



US007341255B2

(12) **United States Patent**
Babiarz et al.

(10) **Patent No.:** **US 7,341,255 B2**
(45) **Date of Patent:** **Mar. 11, 2008**

(54) **SEALING FITTING WITH EXPANDING MATERIAL**

(75) Inventors: **Paul S. Babiarz**, Liverpool, NY (US);
William Bradley Delans, Fayetteville, NY (US)
(73) Assignee: **Cooper Industries**, Houston, TX (US)
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 718 days.

(21) Appl. No.: **10/391,250**

(22) Filed: **Mar. 18, 2003**

(65) **Prior Publication Data**
US 2004/0183261 A1 Sep. 23, 2004

(51) **Int. Cl.**
F16L 17/00 (2006.01)
F16L 41/00 (2006.01)
F16J 15/08 (2006.01)
H01B 17/26 (2006.01)

(52) **U.S. Cl.** **277/314**; 277/627; 285/216;
174/153 R; 174/157

(58) **Field of Classification Search** 277/602,
277/605, 626-627, 645-646; 285/96-97,
285/196, 216, 100; 174/157, 153 R, 153 G,
174/65 R, 65 G; 175/76-77

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,758,916 A *	9/1973	Wetmore	174/152 R
4,086,736 A *	5/1978	Landrigan	52/220.8
4,454,381 A *	6/1984	Ito et al.	174/151
4,607,469 A *	8/1986	Harrison	52/220.8
5,137,306 A *	8/1992	Flood	285/123.2
5,278,357 A *	1/1994	Yamanashi	174/151
5,560,618 A *	10/1996	Wambeke et al.	277/314
6,103,341 A *	8/2000	Barz et al.	428/147

* cited by examiner

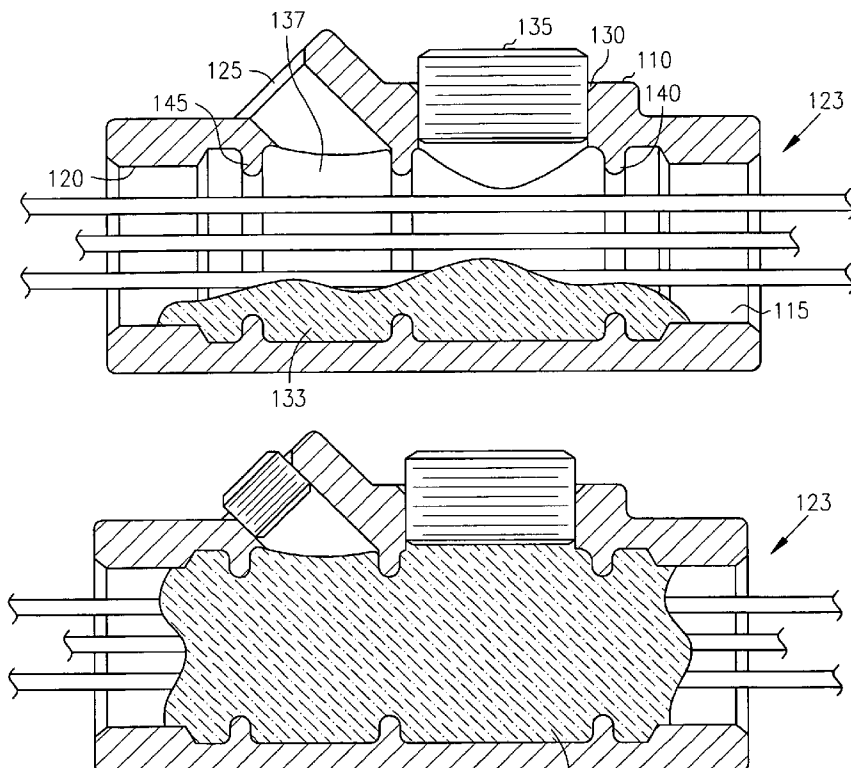
Primary Examiner—Vishal Patel

(74) *Attorney, Agent, or Firm*—Schwegman, Lundberg & Woessner, P.A.

(57) **ABSTRACT**

An expanding compound is used to seal conduit fittings. The compound is injected into the fitting, and expands to separate conductors within the fitting. In one embodiment, the compound expands to four times its size, and hardens within approximately one hour. In a further embodiment, the compound is a two-part product that is mixed in a self contained applicator and injected into the fitting.

