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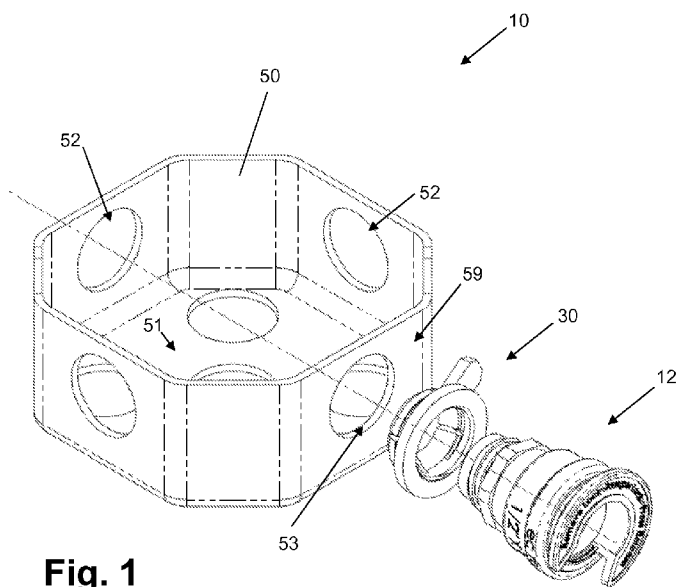
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(54) **Title:** INTEGRATED PIPING CONDUIT WITH ADAPTOR DEVICE AND METHOD**Fig. 1**

(57) **Abstract:** Embodiments of an integrated piping conduit in accordance with aspects of the present invention include a push-to-connect fitting integrated with an adaptor device and associated methods that facilitate the re-use of push fittings without damage to the fitting elements or the pipe, while also facilitating connection to boxes such as electrical boxes in a manner that meets requirements and saves time for professionals dealing with the otherwise challenging management of multiple wires, cables and/or connections. Embodiments can incorporate an integrated release pusher and locking mechanism that allows for quick locking and unlocking of piping elements within a fitting. Embodiments can also include an adaptor having integrated head and body portions, and an ear member extending at least partially radially outwardly and at least partially axially outwardly from the outer surface of the body portion.



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Integrated Piping Conduit with Adaptor Device and Method

TECHNICAL FIELD

The present invention relates to piping conduits, and more particularly to a push-to-connect fitting adaptor device, conduit and method that facilitates protection of contents.

BACKGROUND ART

Piping systems exist to facilitate the flow of fluids (e.g., liquid, gas (such as air) or plasma), contain contents internally and provide other functions. For example, piping systems can include conduits that maintain electrical wiring, effectively bundling and containing wiring within a confined and protected area, so that the inserted wires can be collectively transported, shielded and joined from one point to another. In many instances, one of the end points for the conduit is an electrical box. For purposes of the present disclosure, the term “tube”, “pipe”, “piping”, “conduit”, “conduit element” or “piping element” will be understood to encompass one or more pipes, tubes, conduits, piping elements and/or tubing elements, and may be used interchangeably.

Electrical boxes, which can be referred to as utility boxes, can come in a variety of shapes and sizes, and generally operate to enclose wire connections for indoor electrical applications such as light switches, electrical outlets, fan switches and similar applications. Electrical boxes can be designed for use indoors, outdoors, in an exposed fashion outside of a wall, and in a hidden fashion within a wall, for example. Invariably, electrical boxes include openings to facilitate wiring connections and mounting in desired locations. Various conduits can be employed for collecting and facilitating connection wires through interfacing with one of the electrical box openings, thereby making it safer and easier to connect wires entering from the outside of the box to power sources and ground lines inside of the box, for example. As a specific example, an indoor electrical box for a light switch may have wiring entering the box from a central home power source, and may separately have wiring entering the box from the lighting fixture to be controlled by the light switch. The home power source wiring is connected to the light switch, and the lighting fixture wiring is also connected to the light switch, after which the lighting fixture can be controlled from the electrical box housing the described connections. If the wiring is not securely maintained, or the box improperly positioned or secured, problems can result.

