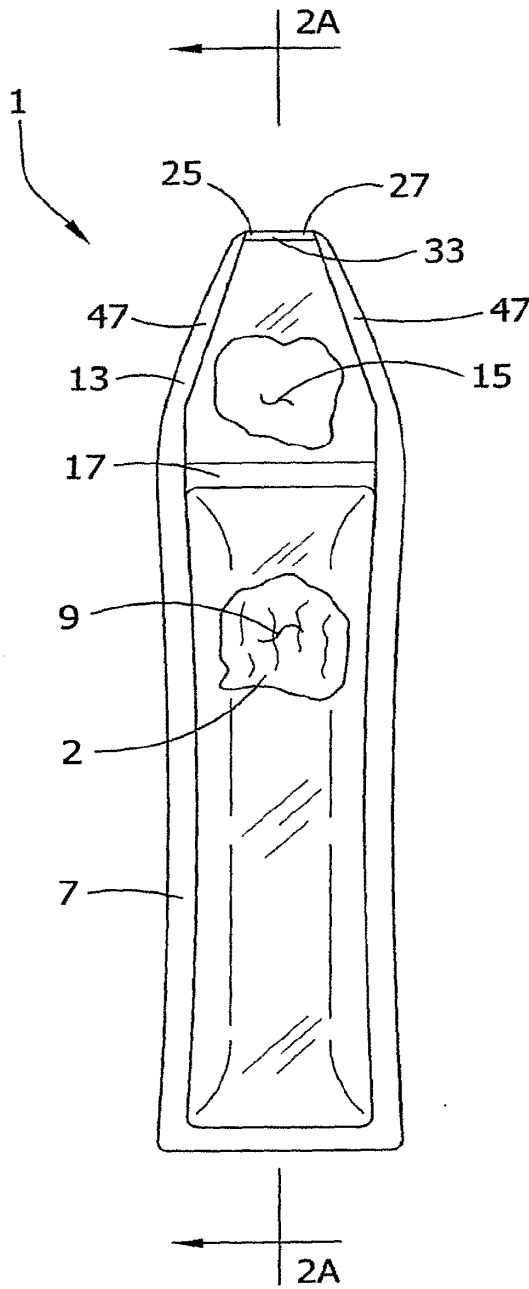
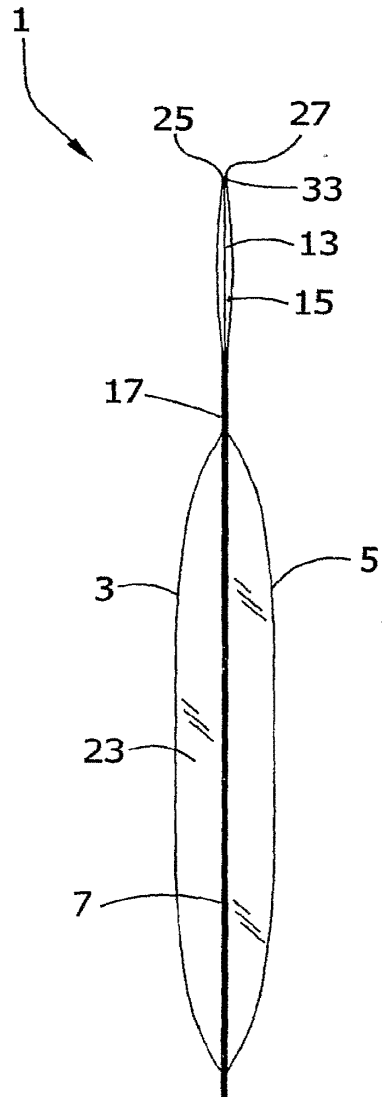


FIG. 1B



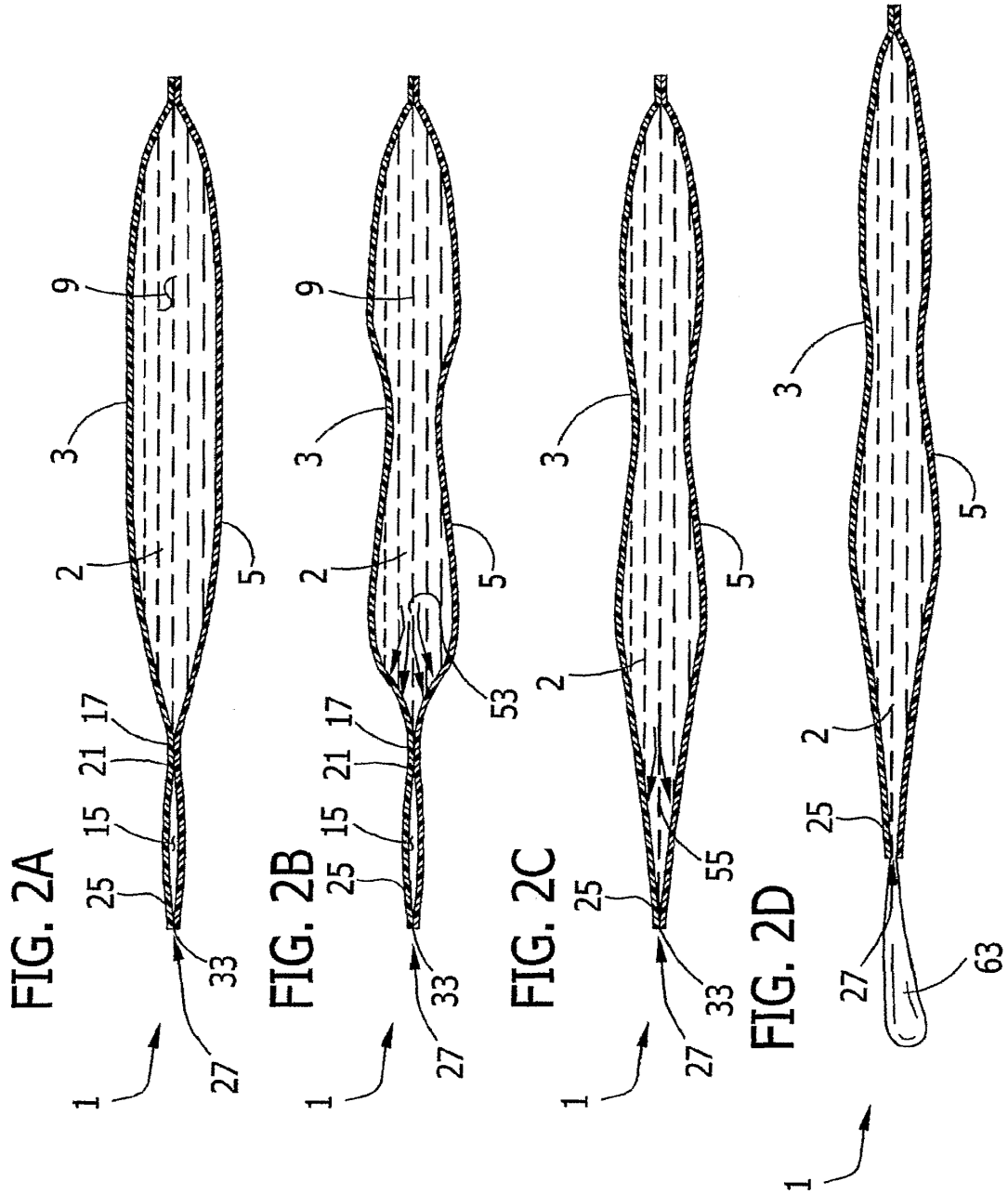
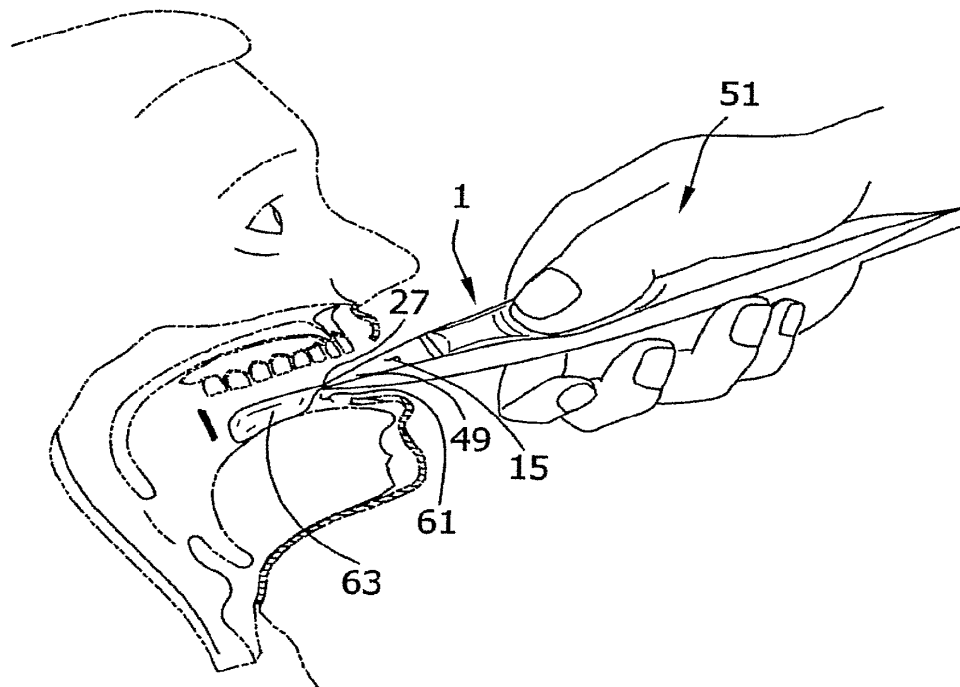
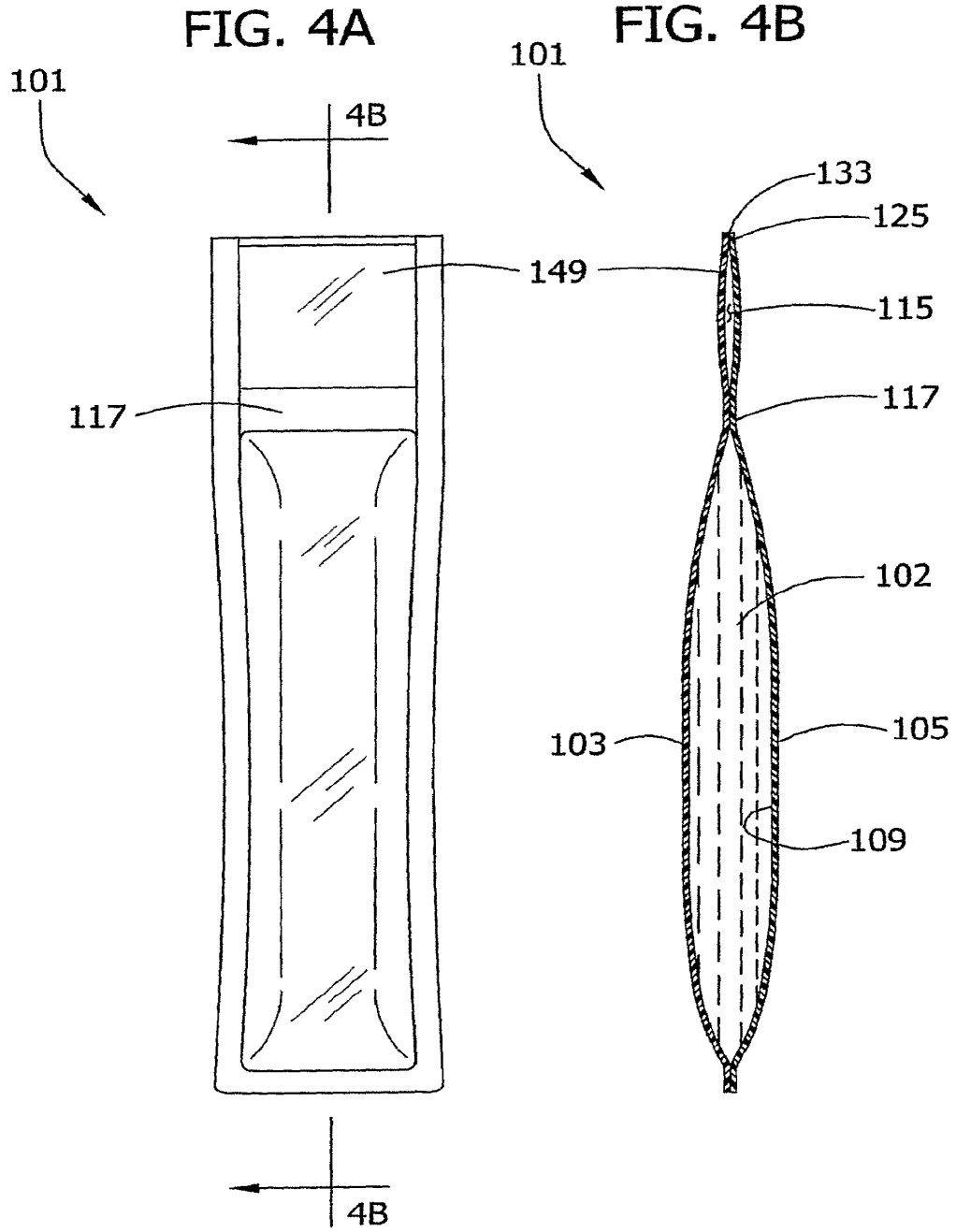


FIG. 3





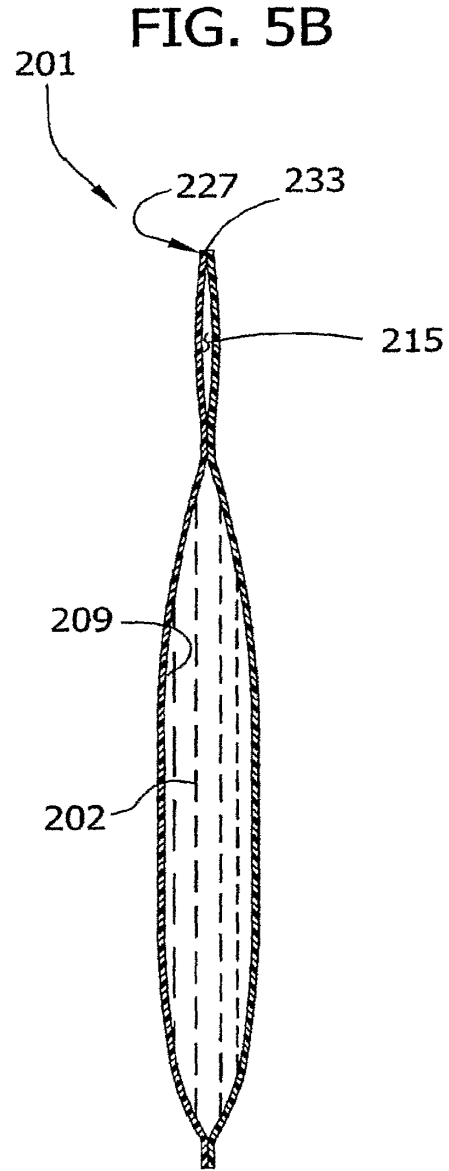
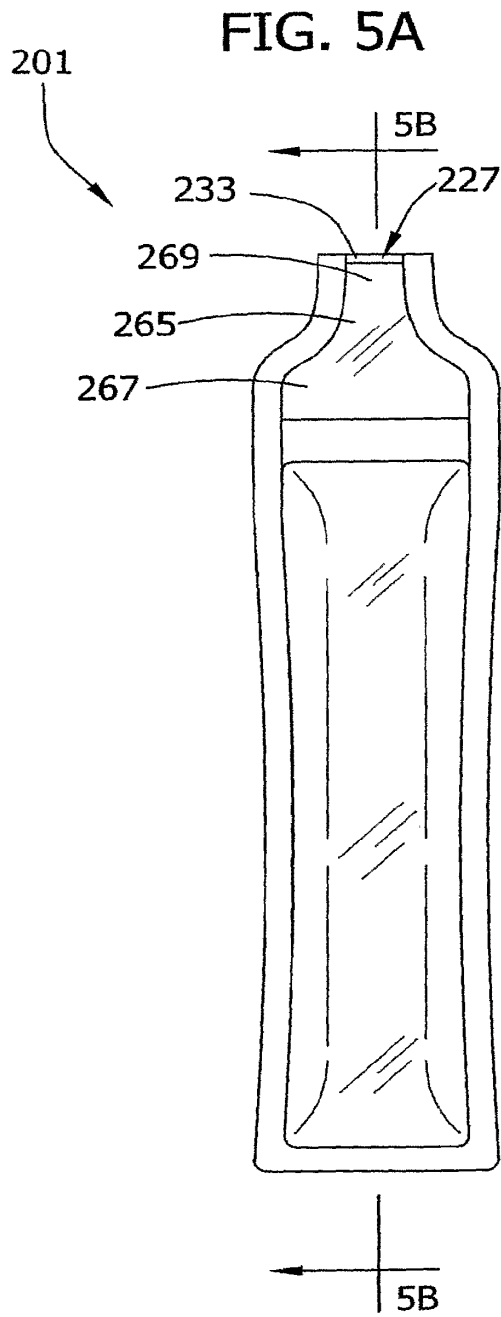


FIG. 6A

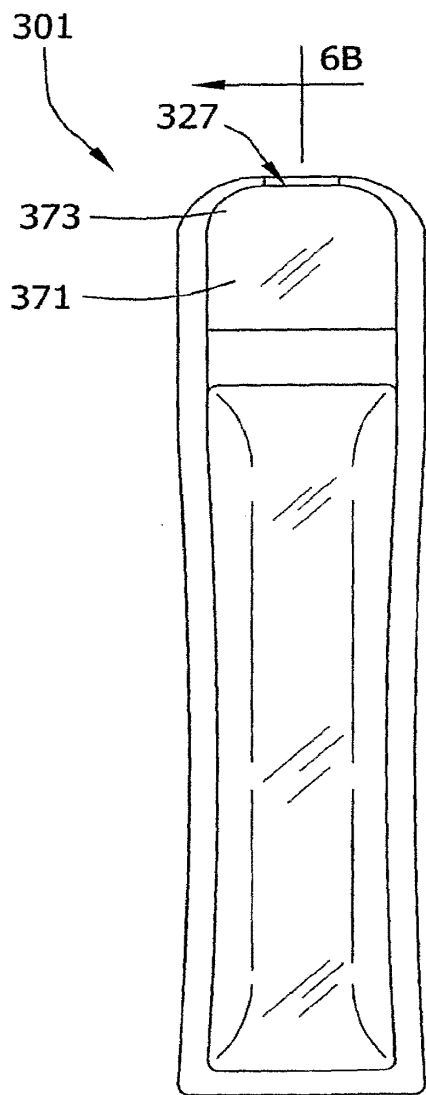


FIG. 6B

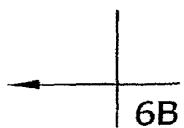
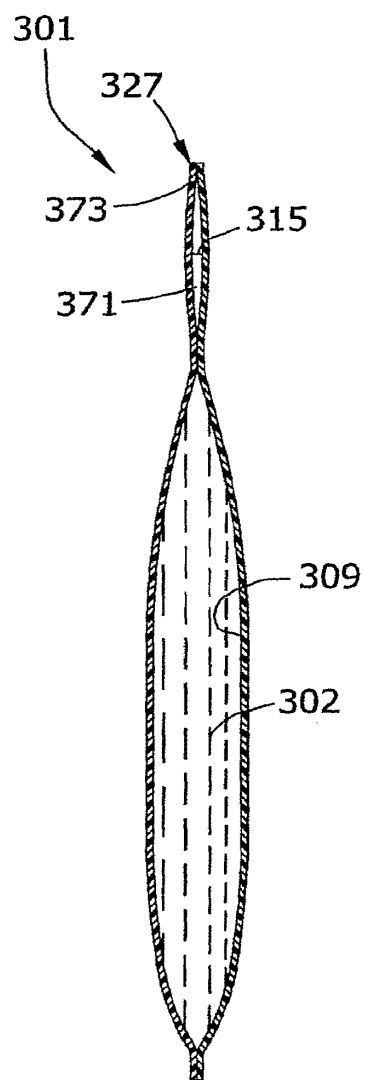


FIG. 7A

FIG. 7B

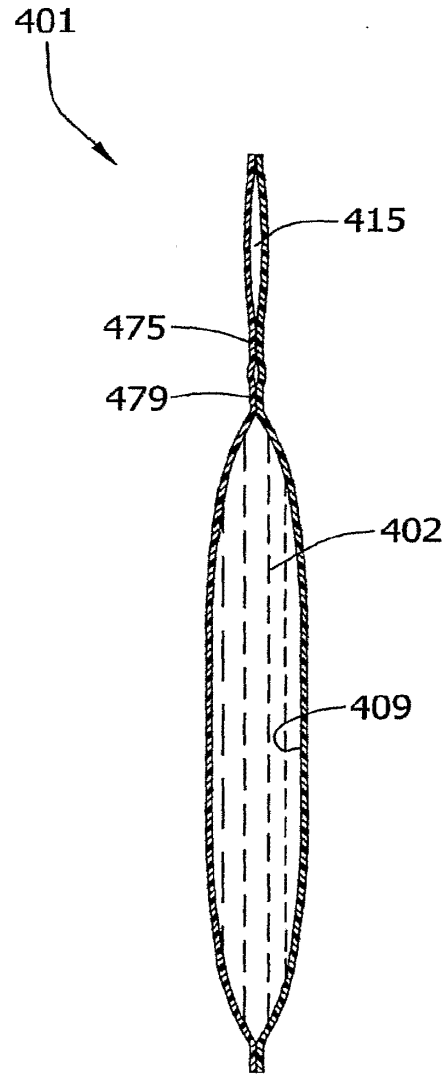
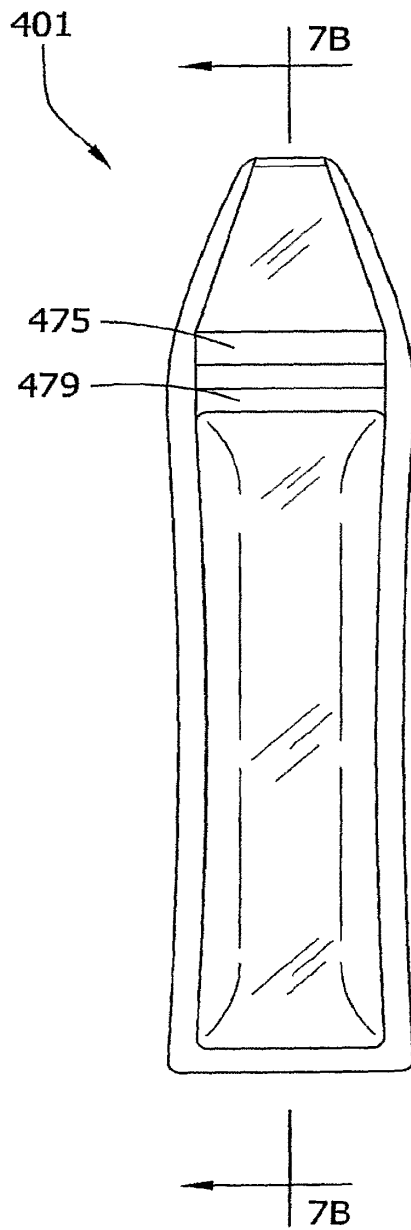
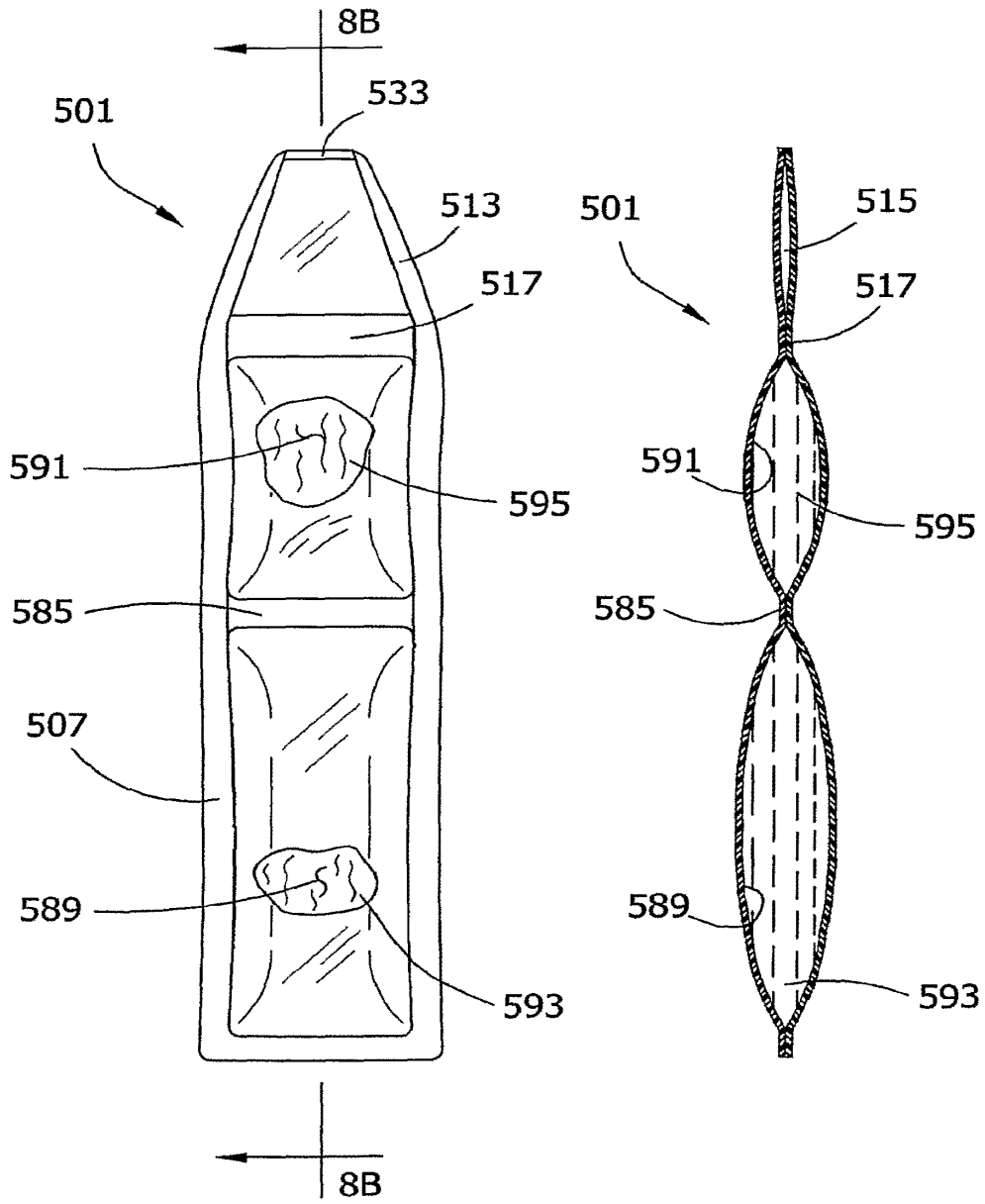
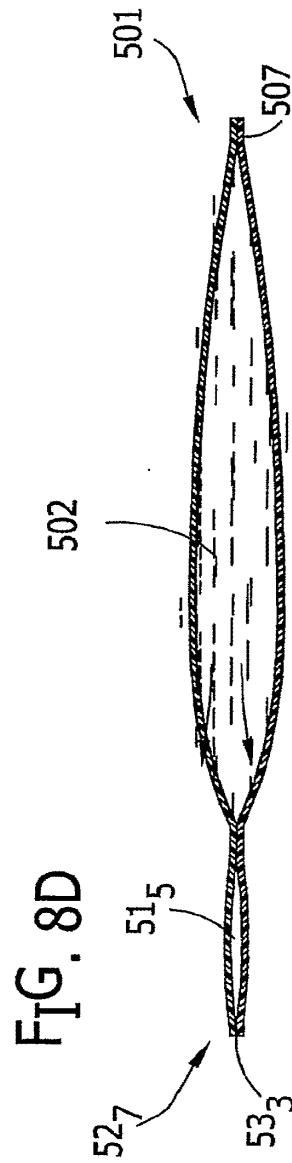
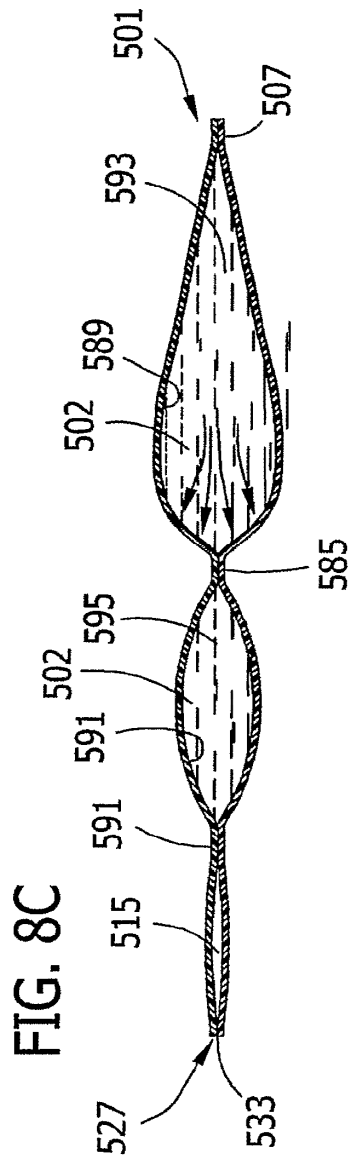




FIG. 8A

FIG. 8B





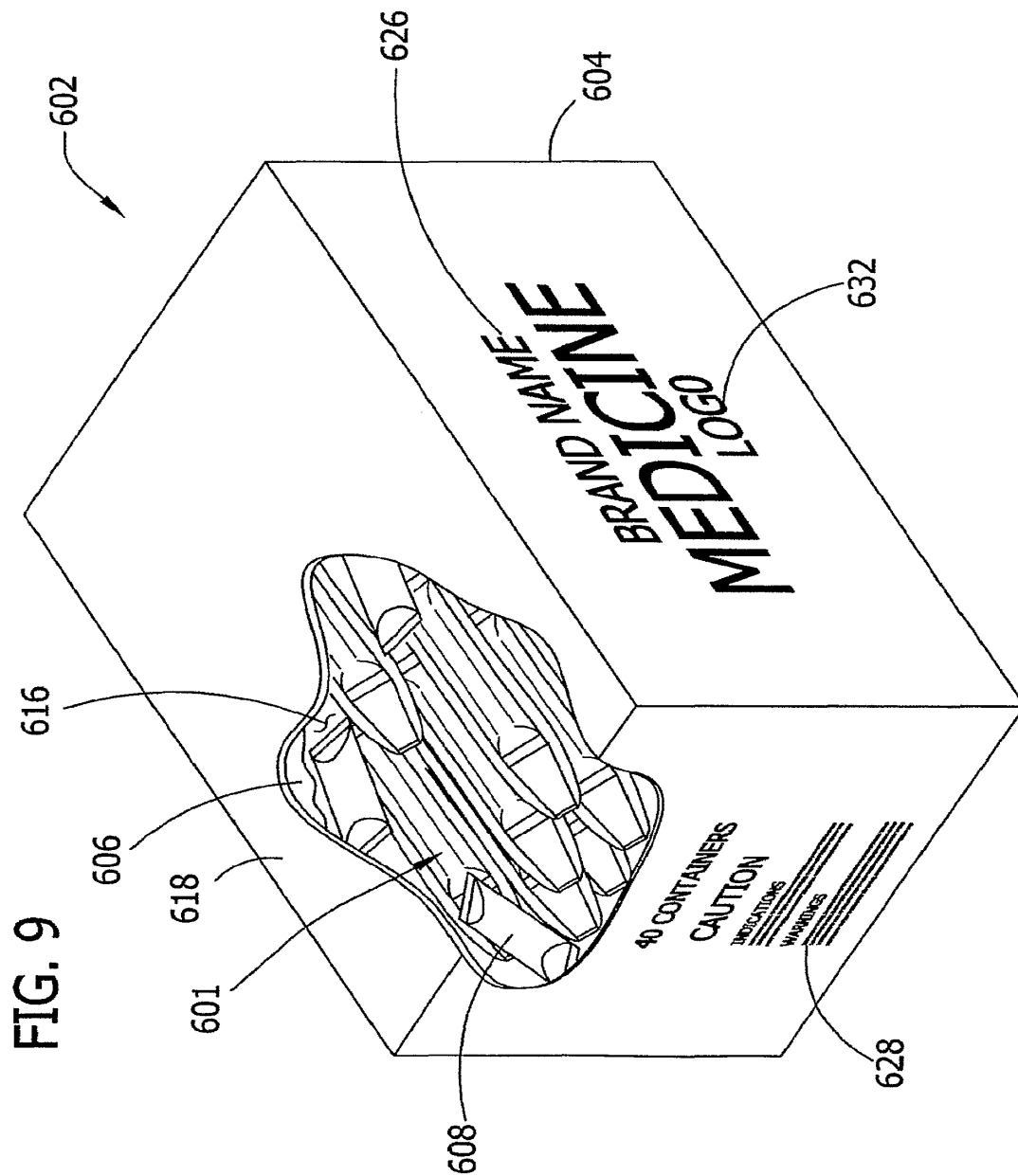


FIG. 10

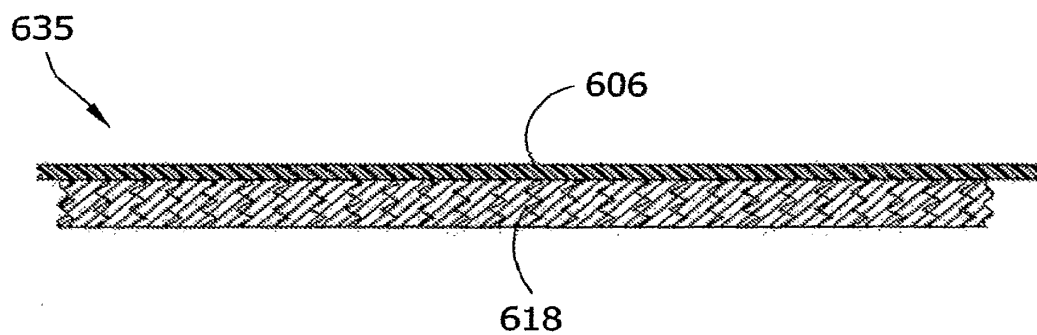
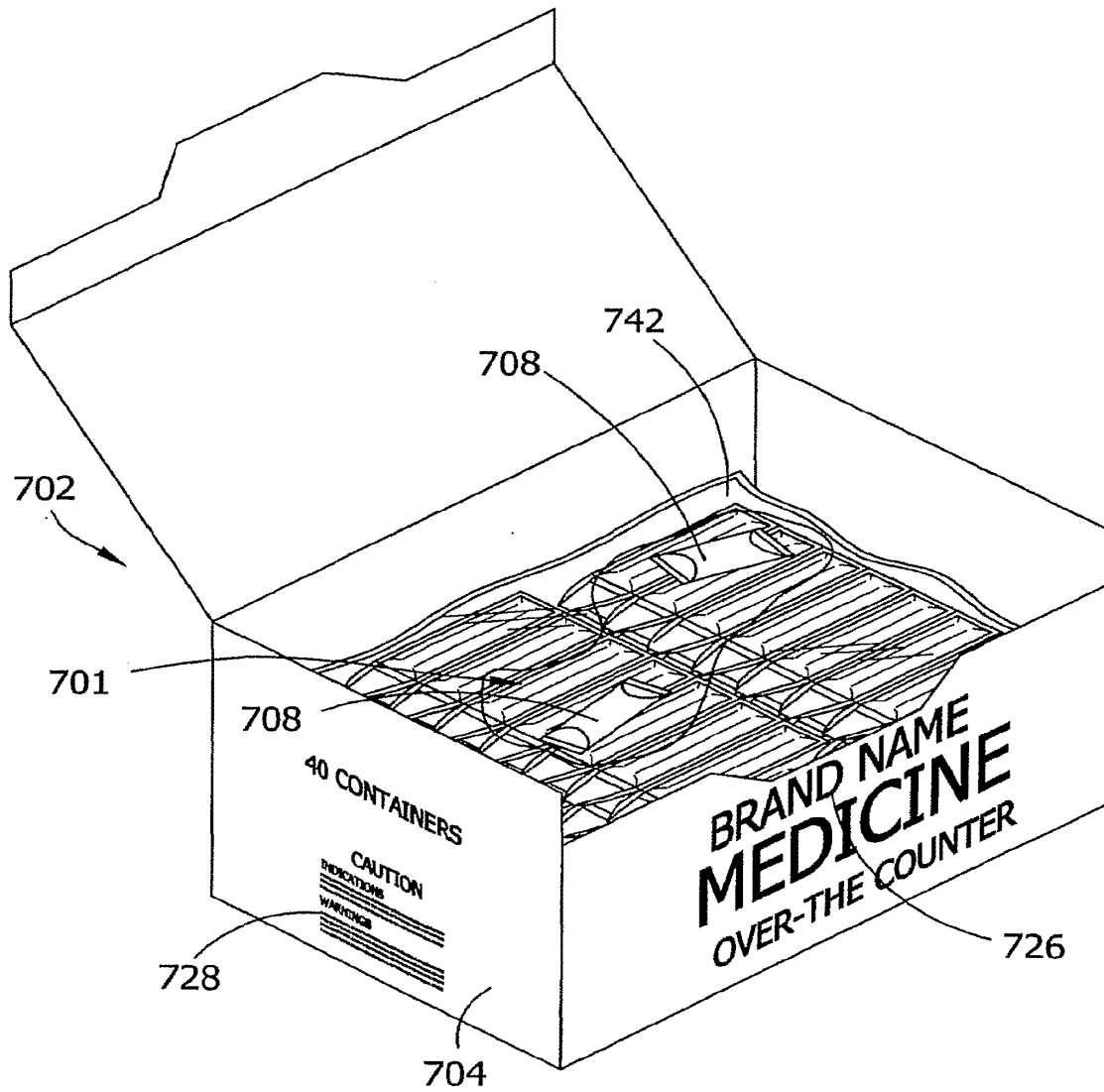


FIG. 11



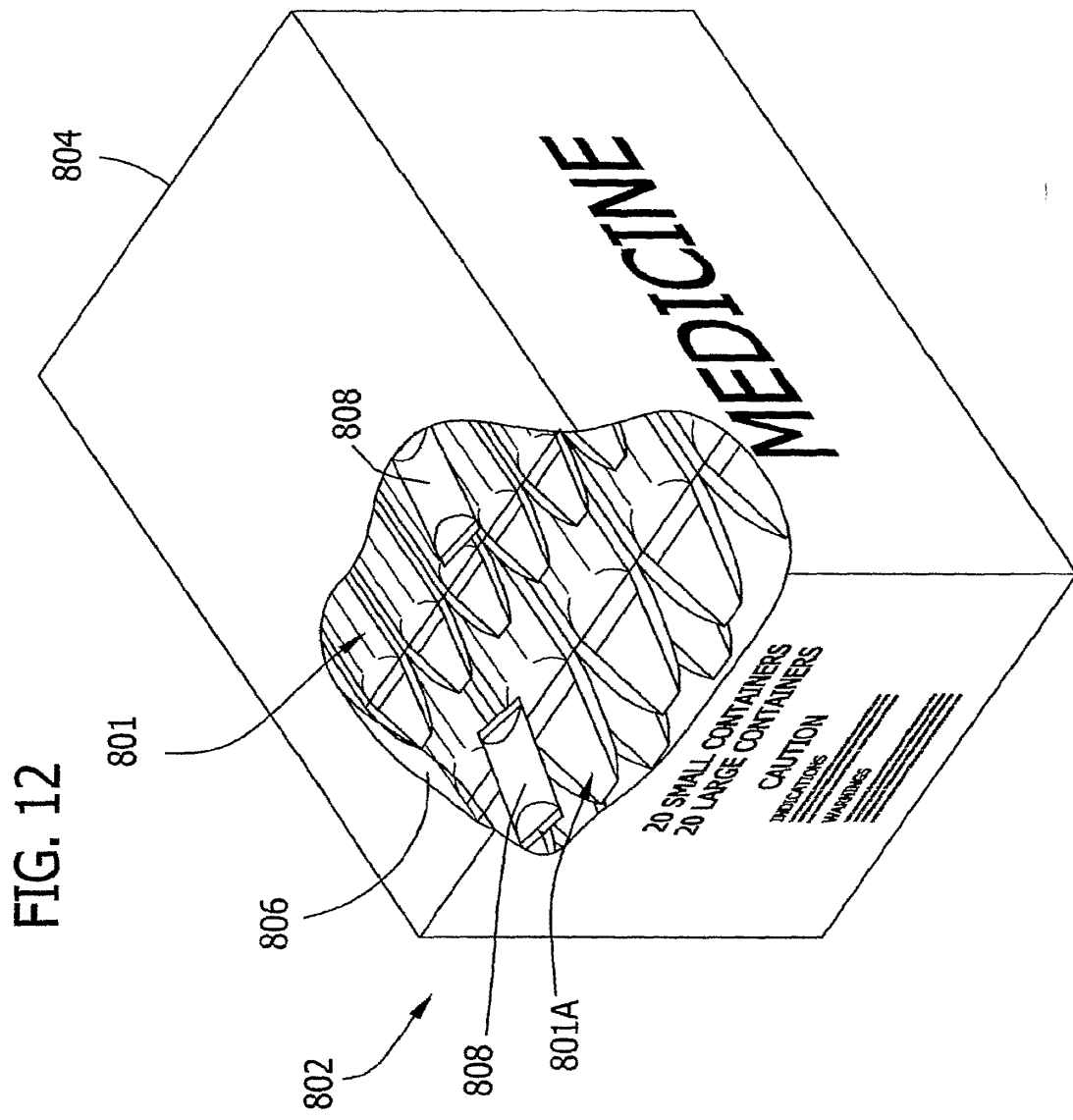


FIG. 13

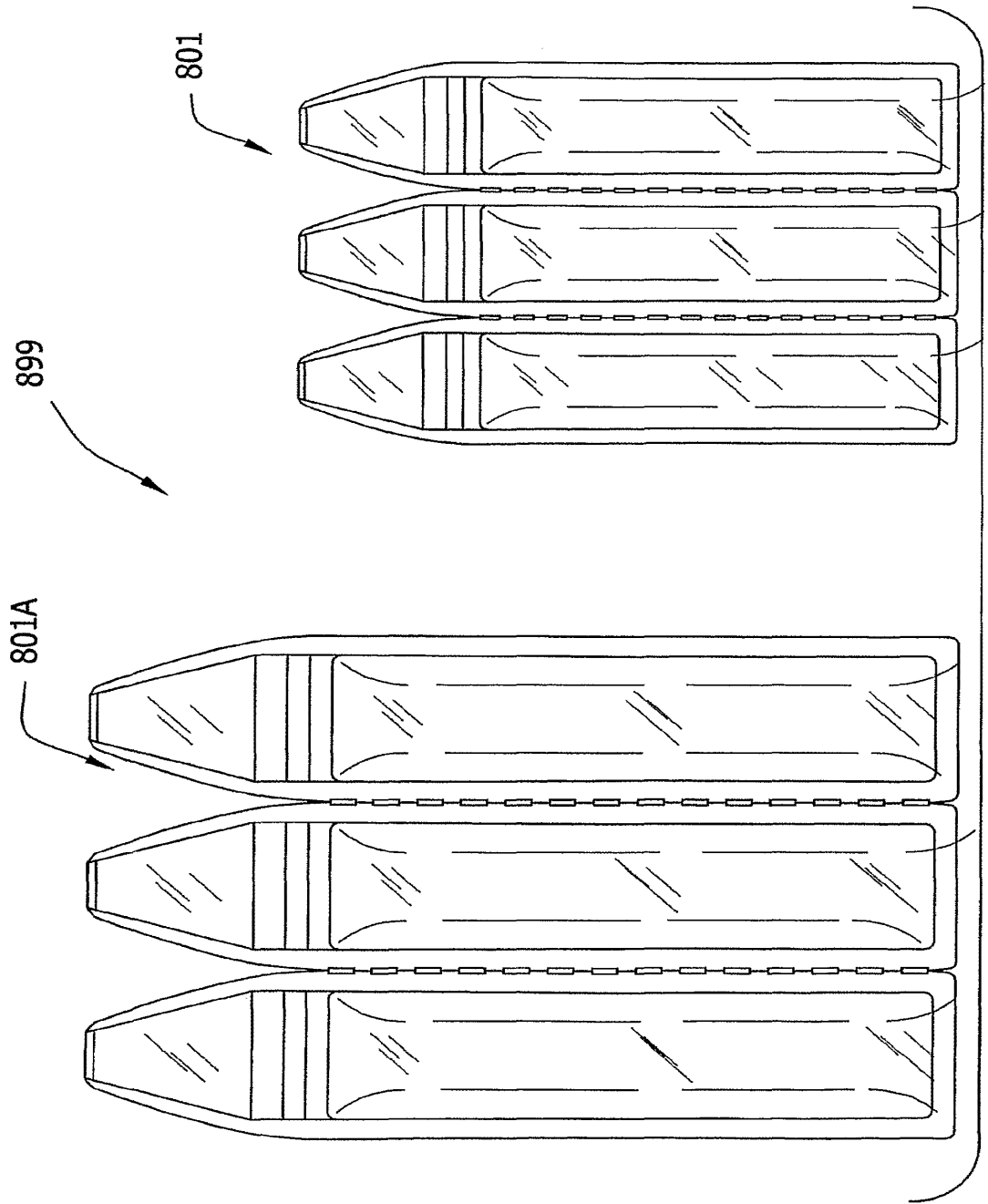


FIG.14

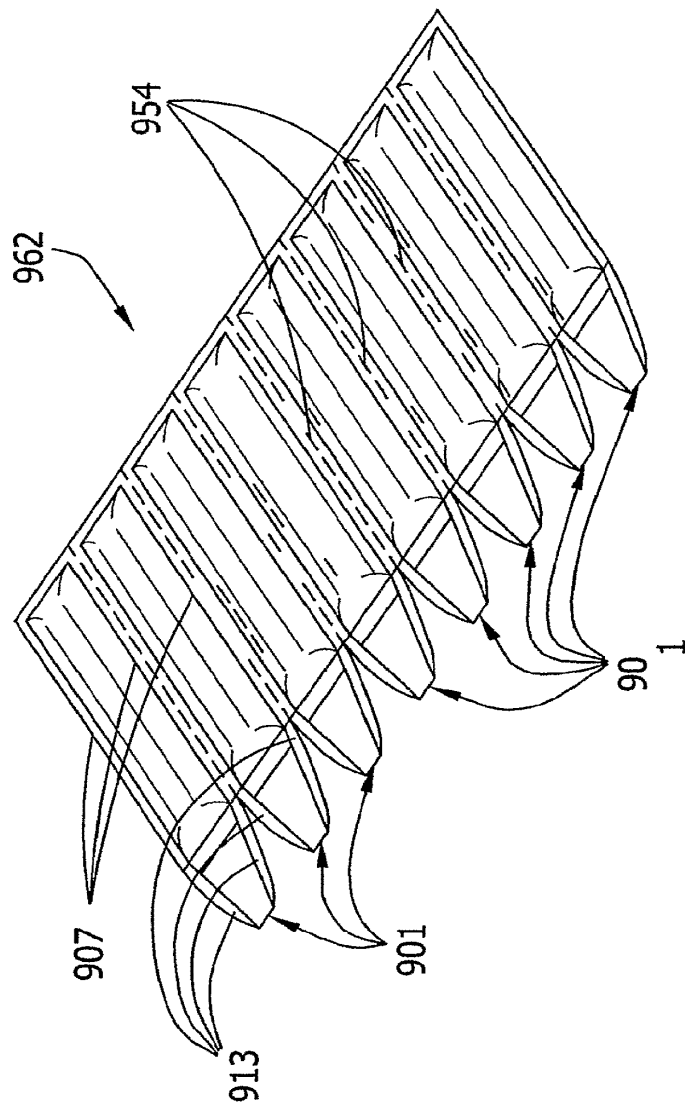
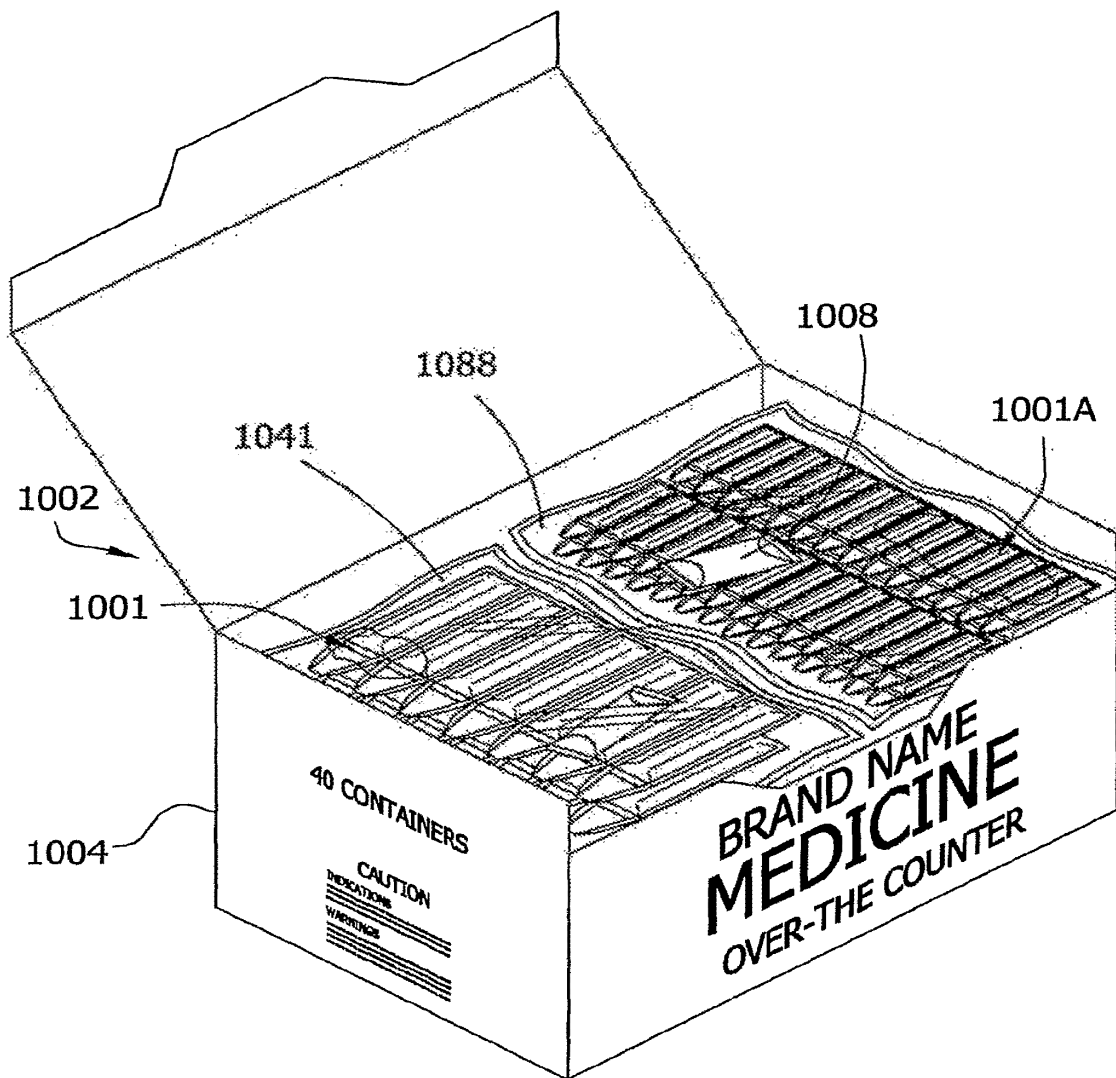




FIG. 15



## Electronic Patent Application Fee Transmittal

|   |                                 |          |        |                      |
|---|---------------------------------|----------|--------|----------------------|
| <b>Application Number:</b>                              | 13391539                        |          |        |                      |
| <b>Filing Date:</b>                                     | 02-May-2012                     |          |        |                      |
| <b>Title of Invention:</b>                              | FILLER ASSEMBLY FOR CABLE GLAND |          |        |                      |
| <b>First Named Inventor/Applicant Name:</b>             | Samuel Liam Proud               |          |        |                      |
| <b>Filer:</b>   | John D. Franzini/Melanie Brunow |          |        |                      |
| <b>Attorney Docket Number:</b>                          | 920257.00016                    |          |        |                      |
| Filed as Large Entity                                   |                                 |          |        |                      |
| <b>U.S. National Stage under 35 USC 371 Filing Fees</b> |                                 |          |        |                      |
| Description   | Fee Code                        | Quantity | Amount | Sub-Total in USD(\$) |
| <b>Basic Filing:</b>                                    |                                 |          |        |                      |
| <b>Pages:</b>   |                                 |          |        |                      |
| <b>Claims:</b>  |                                 |          |        |                      |
| <b>Miscellaneous-Filing:</b>                            |                                 |          |        |                      |
| <b>Petition:</b>  |                                 |          |        |                      |
| <b>Patent-Appeals-and-Interference:</b>                 |                                 |          |        |                      |
| <b>Post-Allowance-and-Post-Issuance:</b>                |                                 |          |        |                      |
| <b>Extension-of-Time:</b>                               |                                 |          |        |                      |

| Description                             | Fee Code | Quantity | Amount | Sub-Total in USD(\$) |
|---|----------|----------|--------|----------------------|
| <b>Miscellaneous:</b>                   |          |          |        |                      |
| Submission- Information Disclosure Stmt | 1806     | 1        | 180    | 180                  |
| <b>Total in USD (\$)</b>                |          |          |        | <b>180</b>           |