10 Claims, 3 Drawing Sheets



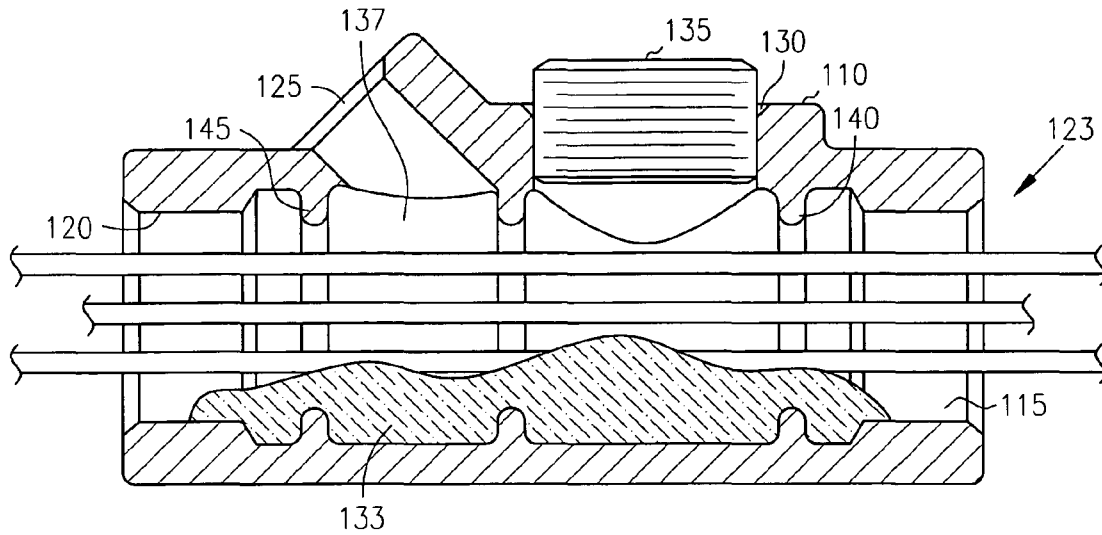


FIG. 1

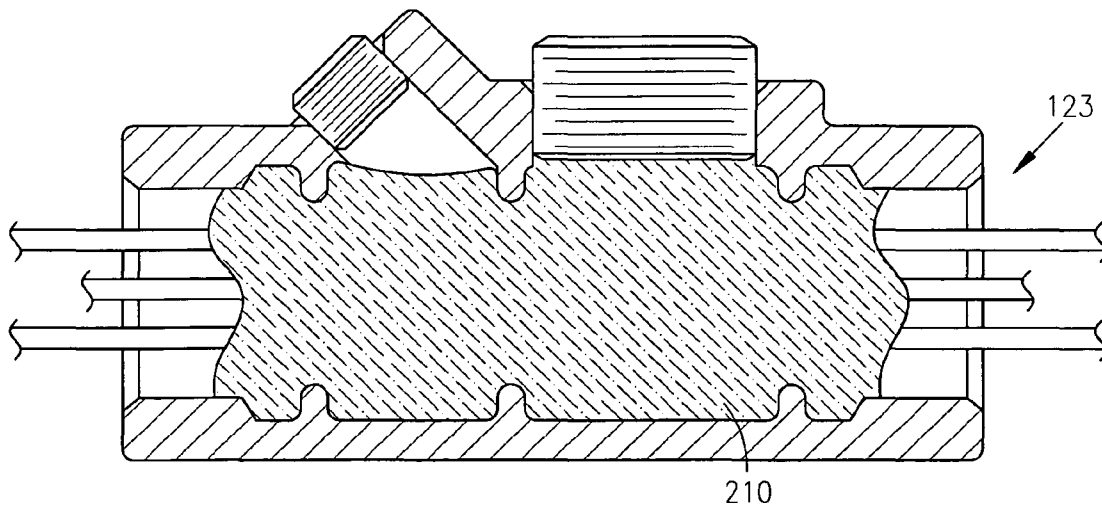


FIG. 2

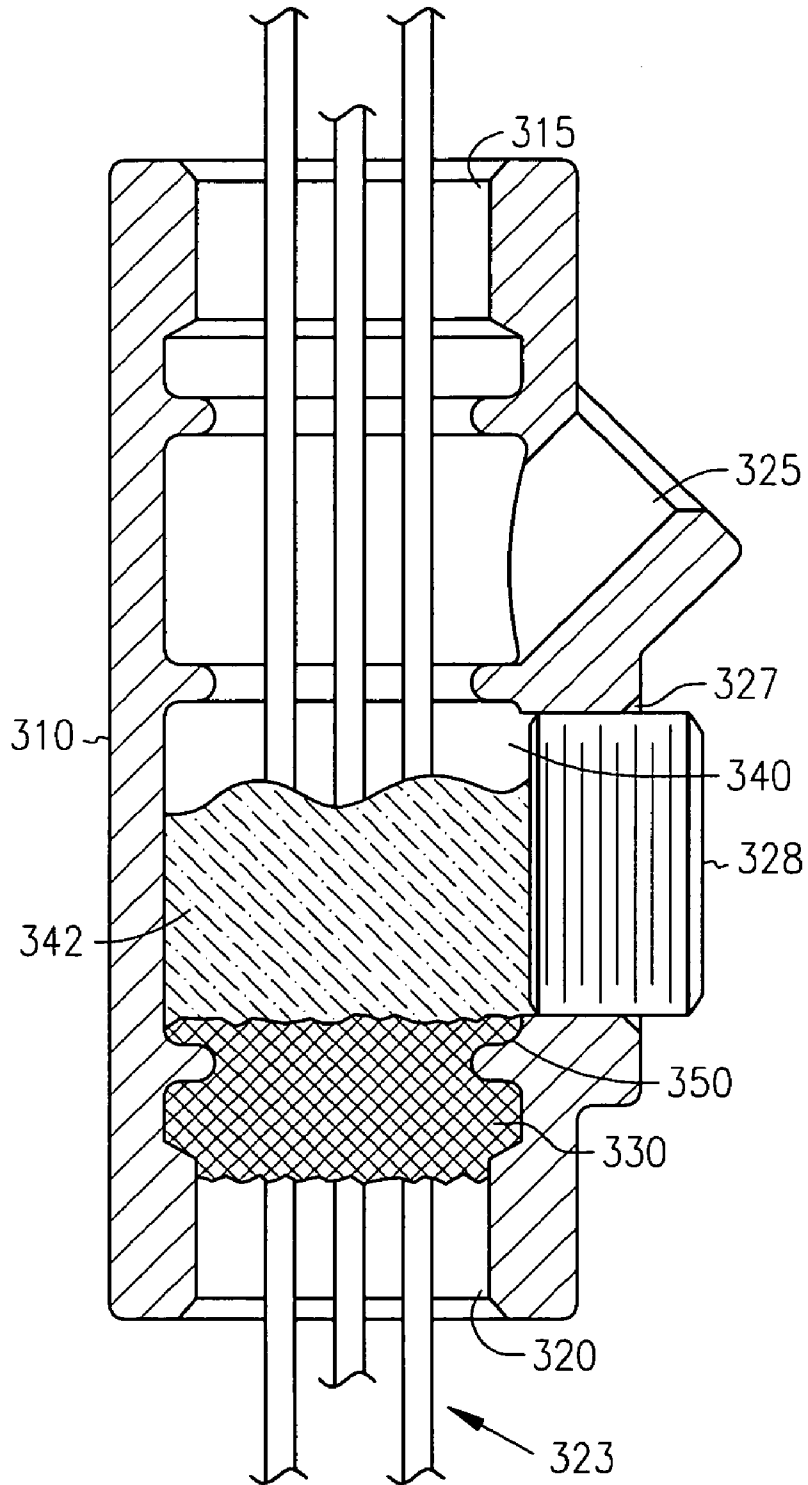


FIG. 3

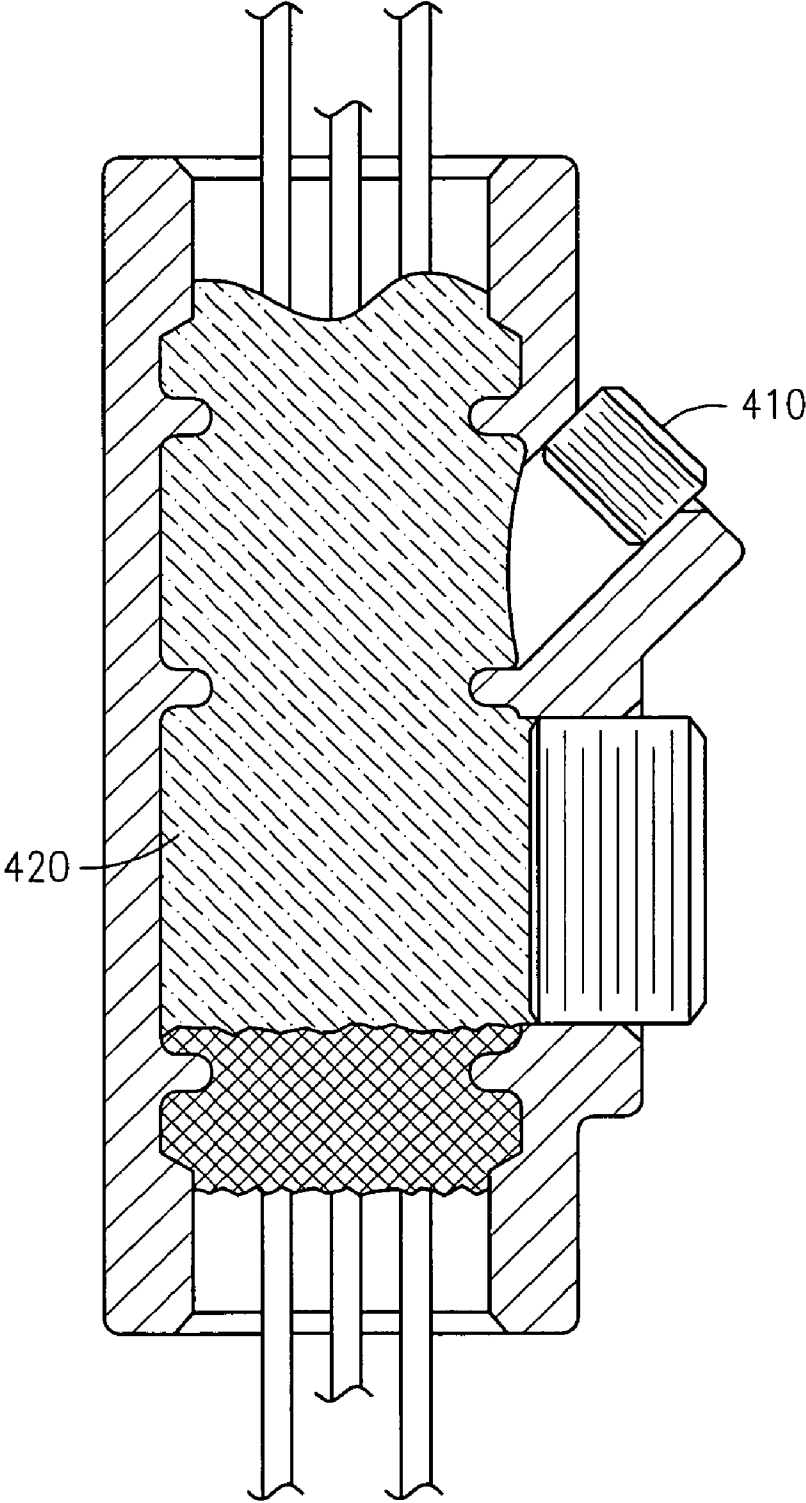


FIG. 4

1

SEALING FITTING WITH EXPANDING MATERIAL

FIELD OF THE INVENTION

The present invention relates to sealing conduits, and in particular to an expanding conduit sealer.

BACKGROUND OF THE INVENTION

Electrical conduit is used to mechanically protect electrical conductors. The U.S. National Electrical Code and Canadian Electrical Code require that explosion-proof enclosures housing arcing and sparking devices be sealed off to prevent propagation of flames or gases through the conduit system, and to minimize the explosion pressures. Such seals minimize the effects of pressure piling by acting as a barrier to stop burning gases from traveling through the conduit to other parts of the system.