The conduits or piping connections for managing loose wires are generally tube-shaped elements with a hollow interior for permitting wiring to pass through. Such conduits

are useful in properly protecting the wires and cables contained therein. If unprotected, the loose wires and/or cables can be damaged, cut (such as against a metal edge of the electrical box opening) and can potentially cause a short circuit, shock, or fire. While code regulations exist to help prevent these problems, various installations may not meet code requirements.

- 5 When traditional conduits are positioned within an electrical box opening, they may be unsecured, or possibly secured through a basic form of attachment such as a threaded engagement.

In recent years, push-fit technology has been employed with piping systems, and particularly with plumbing systems, to reduce the dangers and time involved in soldering joints and other connection methods. Push-fit methods require minimal knowledge of pipe fittings and involve far fewer materials than soldering. For example, one may only need the pipes, quick-connect fittings, a chamfer/de-burring tool and tubing cutter in order to connect pipes using push-fit technology. The steps involved in connecting piping systems using push-fit technology can be outlined as follows. First, the pipe is cut to the appropriate length and the end of the pipe is cleaned with the de-burring tool. Then the pipe and fitting are pushed together for connection. The fitting is provided with a fastening ring (also called a collet, grip ring or grab ring) having teeth that grip the pipe as it is inserted. The fastening ring device is employed to provide opposing energy, preventing the device from disconnection while creating a positive seal. Accordingly, no wrenches, clamping, gluing or soldering is involved. Push-fit and/or quick-connect technology for piping systems can be obtained, for example, through Quick Fitting, Inc. of Warwick, Rhode Island, USA, suppliers of the CoPro® line of push fittings and related products. Also, such technology is described, for example, in U.S. Patent Nos. 7,862,089, 8,205,915, 8,210,576, 8,398,122, and 8,480,134, the disclosures of which are incorporated herein by reference in their entireties.

25 **DISCLOSURE OF INVENTION**

The present invention provides, in part, a push-to-connect fitting integrated conduit with adaptor device and method that facilitates the re-use of push fittings without damage to the fitting elements or the pipe, while also facilitating connection to boxes such as electrical boxes in a manner that meets requirements and saves time for professionals dealing with the otherwise challenging management of multiple wires, cables and/or connections. The present invention connects piping and utility boxes using no tools, clamps, solder or glues, while creating a highly effective seal at the connected joining area. Further, the present invention can incorporate an integrated release pusher and locking mechanism that allows for quick

locking and unlocking of piping elements within a fitting. In embodiments of the present invention, the packing arrangement is also tamper-resistant, and can be provided in accordance with the devices, systems and methods described, for example, in co-owned and pending U.S. Patent No. 9,068,680 issued June 30, 2015 and U.S. application no. 14/291,740, both filed on June 2, 2014, the disclosures of which are hereby incorporated by reference in their entireties.

In various embodiments, the quick connection pipe joint assembly package provided as part of the present invention employs a lockable release pusher that, when in the unlocked position, permits the pusher to move axially inwardly of the fitting, lifting teeth of a fastening ring and thereby facilitating the insertion and release of a cylindrical object such as a piping element held within the fitting. When a piping element is desired to be removed, axially applied pressure can be provided again to the release pusher, lifting the fastening ring teeth off of the inserted pipe to allow it to be removed. In one embodiment of the present invention, the release pusher is permanently secured to the fitting and is part of the packing arrangement.

For purposes of the present disclosure, a fitting can encompass a valve member and other piping elements including, but not limited to: a coupling joint, an elbow joint, a tee joint, a stop end, a ball valve member, tubing and other objects having substantially cylindrical openings. In one embodiment of the present invention, one or more sealing member gasket inserts (e.g., O-ring members) fit within a sealing compartment defined in the interior of the fitting. A sealing ring stabilizer element can also be provided to provide support for the one or more sealing rings. In addition, at each pipe receiving end of the fitting, a locking compartment is machined into the interior wall of the fitting to receive other members, such as, for example, a snap ring member and a locking pusher member and to assist in retaining the edges of the fastening ring. The interior compartments and housing elements provide integrated support for the sealing members and fastening ring when opposing force is applied to piping elements that have been inserted into the fitting.