## Electronic Acknowledgement Receipt

|   |                                      |
|---|--------------------------------------|
| <b>EFS ID:</b>                              | 16390575                             |
| <b>Application Number:</b>                  | 13391539                             |
| <b>International Application Number:</b>    |                                      |
| <b>Confirmation Number:</b>                 | 6980                                 |
| <b>Title of Invention:</b>                  | FILLER ASSEMBLY FOR CABLE GLAND      |
| <b>First Named Inventor/Applicant Name:</b> | Samuel Liam Proud                    |
| <b>Customer Number:</b>                     | 26710                                |
| <b>Filer:</b>                               | John D. Franzini/Melanie Brunow      |
| <b>Filer Authorized By:</b>                 | John D. Franzini                     |
| <b>Attorney Docket Number:</b>              | 920257.00016                         |
| <b>Receipt Date:</b>                        | 23-JUL-2013                          |
| <b>Filing Date:</b>                         | 02-MAY-2012                          |
| <b>Time Stamp:</b>                          | 14:48:01                             |
| <b>Application Type:</b>                    | U.S. National Stage under 35 USC 371 |

### Payment information:

|  |                 |
|--|-----------------|
| Submitted with Payment                   | yes             |
| Payment Type                             | Deposit Account |
| Payment was successfully received in RAM | \$180           |
| RAM confirmation Number                  | 1276            |
| Deposit Account                          | 170055          |
| Authorized User                          |                 |

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 Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

**File Listing:**

| Document Number  | Document Description                                  | File Name                        | File Size(Bytes)/<br>Message Digest                | Multi Part /.zip | Pages (if appl.) |
|--|---|----------------------------------|--|------------------|------------------|
| 1  |   | 920257-00016-amendment.pdf       | 454127<br>a61837ac20c84fb46ea08bc5cfd6cb62155fcb   | yes              | 11               |
| <b>Multipart Description/PDF files in .zip description</b> |   |                                  |  |                  |                  |
|  | <b>Document Description</b>                           |                                  | <b>Start</b>                                       |                  | <b>End</b>       |
|  | Amendment/Req. Reconsideration-After Non-Final Reject |                                  | 1  |                  | 1                |
|  | Specification   |                                  | 2  |                  | 3                |
|  | Claims  |                                  | 4  |                  | 6                |
|  | Applicant Arguments/Remarks Made in an Amendment      |                                  | 7  |                  | 9                |
|  | Drawings-only black and white line drawings           |                                  | 10   |                  | 11               |
| <b>Warnings:</b>   |   |                                  |  |                  |                  |
| <b>Information:</b>  |   |                                  |  |                  |                  |
| 2  | Information Disclosure Statement (IDS) Form (SB08)    | 920257-00016-IDS-2.PDF           | 612887<br>2de9dc946861a4ea72a6fca0910c152930d69035 | no               | 4                |
| <b>Warnings:</b>   |   |                                  |  |                  |                  |
| <b>Information:</b>  |   |                                  |  |                  |                  |
| 3  | Foreign Reference                                     | GB1335047A.PDF                   | 831501<br>187e2bcc2a1a3089596f785b07713838647bc28  | no               | 9                |
| <b>Warnings:</b>   |   |                                  |  |                  |                  |
| <b>Information:</b>  |   |                                  |  |                  |                  |
| 4  | Foreign Reference                                     | DE202005000854-with-abstract.PDF | 390983<br>51ecfd8a4a37cfb95d3a07992279ae267140145c | no               | 11               |
| <b>Warnings:</b>   |   |                                  |  |                  |                  |
| <b>Information:</b>  |   |                                  |  |                  |                  |
| 5  | Foreign Reference                                     | DE202005004135U1.PDF             | 884487<br>9e5c0f8ecd1fb1c17175dffa22b7ea6debd5c2a0 | no               | 20               |
| <b>Warnings:</b>   |   |                                  |  |                  |                  |
| <b>Information:</b>  |   |                                  |  |                  |                  |

|                                     |   |                              |  |    |    |
|-------------------------------------|---|------------------------------|--|----|----|
| 6                                   | Foreign Reference                           | EP1958608A1.PDF              | 911849                                   | no | 18 |
|                                     |   |                              | 555fba912059cc9ea09dc43763a0d255dcd41274 |    |    |
| <b>Warnings:</b>                    |   |                              |  |    |    |
| <b>Information:</b>                 |   |                              |  |    |    |
| 7                                   | Foreign Reference                           | WO2007073526A2.PDF           | 1784368                                  | no | 47 |
|                                     |   |                              | 136cea95552628af36c57dab3fa528cd2e44d349 |    |    |
| <b>Warnings:</b>                    |   |                              |  |    |    |
| <b>Information:</b>                 |   |                              |  |    |    |
| 8                                   | Other Reference-Patent/App/Search documents | EP09168429-Search-Report.PDF | 190815                                   | no | 5  |
|                                     |   |                              | 10ef89e332a522d1984c05deb8bc59497e4516b9 |    |    |
| <b>Warnings:</b>                    |   |                              |  |    |    |
| <b>Information:</b>                 |   |                              |  |    |    |
| 9                                   | Other Reference-Patent/App/Search documents | EP09168430-Search-Report.PDF | 175232                                   | no | 5  |
|                                     |   |                              | 524488cf2c7e35dbe7a6090a22662633ee94b595 |    |    |
| <b>Warnings:</b>                    |   |                              |  |    |    |
| <b>Information:</b>                 |   |                              |  |    |    |
| 10                                  | Other Reference-Patent/App/Search documents | GB1202969-Exam-Report.PDF    | 94881                                    | no | 2  |
|                                     |   |                              | 8ddfbc63aad701b88dd385479a15f76083df8047 |    |    |
| <b>Warnings:</b>                    |   |                              |  |    |    |
| <b>Information:</b>                 |   |                              |  |    |    |
| 11                                  | Fee Worksheet (SB06)                        | fee-info.pdf                 | 30536                                    | no | 2  |
|                                     |   |                              | ca950f650e7ab6f7a69ede472ee356fa9228e25c |    |    |
| <b>Warnings:</b>                    |   |                              |  |    |    |
| <b>Information:</b>                 |   |                              |  |    |    |
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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

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|   |   |              |   |                                  |                                       |
|---|---|--------------|---|----------------------------------|---------------------------------------|
| <b>PATENT APPLICATION FEE DETERMINATION RECORD</b><br>Substitute for Form PTO-875                               |   |              | Application or Docket Number<br><b>13/391,539</b> | Filing Date<br><b>05/02/2012</b> | <input type="checkbox"/> To be Mailed |
| ENTITY: <input checked="" type="checkbox"/> LARGE <input type="checkbox"/> SMALL <input type="checkbox"/> MICRO |   |              |   |                                  |                                       |
| <b>APPLICATION AS FILED – PART I</b>  |   |              |   |                                  |                                       |
| (Column 1)  |   | (Column 2)   |   |                                  |                                       |
| FOR   | NUMBER FILED  | NUMBER EXTRA | RATE (\$)   | FEE (\$)                         |                                       |
| <input type="checkbox"/> BASIC FEE<br><small>(37 CFR 1.16(a), (b), or (c))</small>                              | N/A   | N/A          | N/A   |                                  |                                       |
| <input type="checkbox"/> SEARCH FEE<br><small>(37 CFR 1.16(k), (l), or (m))</small>                             | N/A   | N/A          | N/A   |                                  |                                       |
| <input type="checkbox"/> EXAMINATION FEE<br><small>(37 CFR 1.16(o), (p), or (q))</small>                        | N/A   | N/A          | N/A   |                                  |                                       |
| TOTAL CLAIMS<br><small>(37 CFR 1.16(j))</small>   | minus 20 =  | *            | X \$ =  |                                  |                                       |
| INDEPENDENT CLAIMS<br><small>(37 CFR 1.16(h))</small>   | minus 3 =   | *            | X \$ =  |                                  |                                       |
| <input type="checkbox"/> APPLICATION SIZE FEE<br><small>(37 CFR 1.16(s))</small>                                | If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). |              |   |                                  |                                       |
| <input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT<br><small>(37 CFR 1.16(j))</small>                    |   |              |   |                                  |                                       |
| * If the difference in column 1 is less than zero, enter "0" in column 2.                                       |   |              | TOTAL   |                                  |                                       |

|   |  |                                  |       |                                    |               |                 |                     |
|---|--|----------------------------------|-------|------------------------------------|---------------|-----------------|---------------------|
| <b>APPLICATION AS AMENDED – PART II</b> |  |                                  |       |                                    |               |                 |                     |
| (Column 1)                              |  | (Column 2)                       |       | (Column 3)                         |               |                 |                     |
| AMENDMENT                               | <b>07/23/2013</b>  | CLAIMS REMAINING AFTER AMENDMENT |       | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | RATE (\$)       | ADDITIONAL FEE (\$) |
|   | Total (37 CFR 1.16(i))   | * 12                             | Minus | ** 20                              | = 0           | X \$80 =        | 0                   |
|   | Independent (37 CFR 1.16(h))   | * 2                              | Minus | ***3                               | = 0           | X \$420 =       | 0                   |
|   | <input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))                           |                                  |       |                                    |               |                 |                     |
|   | <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) |                                  |       |                                    |               |                 |                     |
|   |  |                                  |       |                                    |               | TOTAL ADD'L FEE | <b>0</b>            |

|            |  |                                  |       |                                    |               |                 |                     |
|------------|--|----------------------------------|-------|------------------------------------|---------------|-----------------|---------------------|
| (Column 1) |  | (Column 2)                       |       | (Column 3)                         |               |                 |                     |
| AMENDMENT  |  | CLAIMS REMAINING AFTER AMENDMENT |       | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | RATE (\$)       | ADDITIONAL FEE (\$) |
|            | Total (37 CFR 1.16(i))   | *                                | Minus | **                                 | =             | X \$ =          |                     |
|            | Independent (37 CFR 1.16(h))   | *                                | Minus | ***                                | =             | X \$ =          |                     |
|            | <input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))                           |                                  |       |                                    |               |                 |                     |
|            | <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) |                                  |       |                                    |               |                 |                     |
|            |  |                                  |       |                                    |               | TOTAL ADD'L FEE |                     |

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".  
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE  
/TARA WITCHER/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.          | CONFIRMATION NO. |
|--|-------------|----------------------|------------------------------|------------------|
| 13/391,539   | 05/02/2012  | Samuel Liam Proud    | 920257.00016                 | 6980             |
| 26710 7590 06/17/2013<br>QUARLES & BRADY LLP<br>Attn: IP Docket<br>411 E. WISCONSIN AVENUE<br>SUITE 2350<br>MILWAUKEE, WI 53202-4426 |             |                      | EXAMINER<br>GRUBY, RANDALL A |                  |
|  |             |                      | ART UNIT                     | PAPER NUMBER     |
|  |             |                      | 3754                         |                  |
|  |             |                      | NOTIFICATION DATE            | DELIVERY MODE    |
|  |             |                      | 06/17/2013                   | ELECTRONIC       |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pat-dept@quarles.com

|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|                              | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   | <b>AIA (First Inventor to File) Status</b><br>No |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 8 May 2013.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 5)  Claim(s) 1-12 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) 1-12 is/are rejected.
- 8)  Claim(s) \_\_\_\_\_ is/are objected to.
- 9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on 21 February 2012 is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some \*    c)  None of the:
1.  Certified copies of the priority documents have been received.
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Interim copies:**

- a)  All    b)  Some    c)  None of the: Interim copies of the priority documents have been received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 02/21/12
- 3)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 4)  Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Status of the Application***

Claims 1-12 have been examined in this application. This communication is the first action on the merits. The Information Disclosure Statement (IDS) filed on 02/21/12 has been acknowledged by the Office.

### ***Priority***

Acknowledgment is made of applicant's claim for foreign priority based on an application(s) filed in the European Patent Office on 08/21/09. It is noted, however, that applicant has not filed a certified copy of either 09168429.0 or 09168430.8 application as required by 35 U.S.C. 119(b).

### ***Election/Restrictions***

Applicant's election with traverse of Invention I in the reply filed on 05/08/13 is acknowledged. The traversal is on the ground(s) that claim 10 has been amended to include all the limitations of claim 1. This is found persuasive and the restriction requirement is withdrawn accordingly.

### ***Drawings***

The drawings are objected to because:

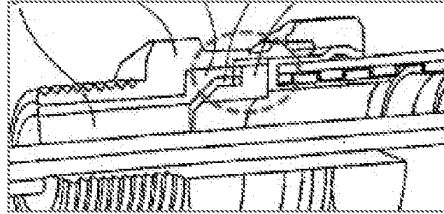
- Lines depicting the boundaries of adjacent structural features are intersecting such that boundaries are not clearly defined, in Figure 3 of the application. See below.



Application 13/391539, Figure 3. Unclear structural boundaries.

Art Unit: 3754

- Lines depicting the boundaries of adjacent structural features are intersecting such that boundaries are not clearly defined, in Figure 2 of the application. See below.



*Application 13/391539, Figure 2. Unclear structural boundaries.*

- The leader line from number 38 in Figure 3 conflicts with the corresponding feature disclosed in the specification (Page 8, ¶ 3, Line 8).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Specification*

The disclosure is objected to because of the following informalities:

- “[...] tube 24 [...]” should be “[...] tube 26 [...]”
- Inconsistent feature name used throughout specification, for feature corresponding to item (20). Change all instances to be consistent (i.e. core conductors). Appropriate correction is required.

### *Claim Objections*

Claim 1 is objected to because of the following informalities: it is unclear whether the limitation in the preamble “having a plurality of cores of at least one cable extending therethrough” is drawn to the filler assembly or to a cable gland. Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-12 rejected under 35 U.S.C. 103(a) as being unpatentable over EP 434105 to Kaptein in view of WO 2008029165 to Hand.

As per claim 1, Kaptein discloses a filler assembly comprising: a body adapted to define at least a first chamber (23), a second chamber (24) said second chamber adapted to communicate with said first chamber to enable mixing of the contents of the respective chambers

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(*Col 4, ¶ 4*); a first barrier barrier apparatus (*21*); one elongate dispenser apparatus (*17*); a second barrier apparatus (*22*);

Kaptein does not disclose a barrier member. Hand teaches a barrier member (*4*) having one aperture.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to employ the use of the barrier member for providing a seal between the gland structure and the hardenable compound (*Page 10, ¶ 4-5*).

Moreover and in regard to the functional recitations preceded by the phrase “adapted to”, claim scope is not limited by claim language that suggests or makes optional but does not require steps to be performed, or by claim language that does not limit a claim to a particular structure. Examples of claim language that may raise a question as to the limiting effect of the language in a claim are: "adapted to" or "adapted for" clauses, "wherein" clauses, and "whereby" clauses (*MPEP §2111.04*). Therefore, although these limitations are considered, they are afforded no patentable weight.

As per claim 2, Kaptein discloses the body being flexible (*Col 1, Line 34*).

As per claim 3, Kaptein discloses the first barrier apparatus comprising a releasable clamp (*Col 4, Lines 19-21*).

As per claim 4, Kaptein discloses a first component of a curable liquid material in the first chamber and a second component of said curable liquid material in the second chamber (*Col 4, Lines 5-9*).

As per claim 5, Kaptein discloses all the structural limitations of the claim and is capable of dispensing a two-part curable liquid that changes color upon mixing the components.

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As per claim 6, the disclosure from Kaptein combined Hand teach the invention according to claim 1. Hand further teaches a cover (**10**) covering the external screw thread of a cable gland (**Page 17, ¶ 2**). At the time of the invention, it would have been obvious to one of ordinary skill in the art to employ the aforementioned teaching from Hand for the purpose of being able to compress a seal (**13**) to engage the outer sheath of a cable extending through the gland for the purpose of fixing the position of the cable relative to the gland.

As per claim 7, the disclosure from Kaptein combined Hand teach the invention according to claim 6. Hand further teaches said cover (**10**) cover a portion of an end face of the cable gland (**Figure 1**). At the time of the invention, it would have been obvious to one of ordinary skill in the art to employ the aforementioned teaching from Hand for the purpose of being able to compress a seal (**13**) to engage the outer sheath of a cable extending through the gland for the purpose of fixing the position of the cable relative to the gland.

As per claim 8, the disclosure from Kaptein combined Hand teach the invention according to claim 1. Hand further teaches said barrier member being flexible (**Page 10, ¶ 1**). At the time of the invention it would have been obvious to employ the use of a flexible seal taught by Hand with the dispenser disclosed by Kaptein for the purpose of allowing the seal to resiliently deform during bonding to the two-part curable liquid material—thereby minimizing air pockets and ensuring integrity of the bondline therewith.

As per claim 9, the disclosure from Kaptein combined Hand teach the invention according to claim 1. Hand further teaches the seal having a tapering portion (**Page 8, ¶ 3-5**). At the time of the invention, it would have been obvious to one of ordinary skill to employ the use of a conically-shaped seal taught by Hand with the dispenser disclosed by Kaptein for the

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purpose of enhancing sealing performance during bonding to the two-part curable liquid material.

As per claim 10, Kaptein discloses a method for filling a cable gland with a curable liquid material comprising:

- a dispenser apparatus comprising: a body adapted to define at least a first chamber (23), a second chamber (24) said second chamber adapted to communicate with said first chamber to enable mixing of the contents of the respective chambers (*Col 4, ¶ 4*); a first barrier barrier apparatus (21); one elongate dispenser apparatus (17); a second barrier apparatus (22);
- a step of locating an outlet of said dispenser in said cable gland and dispensing curable liquid therefrom (*Figure 6*).

Kaptein does not disclose a barrier member and located a barrier member in the cable gland. Hand teaches a barrier member (4) having one aperture and a step of locating the barrier member in the cable gland (*Page 7, ¶ 4*).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to employ the use of the barrier member for providing a seal between the gland structure and the hardenable compound (*Page 10, ¶ 4-5*).

As per claim 11, the disclosure from Kaptein combined Hand teach the invention according to claim 10. Hand further discloses the barrier member being located around at least one said core of at least one said cable (*Page 10, ¶ 4*). At the time of the invention it would have been obvious to one of ordinary skill in the art to incorporate the aforementioned teaching from Hand with the filling method disclosed by Kaptein for the purpose of providing a seal between the gland structure and the hardenable compound (*Page 10, ¶ 4-5*).



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As per claim 12, the disclosure from Kaptein combined Hand teach the invention according to claim 1. Kaptein further discloses the second barrier apparatus comprising a releasable clamp (*Col 4, Lines 1-5*).

### ***Conclusion***

The prior art made of record in FORM PTO-892 and not relied upon is considered pertinent to applicant's disclosure.

US Patent Number(s): 2957038, 3833754, 7507105, 6259029, 5600094, 4692563

Foreign Patent Number(s): 2258350, 2138218, 2074395

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Gruby, whose telephone number is (571) 272-3415. The examiner can normally be reached from Monday to Friday between 8:00 AM and 5:00 PM.

If any attempt to reach the examiner by telephone is unsuccessful, the examiner's supervisor, Paul Durand, can be reached at (571) 272-4459.

Another resource that is available to applicants is the Patent Application Information Retrieval (PAIR). Information regarding the status of an application can be obtained from the (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAX. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, please feel free to contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Applicants are invited to contact the Office to schedule an in-person interview to discuss and resolve the issues set forth in this Office Action. Although an interview is not required, the

Application/Control Number: 13/391,539

Page 9

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Office believes that an interview can be of use to resolve any issues related to a patent application in an efficient and prompt manner.

/Randall A Gruby/  
Examiner, Art Unit 3754

/PAUL R DURAND/  
Supervisory Patent Examiner, Art Unit 3754  
June 12, 2013

|                                   |                                       |   |             |
|-----------------------------------|---------------------------------------|---|-------------|
| <b>Notice of References Cited</b> | Application/Control No.<br>13/391,539 | Applicant(s)/Patent Under Reexamination<br>PROUD, SAMUEL LIAM |             |
|                                   | Examiner<br>RANDALL GRUBY             | Art Unit<br>3754  | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Name | Classification |
|---|--|-----------------|------|----------------|
| A | US-  |                 |      |                |
| B | US-  |                 |      |                |
| C | US-  |                 |      |                |
| D | US-  |                 |      |                |
| E | US-  |                 |      |                |
| F | US-  |                 |      |                |
| G | US-  |                 |      |                |
| H | US-  |                 |      |                |
| I | US-  |                 |      |                |
| J | US-  |                 |      |                |
| K | US-  |                 |      |                |
| L | US-  |                 |      |                |
| M | US-  |                 |      |                |


**FOREIGN PATENT DOCUMENTS**

| * | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Country         | Name         | Classification |
|---|--|-----------------|-----------------|--------------|----------------|
| N | WO 2008029165 A2                                 | 03-2008         | World Intellect | HAND, EDWARD | H02G 15/04     |
| O |  |                 |                 |              |                |
| P |  |                 |                 |              |                |
| Q |  |                 |                 |              |                |
| R |  |                 |                 |              |                |
| S |  |                 |                 |              |                |
| T |  |                 |                 |              |                |

**NON-PATENT DOCUMENTS**

| * | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|
| U |   |
| V |   |
| W |   |
| X |   |


\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

|  |  |  |
|--|--|--|
| <b><i>Index of Claims</i></b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

|   |                 |   |                   |   |                     |   |                 |
|---|-----------------|---|-------------------|---|---------------------|---|-----------------|
| ✓ | <b>Rejected</b> | - | <b>Cancelled</b>  | N | <b>Non-Elected</b>  | A | <b>Appeal</b>   |
| = | <b>Allowed</b>  | ÷ | <b>Restricted</b> | I | <b>Interference</b> | O | <b>Objected</b> |

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

| CLAIM |          | DATE       |            |  |  |  |  |  |  |
|-------|----------|------------|------------|--|--|--|--|--|--|
| Final | Original | 03/27/2013 | 06/07/2013 |  |  |  |  |  |  |
|       | 1        | ÷          | ✓          |  |  |  |  |  |  |
|       | 2        | ÷          | ✓          |  |  |  |  |  |  |
|       | 3        | ÷          | ✓          |  |  |  |  |  |  |
|       | 4        | ÷          | ✓          |  |  |  |  |  |  |
|       | 5        | ÷          | ✓          |  |  |  |  |  |  |
|       | 6        | ÷          | ✓          |  |  |  |  |  |  |
|       | 7        | ÷          | ✓          |  |  |  |  |  |  |
|       | 8        | ÷          | ✓          |  |  |  |  |  |  |
|       | 9        | ÷          | ✓          |  |  |  |  |  |  |
|       | 10       | ÷          | ✓          |  |  |  |  |  |  |
|       | 11       | ÷          | ✓          |  |  |  |  |  |  |
|       | 12       |            | ✓          |  |  |  |  |  |  |

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| <b>Search Notes</b><br><br> | <b>Application/Control No.</b><br><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br><br>RANDALL GRUBY           | <b>Art Unit</b><br><br>3754  |

| CPC- SEARCHED |      |          |
|---------------|------|----------|
| Symbol        | Date | Examiner |
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| CPC COMBINATION SETS - SEARCHED |      |          |
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| Symbol                          | Date | Examiner |
|                                 |      |          |

| US CLASSIFICATION SEARCHED |                                    |          |          |
|----------------------------|------------------------------------|----------|----------|
| Class                      | Subclass                           | Date     | Examiner |
| 222                        | 92,94,95,103,107,145.1,145.5,145.6 | 06/07/13 | RG       |

| SEARCH NOTES                                   |          |          |
|--|----------|----------|
| Search Notes                                   | Date     | Examiner |
| Performed Inventor Names Search                | 06/07/13 | RG       |
| Reviewed IDS References                        | 06/07/13 | RG       |
| Consulted Primary Examiner for Field of Search | 06/07/13 | RG       |
| See EAST search history, attached              | 06/07/13 | RG       |

| INTERFERENCE SEARCH     |                         |      |          |
|-------------------------|-------------------------|------|----------|
| US Class/<br>CPC Symbol | US Subclass / CPC Group | Date | Examiner |
|                         |                         |      |          |

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| /RANDALL GRUBY/<br>Examiner.Art Unit 3754 |  |
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Receipt date: 02/21/2012

13391539 - GAU: 3754

PTO/SB/08a (05-07)

Approved for use through 11/30/2007. OMB 0651-0031  
 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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|   |                        |                    |              |
|---|------------------------|--------------------|--------------|
| <b>INFORMATION DISCLOSURE<br/>STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     |                    |              |
|   | Filing Date            |                    | 2012-02-21   |
|   | First Named Inventor   | PROUD, Samuel Liam |              |
|   | Art Unit               |                    |              |
|   | Examiner Name          |                    |              |
|   | Attorney Docket Number |                    | 920257.00016 |

| U.S.PATENTS       |         |               |                        |            |   |  |
|-------------------|---------|---------------|------------------------|------------|---|--|
| Examiner Initial* | Cite No | Patent Number | Kind Code <sup>1</sup> | Issue Date | Name of Patentee or Applicant of cited Document | Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear |
|                   | 1       |               |                        |            |   |  |

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| U.S.PATENT APPLICATION PUBLICATIONS |         |                    |                        |                  |   |  |
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| Examiner Initial*                   | Cite No | Publication Number | Kind Code <sup>1</sup> | Publication Date | Name of Patentee or Applicant of cited Document | Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear |
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|--------------------------|---------|--------------------------------------|-----------------------------|------------------------|------------------|---|--|--------------------------|
| Examiner Initial*        | Cite No | Foreign Document Number <sup>3</sup> | Country Code <sup>2</sup> i | Kind Code <sup>4</sup> | Publication Date | Name of Patentee or Applicant of cited Document | Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear | T <sup>5</sup>           |
|                          | 1       | 0 434 105                            | EP                          | A1                     | 1991-06-26       | Lopvnik Terborg BV                              |  | <input type="checkbox"/> |
|                          | 2       | 2 074 395                            | GB                          | A                      | 1981-10-28       | British Engines Ltd.                            |  | <input type="checkbox"/> |
|                          | 3       | 2001 0109284                         | KR                          | A                      | 2001-12-08       | 3M Innovative Properties Company                |  | <input type="checkbox"/> |

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /R.G./

Cooper Ex. 1002

Receipt date: 02/21/2012

13391539 - GAU: 3754

|   |                        |                    |              |
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| <b>INFORMATION DISCLOSURE<br/>STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     |                    |              |
|   | Filing Date            |                    | 2012-02-21   |
|   | First Named Inventor   | PROUD, Samuel Liam |              |
|   | Art Unit               |                    |              |
|   | Examiner Name          |                    |              |
|   | Attorney Docket Number |                    | 920257.00016 |

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|  | 4 | 765 082 | GB | A | 1957-01-02 | Minnesota Mining and Manufacturing | <input type="checkbox"/> |
|--|---|---------|----|---|------------|------------------------------------|--------------------------|

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**NON-PATENT LITERATURE DOCUMENTS**

| Examiner Initials* | Cite No | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published. | T <sup>5</sup>           |
|--------------------|---------|---|--------------------------|
|                    | 1       | International Search Report and Written Opinion under date of September 16, 2010 in connection with PCT/GB2010/050989   | <input type="checkbox"/> |

If you wish to add additional non-patent literature document citation information please click the Add button

**EXAMINER SIGNATURE**

|                    |                 |                 |            |
|--------------------|-----------------|-----------------|------------|
| Examiner Signature | /Randall Gruby/ | Date Considered | 06/07/2013 |
|--------------------|-----------------|-----------------|------------|

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

Receipt date: 02/21/2012

13391539 - GAU: 3754

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|---|------------------------|--------------------|--------------|
| <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     |                    |              |
|   | Filing Date            |                    | 2012-02-21   |
|   | First Named Inventor   | PROUD, Samuel Liam |              |
|   | Art Unit               |                    |              |
|   | Examiner Name          |                    |              |
|   | Attorney Docket Number |                    | 920257.00016 |

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).


See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

|            |   |                     |            |
|------------|---|---------------------|------------|
| Signature  |  | Date (YYYY-MM-DD)   | 2012-02-21 |
| Name/Print | John D. Franzini  | Registration Number | 31,356     |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.



**Privacy Act Statement**

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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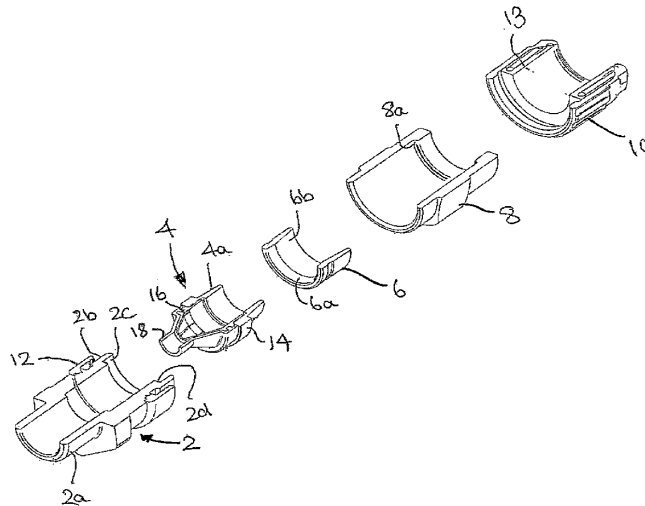
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(57) Abstract: A cable gland has an entry adaptor (2) for securing in an opening, a compression sleeve (8) threadably engageable with the entry adaptor (2) and a back nut (10) with cable seal (13) threadably engageable with the compression sleeve (8). The compression sleeve (8) urges a clamping ring (6) towards one end of an insert (14) to clamp cable armour between opposed surfaces of the clamping ring (6) and insert (14). A cable seal (18) is mounted at the other end of the insert (14) by means of an insert adaptor (16) having an end portion that is a push-fit in the insert (14) and secured within the insert (14) to prevent axial separation. The insert (14) can be used with different insert adaptors (16) and cable seals (18) according to the application of the gland.

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## CABLE GLANDS

This invention relates to cable glands. The invention has particular, but not exclusive, applications to cable glands for electric cables, fibre optic  
5 cables and the like.

Cable glands are used in a wide range of applications when connecting electric cables to electrical equipment. In a common application, cable glands are used to seal cable entries to junction boxes or other electrical  
10 equipment for increased safety, particularly in hazardous environments where fire or explosion is a risk in order to avoid a flame path along the cable. In one type of known cable gland, the electrical conductors are embedded in a hardenable filler compound contained in a barrier sleeve located within the gland body. In another type of known cable gland, the  
15 electrical conductors pass through a diaphragm or compression seal supported to maintain engagement with the electrical conductors under a pressure differential across the seal. The known glands for these applications employ components designed for the intended application. These typically include components made of brass that are expensive to  
20 manufacture and there is a need for components that can be converted for different applications in a simple and cost effective manner.

The present invention has been made from a consideration of the foregoing problems.

25

A preferred object of the invention is to provide cable glands that can be configured for different applications and can be easily converted to a particular application.

Another preferred object of the invention is to provide a cable gland capable of maintaining sealing efficiency at high pressures, in particular under explosive conditions.

- 5 According to a first aspect of the invention there is provided a cable gland for a cable, the cable gland comprising a body, an insert having an internal axial bore, and an adaptor provided with positive location means arranged in use within the bore of the insert.
- 10 By this aspect of the invention, the insert can be configured for any selected one of a range of different applications by selection and fitment of the appropriate adaptor.

15 Preferably, the positive location means is an axially extending tubular portion of the adaptor that is received in the bore of the insert.

Preferably, a leading edge of the tubular portion is slightly chamfered to facilitate smooth insertion of the tubular portion into the bore of the insert

- 20 Preferably, the adaptor and insert are provided with co-operating formations that engage when the tubular portion is inserted in the bore to connect the adaptor to the insert.

25 Preferably, the co-operating formations are configured to interlock when engaged to resist withdrawal of the tubular portion from the bore. In this way, once the adaptor has engaged with the insert, the two components are secured together and do not disengage easily.

30 Preferably, the co-operating formations comprise an inwardly projecting annular rib on the inner surface of the bore of the insert having a

transverse abutment face co-operable with a transverse abutment face on the tubular portion of the adaptor to prevent axial separation of the insert and adaptor when engaged.

- 5 Preferably, the rib has a slightly chamfered face leading to the transverse abutment face for co-operating with tubular portion when the tubular portion is inserted in the bore to facilitate passage past the rib to engage the transverse abutment faces.
- 10 Alternative co-operating formations can be envisaged and the invention includes all possible configurations of co-operating formations to secure the two components together. It is desirable that the adaptor is axially located by such co-operating formations relative to the insert. It may be advantageous if the fit is also such as to inhibit rotational movement of
- 15 the adaptor relative to the insert.

Preferably, the axial bore extends from a first end face of the insert and the adaptor has an external abutment that locates against the first end face when the co-operating formations engage.

- 20 Preferably, the first end face is configured to resist relative rotation between the insert and adaptor when the co-operating formations engage. In this way, insert and adaptor are locked together axially and rotatably when engaged. Thus, the first end face may be knurled, serrated or
- 25 otherwise configured to resist relative rotation between the insert and adaptor.

Preferably, the knurls or serrations on the first end face are also configured to engage the tubular portion around the periphery of the bore

at the first end face to resist relative rotation between the insert and adaptor.

5 Preferably, the axial bore of the insert comprises a counterbore terminating in an internal shoulder leading to an axial bore of reduced diameter that extends to a second end face of the insert.

10 Preferably, the tubular portion has an internal diameter that matches the axial bore of reduced diameter. In this way, an internal surface of the tubular portion is substantially contiguous with an inner surface of the axial bore of reduced diameter to provide a generally smooth surface of substantially uniform diameter between the first and second end faces of the insert.

15 Preferably, the insert is made of metal or alloy, for example brass, and the adaptor is made of plastics or elastomer rubber or other suitable material. In this way, the adaptor can be a relatively low cost moulded component and the insert can be configured to suit a particular application by selection and fitment of the appropriate adaptor.

20 Brass is an expensive material and employing an insert with an adaptor to produce a desired component uses less brass and so may reduce the cost of manufacture of the cable gland. Furthermore, assembly of the same insert with different adaptors may be used to produce a range of  
25 components for a variety of situations.

The adaptor may be configured to provide or assist a sealing function within the gland.

In one embodiment, the adaptor provides support for a cable seal. The cable seal may be detachable from the adaptor but more preferably the cable seal and adaptor are permanently secured together. For example, the seal may be moulded onto the adaptor.

5

In another embodiment, the adaptor provides support for one end of a barrier sleeve for receiving a hardenable filler compound. The adaptor may provide a seal between the filler compound and the barrier sleeve.

10 In another embodiment, the adaptor provides a seal for a cable, for example a lip seal, compression seal or diaphragm seal or any other type of seal as may be used in glands of the type embodying the invention.

15 According to a second aspect of the invention, there is provided a cable gland comprising an insert and an adaptor wherein the adaptor has a tubular portion received in an axial bore extending from an end face of the insert, and an abutment face locatable against the end face of the insert, wherein the end face of the insert is adapted to resist relative rotation between the insert and adaptor.

20

Preferably the end face of the insert is knurled, serrated or otherwise roughened or configured to resist relative rotation between the insert and adaptor.

25 Preferably, the tubular portion is secured in the axial bore to resist withdrawal of the tubular portion from the bore. The tubular portion may be secured by co-operating formations on the tubular portion and the inner surface of the bore as described previously in connection with the first aspect of the invention.

30

Preferably, the insert adaptor is configured to provide or assist a sealing function within the gland. The insert adaptor may have a support portion configured to locate and support a cable seal or barrier sleeve externally of the insert. Alternatively, the insert adaptor provides a cable seal, for  
5 example a lip seal, compression seal or diaphragm seal or any other type of seal as may be used in glands of the type embodying the invention.

According to a third aspect of the invention, there is provided in or for a cable gland, an insert and an insert adaptor connected together to produce  
10 a required gland component, wherein the insert is connectable to any selected one of a set of insert adaptors to configure the insert to the required gland component.

Preferably, the insert adaptor has a tubular portion received and secured  
15 in an axial bore of the insert or vice versa.

Preferably, the insert is made of metal or alloy such as brass and the insert adaptor is made of plastics such as nylon or polyester or an elastomer.  
20

Preferably, the insert adaptor is secured axially and/or rotatably relative to the insert. For example, the insert adaptor may be secured axially in accordance with the first aspect of the invention and rotatably in accordance with the second aspect of the invention.  
25

Preferably, the insert adaptor is configured to provide or assist a sealing function within the gland. The insert adaptor may have a support portion configured to locate and support a cable seal or barrier sleeve externally of the insert. Alternatively, the insert adaptor may incorporate a seal, for



example a lip seal, or any other type of seal as may be used in glands of the type embodying the invention.

5 According to a fourth aspect of the invention there is provided a cable gland for a cable, the cable gland comprising a body, an insert within the body, an adaptor having a first portion located and secured within an axial bore of the insert and a second portion that supports a seal externally of the insert.

10 Preferably, the seal is securely located on the second portion to resist removal from the second portion in the normal course of use. More preferably, the seal and second portion are permanently attached to each other.

15 Preferably, the seal is moulded onto the second portion to be integral therewith. In this way, the seal and adaptor form a single component for fitment to the insert such that the seal cannot be assembled into a cable gland without its associated seal support thereby improving the effectiveness and safety of cable glands utilising the seal.

20 Preferably, the first portion of the adaptor is located and secured within the axial bore of the insert by positive location means similar to the positive location means of the adaptor according to the first aspect of the invention.

25 Preferably, the second portion of the adaptor has an abutment face that locates against an end face of the insert that is configured according to the second aspect of the invention to resist rotation of the adaptor relative to the insert when the adaptor is connected to the insert.

30

Preferably, the seal has a portion locatable against the end face of the insert when the adaptor is connected to the insert, and the end face is configured to resist relative rotation between the seal and the insert.

- 5 Preferably, the second portion of the adaptor and the seal have interengaging formations that resist axial separation of the seal and adaptor. In one preferred embodiment, the seal has an inwardly extending flange received in an outwardly facing groove in the adaptor.
- 10 Preferably, the adaptor and seal further comprise inwardly extending frusto-conical portions that extend away from the insert.

Preferably, the frusto-conical portion of the adaptor has radial slits that extend in the axial direction at least a part way along the frusto-conical  
15 portion from a free end thereof.

Preferably, the frusto-conical portion of the seal is provided with axially extending ribs on an inner surface thereof that are received in the slits and provide the frusto-conical portion of the seal with locally thickened  
20 regions that strengthen the seal and enhance sealing performance.

According to a fifth aspect of the invention there is provided a combined seal and seal support for a cable gland wherein the seal and seal support are provided with co-operating formations to axially and rotationally  
25 locate the seal relative to the seal support.

A particular advantage of this combination is that the seal is securely located on the seal support and is difficult if not impossible to remove therefrom in the course of normal use. Hence, in assembling the  
30 components of a cable gland, the seal will not be incorporated into the

gland without the seal support. This improves the function and safety of the cable gland.

Preferably, a first tubular section of the seal and the seal support have co-  
5 operating location means to axially locate the seal relative to the seal support. The location means may comprise an internal annular flange on the seal received in an external annular groove in the seal support.

Preferably, the seal and seal support are configured for assembly to an  
10 insert received with the gland and the seal is provided with an inwardly extending lip that presents a resilient sealing face to an end face of the insert.

Preferably the seal and seal support comprise an over-molded integral  
15 component. For example, the seal may be moulded over the seal support.

According to a sixth aspect of the invention a method of manufacture of a seal and seal support for a cable gland comprises:

20 moulding a seal support in a suitable mould;  
and moulding a seal thereon,  
the seal and seal support having location means whereby the seal is axially and rotationally located on the seal support.

Preferably, the seal support and seal are moulded integrally in a twin shot  
25 mould.

Preferably, the seal support is made of plastics or any other suitable material. The seal support may be made of nylon or polyester. The seal support may be rigid or flexible.

30

Preferably, the seal is made of elastomer or any other suitable material. The seal may be made of rubber, silicone or neoprene or santoprene (Registered Trade Mark). The seal is preferably resiliently deformable.

- 5 Preferably, the seal and seal support are configured for assembly to an insert received within the gland. For example, the seal support may have a tubular portion received and retained in an axial bore of the insert.

Preferably, the insert is made of metal or alloy or any other suitable material. A particularly preferred material is brass.

10

According to a seventh aspect of the present invention, there is provided a cable barrier gland for a cable having a sheath enclosing at least one conductor core, the gland comprising a body, a barrier sleeve locatable in the body wherein, in use, the at least one conductor core extends through the body and the sleeve and a hardenable compound is disposed in the sleeve filling the sleeve and surrounding the at least one core, and sealing means locatable at one end of the sleeve wherein, in use, the sealing means provides a seal between the sleeve and the hardenable compound within the sleeve.

15

20

By this aspect of the invention, the sealing means ensures the integrity of the gland is maintained such that, if a fault occurs in the bond between the sleeve and hardenable compound sufficient to allow passage of gas or liquid between the sleeve and the hardenable compound, the gas or liquid is contained and prevented from escaping by the sealing member. In this way, the risk of a fire or explosion being caused by permeation of gas or liquid through the gland can be eliminated. Furthermore, the sealing means performs this function irrespective of the material used for the sleeve.

25

30

Preferably, the sealing means comprises a tubular seal member having an end portion that is received within the barrier sleeve and is a clearance fit around the at least one conductor core such that the hardenable compound  
5 fills the barrier sleeve and the seal member. In this way, the end portion of seal member extends axially between the barrier sleeve and hardened compound to form a seal therebetween.

Preferably, the end of the barrier sleeve remote from the seal member is a  
10 clearance fit around the at least one conductor core. In this way, excess hardenable compound can exude from the barrier sleeve on fitment of the barrier sleeve around the hardenable compound surrounding the at least one conductor core in a controlled manner that allows the excess compound to be removed before the compound hardens.

15 Preferably, the seal member is arranged and adapted to seal between opposed end faces of the barrier sleeve and a support member. In a preferred arrangement, the seal member can be pre-assembled to the support member. For example, the seal member and support member  
20 may be provided with complementary formations that are engageable to connect the seal member to the support member. In a preferred arrangement, the support member and seal member are provided by the insert and insert adaptor of the preceding aspects of the invention.

25 In one embodiment, the body in which the barrier sleeve is locatable is an entry adaptor and the gland further comprises a compression sleeve threadably engageable with the entry adaptor to engage the sealing member with the barrier sleeve. Preferably, the support member is locatable in the compression sleeve and the seal member is axially located

between the barrier sleeve and the support member by engagement of the compression sleeve with the entry adaptor.

In one arrangement suitable for use with cables having no armour or earth  
5 element, the support member comprises a cylindrical body that is received  
in and locates against an internal abutment shoulder within the  
compression sleeve. The body has a counterbore at the end remote from  
the abutment shoulder in which an end portion of the seal member is  
received and retained, for example by engagement of an internal flange  
10 or rib in the counterbore with an external groove in the end portion of the  
seal member or vice versa. Other engageable formations to secure the  
seal member may be employed.

In another arrangement suitable for use with cables having armour or  
15 earth element, the gland includes a clamping ring co-operable with the  
support member for clamping the cable armour or earthing element.  
Preferably, the clamping ring and support member are provided with  
opposed clamping faces, preferably tapered clamping faces, and the gland  
is arranged and adapted to urge the clamping ring and support member  
20 axially relative to each other to clamp the cable armour or earthing  
element between the clamping faces. In this arrangement, the support  
member has a counterbore at the end remote from the clamping face in  
which an end portion of the seal member is received and retained, for  
example by engagement of an internal flange or rib in the counterbore  
25 with an external groove in the end portion of the seal member or vice  
versa. Other engageable formations to secure the seal member may be  
employed.

In both arrangements, the seal member has an external annular flange  
30 between the ends that is located between the opposed end faces of the

barrier sleeve and the support member and another end portion located between the barrier sleeve and the hardened compound when the gland is assembled and the compression sleeve tightened on the entry adaptor to urge the support member towards the barrier sleeve so as to provide a seal between the barrier sleeve and the hardened compound.

Preferably, the gland includes a cable seal urged to engage an outer sheath of the cable extending through the gland by engagement of a cap nut in which the cable seal is received with the compression sleeve.

The barrier sleeve may be made of any suitable materials. For example the barrier sleeve may be made of metals or alloys such as brass. Alternatively, the barrier sleeve may be made of plastics such as polycarbonate. Alternatively, the barrier sleeve may be made of resilient or elastic materials such as rubber or other elastomers.

Preferably, the seal member is made of a resilient or elastic material such as rubber although any suitable elastomers may be employed. Alternatively, the seal member may be made of a flexible plastics material such as Santoprene (RTM).

According to an eighth aspect of the invention, there is provided a method of sealing a cable barrier gland in which one or more conductor cores of a cable extending through the gland are embedded in a hardenable compound contained in a barrier sleeve located within the gland, the method including the step of providing a seal member at one end of the barrier sleeve to form a seal between the barrier sleeve and the hardenable compound.

By this aspect of the invention, the sealing member prevents passage of gas or liquid through the gland if an incomplete or partial bond is formed or develops between the barrier sleeve and the hardenable compound. In this way, the integrity of the gland is maintained under all conditions  
5 whatever material the barrier sleeve is made of.

Preferably, the seal member has an end portion received in the barrier sleeve and extends axially between the barrier sleeve and hardened compound to form seal therebetween.  
10

The invention will now be further described, by way of example only, with reference to the following drawings in which:

**Figure 1** is an exploded cross sectional view of a cable gland according to  
15 a first embodiment of the invention;

**Figure 2** is an enlarged cross-section view of the seal, seal support and insert of the cable gland shown in Figure 1, and

20 **Figure 3** is a cross-sectional view of the combined seal and support before location on the insert of the cable gland shown in Figure 1;

**Figure 4** shows a modification to the insert, insert adaptor and seal assembly of the gland shown in Figures 1 to 3;  
25

**Figure 5** is a longitudinal view of a cable barrier gland according to a second embodiment of the invention showing one half of the gland in section and with the hardenable compound in situ within the barrier sleeve;  
30



**Figure 6** is a longitudinal view of the gland shown in Figure 5 with the hardenable compound omitted;

**Figure 7** is an enlarged view of the area A in Figure 6;

5

**Figure 8** shows a modification to the gland of Figures 5 to 7;

**Figure 9** is a longitudinal view of a cable barrier gland according to a third embodiment of the invention showing one half of the gland in section and with the hardenable compound in situ within the barrier sleeve; and

10

**Figures 10 and 11** are cross-sectional views of further embodiments of the invention.

15

Referring to Figure 1 of the drawings, a cable gland according to a first embodiment of the invention is shown comprising an entry adaptor 2, a combined insert, insert adaptor and seal assembly 4, an armour clamping ring 6, a compression sleeve 8 and a back nut 10. The component parts of the gland are arranged and adapted to be co-axially assembled around an armour cable (not shown) having woven or braided metal armour disposed between an outer sheath or jacket of electrically insulating material and an inner sheath of electrically insulating material surrounding one or more conductors.

20

25

The entry adaptor 2 has a spigot 2a at one end for insertion in an opening in a junction box (not shown) or the like through which the conductors extend for connection to terminals within the junction box. The spigot 2a is externally threaded for mounting a locknut (not shown) to secure the entry adaptor 2a to the junction box. Alternatively, the opening in the

30

junction box may be tapped for mating engagement with the external thread on the spigot 2a.

The other end portion 2b of the entry adaptor 2 is externally threaded and  
5 has a counterbore 2c terminating in an internal shoulder 2d providing an abutment for locating the combined seal, seal support and insert assembly 4. An end portion of the assembly 4 projects from the counterbore 2c at the end the entry adaptor 2 and has an external tapered surface 4a for co-operating with an internal tapered surface 6a of the  
10 clamping ring 6 to secure the cable armour therebetween.

In this embodiment, the clamping ring 6 is reversible for presenting a selected one of two tapered surfaces 6a,6b for co-operating with the tapered surface 4a of the assembly 4 for accommodating different  
15 thicknesses of cable armour. Such a reversible clamping ring forms the subject matter of our granted European patent No.0587310. This is not essential, however, and any other suitable clamping ring may be employed.

20 The clamping ring 6 is received in the compression sleeve 8 and locates at the end remote from the assembly 4 against an internal shoulder 8a of the compression sleeve 8. The compression sleeve 8 has an internally threaded portion at one end engageable with the externally threaded end portion 2b of the entry adaptor 2 to urge the clamping ring 6 axially  
25 towards the assembly 4 to clamp cable armour between the opposed tapered surfaces and to locate the assembly 4 against the internal shoulder 2d of the entry adaptor 2.

A rubber boot 12 mounted on the entry adaptor 2 extends axially with  
30 radial clearance over the externally threaded end portion 2b of the entry

adaptor 2 and terminates in an inwardly directed lip that slidably and rotatably engages the outer surface of the compression sleeve 8 to provide a seal between the entry adaptor 2 and compression sleeve 8 that prevents moisture penetrating along the threads and thereby reduces the risk of corrosion of the cable armour.

The back nut 10 is provided with a cable seal 13 and has an internally threaded portion engageable with an externally threaded end portion of the compression sleeve to compress the seal 13 to engage the outer jacket or sheath of the cable (not shown) extending through the gland.

The combined insert, insert adaptor and seal assembly 4 is shown in more detail in Figures 2 and 3 and comprises insert 14, insert adaptor 16 and seal 18. The insert 14 is made of metal or alloy such as brass. The insert adaptor 16 is made of plastics such as nylon or polyester. The seal 18 is made of a flexible, resilient elastomer such as rubber, neoprene or other suitable material. In this embodiment, the seal 18 is moulded onto an end portion of the insert adaptor 16 to be integral therewith. For example, the seal 18 and insert adaptor 16 may be a twin shot injection moulding. This is not essential, however, and the seal 18 and insert adaptor 16 could be made separately and assembled together either permanently with adhesive to bond the seal 18 to the insert adaptor 16 or releasably.

The seal 18 comprises a first cylindrical portion 20, an inwardly angled frusto conical diaphragm portion 22 and a second cylindrical portion 24 coaxial with the first cylindrical portion 20 and of reduced diameter to engage and seal around the inner sheath containing the cable conductor(s).

The first cylindrical portion 20 is provided with an inwardly directed flange 26 that engages in a channel 28 formed between two outwardly extending flanges 30,32 on the insert adaptor 16 to assist in axially locating and retaining the seal 18 relative to the insert adaptor 16. The  
5 first cylindrical portion 20 is also provided with an inwardly extending lip 34 that locates over a stepped portion 36 of the flange 32 of the insert adaptor 16.

As best shown in Figure 3, an end face 38 of the seal 16 and shoulder 40  
10 of the stepped portion 36 of the insert adaptor 16 form a planar abutment surface adapted to seat on an end surface 42 of the insert 14 when the insert adaptor 16 is attached to the insert 14 as described later herein.

The whole or part of the end surface 42 is knurled, serrated or otherwise  
15 roughened (not shown) to resist rotation of the seal 18 and insert adaptor 16 relative to the insert 14. In addition, the shoulder 40 of the stepped portion 36 of the insert adaptor 16 terminates at an axially extending ledge 44 that is received in a counterbore 46 extending axially within the insert 14 from end surface 42. The counterbore 46 terminates  
20 at an internal shoulder 47 leading to an axial bore 49 of reduced diameter coaxial with the counterbore 46 and extending to the other end of the insert 14.

We have found that the roughening applied to the surface 42 tends to  
25 produce sharp edges around the periphery of the counterbore 46 that bite into the plastic material of the ledge 44 to further resist rotation of the insert adaptor 16 and seal 18 mounted thereon relative to the insert 14.

The ledge 44 leads to a tubular portion 48 of the insert adaptor 16 that is  
30 received in the counterbore 46 of the insert 14 and is provided at the

distal end with an external annular collar 50 having a tapered leading face 52 terminating in a transverse locking face 54. The counterbore 46 is provided with an internal annular rib 56 having a tapered leading face 58 terminating in a transverse locking face 60.

5

The tubular portion 48 of the insert adaptor 16 is a push-fit in the counterbore 46 to locate the transverse locking face 54 of the collar 50 at the distal end behind the transverse locking face 60 of the rib 56 to locate and axially retain the tubular portion 48 within the counterbore 46 to  
10 attach the insert adaptor 16 to the insert 14.

The engagement of the locking faces 54,60 is assisted by engagement of the tapered leading faces 52,58 as the tubular portion 48 is inserted into the counterbore 46 such that the collar 50 rides over and engages behind  
15 the rib 56 to resist axial separation of the insert adaptor 16 and insert 14.

The collar 50 and rib 56 are positioned so that, when engaged to lock the insert adaptor 16 and insert 14 together, the end face 38 of the seal and the shoulder 40 of the insert adaptor 16 are held tightly against the  
20 roughened end surface 42 of the insert 14 to optimise the interaction therebetween to resist rotation of the insert adaptor 16 relative to the insert 14. In this way, the insert 14 and insert adaptor 16 are locked together both to resist axial separation and relative rotation.

