

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

PATENT NO. : 9,109,309 B2  
APPLICATION NO. : 13/272977  
DATED : August 18, 2015  
INVENTOR(S) : Susan Walvius and Michelle Marciniak

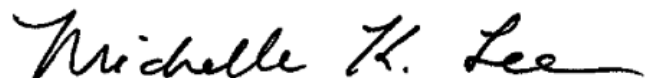
Page 1 of 1

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

Column 9, Line 23, In Claim 14, delete "breathability," and insert --breathability--, therefor.

Signed and Sealed this  
Fifth Day of January, 2016



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

BEDGEAR 1008

IPR of U.S. Pat. No. 8,402,580

000001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor	: Susan Walvius	Art Unit	: 3673
Patent No.	: 9,109,309	Examiner	: Nicholas F. Polito
Issue Date	: August 18, 2015	Conf. No.	: 4915
Serial No.	: 13/272,977		
Filed	: October 13, 2011		
Title	: FABRIC SYSTEM		

Attention Certificate of Corrections Branch  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

REQUEST FOR CERTIFICATE OF CORRECTION

Please issue a certificate of correction in accordance with the attached form.

The error to be corrected was made in printing by the Patent and Trademark Office, and no fee is believed to be due.

Apply any other necessary charges or credits to Deposit Account 06- 1050, referencing the above attorney docket number.

Respectfully submitted,

Date: September 11, 2015 \_\_\_\_\_

/Frank L. Gerratana/  
Frank L. Gerratana  
Reg. No. 62,653

Customer Number 26161  
Fish & Richardson P.C.  
Telephone: (617) 542-5070  
Facsimile: (877) 769-7945

23435862.doc

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

Page 1 of 1

PATENT NO. : 9,109,309  
APPLICATION NO.: 13/272,977  
ISSUE DATE : August 18, 2015  
INVENTOR(S) : Susan Walvius and Michelle Marciniak

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:

Column 9, Line 23, In Claim 14, delete "breathability," and insert -- breathability--, therefor.

**MAILING ADDRESS OF SENDER (Please do not use customer number below):**

Fish & Richardson P.C.  
P.O. Box 1022  
Minneapolis, MN 55440-1022

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 selection option2.*

000003

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	23467203
<b>Application Number:</b>	13272977
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4915
<b>Title of Invention:</b>	Fabric System
<b>First Named Inventor/Applicant Name:</b>	Susan Walvius
<b>Customer Number:</b>	26161
<b>Filer:</b>	Frank L. Gerratana/jennifer franco
<b>Filer Authorized By:</b>	Frank L. Gerratana
<b>Attorney Docket Number:</b>	29712-0002003
<b>Receipt Date:</b>	11-SEP-2015
<b>Filing Date:</b>	13-OCT-2011
<b>Time Stamp:</b>	14:12:34
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Certificate of Correction	trans-cert.pdf	110361 <small>e7ffbfd5be3f9fe7146b9e84092ffe54c6ad5637</small>	no	2

### Warnings:

### Information:

000004



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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/272,977	08/18/2015	9109309	29712-0002003	4915

26161 7590 07/29/2015  
FISH & RICHARDSON P.C. (BO)  
P.O. BOX 1022  
MINNEAPOLIS, MN 55440-1022

**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):

Susan Walvius, Chapin, SC;  
Michelle Marciniak, Irmo, SC;

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).

Substitute Form PTO-1449 (Modified)  <b>Information Disclosure Statement by Applicant</b>  Change(s) applied (Use several sheets if necessary) to document (37 CFR §1.98(b))  /R.K.G./ 7/13/2011	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 29712-0002003	Application No. Unknown
	Applicant Susan Walvius et al.		Filing Date Unknown
			Group Art Unit Unknown

**U.S. Patent Documents**

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	1	6,381,779	05/07/02	Thompson			
	2	5,817,391	10/06/98	Rock et al.			
5765241	3	<del>6,765,241</del>	06/16/98	Macdonald			

**Foreign Patent Documents or Published Foreign Patent Applications**

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	4	EP 2 344 691	07/20/11	EPO				
	5	JP 11309183	11/09/99	Japan				
	6	WO2010/037082	04/01/10	WIPO				

**Other Documents (include Author, Title, Date, and Place of Publication)**

Examiner Initial	Desig. ID	Document
	7	Voluntary Amendment from corresponding Australian patent application no. 2009296195, filed April 12, 2011 (11 pages).
	8	International Preliminary Report on Patentability issued by the Korean Intellectual Property Office for related PCT Patent Application No. PCT/US2009/058716 dated April 7, 2011 (6 pages).
	9	International Search Report and Written Opinion issued by the Korean Intellectual Property Office for related PCT Patent Application No. PCT/US2009/058716 dated April 29, 2010.

Examiner Signature /Nicholas Polito/	Date Considered 12/21/2011
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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)

26161 7590 07/06/2015

FISH & RICHARDSON P.C.  
P.O. BOX 1022  
MINNEAPOLIS, MN 55440-1022

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.

	(Depositor's name)
	(Signature)
	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/272,977	10/13/2011	Susan Walvius	29712-0002003	4915

TITLE OF INVENTION: FABRIC SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	LARGE	\$960	\$0		\$960	10/06/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
POLITO, NICHOLAS F.	3673	005-495000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

"Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 Fish & Richardson P.C.

(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 \_\_\_\_\_

3 \_\_\_\_\_

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 SHEEX, Inc. (B) RESIDENCE: (CITY and STATE OR COUNTRY) Irmo, SC

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

4a. The following fee(s) are submitted:

Issue Fee

Publication Fee (No small entity discount permitted)

Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)

A check in the amount of the fee(s) is enclosed.

Payment by credit card. Form PTO-2038 is attached.

The Director is hereby authorized to charge the required fee(s), or credit any overpayment, to Deposit Account Number 06-1050

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

Applicant certifying micro entity status. See 37 CFR 1.29 **NOTE:** Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

Applicant asserting small entity status. See 37 CFR 1.27. **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.

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

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above. NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Frank L. Gerratana/ Date July 9, 2015

Typed or printed name Frank L. Gerratana Registration No. 62,653

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13272977			
<b>Filing Date:</b>	13-Oct-2011			
<b>Title of Invention:</b>	Fabric System			
<b>First Named Inventor/Applicant Name:</b>	Susan Walvius			
<b>Filer:</b>	Frank L. Gerratana/jennifer franco			
<b>Attorney Docket Number:</b>	29712-0002003			
Filed as Large Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</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

000009

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



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	22871728
<b>Application Number:</b>	13272977
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4915
<b>Title of Invention:</b>	Fabric System
<b>First Named Inventor/Applicant Name:</b>	Susan Walvius
<b>Customer Number:</b>	26161
<b>Filer:</b>	Frank L. Gerratana/Devon Weide
<b>Filer Authorized By:</b>	Frank L. Gerratana
<b>Attorney Docket Number:</b>	29712-0002003
<b>Receipt Date:</b>	09-JUL-2015
<b>Filing Date:</b>	13-OCT-2011
<b>Time Stamp:</b>	16:06:18
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$960
RAM confirmation Number	2625
Deposit Account	061050
Authorized User	FISH & RICHARDSON P C

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

000011

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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Post Allowance Communication - Incoming	response.pdf	66404 4ecca79a32d57ebfcb558c3e8854ee5c90e d10b	no	2

**Warnings:**

**Information:**

2	Issue Fee Payment (PTO-85B)	transmittal.pdf	108384 47e564f89a41b94c8aaf8fc34938b367911f5 297	no	1
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**Warnings:**

**Information:**

3	Fee Worksheet (SB06)	fee-info.pdf	30123 5e8e6e9ec018c5d183735be274c187d17d 7088c	no	2
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**Warnings:**

**Information:**

<b>Total Files Size (in bytes):</b>			204911		
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**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.**





First Named Inventor : Susan Walvius  
Serial No. : 13/272,977  
Filed : October 13, 2011  
Page : 2 of 2

Attorney's Docket No.: 29712-0002003

Respectfully submitted,

Date: July 9, 2015\_\_\_\_\_

/Frank L. Gerratana/\_\_\_\_\_  
Frank L. Gerratana  
Reg. No. 62,653

Customer Number 26161  
Fish & Richardson P.C.  
Telephone: (617) 542-5070  
Facsimile: (877) 769-7945

23412873.doc



NOTICE OF ALLOWANCE AND FEE(S) DUE

26161 7590 07/06/2015
FISH & RICHARDSON P.C. (BO)
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER
POLITO, NICHOLAS F
ART UNIT PAPER NUMBER

3673
DATE MAILED: 07/06/2015

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/272,977 10/13/2011 Susan Walvius 29712-0002003 4915

TITLE OF INVENTION: Fabric System

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 10/06/2015

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)

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.

26161 7590 07/06/2015  
**FISH & RICHARDSON P.C. (BO)**  
 P.O. BOX 1022  
 MINNEAPOLIS, MN 55440-1022

**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.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/272,977	10/13/2011	Susan Walvius	29712-0002003	4915

TITLE OF INVENTION: Fabric System

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	10/06/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
POLITO, NICHOLAS F	3673	005-495000

<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>
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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 undiscouted 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. \_\_\_\_\_



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.
13/272,977 10/13/2011 Susan Walvius 29712-0002003 4915

26161 7590 07/06/2015
FISH & RICHARDSON P.C. (BO)
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER

POLITO, NICHOLAS F

ART UNIT PAPER NUMBER

3673

DATE MAILED: 07/06/2015

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> 13/272,977	<b>Applicant(s)</b> WALVIUS ET AL.	
	<b>Examiner</b> Nicholas Polito	<b>Art Unit</b> 3673	<b>AIA (First Inventor to File) Status</b> 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 amendment filed 6/18/2015.  
 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 33,35-37,53-67 and 70-104. 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 type="checkbox"/> Examiner's Amendment/Comment                             |
| 2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____ | 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 _____                              |  |

/Nicholas Polito/  
Primary Examiner, Art Unit 3673



Art Unit: 3673

## DETAILED ACTION

### *Allowable Subject Matter*

1. Claims 33, 35-37, 53-67 and 70-104 are allowed.
2. The following is an examiner's statement of reasons for allowance:
  - a. Regarding claim 33, the allowable subject matter of previously objected to claim 34 has been successfully incorporated into independent claim 33, on which claim 34 depended.
  - b. Regarding claim 61, the allowable subject matter of previously objected to claim 69 has been successfully incorporated into independent claim 61, on which claim 69 depended.
  - c. Claim 78 is a substantial duplicate of claim 33 except written as a method instead of an apparatus.
  - d. Claim 90 is a substantial duplicate of claim 61 except written as a method instead of an apparatus.
  - e. All remaining claims depend on the independent claims above.

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."



Art Unit: 3673

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicholas Polito whose telephone number is (571)270-5923. The examiner can normally be reached on Monday-Friday 9:30-6:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Cuomo can be reached on (571) 272-6856. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. 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, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nicholas Polito/

Primary Examiner, Art Unit 3673

6/27/2015

<b>Search Notes</b>  	<b>Application/Control No.</b>  13272977	<b>Applicant(s)/Patent Under Reexamination</b>  WALVIUS ET AL.
	<b>Examiner</b>  NICHOLAS POLITO	<b>Art Unit</b>  3673

CPC- SEARCHED		
Symbol	Date	Examiner
A47G 9/023, 0238, 0246	6/27/2015	NP
D04B 1/18	6/27/2015	NP
D10B 2503/062	6/27/2015	NP

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
5	482 - 484, 486, 496, 497, 499 - 502	12/21/2011	NP
	Above Search Updated	5/22/2012	NP
	Above Search Updated	7/9/2013	NP
	Above Search Updated	3/28/2014	NP
	Above Search Updated	12/14/2014	NP
	Above Search Updated	6/27/2015	NP

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Search History Attached	12/21/2011	NP
EAST Search History Attached	5/22/2012	NP
EAST Search History Attached	7/9/2013	NP
EAST Search History Attached	3/28/2014	NP
EAST Search History Attached	12/14/2014	NP
EAST Search History Attached	6/27/2015	NP

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/NICHOLAS POLITO/ Primary Examiner.Art Unit 3673
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### INTERFERENCE SEARCH

US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	See Attached EAST Search History	6/27/2015	NP

/NICHOLAS POLITO/  
Primary Examiner.Art Unit 3673



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BIB DATA SHEET

CONFIRMATION NO. 4915

<b>SERIAL NUMBER</b> 13/272,977	<b>FILING or 371(c) DATE</b> 10/13/2011 <b>RULE</b>	<b>CLASS</b> 005	<b>GROUP ART UNIT</b> 3673	<b>ATTORNEY DOCKET NO.</b> 29712-0002003	
<b>APPLICANTS</b> <b>INVENTORS</b> Susan Walvius, Chapin, SC; Michelle Marciniak, Irmo, SC; <b>** CONTINUING DATA *****</b> This application is a CON of 12/569,659 09/29/2009 PAT 8566982 which claims benefit of 61/101,049 09/29/2008 <b>** FOREIGN APPLICATIONS *****</b> <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 10/27/2011					
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and /NICHOLAS F POLITO/ Acknowledged Examiner's Signature	<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> SC	<b>SHEETS DRAWINGS</b> 4	<b>TOTAL CLAIMS</b> 28	<b>INDEPENDENT CLAIMS</b> 4
<b>ADDRESS</b> FISH & RICHARDSON P.C. (BO) P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022 UNITED STATES					
<b>TITLE</b> Fabric System					
<b>FILING FEE RECEIVED</b> 2280	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

Substitute Disclosure Form  <b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary)  (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 29712-0002003	Application No. 13/272,977
	Applicant Susan Walvius et al.		Filing Date October 13, 2011
			Group Art Unit 3673

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	1	2005/0273930	12-2005	Phillipps			
	2	8,566,982	10-2013	Walvius et. al.			

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	3	AU 2009296195	2/20/2014	Australia				
	4	AU 2012202375	2/20/2014	Australia				
	5	CN 1308150	8/15/2001	China				
	6	CN 2456671	10/31/2001	China				
	7	CN 101155847	4/02/2008	China				
	8	JP8256891	10/08/1996	China				
	9	WO 2006/086715	8/17/2006	WIPO				
	10	WO 2014/150901	9/25/2014	WIPO				
	11	CA 2738658	9/17/2013	Canada				

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	12	Chinese Office Action with English translation from corresponding Chinese Application No. 200980147643.6 issued May 17, 2013 (35 pages).
	13	Long, Hairu, "Knitting Technology", English translation included, China Textile & Apparel Press, 1 <sup>st</sup> Edition, pages 12-13, June 2008 (9 pages).
	14	Response to Office Action dated May 27, 2013 in Canadian Application No. 2738658, filed with the Office on June 17, 2013 (20 pages).
	15	Response to Chinese Office Action with English translation from Chinese Application No. 200980147643.6 issued May 17, 2013, filed September 1, 2013 (7 pages).
	16	Chinese Office Action with English translation from Chinese Application 200980147643.6 issued December 6, 2013 (10 pages).
	17	Chinese Office Action with English translation from Chinese Application 200980147643.6 issued July 28, 2014 (37 pages).
	18	Chinese Office Action from Chinese Application 201110443469.9 issued December 20, 2013 (12 pages).
	19	Chinese response with English translation to Chinese Office Action issued December 20, 2013, filed on July 2, 2014 from Chinese application 201110443469.9 (30 pages).

Examiner Signature /Nicholas Polito/	Date Considered 06/27/2015
---	-------------------------------

EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Disclosure Form  <b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary)  (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office		Attorney Docket No. 29712-0002003	Application No. 13/272,977
	Applicant Susan Walvius et al.			
	Filing Date October 13, 2011		Group Art Unit 3673	

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	20	Chinese Office Action with English translation issued in Chinese Application no. 201110443469.9 on October 10, 2014 (38 pages).
	21	Chinese Response to Office Action with English translation in Chinese application no. 200980147643.6 filed on October 11, 2014 (39 pages).
	22	Chinese Reasons for Rejection with English Translation issued in Chinese Application no. 200980147643.6 on November 18, 2014 (42 pages).