Aspects of the present invention further provide a connector or adaptor device that can be positioned in or through an opening in a utility or electrical box and secured thereto, while being positioned and secured at the other end to a conduit fitting device, which can house various embodiments of fitting insertion components to permit a piping or conduit element to be removably secured therein. Such aspects can further include a releasable locking component as described above and in the references incorporated by reference noted

above, for example. The fitting can be considered a conduit, and the combined fitting and adaptor device can be considered a conduit, in accordance with various embodiments of the present invention.

Other methods, devices and arrangements as described herein are provided by the present invention.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 is an exploded front perspective view of a conduit arrangement with adaptor in accordance with embodiments of the present invention.

Fig. 2 is a perspective view showing the elements of the arrangement of Fig. 1 in cross-section.

Fig. 3 is a front elevational view of one embodiment of the arrangement of the present invention positioned in front of a utility box.

Fig. 4 is an exploded cross-sectional view of the arrangement as taken along line 4-4 of Fig. 3.

Fig. 5 is a front perspective view of a conduit arrangement with adaptor as installed in a utility box in accordance with embodiments of the present invention.

Figs. 6 and 7 are rear perspective views of a conduit arrangement with adaptor as installed in a utility box in accordance with embodiments of the present invention.

Fig. 8 is a front elevational view of an adaptor in accordance with embodiments of the present invention.

Fig. 9 is a right side view of the adaptor of Fig. 8.

Fig. 10 is a rear elevational view of the adaptor of Fig. 8.

Fig. 11 is a left side cross-sectional view of the adaptor of Fig. 8 as taken along line 11-11 of Fig. 10.

Fig. 12 is a front elevational view of a fastening ring in accordance with embodiments of the present invention.

Fig. 13 is an enlarged view of the portion of the fastening ring taken from encircled portion 13-13 of Fig. 11.

Fig. 14 is a left side view of the fastening ring of Fig. 12.

Fig. 15 is a front elevational view of a piping element or fitting in accordance with embodiments of the present invention.

Fig. 16 is a right side cross-sectional view of the piping element of Fig. 15, taken along the line 16-16 of Fig. 15.

Fig. 17 is an enlarged view of the portion of the piping element taken from encircled portion 17-17 of Fig. 16.

MODES FOR CARRYING OUT THE INVENTION

In the conduit assembly 10 of embodiments of the present invention as shown in Figs.

5 1 through 17, elements of the joint assembly as shown include: a fitting (i.e., fitting body member) 12 having an interior wall 21, an exterior wall 27, end walls 23, 25, one or more sealing members 14 (which can be optionally lubricated), a fastening ring 19, a pusher locking member 18 and a release pusher 20. The fastening ring 19, sealing member(s) 14, pusher locking member 18, release pusher 20 and various other internal components,
10 together, and in subset combinations, provide embodiments of a packing arrangement employable in accordance with embodiments of the present invention, and each has a substantially ring-shaped body forming an opening extending through the body along axis A. The interior wall 21 forms an axial opening or cavity 29, which allows for smooth and snug engagement of an external conduit, piping or tubing element external surface (not shown).
15 As noted above, push-to-connect technology for piping and conduit systems that can be employed in accordance with embodiments of the present invention is shown and described in the above-referenced patent documents. In various embodiments of the present invention, as shown in Figs. 12 through 14, for example, the fastening ring 19 can be provided with a base 160, and a plurality of individual teeth 162 extending therefrom, wherein the teeth are
20 provided with side edges 163 and a radially internal edge 164. In various embodiments of the present invention, the fastening ring 19 has a bifurcated design, and edges 164 are formed in a curved fashion so as to facilitate gripping action against an inserted piping element, which may be a galvanized steel pipe, for example.

As further shown in Fig. 2, the release pusher 20 can be positioned at a first end 22 of
25 the fitting 12, and an adaptor mounting end 25 can be positioned adjacent an adaptor 30. Further, as shown in Figs. 2 and 4, the exterior surface of the fitting 12 at the adaptor mounting end 24 can be provided with an external thread 26 and a wedge portion 28, for engaging the adaptor 30 as described further herein.