25 The frusto-conical portion 22 of the seal 18 is supported on the inner surface by a frusto-conical portion 62 of the insert adaptor 16 that is provided with slits 64 approximately 1mm wide extending axially and radially from the free end to form flexible tongues 66 defining an aperture 68 at the free end coaxial with and of slightly larger diameter  
30 than the second cylindrical portion 24 of the seal 18. The tongues 66 can

deflect to change the size of the aperture 68 to accommodate cable inner sheaths of different diameter.

The frusto conical portion 22 of the seal 18 is provided on the inner  
5 surface with ridges 69 that locate in the slits 64 of the insert adaptor 16  
thereby increasing the thickness of the seal 18 which has the advantage of  
strengthening the seal 18 and providing enhanced sealing performance  
when a pressure differential exists across the seal 18 such as may occur  
following an explosion in the junction box or other equipment to which  
10 the gland is connected.

Referring now to Figure 4 of the drawings, there is shown a modification  
to the insert, insert adaptor and seal assembly 4 of the cable gland  
described above with reference to Figures 1 to 3. For convenience, like  
15 reference numerals are used to indicate corresponding parts.

In this modification, the insert adaptor 16 and seal 18 are formed  
separately and the seal 18 fitted on the insert adaptor 16 by locating the  
end portion 20 of the seal over external flange 30 on the insert  
20 adaptor 16. The tubular portion 48 of the insert adaptor 16 is a push-fit  
in the counterbore 46 of the insert 14 to engage the internal rib 56 within  
the counterbore 46 in a matching annular groove 70 in the outer surface  
of the tubular portion 48 to locate and axially retain the tubular  
portion 48 within the counterbore 46 to attach the assembled insert  
25 adaptor 16 and seal 18 to the insert 14. The insert 14, insert adaptor 16  
and seal 18 may be made of materials similar to those employed for the  
same parts in the previous embodiment.

The counterbore 46 opens to an enlarged counterbore 71 at the end of the  
30 insert 14 in which internal flange 26 of the seal 18 is received when the

insert adaptor 16 is secured to the insert 14. As shown, the external flange 30 defines with the end of the insert 14 a portion of reduced cross-section relative to the flange 26 thereby trapping the flange 26 between the insert 14 and insert adaptor 16. In this way, the seal 18 is retained in position on the insert adaptor 16 both during assembly and in use without the use of adhesives to permanently attach the seal 18 to the insert adaptor 16 thereby simplifying production by eliminating the associated cleaning/priming stages required if adhesive is used to secure the seal 18 to the insert adaptor 16. The counterbore 71 is slightly tapered to facilitate insertion of the flange 26 and to compress the flange 26 in a radial direction that may assist in preventing rotation of the insert adaptor 16 and seal 18 relative to the insert 14.

The frusto-conical portion 22 of the seal 18 may be provided with ridges that locate in the slits 64 of the insert adaptor 16 as described above. Alternatively, the ridges may be omitted. In other respects, the construction and operation of the gland with the modified combined insert, insert adaptor and seal assembly 4 is similar to and will be understood from the description of the previous embodiment.

Referring now to Figures 5 to 7 of the drawings, a cable barrier gland 101 according to a second embodiment of the invention is shown in which the insert adaptor 16 and seal member 18 of the first embodiment are replaced by insert adaptor or seal member 107 which performs a sealing function as described later.

The gland 101 comprises an entry adaptor 103, a barrier sleeve 105, insert adaptor 107, insert 109, clamping ring 111, compression sleeve 113, cable seal 115 and cap nut 117. The parts of the gland 101

are arranged and adapted to be co-axially assembled around an electric cable 119 extending through the gland 101 as shown in the Figures.

The entry adaptor 103 has a tubular body 103a with an external screw thread 103b at one end for connecting the adaptor 103 to a threaded bore of an electrical fitting for entry and connection of the cable 119 in known manner.

The barrier sleeve 105 is cylindrical and is a close fit in a cylindrical counterbore 103c extending from the other end of the adaptor 103 to locate against an internal shoulder 103d at the inner end of the counterbore 103c.

The compression sleeve 113 has a tubular body 113a with an internal screw thread 113b at one end for engagement with an external screw thread 103e on the other end of the tubular body 103a of the entry adaptor 103.

The clamping ring 111 is of annular ring shape and is a close fit in a cylindrical counterbore 113c extending from said one end of the compression sleeve 113 to locate against an internal shoulder 113d at the inner end of the counterbore 113c.

The insert 109 is also of annular ring shape and is a close fit in the counterbore 113c to position an external tapered clamping surface 109a opposite an internal tapered clamping surface 111a of the clamping ring 111 for a purpose described later.

The insert adaptor 107 is made of neoprene or other suitable elastomeric material and has a cylindrical body 107a with an external annular



flange 107b intermediate the ends. The body 107a is sized to be a close fit in the barrier sleeve 105 and insert 109 with the flange 107b located between opposed end faces of the barrier sleeve 105 and the insert 109.

5 The insert adaptor 107 can be pre-assembled to the insert 109 to facilitate assembly. In this way, the insert 109 acts as a support member for the insert adaptor 107. For this purpose, an annular groove 107c is formed in the end portion of the insert adaptor 107 received in the insert 109 and an internal annular flange 109b in the bore of the insert 109 is located in  
10 the groove 107c to lock the insert 109 and insert adaptor 107 together to resist axial separation. The flange 107b is held tightly against end surface 109g of the insert 109 which can be roughened as described previously to resist relative rotation between the insert 109 and the insert adaptor 107.

15

As shown, an external annular tapered surface 107d is provided at the end of the insert adaptor 107 received in the bore of the insert 109 and the internal flange 109b has a tapered lead-in face 109c on one side that cooperates with the tapered surface 107d to facilitate insertion of the end of  
20 the insert adaptor 107 in the bore of the insert 109.

The tapered lead-in face 109c of the internal flange 109b terminates in radially extending stop face 109d and the groove 107c is of complementary shape to the flange 109b so that the end portion of the  
25 insert adaptor 107 locates behind the stop face 109d to secure and retain the insert adaptor 107 in the pre-assembled position on the insert 109.

The cap nut 117 has a tubular body with an internal screw thread 117a at one end for engagement with an external screw thread 113e at the other  
30 end of the compression sleeve 113 remote from the barrier sleeve 115.

The cable seal 115 is received in an annular recess 117b within the cap nut 117 and engages an internal abutment shoulder 117c at the other end of the cap nut 117.

- 5 The shoulder 117c is tapered and co-operates with a tapered end portion 115a of the cable seal 115 to urge the cable seal 115 radially inwards to seal around the electric cable 119 when the cap nut 117 is tightened on the compression sleeve 113.
- 10 The assembly and operation of the gland 101 will now be described.

The cable 119 has an outer sheath 121 over which the cap nut 117 together with the cable seal 115 therein and the compression sleeve 113 loosely threaded thereto are slid. The outer sheath 121 is then cut back  
15 from the end of the cable 119 to expose a cable armour or earthing element 122 surrounding one or more conductor cores 123 (two shown but it will be understood any number of cores may be provided according to the electrical connections of a given installation).

- 20 The cable armour or earthing element 122 is then cut back and positioned between the opposed tapered clamping faces 109a,111a of the insert 109 and clamping ring 111 with the exposed conductor cores 123 projecting from the insert adaptor 107 that is secured to the insert 109.

- 25 The projecting conductor cores 123 are then passed through the entry adaptor 103 which has been screwed to the electrical fitting (not shown) and the compression sleeve 113 screwed to the entry adaptor 103 by engaging of the mating screw threads 113b,103a to clamp the cable armour or earthing element 122 between the tapered faces 109a,111a of  
30 the insert 109 and clamping ring 111.

The compression sleeve 113 is then released from the entry adaptor 103 and the conductor cores 123 withdrawn from the entry adaptor 103. A hardenable compound 125 such as an epoxy resin having the consistency of putty or plasticine is then placed around and between the exposed conductor cores 123 to fill any voids between the cores 123.

In this condition, before the compound 125 hardens, the barrier sleeve 105 is slid onto the end of the cable 119 and pushed over the cores 123 with the hardenable compound 125 packed therearound and onto end portion 107e of the insert adaptor 107 to locate against the external flange 107b of the insert adaptor 107.

The hardenable compound 125 fills the barrier sleeve 105 and the cylindrical body 107a of the insert adaptor 107. The end of the barrier sleeve 105 remote from the insert adaptor 107 is a clearance fit around the cores 123 to leave an annular gap 127 through which any excess hardenable compound 125 can exude.

After cleaning away any excess hardenable compound 125, the cable cores 123 are passed through the entry adaptor 103 which has been screwed to the electrical fitting (not shown) and the barrier sleeve 105 inserted into the counterbore 103c of the adaptor 103 and the compression sleeve 113 screwed onto the entry adaptor 103 and hand tightened to pull the gland together and compress the barrier sleeve 105 onto the compound 125 which is left to cure and harden.

Once the compound 125 has hardened, the compression sleeve 113 is tightened on the adaptor 103 with a spanner or similar tool (not shown) so that the external flange 107b of the insert adaptor 107 is axially

compressed between the opposed end faces of the barrier sleeve 105. End portion 107e of the insert adaptor 107 provides a seal between the barrier sleeve 105 and the compound 125.

- 5 Finally, the cap nut 117 is tightened on the compression sleeve 113 to compress and urge the cable seal 115 into engagement with the outer sheath 121 of the cable 119.

Figure 8 shows a modification to the barrier cable gland of Figures 5 to 7  
10 in which like reference numerals are used to indicate corresponding parts. The barrier sleeve 105 may be made of metal or plastics or an elastomer. The insert adaptor 107 may be made of plastics or an elastomer.

The barrier sleeve 105 is configured to be received in the counterbore in  
15 the entry adaptor and is located at one end against an internal shoulder within the counterbore (Figure 5). In use, the barrier sleeve 105 contains a hardenable filler compound (not shown) that is packed around individual conductors of the cable extending through the gland.

20 The insert adaptor 107 has a tubular end portion 107e received in the other end of the barrier sleeve 105, an external flange 107b intermediate the ends that locates between the end of the barrier sleeve 105 and end surface 109e of the insert 109, and another tubular end portion 107f received in the counterbore of the insert 109.

25

The end portion 107f of the insert adaptor 107 is secured in the counterbore of the insert 109 by engagement of internal flange or rib 109b in annular groove 107c as described previously to lock the insert 109 and insert adaptor 107 together to resist axial separation. The  
30 flange 107b is held tightly against the roughened end surface 109g of the

insert 109 to resist relative rotation between the insert 109 and the insert adaptor 107.

5 The end portion 107e of the insert adaptor 107 is received in end portion 105a of the barrier sleeve 105 which is of increased diameter and provides a seal between the barrier sleeve 105 and the hardenable filler compound to maintain sealing efficiency if the bond between the filler compound and the barrier sleeve 105 is broken.

10 Referring now to Figure 9, a cable barrier gland according to a third embodiment of the invention is shown in which parts corresponding to the second embodiment have the same reference numbers and are not described in detail. In this third embodiment, the cable armour or earth element 122 and clamping ring 111 are omitted and the insert 109  
15 replaced by insert 129 for the insert adaptor 107.

The insert 129 has a cylindrical body 131 that is received in the counterbore 113c of the compression sleeve 113 and locates at one end against the internal shoulder 113d so as to be urged axially towards the  
20 barrier sleeve 105 when the compression sleeve 113 is tightened on the entry adaptor 103.

The other end of the insert 129 has a counterbore 129a to receive the end portion of the insert adaptor 107 and is provided with an internal annular  
25 flange 129b that locates in the annular groove 107c of the insert adaptor 107 to attach the insert adaptor 107 to the insert 129.

In other respects the construction, assembly and operation of the gland 101 is similar to the second embodiment and will be understood  
30 from the description of the first embodiment

As will be appreciated from the description of the second and third embodiments, the insert adaptor 107 provides a seal between the barrier sleeve 105 and the hardenable compound 125 contained in the sleeve 105.

5

As a result, if the compound 125 only partially bonds to the internal circumference of the barrier sleeve 105 so that a fluid path is formed between the compound 125 and the barrier sleeve 105 that extends the whole length of the barrier sleeve 105, any gas or liquid that enters the gland is contained by the insert adaptor 107 and prevented from escaping.

10

In this way, the effectiveness of this seal is independent of the material from which the barrier sleeve 105 is made and the integrity of the gland 101 is assured whether the barrier sleeve 105 is made of metal such as brass, elastomer such as Santoprene (RTM) or plastic such as polycarbonate or any other materials as will be familiar to those skilled in the art.

15

Referring now to Figures 9 and 10 of the drawings, alternative embodiments of the invention are shown in which the insert adaptor 16 and seal 18 of the cable gland shown in Figure 1 are replaced by alternative components for assembly with the insert 14 to adapt the gland for different applications. In other respects the glands are similar to the gland shown in Figure 1. Where appropriate, like reference numerals are used to indicate parts similar to Figure 1

20  
25

Figure 10 shows an arrangement for a cable gland in which the insert 14 is assembled with an insert adaptor 90 provided with a lip seal 92 for a low-pressure application. The insert adaptor 90 may be made of plastics or an elastomer.

30

The lip seal 92 is provided at one end of a cylindrical body 94 and extends radially inwards to define an opening for passage of the electrical conductors. The other end of the body 94 is provided with a tubular projection 96 similar to the end portion 80 of the insert adaptor 72 described previously that is a push fit in the counterbore 46 of the insert 14 to engage the internal annular rib 56 of the insert 14 in the groove 84 so that the insert 14 and insert adaptor 90 are locked together to resist axial separation and transverse end face 98 of the body 94 is held tightly against the roughened end surface 42 of the insert to resist relative rotation between the insert 14 and the insert adaptor 90.

Figure 11 shows an arrangement for a cable gland in which the insert 14 is assembled with an insert adaptor 100 for an application in which a cable seal is not required. The insert adaptor 100 may be made of plastics or an elastomer. The insert adaptor 100 is similar to the insert adaptor 90 shown in Figure 10 with the lip seal 92 omitted and the construction and assembly of the insert adaptor 100 with the insert 14 will be understood from the description of Figure 10.

As will be apparent from the foregoing description of exemplary embodiments, a common insert component can be assembled with any selected one of a range of insert adaptor components to configure the insert for the intended application of the gland. The insert component is typically made of metal or alloy, usually brass and, as the insert adaptor is preferably made of plastic or elastomer material, a number of different insert adaptors can be readily and relatively inexpensively manufactured, for example by injection moulding. A variety of insert adaptors for assembly with a common insert may be produced at relatively low cost whereby the cost of the assembled component - insert and insert adaptor -

can be reduced compared to the equivalent component made entirely of brass. Moreover, insert adaptors having complex shapes for different applications can be made with a high degree of accuracy by injection moulding for assembly with the insert thereby avoiding expensive  
5 machining of the brass insert to produce the same shapes leading to further cost savings.

It will be understood that the embodiments described above are examples only of the application of the invention and are not intended to be limiting  
10 on the scope of the invention. Other combinations of insert and insert adaptor that can be employed without departing from the invention as described herein will be apparent to those skilled in the art. For example, the insert may be configured for co-operating with a clamping ring for use of the cable gland with armoured cable. Alternatively, the  
15 insert could be configured for use of the cable gland with cable having no armour. It is envisaged that an insert and insert adaptor as described herein may incorporate all or some of the features described to configure a cable gland for any desired application. It is also envisaged that the invention includes any novel feature of the cable glands described herein  
20 separately or in combination with any other novel feature and that all combinations of novel features described herein are considered to be within the scope of the invention.

Moreover, it will be understood that the invention can be used with any  
25 type of cable, for example fibre optic cable and is not limited to electric cable. Finally, the term "cable" is used herein for convenience to include cables, wires, pipes, tubes and other elongate elements and the scope of the invention is to be construed accordingly.



**CLAIMS**

1. A cable gland for a cable, the cable gland comprising a body, an insert located within the body, the insert having an internal axial bore, and an adaptor provided with positive location means arranged in use  
5 within the bore of the insert.
2. A cable gland according to claim 1 wherein, the positive location means is an axially extending tubular portion of the adaptor that is received in the bore of the insert.  
10
3. A cable gland according to claim 2 wherein, a leading edge of the tubular portion is slightly chamfered to facilitate smooth insertion of the tubular portion into the bore of the insert
- 15 4. A cable gland according to claim 2 or claim 3 wherein, the adaptor and insert are provided with co-operating formations that engage when the tubular portion is inserted in the bore to connect the adaptor to the insert.
- 20 5. A cable gland according to claim 4 wherein, the co-operating formations are configured to interlock when engaged to resist withdrawal of the tubular portion from the bore.
- 25 6. A cable gland according to claim 5 wherein, the co-operating formations comprise an inwardly projecting annular rib on the inner surface of the bore of the insert having a transverse abutment face co-operable with a transverse abutment face on the tubular portion of the adaptor to prevent axial separation of the insert and adaptor when engaged.

7. A cable gland according to claim 6 wherein, the rib has a slightly chamfered face leading to the transverse abutment face for co-operating with tubular portion when the tubular portion is inserted in the bore to facilitate passage past the rib to engage the transverse abutment faces.
- 5
8. A cable gland according to any of claims 4 to 7 wherein, the axial bore extends from a first end face of the insert and the adaptor has an external abutment that locates against the first end face when the co-operating formations engage.
- 10
9. A cable gland according to claim 8 wherein, the first end face is configured to resist relative rotation between the insert and adaptor when the co-operating formations engage.
- 15
10. A cable gland according to claim 9 wherein, the first end face is knurled, serrated or otherwise configured to resist relative rotation between the insert and adaptor.
- 20
11. A cable gland according to claim 10 wherein, the knurls or serrations on the first end face are also configured to engage the tubular portion around the periphery of the bore at the first end face to resist relative rotation between the insert and adaptor.
- 25
12. A cable gland according to any of claims 8 to 11 wherein, the axial bore of the insert comprises a counterbore terminating in an internal shoulder leading to an axial bore of reduced diameter that extends to a second end face of the insert.
- 30
13. A cable gland according to claim 12 wherein, the tubular portion has an internal diameter that matches the axial bore of reduced diameter.

14. A cable gland according to any preceding claim wherein, the insert is made of metal or alloy and the adaptor is made of plastics or elastomer, rubber or other suitable material.
- 5
15. A cable gland according to any preceding claim wherein the adaptor is configured to provide or assist a sealing function within the gland.
- 10
16. A cable gland according to claim 15 wherein, the adaptor provides support for a cable seal.
17. A cable gland according to claim 16 wherein the cable seal and adaptor are permanently secured together.
- 15
18. A cable gland according to claim 18 wherein, the seal is moulded onto the adaptor.
19. A cable gland according to claim 15 wherein, the adaptor provides support for one end of a barrier sleeve for receiving a hardenable filler compound.
- 20
20. A cable gland according to claim 19 wherein the adaptor provides a seal between the filler compound and the barrier sleeve.
- 25
21. A cable gland according to claim 15 wherein, the adaptor provides a seal for a cable.
22. A cable gland according to claim 21 wherein the seal comprises a lip seal.
- 30

23. A cable gland according to claim 21 wherein the seal comprises a compression seal.

5 24. A cable gland according to claim 21 wherein the seal comprises a diaphragm seal.

25. A cable gland according to claim 1 wherein a set of adaptors is provided for assembly of the insert with any selected one of the set of  
10 adaptors to produce a required gland component.

26. In or for a cable gland, an insert and a set of insert adaptors, wherein the insert is connectable to any selected one of the set of insert adaptors to configure the insert to produce a required gland component  
15 for assembly of the cable gland, and wherein the selected insert adaptor has a tubular portion received in an axial bore of the insert, the tubular portion and axial bore having co-operating formations that are engageable to connect the insert and insert adaptor together.

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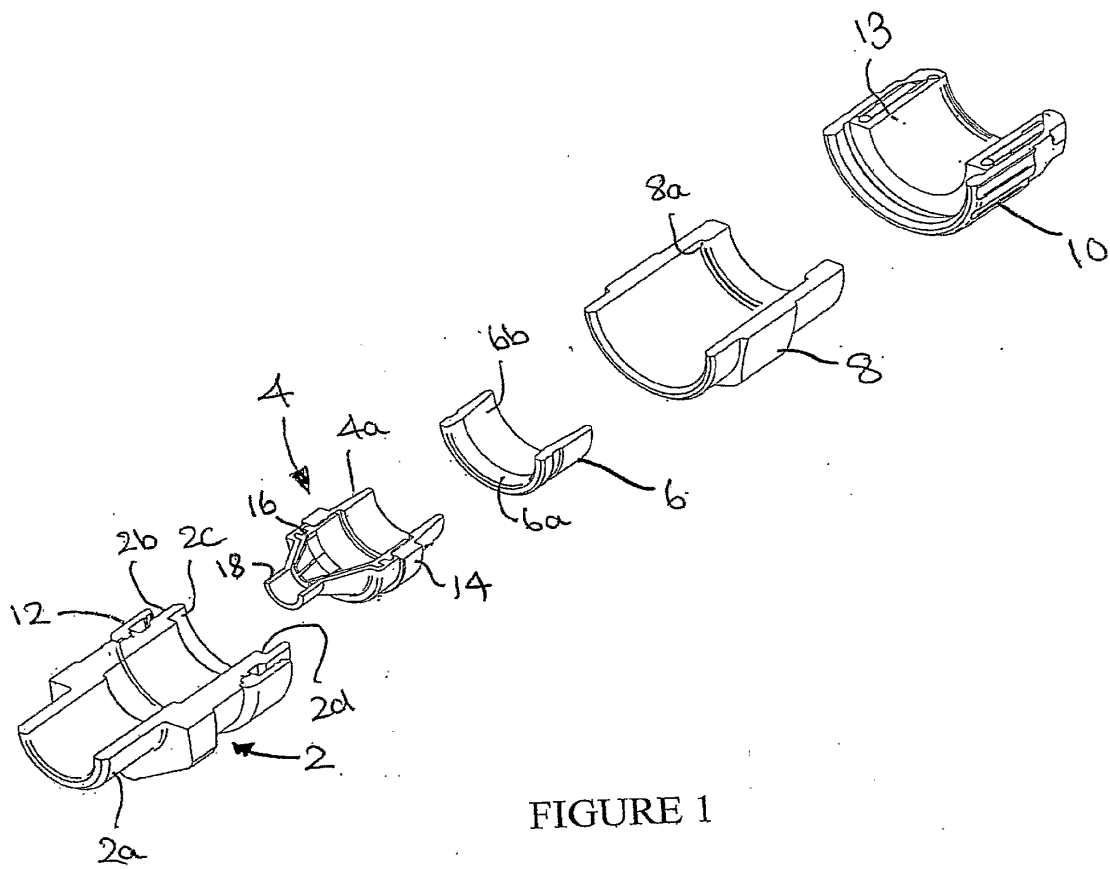


FIGURE 1

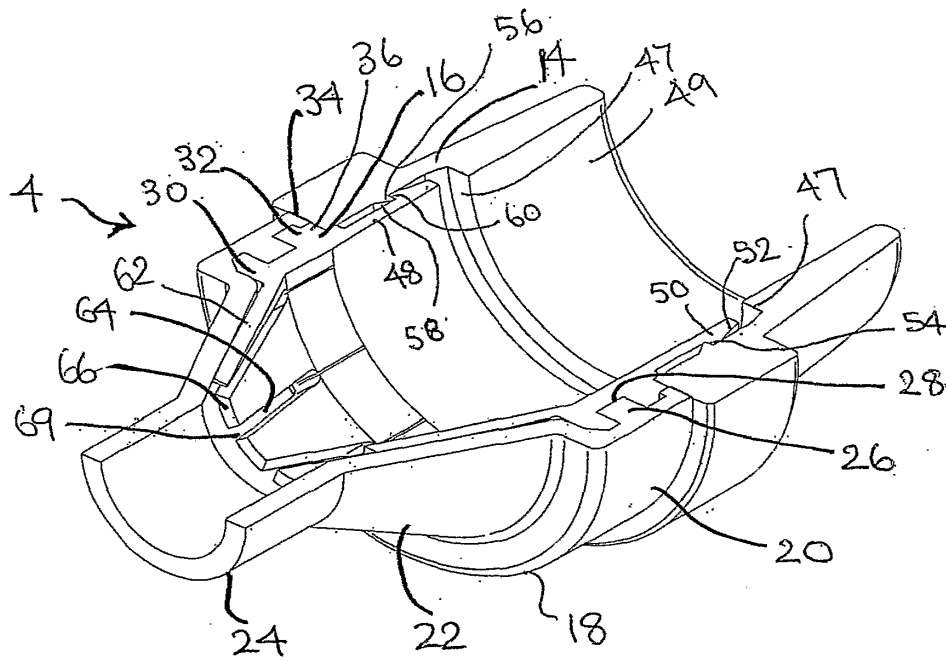


FIGURE 2

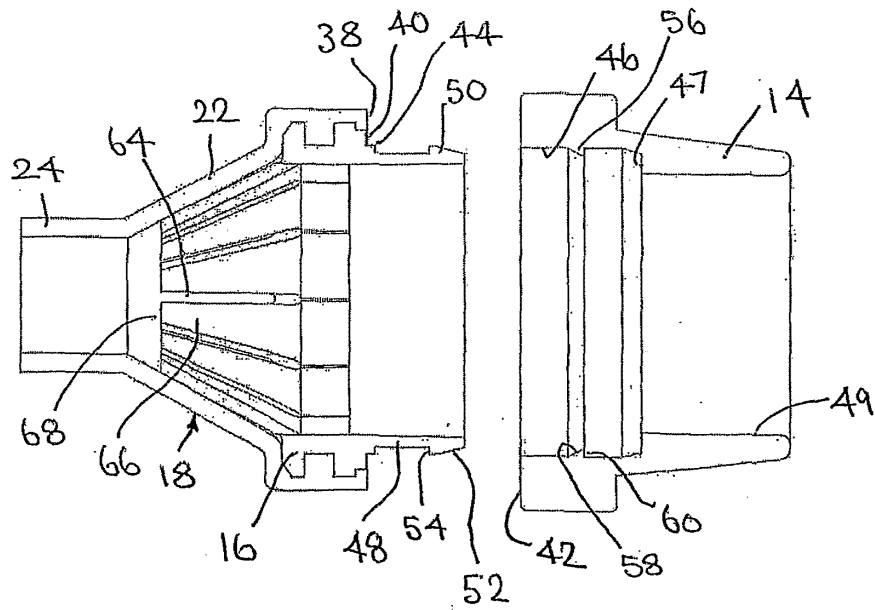


FIGURE 3

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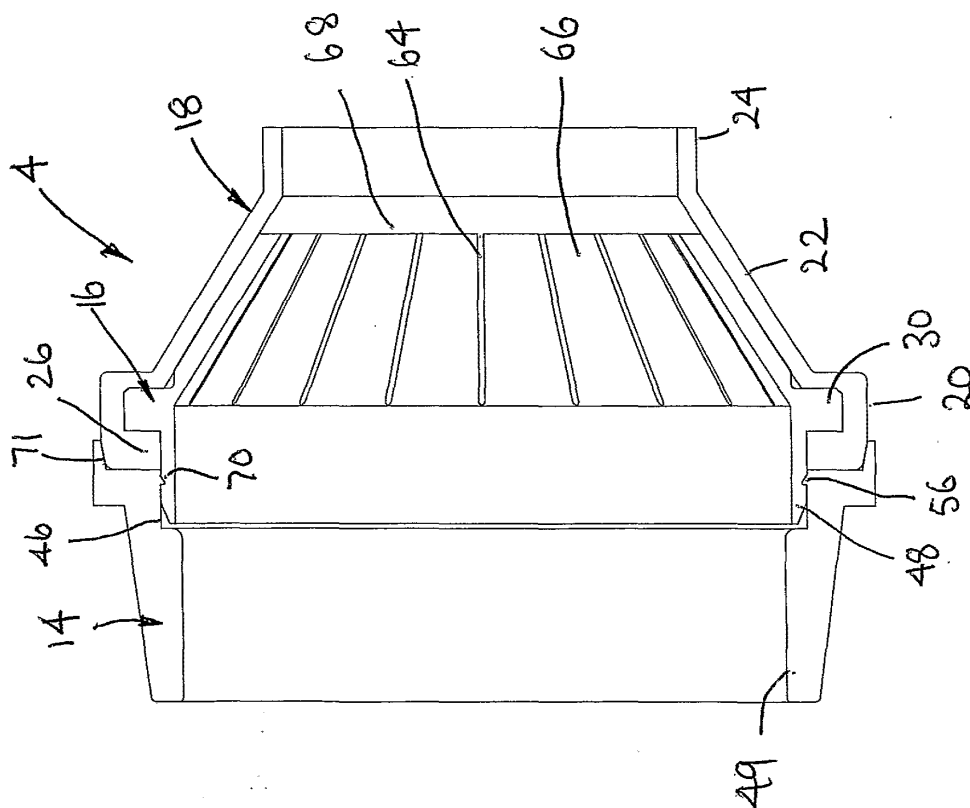


FIGURE 4

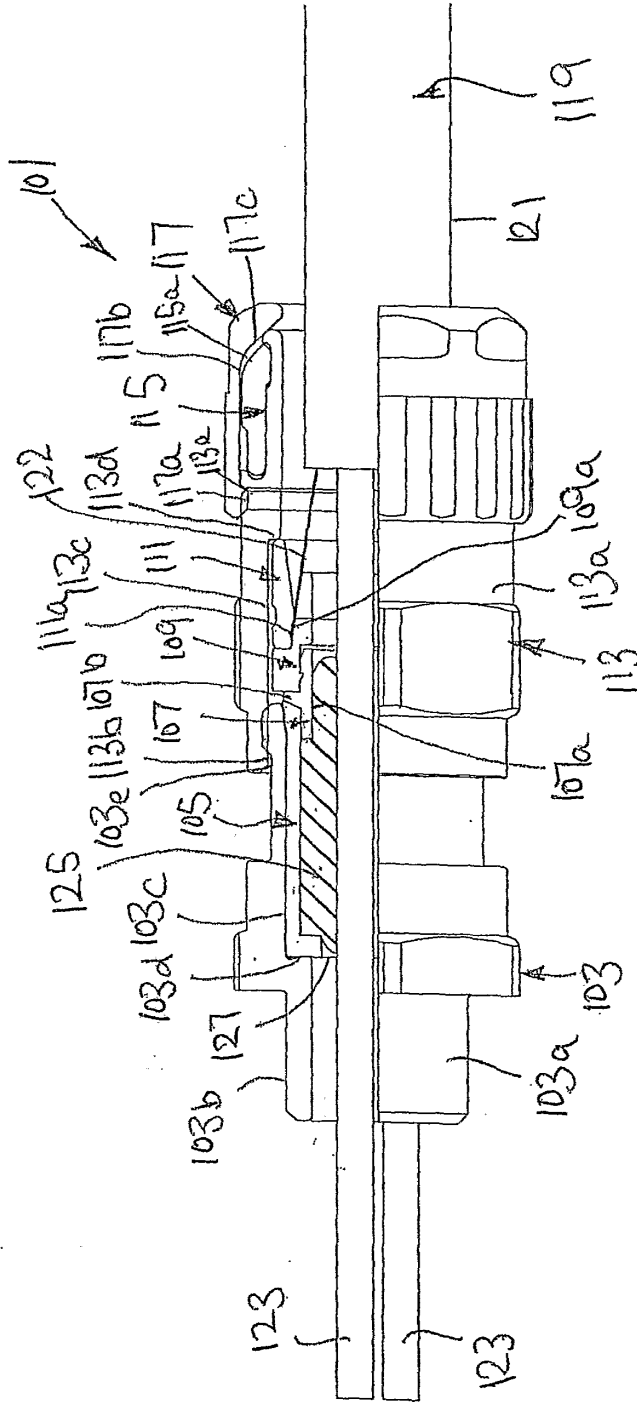


FIGURE 5



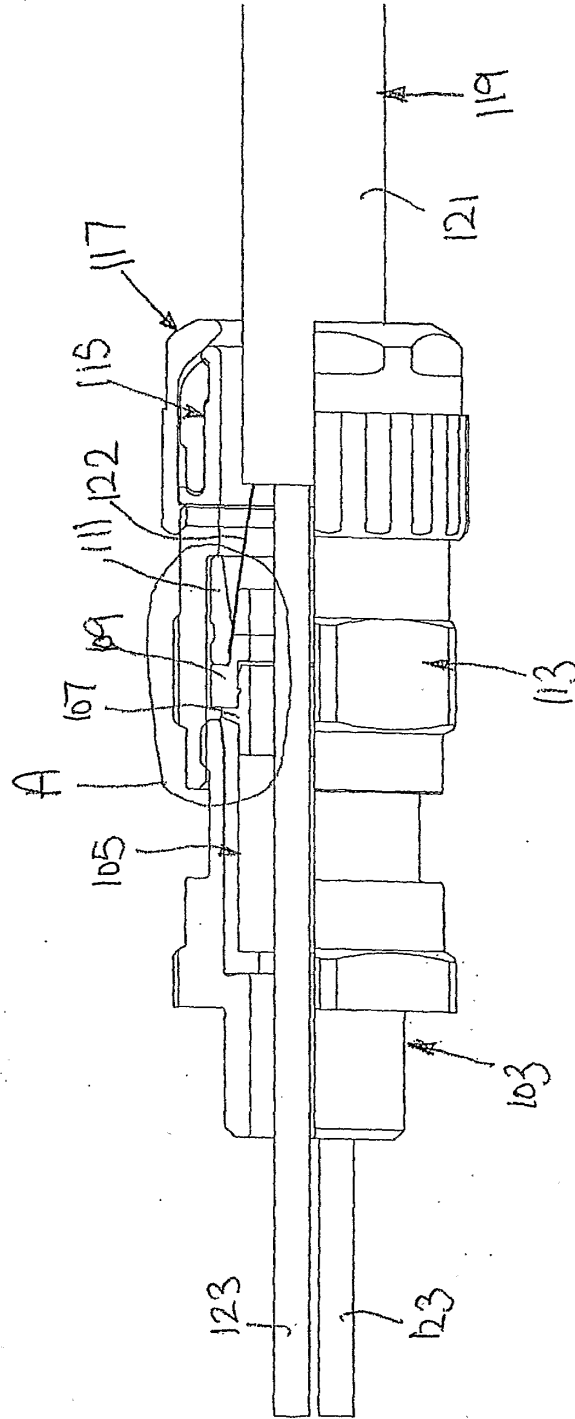


FIGURE 6

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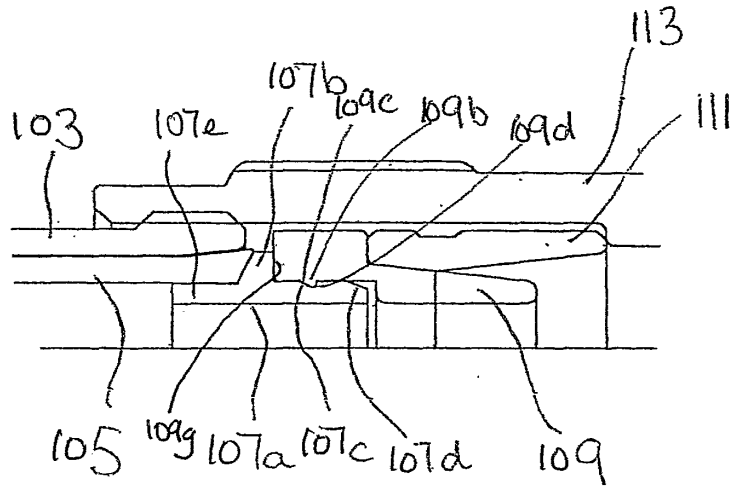


FIGURE 7

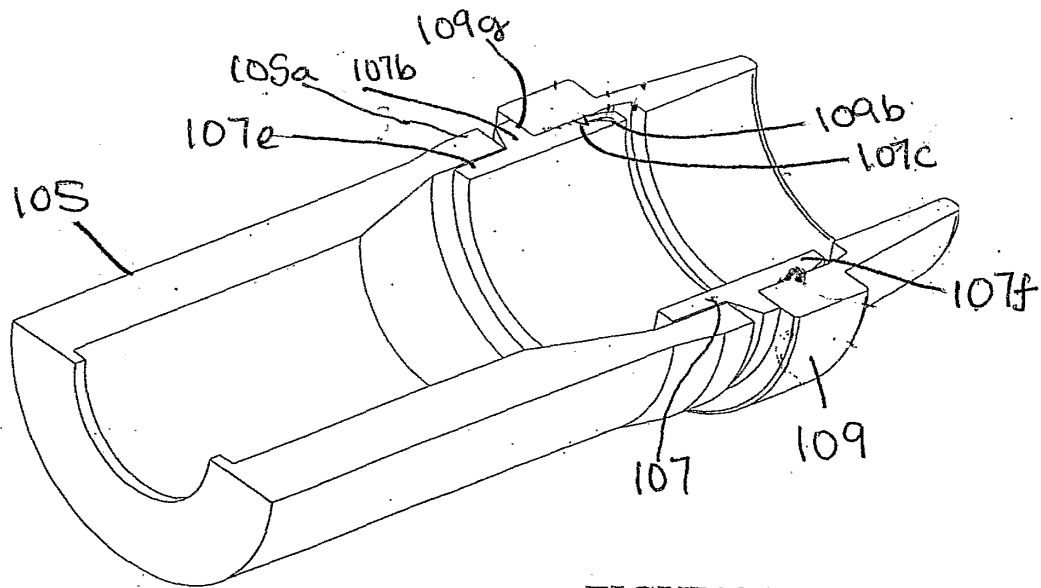


FIGURE 8

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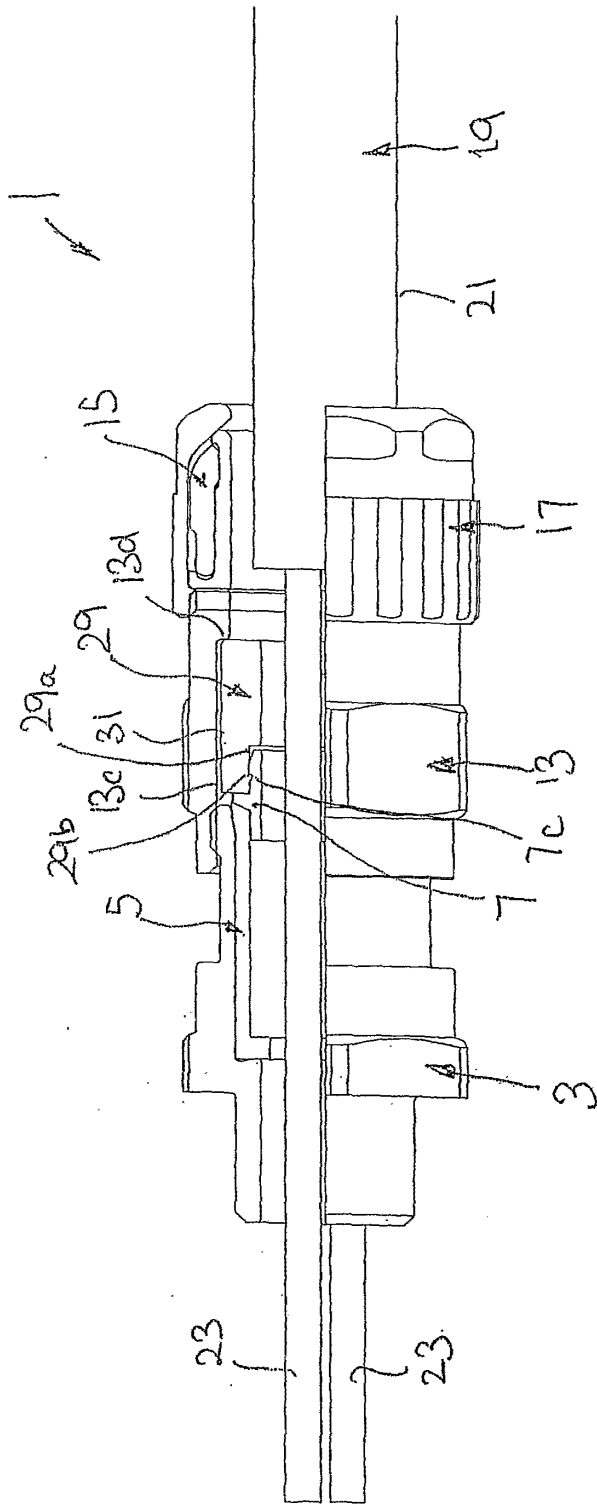
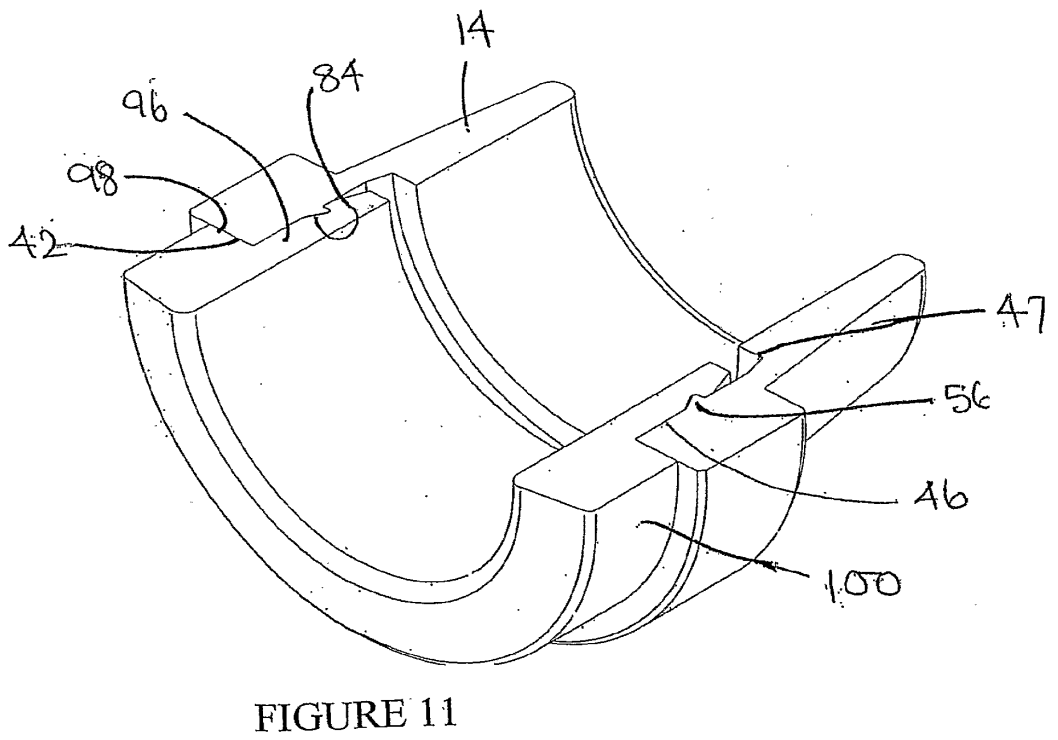
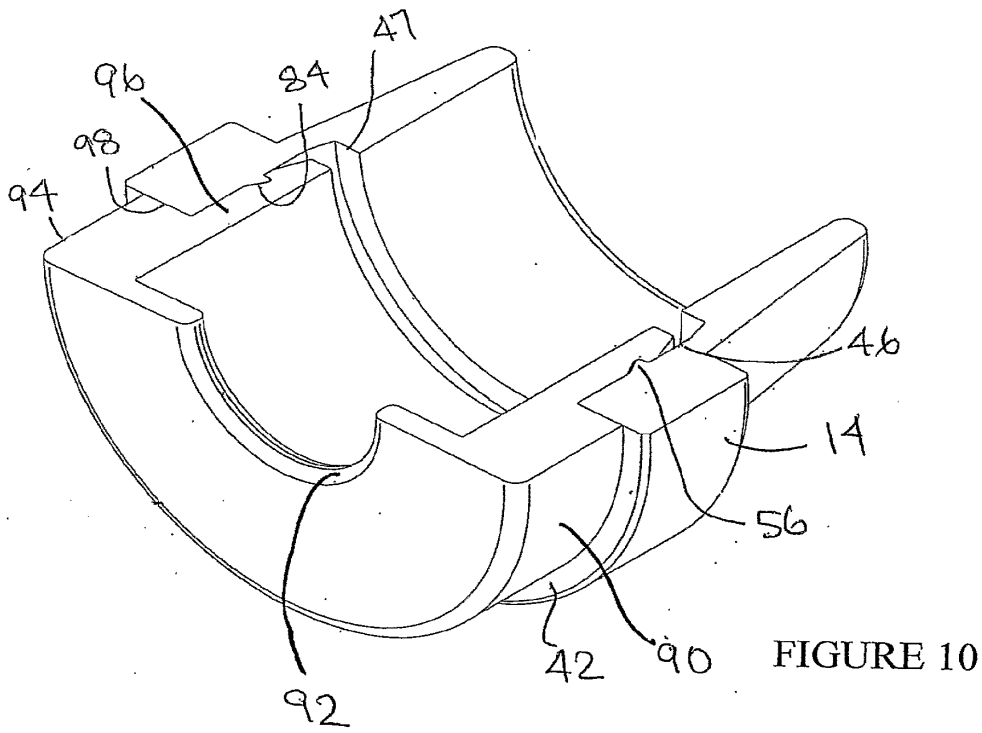


FIGURE 9





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|---|---|--|---|--|---------------------------|--------------------------------|
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| <b>APPLICANTS</b><br>Samuel Liam Proud, Tyne & Wear, UNITED KINGDOM;<br><b>** CONTINUING DATA *****</b><br>This application is a 371 of PCT/GB10/50989 06/14/2010<br><b>** FOREIGN APPLICATIONS *****</b><br>EUROPEAN PATENT OFFICE (EPO) 09168430.8 08/21/2009<br>EUROPEAN PATENT OFFICE (EPO) 09168429.0 08/21/2009<br>UNITED KINGDOM 1004216.6 03/15/2010<br>UNITED KINGDOM 1009450.6 06/07/2010<br><b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b><br>05/07/2012 |   |  |   |  |                           |                                |
| Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No<br>35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Verified and Acknowledged <u>/RANDALL A GRUBY/</u><br>Examiner's Signature  |   | <input type="checkbox"/> Met after Allowance<br>Initials | <b>STATE OR COUNTRY</b><br>UNITED KINGDOM   | <b>SHEETS DRAWINGS</b><br>2                | <b>TOTAL CLAIMS</b><br>12 | <b>INDEPENDENT CLAIMS</b><br>1 |
| <b>ADDRESS</b><br>QUARLES & BRADY LLP<br>Attn: IP Docket<br>411 E. WISCONSIN AVENUE<br>SUITE 2350<br>MILWAUKEE, WI 53202-4426<br>UNITED STATES  |   |  |   |  |                           |                                |
| <b>TITLE</b><br>FILLER ASSEMBLY FOR CABLE GLAND   |   |  |   |  |                           |                                |
| <b>FILING FEE RECEIVED</b><br>1250  | FEES: Authority has been given in Paper<br>No. _____ to charge/credit DEPOSIT ACCOUNT<br>No. _____ for following: |  | <input type="checkbox"/> All Fees<br><input type="checkbox"/> 1.16 Fees (Filing)<br><input type="checkbox"/> 1.17 Fees (Processing Ext. of time)<br><input type="checkbox"/> 1.18 Fees (Issue)<br><input type="checkbox"/> Other _____<br><input type="checkbox"/> Credit |  |                           |                                |

## EAST Search History

## EAST Search History (Prior Art)

| Ref # | Hits   | Search Query                                 | DBs  | Default Operator | Plurals | Time Stamp          |
|-------|--------|--|--|------------------|---------|---------------------|
| L1    | 2537   | 222/94                                       | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR               | ON      | 2013/06/08<br>11:54 |
| L2    | 7297   | 222/94,92,103,95,107,145.5,145.6,145.1.ccls. | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR               | ON      | 2013/06/08<br>11:54 |
| S1    | 1      | "13391539"                                   | US-PGPUB;<br>USPAT   | OR               | ON      | 2013/06/07<br>13:51 |
| S2    | 4      | "4343105"                                    | EPO;<br>DERWENT  | OR               | ON      | 2013/06/07<br>13:51 |
| S3    | 13     | "434105"                                     | EPO;<br>DERWENT  | OR               | ON      | 2013/06/07<br>13:52 |
| S4    | 1      | 1991-186955.NRAN.                            | DERWENT  | OR               | ON      | 2013/06/07<br>13:52 |
| S5    | 9      | "2074395"                                    | EPO;<br>DERWENT  | OR               | ON      | 2013/06/07<br>13:53 |
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| S9    | 0      | "1020017009380"                              | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR               | ON      | 2013/06/07<br>13:56 |

## EAST Search History

|     |     |                   |  |    |    |                     |
|-----|-----|-------------------|--|----|----|---------------------|
| S10 | 48  | "765082"          | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>13:56 |
| S11 | 11  | "765082"          | EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:57 |
| S12 | 18  | "765082"          | USOCR;<br>EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:57 |
| S13 | 0   | GB765082          | USOCR;<br>EPO;<br>DERWENT  | OR | ON | 2013/06/07<br>13:58 |
| S14 | 13  | "2957038"         | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:00 |
| S15 | 0   | "20010109284"     | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:01 |
| S16 | 955 | "9284"            | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:01 |
| S17 | 202 | S16 AND kr        | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:01 |
| S18 | 48  | "765082"          | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:02 |
| S19 | 0   | gb-765082-\$.did  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>14:03 |
| S20 | 4   | ("2957038").URPN. | USPAT  | OR | ON | 2013/06/07<br>14:09 |
| S21 | 48  | "765082"          | US-PGPUB;  | OR | ON | 2013/06/07          |

## EAST Search History

|     |      |  |  |    |    |                     |
|-----|------|--|--|----|----|---------------------|
|     |      |  | USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB              |    |    | 14:15               |
| S22 | 5    | "2258350"  | US-PGPUB;<br>USPAT   | OR | ON | 2013/06/07<br>14:49 |
| S23 | 13   | "2258350"  | US-PGPUB;<br>USPAT;<br>EPO;<br>DERWENT                                     | OR | ON | 2013/06/07<br>14:49 |
| S24 | 2    | "2001109284"   | DERWENT  | OR | ON | 2013/06/07<br>15:18 |
| S25 | 7    | "6242700"  | USPAT  | OR | ON | 2013/06/07<br>15:19 |
| S26 | 2    | "2001109284"   | DERWENT  | OR | ON | 2013/06/07<br>15:20 |
| S27 | 0    | "20010109284"  | DERWENT  | OR | ON | 2013/06/07<br>15:20 |
| S28 | 2    | "2001109284"   | DERWENT  | OR | ON | 2013/06/07<br>15:20 |
| S29 | 2    | "2001109284"   | DERWENT  | OR | ON | 2013/06/07<br>15:29 |
| S30 | 3    | "2001109284"   | JPO;<br>DERWENT  | OR | ON | 2013/06/07<br>15:30 |
| S31 | 2537 | 222/94   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:36 |
| S32 | 624  | S31 and mix  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:37 |
| S33 | 69   | S32 and clamp  | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:37 |
| S34 | 60   | S33 and (flex?ble or flex?bility or elastic\$3)                                    | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>15:37 |
| S35 | 1    | 1991-186955.NRAN.  | DERWENT  | OR | ON | 2013/06/07<br>16:03 |
| S37 | 228  | (cable adj gland) and ((bond\$3 or epoxy or adhesive or (two adj part) or (cure or | US-PGPUB;<br>USPAT;  | OR | ON | 2013/06/07<br>16:15 |



EAST Search History

|     |     |   |  |    |    |                     |
|-----|-----|---|--|----|----|---------------------|
|     |     | curable)) same2 cable)  | USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB                        |    |    |                     |
| S38 | 185 | (cable adj gland) and ((bond\$3 or epoxy or adhesive or (two adj part) or (cure or curable)) same (cable or core or conductor))   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>16:17 |
| S39 | 48  | ("8105945"   "8106407"   "7285782"   "8105691"   "20040121637"   "6623289"   "6668793"   "5432301"   "4515516"   "5194012"   "6812406"   "8102116"   "3833754"   "7735876").FN. | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>16:33 |
| S40 | 3   | "20100003001"   | US-PGPUB;<br>USPAT;<br>USOCR;<br>FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON | 2013/06/07<br>16:41 |
| S41 | 1   | 2008-D99857.NRAN.   | DERWENT  | OR | ON | 2013/06/07<br>16:42 |
| S42 | 2   | "12477580"  | US-PGPUB;<br>USPAT   | OR | ON | 2013/06/07<br>17:00 |
| S43 | 1   | "20100307816"   | DERWENT  | OR | ON | 2013/06/07<br>17:00 |
| S44 | 1   | 2010-Q10826.NRAN.   | DERWENT  | OR | ON | 2013/06/07<br>17:00 |
| S45 | 6   | "2138218"   | DERWENT  | OR | ON | 2013/06/07<br>17:16 |
| S46 | 1   | 1984-258752.NRAN.   | DERWENT  | OR | ON | 2013/06/07<br>17:16 |
| S47 | 5   | "7357579"   | US-PGPUB;<br>USPAT   | OR | ON | 2013/06/07<br>17:22 |

6/ 8/ 2013 11:57:59 AM

C:\Users\rgruby\Documents\EAST\Workspaces\13391539.wsp

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Samuel Liam Proud  
Application No.: 13/391,539  
Filed: May 2, 2012  
For: FILLER ASSEMBLY FOR CABLE GLAND  
Group Art Unit: 3754  
Examiner: Randall A. Gruby  
Confirmation No.: 6980  
Att'y. Docket: 920257.00016

**RESPONSE TO RESTRICTION/ELECTION REQUIREMENT**

MS Amendment  
Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Restriction/Election Requirement dated 04/08/2013, please consider the following:

1. Pages 2-4 contain a set of the pending claims; and
2. Page 5 contains remarks.

In the Claims:

Please amend the claims so that the pending claim set reads as follows:

1. (Currently Amended) A filler assembly for filling a cable gland, having a plurality of cores of at least one cable extending therethrough, with curable liquid material, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

at least one first barrier apparatus ~~means~~ for temporarily preventing mixing of said first and second components;

at least one elongate dispenser apparatus adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

at least one second barrier apparatus ~~means~~ for temporarily preventing passage of said curable liquid material from the or each said second chamber to at least one said dispenser apparatus; and

(b) at least one barrier member ~~for having at least one respective aperture therethrough for engaging at least one core of a cable, wherein the barrier member is adapted to restricting~~ the extent of penetration of said curable liquid material along said cores.