When sealing conduit fittings, past methods utilize a fiber material that is weaved around each electrical conductor in the conduit to separate them. The fiber material is also packed in to form a dam at each end of a horizontal fitting, and at the bottom of a vertical fitting. A Portland type cement is then mixed with water and poured in through a funnel, puddled with a stick to remove air bubbles and left to cure for at least 24 hours.

The past methods were fairly labor intensive and error prone. Errors resulted when electrical conductors were not separated or fittings were not filled completely full with sealing compound. Further labor included obtaining clean water and mixing containers and the use of a stick to remove air bubbles.

SUMMARY OF THE INVENTION

An expanding compound is used to seal conduit fittings. The compound is injected into the fitting, and expands to separate conductors within the fitting. In one embodiment, the compound expands to four times its size, and hardens within approximately one hour. In a further embodiment, the compound is a two-part product that is mixed in a self contained applicator and injected into the fitting.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross section of a horizontal mount sealing fitting illustrating use of a sealing compound.

FIG. 2 is a cross section of the sealing fitting of FIG. 1 with expanded sealing compound.

FIG. 3 is a cross section of a vertical mount sealing fitting illustrating use of a sealing compound

FIG. 4 is a cross section of the sealing fitting of FIG. 2 with expanded sealing compound.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, reference is made to the accompanying drawings that form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that

2

The following description is, therefore, not to be taken in a limited sense, and the scope of the present invention is defined by the appended claims.

FIG. 1 shows a horizontal fitting 110 for joining two horizontally disposed conduits via mating sets of threads 115 and 120 at each end of fitting 110. The length of the fitting is approximately the distance between the two sets of thread, and the width of the fitting is approximately equal to the outside diameter of the fitting.

Multiple conductors 123 are disposed within the fitting. Two openings 125 and 130 are provided in the fitting 110. Removable plugs are used to plug the openings. Opening 125 is shown without the plug installed, and a plug 135 is shown installed in opening 130. Opening 130 is larger than opening 125 in one embodiment. An expanding sealing compound 133 is provided in a liquid state inside the fitting 110. One of the plugs may be removed to allow injection of the sealing compound. In this example embodiment, the sealing compound is injected through opening 125.

In one embodiment, the sealing compound 133 is a two-part mixture that starts to expand once the two parts are mixed. When expanded, it fills the fitting 110 as shown at 210 in FIG. 2. The expanding compound works its way between conductors so that as it expands, the conductors are separated from each other. In one embodiment, the expanding compound expands four times its size immediately after being mixed. It is desired that when the compound is expanded, none of the conductors are touching either themselves, or sides of the fitting 110, and the compound expands to fill the fitting 110 over at least a portion of the length of the fitting 110 referred to as a sealing chamber 137 which extends between the two ends of the fitting 110. In one embodiment, the sealing chamber 137 extends approximately about and partly past the hub stops 140 and 145 on each end of the fitting. In a further embodiment, the sealing compound forms an explosion proof seal.

In one embodiment, the expanding compound is provided in a cartridge with the two parts or materials separated by a barrier, such as a foil barrier partway between a top and bottom of the cartridge. The cartridge is squeezed to deform the foil barrier, and a mixing rod is coupled to a plunger in the cartridge. The plunger is then pushed to the bottom of the cartridge by the rod. The rod is then pushed and pulled between the top and bottom of the cartridge for approximately 40 to 50 strokes, where a stroke is one complete in and out cycle. The cartridge is rotated while the rod is pushed and pulled to ensure that the plunger is swiping all material in the cartridge.

In one embodiment, mixing is done within 30 seconds of starting the mixing process, as pressure builds up on the inside of the cartridge as the material starts to expand. At the last stroke, the mixing rod is pushed all the way to the bottom of the cartridge. The rod is then pulled out, while the cartridge is squeezed to hold the plunger at the bottom. A nozzle is then attached to the top of the cartridge where the rod was removed, and then the rod is used at the bottom of the cartridge to push the plunger. This causes mixed liquid material, the expanding compound, to be injected through the nozzle. In one embodiment, the cartridge is marked with volumetric increments corresponding to one-ounce segments for measuring the amount of compound injected. The sealing fitting plug is promptly replaced and tightened to prevent the sealing compound from expanding outside the fitting and/or gelling around the threads in the fitting that mate with corresponding threads on the plugs.

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.