Examiner Signature  /Nicholas Polito/	Date Considered  06/27/2015
---	-----------------------------------

EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



<b>Index of Claims</b>  	<b>Application/Control No.</b> 13272977	<b>Applicant(s)/Patent Under Reexamination</b> WALVIUS ET AL.
	<b>Examiner</b> NICHOLAS POLITO	<b>Art Unit</b> 3673

✓	<b>Rejected</b>
=	<b>Allowed</b>

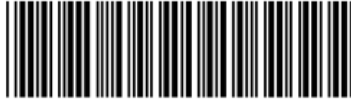
-	<b>Cancelled</b>
÷	<b>Restricted</b>

<b>N</b>	<b>Non-Elected</b>
<b>I</b>	<b>Interference</b>

<b>A</b>	<b>Appeal</b>
<b>O</b>	<b>Objected</b>

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

CLAIM		DATE								
Final	Original	11/09/2011	12/21/2011	05/22/2012	07/09/2013	03/28/2014	12/14/2014	06/27/2015		
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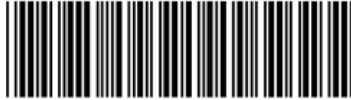
<b>Index of Claims</b>  	<b>Application/Control No.</b>  13272977	<b>Applicant(s)/Patent Under Reexamination</b>  WALVIUS ET AL.
	<b>Examiner</b>  NICHOLAS POLITO	<b>Art Unit</b>  3673

✓	<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	11/09/2011	12/21/2011	05/22/2012	07/09/2013	03/28/2014	12/14/2014	06/27/2015		
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	38	÷	N	N	N	N	-	-		
	39	÷	N	N	N	N	-	-		
	40	÷	N	N	N	N	-	-		
	41	÷	✓	✓	✓	✓	✓	-		
	42					✓	✓	-		
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	68					✓	-	-		
	69					O	O	-		
20	70					✓	✓	=		
21	71					✓	✓	=		
22	72					✓	✓	=		



<b>Index of Claims</b> 	<b>Application/Control No.</b> 13272977	<b>Applicant(s)/Patent Under Reexamination</b> WALVIUS ET AL.
	<b>Examiner</b> NICHOLAS POLITO	<b>Art Unit</b> 3673

✓	<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	11/09/2011	12/21/2011	05/22/2012	07/09/2013	03/28/2014	12/14/2014	06/27/2015			
23	73					○	○	=			
24	74					✓	✓	=			
25	75					✓	✓	=			
26	76							=			
27	77							=			
28	78							=			
29	79							=			
30	80							=			
31	81							=			
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33	83							=			
34	84							=			
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36	86							=			
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40	90							=			
41	91							=			
42	92							=			
43	93							=			
44	94							=			
45	95							=			
46	96							=			
47	97							=			
48	98							=			
49	99							=			
50	100							=			
51	101							=			
52	102							=			
53	103							=			
54	104							=			

**EAST Search History****EAST Search History (Prior Art)**


Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2	((("20050273930") or ("8566982")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/27 14:50
L2	856	(D04B1/18 or A47G9/0246 or D10B2503/062).cpc.	US-PGPUB; USPAT	OR	OFF	2015/06/27 15:28
L3	2273	5/482-484,486,499-502.ccls.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/27 15:28
L4	654	L2 not L3	US-PGPUB; USPAT	OR	OFF	2015/06/27 15:28
L5	40	L3 and @pd> "20141201"	US-PGPUB; USPAT	OR	OFF	2015/06/27 15:29
L6	258	A47G9/023,0238.cpc.	US-PGPUB; USPAT	OR	OFF	2015/06/27 15:30
L7	744	(L2 or L6) not L3	US-PGPUB; USPAT	OR	OFF	2015/06/27 15:30

**EAST Search History (Interference)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L8	6	bed sheet fabric (circle or circularly) knit\$4 gauge elastic\$4 sag circumference	USPAT; UPAD	AND	ON	2015/06/27 16:09

6/ 27/ 2015 4:10:30 PM

C:\Users\npolito\Documents\EAST\Workspaces\13272977.wsp

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13272977	<b>Applicant(s)/Patent Under Reexamination</b> WALVIUS ET AL.
	<b>Examiner</b> NICHOLAS POLITO	<b>Art Unit</b> 3673

CPC						
Symbol					Type	Version
D04B		1		18	F	2013-01-01
A47G		9		0238	A	2013-01-01
A47G		9		0246	I	2013-01-01
D10B		2503		062	A	2013-01-01


CPC Combination Sets					
Symbol		Type	Set	Ranking	Version

NONE		<b>Total Claims Allowed:</b>	
		54	
(Assistant Examiner)	(Date)	O.G. Print Claim(s)	O.G. Print Figure
/NICHOLAS POLITO/ Primary Examiner. Art Unit 3673	06/27/2015	33	1
(Primary Examiner)	(Date)		

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13272977	<b>Applicant(s)/Patent Under Reexamination</b> WALVIUS ET AL.
	<b>Examiner</b> NICHOLAS POLITO	<b>Art Unit</b> 3673

US ORIGINAL CLASSIFICATION					INTERNATIONAL CLASSIFICATION									
CLASS		SUBCLASS			CLAIMED					NON-CLAIMED				
					A	4	7	G	9 / 02 (2006.01.01)					
<b>CROSS REFERENCE(S)</b>														
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)													

NONE		<b>Total Claims Allowed:</b>	
		54	
(Assistant Examiner) _____ /NICHOLAS POLITO/ Primary Examiner. Art Unit 3673	(Date)	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	06/27/2015	33	1
	(Date)		

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13272977	<b>Applicant(s)/Patent Under Reexamination</b> WALVIUS ET AL.
	<b>Examiner</b> NICHOLAS POLITO	<b>Art Unit</b> 3673

<input checked="" type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input checked="" type="checkbox"/> CPA		<input checked="" 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	33	17	65	33	83	49	99								
2	35	18	66	34	84	50	100								
3	36	19	67	35	85	51	101								
4	37	20	70	36	86	52	102								
5	53	21	71	37	87	53	103								
6	54	22	72	38	88	54	104								
7	55	23	73	39	89										
8	56	24	74	40	90										
9	57	25	75	41	91										
10	58	26	76	42	92										
11	59	27	77	43	93										
12	60	28	78	44	94										
13	61	29	79	45	95										
14	62	30	80	46	96										
15	63	31	81	47	97										
16	64	32	82	48	98										

NONE		<b>Total Claims Allowed:</b>	
		54	
(Assistant Examiner)	(Date)	O.G. Print Claim(s)	O.G. Print Figure
/NICHOLAS POLITO/ Primary Examiner. Art Unit 3673	06/27/2015	33	1
(Primary Examiner)	(Date)		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor :	Susan Walvius	Art Unit :	3673
Serial No. :	13/272,977	Examiner :	Nicholas F. Polito
Filed :	October 13, 2011	Conf. No. :	4915
Title :	FABRIC SYSTEM		

**Mail Stop Amendment**

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

REPLY TO ACTION OF DECEMBER 18, 2014

Amendments to the claims (replacing all prior versions):

1-32. (Canceled)

33. (Currently Amended) A bed sheet at least ~~[[72.5]]~~ 90 inches wide comprising a first fabric area where a majority of an individual body rests when the bed sheet is on a bed,

the first fabric area comprising a fabric circularly knit at 17 gauges or higher and including a high performance man-made fiber,

the fabric having an elasticity such that the fabric has a tendency to sag by an amount that is greater than a threshold amount of sag determined by a finishing process, such that the sag would interfere with the finishing process if the fabric were circularly knit at greater than a 72.5 inch circumference.

34. (Canceled)

35. (Currently Amended) The bed sheet of claim 33 in which the bed sheet comprises at least two joined portions of the circularly knit fabric ~~joined to form a finished fabric~~.

36. (Previously Presented) The bed sheet of claim 33 in which the fabric comprises polyurethanepolyurea copolymer fiber.

37. (Previously Presented) The bed sheet of claim 36 in which the polyurethanepolyurea copolymer fiber is included in the fabric in a proportion such that, if circularly knit at a high gauge, the fabric could be knit at no more than a 72.5 inch circumference without losing integrity of the polyurethanepolyurea copolymer fiber.

38 - 52. (Canceled)

53. (Previously Presented) The bed sheet of claim 33, comprising piping.
54. (Previously Presented) The bed sheet of claim 33 being stretchable to fit at least two of a standard rectangular adult bed, a baby crib, and a marine bed.
55. (Previously Presented) The bed sheet of claim 33 having dimensions of approximately 102 inches in length and approximately 91 inches in width.
56. (Currently Amended) The bed sheet of claim 33 comprising an element that can be ~~enched~~ adjusted to increase tension around an edge of the bed sheet.
57. (Previously Presented) The bed sheet of claim 33 in which the first fabric area has a width of a twin size bed.
58. (Previously Presented) The bed sheet of claim 33 in which the first fabric area has a width of a full size bed.
59. (Previously Presented) The bed sheet of claim 33 in which the first fabric area has a width of a queen size bed.
60. (Previously Presented) The bed sheet of claim 33 in which the first fabric area has a width of a king size bed.
61. (Currently Amended) A bed sheet at least ~~[[72.5]]~~ 90 inches wide comprising a first fabric area where the majority of an individual body rests when the bed sheet is placed on a bed,  
the first fabric area comprising a fabric that a) includes polyurethanepolyurea copolymer fiber and b) has been circularly knit at 17 gauges or higher,



the polyurethanepolyurea copolymer fiber included in the fabric in a proportion such that, if circularly knit at a high gauge, the fabric could be knit at no more than a 72.5 inch circumference without losing integrity of the polyurethanepolyurea copolymer fiber.

62. (Currently Amended) The bed sheet of claim 61 in which the polyurethanepolyurea copolymer fiber included in the fabric in a proportion such that the fabric has ~~at least one of~~ higher breathability, ~~higher heat transfer, and higher moisture-wicking characteristics~~ than a cotton fabric.

63. (Previously Presented) The bed sheet of claim 61 in which the first fabric area has a width of a twin size bed.

64. (Previously Presented) The bed sheet of claim 61 in which the first fabric area has a width of a full size bed.

65. (Previously Presented) The bed sheet of claim 61 in which the first fabric area has a width of a queen size bed.

66. (Previously Presented) The bed sheet of claim 61 in which the first fabric area has a width of a king size bed.

67. (Previously Presented) The bed sheet of claim 61 in which the first fabric area is at least 72.5 inches wide.

68-69. (Canceled)

70. (Currently Amended) The bed sheet of claim 61 in which the bed sheet comprises at least two joined portions of the circularly knit fabric ~~joined to form a finished fabric~~.

71. (Previously Presented) The bed sheet of claim 61, comprising piping.

72. (Previously Presented) The bed sheet of claim 61 being stretchable to fit at least two of a standard rectangular adult bed, a baby crib, and a marine bed.

73. (Currently Amended) The bed sheet of claim 61 having dimensions of approximately 102 inches in length ~~and approximately 91 inches in width.~~

74. (Currently Amended) The bed sheet of claim 61 comprising an element that can be ~~enched~~ adjusted to increase tension around an edge of the bed sheet.

75. (Previously Presented) The bed sheet of claim 61 in which the fabric has an elasticity such that the fabric has a tendency to sag by an amount that is greater than a threshold amount of sag determined by a finishing process, such that the sag would interfere with the finishing process if the fabric were circularly knit at greater than a 72.5 inch circumference.

76. (New) The bed sheet of claim 61 in which the polyurethanepolyurea copolymer fiber included in the fabric in a proportion such that the fabric has higher heat transfer than a cotton fabric.

77. (New) The bed sheet of claim 61 in which the polyurethanepolyurea copolymer fiber included in the fabric in a proportion such that the fabric has higher moisture wicking characteristics than a cotton fabric.

78. (New) A method of producing a bed sheet at least 90 inches wide comprising forming a fabric having a first area where a majority of an individual body rests when the bed sheet is on a bed,

the first area comprising a fabric circularly knit at 17 gauges or higher and including a high performance man-made fiber,

the fabric having an elasticity such that the fabric has a tendency to sag by an amount that is greater than a threshold amount of sag determined by a finishing process, such that the sag

would interfere with the finishing process if the fabric were circularly knit at greater than a 72.5 inch circumference.

79. (New) The method of claim 78 comprising joining at least two portions of circularly knit fabric.

80. (New) The method of claim 78 in which the fabric comprises polyurethanepolyurea copolymer fiber.

81. (New) The method of claim 80 in which the polyurethanepolyurea copolymer fiber is included in the fabric in a proportion such that, if circularly knit at a high gauge, the fabric could be knit at no more than a 72.5 inch circumference without losing integrity of the polyurethanepolyurea copolymer fiber.

82. (New) The method of claim 78 in which the bed sheet comprises piping.

83. (New) The method of claim 78 in which the bed sheet is stretchable to fit at least two of a standard rectangular adult bed, a baby crib, and a marine bed.

84. (New) The method of claim 78 in which the bed sheet has dimensions of approximately 102 inches in length.

85. (New) The method of claim 78 in which the bed sheet comprises an element that can be adjusted to increase tension around an edge of the bed sheet.

86. (New) The method of claim 78 in which the first area has a width of a twin size bed.

87. (New) The method of claim 78 in which the first area has a width of a full size bed.

88. (New) The method of claim 78 in which the first area has a width of a queen size bed.

89. (New) The method of claim 78 in which the first area has a width of a king size bed.

90. (New) A method of producing a bed sheet at least 90 inches wide comprising forming a fabric having a first area where the majority of an individual body rests when the bed sheet is placed on a bed,

the first area comprising a fabric that a) includes polyurethanepolyurea copolymer fiber and b) has been circularly knit at 17 gauges or higher,

the polyurethanepolyurea copolymer fiber included in the fabric in a proportion such that, if circularly knit at a high gauge, the fabric could be knit at no more than a 72.5 inch circumference without losing integrity of the polyurethanepolyurea copolymer fiber.

91. (New) The method of claim 90 in which the polyurethanepolyurea copolymer fiber is included in the fabric in a proportion such that the fabric has higher breathability than a cotton fabric.

92. (New) The method of claim 90 in which the polyurethanepolyurea copolymer fiber included in the fabric in a proportion such that the fabric has higher heat transfer than a cotton fabric.

93. (New) The method of claim 90 in which the polyurethanepolyurea copolymer fiber included in the fabric in a proportion such that the fabric has higher moisture wicking characteristics than a cotton fabric.

94. (New) The method of claim 90 in which the first area has a width of a twin size bed.

95. (New) The method of claim 90 in which the first area has a width of a full size bed.

96. (New) The method of claim 90 in which the first area has a width of a queen size bed.

97. (New) The method of claim 90 in which the first area has a width of a king size bed.

98. (New) The method of claim 90 in which the first area is at least 72.5 inches wide.

99. (New) The method of claim 90 comprising joining at least two portions of circularly knit fabric.

100. (New) The method of claim 90, in which the bed sheet comprises piping.

101. (New) The method of claim 90 in which the bed sheet is stretchable to fit at least two of a standard rectangular adult bed, a baby crib, and a marine bed.

102. (New) The method of claim 90 in which the bed sheet has dimensions of approximately 102 inches in length.

103. (New) The method of claim 90 in which the bed sheet comprises an element that can be cinched to increase tension around an edge of the bed sheet.

104. (New) The method of claim 90 in which the fabric has an elasticity such that the fabric has a tendency to sag by an amount that is greater than a threshold amount of sag determined by a finishing process, such that the sag would interfere with the finishing process if the fabric were circularly knit at greater than a 72.5 inch circumference.

First Named Inventor : Susan Walvius  
Serial No. : 13/272,977  
Filed : October 13, 2011  
Page : 9 of 9

Attorney's Docket No.: 29712-0002003

### REMARKS

Claims 14-16, 20-27, 33, 35-37, 41-49, 53-67, 70-72, 74 and 75 stand rejected under pre-AIA 35 U.S.C. 102 or 35 U.S.C. 103. Claims 17, 18, 28-32, 34, 55, 69 and 73 stand objected to but would be allowable if rewritten in independent form.