As shown in Figs. 16 through 18, the fitting 12 further includes a collar portion 60
30 extending radially outwardly of the fitting exterior wall 27 and further extending radially inwardly of the fitting interior wall 21. The collar portion 60 includes an axially inner surface 62 and an axially outer surface 64, wherein the axially outer surface 64 has a pipe engaging portion 65 within the fitting cavity 29, and wherein the collar portion axially inner surface 62 has an adaptor engaging surface 66 external of the cavity 29. The external surface

67 of the collar portion 60 can be considered part of the exterior wall 27 of the fitting 12. As shown in Figs. 16 through 18, the collar portion 60 extends radially outwardly of the wall 27 between the approximate mid-section 31 of the fitting 12 and the wedge portion 28 of the fitting 12. By so doing, the collar portion 60 provides a surface 66 against which the adaptor
5 30 can engage, as described elsewhere herein. Fig. 5 illustrates the connection of the fitting 12 with the adaptor 30, and with the joined conduit 10 inserted and secured in box 50.

In various embodiments of the present invention, as shown in Fig. 17, for example, the radial distance **C** from the fitting axis **A** to the approximate mid-point 69 of the thread 26 can range from approximately 0.26 inches to approximately 2.78 inches, inclusive, and the
10 radial distance **D** from the axis **A** to the tip 71 of the thread 26 can range from approximately 0.51 inches to approximately 3.03 inches, inclusive. Further, in various embodiments, the height **E** of the thread 26 can range from approximately 0.125 inches to approximately 0.75 inches, inclusive, and the axial distance **F** between radially extending walls 72 and/or thread heights of the thread 26 can range from approximately 0.005 inches to approximately 0.250
15 inches, inclusive.

In various embodiments, the interior surface 21 of the fitting 12 can extend in a stair step fashion to accommodate the connections and purposes of the fitting described herein. For example, the interior surface 75 of the wedge portion 28 extends a radial distance from axis **A** that is less than the radial distance from axis **A** to the interior surface 76 of the
20 intermediate portion 31 of the fitting, and the radial distance from axis **A** to the interior surface 76 is less than the radial distance from axis **A** to the interior surface 77 of a sealing ring compartment 97. Further, the radial distance from axis **A** to the interior surface 77 is less than the radial distance from axis **A** to the interior surface 78 of a fastening ring compartment 98, and the radial distance from axis **A** to the interior surface 78 is less than the
25 radial distance from axis **A** to the interior surface 79 of a pusher locking member compartment 99. Also, the radial distance from axis **A** to the interior surface 78 is greater than the radial distance from axis **A** to the interior surface 96 of the end wall 25. In this way, interior surface 96 is part of a pocket or compartment 99 for retaining a pusher locking member 18 shown in Figs. 2 and 4, when a suitable packing arrangement is employed in the
30 fitting. In operation, a packing arrangement such as that described above in connection with Figs. 2 and 4 is positioned within compartments 97, 98 and 99, and a piping element is inserted into the cavity 29. The release pusher 20 lifts the fastening ring teeth 162 so that the piping element can be inserted, and the piping element will stop at the wall 65 of the collar

portion 60 of the fitting 12. Once in place, the piping element can be retained within the cavity 29 and restricted from axial movement back out of the cavity by the fastening ring teeth 162, which make contact with the piping element outer wall once the release pusher 20 is released. In addition, wiring can be inserted through the opening 29, any inserted piping element, and thus into the utility box 50 for the purposes described herein.