2. (Original) An assembly according to claim 1, wherein said body is flexible.

3. (Previously Presented) An assembly according to claim 1, wherein at least one said first barrier apparatus comprises at least one releasable clamp.

4. (Previously Presented) An assembly according to claim 1, further comprising a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

5. (Previously Presented) An assembly according to claim 5, wherein the curable liquid material is adapted to change color as a result of curing thereof.

6. (Previously Presented) An assembly according to claim 1, further comprising a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

7. (Original) An assembly according to claim 6, wherein the cover member is adapted to prevent curable liquid material from penetrating an end face of the cable gland.

8. (Previously Presented) An assembly according to claim 1, wherein at least one said barrier member comprises a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.

9. (Previously Presented) An assembly according to claim 1, wherein at least one said barrier member has a respective tapering portion.

10. (Currently Amended) A method of filling a cable gland with curable liquid material ~~by means of an assembly according to claim 1~~, the method comprising:

using a filler assembly that includes:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

at least one first barrier apparatus for temporarily preventing mixing of said first and second components;

at least one elongate dispenser apparatus adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

at least one second barrier apparatus for temporarily preventing passage of said curable liquid material from the or each said second chamber to at least one said dispenser apparatus; and

(b) at least one barrier member having at least one respective aperture therethrough for engaging at least one core of a cable, wherein the barrier member is adapted to restrict the extent of penetration of said curable liquid material along said cores;

locating at least one said barrier member in the cable gland; and

locating an outlet of at least one said dispenser apparatus in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.

11. (Original) A method according to claim 10, wherein the step of locating at least one said barrier member in the cable gland comprises locating at least one said barrier member around at least one said core of at least one said cable.

12. (Previously Presented) An assembly according to claim 1, wherein at least one said second barrier apparatus comprises at least one releasable clamp.

**REMARKS**

In response to the Patent Office action dated 04/08/2013 for the above application, Applicant elects, with traverse, Invention I, claims 1-9, drawn to a filler assembly container. Claim 10 has been amended to include all of the elements and limitations of claim 1 as amended and so no restriction requirement should be applied against claims 10-12 as amended. Accordingly, claims 1-12 should be examined together.

Allowance of these claims is respectfully requested. No fees are believed due for consideration of this response, however, the Commissioner is hereby authorized to charge any fees deemed necessary to Deposit Account No. 17-0055.

Respectfully submitted,  
SAMUEL LIAM PROUD

Dated: May 8, 2013

/john d. franzini/  
John D. Franzini  
Reg. No. 31,356  
Attorney for Applicant  
Quarles & Brady LLP  
411 East Wisconsin Avenue  
Milwaukee, Wisconsin 53202-4497  
Tel. No. (414) 277-5747  
Fax No. (414) 978-8747

## Electronic Acknowledgement Receipt

|   |                                      |
|---|--------------------------------------|
| <b>EFS ID:</b>                              | 15723899                             |
| <b>Application Number:</b>                  | 13391539                             |
| <b>International Application Number:</b>    |                                      |
| <b>Confirmation Number:</b>                 | 6980                                 |
| <b>Title of Invention:</b>                  | FILLER ASSEMBLY FOR CABLE GLAND      |
| <b>First Named Inventor/Applicant Name:</b> | Samuel Liam Proud                    |
| <b>Customer Number:</b>                     | 26710                                |
| <b>Filer:</b>                               | John D. Franzini/Melanie Brunow      |
| <b>Filer Authorized By:</b>                 | John D. Franzini                     |
| <b>Attorney Docket Number:</b>              | 920257.00016                         |
| <b>Receipt Date:</b>                        | 08-MAY-2013                          |
| <b>Filing Date:</b>                         | 02-MAY-2012                          |
| <b>Time Stamp:</b>                          | 14:52:25                             |
| <b>Application Type:</b>                    | U.S. National Stage under 35 USC 371 |

### Payment information:

|                        |    |
|------------------------|----|
| Submitted with Payment | no |
|------------------------|----|

### File Listing:

| Document Number | Document Description | File Name                | File Size(Bytes)/<br>Message Digest                               | Multi Part /.zip | Pages (if appl.) |
|-----------------|----------------------|--------------------------|---|------------------|------------------|
| 1               |                      | 920257-00016election.pdf | 181659<br><small>629a69145abc01eb771d1c2b550d04215c931212</small> | yes              | 5                |

| <b>Multipart Description/PDF files in .zip description</b> |              |            |
|--|--------------|------------|
| <b>Document Description</b>                                | <b>Start</b> | <b>End</b> |
| Response to Election / Restriction Filed                   | 1            | 1          |
| Claims   | 2            | 4          |
| Applicant Arguments/Remarks Made in an Amendment           | 5            | 5          |

**Warnings:**

**Information:**

|                                     |        |
|-------------------------------------|--------|
| <b>Total Files Size (in bytes):</b> | 181659 |
|-------------------------------------|--------|

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

|   |   |              |   |                                  |                                       |
|---|---|--------------|---|----------------------------------|---------------------------------------|
| <b>PATENT APPLICATION FEE DETERMINATION RECORD</b><br>Substitute for Form PTO-875                               |   |              | Application or Docket Number<br><b>13/391,539</b> | Filing Date<br><b>05/02/2012</b> | <input type="checkbox"/> To be Mailed |
| ENTITY: <input checked="" type="checkbox"/> LARGE <input type="checkbox"/> SMALL <input type="checkbox"/> MICRO |   |              |   |                                  |                                       |
| <b>APPLICATION AS FILED – PART I</b>  |   |              |   |                                  |                                       |
| (Column 1)  |   | (Column 2)   |   |                                  |                                       |
| FOR   | NUMBER FILED  | NUMBER EXTRA | RATE (\$)   | FEE (\$)                         |                                       |
| <input type="checkbox"/> BASIC FEE<br><small>(37 CFR 1.16(a), (b), or (c))</small>                              | N/A   | N/A          | N/A   |                                  |                                       |
| <input type="checkbox"/> SEARCH FEE<br><small>(37 CFR 1.16(k), (l), or (m))</small>                             | N/A   | N/A          | N/A   |                                  |                                       |
| <input type="checkbox"/> EXAMINATION FEE<br><small>(37 CFR 1.16(o), (p), or (q))</small>                        | N/A   | N/A          | N/A   |                                  |                                       |
| TOTAL CLAIMS<br><small>(37 CFR 1.16(j))</small>   | minus 20 =  | *            | X \$ =  |                                  |                                       |
| INDEPENDENT CLAIMS<br><small>(37 CFR 1.16(h))</small>   | minus 3 =   | *            | X \$ =  |                                  |                                       |
| <input type="checkbox"/> APPLICATION SIZE FEE<br><small>(37 CFR 1.16(s))</small>                                | If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). |              |   |                                  |                                       |
| <input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT<br><small>(37 CFR 1.16(j))</small>                    |   |              |   |                                  |                                       |
| * If the difference in column 1 is less than zero, enter "0" in column 2.                                       |   |              | TOTAL   |                                  |                                       |

|   |  |                                  |       |                                    |               |           |                     |  |
|---|--|----------------------------------|-------|------------------------------------|---------------|-----------|---------------------|--|
| <b>APPLICATION AS AMENDED – PART II</b> |  |                                  |       |                                    |               |           |                     |  |
| (Column 1)                              |  | (Column 2)                       |       | (Column 3)                         |               |           |                     |  |
| <b>AMENDMENT</b>                        | <b>05/08/2013</b>  | CLAIMS REMAINING AFTER AMENDMENT |       | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | RATE (\$) | ADDITIONAL FEE (\$) |  |
|   | <small>Total (37 CFR 1.16(i))</small>  | * 12                             | Minus | ** 20                              | = 0           | X \$80 =  | 0                   |  |
|   | <small>Independent (37 CFR 1.16(h))</small>  | * 1                              | Minus | ***3                               | = 0           | X \$420 = | 0                   |  |
|   | <input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))                           |                                  |       |                                    |               |           |                     |  |
|   | <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) |                                  |       |                                    |               |           |                     |  |
| TOTAL ADD'L FEE                         |  |                                  |       |                                    |               | <b>0</b>  |                     |  |

|                  |  |                                  |       |                                    |               |           |                     |  |
|------------------|--|----------------------------------|-------|------------------------------------|---------------|-----------|---------------------|--|
| (Column 1)       |  | (Column 2)                       |       | (Column 3)                         |               |           |                     |  |
| <b>AMENDMENT</b> |  | CLAIMS REMAINING AFTER AMENDMENT |       | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | RATE (\$) | ADDITIONAL FEE (\$) |  |
|                  | <small>Total (37 CFR 1.16(i))</small>  | *                                | Minus | **                                 | =             | X \$ =    |                     |  |
|                  | <small>Independent (37 CFR 1.16(h))</small>  | *                                | Minus | ***                                | =             | X \$ =    |                     |  |
|                  | <input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))                           |                                  |       |                                    |               |           |                     |  |
|                  | <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) |                                  |       |                                    |               |           |                     |  |
| TOTAL ADD'L FEE  |  |                                  |       |                                    |               |           |                     |  |

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".  
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE  
/KIMBERLY PANNELL/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**  
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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes contact info for Quarles & Brady LLP and examination details.

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pat-dept@quarles.com

|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>13/391,539 | <b>Applicant(s)</b><br>PROUD, SAMUEL LIAM |  |
|                              | <b>Examiner</b><br>RANDALL GRUBY     | <b>Art Unit</b><br>3754                   |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 02/21/12.
- 2a)  This action is **FINAL**.
- 2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 5)  Claim(s) 1-11 is/are pending in the application.
- 5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) \_\_\_\_\_ is/are rejected.
- 8)  Claim(s) \_\_\_\_\_ is/are objected to.
- 9)  Claim(s) 1-11 are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All   b)  Some \* c)  None of:  
1.  Certified copies of the priority documents have been received.  
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 3)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4)  Other: \_\_\_\_\_.

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-9, drawn to a filler assembly container, classified in class 222, subclass 094.
  - II. Claims 10-11, drawn to a method of filling a cable gland, classified in class 174, subclass 76.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product. See MPEP § 806.05(h). In the instant case the method of filling a cable gland as claimed can be practiced with a materially different dispenser such as one that is not comprised of two separate chambers.

Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and/or examination burden if restriction were not required because at least the following reason(s) apply:

(a) the inventions have acquired a separate status in the art in view of their different classification;

(b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;

Art Unit: 3754

(c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);

**Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.**

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

The examiner has required restriction between product or apparatus claims and process claims. Where applicant elects claims directed to the product/apparatus, and all product/apparatus claims are subsequently found allowable, withdrawn process claims that include all the limitations of the allowable product/apparatus claims should be considered for

Art Unit: 3754

rejoinder. All claims directed to a nonelected process invention must include all the limitations of an allowable product/apparatus claim for that process invention to be rejoined.


In the event of rejoinder, the requirement for restriction between the product/apparatus claims and the rejoined process claims will be withdrawn, and the rejoined process claims will be fully examined for patentability in accordance with 37 CFR 1.104. Thus, to be allowable, the rejoined claims must meet all criteria for patentability including the requirements of 35 U.S.C. 101, 102, 103 and 112. Until all claims to the elected product/apparatus are found allowable, an otherwise proper restriction requirement between product/apparatus claims and process claims may be maintained. Withdrawn process claims that are not commensurate in scope with an allowable product/apparatus claim will not be rejoined. See MPEP § 821.04. Additionally, in order for rejoinder to occur, applicant is advised that the process claims should be amended during prosecution to require the limitations of the product/apparatus claims. **Failure to do so may result in no rejoinder.** Further, note that the prohibition against double patenting rejections of 35 U.S.C. 121 does not apply where the restriction requirement is withdrawn by the examiner before the patent issues. See MPEP § 804.01.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Gruby, whose telephone number is (571) 272-3415.

/Randall A Gruby/  
Examiner, Art Unit 3754

/PAUL R DURAND/  
Supervisory Patent Examiner, Art Unit 3754  
March 29, 2013

|  |  |  |
|--|--|--|
| <b><i>Index of Claims</i></b><br> | <b>Application/Control No.</b><br>13391539 | <b>Applicant(s)/Patent Under Reexamination</b><br>PROUD, SAMUEL LIAM |
|  | <b>Examiner</b><br>RANDALL GRUBY           | <b>Art Unit</b><br>3754  |

|   |                 |   |                   |   |                     |   |                 |
|---|-----------------|---|-------------------|---|---------------------|---|-----------------|
| ✓ | <b>Rejected</b> | - | <b>Cancelled</b>  | N | <b>Non-Elected</b>  | A | <b>Appeal</b>   |
| = | <b>Allowed</b>  | ÷ | <b>Restricted</b> | I | <b>Interference</b> | O | <b>Objected</b> |

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

| CLAIM |          | DATE       |  |  |  |  |  |  |  |  |
|-------|----------|------------|--|--|--|--|--|--|--|--|
| Final | Original | 03/27/2013 |  |  |  |  |  |  |  |  |
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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|--------------------|-----------------------|-----------------------|------------------------|
| 13/391,539         | 05/02/2012            | Samuel Liam Proud     | 920257.00016           |

**CONFIRMATION NO. 6980**

26710  
QUARLES & BRADY LLP  
Attn: IP Docket  
411 E. WISCONSIN AVENUE  
SUITE 2350  
MILWAUKEE, WI 53202-4426

**PUBLICATION NOTICE**



**Title:**FILLER ASSEMBLY FOR CABLE GLAND

**Publication No.**US-2012-0205023-A1

**Publication Date:**08/16/2012

**NOTICE OF PUBLICATION OF APPLICATION**

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at [www.uspto.gov](http://www.uspto.gov). The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at [www.uspto.gov](http://www.uspto.gov) using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101





UNITED STATES PATENT AND TRADEMARK OFFICE

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P.O. Box 1459
Alexandria, Virginia 22313-1450
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Table with 3 columns: U.S. APPLICATION NUMBER NO. (13/391,539), FIRST NAMED APPLICANT (Samuel Liam Proud), ATTY. DOCKET NO. (920257.00016). Includes international application info and filing dates.

26710
QUARLES & BRADY LLP
411 E. WISCONSIN AVENUE
SUITE 2350
MILWAUKEE, WI 53202-4426

CONFIRMATION NO. 6980
371 ACCEPTANCE LETTER



Date Mailed: 05/09/2012

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

05/02/2012 DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS
05/02/2012 DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE. The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363). Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Copy of the International Application filed on 02/21/2012
• Copy of the International Search Report filed on 02/21/2012
• Preliminary Amendments filed on 02/21/2012
• Information Disclosure Statements filed on 02/21/2012
• Oath or Declaration filed on 05/02/2012
• U.S. Basic National Fees filed on 02/21/2012
• Priority Documents filed on 02/21/2012

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

JOHN L ANDERSON

Telephone: (571) 272-0385



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY DOCKET NO, TOT CLAIMS, IND CLAIMS. Row 1: 13/391,539, 05/02/2012, 1250, 920257.00016, 12, 1

CONFIRMATION NO. 6980

26710
QUARLES & BRADY LLP
411 E. WISCONSIN AVENUE
SUITE 2350
MILWAUKEE, WI 53202-4426

FILING RECEIPT



Date Mailed: 05/09/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Applicant(s)

Samuel Liam Proud, Tyne & Wear, UNITED KINGDOM;

Power of Attorney: The patent practitioners associated with Customer Number 26710

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/GB10/50989 06/14/2010

Foreign Applications (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.)

- EUROPEAN PATENT OFFICE (EPO) 09168430.8 08/21/2009
EUROPEAN PATENT OFFICE (EPO) 09168429.0 08/21/2009
UNITED KINGDOM 1004216.6 03/15/2010
UNITED KINGDOM 1009450.6 06/07/2010

If Required, Foreign Filing License Granted: 05/07/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US 13/391,539

Projected Publication Date: 08/16/2012

Non-Publication Request: No

Early Publication Request: No

**Title**

FILLER ASSEMBLY FOR CABLE GLAND

**Preliminary Class**

**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

**LICENSE FOR FOREIGN FILING UNDER**

**Title 35, United States Code, Section 184**

**Title 37, Code of Federal Regulations, 5.11 & 5.15**

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier

license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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|   |  |
|---|--|
| <b>PATENT APPLICATION FEE DETERMINATION RECORD</b><br>Substitute for Form PTO-875 | Application or Docket Number<br>13/391,539 |
|---|--|

| APPLICATION AS FILED - PART I   |   |              | SMALL ENTITY |         | OR | OTHER THAN SMALL ENTITY |         |
|---|---|--------------|--------------|---------|----|-------------------------|---------|
|   | (Column 1)  | (Column 2)   |              |         |    |                         |         |
| FOR   | NUMBER FILED  | NUMBER EXTRA | RATE(\$)     | FEE(\$) |    | RATE(\$)                | FEE(\$) |
| BASIC FEE<br><small>(37 CFR 1.16(a), (b), or (c))</small>                 | N/A   | N/A          | N/A          |         |    | N/A                     | 380     |
| SEARCH FEE<br><small>(37 CFR 1.16(k), (l), or (m))</small>                | N/A   | N/A          | N/A          |         |    | N/A                     | 490     |
| EXAMINATION FEE<br><small>(37 CFR 1.16(o), (p), or (q))</small>           | N/A   | N/A          | N/A          |         |    | N/A                     | 250     |
| TOTAL CLAIMS<br><small>(37 CFR 1.16(i))</small>                           | 12  | minus 20 = * |              |         |    | x 60 =                  | 0.00    |
| INDEPENDENT CLAIMS<br><small>(37 CFR 1.16(h))</small>                     | 1   | minus 3 = *  |              |         |    | x 250 =                 | 0.00    |
| APPLICATION SIZE FEE<br><small>(37 CFR 1.16(s))</small>                   | If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). |              |              |         |    |                         | 0.00    |
| MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))                         |   |              |              |         |    |                         | 0.00    |
| * If the difference in column 1 is less than zero, enter "0" in column 2. |   |              | TOTAL        |         |    | TOTAL                   | 1120    |

| APPLICATION AS AMENDED - PART II  |   |                                  |                                    |               | SMALL ENTITY    |                    | OR | OTHER THAN SMALL ENTITY |                    |  |
|---|---|----------------------------------|------------------------------------|---------------|-----------------|--------------------|----|-------------------------|--------------------|--|
|   | (Column 1)  | (Column 2)                       | (Column 3)                         |               |                 |                    |    |                         |                    |  |
| AMENDMENT A   |   | CLAIMS REMAINING AFTER AMENDMENT | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | RATE(\$)        | ADDITIONAL FEE(\$) |    | RATE(\$)                | ADDITIONAL FEE(\$) |  |
|   | Total<br><small>(37 CFR 1.16(i))</small>                        | *                                | Minus                              | **            | =               |                    |    | x                       | =                  |  |
|   | Independent<br><small>(37 CFR 1.16(h))</small>                  | *                                | Minus                              | ***           | =               |                    |    | x                       | =                  |  |
|   | Application Size Fee (37 CFR 1.16(s))                           |                                  |                                    |               |                 |                    |    |                         |                    |  |
|   | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) |                                  |                                    |               |                 |                    |    |                         |                    |  |
|   |   |                                  |                                    |               | TOTAL ADD'L FEE |                    |    | TOTAL ADD'L FEE         |                    |  |
| AMENDMENT B   |   | CLAIMS REMAINING AFTER AMENDMENT | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | RATE(\$)        | ADDITIONAL FEE(\$) |    | RATE(\$)                | ADDITIONAL FEE(\$) |  |
|   | Total<br><small>(37 CFR 1.16(i))</small>                        | *                                | Minus                              | **            | =               |                    |    | x                       | =                  |  |
|   | Independent<br><small>(37 CFR 1.16(h))</small>                  | *                                | Minus                              | ***           | =               |                    |    | x                       | =                  |  |
|   | Application Size Fee (37 CFR 1.16(s))                           |                                  |                                    |               |                 |                    |    |                         |                    |  |
|   | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) |                                  |                                    |               |                 |                    |    |                         |                    |  |
|   |   |                                  |                                    |               | TOTAL ADD'L FEE |                    |    | TOTAL ADD'L FEE         |                    |  |
| <p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.</p> |   |                                  |                                    |               |                 |                    |    |                         |                    |  |

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: PROUD, Samuel Liam  
Serial No.: 13/391,539  
I.A. Filing Date: 14 June 2010 (14.06.10)  
Priority Date: 21 August 2009 (21.08.09)  
PCT Appl. No.: PCT/GB2010/050989  
Title: FILLER ASSEMBLY FOR CABLE GLAND  
Docket: 920257.00016  
Confirmation No.: 6980

COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, VA 22313-1450

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**RESPONSE TO NOTIFICATION OF MISSING REQUIREMENTS  
UNDER 35 U.S.C. 371**

---

Dear Sir:

In response to the Notification of Missing Requirements Under 35 U.S.C. 371 under date of mailing of March 05, 2012, Applicant hereby provides the following item:

1. Declaration for Utility Patent Application executed by Inventor Samuel Liam Proud.

The Commissioner is hereby authorized to charge Deposit Account 17-0055 in the amount of \$130.00 for the fee required for furnishing the oath or declaration later than 30 months from the earliest claimed priority date pursuant to 37 CFR 1.492(3). The Commissioner is further authorized to charge any additional fees which may be required, or credit any overpayment, to Deposit Account No. 17-0055.

Respectfully Submitted,

Dated: May 02, 2012

By: /John D. Franzini/  
John D. Franzini, Reg. No. 31,356  
Attorney for Applicants  
Quarles & Brady LLP  
411 East Wisconsin Avenue  
Milwaukee, WI 53202-4497

(414) 277-5700: TELEPHONE  
(414) 271-3552: FAX

Doc Code: Oath

Document Description: Oath or declaration filed

PTO/SB/01 (04-09)

Approved for use through 06/30/2010. OMB 0651-0032  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

|  |                          |                    |
|--|--------------------------|--------------------|
| <b>DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)</b><br><br><input type="checkbox"/> Declaration Submitted With Initial Filing      OR <input checked="" type="checkbox"/> Declaration Submitted After Initial Filing (surcharge (37 CFR 1.16(f)) required) | Attorney Docket Number   | 920257.00016       |
|  | First Named Inventor     | PROUD, Samuel Liam |
|  | <i>COMPLETE IF KNOWN</i> |                    |
|  | Application Number       | 13/391,539         |
|  | Filing Date              | 21 February 2012   |
|  | Art Unit                 |                    |
|  | Examiner Name            |                    |

I hereby declare that: (1) Each inventor's residence, mailing address, and citizenship are as stated below next to their name; and (2) I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention titled:

**FILLER ASSEMBLY FOR CABLE GLAND**

*(Title of the Invention)*

the application of which

is attached hereto

OR

was filed on (MM/DD/YYYY) 21 FEB 2012 as United States Application Number or PCT International Application Number 13/391,539 and was amended on (MM/DD/YYYY) \_\_\_\_\_ (If applicable).

I hereby state that I have reviewed and understand the contents of the above identified application, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

**Authorization To Permit Access To Application by Participating Offices**

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed; 2) any foreign application to which the above-identified patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

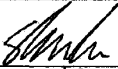
[Page 1 of 3]

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 21 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

16150108

## DECLARATION — Utility or Design Patent Application

|  |                                     |  |   |                             |                          |                              |
|--|-------------------------------------|--|---|-----------------------------|--------------------------|------------------------------|
| Direct all correspondence to:  | <input checked="" type="checkbox"/> | The address associated with Customer Number: | 26710   | OR                          | <input type="checkbox"/> | Correspondence address below |
| Name   |                                     |  |   |                             |                          |                              |
| Address  |                                     |  |   |                             |                          |                              |
| City   |                                     | State  |   | Zip                         |                          |                              |
| Country  |                                     | Telephone                                    |   | Email                       |                          |                              |
| <b>WARNING:</b>  |                                     |  |   |                             |                          |                              |
| <p>Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available. Petitioner/applicant is advised that documents which form the record of a patent application (such as the PTO/SB/01) are placed into the Privacy Act system of records DEPARTMENT OF COMMERCE, COMMERCE-PAT-7, System name: <i>Patent Application Files</i>. Documents not retained in an application file (such as the PTO-2038) are placed into the Privacy Act system of COMMERCE/PAT-TM-10, System name: <i>Deposit Accounts and Electronic Funds Transfer Profiles</i>.</p> |                                     |  |   |                             |                          |                              |
| <p>I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.</p>   |                                     |  |   |                             |                          |                              |
| <b>NAME OF SOLE OR FIRST INVENTOR:</b>   |                                     |  | <input type="checkbox"/> A petition has been filed for this unsigned inventor |                             |                          |                              |
| Given Name (first and middle [if any])   |                                     |  | Family Name or Surname  |                             |                          |                              |
| Samuel Liam  |                                     |  | PROUD   |                             |                          |                              |
| Inventor's Signature   |                                     |  |   | Date                        |                          |                              |
|   |                                     |  |   | 20 <sup>TH</sup> MARCH 2012 |                          |                              |
| Residence: City  |                                     | State  |   | Country                     |                          | Citizenship                  |
| Tyne & Wear  |                                     |  |   | GB                          |                          | GB                           |
| Mailing Address  |                                     |  |   |                             |                          |                              |
| 57 Eighth Avenue   |                                     |  |   |                             |                          |                              |
| City   |                                     | State  |   | Zip                         |                          | Country                      |
| Newcastle upon Tyne  |                                     | Tyne & Wear                                  |   | NE6 5YB                     |                          | GB                           |
| <input type="checkbox"/> Additional inventors or a legal representative are being named on the _____ supplemental sheet(s) PTO/SB/02A or 02LR attached hereto  |                                     |  |   |                             |                          |                              |

[Page 3 of 3]

16150108



Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

**DECLARATION — Utility or Design Patent Application****Claim of Foreign Priority Benefits**

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT International application having a filing date before that of the application on which priority is claimed.

| Prior Foreign Application Number(s) | Country | Foreign Filing Date (MM/DD/YYYY) | Priority Not Claimed     | Certified Copy Attached? |                                     |
|-------------------------------------|---------|----------------------------------|--------------------------|--------------------------|-------------------------------------|
|                                     |         |                                  |                          | YES                      | NO                                  |
| PCT/GB10/050989                     | WO      | 14 JUNE 2010                     | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 09168430.8                          | EP      | 21 AUG 2009                      | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 09168429.0                          | EP      | 21 AUG 2009                      | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1004216.6                           | GB      | 15 MAR 2010                      | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Additional foreign application number(s) are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

[Page 2 of 3]

16150108

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

**DECLARATION – Supplemental Priority Data Sheet**

| Foreign applications:               |         |                                  |                          |                          |                                     |
|-------------------------------------|---------|----------------------------------|--------------------------|--------------------------|-------------------------------------|
| Prior Foreign Application Number(s) | Country | Foreign Filing Date (MM/DD/YYYY) | Priority Not Claimed     | Certified Copy Attached? |                                     |
|                                     |         |                                  |                          | YES                      | NO                                  |
| 1009450.6                           | GB      | 07 JUNE 2010                     | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
|                                     |         |                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 21 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

16150108

## Electronic Patent Application Fee Transmittal

|   |                                 |                 |               |                             |  |
|---|---------------------------------|-----------------|---------------|-----------------------------|--|
| <b>Application Number:</b>                              | 13391539                        |                 |               |                             |  |
| <b>Filing Date:</b>                                     |                                 |                 |               |                             |  |
| <b>Title of Invention:</b>                              | FILLER ASSEMBLY FOR CABLE GLAND |                 |               |                             |  |
| <b>First Named Inventor/Applicant Name:</b>             | Samuel Liam PROUD               |                 |               |                             |  |
| <b>Filer:</b>   | Daniel G. Radler/Tracey Baxter  |                 |               |                             |  |
| <b>Attorney Docket Number:</b>                          | 920257.00016                    |                 |               |                             |  |
| Filed as Large Entity                                   |                                 |                 |               |                             |  |
| <b>U.S. National Stage under 35 USC 371 Filing Fees</b> |                                 |                 |               |                             |  |
| <b>Description</b>                                      | <b>Fee Code</b>                 | <b>Quantity</b> | <b>Amount</b> | <b>Sub-Total in USD(\$)</b> |  |
| <b>Basic Filing:</b>                                    |                                 |                 |               |                             |  |
| <b>Pages:</b>   |                                 |                 |               |                             |  |
| <b>Claims:</b>  |                                 |                 |               |                             |  |
| <b>Miscellaneous-Filing:</b>                            |                                 |                 |               |                             |  |
| Oath/decl > 30 months from priority date                | 1617                            | 1               | 130           | 130                         |  |
| <b>Petition:</b>  |                                 |                 |               |                             |  |
| <b>Patent-Appeals-and-Interference:</b>                 |                                 |                 |               |                             |  |
| <b>Post-Allowance-and-Post-Issuance:</b>                |                                 |                 |               |                             |  |
| <b>Extension-of-Time:</b>                               |                                 |                 |               |                             |  |

| Description              | Fee Code | Quantity | Amount | Sub-Total in USD(\$) |
|--------------------------|----------|----------|--------|----------------------|
| <b>Miscellaneous:</b>    |          |          |        |                      |
| <b>Total in USD (\$)</b> |          |          |        | <b>130</b>           |

## Electronic Acknowledgement Receipt

|   |                                      |
|---|--------------------------------------|
| <b>EFS ID:</b>                              | 12683414                             |
| <b>Application Number:</b>                  | 13391539                             |
| <b>International Application Number:</b>    |                                      |
| <b>Confirmation Number:</b>                 | 6980                                 |
| <b>Title of Invention:</b>                  | FILLER ASSEMBLY FOR CABLE GLAND      |
| <b>First Named Inventor/Applicant Name:</b> | Samuel Liam PROUD                    |
| <b>Customer Number:</b>                     | 26710                                |
| <b>Filer:</b>                               | Daniel G. Radler/Tracey Baxter       |
| <b>Filer Authorized By:</b>                 | Daniel G. Radler                     |
| <b>Attorney Docket Number:</b>              | 920257.00016                         |
| <b>Receipt Date:</b>                        | 02-MAY-2012                          |
| <b>Filing Date:</b>                         |                                      |
| <b>Time Stamp:</b>                          | 12:46:36                             |
| <b>Application Type:</b>                    | U.S. National Stage under 35 USC 371 |

### Payment information:

|  |                 |
|--|-----------------|
| Submitted with Payment                   | yes             |
| Payment Type                             | Deposit Account |
| Payment was successfully received in RAM | \$130           |
| RAM confirmation Number                  | 11398           |
| Deposit Account                          | 170055          |
| Authorized User                          |                 |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)  
 Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)  
 Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

**File Listing:**

| Document Number | Document Description | File Name               | File Size(Bytes)/ Message Digest                                  | Multi Part /.zip | Pages (if appl.) |
|-----------------|----------------------|-------------------------|---|------------------|------------------|
| 1               |                      | 92025700016respmiss.pdf | 242271<br><small>3b572fd941f7896bc1c239dc666de015205b848f</small> | yes              | 5                |

**Multipart Description/PDF files in .zip description**

| Document Description                              | Start | End |
|---|-------|-----|
| Applicant Response to Pre-Exam Formalities Notice | 1     | 1   |
| Oath or Declaration filed                         | 2     | 5   |

**Warnings:**

**Information:**

|   |                      |              |  |    |   |
|---|----------------------|--------------|--|----|---|
| 2 | Fee Worksheet (SB06) | fee-info.pdf | 30125<br><small>67ee0f799ddb3dc5fbb956bd831624c36b40750c</small> | no | 2 |
|---|----------------------|--------------|--|----|---|

**Warnings:**

**Information:**

**Total Files Size (in bytes):** 272396

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 3 columns: U.S. APPLICATION NUMBER NO., FIRST NAMED APPLICANT, ATTY. DOCKET NO.

13/391,539
26710
QUARLES & BRADY LLP
411 E. WISCONSIN AVENUE
SUITE 2350
MILWAUKEE, WI 53202-4426

Samuel Liam PROUD

INTERNATIONAL APPLICATION NO.

PCT/GB10/50989

I.A. FILING DATE PRIORITY DATE

06/14/2010

08/21/2009

CONFIRMATION NO. 6980
371 FORMALITIES LETTER



0C00000052924712

Date Mailed: 03/05/2012

NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as a Designated Office (37 CFR 1.494):

- Priority Document
• Copy of the International Application filed on 02/21/2012
• Copy of the International Search Report filed on 02/21/2012
• Preliminary Amendments filed on 02/21/2012
• Information Disclosure Statements filed on 02/21/2012
• U.S. Basic National Fees filed on 02/21/2012
• Priority Documents filed on 02/21/2012

The applicant needs to satisfy supplemental fees problems indicated below.

The following items MUST be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:

- Oath or declaration of the inventors, in compliance with 37 CFR 1.497(a) and (b), identifying the application by the International application number and international filing date.
• To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.492(h) of \$130 for a non-small entity, must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fees required for this application is \$130 for a Large Entity:

- \$130 Surcharge.

ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE OR BY 32 MONTHS FROM THE PRIORITY DATE FOR THE APPLICATION, WHICHEVER IS LATER. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.  
<https://portal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at <http://www.uspto.gov/ebc>.

**If you are not using EFS-Web to submit your reply, you must include a copy of this notice.**

JOHN L ANDERSON

---

Telephone: (571) 272-0385



|   |  |
|---|--|
| <b>PATENT APPLICATION FEE DETERMINATION RECORD</b><br>Substitute for Form PTO-875 | Application or Docket Number<br>13/391,539 |
|---|--|

| APPLICATION AS FILED - PART I   |   |              | SMALL ENTITY |         | OR | OTHER THAN SMALL ENTITY |         |
|---|---|--------------|--------------|---------|----|-------------------------|---------|
|   | (Column 1)  | (Column 2)   |              |         |    |                         |         |
| FOR   | NUMBER FILED  | NUMBER EXTRA | RATE(\$)     | FEE(\$) |    | RATE(\$)                | FEE(\$) |
| BASIC FEE<br><small>(37 CFR 1.16(a), (b), or (c))</small>                 | N/A   | N/A          | N/A          |         |    | N/A                     | 380     |
| SEARCH FEE<br><small>(37 CFR 1.16(k), (l), or (m))</small>                | N/A   | N/A          | N/A          |         |    | N/A                     | 490     |
| EXAMINATION FEE<br><small>(37 CFR 1.16(o), (p), or (q))</small>           | N/A   | N/A          | N/A          |         |    | N/A                     | 250     |
| TOTAL CLAIMS<br><small>(37 CFR 1.16(i))</small>                           | 12  | minus 20 = * |              |         | OR | x 60 =                  | 0.00    |
| INDEPENDENT CLAIMS<br><small>(37 CFR 1.16(h))</small>                     | 1   | minus 3 = *  |              |         | OR | x 250 =                 | 0.00    |
| APPLICATION SIZE FEE<br><small>(37 CFR 1.16(s))</small>                   | If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). |              |              |         |    |                         | 0.00    |
| MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))                         |   |              |              |         |    |                         | 0.00    |
| * If the difference in column 1 is less than zero, enter "0" in column 2. |   |              | TOTAL        |         |    | TOTAL                   | 1120    |

| APPLICATION AS AMENDED - PART II  |   |                                  |                                    |               | SMALL ENTITY    |                    | OR | OTHER THAN SMALL ENTITY |                    |  |
|---|---|----------------------------------|------------------------------------|---------------|-----------------|--------------------|----|-------------------------|--------------------|--|
|   | (Column 1)  | (Column 2)                       | (Column 3)                         |               |                 |                    |    |                         |                    |  |
| AMENDMENT A   |   | CLAIMS REMAINING AFTER AMENDMENT | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | RATE(\$)        | ADDITIONAL FEE(\$) |    | RATE(\$)                | ADDITIONAL FEE(\$) |  |
|   | Total<br><small>(37 CFR 1.16(i))</small>                        | *                                | Minus                              | **            | =               |                    | OR | x                       | =                  |  |
|   | Independent<br><small>(37 CFR 1.16(h))</small>                  | *                                | Minus                              | ***           | =               |                    | OR | x                       | =                  |  |
|   | Application Size Fee (37 CFR 1.16(s))                           |                                  |                                    |               |                 |                    |    | OR                      |                    |  |
|   | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) |                                  |                                    |               |                 |                    |    | OR                      |                    |  |
|   |   |                                  |                                    |               | TOTAL ADD'L FEE |                    | OR | TOTAL ADD'L FEE         |                    |  |
| AMENDMENT B   |   | CLAIMS REMAINING AFTER AMENDMENT | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | RATE(\$)        | ADDITIONAL FEE(\$) |    | RATE(\$)                | ADDITIONAL FEE(\$) |  |
|   | Total<br><small>(37 CFR 1.16(i))</small>                        | *                                | Minus                              | **            | =               |                    | OR | x                       | =                  |  |
|   | Independent<br><small>(37 CFR 1.16(h))</small>                  | *                                | Minus                              | ***           | =               |                    | OR | x                       | =                  |  |
|   | Application Size Fee (37 CFR 1.16(s))                           |                                  |                                    |               |                 |                    |    | OR                      |                    |  |
|   | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) |                                  |                                    |               |                 |                    |    | OR                      |                    |  |
|   |   |                                  |                                    |               | TOTAL ADD'L FEE |                    | OR | TOTAL ADD'L FEE         |                    |  |
| <p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.</p> |   |                                  |                                    |               |                 |                    |    |                         |                    |  |

|  |                                       |             |
|--|---------------------------------------|-------------|
| <b>MULTIPLE DEPENDENT CLAIM<br/>FEE CALCULATION SHEET</b><br><br>Substitute for Form PTO-1360<br>(For use with Form PTO/SB/06) | Application Number<br><b>13391539</b> | Filing Date |
| Applicant(s) <b>Samuel PROUD</b>   |                                       |             |

\* May be used for additional claims or amendments

| CLAIMS | AS FILED |        | AFTER FIRST AMENDMENT |        | AFTER SECOND AMENDMENT |        | *     |        | *     |        | *     |        |
|--------|----------|--------|-----------------------|--------|------------------------|--------|-------|--------|-------|--------|-------|--------|
|        | Indep    | Depend | Indep                 | Depend | Indep                  | Depend | Indep | Depend | Indep | Depend | Indep | Depend |

|              |    |     |    |   |   |   |
|--------------|----|-----|----|---|---|---|
| 1            | 1  |     | 1  |   |   |   |
| 2            |    | 1   |    | 1 |   |   |
| 3            |    | 2   |    | 1 |   |   |
| 4            |    | (1) |    | 1 |   |   |
| 5            |    | (1) |    | 1 |   |   |
| 6            |    | (1) |    | 1 |   |   |
| 7            |    | (1) |    | 1 |   |   |
| 8            |    | (1) |    | 1 |   |   |
| 9            |    | (1) |    | 1 |   |   |
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| Total Indep  | 2  |     | 1  |   | 0 |   |
| Total Depend | 10 | ↙   | 11 | ↙ | 0 | ↙ |
| Total Claims | 12 |     | 12 |   | 0 |   |

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|---|------------------------|--------------------|--------------|
| <b>INFORMATION DISCLOSURE<br/>STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     |                    |              |
|   | Filing Date            |                    | 2012-02-21   |
|   | First Named Inventor   | PROUD, Samuel Liam |              |
|   | Art Unit               |                    |              |
|   | Examiner Name          |                    |              |
|   | Attorney Docket Number |                    | 920257.00016 |

| U.S.PATENTS  |         |                                      |                             |                        |   |  |  |                          |
|--|---------|--------------------------------------|-----------------------------|------------------------|---|--|--|--------------------------|
| Examiner Initial*  | Cite No | Patent Number                        | Kind Code <sup>1</sup>      | Issue Date             | Name of Patentee or Applicant of cited Document | Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear |  |                          |
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| Examiner Initial*  | Cite No | Foreign Document Number <sup>3</sup> | Country Code <sup>2</sup> i | Kind Code <sup>4</sup> | Publication Date                                | Name of Patentee or Applicant of cited Document                          | Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear | T <sup>5</sup>           |
|  | 1       | 0 434 105                            | EP                          | A1                     | 1991-06-26                                      | Lopvnik Terborg BV   |  | <input type="checkbox"/> |
|  | 2       | 2 074 395                            | GB                          | A                      | 1981-10-28                                      | British Engines Ltd.   |  | <input type="checkbox"/> |
|  | 3       | 2001 0109284                         | KR                          | A                      | 2001-12-08                                      | 3M Innovative Properties Company   |  | <input type="checkbox"/> |

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| <b>INFORMATION DISCLOSURE<br/>STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     |                    |              |  |
|   | Filing Date            |                    | 2012-02-21   |  |
|   | First Named Inventor   | PROUD, Samuel Liam |              |  |
|   | Art Unit               |                    |              |  |
|   | Examiner Name          |                    |              |  |
|   | Attorney Docket Number |                    | 920257.00016 |  |

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|  | 4 | 765 082 | GB | A | 1957-01-02 | Minnesota Mining and Manufacturing | <input type="checkbox"/> |
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|--------------------|---------|---|--------------------------|
|                    | 1       | International Search Report and Written Opinion under date of September 16, 2010 in connection with PCT/GB2010/050989   | <input type="checkbox"/> |

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**EXAMINER SIGNATURE**

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| <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b><br>( Not for submission under 37 CFR 1.99) | Application Number     |                    |              |
|   | Filing Date            |                    | 2012-02-21   |
|   | First Named Inventor   | PROUD, Samuel Liam |              |
|   | Art Unit               |                    |              |
|   | Examiner Name          |                    |              |
|   | Attorney Docket Number |                    | 920257.00016 |

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See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

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|------------|---|---------------------|------------|
| Signature  |  | Date (YYYY-MM-DD)   | 2012-02-21 |
| Name/Print | John D. Franzini  | Registration Number | 31,356     |

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## KOREAN PATENT ABSTRACTS

(11) Publication number: **20010109284 A**  
 (43) Date of publication of application: **08.12.2001**

(21) Application number: **1020017009380**  
 (22) Date of filing: **26.07.2001**  
 (30) Priority: **1999 117376 US 27.01.1999**  
 (51) Int. Cl.: **H02G 15/013 (2006.01);**

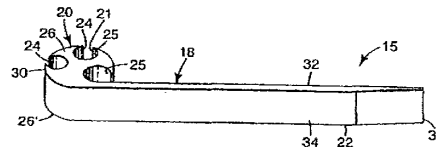
(71) Applicant: **3M INNOVATIVE PROPERTIES COMPANY**  
 (72) Inventor: **SMITH RUSSELL P.**

**(54) END SEAL ASSEMBLY FOR A SPLICE CASE****(57) Abstract:**

An end seal assembly is adapted to seal the space between at least one cable and a closure to restrict fluid transfer through the seal. The end seal assembly includes an end seal having a body formed from an elastic, flexible material. The body includes a core portion (20) and an extended tail portion (22). The core portion has an outer peripheral surface, spaced ends, and a wall forming at least one cylindrical opening (24) through the core portion. The cylindrical opening extends between the spaced ends. The wall has two edges communicating with the outer peripheral surface of the core portion to define between the two edges an entrance slot (21) to the at least one of the cylindrical openings (24). The extended tail portion is integral with and extends from the outer peripheral surface of the core portion (20). Moreover, the tail portion (22) has a surface tangential to the wall forming the at least one opening. In addition, the tail portion has sufficient length to wrap about the outer peripheral surface of the core portion to form a wrapped end seal such that the tail portion covers the entrance slot (21) of the at least one opening and a cable to be placed therein. The assembly further includes a rigid collar having first and second collar portions (90, 91) that are pivotably interconnected. The first and second portions have inner surfaces that conform to and enclose the wrapped end seal to form an inner cavity between the wrapped end seal and the first and second portions of the collar. The collar also has an outer surface adapted to sealingly abut an end of the

closure. Furthermore, the assembly provides for injection of a sealant composition to fill the inner cavity and to bond together the wrapped end seal, the cable (which is placed in the opening), and the rigid collar.

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Publication number: **0 434 105 A1**

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**EUROPEAN PATENT APPLICATION**

21 Application number: **90203025.3**

51 Int. Cl.<sup>5</sup>: **B65D 81/32, F16G 11/00, H02G 15/00, H02G 1/00**

22 Date of filing: **14.11.90**

30 Priority: **20.12.89 NL 8903118**

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43 Date of publication of application:  
**26.06.91 Bulletin 91/26**

72 Inventor: **Van den Hout, Johan Simon**  
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Inventor: **Kapteijn, Bartholomeus Johannes**  
**Ph. P. Cappetilaan 20**  
**NL-7071 CS Uift(NL)**

64 Designated Contracting States:  
**AT BE CH DE DK ES FR GB GR IT LI LU NL SE**

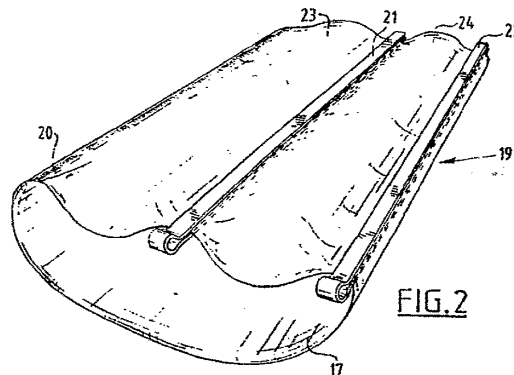
74 Representative: **Schumann, Bernard Herman**  
**Johan et al**  
**OCTROOBUREAU ARNOLD & SIEDSMA**  
**Sweelinckplein 1**  
**NL-2517 GK The Hague(NL)**

54 **System for filling a cavity.**

57 For assembling and finishing cable sleeves, for example, use is often made of two-component insulating material. Such materials usually fall within the provisions of environmental legislation. The liquid remnants left over after assembly of the cable sleeve are chemical waste and the individual components are harmful, irritant and/or flammable during processing so that these substances have to be dealt with extremely carefully.

The invention now offers a system for filling with a mixture of two components a cavity (15) enclosed by a housing, for example a cable sleeve 1, and having a filling opening 8 for placing the mixture in the cavity, characterized by a flexible packaging 19 having three compartments (17, 23, 24) which are mutually separated by two removable dividers (21, 22) and two of which compartments are adjoining and contain the two respective components and the third of which serves as a filling tube (17) for insertion in the access opening (8), which two compartments containing the components can be placed in open communication with one another by removal of the divider, whereafter through kneading of the pack-

aging the two components can form the mixture, whereafter the filling tube can be inserted into the filling opening, the second divider can be removed and the mixture can be carried into the cavity via the filling tube by pressing out the packaging.



**EP 0 434 105 A1**



### SYSTEM FOR FILLING A CAVITY

For assembling and finishing cable sleeves, for example, use is often made of two-component insulating material. Such materials usually fall within the provisions of environmental legislation. The liquid remnants left over after assembly of the cable sleeve are chemical waste and the individual components are harmful, irritant and/or flammable during processing so that these substances have to be dealt with extremely carefully.

The invention has for its object to provide a system for filling a cavity wherein all provisions of environmental legislation can be satisfied in simple manner, while nuisance or danger to persons working with the system is also virtually entirely eliminated.

It is known that the two components have to be separately packed and have to be combined and mixed on-site shortly before use. A known packaging consists for example of two cans, which may or may not be in integrated form, the contents whereof are combined and mixed. Harmful vapours may be released during this open mixing, while spillage can moreover not be ruled out. The remaining, not wholly empty cans form relatively voluminous waste. The advantage of working with these cans is that mixing can be carried out in a clearly observable and therefore well controllable manner, also in large quantities, for instance several tens of kilograms.

The invention now offers a system for filling with a mixture of two components a cavity enclosed by a housing, for example a cable sleeve, and having a filling opening for placing the mixture in the cavity, characterized by a flexible packaging having three compartments which are mutually separated by two removable dividers and two of which compartments are adjoining and contain the two respective components and the third of which serves as a filling tube for insertion in the access opening, which two compartments containing the components can be placed in open communication with one another by removal of the divider, whereafter through kneading of the packaging the two components can form the mixture, whereafter the filling tube can be inserted into the filling opening, the second divider can be removed and the mixture can be carried into the cavity via the filling tube by pressing out the packaging.

A very simple embodiment of the system according to the invention is that in which a removable divider is embodied as two strips pressed resiliently towards one another with clamping of the packaging, for instance in the manner of a hair-pin.

A very reliable coupling between the end of the filling tube and the filling opening is ensured with a

variant wherein the end of the filling tube is coupled to the edge of the filling opening by means of a hollow conical wedge piece which is first placed into that end, whereafter that end is inserted clamping with the zone corresponding to the position of the wedge piece into the filling opening with clamping of the end of the filling tube.

In a preferred embodiment the system is characterized by a housing with a filling opening about which extends a standing wall forming a tray on which can be placed a closing cover. After squeezing out the mixture into the cavity the packaging, in which some of the mixture may still be present, can be laid in the tray which can then be closed by the cover. Any waste is thus made harmless very effectively without there being any danger of leakage, spillage or the like.

In a particular embodiment the system is characterized by a venting opening arranged in the housing adjacent to the filling opening and having a filter placed therein for absorbing harmful vapours emanating from the mixture. Thus prevented is that during filling the harmful vapours that may come from the mixture bring about pollution.

In order to ensure that a possible excess of mixture is not spilled the embodiment is recommended wherein the venting opening is situated below the upper edge of the tray. In this embodiment the tray collects the overflowing excess mixture.

In a particular embodiment the system is characterized by a transparent wall portion of the housing situated in the vicinity of the filling opening. If desired, such a wall portion can be a loose insert piece and serve for visual checking of the cavity, for instance to establish whether the cores present in the cable sleeves are not making a connection against the wall and to determine the degree of filling with mixture.

An easy manner of kneading in order to achieve an homogeneous mixture is ensured with a drivable wringer with co-acting press rollers, at least one of which is profiled, for kneading the packaging. The profiling can serve to press the mixture through the recesses without excessive pressure build-up in the packaging.

A preferred embodiment of the system according to the invention has the feature that the packaging is annular and the dividers extend more or less in transverse direction thereof, wherein the filling tube is separated on the one side by the stated second removable divider and on the other side by a third divider from the two first compartments and can be cut through to form the end of the filling tube. Such a packaging is easily managed

able by hand and is particularly easy to use together with the said drivable wringer, in which case the system is preferably characterized by a reversing roller wherever the packaging can be carried back to the wringer after leaving same.

It is noted in this respect that it can be determined from practical experience how many times the packaging must pass through the wringer to achieve a sufficient homogeneity of the mixture.

The invention further relates to components evidently designed and intended as component of a system as described above. Particularly related to here are the above specified packaging and a housing, for instance a cable sleeve.

The invention will now be elucidated with reference to the annexed drawing, wherein:

Figure 1 shows a partly broken away perspective view of a cable sleeve according to the invention;

figure 2 shows a packaging according to the invention in perspective view;

figure 3 is a schematic side view of the packaging according to figure 2;

figure 4 shows the packaging of figure 3 in a following handling stage;

figure 5 shows the packaging in a subsequent handling stage;

figure 6 shows the packaging in a subsequent handling stage;

figure 7 shows partly in cross section and partly in side view the cable sleeve of figure 1 in finished state; and

figure 8 is a schematic side view of a mixing device according to the invention.

Figure 1 shows a cable sleeve 1 which serves for mutual connection of cables 2, 3, 4.

Situated on the sleeve 1 is a tray 5 which can be closed by a cover 6. The bottom of tray 5 is formed by a transparent plate 7 with a hole 8 serving as filling opening. The bottom 7 is supported by two ribs 9, 10 formed in the sleeve 1. The bottom 7 has two upward sloping ends 11, 12 whereby in this embodiment it is arranged lightly clamping in the tray 5. A venting opening 13 connects under the level of the top edge 14 of the tray via a venting channel to the cavity 15 enclosed by the cable sleeve 1. Not drawn is a carbon filter located in the venting channel whereby during the filling of the cavity 15 to be described below no harmful vapours can escape. Figure 1 further shows an end 16 of a filling tube 17 to be described hereinafter which can be sealingly and clampingly coupled by means of a hollow, conical wedge piece 18 to the filling opening 8. This aspect will be discussed further with reference to figure 6.