The applicant thanks the examiner for the finding of allowable subject matter. Independent claims 33 and 61 have been amended to incorporate the subject matter of allowed dependent claims 34 and 69, respectively. Accordingly, amended independent claims 33 and 61, and their respective dependent claims, are believed to be in condition for allowance. Independent claims 14 and 41 and their dependents have been canceled without prejudice or disclaimer, and the application reserves the right to pursue any or all of the canceled claims in a continuation application.

Independent claims 78 and 90 and their dependents are new, and are also believed to be in condition for allowance for substantially the same reasons as independent claims 33 and 61 and their dependents.

Any circumstance in which the applicant has (a) addressed certain comments of the examiner does not mean that the applicant concedes other comments of the examiner, (b) made arguments for the patentability of some claims does not mean that there are not other good reasons for patentability of those claims and other claims, or (c) amended or canceled a claim does not mean that the applicant concedes any of the examiner's positions with respect to that claim or other claims. Please apply any other charges or credits to deposit account 06-1050, referencing attorney docket 29712-0002003.

Respectfully submitted,

Date: June 18, 2015 \_\_\_\_\_

/Frank L. Gerratana/  
Frank L. Gerratana  
Reg. No. 62,653

Customer Number 26161  
Fish & Richardson P.C.  
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Facsimile: (877) 769-7945

23369606.doc

000042



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor :	Susan Walvius	Art Unit :	3673
Serial No. :	13/272,977	Examiner :	Nicholas F. Polito
Filed :	October 13, 2011	Conf. No. :	4915
Title :	FABRIC SYSTEM		

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

PETITION FOR THREE-MONTH EXTENSION OF TIME UNDER 37 C.F.R. §1.136

Please extend the period for response to the action dated December 18, 2014, for three months to and including June 18, 2015.

The fees of \$1400 are being paid with this petition. In addition, please apply any other necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: June 18, 2015 \_\_\_\_\_

/Frank L. Gerratana/ \_\_\_\_\_  
Frank L. Gerratana  
Reg. No. 62,653

Customer Number 26161  
Fish & Richardson P.C.  
Telephone: (617) 542-5070  
Facsimile: (877) 769-7945

23405441.doc

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13272977			
<b>Filing Date:</b>	13-Oct-2011			
<b>Title of Invention:</b>	Fabric System			
<b>First Named Inventor/Applicant Name:</b>	Susan Walvius			
<b>Filer:</b>	Frank L. Gerratana/jennifer franco			
<b>Attorney Docket Number:</b>	29712-0002003			
Filed as Large Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</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>				

000044



Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 3 months with \$0 paid	1253	1	1400	1400
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>1400</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	22671696
<b>Application Number:</b>	13272977
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4915
<b>Title of Invention:</b>	Fabric System
<b>First Named Inventor/Applicant Name:</b>	Susan Walvius
<b>Customer Number:</b>	26161
<b>Filer:</b>	Frank L. Gerratana/jennifer franco
<b>Filer Authorized By:</b>	Frank L. Gerratana
<b>Attorney Docket Number:</b>	29712-0002003
<b>Receipt Date:</b>	18-JUN-2015
<b>Filing Date:</b>	13-OCT-2011
<b>Time Stamp:</b>	14:21:13
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 1400
RAM confirmation Number	609
Deposit Account	061050
Authorized User	FISH & RICHARDSON P C

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

000046

<b>File Listing:</b>					
<b>Document Number</b>	<b>Document Description</b>	<b>File Name</b>	<b>File Size(Bytes)/ Message Digest</b>	<b>Multi Part /.zip</b>	<b>Pages (if appl.)</b>
1		response.pdf	78893 c9a6d7936bf8b49bffbfc04b6150e330f1aa424c	yes	9
<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	
		Claims	2	8	
		Applicant Arguments/Remarks Made in an Amendment	9	9	
<b>Warnings:</b>					
<b>Information:</b>					
2	Extension of Time	ext.pdf	46867 8bf9cf972c0cb4031c900c9d7820bafac21d1f	no	1
<b>Warnings:</b>					
<b>Information:</b>					
3	Fee Worksheet (SB06)	fee-info.pdf	30177 071ba759c96e3ed10ebbe02d2d66d18a4add866	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			155937		

**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> Substitute for Form PTO-875	Application or Docket Number <b>13/272,977</b>	Filing Date <b>10/13/2011</b>	<input type="checkbox"/> To be Mailed
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ENTITY:  LARGE  SMALL  MICRO

**APPLICATION AS FILED – PART I**

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A	
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>	minus 20 = *		X \$ =	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 = *		X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE <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 <small>(37 CFR 1.16(j))</small>				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

**APPLICATION AS AMENDED – PART II**

	(Column 1)	(Column 2)	(Column 3)	RATE (\$)	ADDITIONAL FEE (\$)	
<b>AMENDMENT</b>	<b>06/18/2015</b>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
	Total <small>(37 CFR 1.16(i))</small>	* 54	Minus	** 61	= 0	
	Independent <small>(37 CFR 1.16(h))</small>	* 4	Minus	***4	= 0	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>					
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>					
				TOTAL ADD'L FEE	<b>0</b>	

	(Column 1)	(Column 2)	(Column 3)	RATE (\$)	ADDITIONAL FEE (\$)	
<b>AMENDMENT</b>		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>					
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>					
				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  
/FELICIA R. FARMER/

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Substitute Disclosure Form  <b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary)  (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 29712-0002003	Application No. 13/272,977
	Applicant Susan Walvius et al.		
	Filing Date October 13, 2011		Group Art Unit 3673

U.S. Patent Documents							
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	1	2005/0273930	12-2005	Phillipps			
	2	8,566,982	10-2013	Walvius et. al.			

Foreign Patent Documents or Published Foreign Patent Applications								
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							Yes	No
	3	AU 2009296195	2/20/2014	Australia				
	4	AU 2012202375	2/20/2014	Australia				
	5	CN 1308150	8/15/2001	China				
	6	CN 2456671	10/31/2001	China				
	7	CN 101155847	4/02/2008	China				
	8	JP8256891	10/08/1996	China				
	9	WO 2006/086715	8/17/2006	WIPO				
	10	WO 2014/150901	9/25/2014	WIPO				
	11	CA 2738658	9/17/2013	Canada				

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	12	Chinese Office Action with English translation from corresponding Chinese Application No. 200980147643.6 issued May 17, 2013 (35 pages).
	13	Long, Hairu, "Knitting Technology", English translation included, China Textile & Apparel Press, 1 <sup>st</sup> Edition, pages 12-13, June 2008 (9 pages).
	14	Response to Office Action dated May 27, 2013 in Canadian Application No. 2738658, filed with the Office on June 17, 2013 (20 pages).
	15	Response to Chinese Office Action with English translation from Chinese Application No. 200980147643.6 issued May 17, 2013, filed September 1, 2013 (7 pages).
	16	Chinese Office Action with English translation from Chinese Application 200980147643.6 issued December 6, 2013 (10 pages).
	17	Chinese Office Action with English translation from Chinese Application 200980147643.6 issued July 28, 2014 (37 pages).
	18	Chinese Office Action from Chinese Application 201110443469.9 issued December 20, 2013 (12 pages).
	19	Chinese response with English translation to Chinese Office Action issued December 20, 2013, filed on July 2, 2014 from Chinese application 201110443469.9 (30 pages).

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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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	20	Chinese Office Action with English translation issued in Chinese Application no. 201110443469.9 on October 10, 2014 (38 pages).
	21	Chinese Response to Office Action with English translation in Chinese application no. 200980147643.6 filed on October 11, 2014 (39 pages).
	22	Chinese Reasons for Rejection with English Translation issued in Chinese Application no. 200980147643.6 on November 18, 2014 (42 pages).

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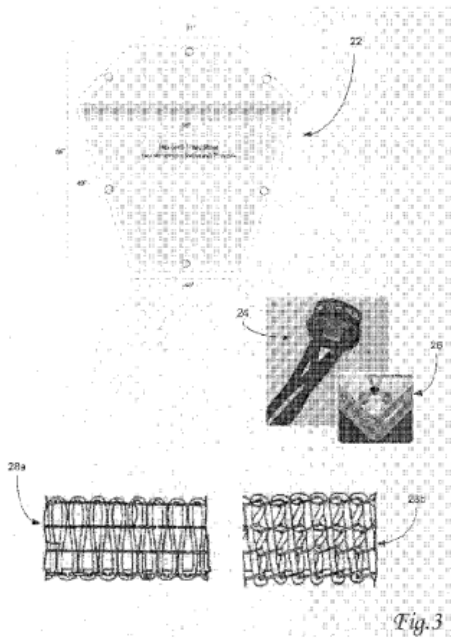
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(54) Title: FABRIC SYSTEM



(57) Abstract: Bedding material including a first fabric section manufactured from performance fabric and having a first and second side; and, a second fabric section attached to the first side of the first fabric section. Additionally, a third fabric section can be attached to the second side of the first fabric section. The first fabric section can be attached to the second fabric section through a flatlock stitch. The first fabric section can include a first zone and a second zone wherein the first zone contains different performance properties from the second zone and the first zone can have thermal or moisture wicking properties.

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## FABRIC SYSTEM

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates generally to fabric systems, and more specifically to bed coverings constructed of high gauge circular knitted fabrics that accommodate and maintain optimum thermal conditions for sleep, which in turn can lead to faster sleep initiation and deeper, more restorative sleep.

#### 2. Description of Related Art

Sleep problems in the United States are remarkably widespread, affecting roughly three out of four American adults, according to research by the National Sleep Foundation (NSF). Consequently, a great deal of attention has been paid to the circumstances surrounding poor sleep, along with strategies for how to improve it.

The implications are not merely academic. Sleep – not only the right amount of it but also the right quality – impacts not just day-to-day performance, but also “the overall quality of our lives,” according to the NSF. Addressing the causes of poor quality sleep, therefore, has ramifications for millions.

Though many factors contribute to sleep quality, the sleep environment itself plays a critical role, and sleep researchers routinely highlight temperature as one of the most important components in creating an environment for optimal sleep. As advised by the University of Maryland Medical Center, “a cool (not cold) bedroom is often the most conducive to sleep.” The National Sleep Foundation further notes that “temperatures above 75 degrees Fahrenheit and below 54 degrees will disrupt sleep,” with 65 degrees being the ideal sleep temperature for most individuals, according to the NSF.

A lower environmental temperature is not the only thermal factor associated with improved sleep. Researchers have noted a nightly drop in body temperature among healthy, normal adults during sleep. This natural cycle, when inhibited or not functioning properly, can disrupt sleep and delay sleep onset, according to medical researchers at Cornell University. Conversely, the researchers noted, a rapid decline in body temperature not only accelerates sleep onset but also “may facilitate an entry into the deeper stages of sleep.”

Therefore, maintaining an appropriately cool sleep environment and accommodating the body's natural tendency to cool itself at night should be a top priority for individuals interested in optimizing their sleep quality. Performance fabrics crafted into bedding applications would be uniquely capable of promoting cool, comfortable – and therefore better – sleep, as these advanced fabrics maximize breathability and heat transfer. Performance fabrics are made for a variety of end-use applications, and can provide multiple functional qualities, such as moisture management, UV protection, anti-microbial, thermo-regulation, and wind/water resistance.

There has been a long felt need in several industries to provide improved bedding to help individuals get better sleep. Such improved bedding would include beneficial wicking among other properties. For example, in marine, boating and recreational vehicle applications, bedding should resist moisture, fit odd-shaped mattresses and beds, and reduce mildew. Particularly with watercraft, there is a need to protect bedding, and specifically sheets, from moisture and mildew accumulation.

An additional problem with bedding, not just with marine and recreational vehicles, is the sticky, wet feeling that can occur when the bedding sheets are wet due to body sweat, environmental moisture, or other bodily fluids. In particular, when bedding is used during hot weather, or is continuously used for a long time by a person suffering from an illness, problems can arise in that the conventional bed sheet of cotton fiber or the like cannot sufficiently absorb the moisture. All of these issues lead to poor sleep.

To date, performance fabric bedding products are not known. There are width limitations in the manufacturing of high gauge circular knit fabrics, because the finished width of bedding fabrics are dictated by the machine used in its construction. At present, performance fabrics are manufactured with a maximum width of under 90 inches wide, given present manufacturing and technical limitations, along with the inability of alternate manufacturing processes to produce a fabric with identical performance attributes. Yet, normal bed sheet panels can be 102 by 91 inches or larger. Thus, performance fabrics cannot yet be used for bed sheets.

Some conventional solutions for the above issues that hinder a good night's sleep include United States Patent 4,648,186, which discloses an absorbent wood pulp cellulose fiber that is provided in a variety of sizes and is placed under a mattress. The wood pulp is water absorbent and acts to capture moisture to prevent such moisture from being retained by the bedding or the



bedding sheets. However, this proposed solution does not interact with the bedding or the bedding sheets, but merely acts as a sponge for moisture that is in proximity to the target bedding.

United States Patent 5,092,088 discloses a sheet-like mat comprised of a mat cover, the inside of which is divided into a plurality of bag-like spaces, and a drying agent packed into a bag and contained in the bag-like spaces in such a manner that the drying agent cannot fall out of the bag-like spaces. A magnesium sulfate, a high polymer absorbent, a silica gel or the like can be used as the drying agent. As can be seen, this proposed solution to moisture in bedding is cumbersome and chemically-based.

In the athletic apparel industry, moisture wicking fabric has been used to construct athletic apparel. For example, United States Patent 5,636,380 discloses a base fabric of CoolmaxQ high moisture evaporation fabric having one or more insulating panels of ThermaxB or ThermastatQ hollow core fiber fabric having moisture wicking capability and applied to the inner side of the garment for skin contact at selected areas of the body where muscle protection is desired. However, this application cannot be applied to bedding sheets due to the limitations of the size of the performance fabrics manufactured. Further, performance fabric such as this type cannot be easily stitched together as the denier is so fine that stitching this fabric results in the stitching simply falling apart.

Circular knitting is typically used for athletic apparel. The process includes circularly knitting yarns into fabrics. Circular knitting is a form of weft knitting where the knitting needles are organized into a circular knitting bed. A cylinder rotates and interacts with a cam to move the needles reciprocally for knitting action. The yarns to be knitted are fed from packages to a carrier plate that directs the yarn strands to the needles. The circular fabric emerges from the knitting needles in a tubular form through the center of the cylinder. This process is described in United States Patent 7,117,695. However, the machinery presently available for this method of manufacture can only produce a fabric with a maximum width of approximately 90 inches. Therefore, this process has not been known to manufacture sheets, since sheets can have dimensions of 91 inches by 102 inches or greater.

Further, the machinery that is used for bedding is very different than for athletic wear. For example, bedding manufacturing equipment is not equipped to sew flatlock stitching or to provide circular knitting. Bed sheets typically are knit using a process known as warp knitting, a

process capable of producing finished fabrics in the widths required for bedding. This method, however, cannot be employed to produce high-quality performance fabrics. Warp knitting is not capable of reproducing these fabrics' fine tactile qualities nor their omni-direction stretch properties, for example.

Circular knitting must be employed to produce a performance fabric that retains these fabric's full range of benefits and advantages. However, in order to produce a fabric of the proper width for bedding applications, a circular knit machine of at least 48 inches in diameter would be necessary. Manufacturing limitations therefore preclude the construction of performance fabrics at proper widths for bedding. The industry is unsure if it could actually knit and then finish performance fabrics at these large sizes, even if the machinery were readily available.

Further, athletic sewing factories are typically not equipped to sew and handle large pieces of fabrics so that equipment limitations do not allow for the manufacture of bedding sheets.

What is needed, therefore, is a bedding system that utilizes performance fabrics and their beneficial properties, the design of which acknowledges and addresses limitations in the manufacture of these fabrics. It is to such a system that the present invention is primarily directed.

#### **BRIEF SUMMARY OF THE INVENTION**

Briefly described, in preferred form, the present invention is a high gauge circular knit fabric for use in bedding, and a method for manufacturing such bedding. The bedding fabric has superior performance properties, while allowing for manufacture by machinery presently available and in use. In order to achieve a finished width of the size needed to create sheet-sized performance fabric, a high gauge circular knit machine of at least 48 inches in diameter is necessary. And while warp knitting machines are available that can produce wider fabrics, this method will not provide a fabric with the tactile qualities required, nor provide a fabric with omni-directional stretch.