As shown in Figs. 2, 4 and 8 through 11, the adaptor 30 has a head portion 35 at a first end 32, and a body portion 40 integrally formed with and extending from the head portion 35 to a second end 34. The adaptor 30 can be substantially ring-shaped in the sense that the adaptor 30 has an interior surface 73 forming an opening 74 extending axially through the head portion 35 and the body portion 40 along axis **B**. The head portion 35 can extend radially outwardly of the body portion 40, as shown in Figs. 9 and 11, for example. The body portion includes an interior wall 38 and an exterior wall 41. In various embodiments, the body portion 40 comprises a neck portion 80, a shoulder portion 82 and a ledge portion 84, wherein the neck portion 80 has an external surface 81 that extends axially from the head portion 35 in substantially parallel relation to axis **B**. The shoulder portion 82 further has an outer surface 83 and the ledge portion 84 also has an outer surface 85. Outer surfaces 81, 83 and 85 form the exterior wall 41 of the adaptor 30. In various embodiments, the radial distance from axis **B** to the outer surface 81 of neck portion 80 is less than the radial distance from axis **B** to the outer surface 83 of shoulder portion 82. In various embodiments, the outer surface 83 of shoulder portion 82 extends from a longer radial distance from axis **B** at edge 88 adjacent neck portion 80 to a shorter radial distance from axis **B** at edge 89 adjacent ledge portion 84. Such a relative dimensioning can assist, for example, with inserting the adaptor 30 into a box 50 during installation, for example. In specific embodiments, the outer surface 83 of shoulder portion 82 extends substantially linearly from edge 88 to edge 89. The relative dimensions of the neck 80, shoulder 82 and ledge 84 portions help provide a strong base for supporting the ear member 55. Further, the radial distance from axis **B** to the outer surface 81 of neck portion 80 matches the radius **R** of the opening 52 in the box 50 to ensure snug engagement of the adaptor 30 within the box 50.

In various embodiments of the present invention, the outer surface 85 of ledge portion 84 of adaptor 30 extends radially inwardly from edge 89 adjacent shoulder portion 82 to edge 90 forming the axially inner end 92 of the adaptor 30. In this way, a portion of the outer surface 85 has a radial distance from axis **B** that exceeds the radial distance from axis **B** to the outer surface 81 of the neck portion 80, while outer surface 85 also has a portion with a radial

distance from axis **B** that is less than the radial distance from axis **B** to the outer surface 81 of the neck portion. In specific embodiments, the outer surface 85 of ledge portion 84 extends substantially linearly from edge 89 to edge 90 in chamfered form. In other embodiments, the outer surface 85 can be rounded. With the arrangement as shown in Figs. 9 and 11 and
5 described above, the adaptor 30 maintains core strength at neck portion 80 while providing stability for ear member 55 as described hereinafter.

As further shown in Fig. 2, the first end 32 of the adaptor 30 is adapted to engage the adaptor mounting end 24 of the fitting 12. In embodiments of the present invention, the thread 26 on the adaptor mounting end 24 of the fitting 12 can threadingly engage an interior
10 thread-receiving cavity 36 of the adaptor 30. Further, the wedge portion 28 of the fitting 12 can engage interior wall(s) 38 of the adaptor 30 such that, as the fitting threadingly engages the adaptor, the wedge portion 28 pushes the interior wall 38 of the adaptor outwardly, assisting in secure connection between the adaptor 30 and a utility box 50 as described elsewhere herein. In various embodiments of the present invention, the thread arrangement
15 can include a buttress thread, a standard thread, a rectangular thread, a square thread and/or a double buttress thread design. The thread design can include, for example, a ½ inch thread or a ¾ inch thread. As shown in Figs. 15 through 17, for example, the fitting 12 can be provided such that the thread 26 on the adaptor mounting end 24 has an outer diameter **D**, a pitch diameter and a thread pitch consistent with the discussion elsewhere herein. The dimensions
20 of these measurements can vary depending upon the implementation, but can generally result in a very tight fitting that helps to keep the fitting securely connected with the box.

As shown in Figs. 4 and 11, as the interior wall 38 moves away from the head portion 35 and axially outwardly thereof, the interior wall 38 also extends radially inwardly. In various embodiments, this radially inward movement begins from a first radial inner wall
25 point 39, where the inner wall is of substantially the same radius as the thread-receiving cavity 36 of the adaptor 30. As the wall 38 moves axially outwardly to the second end 34, the wall radius becomes smaller. In embodiments of the present invention as shown in Figs. 2 and 6 through 11, the adaptor 30 further includes ear member 55 extending outwardly from the outer surface of the adaptor 30 at or near the second end 34. In various embodiments, the
30 ear member 55 is secured to the outer surface 83 of shoulder portion 82, and in additional embodiments, the ear member 55 is secured to the outer surface 83 of shoulder portion 82 and the outer surface 85 of ledge portion 84. In various embodiments, the ear outer edge 155 is provided with a top squared off edge 157, and chamfered side edges 159 such that the full

side edges 159 can mate with the floor 51 of the box 50 as it is rotated during operation, as shown in Fig. 7. In this way, the ear member 55 provides greater and more stable resistance to turning, which facilitates secure connection of the adaptor to the fitting during operation.