Figure 2 shows a flexible packaging 19 in the form of an annular plastic tube comprising a trans-

verse seal seam 20 in addition to two metal clamps 21, 22. The seal seam 20 and the metal clamp 21 form the dividers bounding a first compartment 23. The clamps 21 and 22 bound a second compartment 24 in analogous manner. The compartments 23 and 24 contain the two components which are mixed with one another at a later stage, whereafter the formed mixture has to be carried into the cable sleeve 1. The metal clamp 22 bounds with the seal seam 20 an empty part of the packaging which will later serve as filling tube.

With reference to the figures 3, 4 and 5 the packaging 19 and operating therewith will be discussed in more detail.

Figure 3 shows the packaging 19 in its original form. It will be apparent that the packaging 19 has the form of a closed loop or ring. As a result it can be very easily carried and handled by a user.

Figure 4 shows a following phase wherein the clamp 21, which formed the division between the compartments 23 and 24, is removed. The compartments 23 and 24 thereby come into open communication with one another, whereby the user has the opportunity to mix together the two components present therein by kneading the packaging 19.

Figure 5 shows, likewise schematically, the final form wherein the compartments 23, 24 form one entity and contain the homogeneous mixture.

The filling tube 17 is also brought in its final form by cutting it through in the vicinity of the seal seam 17. The free end 16 of the filling tube is thereby made available as according to figure 1.

Figure 6 shows that the conical wedge piece is arranged in the end 16 of the filler tube 17. This takes place prior to the removal of the metal clamp 22, therefore with the filling tube 17 in "clean" state. In the manner indicated in figure 6 the end 16 of the filling tube is inserted clampingly into the filling opening 8 making use of the wedge piece 18 such that by squeezing out packaging 19 according to arrows 25 the mixture can be admitted as according to arrow 26 via the filling tube 17 into the cavity 15.

Figure 7 shows the assembled cable sleeve 1 filled with mixture 27. As will be apparent, in the assembled state of the cable sleeve as shown in figure 7, the whole packaging 19, after having been at least substantially emptied, is laid on the bottom 7 without breaking the coupling by means of the wedge piece 8, whereafter the tray 5 is closed by the cover 6. The last phase in the assembly of the cable sleeve 1 is thereby completed.

Finally, figure 8 shows a mixing device 28 wherein a packaging is placed in the phase of figure 4. The device 28 comprises an unprofiled press roller 29 and, spring-loaded towards it, a profiled press roller 30 which is drivable by a

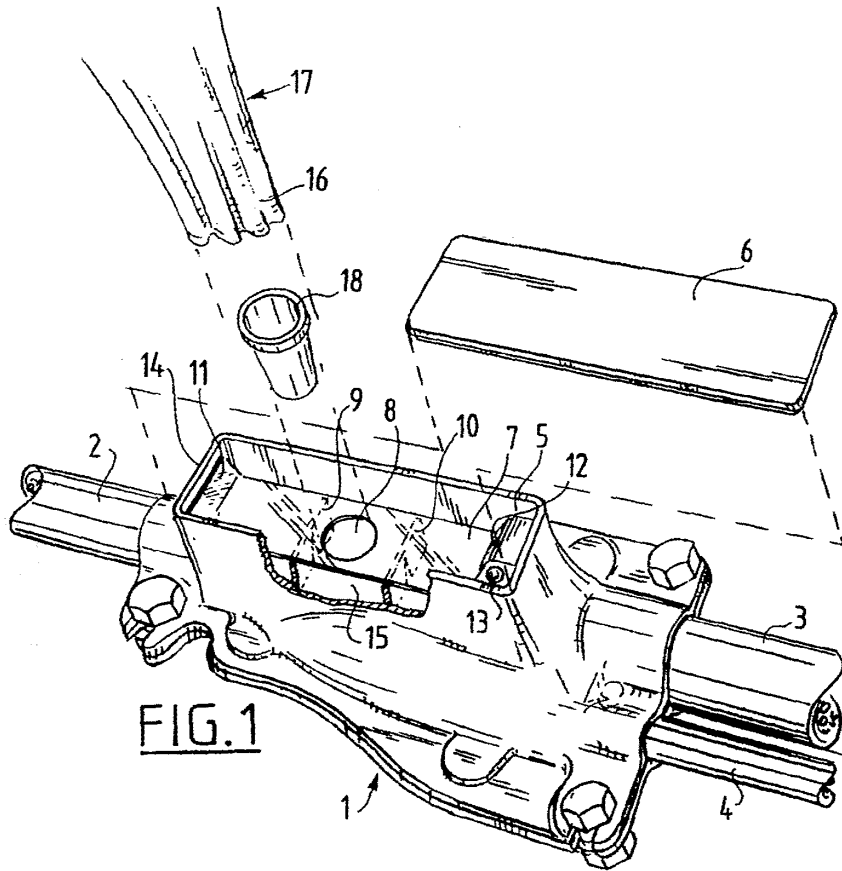
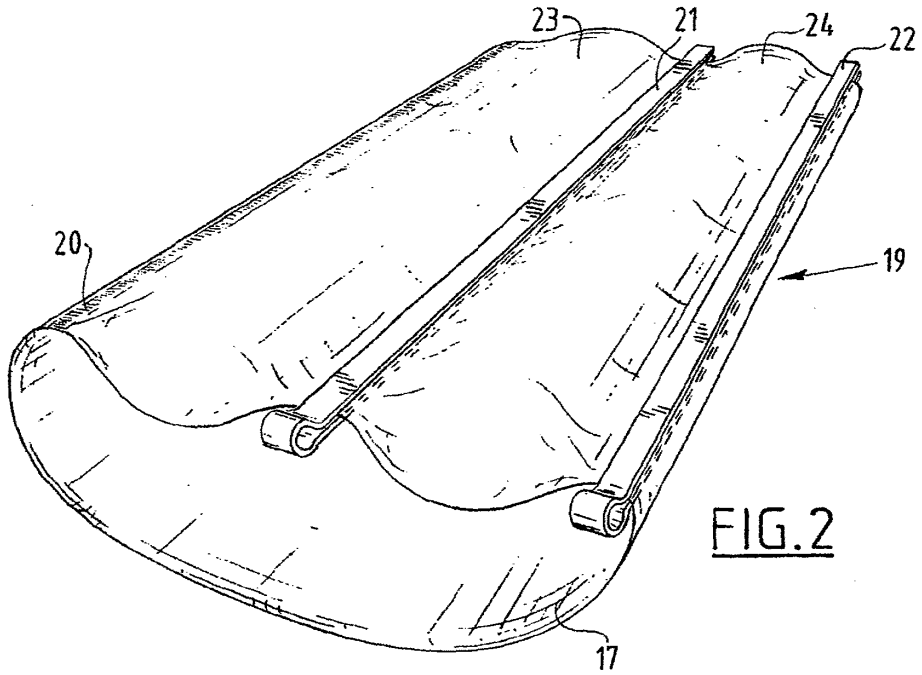
handle 31. This wringer construction serves for mixing of the two components in the compartments 23 and 24 during wringing. Due to the closed loop form of the packaging 19 the action of the device 28 can take place continuously. To this end the packaging is guided over a reversing roller 32.

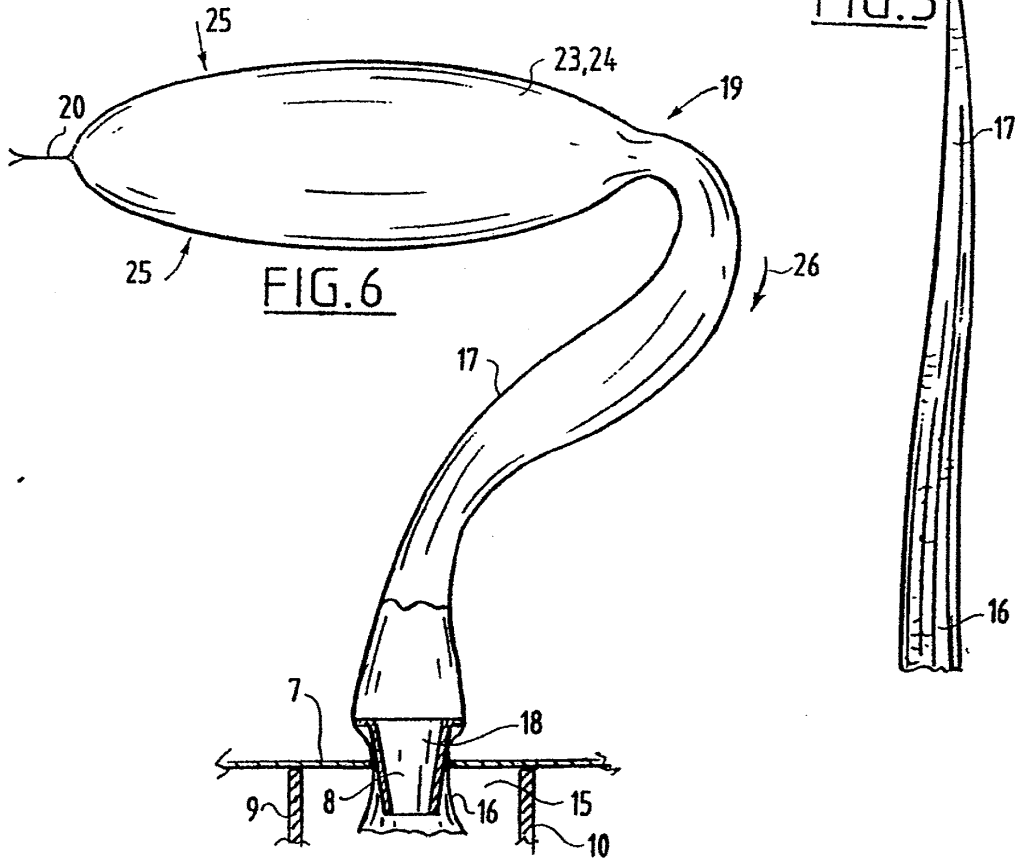
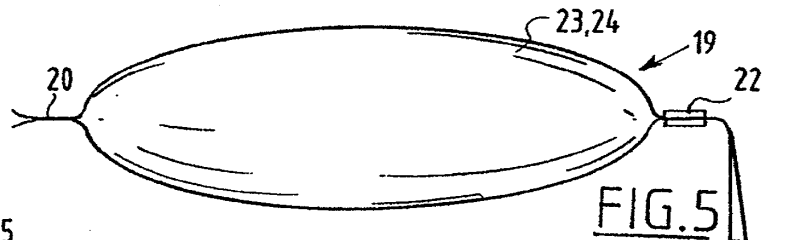
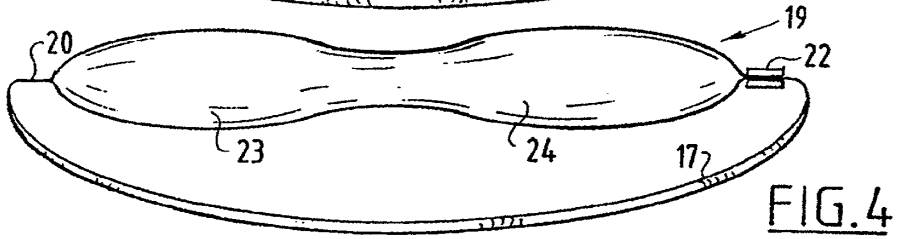
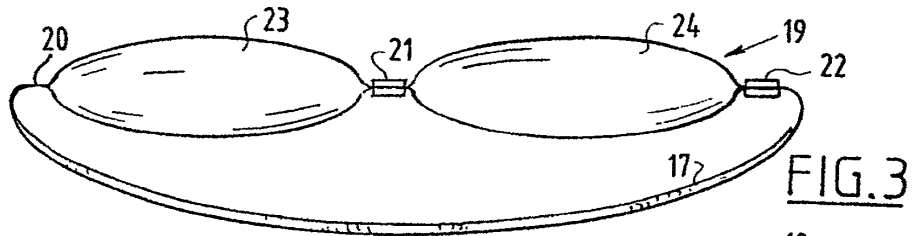
It will be apparent that the invention is not limited to cable sleeves.

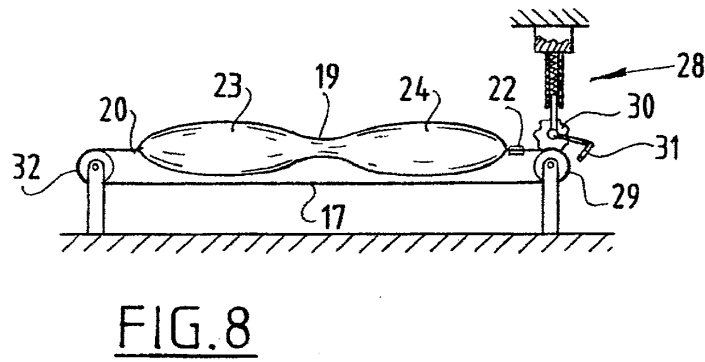
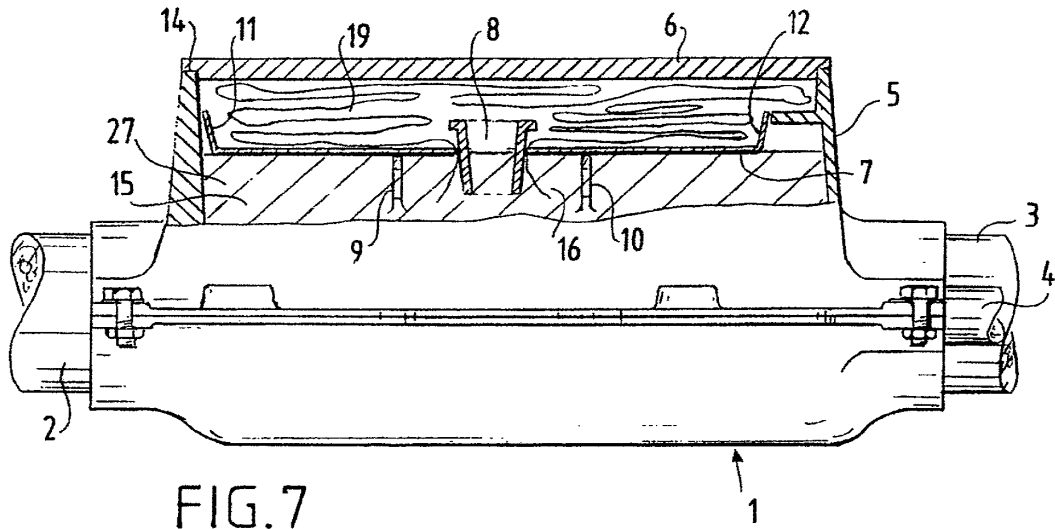
Pressing out of the packaging in the situation of figure 6 can be carried out manually without extra tools; in order to ensure the fullest possible emptying of the packaging, however, squeezing out the compartment 23, 24 by winding up in the per se known manner of a tube by means of a rotatable clamp could also be used.

#### Claims

1. System for filling with a mixture of two components a cavity enclosed by a housing, for example a cable sleeve, and having a filling opening for placing the mixture into the cavity, **characterized by** a flexible packaging having three compartments mutually separated by two removable dividers, two of which compartments are adjoining and contain the two respective components and the third of which serves as a filling tube for insertion in the access opening, which two compartments containing the components can be placed in open communication with one another by removal of the divider, whereafter through kneading of the packaging the two components can form the mixture, whereafter the filling tube can be inserted into the filling opening, the second divider can be removed, and the mixture can be carried into the cavity via the filling tube by pressing out the packaging.
2. System as claimed in claim 1, **characterized in that** a removable divider is embodied as two strips pressed to one another resiliently with clamping of the packaging, for instance in the manner of a hair-pin.
3. System as claimed in claim 2, **characterized in that** the end of the filling tube is coupled to the edge of the filling opening by means of a hollow conical wedge piece which is first placed into that end, whereafter that end is inserted clampingly with the zone corresponding to the position of the wedge piece into the filling opening with clamping of the end of the filling tube.
4. System as claimed in claim 1, **characterized by** a housing with a filling opening about which extends a standing wall forming a tray on which can be placed a closing cover.
5. System as claimed in claim 4, **characterized by** a venting opening arranged adjacent to the filling opening in the housing and having a filter placed therein for absorbing harmful vapours emanating from the mixture.
6. System as claimed in claim 5, **characterized in that** the venting opening is situated below the upper edge of the tray.
7. System as claimed in claim 4, **characterized by** a transparent wall portion of the housing situated in the vicinity of the filling opening.
8. System as claimed in claim 1, **characterized by** a drivable wringer with co-acting press rollers, at least one of which is profiled, for kneading the packaging.
9. System as claimed in claim 1, **characterized in that** the packaging is annular and the dividers extend more or less in transverse direction thereof, wherein the filling tube is separated from the two first compartments on the one side by the said second removable divider and on the other side by a third divider and can be cut through to form the end of the filling tube.
10. System as claimed in claims 8 and 9, **characterized by** a reversing roller wherever the packaging can be carried back to the wringer after leaving same.
11. Packaging evidently designed as component of a system as claimed in any of the foregoing claims.
12. Housing, for instance a cable sleeve, evidently designed as component of a system as claimed in any of the claims 1-10.









European  
Patent Office

EUROPEAN SEARCH  
REPORT

Application Number

EP 90 20 3025

| DOCUMENTS CONSIDERED TO BE RELEVANT   |   |                              |   |
|---|---|------------------------------|---|
| Category  | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim            | CLASSIFICATION OF THE APPLICATION (Int. Cl.5) |
| Y   | GB-A-2 134 067 (BARD)<br>* Claim 1; figures 1,2 *<br>-----                    | 1,2                          | B 65<br>D 81/32<br>F 16 G 11/00               |
| Y   | FR-A-2 272 322 (COGEBI)<br>* Lines 16-28; figure 1; lines 32-37 *<br>-----    | 1,2                          | H 02 G 15/00<br>H 02 G 1/00                   |
| A   | FR-A-2 301 119 (HEXCEL)<br>* Page 8, lines 2-14; figure 1 *<br>-----          | 3                            |   |
| A   | EP-A-0 100 903 (BASF)<br>* Figure 1; claims 1-9 *<br>-----                    | 4-7                          |   |
| The present search report has been drawn up for all claims  |   |                              |   |
|   |   |                              | TECHNICAL FIELDS<br>SEARCHED (Int. Cl.5)      |
|   |   |                              | B 65 D<br>H 02 G<br>F 16 G                    |
| Place of search   |   | Date of completion of search | Examiner                                      |
| The Hague   |   | 14 February 91               | ANDEREGG P-Y.F.                               |
| <p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X: particularly relevant if taken alone<br/> Y: particularly relevant if combined with another document of the same category<br/> A: technological background<br/> O: non-written disclosure<br/> P: intermediate document<br/> T: theory or principle underlying the invention</p> <p>E: earlier patent document, but published on, or after the filing date<br/> D: document cited in the application<br/> L: document cited for other reasons<br/> .....<br/> &amp;: member of the same patent family, corresponding document</p> |   |                              |   |

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(54) Sealing of cable cores to cable glands

(57) A cable core 30 is sealed to a gland 10 by means of a mass of curable or hardenable compound 37, a sleeve 31 and a core seal element 40. The compound 37 fills the space between the sleeve 31 and the core 30 and is sealed to the sleeve, and the core seal element 40 seals the core 30 to the compound 37. The element 40 ensures a fluid-tight seal between the compound 37 and the core 30 on curing of the compound. The element 40 may be an elastomeric tube or may be formed of natural rubber, synthetic rubber, neoprene, synthetic plastics or may comprise a layer of low viscosity curable epoxy resin or hard setting glue or a layer of wound metallic tape. The compound 37 may be a low shrinkage,

two-part epoxy resin putty and is chosen to adhere to the sleeve material which is preferably metal and is roughened to improve adhesion. The core seal element 40 may take a variety of forms (see Figs. 6A to V, not shown).

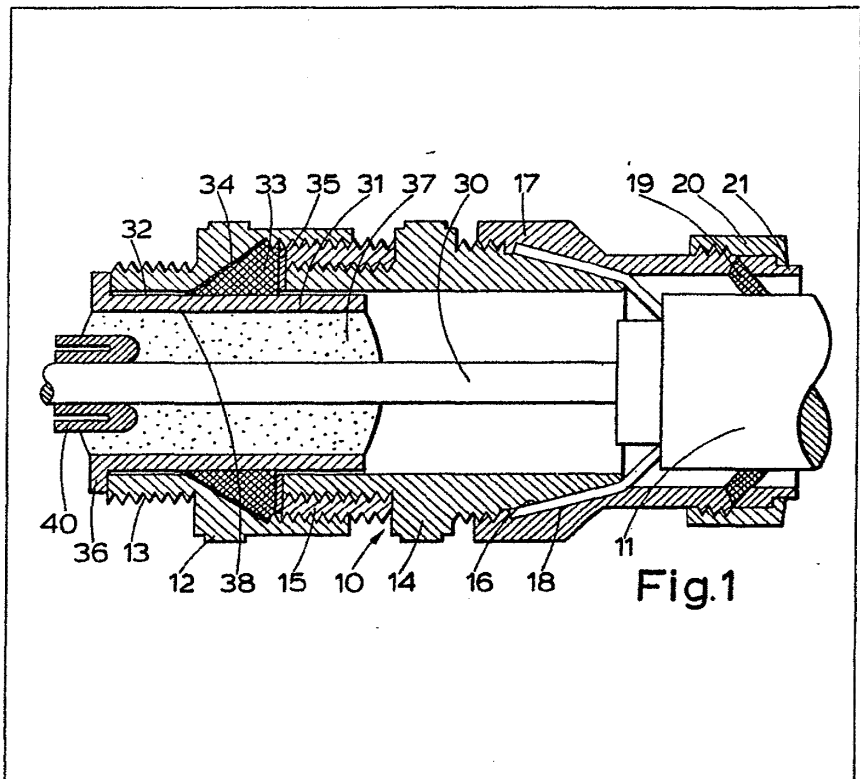


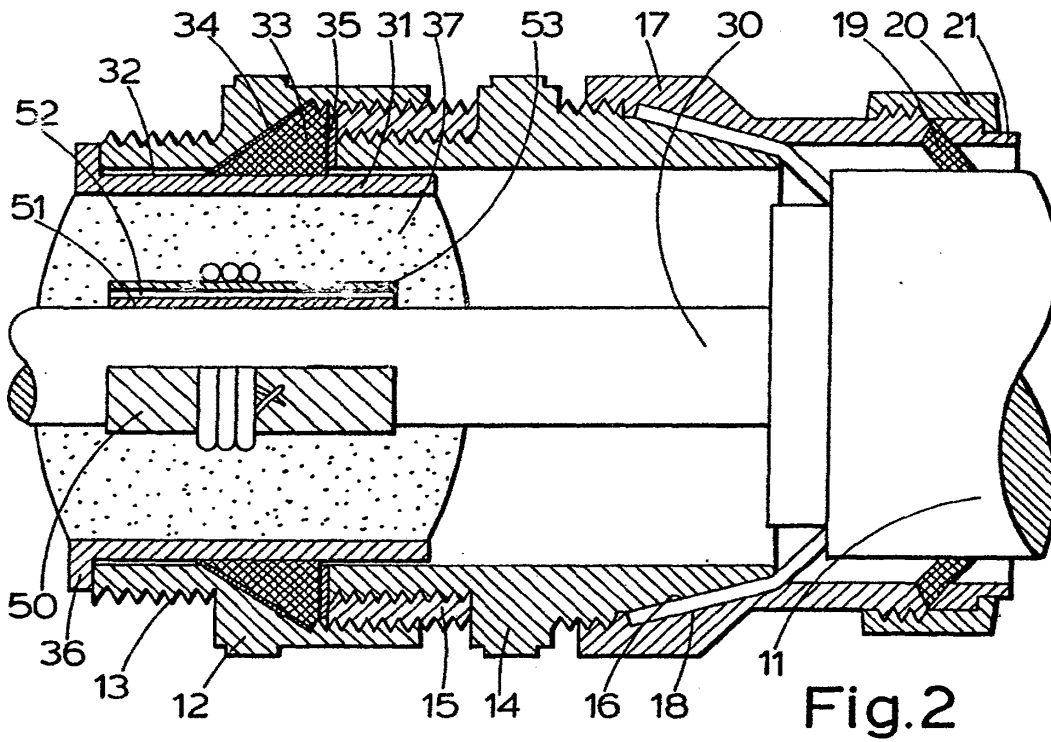
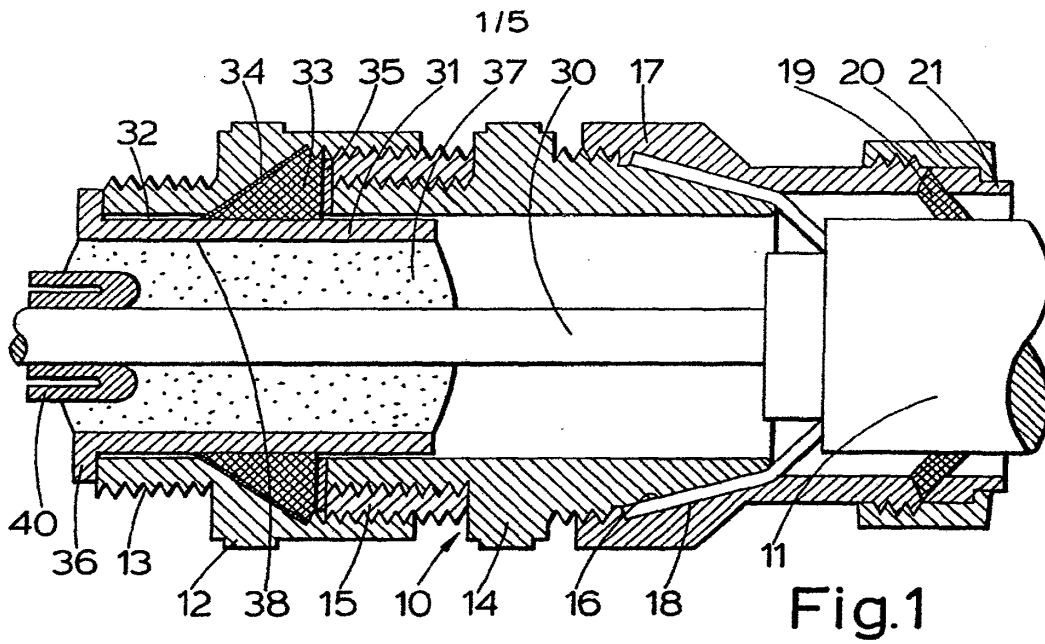
Fig.1

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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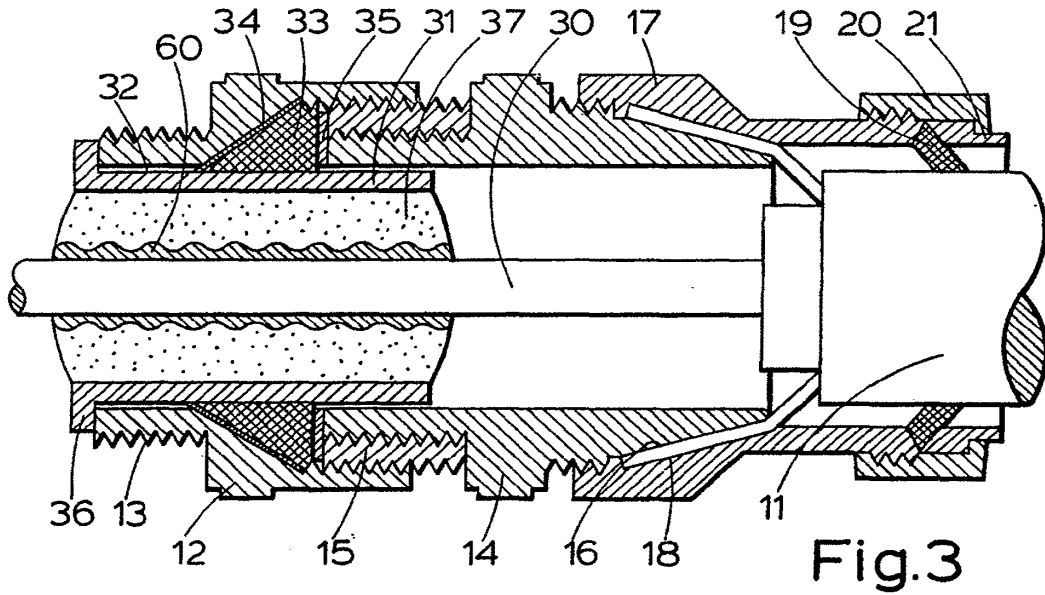


Fig.3

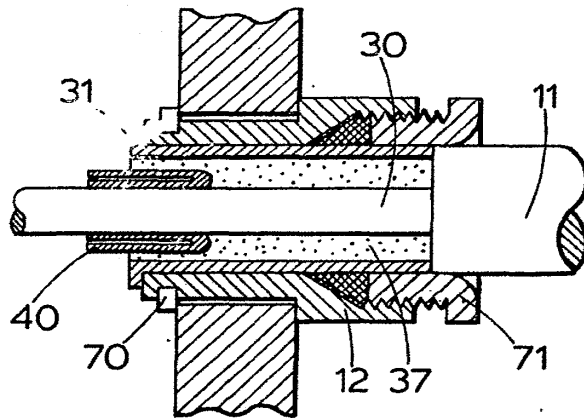


Fig.4

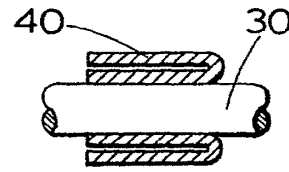
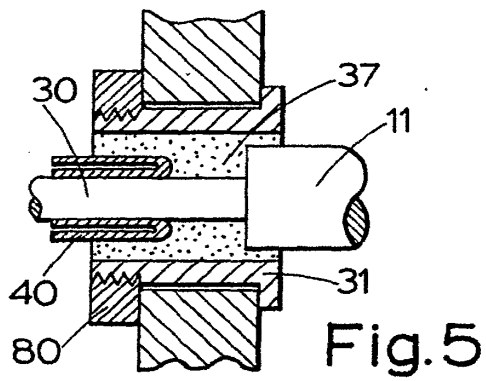


Fig. 6A

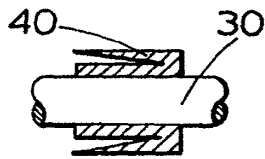


Fig. 6B

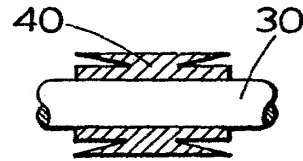


Fig. 6C

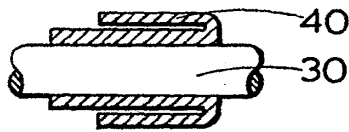


Fig. 6D

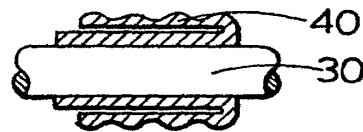


Fig. 6E

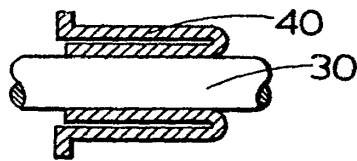


Fig. 6F

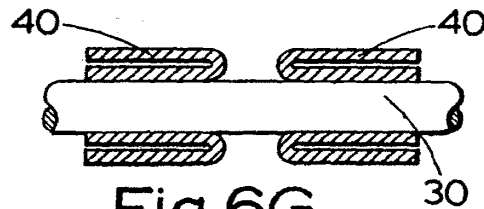


Fig. 6G

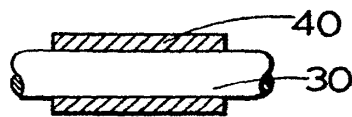


Fig. 6H

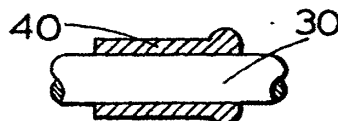


Fig. 6J

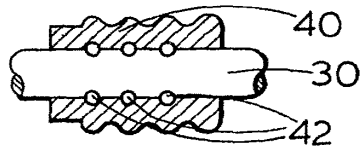


Fig. 6K

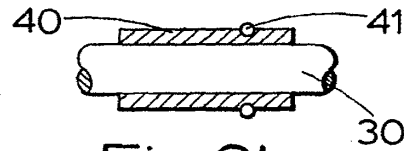


Fig. 6L

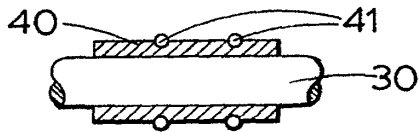


Fig. 6M

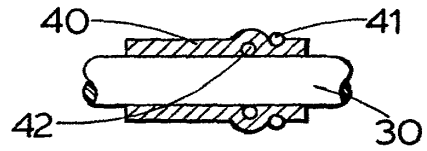


Fig. 6N

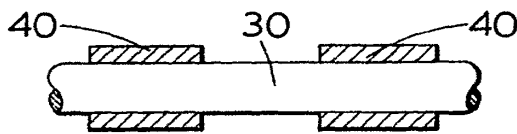


Fig. 6P

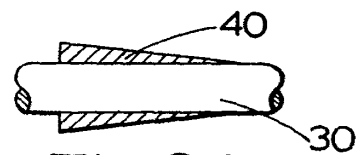


Fig. 6Q

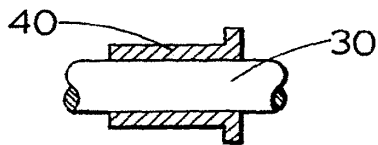


Fig. 6R

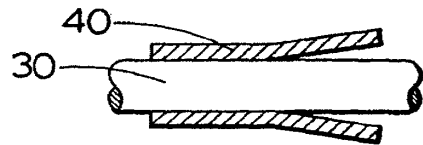


Fig. 6S

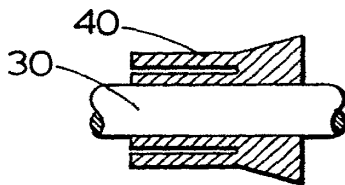


Fig. 6T

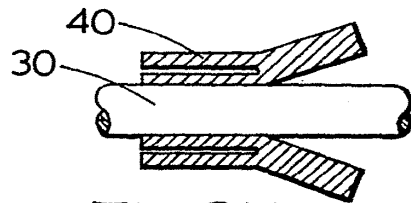


Fig. 6U

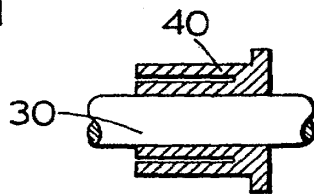


Fig. 6V

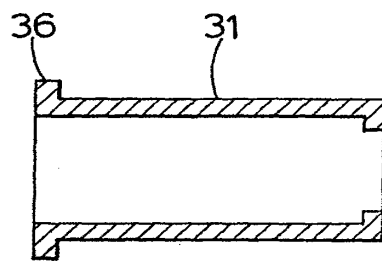


Fig.7A

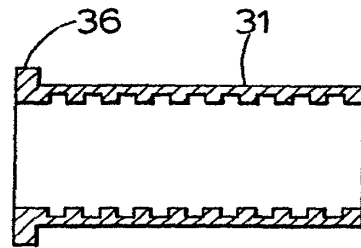


Fig.7B

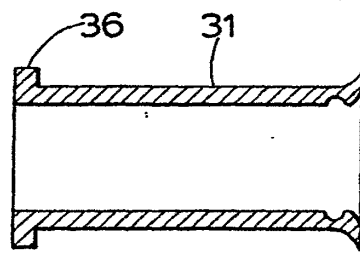


Fig.7C

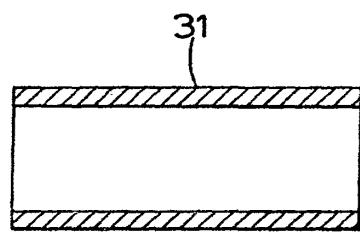


Fig.7D

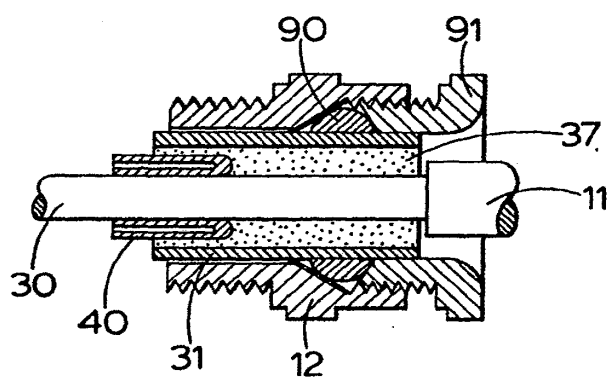


Fig.8

## SPECIFICATION

**Improvements in or relating to cable glands**

- 5 This invention relates to the sealing of cable cores and where appropriate any sheath around those cores to a cable gland or other fitting, in order to prevent gases or liquids which may be dangerous, from passing into the cable at a termination of the cable. The invention finds particular application in flameproof glands for cables where the gases may be combustion or explosion products. 5
- 10 When sheathed cables which do not have full moulded cores, and thus have spaces between the conductor elements and other structural elements and the cable sheath, are terminated, for instance in flameproof or waterproof glands, there is the possibility of communication through the gland and the spaces in the cable structure between a casing or other space to which the gland is attached and the exterior of the cable sheath, either through failure of the sheath in the case of a flameproof gland in an explosion, or through a leak in the sheath in the case of a 15 waterproof gland. 15
- Previously known techniques for meeting this problem have involved placing a specially adapted gland around the termination of the cable where the core is to be sealed to the sheath, and surrounding the end of the cable sheath and the individual conductors which may be 20 protecting from the sheath at the termination with a hardenable or curable compound. The gland has been designed so that before the compound hardens or cures it can be subjected to pressure by tightening elements of the gland. The subjection to pressure has been necessary as the compounds used for sealing the cable core undergo a considerable shrinkage when they harden or cure and thus if they are not subjected to pressure do not adequately seal either to 25 the cable core or to the gland body. Again the compounds have been highly viscous in their raw state, and the subjection to pressure has been necessary to ensure that the compound enters all the interstices in the structure of the cable. 25
- These known techniques have required the use of a specially adapted gland whenever a cable core is to be so sealed.
- 30 It is therefore an object of the present invention to provide an arrangement which can be used to seal a cable core to a gland or other fitting with a compound without the need for such subjection to pressure. It is a further object of the invention to provide such an arrangement which can be used with conventional cable glands or fittings. 30
- Accordingly the present invention provides an arrangement for sealing a cable core to a cable gland or other fitting, comprising a sleeve member arranged to be located and sealed in the 35 cable gland or fitting with the cable core passing through the sleeve, a curable or hardenable compound filling disposed to seal the space around the core in the sleeve, and a seal element disposed around the core to seal the core to the compound filling. 35
- The compound filling may preferably comprise a two-part epoxy putty which will adhere to the 40 material of the sleeve member. 40
- The sleeve member is preferably of metal and may be roughened internally to assist adhesion of the compound filling.
- The seal element may take the form of a rubber, synthetic rubber or other elastomeric material ring-seal element, the form of a metal tape wound round the core with a contact adhesive 45 between the tape and the core, and between the tape and the compound filling, or it may take the form of a layer of adhesive or glue which will adhere to the surface of the core and to the compound filling. 45
- In order to promote a fuller understanding of the above and other aspects of the present invention, some embodiments will now be described, by way of example only, with reference to 50 the accompanying drawings in which: 50
- Figure 1* shows in schematic cross-section a cable gland embodying the invention,  
*Figure 2* shows in schematic cross-section a second cable gland embodying the invention,  
*Figure 3* shows in schematic cross-section a third cable gland embodying the invention,  
*Figure 4* shows in schematic cross-section a fourth cable gland embodying the invention,  
55 *Figure 5* shows in schematic cross-section a fifth cable gland embodying the invention, 55  
*Figures 6a through to 6v* show cross-sectional views of various core seals for use in the embodiments of Figs. 1 through to 5,  
*Figures 7a through to 7d* show various sleeve members for use in the embodiments of Fig. 1 through to Fig. 5, and  
60 *Figure 8* shows a cross-sectional view of a sixth cable gland embodying the invention. 60
- Fig. 1 shows a cable gland 10 for use in terminating a cable 11 at the point where it enters an enclosure, in a flameproof manner.
- The cable gland comprises a body 12 which has a screw-threaded nose 13 by which it may be screwed into an aperture in an enclosure, or locked in an unthreaded aperture by means of a 65 locking ring or nut in conventional manner *per se*. The gland 10 further comprises a body 65

sleeve 14 which is screw-threaded into the body 12, in this embodiment by means of an internally and externally screw-threaded adaptor sleeve 15, and which at the outer end is formed with a conical seating 16 to provide gripping means for armouring wires or the like of the cable 11. An armour gripping sleeve 17 is screw-threaded onto the sleeve 14, being

5 provided with an internal seating 18 to complete the armour wire gripping means in known manner *per se*. The sleeve 17 is also provided at its outer end with a cable sleeve sealing ring 19 which is distorted in the sleeve 17 onto the cable 11 by means of a screw-threaded ring 20 through the intermediary of a moulded plastics material slip ring 21. 5

10 Thus it can be seen that the cable gland provides for the termination of the cable 11 and the entry of the cores into an enclosure in which the body 12 is fitted. The parts of the cable gland so far described may be as described in this particular embodiment or if desired of more or less any suitable conventional design as long as they provide for the receipt and gripping of the cable 11 in a manner appropriate to the construction of that cable in a manner which is acceptable having regard to the flameproof or other requirements of the application. 10

15 In the embodiment of Fig. 1 a single cable core 30 is shown although it is to be understood that any number of cores appropriate to the overall size of the gland may be incorporated in glands embodying the invention. 15

A sleeve member 31 is provided as a fit in the core of the body 12 to provide a flame path 32 which meets with the approved criteria for such a flame path in a flameproof gland. A seal 20 33 which may be of neoprene or other suitable material is provided between the sleeve member 31 and the gland body 12. The body 12 includes a conical seat 34 against which the seal 33 is urged to distort it to seal on and grip the sleeve member 31, by means of the sleeve 14 being screwed into the body 12. A slip washer 35 preferably formed of synthetic plastics material, is interposed between the sleeve 14 and the seal 33 although in some embodiments this may be 25 left out. Thus it can be seen that the sleeve member 31 may be sealed in and gripped in the gland body 12. In the embodiment shown in Fig. 1 the sleeve member 31 is formed with a shoulder 36 which abuts the inner end of the gland body 12 to resist outward movement of the sleeve member 31 under the influence of any fluid pressure which may arise in an enclosure to which the gland is fitted. 25

30 The space between the bore of the sleeve member 31 and the core 30 or where appropriate the cores of the cable 11 is filled with a two-part epoxy putty compound as indicated at 37. The compound 37 is chosen to adhere to the material of the sleeve member 31, this being preferably metal, and the bore surface 38 being preferably roughened to improve such adhesion. The compound 37 is also chosen for minimum shrinkage away from the core 30 or 35 cores of the cable 11, on curing and while it is not necessary that the compound adheres to the cores of the cable, it is preferable that shrinkage is a minimum so that a close fit but not necessarily a sealed fit is achieved around the core or cores when the compound has cured. 35

In order to provide for a pressure-tight seal between the compound 37 and the core 30, or each core of the cable 11, a core seal 40 is positioned around each core of the cable adjacent 40 the inner end of the sleeve member 31 before the compound 37 is put in place. Thus when the compound 37 cures the core seal 40 acts to provide a fluid-tight pressure seal between the compound 37 and the outer diameter of the respective core of the cable. 40

Thus it can be seen that a fluid-tight seal may be provided between the interior of an enclosure to which the gland body 12 is fitted, the gland body being sealed in the wall of the enclosure in conventional manner, and the outside of the enclosure. In particular the interior of 45 the cable 11 is sealed from the interior of the enclosure so that in the event of any rise in pressure in the interior of the enclosure for instance as a result of an explosion, gases from the enclosure cannot enter the spaces between the cores in the cable 11 and the other parts of its structure to escape from the enclosure. 45

50 Thus it can be seen that the embodiment provides a gland which may be used as a flameproof gland or as a fluid pressure-tight gland for other purposes, or as a watertight gland. Experience has shown that with conventional cable materials a gland as shown in Fig. 1 can withstand pressures of as much as a 1000 pounds per square inch without leakage over 55 extended periods of time. The embodiment shown offers a performance in flameproof glands which far exceeds those previously available. 55

The core seal 40 is preferably in the form of a piece of thin wall tubing folded back upon itself in the manner shown in Fig. 1 so that any fluid pressure in the enclosure to which the gland is fitted tends to open the seal 40 out to seal more firmly against both the cable core and the compound 37. The core seal 40 is preferably formed of neoprene or synthetic rubber 60 material or other synthetic plastics material, the particular material being chosen being appropriate to the conditions to be resisted in use of the gland. 60

Figs. 6a through to 6v show various forms which the core seal may take. Those shown in Figs. 6a, 6b, 6c, 6d, 6e, 6f, 6g, 6t, 6u and 6v function in a basically similar manner to that described with regard to the seal 40 in Fig. 1. The seals shown in Fig. 6c and 6g are operative 65 in both directions with respect to the cable core and thus may resist pressures in the enclosure 65

or outside the enclosure. The seals shown in Fig. 6e, 6f, 6t, 6u and 6v are formed with outward protuberances of various shapes to form a key into the compound 37 when it is cured.

The core seals shown in Figs. 6h, 6j, 6l, 6m, 6n, 6p, 6q, 6r and 6s are basically sleeves of elastic material such as neoprene, synthetic rubber or synthetic plastics material arranged to form a seal between the compound and the cable core. Some of these such as that shown in Fig. 6j, 6r or 6s include outward protuberances to form a key in the compound 37, and some are provided with external wire clips indicated at 41 to grip the seals on the cable core and thus improve sealing between the core and seal. In some arrangements such as those shown at 6k and 6n, the effectiveness of the seal between the seal 40 and the cable core may be improved by an internal sealing ring such as an O-ring.

With the seals shown in Figs. 6h, 6j, 6k, 6l, 6m, 6n, 6p, 6q, 6r, and 6s, it is preferable that the compound 37 is chosen such that it will also adhere to the material of the core seals 40 used.

Figs. 7a, 7b, 7c and 7d show various embodiments of the sleeve member 31 which may be used in the gland shown in Fig. 1. As can be seen Figs. 7a, 7b, and 7c show various sleeve members having means to enhance the grip between the compound 37 and the sleeve member 31 to better resist pressure arising inside or outside the enclosure tending to displace the compound 37 from the sleeve member. Fig. 7d shows a sleeve member without an external shoulder such as that shown at 36 in Fig. 1 and if this embodiment is used in Fig. 1 then the frictional grip of the seal 33 is utilised to prevent the sleeve member 31 moving in the gland body under pressure.

Fig. 2 shows a second gland embodying the invention which is generally similar to that shown in Fig. 1 and where similar parts are used and serve a similar purpose they have been given the same reference number and no further description will be given.

In this embodiment the core seal indicated generally at 50 provided around each cable core to be effective between the core and the compound 37 is formed in a different fashion. The core seal 50 comprises a layer of contact adhesive 51 applied around the surface of the cable core 30, a layer of metal tape such as aluminium tape half-lap wound around the adhesive 51 as indicated at 52 and then coated with an outer layer of contact adhesive as indicated at 53, the layers 51, 52 and 53 being put in place on the cable core before the compound 37 is placed in position. Preferably the metal tape is gripped on the cable core by means of a copper or other metal binding wire 54 wound round the metal tape with a few turns, three being shown, and having the ends twisted together to grip the metal tape onto the core. The binding wire 54 is chosen so that when the ends are twisted together and a break occurs the binding is tightened to the desired pressure around the cable core. The contact adhesive layers 51 and 53 are chosen to provide adhesion between the metal tape and the core and the metal tape and the compound 37 after curing respectively.

Fig. 3 shows a third cable gland embodying the invention which is again similar to that shown in Fig. 1 and again where parts are similar and/or serve the same purpose, they have been given the same reference numerals.

In this embodiment the core seal between each cable core and the compound 37 is in the form of a layer of low viscosity epoxy or other glue which will cure or set to form a layer indicated at 60 between the cable core and the compound 37. The glue layer 60 is preferably such that a bond may be formed between it and the compound 37 either during curing or setting or both, or after the layer 67 has cured or set.

Fig. 4 shows a further cable gland embodying the invention in which the gland body 12 is held in the wall of an enclosure by means of a circlip 70. Further the seal 33 is distorted to grip and seal against the sleeve member 31 by means of a screw-threaded ring 71. In other respects the gland of Fig. 4 is similar to that of Fig. 1.

Fig. 5 shows an arrangement embodying the invention in which the sleeve member 31 is itself located in an aperture in a wall of an enclosure by means of a screw-threaded ring 80. In other respects the arrangement of Fig. 5 is similar to that of Fig. 1.

Fig. 8 shows a yet further arrangement embodying the invention in which the sleeve member 31, in this case corresponding to that shown in Fig. 7d, is located and sealed in the gland body 12 by means of a metal olive 90 which is of known design *per se* and which is compressed in the gland body by means of a screw-threaded nut 91 to grip and seal against the sleeve member 31.

It is to be noted that in the arrangements of Figs. 4, 5 and 8 the outer sleeve of the cable 11 is not held in the gland.

Examples of materials which are suitable for the filling compound 37 in the above embodiments are:



|    |  |    |
|----|--|----|
|    | William Beared (CIBA GEIGY) — SP4424   |    |
|    | Kompress — Kompound 'E'  |    |
|    | Winn and Coales — Denso 2132/C   |    |
| 5  | Devcon — UW  | 5  |
|    | Cil — 664/K  |    |
|    | Plastic Padding  |    |
|    | Isopon   |    |
| 10 | However, other compounds may be used in accordance with the operating conditions expected in use of the arrangement. | 10 |
|    | Examples of contact adhesives which may be used for the layers 51 and 53 are:  |    |
|    | Ensis Compound — 356   |    |
| 15 | Hylomar — PL32   | 15 |
|    | Hellerman — HMT 100A   |    |
|    | Hellerman — WM 250   |    |
|    | Devcon — Zip Patch   |    |
|    | Evo Stik — 528   |    |
| 20 | Evo Stik — 873   | 20 |

Other suitable adhesives may however be used.

#### CLAIMS

|    |  |    |
|----|--|----|
| 25 | 1. An arrangement for sealing a cable core to a cable gland or other fitting, comprising a sleeve member arranged to be located and sealed in the cable gland or fitting with the cable core passing through the sleeve, a curable or hardenable compound filling disposed in the space around the core in the sleeve and sealed to the sleeve, and a core seal element disposed around the core to seal the core to the compound filling.                             | 25 |
| 30 | 2. An arrangement for sealing a plurality of cable cores to a cable gland or other fitting, comprising a sleeve member arranged to be located and sealed in the cable gland or fitting with the cable cores passing through the sleeve, a curable or hardenable compound filling disposed in the space around the cores in the sleeve and sealed to the sleeve, and a respective core seal element disposed around each core to seal the core to the compound filling. | 30 |
| 35 | 3. An arrangement as claimed in Claim 1 or 2, in which each said core seal element comprises an elastomeric tube.  | 35 |
|    | 4. An arrangement as claimed in Claim 3, in which said tube is folded back over itself to present a double edge to that side of the arrangement expected to experience a higher fluid pressure.  |    |
| 40 | 5. An arrangement as claimed in Claims 1, 2, 3 or 4, in which each said core seal element is formed of natural rubber.   | 40 |
|    | 6. An arrangement as claimed in Claims 1, 2, 3 or 4, in which each said core seal element is formed of synthetic rubber or neoprene.   |    |
| 45 | 7. An arrangement as claimed in Claims 1, 2, 3 or 4, in which each said core seal element is formed of synthetic plastics material.  | 45 |
|    | 8. An arrangement as claimed in any one of Claims 1, 2 or 3 in which said core seal element is substantially as herein described with reference to any one of Figs. 6a to 6v of the accompanying drawings.   |    |
| 50 | 9. An arrangement as claimed in Claims 1, 2 or 3 in which each said core seal element comprises a layer of low viscosity curable epoxy resin or hard setting glue.   | 50 |
|    | 10. An arrangement as claimed in Claims 1, 2 or 3 in which said core seal element comprises a layer of contact adhesive on the core, a second layer of wound metallic tape, and a third layer of contact adhesive.   |    |
| 55 | 11. An arrangement as claimed in Claim 10, in which said metallic tape is lap wound.   | 55 |
|    | 12. An arrangement as claimed in Claim 10 or 11, in which said metallic tape is tied to the core by means of an overwinding of metal wire.   |    |
|    | 13. An arrangement as claimed in any one of Claims 1 to 12, in which said sleeve member is roughened internally to assist bonding of said compound filling.  |    |
| 60 | 14. An arrangement as claimed in any one of Claims 1 to 12, in which said sleeve member is formed with ribs or grooves to assist bonding or gripping of said compound filling.   | 60 |
|    | 15. An arrangement as claimed in any one of Claims 1 to 14, in which said sleeve member is formed with an external shoulder to prevent axial movement thereof.   |    |
| 65 | 16. An arrangement as claimed in any one of Claims 1 to 12, in which said sleeve member is substantially as herein described with reference to any one of Figs. 7a to 7d of the accompanying drawings.   | 65 |

17. A cable gland including an arrangement as claimed in any preceding claim.
18. A cable gland as claimed in Claim 17, including a gland body having means to grip and seal to said sleeve member.
- 5 19. A cable gland as claimed in Claim 18, wherein a flame path is provided between said gland body and the sleeve member. 5
20. A cable gland as claimed in Claim 18 or 19, wherein a seal member is provided operative between the gland body and the sleeve member.
21. A cable gland as claimed in Claim 16, in which the seal member comprises a metal olive.
- 10 22. A cable gland as claimed in any one of Claims 18 to 21, in which said gland body includes means to seal against the external sleeve of a cable. 10
23. A cable gland as claimed in any one of Claims 18 to 22, in which said gland body includes means to grip armour wires of a cable.
- 15 24. A cable gland substantially as herein described with reference to any of Figs. 1, 2, 3, 4, 5 or 8 of the accompanying drawings. 15
25. A cable gland as claimed in Claim 20, including a core seal element or core seal elements substantially as herein described with reference to any one of Figs. 6a to 6v of the accompanying drawings.
- 20 26. A cable gland as claimed in Claim 20 or 21, including a sleeve member substantially as herein described with reference to any one of Figs. 7a to 7d of the accompanying drawings. 20

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AMENDED SPECIFICATION

Reprinted as amended in accordance with the decision of the Superintending Examiner, acting for the Comptroller-General, dated the nineteenth day of February, 1960, under Section 33, of the Patents Act, 1949.