In an exemplary embodiment, the present invention is a method of making a finished fabric comprising at least two discrete performance fabric portions, and joining at least two



discrete performance fabric portions to form the finished fabric. Forming the at least two discrete performance fabric portions can comprise knitting at least two discrete performance fabric portions, and more preferably, circular knitting at least two discrete performance fabric portions. Joining the at least two discrete performance fabric portions to form the finished fabric can comprise stitching at least two discrete performance fabric portions together to form the finished fabric.

The at least two discrete performance fabric portions can have different fabric characteristics. Fabric characteristics as used herein include, among other things, moisture management, UV protection, anti-microbial, thermo-regulation, wind resistance and water resistance.

The finished fabric can be used in, among other applications, residential settings, or in marine, boating and recreational vehicle environments.

The present sheets offer enhanced drape and comfort compared to traditional cotton bedding, and are as fine as silk, yet provide the benefits of high elasticity and recovery along with superior breathability, body-heat transport, and moisture management as compared to traditional cotton bedding.

Conventional fitted sheets can bunch and slide on standard mattress sizes. Furthermore, if the fitted bed sheets do not fit properly, they do not provide a smooth surface to lie on. The present invention overcomes these issues.

The present high gauge circular knit fabrics stretch to fit and offer superior recovery on the mattress allowing the fabric to conform to fit the mattress without popping off the corners of the mattress or billowing. The performance fabric can include spandex, offers a better fit than conventional bedding products, can accommodate larger or smaller mattress sizes with a single size sheet, and can conform to mattresses with various odd dimensions.

Spandex - or elastane - is a synthetic fiber known for its exceptional elasticity. It is stronger and more durable than rubber, its major non-synthetic competitor. It is a polyurethane-polyurea copolymer that was invented by DuPont. "Spandex" is a generic name, and an anagram of the word "expands." "Spandex" is the preferred name in North America; elsewhere it is

referred to as “elastane.” The most famous brand name associated with spandex is Lycra, a trademark of Invista.

The present high gauge circular knit fabric offers durability in reduced pilling and pulling when compared to other knit technologies, and offer reduced wrinkles and enhanced color steadfastness

In a preferred embodiment, the present performance fabric can allow for a one-size fitted sheet that can actually fit two different size mattresses. For example, the full fitted sheet of the present invention can fit on both the full and queen size bed. The twin fitted sheet of the present invention will also fit an XL twin. In a boating application, the present invention can be produced to fit almost every custom boat mattress.

Testing of the present invention conducted at the North Carolina State University (NCSU) Center for Research on Textile Protection and Comfort confirms that the present performance fabrics provide a cooler sleeping environment than cotton. Performance bedding was tested side-by-side with commercially available cotton bed sheets in a series of procedures designed to measure each product’s heat- and moisture-transport properties, as well as warm/cool-to-touch thermal transport capabilities.

Across all tests, the present performance fabrics in bedding outperformed cotton, demonstrating the performance fabric’s superiority in establishing and maintaining thermal comfort during sleep. This advantage is evident to users from the very onset, as NCSU testing indicates that, on average, performance bedding of the present invention offers improved heat transfer upon initial contact with the skin, resulting in a cooler-to-the-touch feeling.

During sleep, high gauge circular knit performance bedding of the present invention helps to maintain thermal comfort by trapping less body heat and breathing better than cotton. Testing has demonstrated that performance bedding made out of performance fabrics transfers heat away from the body up to two times more effectively than cotton. This is critically important not only for sustained comfort during sleep, but also in terms of enabling the body to cool itself as rapidly as possible to facilitate sleep onset. In addition to trapping less heat, performance bedding breathes better than cotton – up to 50% better, giving performance bedding a strong advantage in terms of ventilation and heat and moisture transfer.

The performance advantage over cotton holds true for simulated dry and wet skin conditions, confirming that certain performance fabrics in bedding are better suited than cotton at managing moisture (e.g., sweat) to maintain thermal comfort. In addition to wicking moisture away from the skin through capillary action, the performance fabric's advanced breathability further enables heat and moisture transfer through evaporative cooling. As a result, the user is kept cooler, drier and more comfortable than with cotton.

The present performance bedding holds a distinct advantage over cotton in enabling, accommodating and maintaining optimum thermal conditions for sleep, which in turn can lead to faster sleep initiation and deeper, more restorative sleep.

These and other objects, features and advantages of the present invention will become more apparent upon reading the following specification in conjunction with the accompanying drawings.

#### **BRIEF DESCRIPTION OF THE FIGURES**

**Fig. 1** illustrates a preferred embodiment of the present invention.

**Fig. 2** illustrates another preferred embodiment of the present invention.

**Fig. 3** illustrates a further preferred embodiment of the present invention.

**Fig. 4** illustrates another preferred embodiment of the present invention.

#### **DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS**

Although preferred embodiments of the invention are explained in detail, it is to be understood that other embodiments are contemplated. Accordingly, it is not intended that the invention is limited in its scope to the details of construction and arrangement of components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or carried out in various ways. Also, in describing the preferred embodiments, specific terminology will be resorted to for the sake of clarity.

It must also be noted that, as used in the specification and the appended claims, the singular forms "a," "an" and "the" include plural referents unless the context clearly dictates otherwise. For example, reference to a sheet or portion is intended also to include the

manufacturing of a plurality of sheets or portions. References to a sheet containing “a” constituent is intended to include other constituents in addition to the one named.

Also, in describing the preferred embodiments, terminology will be resorted to for the sake of clarity. It is intended that each term contemplates its broadest meaning as understood by those skilled in the art and includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

Ranges may be expressed herein as from “about” or “approximately” one particular value and/or to “about” or “approximately” another particular value. When such a range is expressed, another embodiment includes from the one particular value and/or to the other particular value.

By “comprising” or “containing” or “including” is meant that at least the named compound, element, particle, or method step is present in the composition or article or method, but does not exclude the presence of other compounds, materials, particles, method steps, even if the other such compounds, material, particles, method steps have the same function as what is named.

It is also to be understood that the mention of one or more method steps does not preclude the presence of additional method steps or intervening method steps between those steps expressly identified. Similarly, it is also to be understood that the mention of one or more components in a fabric or system does not preclude the presence of additional components or intervening components between those components expressly identified.

Referring now in detail to the drawing figures, wherein like reference numerals represent like parts throughout the several views, the present invention of **Figs. 1 and 4** provides a sheet **10** shown having dimensions of 102 inches in length and 91 inches in width. The material is manufactured from performance fabric, which can include, for example, varying amounts of one or more of Lycra, Coolmax, Thermax and Thermostat. In a preferred embodiment, the fabric is treated so that the fabric has antimicrobial properties. By using circular-knit performance fabric, the fabric is able to provide elasticity in all four directions. This property allows for the sheet to fit extraordinary mattress, cushion and bedding shapes, as well as providing better fits for traditional rectangular sheets. By using performance fabrics, the sheet has elastic properties that allow stretching in the directions shown as **30**. In addition, by using circular-knit performance



fabric, the resulting bedding retains an exceptionally fine tactile quality critical for providing maximum levels of enhanced comfort.

An alternative to circular knitting is non-circular knitting – for example, warp knitting. This method can achieve widths greater than circular knitting. Industrial warp knit machines, for example, can produce tricote warp knit fabrics up to 130-140 inches in width. Circular knitting, however, is less expensive, as it requires less set-up time. Circular knitting also provides greater multidirectional stretch.

In order to provide a sheet that exceeds the maximum dimensions of fabric that can be produced by available circular knitting machines, flat lock stitching **12** is used to join a plurality of portions resulting in a sheet that is 91 inches wide (as shown). In an exemplary embodiment, piping **11** can be included in close proximity to the stitching. The stitching can be the same color as the fabric of the sheet portions, or different color(s). The piping can be 3/4 inch straight piping without a cord or other filler. In one preferred embodiment, the stitching is 16 stitches per inch. Piping **11** can be included at one end of the sheet and can be the same or a different color as the sheet fabric.

For a fitted sheet, the sheet can include an elastic portion surrounding the edge of the fitted sheet to better keep the fitted sheet in place when placed on a mattress or other sleeping surface. A cord can be sewn into the edge of the fitted sheet and cinched around the mattress or other sleeping surface to better hold the fitted sheet in place.

Referring to **Fig. 2**, a sheet is shown having dimensions of 91 inches wide and 102 inches in length. In this embodiment, stitching **14** is shown 34 inches from an interior edge **18** of a main portion **16** and another stitch **14** at edge **20** of the sewn-on portion. Flat lock stitching can be used for the stitching. Piping can be applied at or in proximity to the stitching.

Referring to **Fig. 3**, a non-rectangular shaped sheet is shown. In this exemplary embodiment, elastic can be included around the edge of the fitted sheet to better maintain the fitted sheet in position when placed on a sleeping surface. In one embodiment, pull ties **24** can be installed at various locations around the edge of the fitted sheet in order to assist in maintaining the fitted sheet secured to the sleeping surface. The pull tie can be cinched to increase tension around the edge of the fitted sheet as shown by **26**.

Stitching used for securing the portions of the sheet together can include that shown as **28a**. In another embodiment, the stitching used for securing the portion of fabric together is shown as **28b**.

Referring to **Fig. 4**, yet another preferred embodiment of the invention is shown. In this embodiment, the sheet can be assembled through stitching of differing fabrics for generating performance zones in the sheet. For example, zone **32** can have higher wicking properties than the other zones since this area is where the majority of the individual body rests. Areas **34a** through **34d** can have higher spandex or other elastic fabric properties so that the fit around a sleeping surface is improved. Area **36** may have thermal properties such as increased cooling since this area is generally where the individual's head lies. In an exemplary embodiment, the pillow covers of pillows used by the individual also have differing properties from the remainder of the sheet, e.g., thermal properties.

The present invention encompasses the construction of bedding materials that have superior performance properties while allowing for manufacture by machinery presently available and in use. More specifically, the invention is related to a new method for fabricating a covering and or sheets in bedding. When using the circular knitting machine, the high gauge performance fabrics can only be made to a maximum size of 72.5 inches without losing the integrity of the spandex in the fabric. Yet, normal sheet panels are 102 x 91 inches. This presents problems when manufacturing sheets from performance fabrics.

Additionally, special stitching techniques must be used given the thread density of the fabric. Using this special stitching, panels are sewn together to produce bedding or a sheet that is the proper size for standard bed sheets. Because discrete portions/panels are used in the manufacture of the present fabrics, panels can be selected that provide different properties for different areas of the bedding (**Fig. 4**). Stitching or seams on the sheet can also allow for the ease of making the bed. Because the bedding is made from performance fabric with spandex, it stretches to permit multiple and custom sizing for applications in cribs, recreational vehicles and boats.

Circular knitting machines used for high gauge performance bedding fabrics are called high-gauge circular knitting machines, because of dense knitting with thin yarn. High gauge generally denotes 17 gauges or more. Seventeen gauges indicate that 17 or more cylinder



needles are contained in one inch. Circular knitting machines of less than 17 gauges are referred to as low-gauge circular knitting machines. The low-gauge circular knitting machines are often used to knit outerwear.

“Yarn count” indicates the linear density (yarn diameter or fineness) to which that particular yarn has been spun. The choice of yarn count is restricted by the type of knitting machine employed and the knitting construction. The yarn count, in turn, influences the cost, weight, opacity, hand and drape of the resulting knitted structure. In general, staple spun yarns tend to be comparatively more expensive the finer their count, because finer fibers and a more exacting spinning process are necessary in order to prevent the yarn from showing an irregular appearance.

A top width in the 90-inch range is currently possible using a circular knit fabric formed on a 36-38-inch diameter machine, although higher levels of spandex in the performance fabric tend to pull the width in. In just one example, on a 30-inch diameter machine, the spandex can reduce an otherwise 94-inch circumference fabric tube to one with a 60-65 inch finished width.

A major limitation in finished width is not strictly a knitting concern but also concerns finishing. With performance fabric, it tends to sag in the middle – increasingly so with greater widths – making finishing difficult to impossible above a certain threshold. A possible 90-inch finished width is contingent upon having a good finishing set-up capable of handling the present performance fabric. This potential for difficulties would only become compounded at the larger widths required for bed sheets.

In a preferred process, the present fabric undergoes a heat setting finishing process. Applying a moisture-wicking finish to another fabric – like cotton – that can be produced at larger widths appears unlikely to match the moisture-control properties of the present fabric, as polyester itself is naturally moisture-resistant and there are physical actions (e.g. capillary action) at play. Further, the use of cotton comes at the expense of breathability and heat-transfer capabilities (as confirmed by laboratory testing) and stretchability.

Numerous characteristics and advantages have been set forth in the foregoing description, together with details of structure and function. While the invention has been disclosed in several forms, it will be apparent to those skilled in the art that many modifications, additions, and deletions, especially in matters of shape, size, and arrangement of parts, can be made therein

without departing from the spirit and scope of the invention and its equivalents as set forth in the following claims. Therefore, other modifications or embodiments as may be suggested by the teachings herein are particularly reserved as they fall within the breadth and scope of the claims here appended.

Reference to any prior art throughout this specification is not, and should not be taken as, an acknowledgement or any form of suggestion that such prior art forms part of the common general knowledge in Australia.

**CLAIMS:**

1. A method of making a finished fabric at least 90 inches wide comprising:  
forming at least two discrete performance fabric portions; and  
joining at least two discrete performance fabric portions to form the finished fabric, wherein at least one of the performance fabric portions has been circularly knit at 17 gauges or higher.
2. The method of claim 1, wherein forming at least two discrete performance fabric portions comprises knitting at least two discrete performance fabric portions.
3. The method of claim 1, wherein forming at least two discrete performance fabric portions comprises circular knitting at least one of the discrete performance fabric portions.
4. The method of claim 1, wherein joining at least two discrete performance fabric portions to form the finished fabric comprises stitching at least two discrete performance fabric portions together to form the finished fabric.
5. The method of claim 1, wherein the two discrete performance fabric portions are joined by flatlock stitching.
6. The method of claim 1, comprising  
heat setting finishing the joined at least two discrete fabric portions.
7. The method of claim 1 wherein the finished fabric comprises a bed sheet.
8. The method of claim 7, further comprising providing piping to the bed sheet.
9. The method according to claim 1, wherein the at least two discrete fabric portions have different fabric characteristics.
10. A method of making a finished fabric at least 90 inches wide comprising

circular knitting at least two discrete fabric portions;  
stitching at least two discrete fabric portions; and  
heat setting finishing the stitched at least two discrete fabric portions, wherein at least one of the discrete fabric portions includes a performance fabric portion that has been circularly knit at 17 gauges or higher.

11. A method of making a bed sheet at least 90 inches wide from performance fabric comprising:

circular knitting at least two discrete fabric portions; the two discrete fabric portions having different fabric characteristics including at least one of the following: moisture management, UV protection, anti-microbial, thermo-regulation, wind resistance, and water resistance;

stitching at least two discrete fabric portions together;

heat setting finishing the stitched at least two discrete fabric portions to form a finished bed sheet; and

providing piping to the finished bed sheet,

wherein at least one of the discrete fabric portions includes a performance fabric portion that has been circularly knit at 17 gauges or higher.

12. A finished fabric at least 90 inches wide comprising:

a first circular knitted fabric portion; and a second circular knitted fabric portion, at least one of the circular knitted fabric portions comprising a circular knitted performance fabric portion that has been circularly knit at 17 gauges or higher;

wherein the first and second fabric portions are discrete; and

wherein the first and second fabric portions are joined to form the finished fabric.

