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Widman

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(54) **APPARATUS AND METHOD FOR SEALING A CONDUIT**

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22 R, 34, 47, 68.3, 100, 23 R; 138/109,
120, 155, 96 T; 285/333, 390, 355, 93

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Primary Examiner—Dean A. Reichard

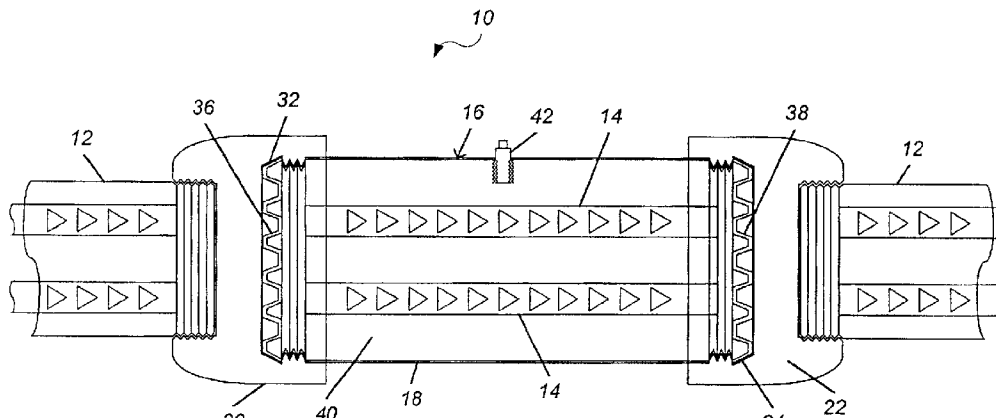
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(57) **ABSTRACT**

An apparatus and method for sealing a conduit is provided. The apparatus includes a cylindrical housing having an inner chamber and two free running hubs disposed on opposite ends of the cylinder. The free running hubs couple to opposing ends of the conduit. A pair of neoprene membranes are provided within the free running hubs, which isolate the inside of the conduit from the inner chamber of the housing. The inner chamber is filled with a polyurethane-based epoxy sealant compound. Any air, other gases or moisture trapped within the inner chamber is released through a port in the housing, which is then sealed with a plug. The apparatus forms a hermetic seal between the inside of the conduit and the outside environment.

23 Claims, 2 Drawing Sheets



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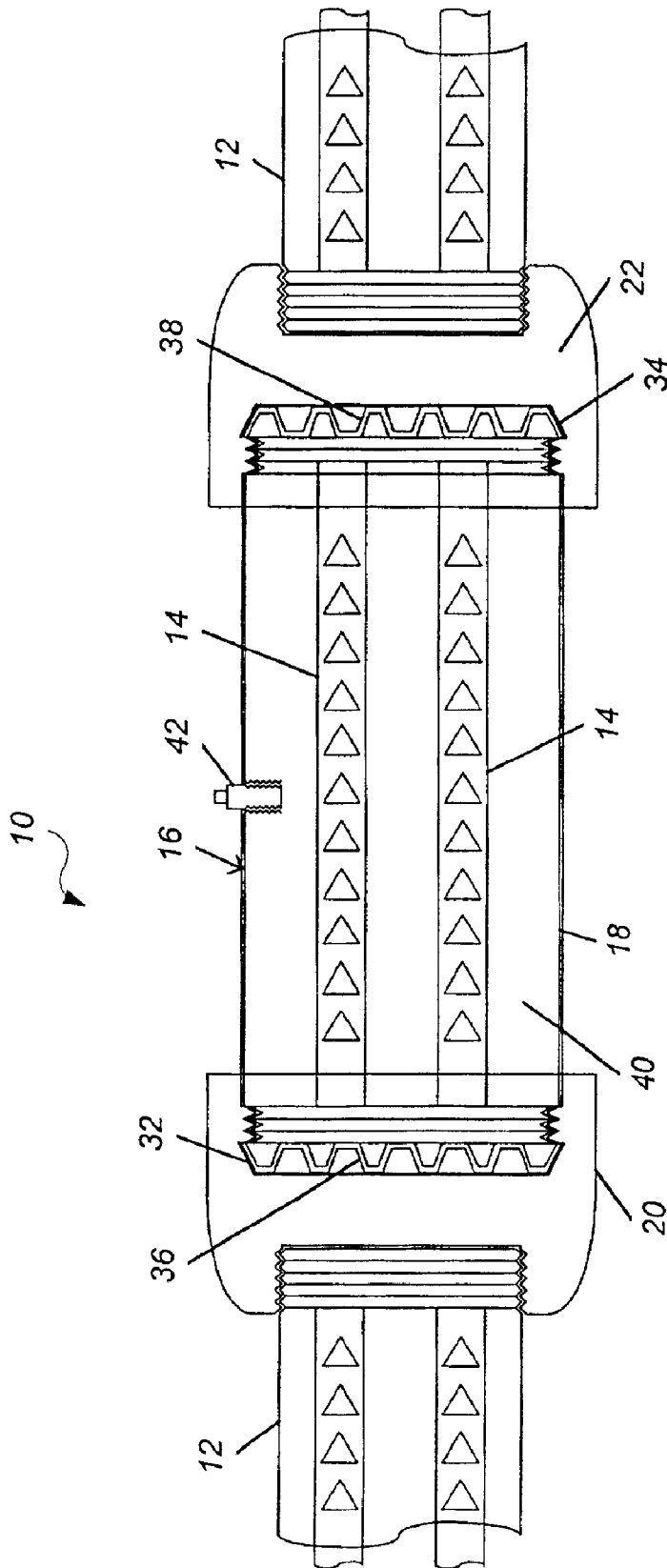