PATENT SPECIFICATION

DRAWINGS ATTACHED

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International Classification:—B65d. H02f.

COMPLETE SPECIFICATION

Improvements in and relating to the Insulation and Protection of Wire Splices or Connections

We, MINNESOTA MINING AND MANUFACTURING COMPANY, of 900, Fauquier Avenue, Saint Paul 6, Minnesota, United States of America, a Corporation organised under the laws of the State of Delaware, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the insulation and protection of wire splices or connections.

Electrical coils, splices, and connections have previously been protected and insulated by means of thermoplastic impregnating agents or potting compounds having an asphaltic base. These compounds are subject to melting caused by heating of the coils or wires during use thereof, and resulting in flow of the insulating material away from its designated position.

Other prior art applications have employed heat-curing resinous or plastic compositions for coating or encapsulating various electrical components. Heat is required to cause the normally stable and non-reacting resinous material to cure to the non-thermoplastic state. The method is limited in its application due to the heat sensitivity of components of many electrical systems.

Another type of material which has previously been suggested for use in the coating of encapsulating of electrical or other components involves mixtures of two or more inter-reactive materials which set up or cure at room temperature when intimately mixed together. Highly reactive mixtures are necessary in order to attain desired production rates. Premixing of large quantities of the material is therefore precluded because of the

danger of the material curing before it can be applied to the joint or connection.

Transfer of the reactive components from storage containers to weighing-pans and mixing-pans is difficult and untidy, resulting in waste of material and, even more significantly, in improper proportioning and mixing of the reactive materials. Opening the containers and dipping or otherwise transferring the mixtures to a separate vessel for mixing exposes the components to the atmosphere, in many cases resulting in excessive or noxious fumes, skin irritation and other personal problems, and in degradation of the curing agent or resin.

These and other deficiencies and difficulties of the prior art are overcome by means of the present invention in accordance with which wire splices or connections are electrically insulated and protected by a method which comprises mixing liquid or plastic ingredients that will react upon being mixed to form a self-setting resinous material, within a closed multi-compartment flexible unitary package without opening the package, by the rupture of a temporary diaphragm or other barrier separating the ingredients, and flexing the package to cause the ingredients to commingle within it, and applying the mixed ingredients directly to the splice or connection. The package is simple and economical to produce and use, and the reactive components are maintained in a stable, non-reacted and inter-reactive state during prolonged periods of storage.

Many useful systems of inter-reactive liquid or plastic materials are known. One example is a combination of a solution in a volatile solvent of natural or synthetic rubber and a co-reactive solution of suitable low tempera-

[Pr

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ture accelerating and vulcanizing agents. Another system makes use of an alkyd resin as one component and a suitable catalyst mixture as a second component. The more recently developed "epoxy" resins may also be used in conjunction with solutions of reactants and catalysts, such as organic amines, carboxylic acid anhydrides, liquid polysulfide polymers and various combinations of such components which react with the epoxy resins, preferably at or near normal room temperature, to form hard, tough, dense and impervious resinous materials.

The invention will be further described by way of example in connection with the drawings, in which:

Figure 1 is a representation, largely in cross-section, of a wire-splice, insulated and protected with a resinous composition applied from a unitary package as illustrated in cross-section in Figure 2, a modification of one portion of such package being illustrated in cross-section in Figure 2a.

Figure 3 represents another method of insulating and protecting a wire-splice, employing a unitary package of resinous materials as illustrated in side elevation in Figure 4 and in end elevation in Figure 5.

Figures 6, 8, 10 and 12 represent, in elevation, other varieties of unitary packages of multiple inter-active resinous components for use in accordance with the present invention. Figures 5 and 7 represent end elevations of the packages of Figures 4 and 6, respectively, and Figures 9, 11 and 13 represent cross-sectional views of the packages of Figures 8, 10 and 12, respectively, and on the section-lines indicated.

In Figure 1, the bare tips of the stranded conductors of insulated wires 10 and 11 are clamped together in a "pigtail" splice by means of a spring-wire connector 12. A flexible shell 13 surrounds the splice with an internally threaded tip portion 14 closely conformed to the outer surfaces of the insulated wires adjacent the large end of the spring-wire connector. The interior of the shell 13 containing the splice is filled with a hardened resinous material 16, which also permeates the voids within the splice and connector, the shell 13 serving as a mould for the resinous material during curing thereof.

Figure 2 represents in cross-section a capsule 20, which consists of a bulb portion 21, inter-connected with a neck portion 22, the latter being closed at the outward end by a seal 25. The interior of the capsule is divided into two parts by a central diaphragm 23, and the two closed chambers thus formed contain the two inter-reactive liquid or plastic materials 26 and 27. The interior surface of the neck portion 22 is threaded, as shown at 24, to correspond with the outer surface of the spring-wire connector of Figure 1.

The diaphragm 23 of Figure 2 is adherently sealed to the inner surface of the outer wall of the bulb. An alternative structure is indicated in Figure 2a, showing a channel 28 in the interior surface of the wall of the bulb 21a, a resilient diaphragm 23a being fitted snugly within such channel.

In applying the capsule of Figure 2 to the splice, as indicated in Figure 1, the rear portion of the capsule, containing the reactive component 26, is compressed to an extent sufficient to rupture the diaphragm 23 (or displace the diaphragm 23a) and thus permit mixing of the reactive components 26 and 27. The rim of the ruptured diaphragm is indicated at 15 in Figure 1. Mixing is completed by alternately compressing the two ends of the capsule, the latter being made of flexible material and in a shape having less than the minimum ratio of external area to internal volume. After mixing is complete, the sealed end is clipped from the neck portion 22, and the capsule is screwed on to the spring-wire connector 12 of the splice, as shown in Figure 1. Hydraulic pressure set up by this operation is sufficient to force the liquid or plastic resinous mixture into all of the openings and interstices between the elements of the splice, whereby complete and effective insulation and protection of the splice is attained. The resinous composition then rapidly sets up or cures to the final hard and tough state. It will be apparent that resinous compositions which are free, or essentially free, of volatile solvents are of greatest effectiveness in such operations.

Figure 3 illustrates a line or running splice between two stranded conductors 30 and 31, which is protected and insulated with resinous material introduced from a capsule 35, and maintained in position during the curing period by a close fitting and preferably transparent shield 32. The shield is held in place on the outer surface of the conductor 30 by means of a wrapping of adhesive tape 33, and on the conductor 31 by the close-fitting elastic friction seal portion 34 of the shield 32. The shield is perforated so as to permit the entry of the open end tip 36 of the capsule 35, through which the pre-mixed resinous composition 38 is introduced, under pressure, into the sleeve and around the spliced areas of the conductors. Rather than employ a preformed fitted sleeve 32, suitable strips of plastic or elastic film or sheet material may be wound around the splice area, temporarily fastened in place on each of the conductors, and perforated to permit the entry of the resinous mixture.

Figures 4 and 5 provide further detail in connection with the capsule 35 of Figure 3. The complete capsule, here designated 40, consists of a tubular portion 41, closed at both ends and having a protruding tip 42 at one end. A diaphragm 43 separates the interior of the capsule into two portions con-

5 taining two inter-reactive liquid or plastic materials 44 and 45. Such a diaphragm may be constructed of the same material as the outer wall of the capsule 40 but in reduced thickness; or it may be made of some other impervious material. For example, the diaphragm 43 has been produced by inter-reaction of the two reactive components 44 and 45, e.g. where the latter were epoxy resin and amine catalyst mixtures, respectively. A resilient removable diaphragm of "Mylar" (Registered Trade Mark) polyester film material is also effective, the structure in such case being similar to that indicated in Figure 2a. Pressure on either end of the capsule bulges the walls of the capsule at the opposite end and shatters or ruptures (or displaces) the diaphragm, thus permitting mixing of the two reactive components. The closed tip 42 is then cut off and the enclosed material applied to a splice as shown in Figure 3 or used for any other desired application.

10 The two-compartment capsule 60 of Figures 6 and 7 consists of a larger outer tube 61, terminating at one end in an elongated small tube 62 having a sealed end 63, and enclosing an intermediate size tube 64, the two having a common sealed end 66. The intermediate tube 64 is closed at the other end with a seal 65, and this tube contains one component 67 of a two-component inter-reactive resinous system, the other component 68 of which is contained within the large tube 61 and around the outside of the intermediate tube 64. The walls of the large tube 61 and of the small terminal tube 62 are substantially thicker and stronger than the walls of the intermediate tube 64, and the latter tube is preferably filled to, or nearly to, capacity, so that external pressure, applied adjacent the end seal 66 will cause rupture of the intermediate tube 64 while causing mere distortion of the external tube 61. The two reactive components are then thoroughly intermixed by manipulation of the outer tube, the sealed tip 63 is cut off, and the resin is applied where desired.

15 Figures 8 and 9 represent another example of a thin walled and highly flexible envelope or capsule, the envelope 100 being constructed of two co-extensive films 101 and 102, sealed together around their entire edges as shown at 103. Two compartments for the reactive components 107 and 108 are formed within the envelope by another thinner or weaker film 104, which is sealed to the upper film 101 at area 106 and to the lower film 102 at area 105. External pressure on either end compartment forces the liquid or plastic material contained therein against the barrier 104, which, due to its lesser thickness and lesser strength, then ruptures to permit intermixing of the two reactive components. The mixture is then pressed from the envelope

through the opened corner formed by cutting along dotted line 109.

Another form of envelope, somewhat similar in construction but having additional advantages for some reactive systems, is illustrated in Figures 10 and 11. The package 120 consists of an inner envelope 122 containing one reactant 124, and an outer envelope 121 containing another reactant 125. The two envelopes have a common seal 123 extending along three sides of the smaller envelope, sealing of the larger envelope being completed by seals 123a. Alternatively, the inner envelope may be made narrower than the outer envelope and the two sealed separately along one or both sides, being joined with a common seal at the common end. As in the package of Figure 8, the separating membrane, in this case the inner envelope 122, is preferably of thinner and weaker sheet material than the outer package 121; although somewhat the same effect may be obtained by more completely filling the inner envelope 122 so as to render it relatively turgid, the outer envelope 121 being filled in an amount sufficient to render it relatively flaccid. The mixture formed on bursting the inner envelope and massaging the capsule may be expelled from the bag through a corner cut as shown at 126.

The outer envelope 161 of the package 160 of Figures 12 and 13 contains the reactive component 167 together with small enclosed spheres 164, 165 of one or more further reactive components 166. Since the spheres represent the minimum possible surface to volume ratio, pressure applied to them through the outer envelope 161 results in rupture of the spherical membrane and in intermixing of the contained reactant with the reactive material in the outer envelope. The size of the spheres may be reduced by increasing the number, so that rather strong spheres may be made even though the outer membrane thereof is relatively weak and frangible. A preferred method of making such spherical membranes is by forming the membrane *in situ* at the surface of a drop of the reactive liquid by reaction of such surface with a surrounding reactive liquid, somewhat as described in connection with the diaphragm 43 of the package of Figure 4.

Of the materials which may be employed in constructing these several packages or analogous packages, flexible and heat-sealable inert organic materials such as polyethylene are preferred. The films of polyethylene are readily sealed together or welded by the application of controlled heat. The material is inert to, and insoluble in, many of the desirable resinous systems. It is flexible and strong, and is readily obtainable in sheets of various thicknesses. It may also be extruded or moulded into any desired shape or form.

Another material which has been found

useful, particularly in making the relatively thick-walled capsules of Figures 2, 4 and 6, is plasticised vinyl chloride; and a preferred method of making such capsules is by moulding, casting or dipping from vinyl chloride plastisols. For example, a suitable form may be covered with a layer of a plastisol consisting of 100 parts of high molecular weight vinyl chloride polymer and 60 parts of dioctyl phthalate, and then heated to 250—400° F, to form a thick, homogeneous and flexible wall section. The open end may be heat-sealed. The internal separating membrane may be formed of the same vinyl chloride material, or of a less flexible, more waxy material, adhered directly to the walls of the capsule; or a resilient disc may be inserted as previously described in connection with Figure 2a; or the separating membrane may be formed as the inter-facial reaction product of two reactive components within the package.

Cellulosic film materials, "Mylar" (Registered Trade Mark) polyester films, rubber hydrochloride, and various other film-forming polymeric materials are also useful in making these novel packages, depending on the particular reactive system to be contained thereby, on the methods to be employed in producing the package, and on various other factors. Transparency is desirable, and the materials just listed possess this property; however, in many cases an opaque packaging material may be equally applicable and in some cases preferable, e.g. where exposure of the resinous components to actinic light is to be avoided. In the latter case, coloured or pigmented organic films, or even metallic foils, suitably lined or treated where necessary for prevention of chemical attack, may be found useful. However the transparent organic films permit visual inspection of the contents during manipulation of the package and are much preferred.

Of the several inter-reactive systems previously noted herein, the epoxy resin systems are preferred. One example of such a system comprises 46 parts of "Epon" resin No. 562, a resinous material containing free epoxy groups and produced from bisphenol and epichlorohydrin, as one reactive component and a mixture of 46 parts "Thiokol (Registered Trade Mark) LP-2", a liquid organic polysulphide polymer, with 8 parts of 2,4,6-tri(dimethylaminomethyl) phenol, as the other reactive component. The second of these two reactive components gives off irritating vapours which slowly penetrate and pass through many of the organic films above mentioned. However, the reaction product of the two reactive components has been found to be impervious to such vapours and to the liquid components, and to provide highly suitable retaining membranes. Packages of the type illustrated in Figures 6, 10 and 12

are therefore preferred for this class of materials. In these packages it will be noted that one of the reactive components is completely, or substantially completely, surrounded by the other of the reactive components. Hence, the more volatile or migratory of the two components is placed within the inner container, and any volatilisation or migration through the membrane then results in immediate reaction with the component in the outer compartment and in re-sealing of the membrane. In the case of the packages of Figures 2, 4 and 12, this reaction may be relied upon to provide the entire membrane, as previously described.

These same considerations apply with epoxy resin compositions in which other amine activators, such as diethylene triamine, are employed, since such amine compounds are particularly penetrative of many polymeric films.

For convenience in determining the extent of mixing of the inter-reactive components it has been found desirable to include in one or the other of said components an indicator, such as an aniline dye or an inert pigment such as carbon black, so that the completeness of mixing of the two or more materials may be visually determined.

#### WHAT WE CLAIM IS:—

1. A method of electrically insulating and protecting wire splices or connections which comprises mixing liquid or plastic ingredients that will react upon being mixed to form a self-setting resinous material, within a closed multi-compartment flexible unitary package without opening the package, by the rupture of a temporary diaphragm or other barrier separating the ingredients and flexing the package to cause the ingredients to commingle within it, and applying the mixed ingredients directly to the splice or connection.

2. A method according to claim 1 wherein the package comprises a flexible flat sealed envelope of relatively strong flexible film material internally separated into two sealed compartments by a relatively weak temporary diaphragm.

3. A method according to claim 2 in which the diaphragm is a flexible film bonded at its edge areas to the envelope.

4. A method according to claim 1 or 2 in which the diaphragm consists of a rupturable, impervious membrane which is formed *in situ* by interfacial inter-reaction of the inter-reactive components.

5. A method according to claim 1 wherein the package comprises a smaller flexible sealed inner envelope having a number of sealed edges and enclosed within a larger flexible sealed outer envelope having a number of sealed edges, the two envelopes being sealed together along at least one edge.

6. A method according to claim 5 wherein the smaller envelope is rupturable and con-

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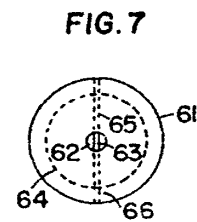
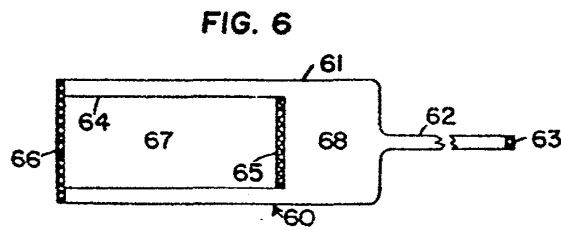
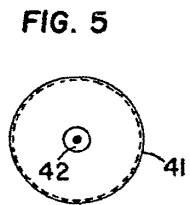
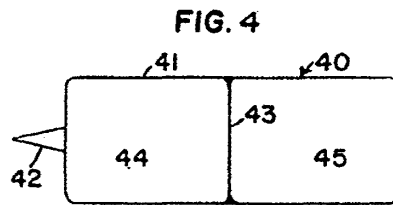
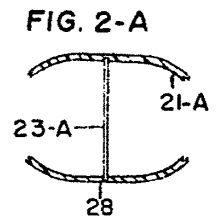
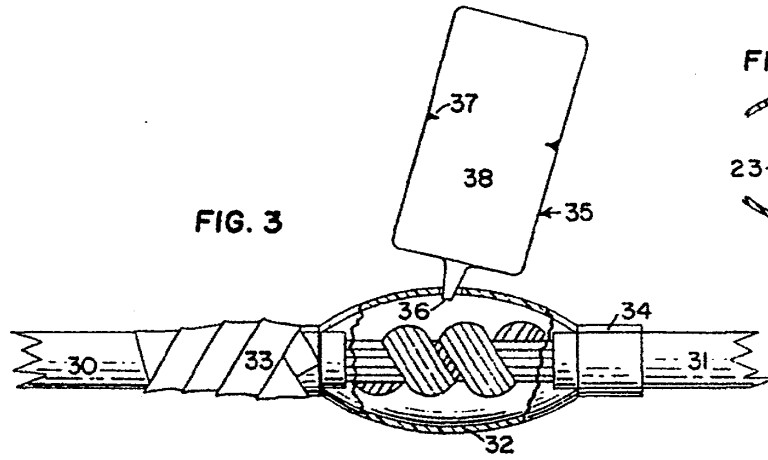
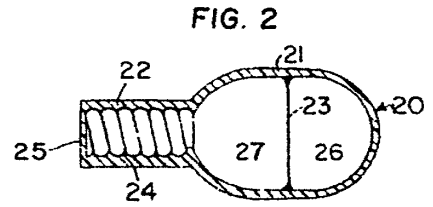
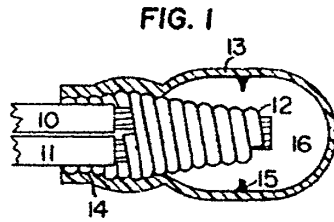
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- 5 tains a first liquid or plastic ingredient in an amount sufficient to render the envelope relatively turgid, the outer envelope containing a second liquid or plastic ingredient inter-reactive with the first ingredient in an amount sufficient to render the outer envelope relatively flaccid.
- 10 7. A method according to any of the preceding claims wherein one ingredient is a liquid epoxy resin and another is a liquid curing agent for the resin.
- 15 8. A method according to claim 7 wherein the liquid curing agent comprises an amine activator and a liquid organic polysulphide polymer.
9. A method according to any of the preceding claims in which the reactant components are differently coloured and the package is transparent.
- 20 10. A method according to any of the preceding claims wherein a splice in an electrical cable is enclosed by a close fitting shield fitted tightly to the cable near the splice area and having an opening for entry of the mixed ingredients.
- 25 11. A method of forming and applying electrical insulation material substantially as described with reference to the accompanying drawing.

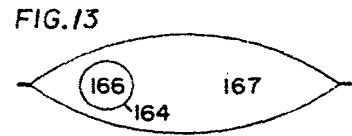
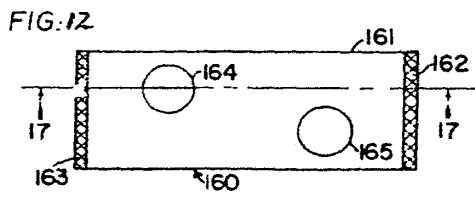
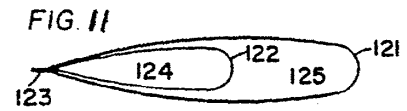
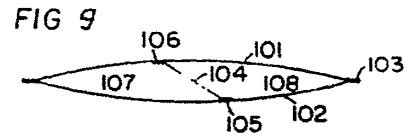
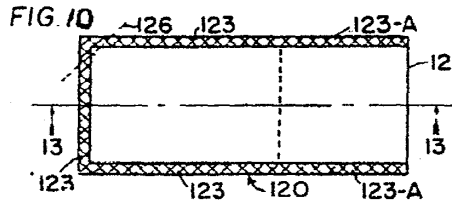
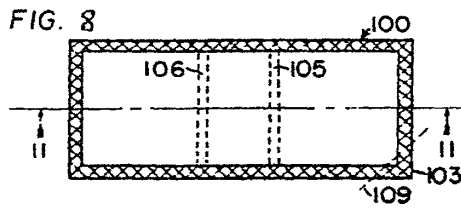
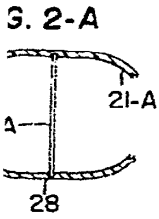
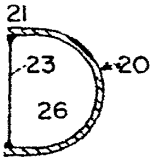
For the Applicants:  
LLOYD-WISE, BOULY & HAIG,  
Chartered Patent Agents,  
10, New Court, Lincoln's Inn,  
London, W.C.2.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press, 1960.  
Published by The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

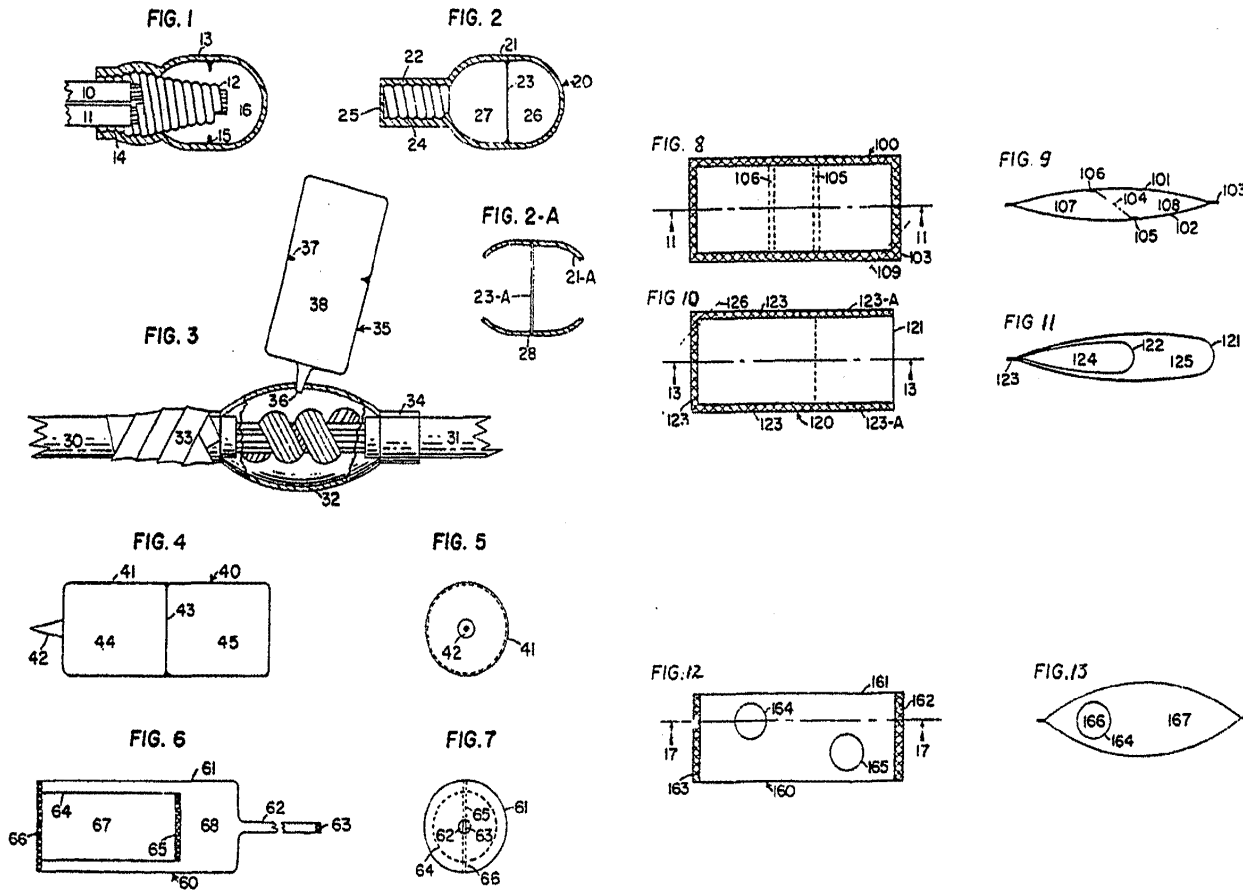




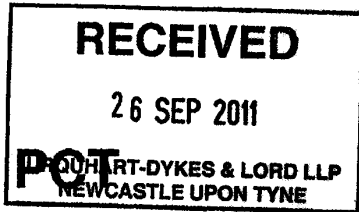
765,082 AMENDED SPECIFICATION  
 2 SHEETS This drawing is a reproduction of  
 the Original on a reduced scale.  
 SHEETS 1 & 2



765,082 AMENDED SPECIFICATION  
 2 SHEETS This drawing is a reproduction of  
 the Original on a reduced scale.  
 SHEETS 1 & 2



PATENT COOPERATION TREATY



From the INTERNATIONAL SEARCHING AUTHORITY

To:  
 Vinsome, Rex Martin  
 URQUHART-DYKES & LORD LLP  
 Cale Cross House  
 156 Pilgrim Street  
 Newcastle upon Tyne  
 Tyne and Wear NE1 6SU  
 ROYAUME UNI

NOTIFICATION OF TRANSMITTAL OF  
 THE INTERNATIONAL SEARCH REPORT AND  
 THE WRITTEN OPINION OF THE INTERNATIONAL  
 SEARCHING AUTHORITY, OR THE DECLARATION

DIARY ENTRY  
 Date: 21/2/12 Initials: [Signature]  
 (PCT Rule 4.1)

Date of mailing  
 (day/month/year) 26 September 2011 (26-09-2011)

|  |   |
|--|---|
| Applicant's or agent's file reference<br>P403856WO | <b>FOR FURTHER ACTION</b> See paragraphs 1 and 4 below                  |
| International application No.<br>PCT/GB2010/050989 | International filing date<br>(day/month/year) 14 June 2010 (14-06-2010) |
| Applicant<br>CMP PRODUCTS LIMITED                  |   |

1.  The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

**Filing of amendments and statement under Article 19:**  
 The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

**When?** The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

**Where?** Directly to the International Bureau of WIPO, 34 chemin des Colombettes  
 1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70

**For more detailed instructions, see PCT Applicant's Guide, International Phase, paragraphs 9.004 - 9.011.**

2.  The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3.  **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.


4. **Reminders**  
 The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see [www.wipo.int/pct/en/texts/time\\_limits.html](http://www.wipo.int/pct/en/texts/time_limits.html) and the PCT Applicant's Guide, National Chapters.

|  |   |
|--|---|
| Name and mailing address of the International Searching Authority<br> European Patent Office, P.B. 5818 Patentlaan 2<br>NL-2280 HV Rijswijk<br>Tel. (+31-70) 340-2040<br>Fax: (+31-70) 340-3016 | Authorized officer<br>OSAFO-GYIMAH, Lana<br>Tel: +31 (0)70 340-4745 |
|--|---|

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

|  |  |   |   |
|--|--|---|---|
| Applicant's or agent's file reference<br>P403856WO | <b>FOR FURTHER ACTION</b>                                |   | see Form PCT/ISA/220<br>as well as, where applicable, item 5 below. |
| International application No.<br>PCT/GB2010/050989 | International filing date (day/month/year)<br>14/06/2010 | (Earliest) Priority Date (day/month/year)<br>21/08/2009 |   |
| Applicant<br><br>CMP PRODUCTS LIMITED              |  |   |   |

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

the international application in the language in which it was filed

a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b.  This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6b/s(a)).

c.  With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2.  **Certain claims were found unsearchable** (See Box No. II)

3.  **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

the text is approved as submitted by the applicant

the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

the text is approved as submitted by the applicant

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 1

as suggested by the applicant

as selected by this Authority, because the applicant failed to suggest a figure

as selected by this Authority, because this figure better characterizes the invention

b.  none of the figures is to be published with the abstract

**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/GB2010/050989

| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>INV. B65D81/32 H02G15/04 H02G15/013<br>ADD.   |  |   |
|---|--|---|
| According to International Patent Classification (IPC) or to both national classification and IPC   |  |   |
| <b>B. FIELDS SEARCHED</b>   |  |   |
| Minimum documentation searched (classification system followed by classification symbols)<br>B65D H02G  |  |   |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched   |  |   |
| Electronic data base consulted during the international search (name of data base and, where practical, search terms used)<br>EPO-Internal, WPI Data  |  |   |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>   |  |   |
| Category*   | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No.   |
| Y   | EP 0 434 105 A1 (LOVINK TERBERG BV [NL])<br>26 June 1991 (1991-06-26)<br>column 3, line 57 - column 4, line 44;<br>figures 2-6     | 1-4,6-8,<br>10,11   |
| Y   | GB 2 074 395 A (BRITISH ENGINES LTD)<br>28 October 1981 (1981-10-28)<br>page 2, line 9 - page 2, line 61; figure 1                 | 1-4,6-8,<br>10,11   |
| Y   | KR 2001 0109284 A (3M INNOVATIVE<br>PROPERTIES COMPANY)<br>8 December 2001 (2001-12-08)<br>abstract                                | 1-5,8-11  |
| Y   | GB 765 082 A (MINNESOTA MINING AND<br>MANUFACTURING) 2 January 1957 (1957-01-02)<br>cited in the application<br>the whole document | 1-5,8-11  |
| <input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.  |  |   |
| * Special categories of cited documents :   |  |   |
| *A* document defining the general state of the art which is not considered to be of particular relevance<br>*E* earlier document but published on or after the international filing date<br>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>*O* document referring to an oral disclosure, use, exhibition or other means<br>*P* document published prior to the international filing date but later than the priority date claimed |  | *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.<br>*Z* document member of the same patent family |
| Date of the actual completion of the international search<br><br><p align="center">16 September 2011</p>  |  | Date of mailing of the international search report<br><br><p align="center">26/09/2011</p>  |
| Name and mailing address of the ISA/<br>European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016  |  | Authorized officer<br><br><p align="center">Bolder, Arthur</p>  |

1

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2010/050989

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date          |
|--|------------------|-------------------------|---------------------------|
| EP 0434105                             | A1               | 26-06-1991              | AT 112747 T 15-10-1994    |
|  |                  |                         | DE 69013307 D1 17-11-1994 |
|  |                  |                         | DE 69013307 T2 16-02-1995 |
|  |                  |                         | DK 0434105 T3 27-02-1995  |
|  |                  |                         | ES 2060935 T3 01-12-1994  |
|  |                  |                         | NL 8903118 A 16-07-1991   |
|  |                  |                         |                           |
| GB 2074395                             | A                | 28-10-1981              | NONE                      |
|  |                  |                         |                           |
| KR 20010109284                         | A                |                         | NONE                      |
|  |                  |                         |                           |
| GB 765082                              | A                | 02-01-1957              | NONE                      |
|  |                  |                         |                           |

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

## PCT

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY  
(PCT Rule 43bis.1)**

To:

see form PCT/ISA/220

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

|  |  |  |
|--|--|--|
| International application No.<br>PCT/GB2010/050989 | International filing date (day/month/year)<br>14.06.2010 | Priority date (day/month/year)<br>21.08.2009 |
|--|--|--|

International Patent Classification (IPC) or both national classification and IPC  
INV. B65D81/32 H02G15/04 H02G15/013

Applicant  
**CMP PRODUCTS LIMITED**

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application



2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

|   |   |  |
|---|---|--|
| <p>Name and mailing address of the ISA:</p>  <p>European Patent Office<br/>P.B. 5818 Patentiaan 2<br/>NL-2280 HV Rijswijk - Pays Bas<br/>Tel. +31 70 340 - 2040<br/>Fax: +31 70 340 - 3016</p> | <p>Date of completion of this opinion</p> <p>see form PCT/ISA/210</p> | <p>Authorized Officer</p> <p>Bolder, Arthur</p> <p>Telephone No. +31 70 340-3636</p>  |
|---|---|--|

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/GB2010/050989

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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of:
  - the international application in the language in which it was filed
  - a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2.  This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
  - a. (means)
    - on paper
    - in electronic form
  - b. (time)
    - in the international application as filed
    - together with the international application in electronic form
    - subsequently to this Authority for the purposes of search
4.  In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

---

**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

---

1. Statement

|                               |             |             |
|-------------------------------|-------------|-------------|
| Novelty (N)                   | Yes: Claims | <u>1-11</u> |
|                               | No: Claims  |             |
| Inventive step (IS)           | Yes: Claims |             |
|                               | No: Claims  | <u>1-11</u> |
| Industrial applicability (IA) | Yes: Claims | <u>1-11</u> |
|                               | No: Claims  |             |

2. Citations and explanations

**see separate sheet**



**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following documents:

- D1 EP 0 434 105 A1 (LOVINK TERBORG BV [NL]) 26 June 1991 (1991-06-26)
- D2 GB 2 074 395 A (BRITISH ENGINES LTD) 28 October 1981 (1981-10-28)
- D3 KR 2001 0109284 A (3M INNOVATIVE PROPERTIES COMPANY) 8 December 2001 (2001-12-08)
- D4 GB 765 082 A (MINNESOTA MINING AND MANUFACTURING) 2 January 1957 (1957-01-02) cited in the application

- 1 The present application does not meet the criteria of Article 33(3) PCT, because the subject-matter of claim 1 does not involve an inventive step.
- 1.1 D1 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses a filler assembly for filling a cable connection cavity, having a plurality of cores of at least one cable extending therethrough, with curable liquid material, the assembly comprising: a dispenser apparatus (19) for a curable liquid material, the apparatus comprising: a body adapted to define at least one first chamber (23) for accommodating a first component of a curable liquid material, and at least one second chamber (24) for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material; first barrier means (21) for temporarily preventing mixing of said first and second components; elongate dispenser means (17) adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and second barrier means(22) for temporarily preventing passage of said curable liquid material from the or each said second chamber to said dispenser means.
- 1.2 The subject-matter of claim 1 therefore differs from this known filler assembly in that it comprises a barrier member for restricting the extent of penetration of said curable liquid material along said cores.
- 1.3 and is therefore new.

- 1.4 The problem to be solved by the present invention may therefore be regarded as how to minimize the amount of curable liquid needed.
- 1.5 The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons: The end seal as proposed in D2 comprises a barrier member for restricting the extent of penetration of said curable liquid material along said cores. The skilled person would therefore regard it as a normal option to include this feature in the sealing assembly described in D1 in order to solve the problem posed.
- 2 The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claim 10, which therefore is also considered not inventive.
- 3 Dependent claims 2-9,11 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, see D1-D4.
- 4 Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art D1 being placed in the preamble (Rule 6.3(b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
- 5 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

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|   |   |
|---|---|
| General information                                       | For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.   |
| Amending claims under Art. 19 PCT                         | Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.   |
| Filing a demand for international preliminary examination | <p>In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/ WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT).</p> <p>If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).</p> |
| Filing informal comments                                  | After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.  |
| End of the international phase                            | At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).   |
| Relevant PCT Rules and more information                   | Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003  |

---

## Electronic Patent Application Fee Transmittal

|   |                                 |                 |               |                             |
|---|---------------------------------|-----------------|---------------|-----------------------------|
| <b>Application Number:</b>                              |                                 |                 |               |                             |
| <b>Filing Date:</b>                                     |                                 |                 |               |                             |
| <b>Title of Invention:</b>                              | FILLER ASSEMBLY FOR CABLE GLAND |                 |               |                             |
| <b>First Named Inventor/Applicant Name:</b>             | Samuel Liam PROUD               |                 |               |                             |
| <b>Filer:</b>   | John D. Franzini/Tracey Baxter  |                 |               |                             |
| <b>Attorney Docket Number:</b>                          |                                 |                 |               |                             |
| Filed as Large Entity                                   |                                 |                 |               |                             |
| <b>U.S. National Stage under 35 USC 371 Filing Fees</b> |                                 |                 |               |                             |
| <b>Description</b>                                      | <b>Fee Code</b>                 | <b>Quantity</b> | <b>Amount</b> | <b>Sub-Total in USD(\$)</b> |
| <b>Basic Filing:</b>                                    |                                 |                 |               |                             |
| National Stage Fee                                      | 1631                            | 1               | 380           | 380                         |
| Natl Stage Search Fee - Report provided                 | 1642                            | 1               | 490           | 490                         |
| National Stage Exam - all other cases                   | 1633                            | 1               | 250           | 250                         |
| <b>Pages:</b>   |                                 |                 |               |                             |
| <b>Claims:</b>  |                                 |                 |               |                             |
| <b>Miscellaneous-Filing:</b>                            |                                 |                 |               |                             |
| <b>Petition:</b>  |                                 |                 |               |                             |
| <b>Patent-Appeals-and-Interference:</b>                 |                                 |                 |               |                             |

| Description                              | Fee Code | Quantity | Amount | Sub-Total in USD(\$) |
|--|----------|----------|--------|----------------------|
| <b>Post-Allowance-and-Post-Issuance:</b> |          |          |        |                      |
| <b>Extension-of-Time:</b>                |          |          |        |                      |
| <b>Miscellaneous:</b>                    |          |          |        |                      |
| <b>Total in USD (\$)</b>                 |          |          |        | <b>1120</b>          |

## Electronic Acknowledgement Receipt

|   |                                      |
|---|--------------------------------------|
| <b>EFS ID:</b>                              | 12123416                             |
| <b>Application Number:</b>                  | 13391539                             |
| <b>International Application Number:</b>    | PCT/GB10/50989                       |
| <b>Confirmation Number:</b>                 | 6980                                 |
| <b>Title of Invention:</b>                  | FILLER ASSEMBLY FOR CABLE GLAND      |
| <b>First Named Inventor/Applicant Name:</b> | Samuel Liam PROUD                    |
| <b>Customer Number:</b>                     | 26710                                |
| <b>Filer:</b>                               | John D. Franzini/Tracey Baxter       |
| <b>Filer Authorized By:</b>                 | John D. Franzini                     |
| <b>Attorney Docket Number:</b>              |                                      |
| <b>Receipt Date:</b>                        | 21-FEB-2012                          |
| <b>Filing Date:</b>                         |                                      |
| <b>Time Stamp:</b>                          | 16:36:53                             |
| <b>Application Type:</b>                    | U.S. National Stage under 35 USC 371 |

### Payment information:

|  |                 |
|--|-----------------|
| Submitted with Payment                   | yes             |
| Payment Type                             | Deposit Account |
| Payment was successfully received in RAM | \$1120          |
| RAM confirmation Number                  | 4036            |
| Deposit Account                          | 170055          |
| Authorized User                          |                 |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

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|-----------------|----------------------|----------------------------|--|------------------|------------------|
| 1               |                      | 92025700016usnatlphase.pdf | 1116628<br>3fc2e2c2310d11cba99acbbffe22a0c6e5a56cc | yes              | 30               |

**Multipart Description/PDF files in .zip description**

| Document Description                               | Start | End |
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| Documents submitted with 371 Applications          | 1     | 3   |
| Preliminary Amendment                              | 4     | 9   |
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| 2 | Foreign Reference | kr20010109284.pdf | 63127<br>2fcb55e59882a6034bcd6c84b9e8d61e1a1cfd0c | no | 1 |
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| 5  | Foreign Reference     | 765082.pdf              | 606468                                   | no      | 8 |
|  |                       |                         | 2bc5d213c9bdd92e85300930b6ec669dd3456471 |         |   |
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| 6  | Non Patent Literature | 92025700016PCTISRWO.PDF | 454638                                   | no      | 9 |
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|  |                       |                         | eaad4e8f9fc8fd6497f10b5fe3b0cf28fbc57b   |         |   |
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| <b>TRANSMITTAL LETTER TO THE UNITED STATES<br/>DESIGNATED/ELECTED OFFICE (DO/EO/US)<br/>CONCERNING A SUBMISSION UNDER 35 U.S.C. 371</b>   |  | ATTORNEY'S DOCKET NUMBER<br><b>920257.00016</b>    |
|   |  | U.S. APPLICATION NO. (If known, see 37 CFR 1.5)    |
| INTERNATIONAL APPLICATION NO.<br>PCT/GB2010/050989  | INTERNATIONAL FILING DATE<br>14 June 2010 (14.06.10) | PRIORITY DATE CLAIMED<br>21 August 2009 (21.08.09) |
| TITLE OF INVENTION<br>FILLER ASSEMBLY FOR CABLE GLAND   |  |  |
| APPLICANT(S) FOR DO/EO/US<br>PROUD, Samuel Liam   |  |  |
| Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:   |  |  |
| <p>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a submission under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a submission under 35 U.S.C. 371.</p> <p>3. <input type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.</p> <p>4. <input type="checkbox"/> The US has been elected (Article 31).</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p style="padding-left: 20px;">a. <input checked="" type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau).</p> <p style="padding-left: 20px;">b. <input type="checkbox"/> has been communicated by the International Bureau.</p> <p style="padding-left: 20px;">c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p style="padding-left: 20px;">a. <input type="checkbox"/> is attached hereto.</p> <p style="padding-left: 20px;">b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4).</p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p style="padding-left: 20px;">a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).</p> <p style="padding-left: 20px;">b. <input type="checkbox"/> have been communicated by the International Bureau.</p> <p style="padding-left: 20px;">c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p style="padding-left: 20px;">d. <input checked="" type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p><b>Items 11 to 20 below concern document(s) or information included:</b></p> <p>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A preliminary amendment.</p> <p>14. <input type="checkbox"/> An Application Data Sheet under 37 CFR 1.76.</p> <p>15. <input type="checkbox"/> A substitute specification.</p> <p>16. <input type="checkbox"/> A power of attorney and/or change of address letter.</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 37 CFR 1.821- 1.825.</p> <p>18. <input type="checkbox"/> A second copy of the published International Application under 35 U.S.C. 154(d)(4).</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> |  |  |

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| U.S. APPLICATION NO. (if known, see 37 CFR 1.5)   | INTERNATIONAL APPLICATION NO.<br>PCT/GB2010/050989 | ATTORNEY'S DOCKET NUMBER<br>920257.00016 |
| 20. Other items or information:   |  |  |
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 John D. Franzini  
 \_\_\_\_\_  
 NAME  
 31,356  
 \_\_\_\_\_  
 REGISTRATION NUMBER

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: PROUD, Samuel Liam  
Serial No.: Not Yet Assigned  
I.A. Filing Date: 14 June 2010 (14.06.10)  
Priority Date: 21 August 2009 (21.08.09)  
PCT Appl. No.: PCT/GB2010/050989  
Title: FILLER ASSEMBLY FOR CALBE GLAND  
Docket: 920257.00016

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Alexandria, VA 22313-1450

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**PRELIMINARY AMENDMENT**

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Dear Sir:

**Amendments to the Specification** begin on page 2.

**Amendments to the Claims** begin on page 3.

**Remarks** are found on page 6.

**AMENDMENTS TO THE SPECIFICATION:**

Please add the following paragraph after the title on Page 1 of the specification:

**CROSS-REFERENCE TO RELATED APPLICATIONS**

This application claims priority to PCT International Application No. PCT/GB2010/050989 filed on June 14, 2010, which claims priority to European Patent Application No. 09168430.8 filed on August 21, 2009, European Patent Application No. 09168429.0 filed on August 21, 2009, Great Britain Patent Application 1004216.6 filed on March 15, 2010 and Great Britain Patent Application 1009450.6 filed on June 7, 2010, all of which are fully incorporated by reference herein.

## AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions of claims in the application.

1. (Currently Amended) A filler assembly for filling a cable gland, having a plurality of cores of at least one cable extending therethrough, with curable liquid material, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

at least one first barrier apparatus ~~means~~ for temporarily preventing mixing of said first and second components;

at least one elongate dispenser apparatus ~~means~~ adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

at least one second barrier apparatus ~~means~~ for temporarily preventing passage of said curable liquid material from the or each said second chamber to at least one said dispenser apparatus ; and

(b) at least one barrier member for restricting the extent of penetration of said curable liquid material along said cores.

2. (Original) -An assembly according to claim 1, wherein said body is flexible.

3. (Currently Amended) An assembly according to claim 1 ~~or 2~~, wherein at least one said ~~the first and/or second~~ barrier apparatus ~~means~~ comprises at least one releasable clamp.

4. (Currently Amended) An assembly according to ~~any one of the preceding claims~~ claim 1, further comprising a first component of a curable liquid material in at least one said first

chamber, and a second component of said curable liquid material in at least one said second chamber.

5. (Original) An assembly according to claim 5, wherein the curable liquid material is adapted to change ~~colour~~ color as a result of curing thereof.
6. (Currently Amended) An assembly according to ~~any one of the preceding claims~~ claim 1, further comprising a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.
7. (Original) An assembly according to claim 6, wherein the cover member is adapted to prevent curable liquid material from penetrating an end face of the cable gland.
8. (Currently Amended) An assembly according to ~~any one of the preceding claims~~ claim 1, wherein at least one said barrier member comprises a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.
9. (Currently Amended) An assembly according to ~~any one of the preceding claims~~ claim 1, wherein at least one said barrier member has a respective tapering portion.
10. (Currently Amended) A method of filling a cable gland with curable liquid material by means of an assembly according to ~~any one of the preceding claims~~ claim 1, the method comprising:  
  
locating at least one said barrier member in the cable gland; and  
  
locating an outlet of at least one said dispenser apparatus in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.
11. (Original) A method according to claim 10, wherein the step of locating at least one said barrier member in the cable gland comprises locating at least one said barrier member around at least one said core of at least one said cable.

12. (New) An assembly according to claim 1, wherein at least one said second barrier apparatus comprises at least one releasable clamp.



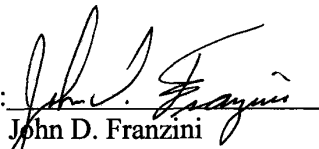
**REMARKS**

Please enter these amendments prior to examination and before the filing fees are calculated.

Although no additional fees are believed due, other than authorized on the accompanying fee sheet, if an additional fee is deemed due, please charge any additional fees due to deposit account no. 17-0055.

Respectfully submitted,

Date: 21 February 2012

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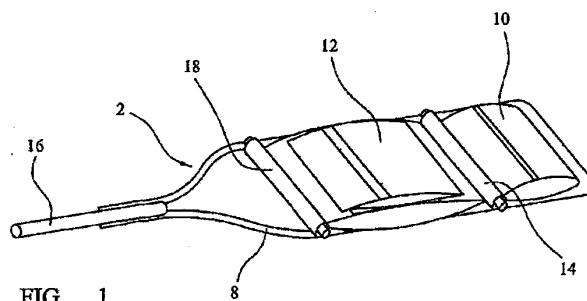
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- (71) Applicant (for all designated States except US): **CMP PRODUCTS LIMITED** [GB/GB]; 36 Nelson Way, Nelson Park East, Cramlington, Northumberland NE23 1WH (GB).
- (72) Inventor; and  
(75) Inventor/Applicant (for US only): **PROUD, Samuel Liam** [GB/GB]; 39 Bluebell Dene, Newcastle upon Tyne, Tyne & Wear NE5 4DF (GB).
- (74) Agent: **VINSOME, Rex Martin**; Urquhart-Dykes & Lord LLP, Cale Cross House, 156 Pilgrim Street, Newcastle Upon Tyne, Tyne & Wear NE1 6SU (GB).
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(54) Title: FILLER ASSEMBLY FOR CABLE GLAND



(57) Abstract: A dispenser apparatus (2) for a curable liquid material is disclosed. The apparatus comprises a flexible bag (8) defining a first compartment (10) for accommodating a first component of a curable liquid material, and a second compartment (12) for accommodating a second component of the curable liquid material and adapted to communicate with the first chamber to enable mixing of the first and second components to initiate curing of the curable liquid material. A first clamp (14) temporarily prevents mixing of the first and second components, and an elongate nozzle (16) communicates with the second compartment to dispense the mixed curable liquid material therefrom. A second clamp (18) temporarily prevents passage of the curable liquid material from the second compartment to the nozzle.

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FILLER ASSEMBLY FOR CABLE GLAND

The present invention relates to a filler assembly for cable glands and relates particularly, but not exclusively, to such a filler assembly for filling cable glands for use in hazardous areas.

Many cable glands for use in connecting a cable to an enclosure in hazardous areas need to be filled with a compound which provides a barrier against the effects of an explosion occurring within the enclosure to which the cable gland is attached. The barrier is typically formed from a two-part clay-filled epoxy compound. The two component parts of the compound need to be thoroughly mixed with each other prior to fitting into the gland, and the resulting putty like material needs to be packed between the individual conductors in the cable. Such an arrangement is disclosed in GB 2258350.

This known arrangement suffers from a number of drawbacks. Firstly, the cure time of the putty like material is chosen to be relatively long, in order to enable it to be manipulated into the spaces between the individual conductors before curing becomes advanced. As a result, the filled cable assembly must be left undisturbed for a significant period, usually several hours, especially if mixed at low temperatures. Also, the components of the filler material sometimes contain hazardous materials which become harmless when the filler material is mixed. Persons mixing the components of the putty like filler material may come into contact with these hazardous materials during mixing, and air can become trapped within the cable gland by the filler material which may cause the barrier formed by the filler

-2-

material to fail in the event of an explosion. Filling of the cable gland is also relatively difficult, especially in the case of small cable glands.

GB 765082 discloses an arrangement for insulating a splice between two stranded connectors in which resinous material is introduced from a capsule having an elongate tip. However, this arrangement suffers from the drawback that it is not suitable for filling cable glands, since the introduction of a material which is sufficiently fluid to penetrate between the individual conductors of a cable would cause material to flow along the conductors along the interior of the cable, which would prevent the cable gland from being sufficiently filled to expel all of the air from the cable gland to avoid air voids.

Preferred embodiments of the present invention seek to overcome one or more of the above disadvantages of the prior art.

According to an aspect of the present invention, there is provided a filler assembly for filling a cable gland, having a plurality of cores of at least one cable extending therethrough, with curable liquid material, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable

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mixing of said first and second components to initiate curing of said curable liquid material;

first barrier means for temporarily preventing mixing of said first and second components;

elongate dispenser means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

second barrier means for temporarily preventing passage of said curable liquid material from the or each said second chamber to said dispenser means; and

(b) at least one barrier member for restricting the extent of penetration of said curable liquid material along said cores.

By providing elongate dispenser means to dispense mixed curable liquid material and second barrier means for temporarily preventing passage of the curable liquid material to said dispenser means, this provides the advantage that the first and second components of the curable liquid material can be mixed in a sealed container comprising the first and second compartments, thus enabling the user to avoid coming into contact with harmful components of the curable liquid material. As a result of the provision of elongate dispenser means, dispensing of the curable liquid can be more carefully controlled, as a result of which less viscous and faster curing liquid material can be used than in the prior art. This therefore provides the advantage of enabling more rapid formation of a filled cable gland incorporating the material, while also allowing the liquid material to be introduced into the cable gland in such a way that the air is expelled from the cable gland to avoid air voids, which could lead to failure of the cable gland in the event of an explosion. In

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addition, with the present invention, the curable material can be dispensed into the assembled gland, i.e. the cable gland can be filled with the conductors of the cable in a connected state, as a result of which the electrical integrity of the joint can be ensured, whereas the putty like compound of the known arrangement must be moulded around the conductors of the cable with the gland disassembled, as a result of which the cable cores can not be electrically connected. The provision of at least one barrier member for restricting the extent of penetration of said curable liquid material along the cable cores provides the advantage of enabling highly flowable curable liquid material to be used, while also enabling filling of the cable gland.

The body may be flexible.

This provides the advantage of making the apparatus easier and less expensive to manufacture.

The first and/or second barrier means may comprise at least one releasable clamp.

The assembly may further comprise a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

The curable liquid material may be adapted to change colour as a result of curing thereof.

This provides the advantage of providing a visual indicator to the user when the cable gland filling process is complete.

The assembly may further comprise a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

The cover member may be adapted to prevent curable liquid material from penetrating an end face of the cable gland.

At least one said barrier member may comprise a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.

At least one said barrier member may have a respective tapering portion.