13. The finished fabric of claim 12, further comprising piping.

14. The finished fabric of claim 12, wherein the first and second fabrics have different fabric characteristics.

15. The finished fabric of claim 14, wherein at least one of the fabric characteristics comprises moisture management.

16. The finished fabric of claim 14, wherein at least one of the fabric characteristics comprises UV protection.
17. The finished fabric of claim 14, wherein at least one of the fabric characteristics comprises anti-microbial properties.
18. The finished fabric of claim 14, wherein at least one of the fabric characteristics comprises thermo-regulation.
19. The finished fabric of claim 14, wherein at least one of the fabric characteristics comprises wind resistance.
20. The finished fabric of claim 14, wherein at least one of the fabric characteristics comprises water resistance.
21. The finished fabric of claim 12, wherein the performance fabric portion comprises a man-made fiber that has higher breathability than a cotton fabric.
22. The finished fabric of claim 12, wherein the performance fabric portion comprises a man-made fiber that has higher heat transfer than a cotton fabric.
23. The finished fabric of claim 12, wherein the performance fabric portion comprises a man-made fiber that has higher moisture wicking characteristics than a cotton fabric.
24. The finished fabric of claim 12, having a gauge of at least 17 gauges.
25. The finished fabric of claim 12, comprising a bed sheet.
26. The finished fabric of claim 25, comprising a bed covered by the bed sheet.

27. The finished fabric of claim 25, wherein the bed sheet is sufficiently stretchable to fit a standard rectangular bed and a smaller, non-rectangular marine bed.

28. The finished fabric of claim 25, wherein the bed sheet is sufficiently stretchable to fit either a crib or a standard adult bed.

29. The finished fabric of claim 12, comprising a knit fabric that includes polyurethanepolyurea copolymer fiber.

30. The finished fabric of claim 29, wherein the polyurethanepolyurea copolymer fiber is included in the knit fabric in a proportion that, if circularly knit at a high gauge, the knit fabric could be knit at no more than a 72.5 inch circumference without losing integrity of the polyurethanepolyurea copolymer fiber.

31. The method of claim 1, wherein the performance fabric has an elasticity such that the performance fabric has a tendency to sag by an amount that is greater than a threshold amount of sag determined by a finishing process, such that the sag would interfere with the finishing process if the performance fabric were circularly knit at greater than a 72.5 inch circumference.

32. The method of claim 1, wherein the performance fabric comprises a synthetic material in a proportion such that the fabric could be circularly knit at no more than a 72.5 inch circumference without losing integrity of the fabric.

33. The finished fabric of claim 12, wherein the circular knitted performance fabric portion comprises a performance fabric that has an elasticity such that the performance fabric has a tendency to sag by an amount that is greater than a threshold amount of sag determined by a finishing process, such that the sag would interfere with the finishing process if the performance fabric were circularly knit at greater than a 72.5 inch circumference.

34. The finished fabric of claim 12, wherein the circular knitted performance fabric portion comprises a synthetic material in a proportion such that the fabric could be



circularly knit at no more than a 72.5 inch circumference without losing integrity of the fabric.

35. A method of making a finished fabric substantially as herein described.

36. A method of making a finished fabric at least 90 inches substantially as herein described.

37. A method of making a bed sheet at least 90 inches wide from performance fabric substantially as herein described.

38. A finished fabric at least 90 inches wide substantially as herein described.

39. A finished fabric comprising:

a first circular knitted fabric portion; and a second circular knitted fabric portion, at least one of the circular knitted fabric portions comprising a circular knitted performance fabric portion, and at least one of the circular knitted fabric portions comprising polyurethanepolyurea copolymer fiber;

wherein the first and second fabric portions are discrete; and

wherein the first and second fabric portions are joined to form the finished fabric.

40. The finished fabric of claim 39, wherein the polyurethanepolyurea copolymer fiber is included in the circular knitted fabric portion in a proportion that, if circularly knit at a high gauge, the circular knitted fabric portion could be knit at no more than a 72.5 inch circumference without losing integrity of the polyurethanepolyurea copolymer fiber.

41. A method of making a finished fabric comprising:

forming at least two discrete performance fabric portions; and

joining at least two discrete performance fabric portions to form the finished fabric,

wherein the performance fabric has an elasticity such that the performance fabric has a tendency to sag by an amount that is greater than a threshold amount of sag determined by a

finishing process, such that the sag would interfere with the finishing process if the performance fabric were circularly knit at greater than a 72.5 inch circumference.

42. A method of making a finished fabric comprising:  
forming at least two discrete performance fabric portions; and  
joining at least two discrete performance fabric portions to form the finished fabric,

wherein the performance fabric comprises a synthetic material in a proportion such that the fabric could be circularly knit at no more than a 72.5 inch circumference without losing integrity of the fabric.

43. A finished fabric comprising:  
a first circular knitted fabric portion; and a second circular knitted fabric portion, at least one of the circular knitted fabric portions comprising a circular knitted performance fabric portion;

wherein the circular knitted performance fabric portion comprises a performance fabric that has an elasticity such that the performance fabric has a tendency to sag by an amount that is greater than a threshold amount of sag determined by a finishing process, such that the sag would interfere with the finishing process if the performance fabric were circularly knit at greater than a 72.5 inch circumference;

wherein the first and second fabric portions are discrete; and

wherein the first and second fabric portions are joined to form the finished fabric.

44. The finished fabric of claim 43, wherein the finished fabric comprises a bed sheet.

45. The finished fabric of claim 43, wherein the performance fabric portion has at least one of higher breathability, higher heat transfer, or higher moisture wicking characteristics than a cotton fabric.

46. A finished fabric comprising:

a first circular knitted fabric portion; and a second circular knitted fabric portion, at least one of the circular knitted fabric portions comprising a circular knitted performance fabric portion;

wherein the circular knitted performance fabric portion comprises a synthetic material in a proportion such that the fabric could be circularly knit at no more than a 72.5 inch circumference without losing integrity of the fabric;

wherein the first and second fabric portions are discrete; and

wherein the first and second fabric portions are joined to form the finished fabric.

47. The finished fabric of claim 46, wherein the finished fabric comprises a bed sheet.

48. The finished fabric of claim 46, wherein the performance fabric portion has at least one of higher breathability, higher heat transfer, or higher moisture wicking characteristics than a cotton fabric.