FIG. 1

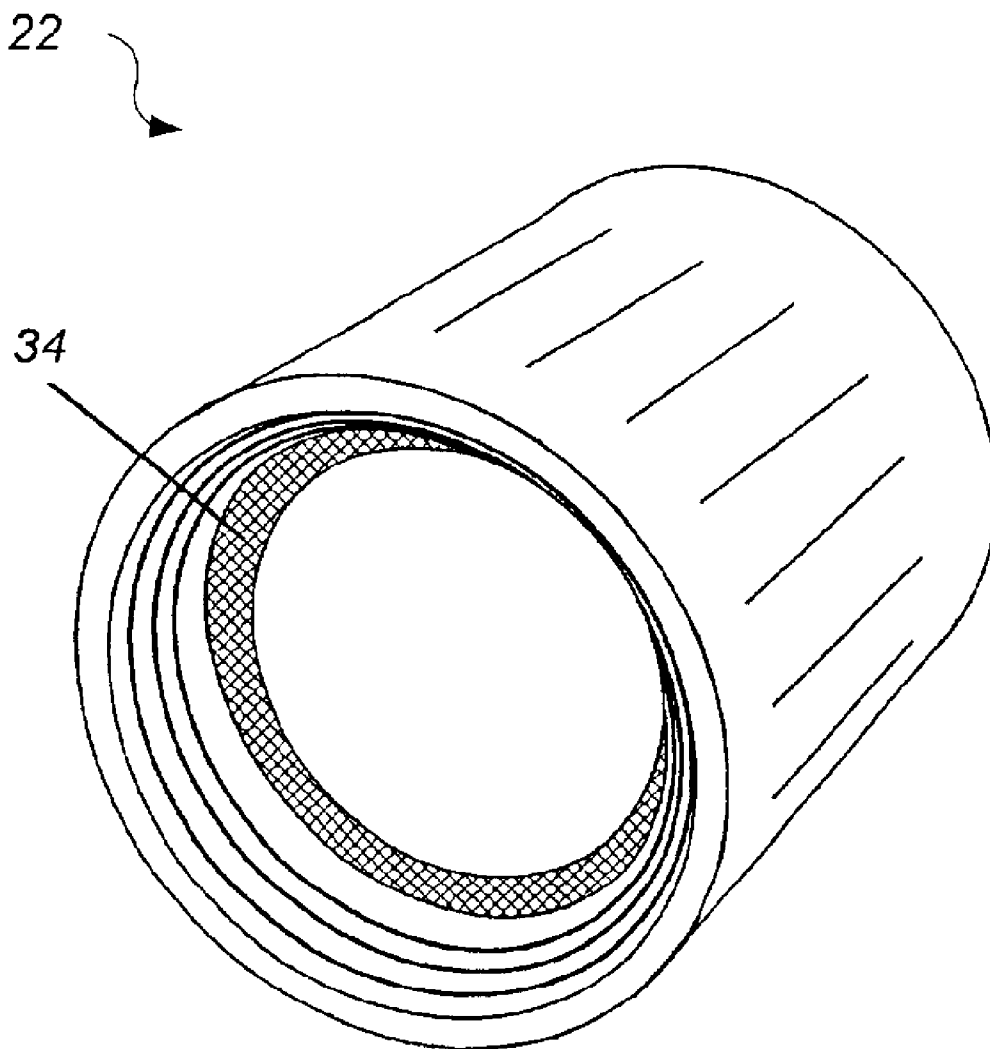


FIG. 2

APPARATUS AND METHOD FOR SEALING A CONDUIT

FIELD OF THE INVENTION

The present invention relates generally to conduit seals, and more particularly to a conduit seal system incorporated into a conduit run, which isolates internal sections of the conduit, thus preventing the passage of vapor, gases or flames via the conduit from section to section.