According to another aspect of the present invention, there is provided a method of filling a cable gland with curable liquid material by means of an assembly according to any one of the preceding claims, the method comprising:

locating at least one said barrier member in the cable gland; and

locating an outlet of said dispenser means in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.

The step of locating at least one said barrier member in the cable gland may comprise locating at least one said

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barrier member around at least one said core of at least one said cable.

A preferred embodiment of the invention will now be described, by way of example only and not in any limitative sense, with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a dispensing apparatus embodying the present invention;

Figure 2 is a partially cut away perspective view of a cable gland having a filler formed using the apparatus of Figure 1; and

Figure 3 is a cross sectional view of the filled cable gland of Figure 2 with a thread protector in place.

Referring to Figure 1, a dispenser apparatus 2 embodying the present invention and for use in filling a cable gland 4 (Figure 2) with curable liquid material 6 comprises a body of suitable transparent flexible plastics material defining a flexible bag 8 having a first compartment 10 for accommodating a first component of a liquid curable material 6, and a second compartment 12 for accommodating a second component of the material 6. A first clamp 14 temporarily separates the first compartment 10 and second compartment 12 to thereby prevent mixing of the first and second components of the material 6. The first and second components are coloured differently (for example blue and yellow) so that thorough mixing of the first and second components produces a green liquid, thereby providing a visual indication when thorough mixing of the first and second components has occurred. Mixing of the first and



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second components together causes gelling of the material and initiates curing of the curable liquid material 6.

The dispenser apparatus 2 is also provided with an elongate hollow nozzle 16 extending from the second compartment 12 such that dispensing of the mixed curable liquid material can be carefully controlled. In particular, the nozzle 16 can be inserted a considerable distance into the cable gland 4 and between individual conductors 20 of the core of a cable 22 attached to the cable gland 4 (Figure 2) so that the liquid material 6 can be highly flowable and fast-curing, as a result of which the cable gland 4 can be rapidly filled and air entrapment by the liquid material 6 minimised. A second clamp 18 temporarily prevents material flowing from the second compartment 12 into the nozzle 16, so that dispensing of the material 6 can be prevented until thorough mixing together of the first and second components has occurred.

The flexible bag 8 is formed from two sheets of material welded together along all but one of their edges to form a bag having an open mouth, which is then mounted to the nozzle 16. The second clamp 18 is then mounted to the bag adjacent to the nozzle 16, and the second component of the material 6 is dispensed into the second compartment 12. The first clamp 14 is then mounted to the bag to seal the second component in the second compartment 12, and the first component is then dispensed into the first compartment 10. The open edge of the bag is then sealed to seal the first component in the first compartment 10.

Referring to Figures 2 and 3, the cable gland 4 to be filled by means of the dispenser apparatus 2 of Figure 1

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comprises a threaded outer connector 24 for threaded connection to an enclosure (not shown) and a compound tube 26 rotatably mounted within the outer connector 24. A cable connector 28 is mounted to the end of the cable 22 and is connected to the outer connector 24 by means of cooperating screw threads (not shown).

A ring 30 abuts the cable connector 28 and a flexible seal 32 is located around the inner conductors 20 of the cable 22 and compressed between the compound tube 26 and ring 30 for limiting the extent of penetration of curable material 6 into the cable gland 4 before curing of the curable material 6. The flexible seal 32 comprises a generally frusto-conical body of elastomeric material having an aperture (not shown) therethrough for engaging the central conductors 20 of the cable 22. The aperture in the seal 32 is sized such that it stretches to pass around the conductors 20 to tightly engage the conductors 20 to form a reasonably effective barrier to passage of the material 6 along the space defined between the conductors 20 and the compound tube 26.

Referring to Figure 3, a thread protector 34 formed of elastomeric material such as rubber is located over the external screw thread of the outer connector 24 of the cable gland 4 prior to filling of the cable gland with curable material 6. The thread protector 34 has a hollow rim 36 for catching excess curable material 6 which may flow out of end 40 of the cable gland 4 during the filling procedure, and an inner circular rim 38 which prevents penetration of curable material 6 into the gap between the outer connector 24 and the compound tube 26. This ensures that the compound tube 24

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complete with cable connectors 20 can be removed from the outer connector 24 after curing of the material 6.

The process of filling the cable gland 4 of Figures 2 and 3 by means of the dispenser apparatus 2 of Figure 1 will now be described.

In order to fill the core of the cable gland 4 with curable material, the flexible seal 32 initially placed over the core conductors 20 of the cable 22 so that the seal 32 tightly grips the conductors 20. The outer connector 24 with compound tube 26 are then mounted to the ring 30 and cable connector 28 to compress the seal 32 between the ring 30 and compound tube 26. As a result, the flexible seal 32 acts as a barrier to penetration of the curable liquid material 6 into the interior of the cable gland 4.

The first clamp 14 is then removed from the dispenser apparatus 2 and the second clamp 18 left in place, to enable thorough mixing of the first and second components of the curable liquid material 6. The first and second components are coloured blue and yellow respectively, a result of which the curable liquid material 6 is bright green when it is thoroughly mixed. The second clamp 18 is then removed, and the outlet of the nozzle 16 is placed at a location near the seal 32. The liquid material 6 is then dispensed through the nozzle 16 into the space between the conductors 20 of the cable 22 and into the space around the conductors 20 inside the compound tube 26 of the cable gland 4, where its movement along the axis of the cable gland 4 is restricted by the flexible seal 32. The location of the outlet of the nozzle 16 near the seal 32 causes air to be expelled from the cable gland when the curable liquid material 6 is dispensed from

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the nozzle 16. The seal 32 provides a sufficient barrier to penetration of the material 6 to hold back the curable material until it begins to gel and support itself. At the same time, the thread protector 34 protects the external thread of the outer connector 24 from excess curable material and prevents penetration of the liquid curable material between the outer connector 24 and the compound tube 26. The material 6 is arranged to change colour to dark green when it is cured, so that a visual indication is provided when the curing process is completed.

It will be appreciated by persons skilled in the art that the above embodiment has been described by way of example only, and not in any limitative sense, and that various alterations and modifications are possible without departure from the scope of the invention as defined by the appended claims.

## CLAIMS

1. A filler assembly for filling a cable gland, having a plurality of cores of at least one cable extending therethrough, with curable liquid material, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

first barrier means for temporarily preventing mixing of said first and second components;

elongate dispenser means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

second barrier means for temporarily preventing passage of said curable liquid material from the or each said second chamber to said dispenser means; and

(b) at least one barrier member for restricting the extent of penetration of said curable liquid material along said cores.

2. An assembly according to claim 1, wherein said body is flexible.

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3. An assembly according to claim 1 or 2, wherein the first and/or second barrier means comprises at least one releasable clamp.
4. An assembly according to any one of the preceding claims, further comprising a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.
5. An assembly according to claim 5, wherein the curable liquid material is adapted to change colour as a result of curing thereof.
6. An assembly according to any one of the preceding claims, further comprising a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.
7. An assembly according to claim 6, wherein the cover member is adapted to prevent curable liquid material from penetrating an end face of the cable gland.
8. An assembly according to any one of the preceding claims, wherein at least one said barrier member comprises a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.
9. An assembly according to any one of the preceding claims, wherein at least one said barrier member has a respective tapering portion.

10. A method of filling a cable gland with curable liquid material by means of an assembly according to any one of the preceding claims, the method comprising:

locating at least one said barrier member in the cable gland;  
and

locating an outlet of said dispenser means in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.

11. A method according to claim 10, wherein the step of locating at least one said barrier member in the cable gland comprises locating at least one said barrier member around at least one said core of at least one said cable.

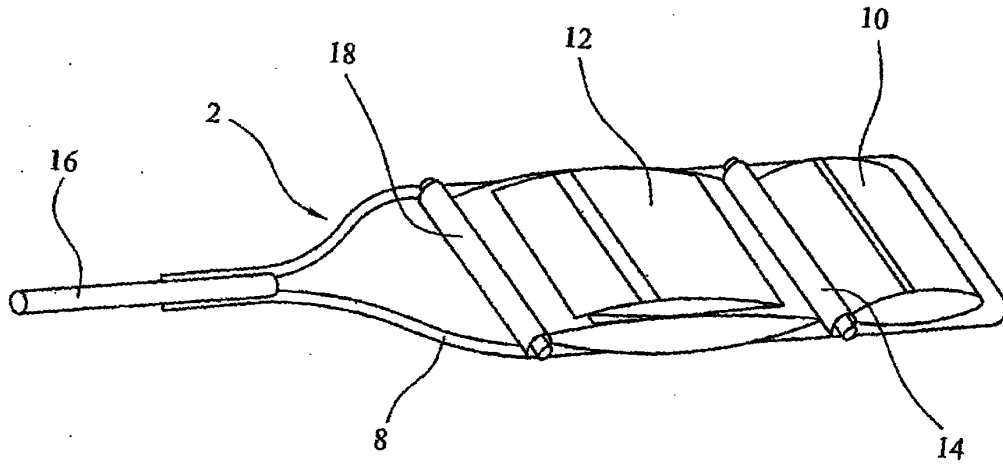


FIG. 1

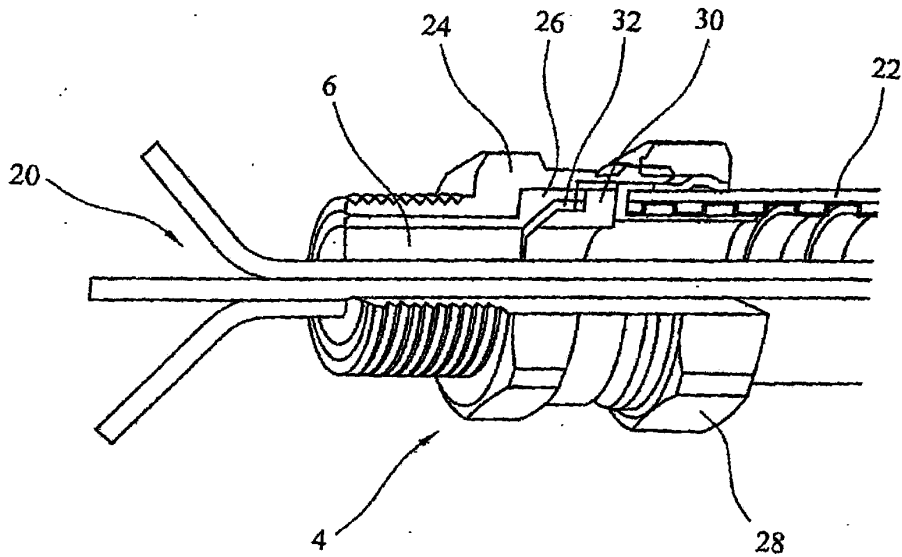


FIG. 2



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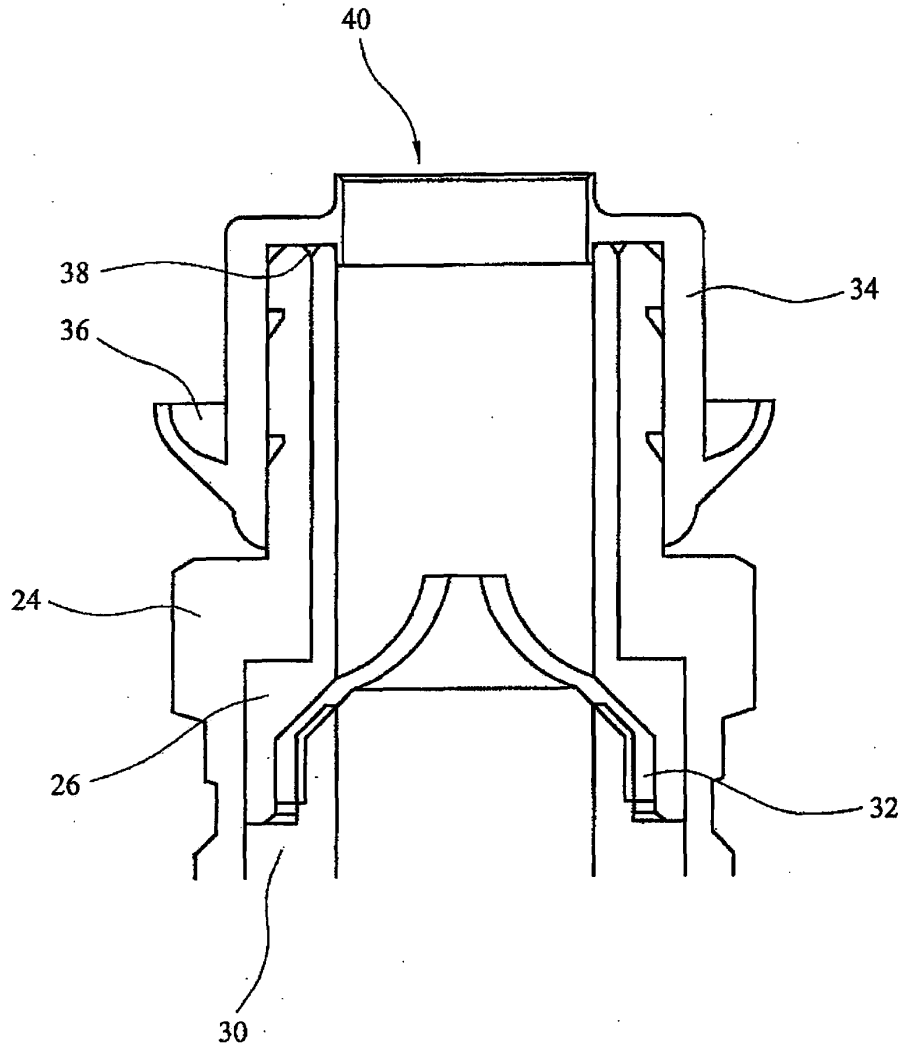


FIG. 3

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: PROUD, Samuel Liam  
Serial No.: Not Yet Assigned  
I.A. Filing Date: 14 June 2010 (14.06.10)  
Priority Date: 21 August 2009 (21.08.09)  
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Docket: 920257.00016

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**INFORMATION DISCLOSURE STATEMENT**

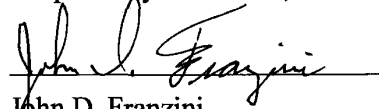
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Dear Sir:

The accompanying form PTO-1449, listing documents to be considered with respect to the subject patent application, is being submitted in compliance with 37 CFR §1.97 and §1.98. A copy of each document, which is not a U.S. patent, is enclosed.

This paper is submitted in accordance with 37 CFR §1.97(b) and a fee is not required for consideration of these documents.

Respectfully Submitted,



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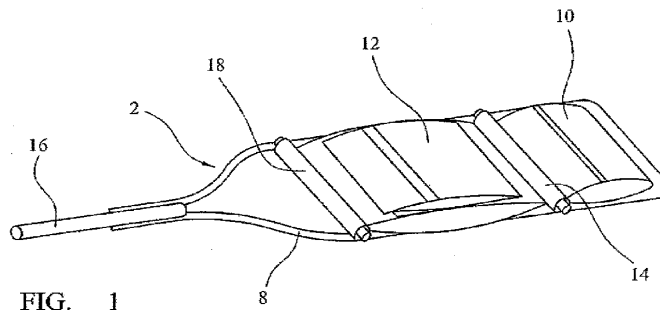
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(54) **Title:** FILLER ASSEMBLY FOR CABLE GLAND



(57) **Abstract:** A dispenser apparatus (2) for a curable liquid material is disclosed. The apparatus comprises a flexible bag (8) defining a first compartment (10) for accommodating a first component of a curable liquid material, and a second compartment (12) for accommodating a second component of the curable liquid material and adapted to communicate with the first chamber to enable mixing of the first and second components to initiate curing of the curable liquid material. A first clamp (14) temporarily prevents mixing of the first and second components, and an elongate nozzle (16) communicates with the second compartment to dispense the mixed curable liquid material therefrom. A second clamp (18) temporarily prevents passage of the curable liquid material from the second compartment to the nozzle.

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FILLER ASSEMBLY FOR CABLE GLAND

The present invention relates to a filler assembly for cable glands and relates particularly, but not exclusively, to such a filler assembly for filling cable glands for use in hazardous areas.

Many cable glands for use in connecting a cable to an enclosure in hazardous areas need to be filled with a compound which provides a barrier against the effects of an explosion occurring within the enclosure to which the cable gland is attached. The barrier is typically formed from a two-part clay-filled epoxy compound. The two component parts of the compound need to be thoroughly mixed with each other prior to fitting into the gland, and the resulting putty like material needs to be packed between the individual conductors in the cable. Such an arrangement is disclosed in GB 2258350.

This known arrangement suffers from a number of drawbacks. Firstly, the cure time of the putty like material is chosen to be relatively long, in order to enable it to be manipulated into the spaces between the individual conductors before curing becomes advanced. As a result, the filled cable assembly must be left undisturbed for a significant period, usually several hours, especially if mixed at low temperatures. Also, the components of the filler material sometimes contain hazardous materials which become harmless when the filler material is mixed. Persons mixing the components of the putty like filler material may come into contact with these hazardous materials during mixing, and air can become trapped within the cable gland by the filler material which may cause the barrier formed by the filler

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material to fail in the event of an explosion. Filling of the cable gland is also relatively difficult, especially in the case of small cable glands.

GB 765082 discloses an arrangement for insulating a splice between two stranded connectors in which resinous material is introduced from a capsule having an elongate tip. However, this arrangement suffers from the drawback that it is not suitable for filling cable glands, since the introduction of a material which is sufficiently fluid to penetrate between the individual conductors of a cable would cause material to flow along the conductors along the interior of the cable, which would prevent the cable gland from being sufficiently filled to expel all of the air from the cable gland to avoid air voids.

Preferred embodiments of the present invention seek to overcome one or more of the above disadvantages of the prior art.

According to an aspect of the present invention, there is provided a filler assembly for filling a cable gland, having a plurality of cores of at least one cable extending therethrough, with curable liquid material, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable

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mixing of said first and second components to initiate curing of said curable liquid material;

first barrier means for temporarily preventing mixing of said first and second components;

elongate dispenser means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

second barrier means for temporarily preventing passage of said curable liquid material from the or each said second chamber to said dispenser means; and

(b) at least one barrier member for restricting the extent of penetration of said curable liquid material along said cores.

By providing elongate dispenser means to dispense mixed curable liquid material and second barrier means for temporarily preventing passage of the curable liquid material to said dispenser means, this provides the advantage that the first and second components of the curable liquid material can be mixed in a sealed container comprising the first and second compartments, thus enabling the user to avoid coming into contact with harmful components of the curable liquid material. As a result of the provision of elongate dispenser means, dispensing of the curable liquid can be more carefully controlled, as a result of which less viscous and faster curing liquid material can be used than in the prior art. This therefore provides the advantage of enabling more rapid formation of a filled cable gland incorporating the material, while also allowing the liquid material to be introduced into the cable gland in such a way that the air is expelled from the cable gland to avoid air voids, which could lead to failure of the cable gland in the event of an explosion. In

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addition, with the present invention, the curable material can be dispensed into the assembled gland, i.e. the cable gland can be filled with the conductors of the cable in a connected state, as a result of which the electrical integrity of the joint can be ensured, whereas the putty like compound of the known arrangement must be moulded around the conductors of the cable with the gland disassembled, as a result of which the cable cores can not be electrically connected. The provision of at least one barrier member for restricting the extent of penetration of said curable liquid material along the cable cores provides the advantage of enabling highly flowable curable liquid material to be used, while also enabling filling of the cable gland.

The body may be flexible.

This provides the advantage of making the apparatus easier and less expensive to manufacture.

The first and/or second barrier means may comprise at least one releasable clamp.

The assembly may further comprise a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

The curable liquid material may be adapted to change colour as a result of curing thereof.

This provides the advantage of providing a visual indicator to the user when the cable gland filling process is complete.

The assembly may further comprise a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

The cover member may be adapted to prevent curable liquid material from penetrating an end face of the cable gland.

At least one said barrier member may comprise a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.

At least one said barrier member may have a respective tapering portion.

According to another aspect of the present invention, there is provided a method of filling a cable gland with curable liquid material by means of an assembly according to any one of the preceding claims, the method comprising:

locating at least one said barrier member in the cable gland; and

locating an outlet of said dispenser means in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.

The step of locating at least one said barrier member in the cable gland may comprise locating at least one said



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barrier member around at least one said core of at least one said cable.

A preferred embodiment of the invention will now be described, by way of example only and not in any limitative sense, with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a dispensing apparatus embodying the present invention;

Figure 2 is a partially cut away perspective view of a cable gland having a filler formed using the apparatus of Figure 1; and

Figure 3 is a cross sectional view of the filled cable gland of Figure 2 with a thread protector in place.

Referring to Figure 1, a dispenser apparatus 2 embodying the present invention and for use in filling a cable gland 4 (Figure 2) with curable liquid material 6 comprises a body of suitable transparent flexible plastics material defining a flexible bag 8 having a first compartment 10 for accommodating a first component of a liquid curable material 6, and a second compartment 12 for accommodating a second component of the material 6. A first clamp 14 temporarily separates the first compartment 10 and second compartment 12 to thereby prevent mixing of the first and second components of the material 6. The first and second components are coloured differently (for example blue and yellow) so that thorough mixing of the first and second components produces a green liquid, thereby providing a visual indication when thorough mixing of the first and second components has occurred. Mixing of the first and

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second components together causes gelling of the material and initiates curing of the curable liquid material 6.

The dispenser apparatus 2 is also provided with an elongate hollow nozzle 16 extending from the second compartment 12 such that dispensing of the mixed curable liquid material can be carefully controlled. In particular, the nozzle 16 can be inserted a considerable distance into the cable gland 4 and between individual conductors 20 of the core of a cable 22 attached to the cable gland 4 (Figure 2) so that the liquid material 6 can be highly flowable and fast-curing, as a result of which the cable gland 4 can be rapidly filled and air entrapment by the liquid material 6 minimised. A second clamp 18 temporarily prevents material flowing from the second compartment 12 into the nozzle 16, so that dispensing of the material 6 can be prevented until thorough mixing together of the first and second components has occurred.

The flexible bag 8 is formed from two sheets of material welded together along all but one of their edges to form a bag having an open mouth, which is then mounted to the nozzle 16. The second clamp 18 is then mounted to the bag adjacent to the nozzle 16, and the second component of the material 6 is dispensed into the second compartment 12. The first clamp 14 is then mounted to the bag to seal the second component in the second compartment 12, and the first component is then dispensed into the first compartment 10. The open edge of the bag is then sealed to seal the first component in the first compartment 10.

Referring to Figures 2 and 3, the cable gland 4 to be filled by means of the dispenser apparatus 2 of Figure 1

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comprises a threaded outer connector 24 for threaded connection to an enclosure (not shown) and a compound tube 26 rotatably mounted within the outer connector 24. A cable connector 28 is mounted to the end of the cable 22 and is connected to the outer connector 24 by means of cooperating screw threads (not shown).

A ring 30 abuts the cable connector 28 and a flexible seal 32 is located around the inner conductors 20 of the cable 22 and compressed between the compound tube 26 and ring 30 for limiting the extent of penetration of curable material 6 into the cable gland 4 before curing of the curable material 6. The flexible seal 32 comprises a generally frusto-conical body of elastomeric material having an aperture (not shown) therethrough for engaging the central conductors 20 of the cable 22. The aperture in the seal 32 is sized such that it stretches to pass around the conductors 20 to tightly engage the conductors 20 to form a reasonably effective barrier to passage of the material 6 along the space defined between the conductors 20 and the compound tube 26.

Referring to Figure 3, a thread protector 34 formed of elastomeric material such as rubber is located over the external screw thread of the outer connector 24 of the cable gland 4 prior to filling of the cable gland with curable material 6. The thread protector 34 has a hollow rim 36 for catching excess curable material 6 which may flow out of end 40 of the cable gland 4 during the filling procedure, and an inner circular rim 38 which prevents penetration of curable material 6 into the gap between the outer connector 24 and the compound tube 26. This ensures that the compound tube 24

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complete with cable connectors 20 can be removed from the outer connector 24 after curing of the material 6.

The process of filling the cable gland 4 of Figures 2 and 3 by means of the dispenser apparatus 2 of Figure 1 will now be described.

In order to fill the core of the cable gland 4 with curable material, the flexible seal 32 initially placed over the core conductors 20 of the cable 22 so that the seal 32 tightly grips the conductors 20. The outer connector 24 with compound tube 26 are then mounted to the ring 30 and cable connector 28 to compress the seal 32 between the ring 30 and compound tube 26. As a result, the flexible seal 32 acts as a barrier to penetration of the curable liquid material 6 into the interior of the cable gland 4.

The first clamp 14 is then removed from the dispenser apparatus 2 and the second clamp 18 left in place, to enable thorough mixing of the first and second components of the curable liquid material 6. The first and second components are coloured blue and yellow respectively, a result of which the curable liquid material 6 is bright green when it is thoroughly mixed. The second clamp 18 is then removed, and the outlet of the nozzle 16 is placed at a location near the seal 32. The liquid material 6 is then dispensed through the nozzle 16 into the space between the conductors 20 of the cable 22 and into the space around the conductors 20 inside the compound tube 26 of the cable gland 4, where its movement along the axis of the cable gland 4 is restricted by the flexible seal 32. The location of the outlet of the nozzle 16 near the seal 32 causes air to be expelled from the cable gland when the curable liquid material 6 is dispensed from

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the nozzle 16. The seal 32 provides a sufficient barrier to penetration of the material 6 to hold back the curable material until it begins to gel and support itself. At the same time, the thread protector 34 protects the external thread of the outer connector 24 from excess curable material and prevents penetration of the liquid curable material between the outer connector 24 and the compound tube 26. The material 6 is arranged to change colour to dark green when it is cured, so that a visual indication is provided when the curing process is completed.

It will be appreciated by persons skilled in the art that the above embodiment has been described by way of example only, and not in any limitative sense, and that various alterations and modifications are possible without departure from the scope of the invention as defined by the appended claims.

## CLAIMS

1. A filler assembly for filling a cable gland, having a plurality of cores of at least one cable extending therethrough, with curable liquid material, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

first barrier means for temporarily preventing mixing of said first and second components;

elongate dispenser means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

second barrier means for temporarily preventing passage of said curable liquid material from the or each said second chamber to said dispenser means; and

(b) at least one barrier member for restricting the extent of penetration of said curable liquid material along said cores.

2. An assembly according to claim 1, wherein said body is flexible.

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3. An assembly according to claim 1 or 2, wherein the first and/or second barrier means comprises at least one releasable clamp.

4. An assembly according to any one of the preceding claims, further comprising a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

5. An assembly according to claim 5, wherein the curable liquid material is adapted to change colour as a result of curing thereof.

6. An assembly according to any one of the preceding claims, further comprising a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

7. An assembly according to claim 6, wherein the cover member is adapted to prevent curable liquid material from penetrating an end face of the cable gland.

8. An assembly according to any one of the preceding claims, wherein at least one said barrier member comprises a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.

9. An assembly according to any one of the preceding claims, wherein at least one said barrier member has a respective tapering portion.

-13-

10. A method of filling a cable gland with curable liquid material by means of an assembly according to any one of the preceding claims, the method comprising:

locating at least one said barrier member in the cable gland;  
and

locating an outlet of said dispenser means in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.

11. A method according to claim 10, wherein the step of locating at least one said barrier member in the cable gland comprises locating at least one said barrier member around at least one said core of at least one said cable.



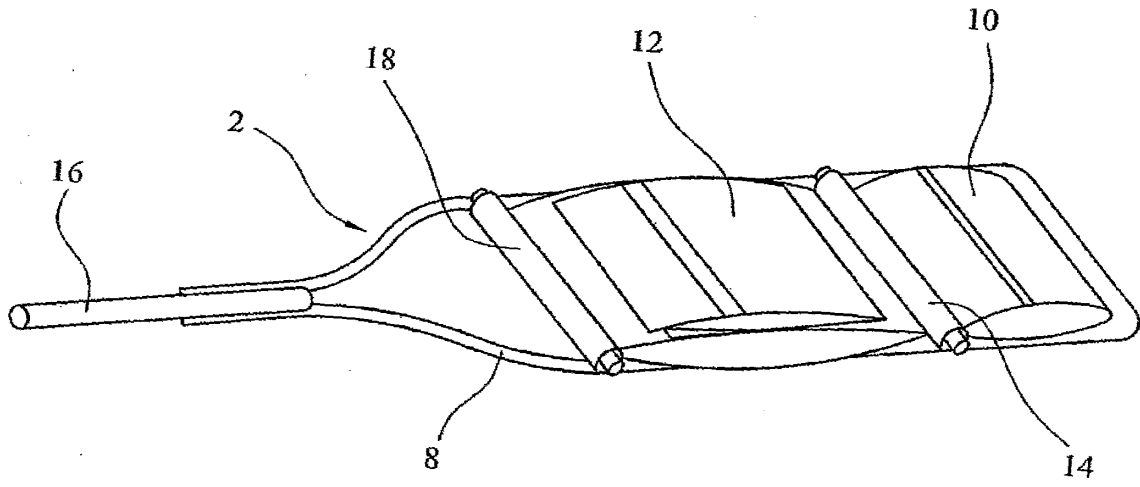


FIG. 1

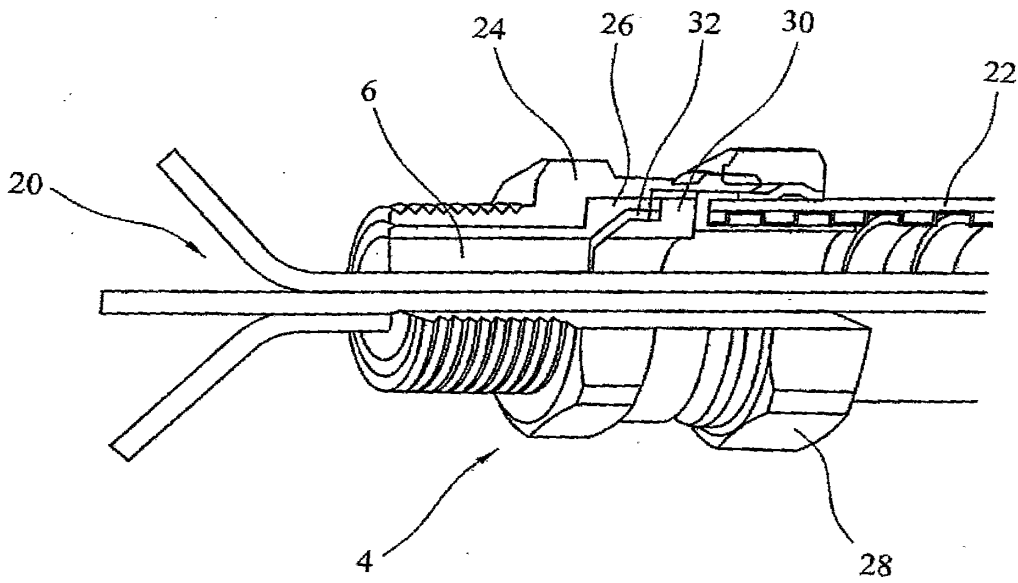


FIG. 2

-2/2-

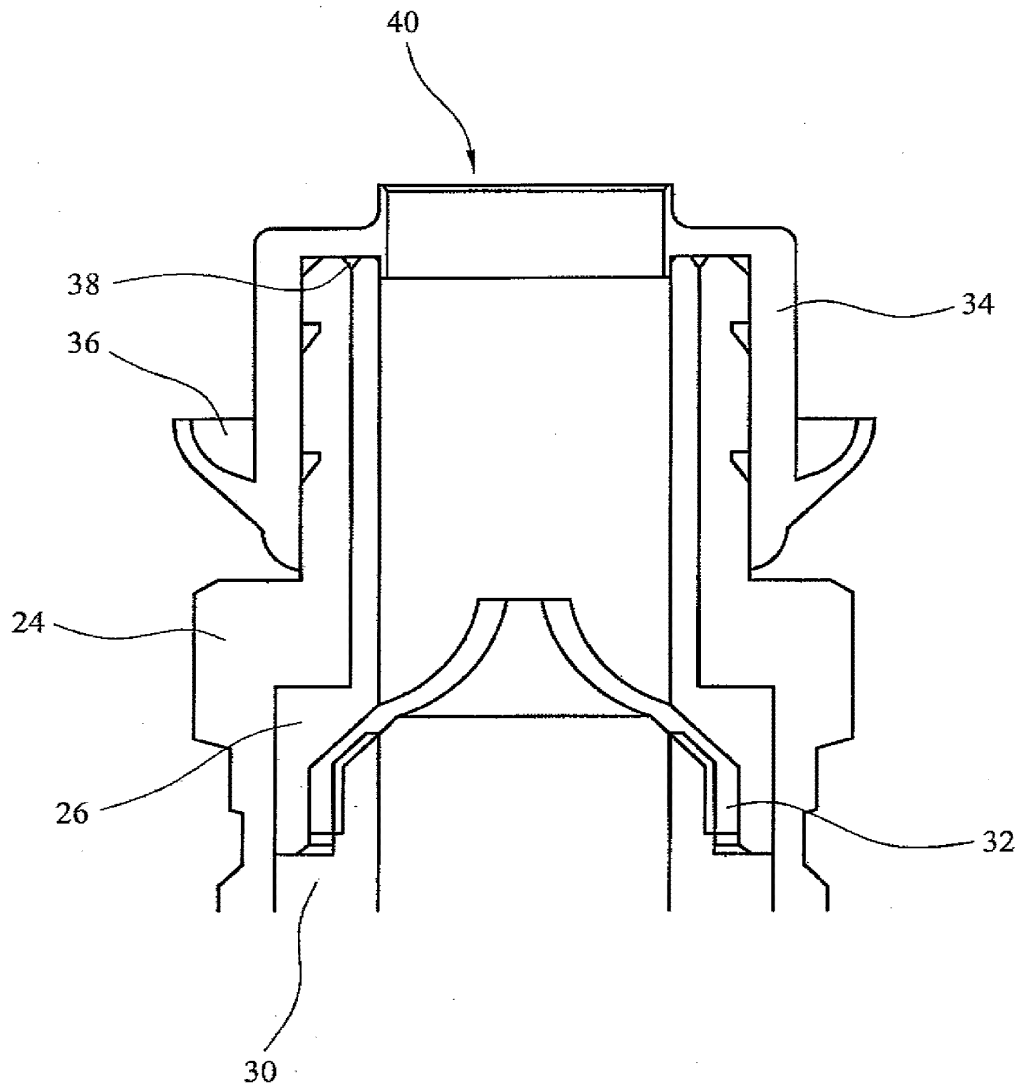


FIG. 3

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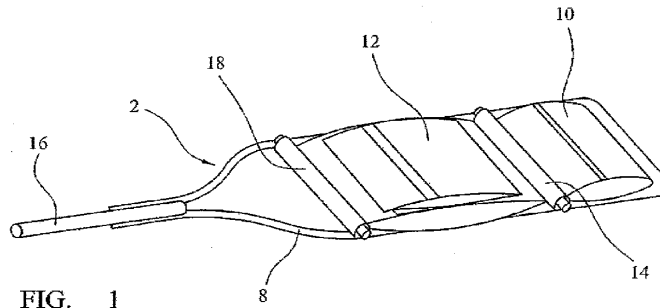
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(54) Title: FILLER ASSEMBLY FOR CABLE GLAND



(57) Abstract: A dispenser apparatus (2) for a curable liquid material is disclosed. The apparatus comprises a flexible bag (8) defining a first compartment (10) for accommodating a first component of a curable liquid material, and a second compartment (12) for accommodating a second component of the curable liquid material and adapted to communicate with the first chamber to enable mixing of the first and second components to initiate curing of the curable liquid material. A first clamp (14) temporarily prevents mixing of the first and second components, and an elongate nozzle (16) communicates with the second compartment to dispense the mixed curable liquid material therefrom. A second clamp (18) temporarily prevents passage of the curable liquid material from the second compartment to the nozzle.

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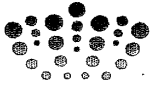
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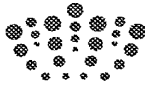
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|---|---|----------------------------------|-------------------------------------|
| 1. Filing date  | 11-06-2010  |                                  |                                     |
| 2. Full name, address and postcode of the applicant or of each applicant  | <b>P403856/RMV</b><br><b>CMP Products Limited</b><br><b>36 Nelson Way</b><br><b>Nelson Park East</b><br><b>Cramlington NE23 1WH</b><br><b>Northumberland</b><br><b>United Kingdom</b>                                       |                                  |                                     |
| Patents ADP number (if you know it)   | 09797325001   |                                  |                                     |
| 3. Title of the invention   | <b>Filler Assembly for Cable Gland</b>  |                                  |                                     |
| 4. Name of your agent (if you have one)<br>"Address for service" to which all correspondence should be sent. This may be in the European Economic area or Channel Islands (see warning note below) (including the postcode)                       | <b>Urquhart-Dykes &amp; Lord LLP</b><br><b>Urquhart-Dykes &amp; Lord LLP</b><br><b>Cale Cross House</b><br><b>156 Pilgrim Street</b><br><b>Newcastle upon Tyne NE1 6SU</b><br><b>Tyne and Wear</b><br><b>United Kingdom</b> |                                  |                                     |
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|   | European Patent Office  | 09168430.8                       | 21 Aug 2009                         |
|   |   |                                  | Date available on PDAS              |
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12. Name, e-mail address, telephone, fax and/or mobile number, if any, of a contact point for the applicant **Vinsome, Rex Martin Telephone: +44 191 261 8573 Fax: +44 191 222 1604**

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FILLER ASSEMBLY FOR CABLE GLAND

The present invention relates to a filler assembly for cable glands and relates particularly, but not exclusively, to such a filler assembly for filling cable glands for use in hazardous areas.

Many cable glands for use in connecting a cable to an enclosure in hazardous areas need to be filled with a compound which provides a barrier against the effects of an explosion occurring within the enclosure to which the cable gland is attached. The barrier is typically formed from a two-part clay-filled epoxy compound. The two component parts of the compound need to be thoroughly mixed with each other prior to fitting into the gland, and the resulting putty like material needs to be packed between the individual conductors in the cable. Such an arrangement is disclosed in GB 2258350.

This known arrangement suffers from a number of drawbacks. Firstly, the cure time of the putty like material is chosen to be relatively long, in order to enable it to be manipulated into the spaces between the individual conductors before curing becomes advanced. As a result, the filled cable assembly must be left undisturbed for a significant period, usually several hours, especially if mixed at low temperatures. Also, the components of the filler material sometimes contain hazardous materials which become harmless when the filler material is mixed. Persons mixing the components of the putty like filler material may come into contact with these hazardous materials during mixing, and air can become trapped within the cable gland by the filler material which may cause the barrier formed by the filler

material to fail in the event of an explosion. Filling of the cable gland is also relatively difficult, especially in the case of small cable glands.

5 GB 765082 discloses an arrangement for insulating a splice between two stranded connectors in which resinous material is introduced from a capsule having an elongate tip. However, this arrangement suffers from the drawback that it is not suitable for filling cable glands, since the  
10 introduction of a material which is sufficiently fluid to penetrate between the individual conductors of a cable would cause material to flow along the conductors along the interior of the cable, which would prevent the cable gland from being sufficiently filled to expel all of the air from  
15 the cable gland to avoid air voids.

Preferred embodiments of the present invention seek to overcome one or more of the above disadvantages of the prior art.

20

According to an aspect of the present invention, there is provided a filler assembly for filling a cable gland, having a plurality of cores of at least one cable extending therethrough, with curable liquid material, the assembly  
25 comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for  
30 accommodating a first component of a curable liquid material and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable

mixing of said first and second components to initiate curing of said curable liquid material;

first barrier means for temporarily preventing mixing of said first and second components;

5 elongate dispenser means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

10 second barrier means for temporarily preventing passage of said curable liquid material from the or each said second chamber to said dispenser means; and

(b) at least one barrier member for restricting the extent of penetration of said curable liquid material along said cores.

15

By providing elongate dispenser means to dispense mixed curable liquid material and second barrier means for temporarily preventing passage of the curable liquid material to said dispenser means, this provides the advantage that the 20 first and second components of the curable liquid material can be mixed in a sealed container comprising the first and second compartments, thus enabling the user to avoid coming into contact with harmful components of the curable liquid material. As a result of the provision of elongate dispenser 25 means, dispensing of the curable liquid can be more carefully controlled, as a result of which less viscous and faster curing liquid material can be used than in the prior art. This therefore provides the advantage of enabling more rapid formation of a filled cable gland incorporating the material, 30 while also allowing the liquid material to be introduced into the cable gland in such a way that the air is expelled from the cable gland to avoid air voids, which could lead to failure of the cable gland in the event of an explosion. In

addition, with the present invention, the curable material can be dispensed into the assembled gland, i.e. the cable gland can be filled with the conductors of the cable in a connected state, as a result of which the electrical  
5 integrity of the joint can be ensured, whereas the putty like compound of the known arrangement must be moulded around the conductors of the cable with the gland disassembled, as a result of which the cable cores can not be electrically connected. The provision of at least one barrier member for  
10 restricting the extent of penetration of said curable liquid material along the cable cores provides the advantage of enabling highly flowable curable liquid material to be used, while also enabling filling of the cable gland.

15           The body may be flexible.

          This provides the advantage of making the apparatus easier and less expensive to manufacture.

20           The first and/or second barrier means may comprise at least one releasable clamp.

          The assembly may further comprise a first component of a curable liquid material in at least one said first chamber,  
25 and a second component of said curable liquid material in at least one said second chamber.

          The curable liquid material may be adapted to change colour as a result of curing thereof.

30           This provides the advantage of providing a visual indicator to the user when the cable gland filling process is complete.

The assembly may further comprise a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said  
5 screw thread.

The cover member may be adapted to prevent curable liquid material from penetrating an end face of the cable gland.  
10

At least one said barrier member may comprise a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.  
15

At least one said barrier member may have a respective tapering portion.

According to another aspect of the present invention, there is provided a method of filling a cable gland with curable liquid material by means of an assembly according to any one of the preceding claims, the method comprising:  
20

locating at least one said barrier member in the cable gland; and  
25

locating an outlet of said dispenser means in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.  
30

The step of locating at least one said barrier member in the cable gland may comprise locating at least one said

barrier member around at least one said core of at least one said cable.

A preferred embodiment of the invention will now be described, by way of example only and not in any limitative sense, with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a dispensing apparatus embodying the present invention;

10

Figure 2 is a partially cut away perspective view of a cable gland having a filler formed using the apparatus of Figure 1; and

15

Figure 3 is a cross sectional view of the filled cable gland of Figure 2 with a thread protector in place.

Referring to Figure 1, a dispenser apparatus 2 embodying the present invention and for use in filling a cable gland 4 (Figure 2) with curable liquid material 6 comprises a body of suitable transparent flexible plastics material defining a flexible bag 8 having a first compartment 10 for accommodating a first component of a liquid curable material 6, and a second compartment 12 for accommodating a second component of the material 6. A first clamp 14 temporarily separates the first compartment 10 and second compartment 12 to thereby prevent mixing of the first and second components of the material 6. The first and second components are coloured differently (for example blue and yellow) so that thorough mixing of the first and second components produces a green liquid, thereby providing a visual indication when thorough mixing of the first and second components has occurred. Mixing of the first and

30

second components together causes gelling of the material and initiates curing of the curable liquid material 6.

The dispenser apparatus 2 is also provided with an  
5 elongate hollow nozzle 16 extending from the second  
compartment 12 such that dispensing of the mixed curable  
liquid material can be carefully controlled. In particular,  
the nozzle 16 can be inserted a considerable distance into  
the cable gland 4 and between individual conductors 20 of  
10 the core of a cable 22 attached to the cable gland 4 (Figure  
2) so that the liquid material 6 can be highly flowable and  
fast-curing, as a result of which the cable gland 4 can be  
rapidly filled and air entrapment by the liquid material 6  
minimised. A second clamp 18 temporarily prevents material  
15 flowing from the second compartment 12 into the nozzle 16, so  
that dispensing of the material 6 can be prevented until  
thorough mixing together of the first and second components  
has occurred.

20 The flexible bag 8 is formed from two sheets of  
material welded together along all but one of their edges to  
form a bag having an open mouth, which is then mounted to the  
nozzle 16. The second clamp 18 is then mounted to the bag  
adjacent to the nozzle 16, and the second component of the  
25 material 6 is dispensed into the second compartment 12. The  
first clamp 14 is then mounted to the bag to seal the second  
component in the second compartment 12, and the first  
component is then dispensed into the first compartment 10.  
The open edge of the bag is then sealed to seal the first  
30 component in the first compartment 10.

Referring to Figures 2 and 3, the cable gland 4 to be  
filled by means of the dispenser apparatus 2 of Figure 1

comprises a threaded outer connector 24 for threaded connection to an enclosure (not shown) and a compound tube 26 rotatably mounted within the outer connector 24. A cable connector 28 is mounted to the end of the cable 22 and is  
5 connected to the outer connector 24 by means of cooperating screw threads (not shown).

A ring 30 abuts the cable connector 28 and a flexible seal 32 is located around the inner conductors 20 of the  
10 cable 22 and compressed between the compound tube 26 and ring 30 for limiting the extent of penetration of curable material 6 into the cable gland 4 before curing of the curable material 6. The flexible seal 32 comprises a generally frusto-conical body of elastomeric material having an  
15 aperture (not shown) therethrough for engaging the central conductors 20 of the cable 22. The aperture in the seal 32 is sized such that it stretches to pass around the conductors 20 to tightly engage the conductors 20 to form a reasonably effective barrier to passage of the material 6 along the  
20 space defined between the conductors 20 and the compound tube 26.

Referring to Figure 3, a thread protector 34 formed of elastomeric material such as rubber is located over the  
25 external screw thread of the outer connector 24 of the cable gland 4 prior to filling of the cable gland with curable material 6. The thread protector 34 has a hollow rim 36 for catching excess curable material 6 which may flow out of end 40 of the cable gland 4 during the filling procedure, and an  
30 inner circular rim 38 which prevents penetration of curable material 6 into the gap between the outer connector 24 and the compound tube 26. This ensures that the compound tube 24



complete with cable connectors 20 can be removed from the outer connector 24 after curing of the material 6.

5 The process of filling the cable gland 4 of Figures 2 and 3 by means of the dispenser apparatus 2 of Figure 1 will now be described.

10 In order to fill the core of the cable gland 4 with curable material, the flexible seal 32 initially placed over the core conductors 20 of the cable 22 so that the seal 32 tightly grips the conductors 20. The outer connector 24 with compound tube 26 are then mounted to the ring 30 and cable connector 28 to compress the seal 32 between the ring 30 and compound tube 26. As a result, the flexible seal 32 acts as a  
15 barrier to penetration of the curable liquid material 6 into the interior of the cable gland 4.

The first clamp 14 is then removed from the dispenser apparatus 2 and the second clamp 18 left in place, to enable  
20 thorough mixing of the first and second components of the curable liquid material 6. The first and second components are coloured blue and yellow respectively, a result of which the curable liquid material 6 is bright green when it is thoroughly mixed. The second clamp 18 is then removed, and  
25 the outlet of the nozzle 16 is placed at a location near the seal 32. The liquid material 6 is then dispensed through the nozzle 16 into the space between the conductors 20 of the cable 22 and into the space around the conductors 20 inside the compound tube 26 of the cable gland 4, where its movement  
30 along the axis of the cable gland 4 is restricted by the flexible seal 32. The location of the outlet of the nozzle 16 near the seal 32 causes air to be expelled from the cable gland when the curable liquid material 6 is dispensed from

the nozzle 16. The seal 32 provides a sufficient barrier to penetration of the material 6 to hold back the curable material until it begins to gel and support itself. At the same time, the thread protector 34 protects the external  
5 thread of the outer connector 24 from excess curable material and prevents penetration of the liquid curable material between the outer connector 24 and the compound tube 26. The material 6 is arranged to change colour to dark green when it is cured, so that a visual indication is provided when the  
10 curing process is completed.

It will be appreciated by persons skilled in the art that the above embodiment has been described by way of example only, and not in any limitative sense, and that  
15 various alterations and modifications are possible without departure from the scope of the invention as defined by the appended claims.

CLAIMS

1. A filler assembly for filling a cable gland, having a plurality of cores of at least one cable extending therethrough, with curable liquid material, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

10 a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable  
15 mixing of said first and second components to initiate curing of said curable liquid material;

first barrier means for temporarily preventing mixing of said first and second components;

20 elongate dispenser means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

25 second barrier means for temporarily preventing passage of said curable liquid material from the or each said second chamber to said dispenser means; and

(b) at least one barrier member for restricting the extent of penetration of said curable liquid material along said cores.

30 2. An assembly according to claim 1, wherein said body is flexible.

3. An assembly according to claim 1 or 2, wherein the first and/or second barrier means comprises at least one releasable clamp.
- 5 4. An assembly according to any one of the preceding claims, further comprising a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.
- 10 5. An assembly according to claim 5, wherein the curable liquid material is adapted to change colour as a result of curing thereof.
- 15 6. An assembly according to any one of the preceding claims, further comprising a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.
- 20 7. An assembly according to claim 6, wherein the cover member is adapted to prevent curable liquid material from penetrating an end face of the cable gland.
- 25 8. An assembly according to any one of the preceding claims, wherein at least one said barrier member comprises a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.
- 30 9. An assembly according to any one of the preceding claims, wherein at least one said barrier member has a respective tapering portion.

10. A method of filling a cable gland with curable liquid material by means of an assembly according to any one of the preceding claims, the method comprising:

5 locating at least one said barrier member in the cable gland;  
and

locating an outlet of said dispenser means in said cable gland and dispensing curable liquid material therefrom so as  
10 to expel air from the cable gland.

11. A method according to claim 10, wherein the step of locating at least one said barrier member in the cable gland comprises locating at least one said barrier member around at  
15 least one said core of at least one said cable.



ABSTRACT

FILLER ASSEMBLY FOR CABLE GLAND

5 A dispenser apparatus (2) for a curable liquid material is disclosed. The apparatus comprises a flexible bag (8) defining a first compartment (10) for accommodating a first component of a curable liquid material, and a second compartment (12) for accommodating a second component of the curable liquid material and adapted to communicate with the first chamber to enable mixing of the first and second components to initiate curing of the curable liquid material. A first clamp (14) temporarily prevents mixing of the first and second components, and an elongate nozzle (16);

10 communicates with the second compartment to dispense the mixed curable liquid material therefrom. A second clamp (18) temporarily prevents passage of the curable liquid material from the second compartment to the nozzle.