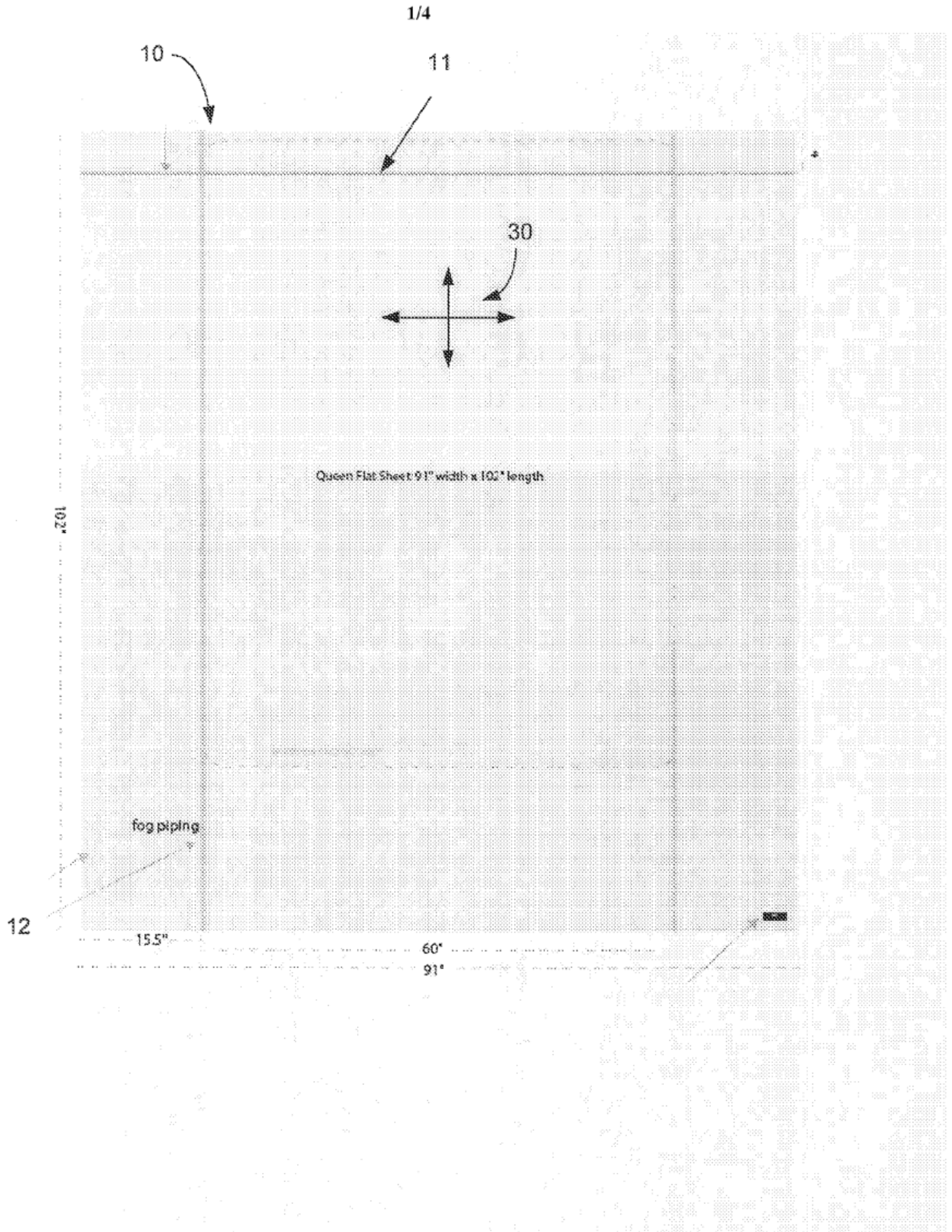


Fig. 1



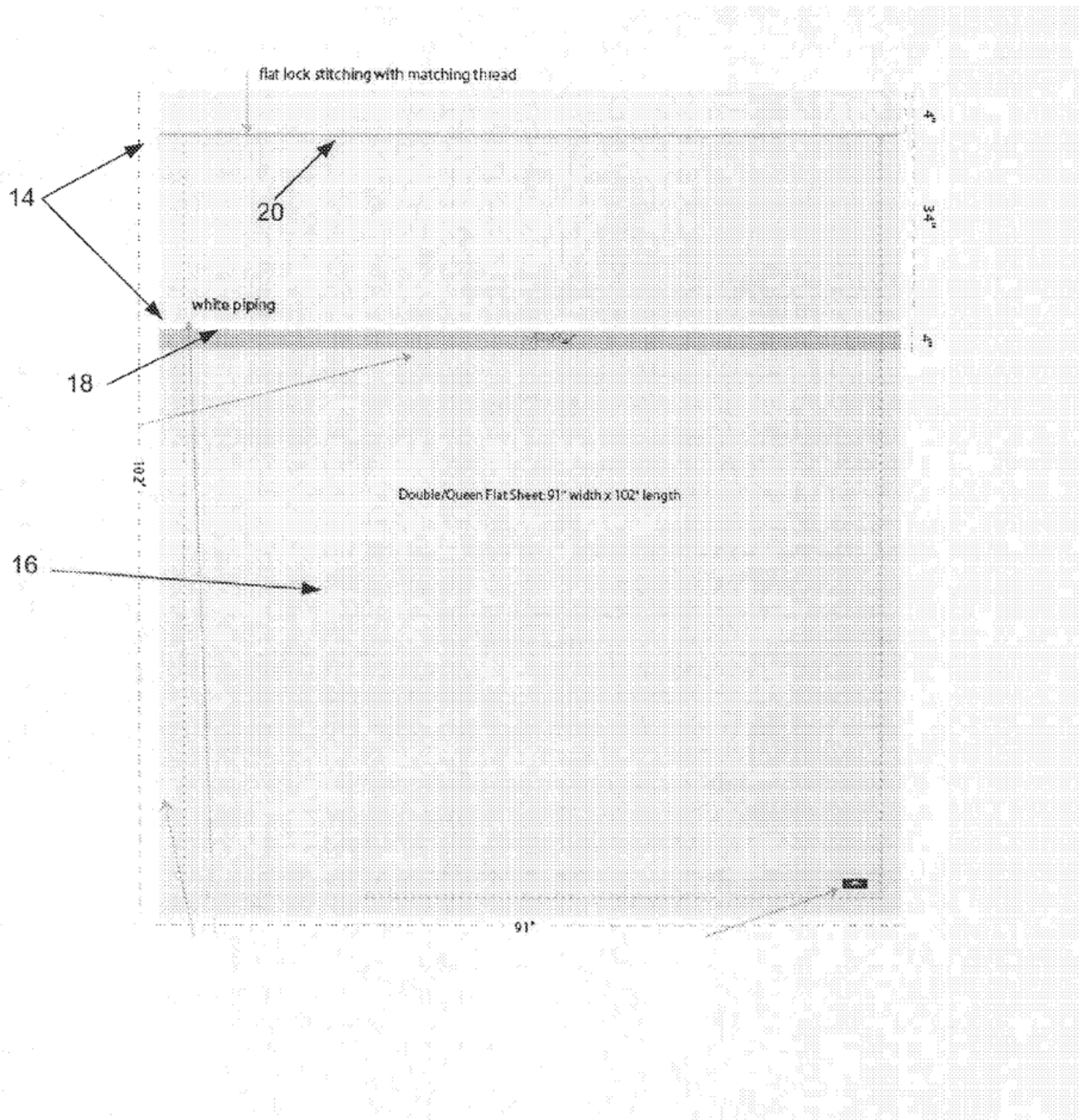


Fig. 2

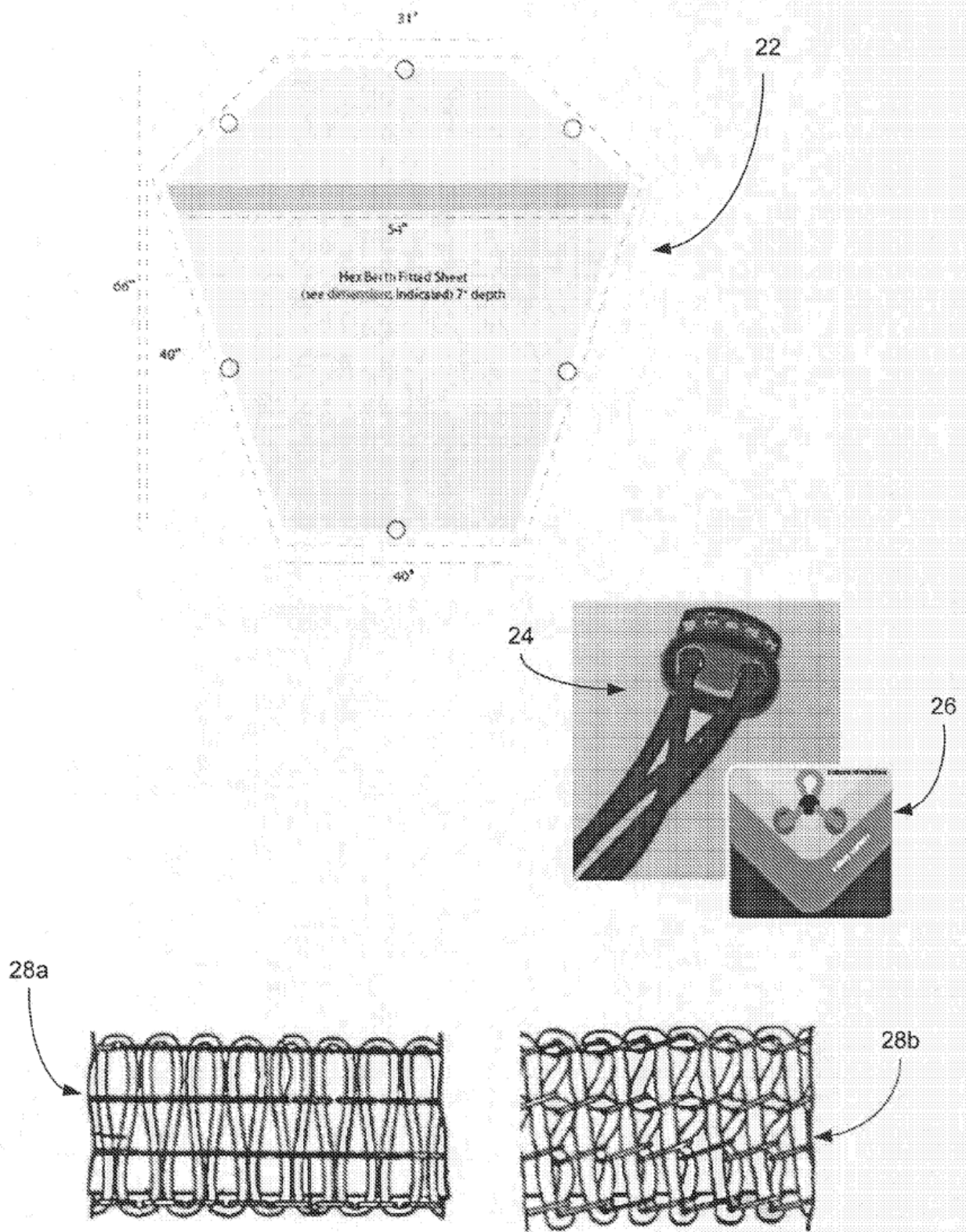


Fig. 3



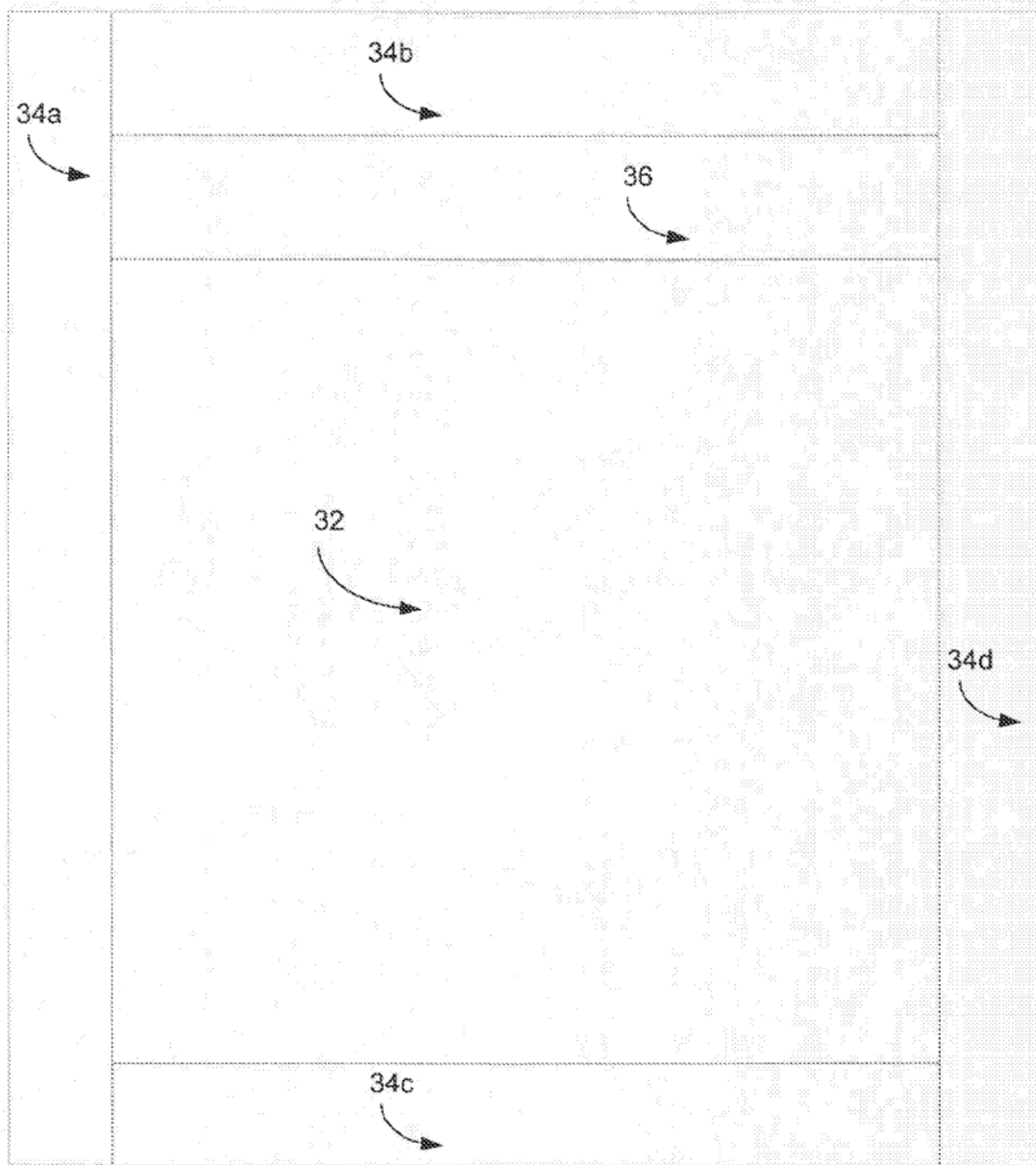


Fig.4

**(12) STANDARD PATENT**  
**(19) AUSTRALIAN PATENT OFFICE**

(11) Application No. **AU 2012202375 B2**

(54) Title  
**Fabric system**

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(56) Related Art  
**US 6,381,779 B1**  
**JP 11-309183 A**  
**US 6,823,548 B2**

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ABSTRACT

Bedding material including a first fabric section manufactured from performance fabric and having a first and second side; and, a second fabric section attached to the first side of the first fabric section. Additionally, a third fabric section can be attached to the second side of the first fabric section. The first fabric section can be attached to the second fabric section through a flatlock stitch. The first fabric section can include a first zone and a second zone wherein the first zone contains different performance properties from the second zone and the first zone can have thermal or moisture wicking properties.

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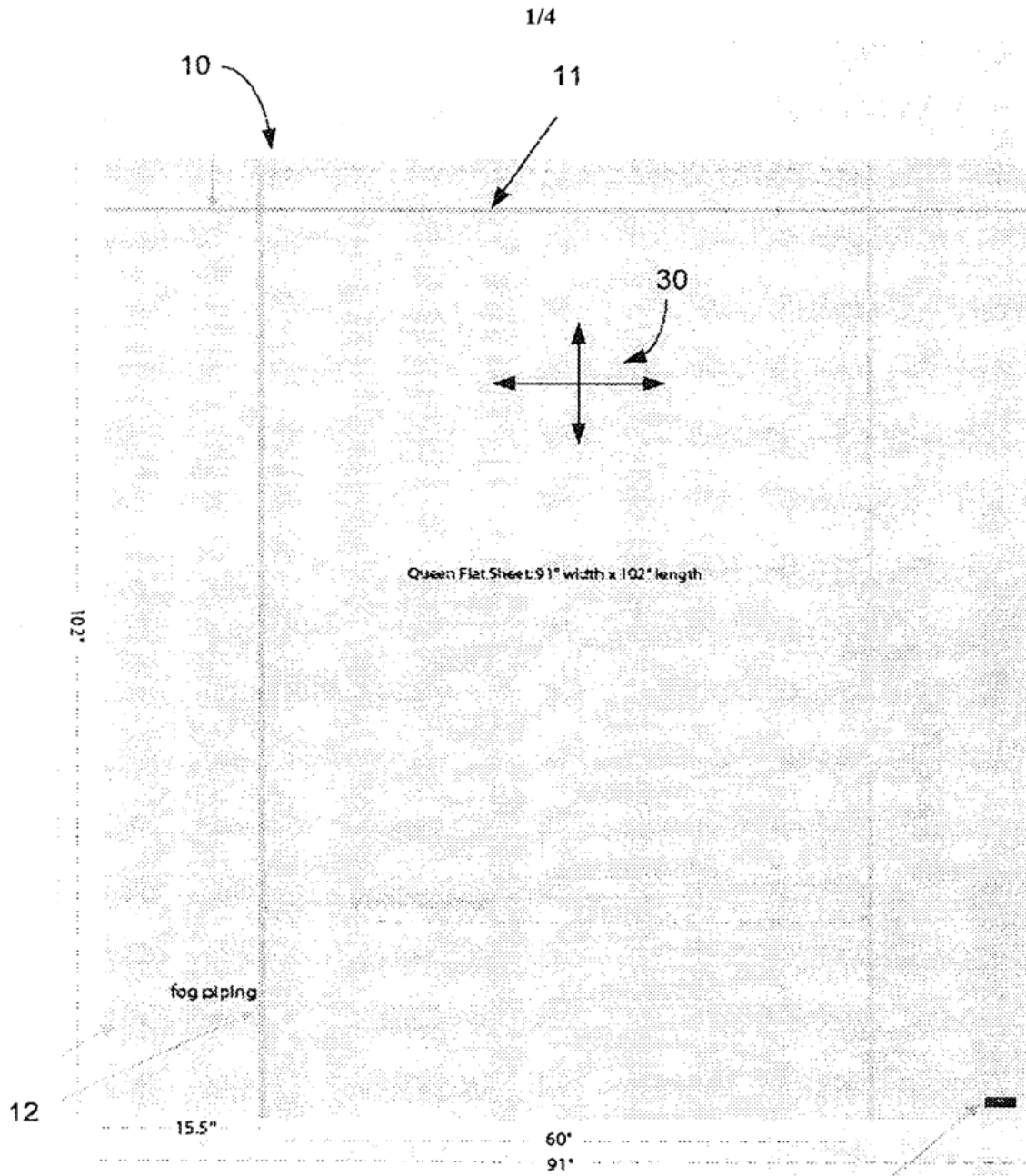


Fig. 1

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AUSTRALIA  
*Patents Act 1990*

Regulation 3.2

# Complete Specification

## Standard Patent

### **DIVISIONAL**

APPLICANT: **Sheex, Inc.**

Invention Title: **FABRIC SYSTEM**

The following statement is a full description of this invention, including the best method of performing it known to me:

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## FABRIC SYSTEM

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates generally to fabric systems, and more specifically to bed coverings constructed of high gauge circular knitted fabrics that accommodate and maintain optimum thermal conditions for sleep, which in turn can lead to faster sleep initiation and deeper, more restorative sleep.

#### 2. Description of Related Art

Sleep problems in the United States are remarkably widespread, affecting roughly three out of four American adults, according to research by the National Sleep Foundation (NSF). Consequently, a great deal of attention has been paid to the circumstances surrounding poor sleep, along with strategies for how to improve it.

The implications are not merely academic. Sleep – not only the right amount of it but also the right quality – impacts not just day-to-day performance, but also “the overall quality of our lives,” according to the NSF. Addressing the causes of poor quality sleep, therefore, has ramifications for millions.

Though many factors contribute to sleep quality, the sleep environment itself plays a critical role, and sleep researchers routinely highlight temperature as one of the most important components in creating an environment for optimal sleep. As advised by the University of Maryland Medical Center, “a cool (not cold) bedroom is often the most conducive to sleep.” The National Sleep Foundation further notes that “temperatures above 75 degrees Fahrenheit and below 54 degrees will disrupt sleep,” with 65 degrees being the ideal sleep temperature for most individuals, according to the NSF.

A lower environmental temperature is not the only thermal factor associated with improved sleep. Researchers have noted a nightly drop in body temperature among healthy, normal adults during sleep. This natural cycle, when inhibited or not functioning properly, can disrupt sleep and delay sleep onset, according to medical researchers at Cornell University. Conversely, the researchers noted, a rapid decline in body temperature not only accelerates sleep onset but also “may facilitate an entry into the deeper stages of sleep.”



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Therefore, maintaining an appropriately cool sleep environment and accommodating the body's natural tendency to cool itself at night should be a top priority for individuals interested in optimizing their sleep quality. Performance fabrics crafted into bedding applications would be uniquely capable of promoting cool, comfortable – and therefore better – sleep, as these advanced fabrics maximize breathability and heat transfer. Performance fabrics are made for a variety of end-use applications, and can provide multiple functional qualities, such as moisture management, UV protection, anti-microbial, thermo-regulation, and wind/water resistance.

There has been a long felt need in several industries to provide improved bedding to help individuals get better sleep. Such improved bedding would include beneficial wicking among other properties. For example, in marine, boating and recreational vehicle applications, bedding should resist moisture, fit odd-shaped mattresses and beds, and reduce mildew. Particularly with watercraft, there is a need to protect bedding, and specifically sheets, from moisture and mildew accumulation.

An additional problem with bedding, not just with marine and recreational vehicles, is the sticky, wet feeling that can occur when the bedding sheets are wet due to body sweat, environmental moisture, or other bodily fluids. In particular, when bedding is used during hot weather, or is continuously used for a long time by a person suffering from an illness, problems can arise in that the conventional bed sheet of cotton fiber or the like cannot sufficiently absorb the moisture. All of these issues lead to poor sleep.

To date, performance fabric bedding products are not known. There are width limitations in the manufacturing of high gauge circular knit fabrics, because the finished width of bedding fabrics are dictated by the machine used in its construction. At present, performance fabrics are manufactured with a maximum width of under 90 inches wide, given present manufacturing and technical limitations, along with the inability of alternate manufacturing processes to produce a fabric with identical performance attributes. Yet, normal bed sheet panels can be 102 by 91 inches or larger. Thus, performance fabrics cannot yet be used for bed sheets.

Some conventional solutions for the above issues that hinder a good night's sleep include United States Patent 4,648,186, which discloses an absorbent wood pulp cellulose fiber that is provided in a variety of sizes and is placed under a mattress. The wood pulp is water absorbent and acts to capture moisture to prevent such moisture from being retained by the bedding or the

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bedding sheets. However, this proposed solution does not interact with the bedding or the bedding sheets, but merely acts as a sponge for moisture that is in proximity to the target bedding.

United States Patent 5,092,088 discloses a sheet-like mat comprised of a mat cover, the inside of which is divided into a plurality of bag-like spaces, and a drying agent packed into a bag and contained in the bag-like spaces in such a manner that the drying agent cannot fall out of the bag-like spaces. A magnesium sulfate, a high polymer absorbent, a silica gel or the like can be used as the drying agent. As can be seen, this proposed solution to moisture in bedding is cumbersome and chemically-based.

In the athletic apparel industry, moisture wicking fabric has been used to construct athletic apparel. For example, United States Patent 5,636,380 discloses a base fabric of CoolmaxQ high moisture evaporation fabric having one or more insulating panels of ThermaxB or ThermastatQ hollow core fiber fabric having moisture wicking capability and applied to the inner side of the garment for skin contact at selected areas of the body where muscle protection is desired. However, this application cannot be applied to bedding sheets due to the limitations of the size of the performance fabrics manufactured. Further, performance fabric such as this type cannot be easily stitched together as the denier is so fine that stitching this fabric results in the stitching simply falling apart.

Circular knitting is typically used for athletic apparel. The process includes circularly knitting yarns into fabrics. Circular knitting is a form of weft knitting where the knitting needles are organized into a circular knitting bed. A cylinder rotates and interacts with a cam to move the needles reciprocally for knitting action. The yarns to be knitted are fed from packages to a carrier plate that directs the yarn strands to the needles. The circular fabric emerges from the knitting needles in a tubular form through the center of the cylinder. This process is described in United States Patent 7,117,695. However, the machinery presently available for this method of manufacture can only produce a fabric with a maximum width of approximately 90 inches. Therefore, this process has not been known to manufacture sheets, since sheets can have dimensions of 91 inches by 102 inches or greater.

Further, the machinery that is used for bedding is very different than for athletic wear. For example, bedding manufacturing equipment is not equipped to sew flatlock stitching or to provide circular knitting. Bed sheets typically are knit using a process known as warp knitting, a

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process capable of producing finished fabrics in the widths required for bedding. This method, however, cannot be employed to produce high-quality performance fabrics. Warp knitting is not capable of reproducing these fabrics' fine tactile qualities nor their omni-direction stretch properties, for example.

Circular knitting must be employed to produce a performance fabric that retains these fabric's full range of benefits and advantages. However, in order to produce a fabric of the proper width for bedding applications, a circular knit machine of at least 48 inches in diameter would be necessary. Manufacturing limitations therefore preclude the construction of performance fabrics at proper widths for bedding. The industry is unsure if it could actually knit and then finish performance fabrics at these large sizes, even if the machinery were readily available.

Further, athletic sewing factories are typically not equipped to sew and handle large pieces of fabrics so that equipment limitations do not allow for the manufacture of bedding sheets.

What is needed, therefore, is a bedding system that utilizes performance fabrics and their beneficial properties, the design of which acknowledges and addresses limitations in the manufacture of these fabrics. It is to such a system that the present invention is primarily directed.