BACKGROUND OF THE INVENTION TECHNOLOGY

To comply with the current National Electrical Code, conduit seals must prevent the passage of gases, vapors, or flames from one portion of an electrical installation to another when used in areas where flammable or explosive gases and vapors may be present. For this reason, hermetically sealed conduits have been developed. One method and apparatus for accomplishing this goal can be found in U.S. Pat. No. 4,640,978 issued to the Minnesota Mining and Manufacturing Company. This patent relates to a method of sealing electrical fittings by foaming in situ a removable, flame retardant, solvent resistant, substantially closed cell isocyanurate resin. The patent provides that once the conduit and conduit fitting are installed and wires threaded through the conduit, a nonflammable packing material is inserted into the fitting to prevent the flow of the resin beyond the area that needs to be sealed. The resin compound is then mixed and poured into the fitting through an opening, which is closed with a seal plug once the area to be sealed is filled with the resin compound. A drawback of this invention is that the composition contains water, which can cause the composition to swell at low temperatures and fracture the seal casing. Another drawback of this design is that the nonflammable packing material used to section off the area to be sealed is extremely difficult to insert in a manner necessary to prevent the migration of the composition into the conduit and out of the seal body.

At least one prior art conduit seal has eliminated the use of packing material to section off the area to be sealed. This device is disclosed in U.S. Pat. No. 2,247,671 issued to Tepel et al. In this device, the conduit seal is mounted on the end of the conduit and consists of three separate body-forming elements, an inner casing or coupling member, an extension or intermediate casing member, and an outer end or ring bushing member. The inner casing member is formed with an interior thread adapted to be screwed onto the threaded end of the conduit. Adjacent to the threaded portion of the inner casing and opposite the end of the conduit is an annular shoulder or abutment. Between the end of the conduit and the abutment is a soft rubber diaphragm mounted between two relatively thin annular sheet metal rings. The rubber diaphragm is formed with an opening of a diameter considerably smaller than the outside diameter of the sheath of the cable. This is so that when the cable is inserted in the opening, the rubber snugly embraces the cable in a substantially tight manner. Thus, the rubber diaphragm in this device replaces the use of the packing material. However, a drawback of this device is that it is designed as an end seal, primarily for lead sheathed cables. It is not designed to join two lengths of conduit and provide a seal that will deter the flow of gases, vapors, and flames. Also, it is not easily connectable to the conduit.

SUMMARY OF THE INVENTION

existing technologies by providing an apparatus and method for sealing a conduit from gases, vapors and flames, which is not susceptible to fracturing and eliminates the necessity of stuffing packing material into difficult to reach areas with very limited visibility. This assures that the sealant remains in the seal and prevents the passages of vapors, gases, and/or flames.

In one embodiment of the present invention an apparatus for sealing the conduit is provided. The apparatus includes a housing defined by an inner chamber and outer surface. The apparatus further includes at least one free running hub disposed on, and mounted to, the housing, which is adapted for coupling to at least one end of the conduit. The apparatus also includes a flexible membrane disposed within the inner chamber of the housing, which is adjacent to the free running hub. The apparatus further includes a polyurethane-based epoxy sealant disposed within the inner chamber and means for purging any air, other gases, or moisture which may be trapped within the inner chamber. In one embodiment, the purging means includes a threaded port and corresponding threaded plug adapted to mate with the threaded port. In another embodiment, the purging means includes a valve, preferably of the spring loaded ball type. As those of ordinary skill in the art will appreciate, the purging means may include other equivalent devices.

In another embodiment of the present invention, a method of sealing a conduit using the apparatus described above is provided. The method includes the steps of coupling the apparatus to at least one end of the conduit, threading any wires or cables that may be contained within the conduit through the flexible membrane, and filling the inner chamber with the polyurethane-based epoxy sealant compound. The method also includes the step of releasing any air, other gases, or moisture which may be trapped in the inner chamber after it is filled with the polyurethane-based epoxy sealant compound.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the present disclosure and advantages thereof may be acquired by referring to the following description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a cross-sectional view of an apparatus for sealing a conduit in accordance with the present invention.

FIG. 2 is a side view of a free running hub in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, the details of preferred embodiments of the invention are schematically illustrated. FIG. 1 illustrates the apparatus for sealing a conduit in accordance with the present invention. The apparatus is shown generally by reference numeral **10**. The apparatus **10** couples opposing ends of a conduit **12** to each other by hermetically sealing the inside of the conduit and its contents, namely wires and/or cables **14**, from the outside.

The apparatus **10** includes a housing **16**, which is formed of a generally cylindrically-shaped mid-section **18**, and a pair of oppositely mounted free running hubs **20** and **22**. The cylindrically-shaped mid-section **18** of the housing **16** is formed of metal, preferably an aluminum alloy.

The free running hubs **20** and **22** are generally conical in

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