20 [Figure 1]





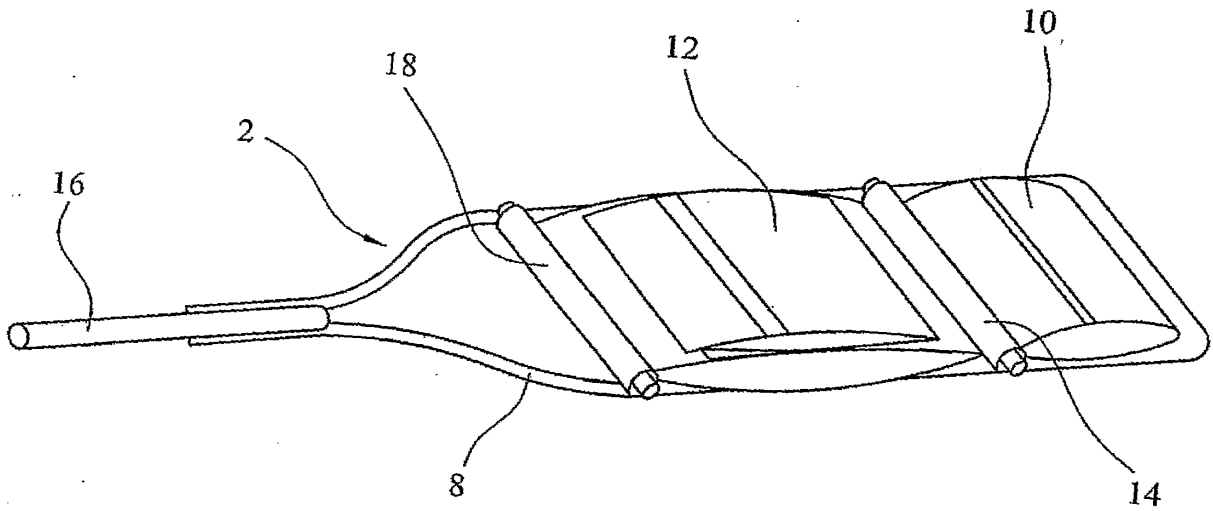


FIG. 1

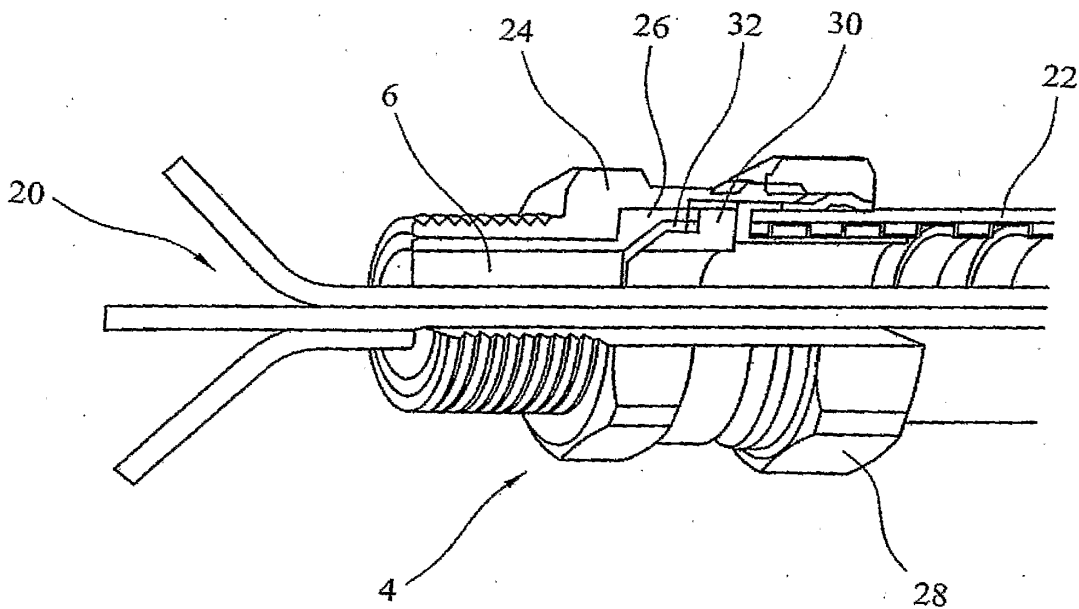


FIG. 2



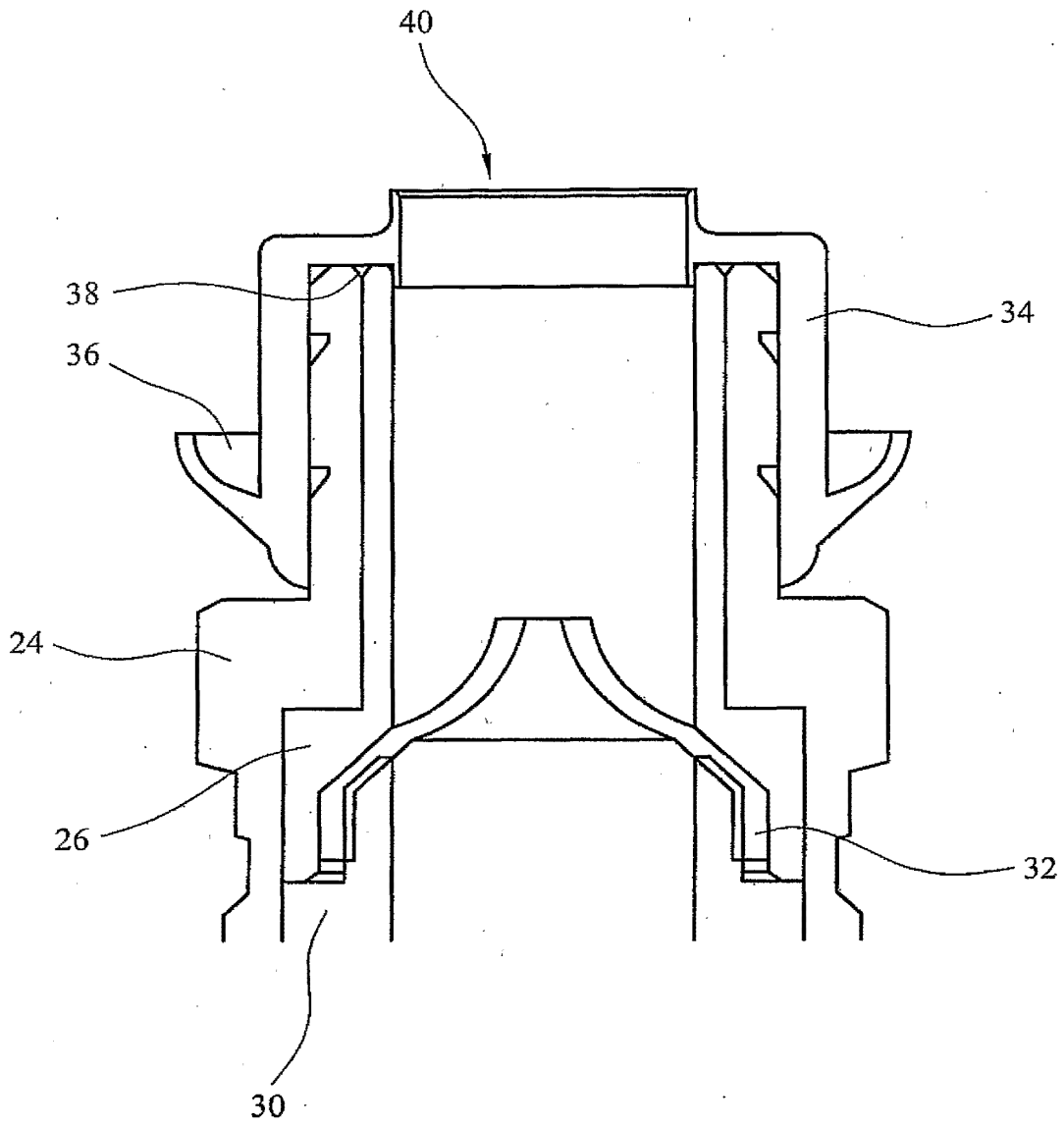


FIG. 3



# Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/GB2010/050989

International filing date: 14 June 2010 (14.06.2010)

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Document details: Country/Office: GB  
Number: 1009450.6  
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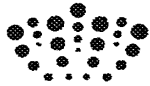
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**Patents Form 1**

Patents Act 1977 (Rule 12)

Request for grant of a patent

Concept House  
Cardiff Road  
Newport  
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NP10 8QQ

**Application number** GB 1009450.6

|   |   |                                  |                                     |
|---|---|----------------------------------|-------------------------------------|
| 1. Your reference   | <b>P403857/RMV</b>  |                                  |                                     |
| 2. Full name, address and postcode of the applicant or of each applicant  | <b>CMP Products Ltd<br/>36 Nelson Way<br/>Nelson Park East<br/>Cramlington NE23 1WH<br/>Northumberland<br/>United Kingdom</b>   |                                  |                                     |
| Patents ADP number (if you know it)   |   |                                  |                                     |
| 3. Title of the invention   | <b>SEALING ASSEMBLY FOR CABLE CONDUIT JUNCTION</b>  |                                  |                                     |
| 4. Name of your agent (if you have one)<br>"Address for service" to which all correspondence should be sent. This may be in the European Economic area or Channel Islands (see warning note below)<br>(including the postcode)                    | <b>Urquhart-Dykes &amp; Lord LLP<br/>Urquhart-Dykes &amp; Lord LLP<br/>Cale Cross House<br/>156 Pilgrim Street<br/>Newcastle upon Tyne NE1 6SU<br/>United Kingdom</b> |                                  |                                     |
| Patents ADP number (if you know it)   | <b>1644019</b>  | <b>08857310002</b>               |                                     |
| 5. Priority declaration: Are you claiming priority from one or more earlier-filed patent applications? If so, please give details of the application(s)   |   |                                  |                                     |
|   | Country   | Application number               | Date of filing                      |
|   | <b>European Patent Office</b>   | <b>09168429.0</b>                | <b>21 Aug 2009</b>                  |
|   |   |                                  | Date available on PDAS              |
| 6. Divisionals etc: Is this application a divisional application, or being made following resolution of an entitlement dispute about an earlier application. If so, please give the application number and filing date of the earlier application |   | Number of earlier UK application | Date of filing (day / month / year) |
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9. Accompanying documents: please enter the number of pages of each item accompanying this form.

Continuation sheets of this form

Description: **8**

Claim(s): **3**

Abstract: **n/a**

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Priority documents: **0**

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Request for search (Patents Form 9A): **0**

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Signature: **Subject: UK, Urquhart-Dykes & Lord LLP, R. Vinsome 14531; Issuer: , European Patent Office, European Patent Office CA** Date: **07 Jun 2010**

12. Name, e-mail address, telephone, fax and/or mobile number, if any, of a contact point for the applicant **Vinsome, Rex Martin Telephone: +44 191 261 8573 Fax: +44 191 222 1604**

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SEALING ASSEMBLY FOR CABLE CONDUIT JUNCTION

The present invention relates to a sealing assembly for a cable conduit junction, and relates particularly, but not exclusively, to a sealing assembly for sealing a junction of an enclosure and one or more conduits for receiving a cable.

Cables are often installed in conduits for the purposes of protection. Lengths of conduit housing the cables are connected by means of enclosures which are filled in order to provide a barrier against passage of fire or explosion along the conduit containing the cable. In order to fill the enclosure, mineral wool is packed between individual cores of a cable passing through the enclosure between two lengths of conduit, and the enclosure then filled with a water based cement. The cement when set acts as a barrier to the transmission of fire or explosions.

This known conduit sealing system suffers from the disadvantage that it is difficult to effectively pack the mineral wool between the individual cores of the cable, as a result of which the effectiveness of electrical insulation between adjacent cores of the cable can be insufficient and the cement can migrate down the conduit.

Preferred embodiments of the present invention seek to overcome one or more of the above disadvantages of the prior art.

According to an aspect of the present invention, there is provided a sealing assembly for sealing a conduit junction for accommodating a cable, having a plurality of cores of at

least one cable extending therethrough, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

first barrier means for temporarily preventing mixing of said first and second components;

outlet means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

second barrier means for temporarily preventing passage of said curable liquid material from the or each said second chamber to said outlet means; and

(b) at least one barrier member for restricting the extent of penetration of said curable liquid material along said cores and comprising a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.

By providing at least one barrier member for restricting the extent of penetration of said curable liquid material along said cores and comprising a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable, this

provides the advantage that the barrier member can be arranged to fit tightly around one of more cores of a cable passing through the enclosure to limit the extent of penetration of the curable liquid material along the cores, while ensuring that the curable material can effectively penetrate between the cores of the cable and at least partially fill the enclosure. This in turn minimises the extent to which the degree of electrical insulation between the individual cores is compromised.

10.

At least one said barrier member may be adapted to sealingly engage an internal wall of the enclosure.

The assembly may further comprise biasing means for urging at least one said barrier member into engagement with an internal wall of the enclosure.

20

This provides the advantage of making it easier to form a seal using the assembly.

The biasing means may comprise at least one circlip.

25

At least one said barrier member may be provided with at least one groove or recess for engaging the biasing means.

The body may be flexible.

30

This provides the advantage of making the apparatus easier and less expensive to manufacture.

The first and/or second barrier means may comprise at least one releasable clamp.

The assembly may further comprise a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

5

The curable liquid material may be adapted to change colour as a result of curing thereof.

This provides the advantage of providing a visual  
10 indicator to the user when the cable gland filling process is complete.

According to another aspect of the present invention, there is provided a method of sealing a conduit junction for  
15 accommodating a cable, having a plurality of cores of at least one cable extending therethrough, using an assembly as defined above, the method comprising:

20 locating at least one said barrier member in sealing engagement with an internal wall of the enclosure;

passing at least one said barrier member around at least one core of the cable; and

25 dispensing curable liquid material from said outlet means into the enclosure.

A preferred embodiment of the invention will now be described, by way of example only and not in any limitative  
30 sense, with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a dispensing apparatus forming part of a sealing assembly embodying the present invention;

5

Figure 2 is an exploded view of a seal and circlip forming part of the assembly of the present invention;

Figure 3 is an end view of the seal and circlip of Figure 2 while being mounted to an enclosure for sealing  
10 thereof; and

Figure 4 is a perspective view of an enclosure of a cable conduit junction during the process of being sealed using the assembly embodying the present invention.

15

Referring to Figure 1, a dispenser apparatus 2 embodying the present invention and for use in filling a cable conduit junction 4 (Figure 4) with curable liquid material 6 comprises a body of suitable transparent flexible plastics material defining a flexible bag 8 having a first  
20 compartment 10 for accommodating a first component of a liquid curable material 6, and a second compartment 12 for accommodating a second component of the material 6. A first clamp 14 temporarily separates the first compartment 10 and second compartment 12 to thereby prevent mixing of the first  
25 and second components of the material 6. The first and second components are coloured differently (for example blue and yellow) so that thorough mixing of the first and second components produces a green liquid, thereby providing a visual indication when thorough mixing of the first and  
30 second components has occurred. Mixing of the first and second components together causes gelling of the material and initiates curing of the curable liquid material 6.

The dispenser apparatus 2 is also provided with an elongate hollow nozzle 16 extending from the second compartment 12 such that dispensing of the mixed curable liquid material can be carefully controlled. In particular, the nozzle 16 can be inserted a considerable distance into an enclosure 20 of the conduit junction 4 and between individual cores 22 of a cable 24 passing through the conduit junction 4 so that the liquid material 6 can be highly flowable and fast-curing, as a result of which the enclosure 20 can be rapidly filled and air entrapment by the liquid material 6 minimised. A second clamp 18 temporarily prevents material flowing from the second compartment 12 into the nozzle 16, so that dispensing of the material 6 can be prevented until thorough mixing together of the first and second components has occurred.

The flexible bag 8 is formed from two sheets of material welded together along all but one of their edges to form a bag having an open mouth, which is then mounted to the nozzle 16. The second clamp 18 is then mounted to the bag adjacent to the nozzle 16, and the second component of the material 6 is dispensed into the second compartment 12. The first clamp 14 is then mounted to the bag to seal the second component in the second compartment 12, and the first component is then dispensed into the first compartment 10. The open edge of the bag is then sealed to seal the first component in the first compartment 10.

Referring to Figure 2, a seal 26 for use with the dispenser apparatus 2 of Figure 1 comprises a hollow generally cylindrical body 28 of elastomeric material having a groove 30 for receiving a circlip 32 and an aperture 34 for receiving the individual cores 22 of the cable 24 passing

through the enclosure 20 (Figure 4) joining a pair of lengths of conduit (not shown).

Referring to Figure 4, the enclosure 20 of the conduit junction 4 for joining two lengths of cable conduit (not shown) has a generally cylindrical body having apertures 36, 38 at its axial ends, and an aperture 40 in its side surface for enabling the enclosure 20 to be filled and sealed with curable liquid material from the dispenser apparatus 2.

10

In order to seal the conduit junction 4, a seal 26 is mounted to each axial end of the enclosure 20 as shown in Figure 3 by compressing the seal 26 against the action of the circlip 32 to form a concave portion 42 of the seal 26. A seal 26 is then introduced into each axial aperture 36, 38, and then released so that the circlip 32 urges it into engagement with the internal circumferential wall of the enclosure 20 adjacent the aperture 36, 38. The individual cores 22 of the cable 24 are then introduced through the central aperture 34 of each seal at each end of the enclosure 20, such that the periphery of the aperture 34 of each seal 26 fits tightly around the cable cores 22.

The mixed curable material is then introduced into the internal volume of the enclosure 20 via the aperture 40 in the circumferential wall of the enclosure 20, and the tight fit of the periphery of the central aperture 34 of each seal 26 around the cable cores 22 minimises the extent to which liquid curable material can escape from the aperture 34, while enabling the liquid curable material to penetrate between the individual cores 22 to provide good thermal and electrical insulation when the curable material sets. The cable conduit junction 4 is then completed by mounting

30

lengths of cable conduit (not shown) to the ends of the enclosure 20, and mounting a cover (not shown) to the aperture 40 in the circumferential wall of the enclosure.

It will be appreciated by persons skilled in the art  
5 that the above embodiment has been described by way of  
example only, and not in any limitative sense, and that  
various alterations and modifications are possible without  
departure from the scope of the invention as defined by the  
appended claims..

10



CLAIMS

1. A sealing assembly for sealing a conduit junction for accommodating a cable, having a plurality of cores of at least one cable extending therethrough, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

10 a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable  
15 mixing of said first and second components to initiate curing of said curable liquid material;

first barrier means for temporarily preventing mixing of said first and second components;

20 outlet means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

25 second barrier means for temporarily preventing passage of said curable liquid material from the or each said second chamber to said outlet means; and

(b) at least one barrier member for restricting the extent of penetration of said curable liquid material along said cores and comprising a respective flexible member having  
30 at least one aperture therethrough for engaging at least one core of at least one cable.

2. An assembly according to claim 1, wherein at least one said barrier member is adapted to sealingly engage an internal wall of the enclosure.
- 5 3. An assembly according to claim 1 or 2, further comprising biasing means for urging at least one said barrier member into engagement with an internal wall of the enclosure.
4. An assembly according to claim 3, wherein the biasing  
10 means comprises at least one circlip.
5. An assembly according to claim 3 or 4, wherein at least one said barrier member is provided with at least one groove or recess for engaging the biasing means.  
15
6. An assembly according to any one of the preceding claims, wherein the body is flexible.
7. An assembly according to any one of the preceding claims,  
20 wherein the first and/or second barrier means comprises at least one releasable clamp.
8. An assembly according to any one of the preceding claims, further comprising a first component of a curable liquid  
25 material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.
9. An assembly according to claim 8, wherein the curable  
30 liquid material is adapted to change colour as a result of curing thereof.

10. A method of sealing a conduit junction, for accommodating a cable, having a plurality of cores of at least one cable extending therethrough, using an assembly according to any one of the preceding claims, the method comprising:

5

locating at least one said barrier member in sealing engagement with an internal wall of the enclosure;

passing at least one said barrier member around at  
10 least one core of the cable; and

dispensing curable liquid material from said outlet means into the enclosure.

15

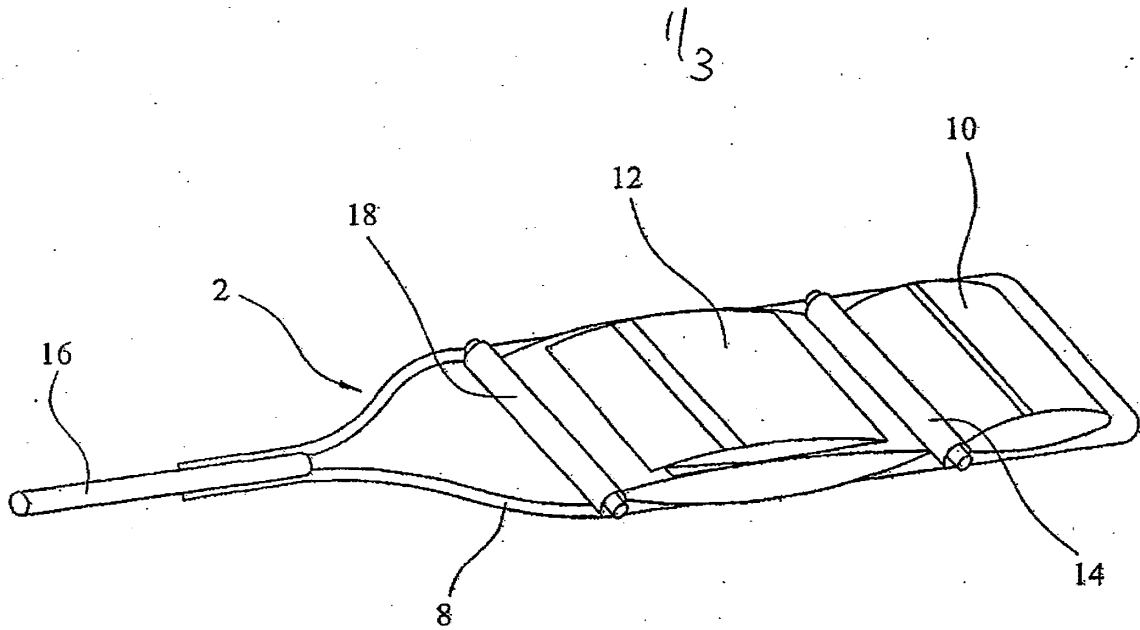
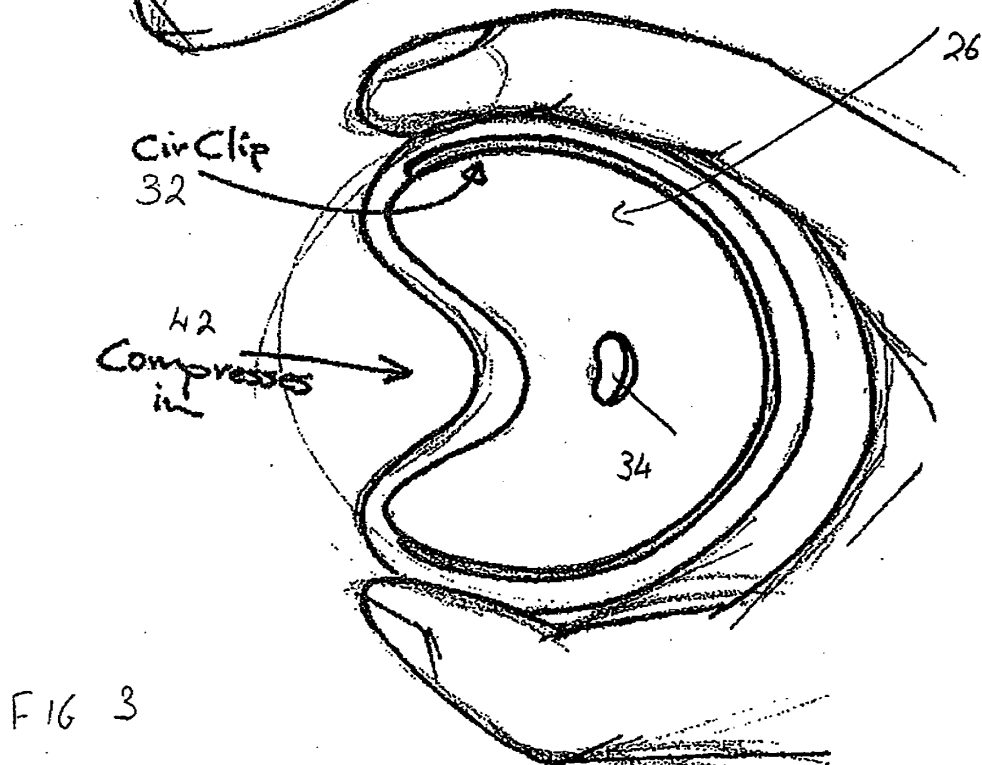
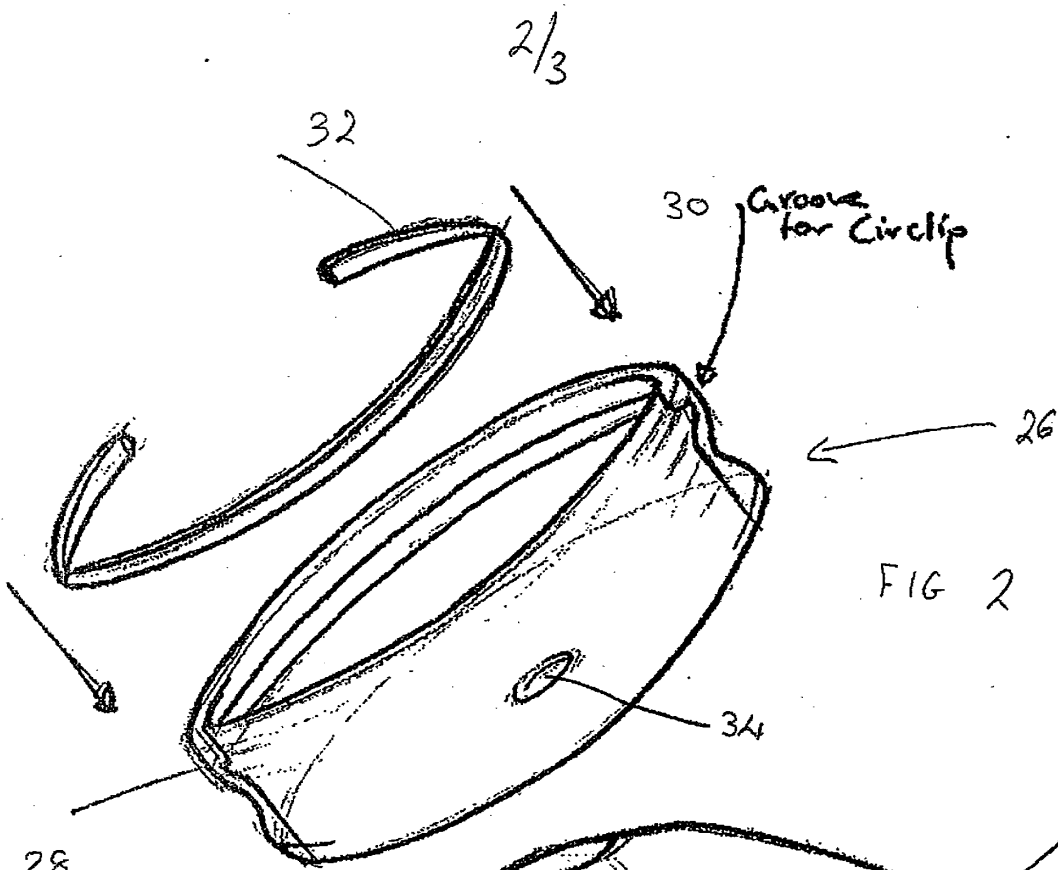


FIG. 1



3/3

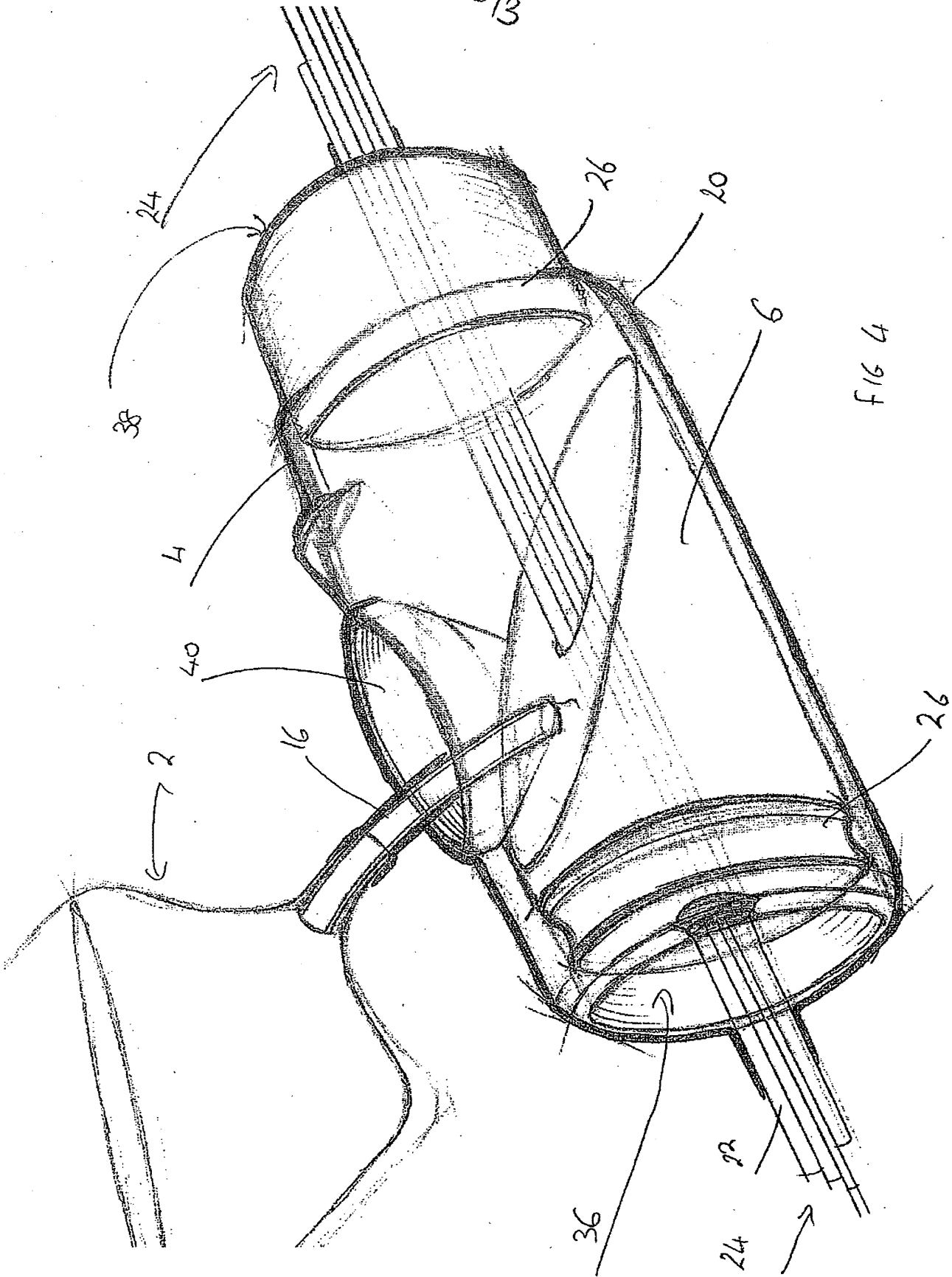


FIG 4

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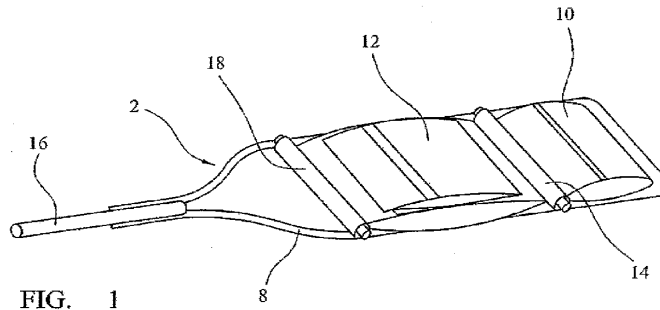
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- (71) Applicant (for all designated States except US): **CMP PRODUCTS LIMITED** [GB/GB]; 36 Nelson Way, Nelson Park East, Cramlington, Northumberland NE23 1WH (GB).
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- (74) Agent: **VINSOME, Rex Martin**; Urquhart-Dykes & Lord LLP, Cale Cross House, 156 Pilgrim Street, Newcastle Upon Tyne, Tyne & Wear NE1 6SU (GB).

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(54) Title: FILLER ASSEMBLY FOR CABLE GLAND



(57) Abstract: A dispenser apparatus (2) for a curable liquid material is disclosed. The apparatus comprises a flexible bag (8) defining a first compartment (10) for accommodating a first component of a curable liquid material, and a second compartment (12) for accommodating a second component of the curable liquid material and adapted to communicate with the first chamber to enable mixing of the first and second components to initiate curing of the curable liquid material. A first clamp (14) temporarily prevents mixing of the first and second components, and an elongate nozzle (16) communicates with the second compartment to dispense the mixed curable liquid material therefrom. A second clamp (18) temporarily prevents passage of the curable liquid material from the second compartment to the nozzle.

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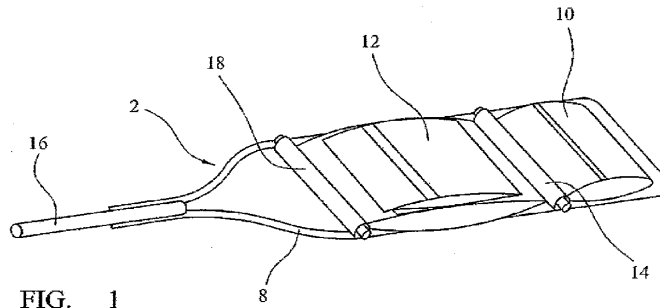
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- (71) **Applicant** (for all designated States except US): **CMP PRODUCTS LIMITED** [GB/GB]; 36 Nelson Way, Nelson Park East, Cramlington, Northumberland NE23 1WH (GB).
- (72) **Inventor; and**
- (75) **Inventor/Applicant** (for US only): **PROUD, Samuel Liam** [GB/GB]; 39 Bluebell Dene, Newcastle upon Tyne, Tyne & Wear NE5 4DF (GB).
- (74) **Agent:** **VINSOME, Rex Martin**; Urquhart-Dykes & Lord LLP, Cale Cross House, 156 Pilgrim Street, Newcastle Upon Tyne, Tyne & Wear NE1 6SU (GB).

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- (84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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(54) **Title:** FILLER ASSEMBLY FOR CABLE GLAND



(57) **Abstract:** A dispenser apparatus (2) for a curable liquid material is disclosed. The apparatus comprises a flexible bag (8) defining a first compartment (10) for accommodating a first component of a curable liquid material, and a second compartment (12) for accommodating a second component of the curable liquid material and adapted to communicate with the first chamber to enable mixing of the first and second components to initiate curing of the curable liquid material. A first clamp (14) temporarily prevents mixing of the first and second components, and an elongate nozzle (16) communicates with the second compartment to dispense the mixed curable liquid material therefrom. A second clamp (18) temporarily prevents passage of the curable liquid material from the second compartment to the nozzle.

WO 2011/021016 A2



-1-

FILLER ASSEMBLY FOR CABLE GLAND

The present invention relates to a filler assembly for cable glands and relates particularly, but not exclusively, to such a filler assembly for filling cable glands for use in hazardous areas.

Many cable glands for use in connecting a cable to an enclosure in hazardous areas need to be filled with a compound which provides a barrier against the effects of an explosion occurring within the enclosure to which the cable gland is attached. The barrier is typically formed from a two-part clay-filled epoxy compound. The two component parts of the compound need to be thoroughly mixed with each other prior to fitting into the gland, and the resulting putty like material needs to be packed between the individual conductors in the cable. Such an arrangement is disclosed in GB 2258350.

This known arrangement suffers from a number of drawbacks. Firstly, the cure time of the putty like material is chosen to be relatively long, in order to enable it to be manipulated into the spaces between the individual conductors before curing becomes advanced. As a result, the filled cable assembly must be left undisturbed for a significant period, usually several hours, especially if mixed at low temperatures. Also, the components of the filler material sometimes contain hazardous materials which become harmless when the filler material is mixed. Persons mixing the components of the putty like filler material may come into contact with these hazardous materials during mixing, and air can become trapped within the cable gland by the filler material which may cause the barrier formed by the filler

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material to fail in the event of an explosion. Filling of the cable gland is also relatively difficult, especially in the case of small cable glands.

GB 765082 discloses an arrangement for insulating a splice between two stranded connectors in which resinous material is introduced from a capsule having an elongate tip. However, this arrangement suffers from the drawback that it is not suitable for filling cable glands, since the introduction of a material which is sufficiently fluid to penetrate between the individual conductors of a cable would cause material to flow along the conductors along the interior of the cable, which would prevent the cable gland from being sufficiently filled to expel all of the air from the cable gland to avoid air voids.

Preferred embodiments of the present invention seek to overcome one or more of the above disadvantages of the prior art.

According to an aspect of the present invention, there is provided a filler assembly for filling a cable gland, having a plurality of cores of at least one cable extending therethrough, with curable liquid material, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable

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mixing of said first and second components to initiate curing of said curable liquid material;

first barrier means for temporarily preventing mixing of said first and second components;

elongate dispenser means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

second barrier means for temporarily preventing passage of said curable liquid material from the or each said second chamber to said dispenser means; and

(b) at least one barrier member for restricting the extent of penetration of said curable liquid material along said cores.

By providing elongate dispenser means to dispense mixed curable liquid material and second barrier means for temporarily preventing passage of the curable liquid material to said dispenser means, this provides the advantage that the first and second components of the curable liquid material can be mixed in a sealed container comprising the first and second compartments, thus enabling the user to avoid coming into contact with harmful components of the curable liquid material. As a result of the provision of elongate dispenser means, dispensing of the curable liquid can be more carefully controlled, as a result of which less viscous and faster curing liquid material can be used than in the prior art. This therefore provides the advantage of enabling more rapid formation of a filled cable gland incorporating the material, while also allowing the liquid material to be introduced into the cable gland in such a way that the air is expelled from the cable gland to avoid air voids, which could lead to failure of the cable gland in the event of an explosion. In

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addition, with the present invention, the curable material can be dispensed into the assembled gland, i.e. the cable gland can be filled with the conductors of the cable in a connected state, as a result of which the electrical integrity of the joint can be ensured, whereas the putty like compound of the known arrangement must be moulded around the conductors of the cable with the gland disassembled, as a result of which the cable cores can not be electrically connected. The provision of at least one barrier member for restricting the extent of penetration of said curable liquid material along the cable cores provides the advantage of enabling highly flowable curable liquid material to be used, while also enabling filling of the cable gland.

The body may be flexible.

This provides the advantage of making the apparatus easier and less expensive to manufacture.

The first and/or second barrier means may comprise at least one releasable clamp.

The assembly may further comprise a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

The curable liquid material may be adapted to change colour as a result of curing thereof.

This provides the advantage of providing a visual indicator to the user when the cable gland filling process is complete.

The assembly may further comprise a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

The cover member may be adapted to prevent curable liquid material from penetrating an end face of the cable gland.

At least one said barrier member may comprise a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.

At least one said barrier member may have a respective tapering portion.

According to another aspect of the present invention, there is provided a method of filling a cable gland with curable liquid material by means of an assembly according to any one of the preceding claims, the method comprising:

locating at least one said barrier member in the cable gland; and

locating an outlet of said dispenser means in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.

The step of locating at least one said barrier member in the cable gland may comprise locating at least one said

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barrier member around at least one said core of at least one said cable.

A preferred embodiment of the invention will now be described, by way of example only and not in any limitative sense, with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a dispensing apparatus embodying the present invention;

Figure 2 is a partially cut away perspective view of a cable gland having a filler formed using the apparatus of Figure 1; and

Figure 3 is a cross sectional view of the filled cable gland of Figure 2 with a thread protector in place.

Referring to Figure 1, a dispenser apparatus 2 embodying the present invention and for use in filling a cable gland 4 (Figure 2) with curable liquid material 6 comprises a body of suitable transparent flexible plastics material defining a flexible bag 8 having a first compartment 10 for accommodating a first component of a liquid curable material 6, and a second compartment 12 for accommodating a second component of the material 6. A first clamp 14 temporarily separates the first compartment 10 and second compartment 12 to thereby prevent mixing of the first and second components of the material 6. The first and second components are coloured differently (for example blue and yellow) so that thorough mixing of the first and second components produces a green liquid, thereby providing a visual indication when thorough mixing of the first and second components has occurred. Mixing of the first and

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second components together causes gelling of the material and initiates curing of the curable liquid material 6.

The dispenser apparatus 2 is also provided with an elongate hollow nozzle 16 extending from the second compartment 12 such that dispensing of the mixed curable liquid material can be carefully controlled. In particular, the nozzle 16 can be inserted a considerable distance into the cable gland 4 and between individual conductors 20 of the core of a cable 22 attached to the cable gland 4 (Figure 2) so that the liquid material 6 can be highly flowable and fast-curing, as a result of which the cable gland 4 can be rapidly filled and air entrapment by the liquid material 6 minimised. A second clamp 18 temporarily prevents material flowing from the second compartment 12 into the nozzle 16, so that dispensing of the material 6 can be prevented until thorough mixing together of the first and second components has occurred.

The flexible bag 8 is formed from two sheets of material welded together along all but one of their edges to form a bag having an open mouth, which is then mounted to the nozzle 16. The second clamp 18 is then mounted to the bag adjacent to the nozzle 16, and the second component of the material 6 is dispensed into the second compartment 12. The first clamp 14 is then mounted to the bag to seal the second component in the second compartment 12, and the first component is then dispensed into the first compartment 10. The open edge of the bag is then sealed to seal the first component in the first compartment 10.

Referring to Figures 2 and 3, the cable gland 4 to be filled by means of the dispenser apparatus 2 of Figure 1

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comprises a threaded outer connector 24 for threaded connection to an enclosure (not shown) and a compound tube 26 rotatably mounted within the outer connector 24. A cable connector 28 is mounted to the end of the cable 22 and is connected to the outer connector 24 by means of cooperating screw threads (not shown).

A ring 30 abuts the cable connector 28 and a flexible seal 32 is located around the inner conductors 20 of the cable 22 and compressed between the compound tube 26 and ring 30 for limiting the extent of penetration of curable material 6 into the cable gland 4 before curing of the curable material 6. The flexible seal 32 comprises a generally frusto-conical body of elastomeric material having an aperture (not shown) therethrough for engaging the central conductors 20 of the cable 22. The aperture in the seal 32 is sized such that it stretches to pass around the conductors 20 to tightly engage the conductors 20 to form a reasonably effective barrier to passage of the material 6 along the space defined between the conductors 20 and the compound tube 26.

Referring to Figure 3, a thread protector 34 formed of elastomeric material such as rubber is located over the external screw thread of the outer connector 24 of the cable gland 4 prior to filling of the cable gland with curable material 6. The thread protector 34 has a hollow rim 36 for catching excess curable material 6 which may flow out of end 40 of the cable gland 4 during the filling procedure, and an inner circular rim 38 which prevents penetration of curable material 6 into the gap between the outer connector 24 and the compound tube 26. This ensures that the compound tube 24



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complete with cable connectors 20 can be removed from the outer connector 24 after curing of the material 6.

The process of filling the cable gland 4 of Figures 2 and 3 by means of the dispenser apparatus 2 of Figure 1 will now be described.

In order to fill the core of the cable gland 4 with curable material, the flexible seal 32 initially placed over the core conductors 20 of the cable 22 so that the seal 32 tightly grips the conductors 20. The outer connector 24 with compound tube 26 are then mounted to the ring 30 and cable connector 28 to compress the seal 32 between the ring 30 and compound tube 26. As a result, the flexible seal 32 acts as a barrier to penetration of the curable liquid material 6 into the interior of the cable gland 4.

The first clamp 14 is then removed from the dispenser apparatus 2 and the second clamp 18 left in place, to enable thorough mixing of the first and second components of the curable liquid material 6. The first and second components are coloured blue and yellow respectively, a result of which the curable liquid material 6 is bright green when it is thoroughly mixed. The second clamp 18 is then removed, and the outlet of the nozzle 16 is placed at a location near the seal 32. The liquid material 6 is then dispensed through the nozzle 16 into the space between the conductors 20 of the cable 22 and into the space around the conductors 20 inside the compound tube 26 of the cable gland 4, where its movement along the axis of the cable gland 4 is restricted by the flexible seal 32. The location of the outlet of the nozzle 16 near the seal 32 causes air to be expelled from the cable gland when the curable liquid material 6 is dispensed from

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the nozzle 16. The seal 32 provides a sufficient barrier to penetration of the material 6 to hold back the curable material until it begins to gel and support itself. At the same time, the thread protector 34 protects the external thread of the outer connector 24 from excess curable material and prevents penetration of the liquid curable material between the outer connector 24 and the compound tube 26. The material 6 is arranged to change colour to dark green when it is cured, so that a visual indication is provided when the curing process is completed.

It will be appreciated by persons skilled in the art that the above embodiment has been described by way of example only, and not in any limitative sense, and that various alterations and modifications are possible without departure from the scope of the invention as defined by the appended claims.

## CLAIMS

1. A filler assembly for filling a cable gland, having a plurality of cores of at least one cable extending therethrough, with curable liquid material, the assembly comprising:

(a) a dispenser apparatus for a curable liquid material, the apparatus comprising:-

a body adapted to define at least one first chamber for accommodating a first component of a curable liquid material, and at least one second chamber for accommodating a second component of said curable liquid material and adapted to communicate with at least one said first chamber to enable mixing of said first and second components to initiate curing of said curable liquid material;

first barrier means for temporarily preventing mixing of said first and second components;

elongate dispenser means adapted to communicate with at least one said second chamber and to dispense said mixed curable liquid material therefrom between a plurality of cores of at least one cable; and

second barrier means for temporarily preventing passage of said curable liquid material from the or each said second chamber to said dispenser means; and

(b) at least one barrier member for restricting the extent of penetration of said curable liquid material along said cores.

2. An assembly according to claim 1, wherein said body is flexible.

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3. An assembly according to claim 1 or 2, wherein the first and/or second barrier means comprises at least one releasable clamp.

4. An assembly according to any one of the preceding claims, further comprising a first component of a curable liquid material in at least one said first chamber, and a second component of said curable liquid material in at least one said second chamber.

5. An assembly according to claim 5, wherein the curable liquid material is adapted to change colour as a result of curing thereof.

6. An assembly according to any one of the preceding claims, further comprising a cover member for covering an external screw thread of a cable gland to prevent said curable liquid material coming into contact with said screw thread.

7. An assembly according to claim 6, wherein the cover member is adapted to prevent curable liquid material from penetrating an end face of the cable gland.

8. An assembly according to any one of the preceding claims, wherein at least one said barrier member comprises a respective flexible member having at least one aperture therethrough for engaging at least one core of at least one cable.

9. An assembly according to any one of the preceding claims, wherein at least one said barrier member has a respective tapering portion.

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10. A method of filling a cable gland with curable liquid material by means of an assembly according to any one of the preceding claims, the method comprising:

locating at least one said barrier member in the cable gland;  
and

locating an outlet of said dispenser means in said cable gland and dispensing curable liquid material therefrom so as to expel air from the cable gland.

11. A method according to claim 10, wherein the step of locating at least one said barrier member in the cable gland comprises locating at least one said barrier member around at least one said core of at least one said cable.

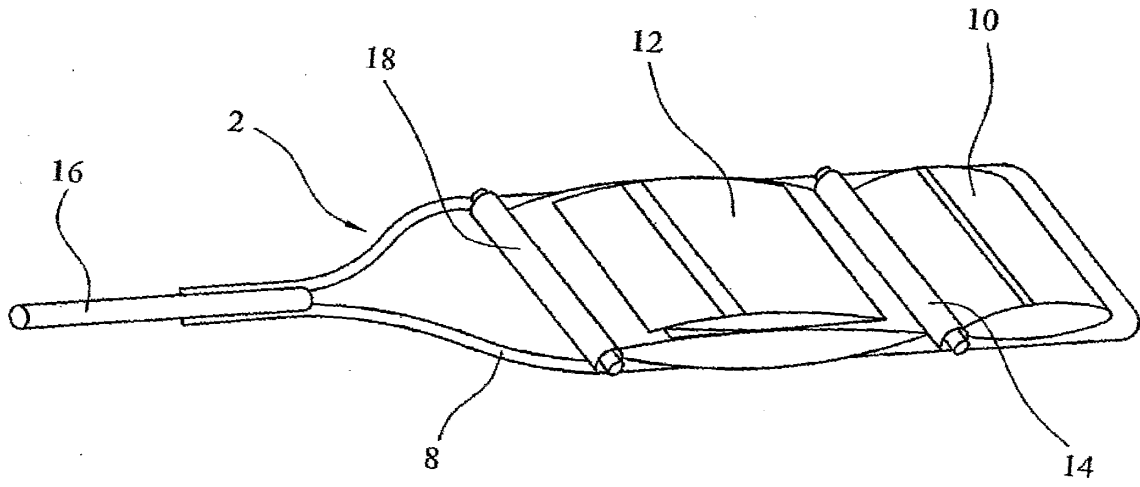


FIG. 1

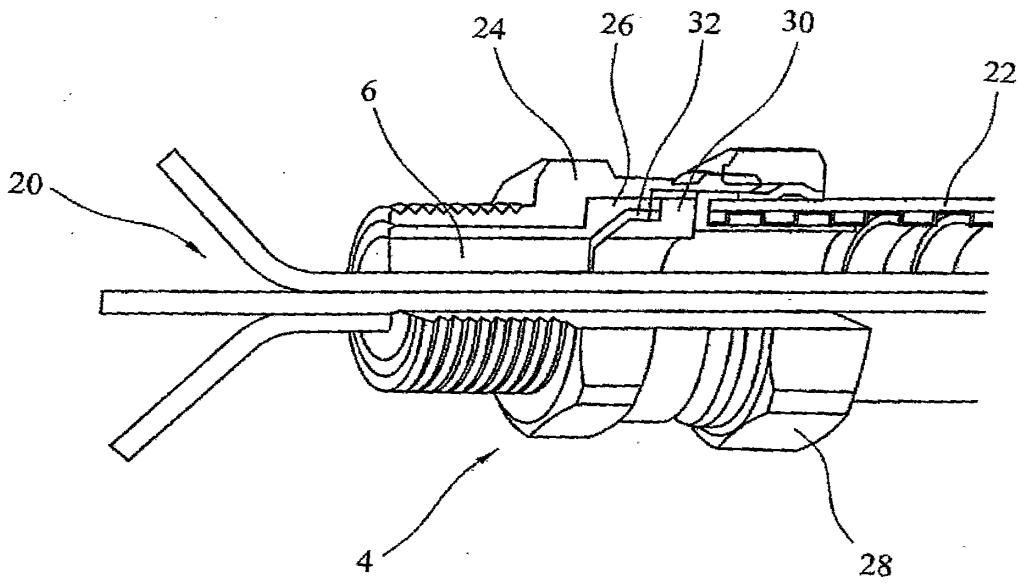


FIG. 2

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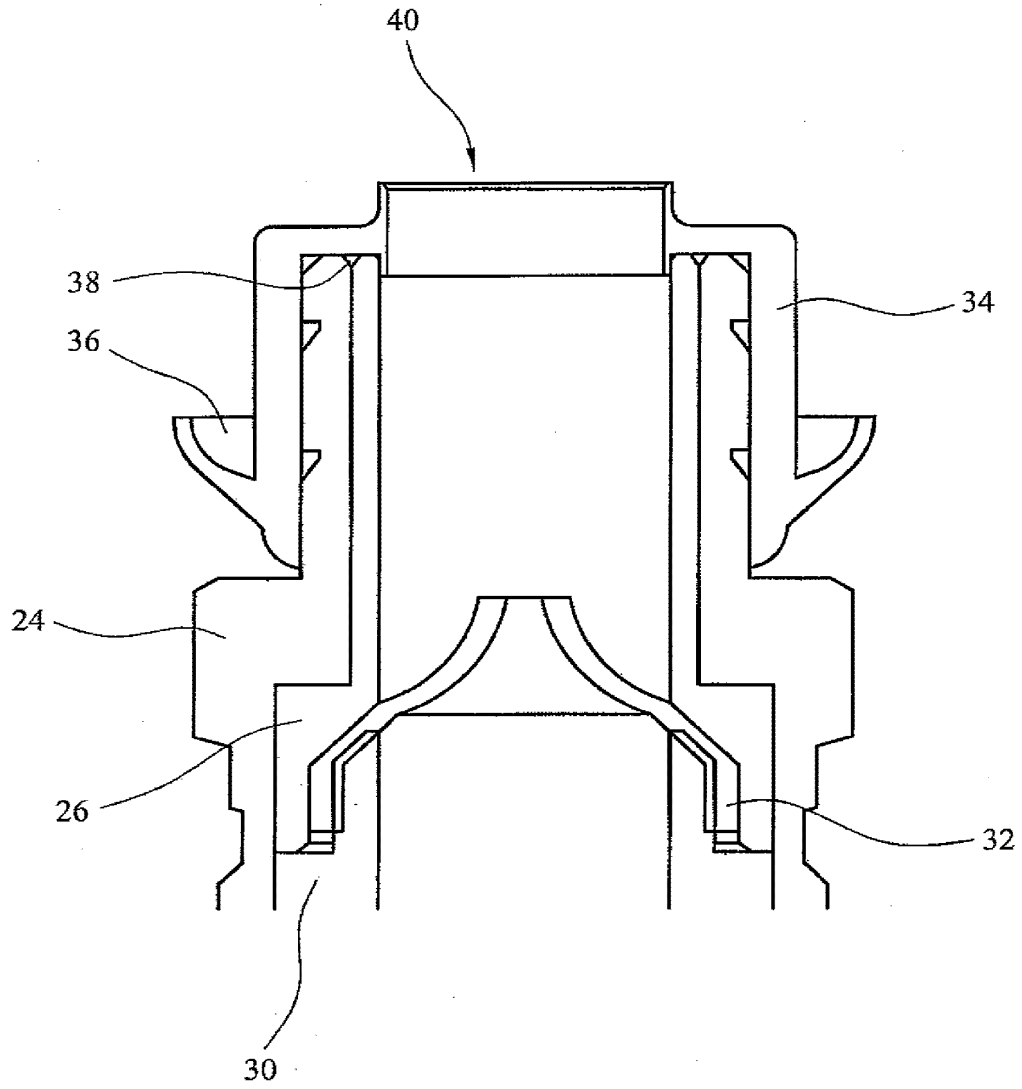


FIG. 3

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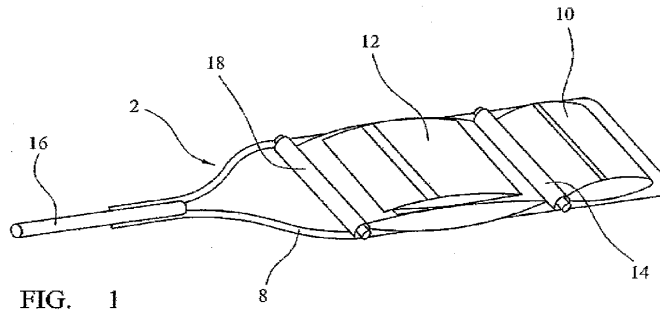
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(57) Abstract: A dispenser apparatus (2) for a curable liquid material is disclosed. The apparatus comprises a flexible bag (8) defining a first compartment (10) for accommodating a first component of a curable liquid material, and a second compartment (12) for accommodating a second component of the curable liquid material and adapted to communicate with the first chamber to enable mixing of the first and second components to initiate curing of the curable liquid material. A first clamp (14) temporarily prevents mixing of the first and second components, and an elongate nozzle (16) communicates with the second compartment to dispense the mixed curable liquid material therefrom. A second clamp (18) temporarily prevents passage of the curable liquid material from the second compartment to the nozzle.

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