#### **BRIEF SUMMARY OF THE INVENTION**

Briefly described, in preferred form, the present invention is a high gauge circular knit fabric for use in bedding, and a method for manufacturing such bedding. The bedding fabric has superior performance properties, while allowing for manufacture by machinery presently available and in use. In order to achieve a finished width of the size needed to create sheet-sized performance fabric, a high gauge circular knit machine of at least 48 inches in diameter is necessary. And while warp knitting machines are available that can produce wider fabrics, this method will not provide a fabric with the tactile qualities required, nor provide a fabric with omni-directional stretch.

In an exemplary embodiment, the present invention is a method of making a finished fabric comprising at least two discrete performance fabric portions, and joining at least two

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discrete performance fabric portions to form the finished fabric. Forming the at least two discrete performance fabric portions can comprise knitting at least two discrete performance fabric portions, and more preferably, circular knitting at least two discrete performance fabric portions. Joining the at least two discrete performance fabric portions to form the finished fabric can comprise stitching at least two discrete performance fabric portions together to form the finished fabric.

The at least two discrete performance fabric portions can have different fabric characteristics. Fabric characteristics as used herein include, among other things, moisture management, UV protection, anti-microbial, thermo-regulation, wind resistance and water resistance.

The finished fabric can be used in, among other applications, residential settings, or in marine, boating and recreational vehicle environments.

The present sheets offer enhanced drape and comfort compared to traditional cotton bedding, and are as fine as silk, yet provide the benefits of high elasticity and recovery along with superior breathability, body-heat transport, and moisture management as compared to traditional cotton bedding.

Conventional fitted sheets can bunch and slide on standard mattress sizes. Furthermore, if the fitted bed sheets do not fit properly, they do not provide a smooth surface to lie on. The present invention overcomes these issues.

The present high gauge circular knit fabrics stretch to fit and offer superior recovery on the mattress allowing the fabric to conform to fit the mattress without popping off the corners of the mattress or billowing. The performance fabric can include spandex, offers a better fit than conventional bedding products, can accommodate larger or smaller mattress sizes with a single size sheet, and can conform to mattresses with various odd dimensions.

Spandex - or elastane - is a synthetic fiber known for its exceptional elasticity. It is stronger and more durable than rubber, its major non-synthetic competitor. It is a polyurethane-polyurea copolymer that was invented by DuPont. "Spandex" is a generic name, and an anagram of the word "expands." "Spandex" is the preferred name in North America; elsewhere it is



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referred to as “elastane.” The most famous brand name associated with spandex is Lycra, a trademark of Invista.

The present high gauge circular knit fabric offers durability in reduced pilling and pulling when compared to other knit technologies, and offer reduced wrinkles and enhanced color steadfastness

In a preferred embodiment, the present performance fabric can allow for a one-size fitted sheet that can actually fit two different size mattresses. For example, the full fitted sheet of the present invention can fit on both the full and queen size bed. The twin fitted sheet of the present invention will also fit an XL twin. In a boating application, the present invention can be produced to fit almost every custom boat mattress.

Testing of the present invention conducted at the North Carolina State University (NCSU) Center for Research on Textile Protection and Comfort confirms that the present performance fabrics provide a cooler sleeping environment than cotton. Performance bedding was tested side-by-side with commercially available cotton bed sheets in a series of procedures designed to measure each product’s heat- and moisture-transport properties, as well as warm/cool-to-touch thermal transport capabilities.

Across all tests, the present performance fabrics in bedding outperformed cotton, demonstrating the performance fabric’s superiority in establishing and maintaining thermal comfort during sleep. This advantage is evident to users from the very onset, as NCSU testing indicates that, on average, performance bedding of the present invention offers improved heat transfer upon initial contact with the skin, resulting in a cooler-to-the-touch feeling.

During sleep, high gauge circular knit performance bedding of the present invention helps to maintain thermal comfort by trapping less body heat and breathing better than cotton. Testing has demonstrated that performance bedding made out of performance fabrics transfers heat away from the body up to two times more effectively than cotton. This is critically important not only for sustained comfort during sleep, but also in terms of enabling the body to cool itself as rapidly as possible to facilitate sleep onset. In addition to trapping less heat, performance bedding breathes better than cotton – up to 50% better, giving performance bedding a strong advantage in terms of ventilation and heat and moisture transfer.

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The performance advantage over cotton holds true for simulated dry and wet skin conditions, confirming that certain performance fabrics in bedding are better suited than cotton at managing moisture (e.g., sweat) to maintain thermal comfort. In addition to wicking moisture away from the skin through capillary action, the performance fabric's advanced breathability further enables heat and moisture transfer through evaporative cooling. As a result, the user is kept cooler, drier and more comfortable than with cotton.

The present performance bedding holds a distinct advantage over cotton in enabling, accommodating and maintaining optimum thermal conditions for sleep, which in turn can lead to faster sleep initiation and deeper, more restorative sleep.

These and other objects, features and advantages of the present invention will become more apparent upon reading the following specification in conjunction with the accompanying drawings.

#### **BRIEF DESCRIPTION OF THE FIGURES**

**Fig. 1** illustrates a preferred embodiment of the present invention.

**Fig. 2** illustrates another preferred embodiment of the present invention.

**Fig. 3** illustrates a further preferred embodiment of the present invention.

**Fig. 4** illustrates another preferred embodiment of the present invention.

#### **DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS**

Although preferred embodiments of the invention are explained in detail, it is to be understood that other embodiments are contemplated. Accordingly, it is not intended that the invention is limited in its scope to the details of construction and arrangement of components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or carried out in various ways. Also, in describing the preferred embodiments, specific terminology will be resorted to for the sake of clarity.

It must also be noted that, as used in the specification and the appended claims, the singular forms "a," "an" and "the" include plural referents unless the context clearly dictates otherwise. For example, reference to a sheet or portion is intended also to include the



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manufacturing of a plurality of sheets or portions. References to a sheet containing "a" constituent is intended to include other constituents in addition to the one named.

Also, in describing the preferred embodiments, terminology will be resorted to for the sake of clarity. It is intended that each term contemplates its broadest meaning as understood by those skilled in the art and includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

Ranges may be expressed herein as from "about" or "approximately" one particular value and/or to "about" or "approximately" another particular value. When such a range is expressed, another embodiment includes from the one particular value and/or to the other particular value.

By "comprising" or "containing" or "including" is meant that at least the named compound, element, particle, or method step is present in the composition or article or method, but does not exclude the presence of other compounds, materials, particles, method steps, even if the other such compounds, material, particles, method steps have the same function as what is named.

It is also to be understood that the mention of one or more method steps does not preclude the presence of additional method steps or intervening method steps between those steps expressly identified. Similarly, it is also to be understood that the mention of one or more components in a fabric or system does not preclude the presence of additional components or intervening components between those components expressly identified.

Referring now in detail to the drawing figures, wherein like reference numerals represent like parts throughout the several views, the present invention of **Figs. 1 and 4** provides a sheet **10** shown having dimensions of 102 inches in length and 91 inches in width. The material is manufactured from performance fabric, which can include, for example, varying amounts of one or more of Lycra, Coolmax, Thermax and Thermastat. In a preferred embodiment, the fabric is treated so that the fabric has antimicrobial properties. By using circular-knit performance fabric, the fabric is able to provide elasticity in all four directions. This property allows for the sheet to fit extraordinary mattress, cushion and bedding shapes, as well as providing better fits for traditional rectangular sheets. By using performance fabrics, the sheet has elastic properties that allow stretching in the directions shown as **30**. In addition, by using circular-knit performance

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fabric, the resulting bedding retains an exceptionally fine tactile quality critical for providing maximum levels of enhanced comfort.

An alternative to circular knitting is non-circular knitting – for example, warp knitting. This method can achieve widths greater than circular knitting. Industrial warp knit machines, for example, can produce tricote warp knit fabrics up to 130-140 inches in width. Circular knitting, however, is less expensive, as it requires less set-up time. Circular knitting also provides greater multidirectional stretch.

In order to provide a sheet that exceeds the maximum dimensions of fabric that can be produced by available circular knitting machines, flat lock stitching **12** is used to join a plurality of portions resulting in a sheet that is 91 inches wide (as shown). In an exemplary embodiment, piping **11** can be included in close proximity to the stitching. The stitching can be the same color as the fabric of the sheet portions, or different color(s). The piping can be 3/4 inch straight piping without a cord or other filler. In one preferred embodiment, the stitching is 16 stitches per inch. Piping **11** can be included at one end of the sheet and can be the same or a different color as the sheet fabric.

For a fitted sheet, the sheet can include an elastic portion surrounding the edge of the fitted sheet to better keep the fitted sheet in place when placed on a mattress or other sleeping surface. A cord can be sewn into the edge of the fitted sheet and cinched around the mattress or other sleeping surface to better hold the fitted sheet in place.

Referring to **Fig. 2**, a sheet is shown having dimensions of 91 inches wide and 102 inches in length. In this embodiment, stitching **14** is shown 34 inches from an interior edge **18** of a main portion **16** and another stitch **14** at edge **20** of the sewn-on portion. Flat lock stitching can be used for the stitching. Piping can be applied at or in proximity to the stitching.

Referring to **Fig. 3**, a non-rectangular shaped sheet is shown. In this exemplary embodiment, elastic can be included around the edge of the fitted sheet to better maintain the fitted sheet in position when placed on a sleeping surface. In one embodiment, pull ties **24** can be installed at various locations around the edge of the fitted sheet in order to assist in maintaining the fitted sheet secured to the sleeping surface. The pull tie can be cinched to increase tension around the edge of the fitted sheet as shown by **26**.

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Stitching used for securing the portions of the sheet together can include that shown as **28a**. In another embodiment, the stitching used for securing the portion of fabric together is shown as **28b**.

Referring to **Fig. 4**, yet another preferred embodiment of the invention is shown. In this embodiment, the sheet can be assembled through stitching of differing fabrics for generating performance zones in the sheet. For example, zone **32** can have higher wicking properties than the other zones since this area is where the majority of the individual body rests. Areas **34a** through **34d** can have higher spandex or other elastic fabric properties so that the fit around a sleeping surface is improved. Area **36** may have thermal properties such as increased cooling since this area is generally where the individual's head lies. In an exemplary embodiment, the pillow covers of pillows used by the individual also have differing properties from the remainder of the sheet, e.g., thermal properties.

The present invention encompasses the construction of bedding materials that have superior performance properties while allowing for manufacture by machinery presently available and in use. More specifically, the invention is related to a new method for fabricating a covering and or sheets in bedding. When using the circular knitting machine, the high gauge performance fabrics can only be made to a maximum size of 72.5 inches without losing the integrity of the spandex in the fabric. Yet, normal sheet panels are 102 x 91 inches. This presents problems when manufacturing sheets from performance fabrics.

Additionally, special stitching techniques must be used given the thread density of the fabric. Using this special stitching, panels are sewn together to produce bedding or a sheet that is the proper size for standard bed sheets. Because discrete portions/panels are used in the manufacture of the present fabrics, panels can be selected that provide different properties for different areas of the bedding (**Fig. 4**). Stitching or seams on the sheet can also allow for the ease of making the bed. Because the bedding is made from performance fabric with spandex, it stretches to permit multiple and custom sizing for applications in cribs, recreational vehicles and boats.

Circular knitting machines used for high gauge performance bedding fabrics are called high-gauge circular knitting machines, because of dense knitting with thin yarn. High gauge generally denotes 17 gauges or more. Seventeen gauges indicate that 17 or more cylinder



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needles are contained in one inch. Circular knitting machines of less than 17 gauges are referred to as low-gauge circular knitting machines. The low-gauge circular knitting machines are often used to knit outerwear.

“Yarn count” indicates the linear density (yarn diameter or fineness) to which that particular yarn has been spun. The choice of yarn count is restricted by the type of knitting machine employed and the knitting construction. The yarn count, in turn, influences the cost, weight, opacity, hand and drape of the resulting knitted structure. In general, staple spun yarns tend to be comparatively more expensive the finer their count, because finer fibers and a more exacting spinning process are necessary in order to prevent the yarn from showing an irregular appearance.

A top width in the 90-inch range is currently possible using a circular knit fabric formed on a 36-38-inch diameter machine, although higher levels of spandex in the performance fabric tend to pull the width in. In just one example, on a 30-inch diameter machine, the spandex can reduce an otherwise 94-inch circumference fabric tube to one with a 60-65 inch finished width.

A major limitation in finished width is not strictly a knitting concern but also concerns finishing. With performance fabric, it tends to sag in the middle – increasingly so with greater widths – making finishing difficult to impossible above a certain threshold. A possible 90-inch finished width is contingent upon having a good finishing set-up capable of handling the present performance fabric. This potential for difficulties would only become compounded at the larger widths required for bed sheets.

In a preferred process, the present fabric undergoes a heat setting finishing process. Applying a moisture-wicking finish to another fabric – like cotton – that can be produced at larger widths appears unlikely to match the moisture-control properties of the present fabric, as polyester itself is naturally moisture-resistant and there are physical actions (e.g. capillary action) at play. Further, the use of cotton comes at the expense of breathability and heat-transfer capabilities (as confirmed by laboratory testing) and stretchability.

Numerous characteristics and advantages have been set forth in the foregoing description, together with details of structure and function. While the invention has been disclosed in several forms, it will be apparent to those skilled in the art that many modifications, additions, and deletions, especially in matters of shape, size, and arrangement of parts, can be made therein

without departing from the spirit and scope of the invention and its equivalents as set forth in the following claims. Therefore, other modifications or embodiments as may be suggested by the teachings herein are particularly reserved as they fall within the breadth and scope of the claims here appended.

Reference to any prior art throughout this specification is not, and should not be taken as, an acknowledgement or any form of suggestion that such prior art forms part of the common general knowledge in Australia.

CLAIMS:

1. A bed sheet comprising a fabric of a man-made fiber, the fabric having been knit at 17 gauges or higher, the fabric having higher breathability, higher heat transfer, and higher moisture wicking characteristics than a cotton fabric,

wherein the man-made fiber comprises a performance fabric that has an elasticity such that the performance fabric has a tendency to sag by an amount that is greater than a threshold amount of sag determined by a finishing process, such that the sag would interfere with the finishing process if the performance fabric were circularly knit at greater than a 72.5 inch circumference.

2. The bed sheet of claim 1 wherein the fabric comprises a finished fabric comprising:

a first circular knitted fabric portion; and

a second circular knitted fabric portion;

at least one of the fabric portions comprising a performance fabric portion;

the first and second fabric portions being discrete and joined to form the finished fabric.

3. The bed sheet of claim 1, comprising piping.

4. The bed sheet of claim 2, wherein the first and second fabric portions have different fabric characteristics.

5. The bed sheet of claim 4, wherein at least one of the fabric characteristics comprises moisture management.

6. The bed sheet of claim 1 in which the fabric is knit of the man-made fiber.

7. The bed sheet of claim 1 in which the fabric is circularly knit.

8. The bed sheet of claim 1 being stretchable to fit either a baby crib and an adult bed.



9. The bed sheet of claim 1 that is sufficiently stretchable to fit a standard rectangular bed and a smaller, non-rectangular marine bed.
10. The bed sheet of claim 1 that is sufficiently stretchable to fit either a crib or a standard adult bed.
11. The bed sheet of claim 1 that is at least 90 inches wide.
12. The bed sheet of claim 1 having dimensions of approximately 102 inches in length and approximately 91 inches in width.
13. The bed sheet of claim 1 comprising a pull tie that can be cinched to increase tension around an edge of the bed sheet.
14. The bed sheet of claim 4, wherein at least one of the fabric characteristics is UV protection.
15. The bed sheet of claim 4, wherein at least one of the fabric characteristics is anti-microbial fabric.
16. The bed sheet of claim 4, wherein at least one of the fabric characteristics is thermo-regulation.
17. The bed sheet of claim 4, wherein at least one of the fabric characteristics is wind resistance.
18. The bed sheet of claim 4, wherein at least one of the fabric characteristics is water resistance.

19. A bed sheet comprising a fabric circularly knit of a man-made fiber, the fabric having a gauge of at least 17 gauges, and the fabric having higher breathability, higher heat transfer, and higher moisture wicking characteristics than a cotton fabric, wherein the man-made fiber comprises a synthetic material in a proportion such that the fabric could be circularly knit at no more than a 72.5 inch circumference without losing integrity of the fabric.

20. A bed sheet comprising a fabric of a man-made fiber substantially as herein described.

21. The bed sheet of claim 19, wherein the man-made fiber comprises a performance fabric that has an elasticity such that the performance fabric has a tendency to sag by an amount that is greater than a threshold amount of sag determined by a finishing process, such that the sag would interfere with the finishing process if the performance fabric were circularly knit at greater than a 72.5 inch circumference.

22. The bed sheet of claim 19 that is at least 90 inches wide.

23. The bed sheet of claim 19 wherein the fabric comprises a finished fabric comprising:

a first circular knitted fabric portion; and

a second circular knitted fabric portion;

at least one of the fabric portions comprising a performance fabric portion;

the first and second fabric portions being discrete and joined to form the finished fabric.

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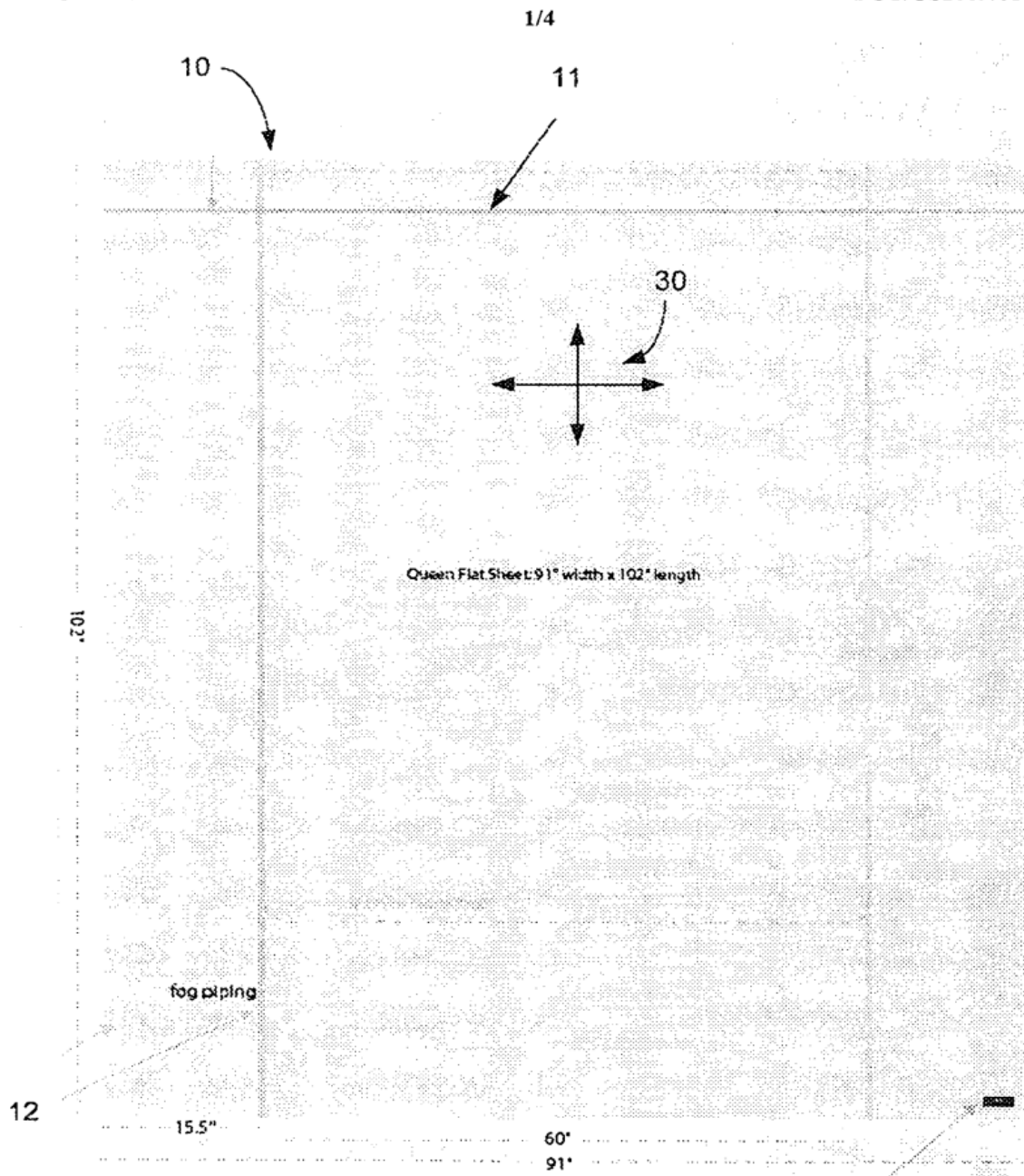


Fig. 1

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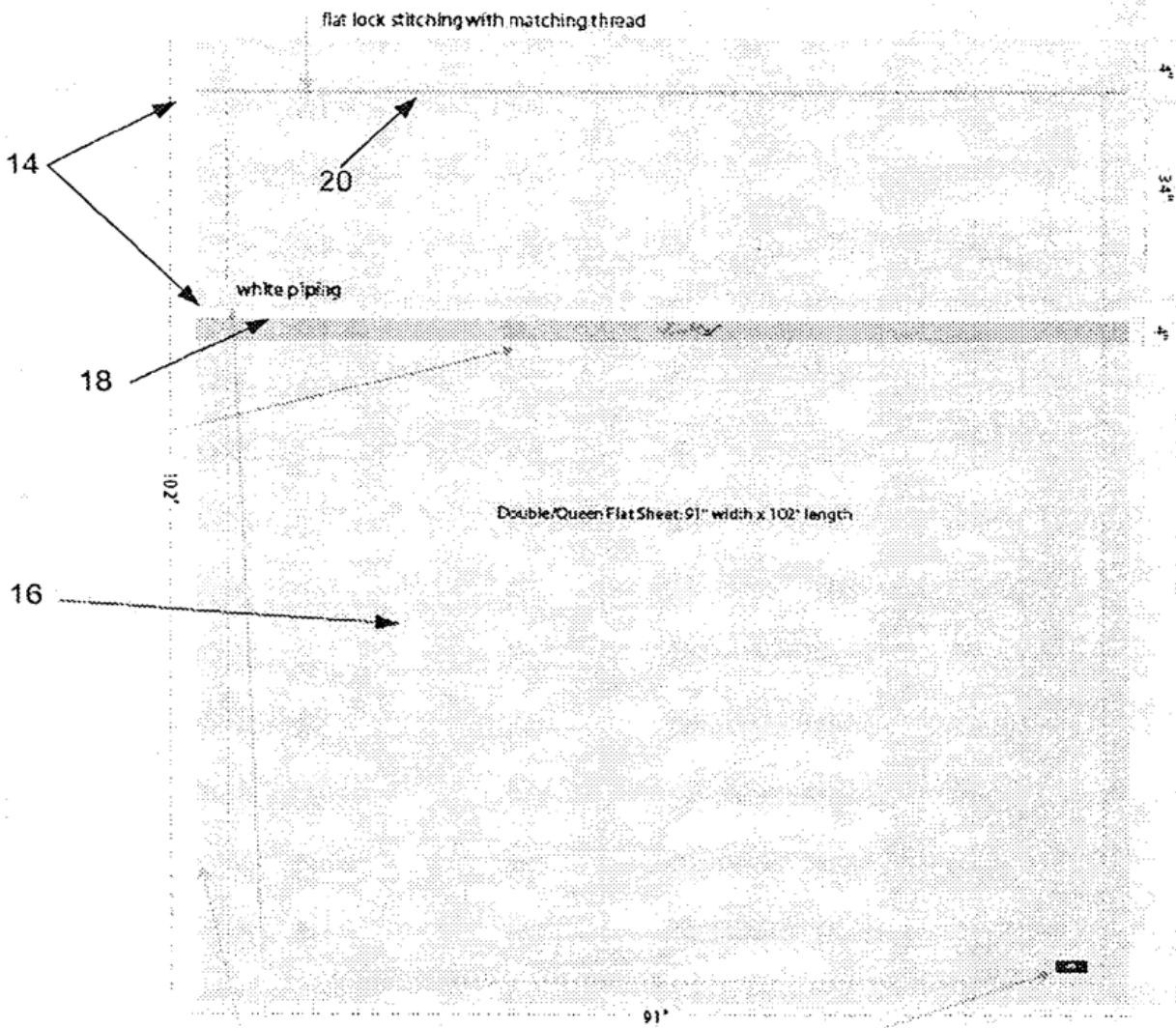


Fig. 2



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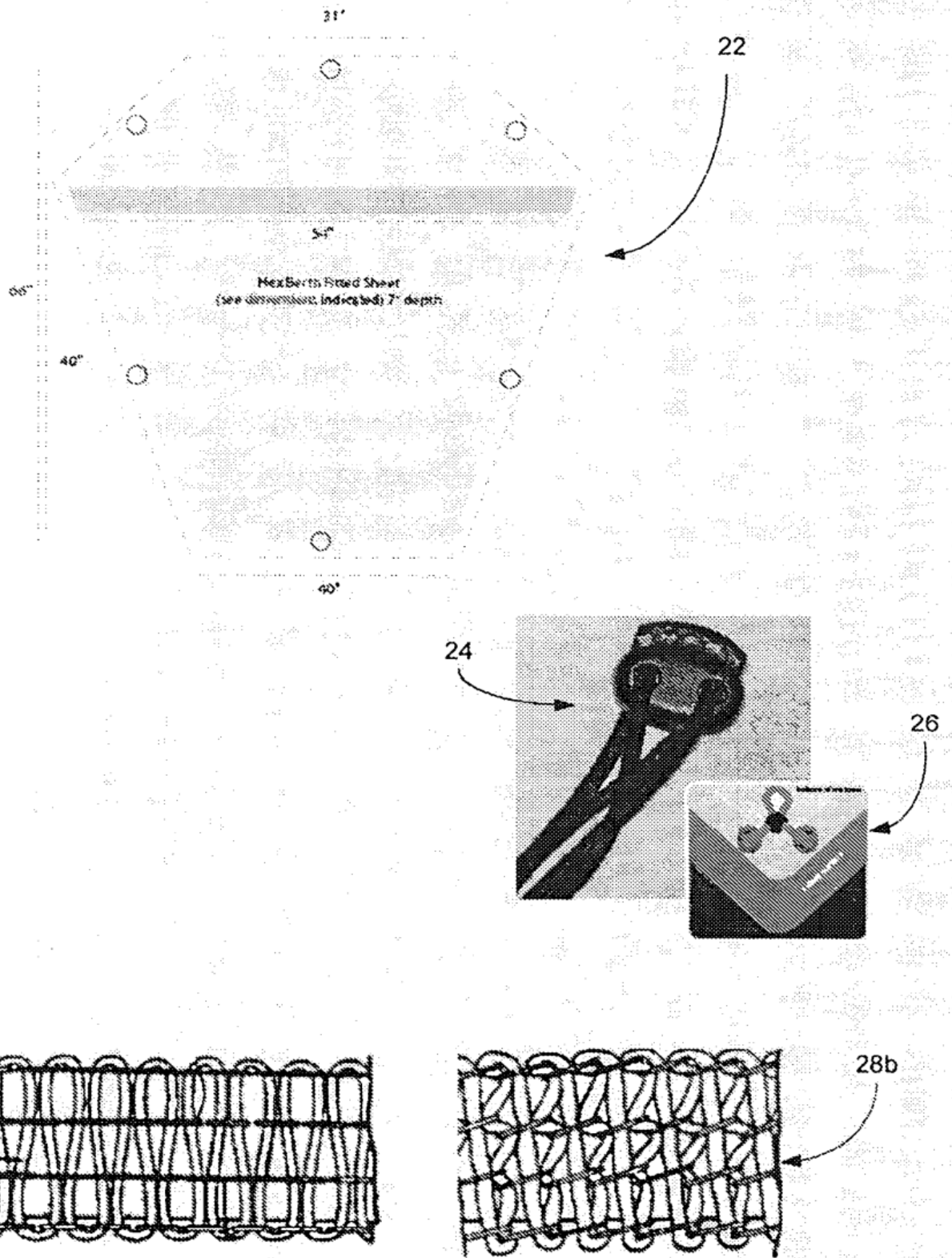


Fig. 3

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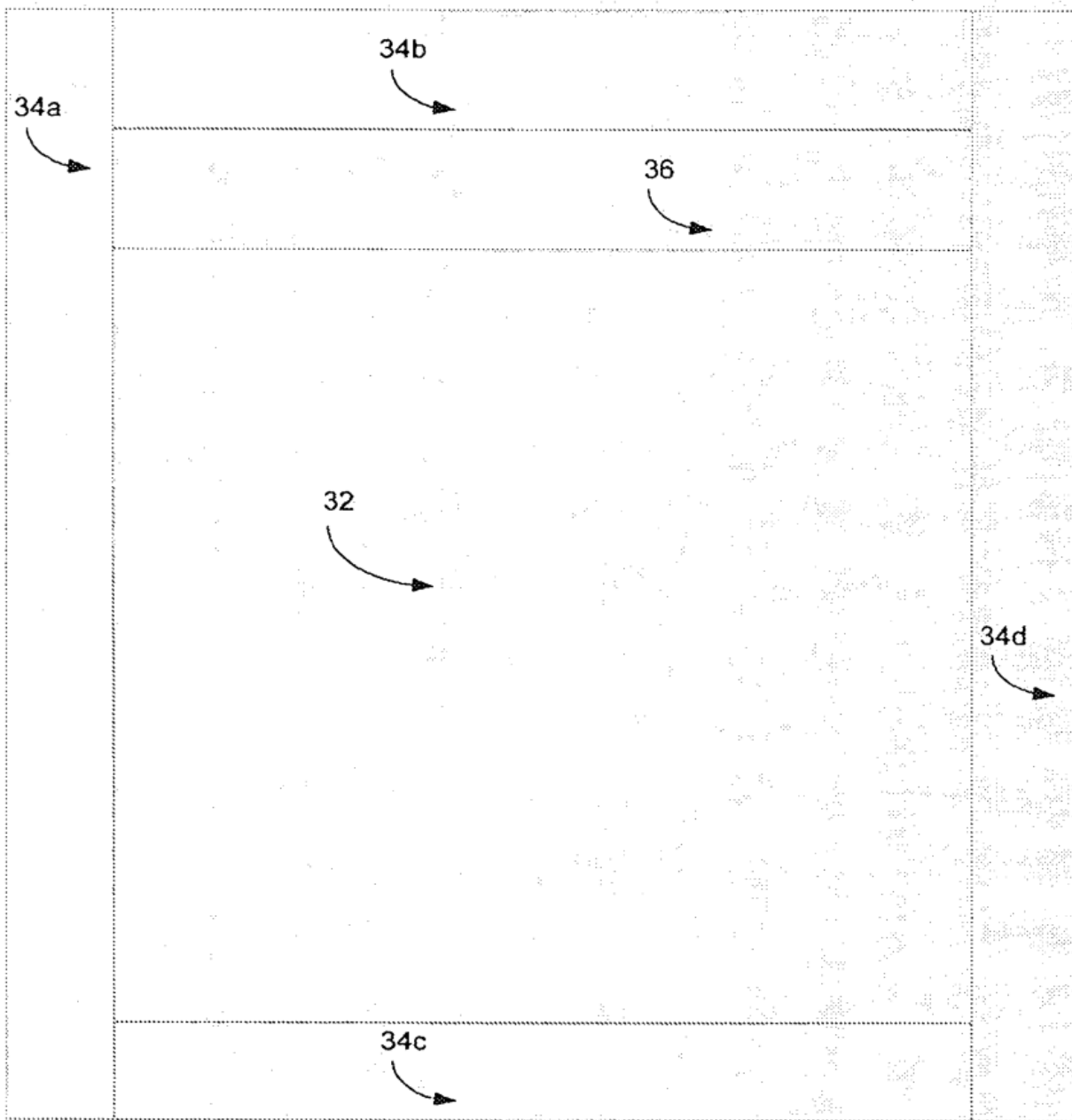


Fig. 4