The ear member 55 can be of varying shapes, thicknesses and sizes, and can extend
5 both radially and axially outwardly from the body portion 40 so as to be capable of suitably engaging an inner wall 51 of a utility box 50 when installed. It will be appreciated that the ear member 55 can thus extend at least partially radially outwardly from the body portion 40 as well as at least partially axially outwardly of the body portion 40, and that the radial outward extension of the ear member 55 does not necessitate an extension that is
10 perpendicular to the adaptor axis. In various embodiments, the ear member 55 extends primarily radially outwardly from the body portion 40. It will be appreciated that by extending outwardly from the outer surface 83 (and also optionally outer surface 85), the ear member 55 has a substantially flat surface that is angled radially outwardly and axially outwardly from the body portion 40 in order to operate smoothly when engaging and
15 disengaging from the inner wall 51 of utility box 50.

In addition to the above, the body portion 40 of the adaptor 30 can be formed with one or more axially extending grooves 42. The grooves 42 permit the body member 40 to flex during operation, such that the body member 40 can extend through an opening 52 in a utility box 50 during installation or de-construction. In embodiments of the present invention, the
20 grooves 42 extend in a direction that is coaxially aligned with the axis of the opening through the adaptor 30. In other embodiments, the grooves 42 can extend at non-coaxial angles. In various embodiments, the grooves 42 extend from the head portion xx to the second end xx of the adaptor.

The electrical and/or utility box 50 shown in the drawings is representative of various
25 utility boxes where manual wiring connections can take place. As shown in Figs. 1 through 7, the box 50 includes a floor 51 and one or more openings 52. Typically, the openings 52 are formed in the box and may have rough edges, but can generally be formed with a substantially rounded or circular shape.

For installation, the second end 34 of the adaptor 30 can be inserted through an
30 opening 52 in the box 50, whereby the ear member 55 is most likely inserted through the opening first, followed by the body portion 40. Once the adaptor is through the opening 52, it can be pushed with manual pressure at the head portion 35 until a base surface 39 of the head portion 35 abuts the outside surface 59 of the box 50. At such time, the ear member 55

resides completely within the box 50, as shown in Figs. 5 through 7. It will also be appreciated that the outer surface 81 of the neck portion 82 of the body portion 40 mates with the edges 53 of the opening 52 when installed. The fitting can then be inserted into the first end 32 of the adaptor 30, whereupon the wedge portion 28 of the fitting engages or nearly engages the inner wall 38 of the adaptor, and the external thread 26 of the fitting engages the thread-receiving cavity 36 of the adaptor 30. As the fitting is rotated (e.g., clockwise), the threaded engagement of the fitting 12 with the adaptor 30 moves the wedge portion 28 further within the adaptor, and begins to put pressure on the internal wall 38 to expand outwardly. The expansion of the internal wall 38 outwardly is facilitated by the gaps 42, and thus the body portion 40 can more snugly engage the edges 53 of the opening 52 of the box 50. Further, the rotation of the fitting 12 and engaged adaptor 30 causes the ear member 55 to rotate such that outer edge 159 will contact the floor 51 of the box, as shown in Fig. 7. In this way, the adaptor and fitting are snugly engaged with the box, and a pipe or conduit element can then be inserted into the first end 22 of the fitting as described elsewhere herein. Any wiring or cabling within the conduit element can then be drawn through the fitting and adaptor for ready manipulation within the box 50.

In embodiments, the fitting 12 and can be forged CW617N brass, with full porting and full flow fitting, for example. In other embodiments, the fitting 12 can be a plastic material. Similarly, the adaptor 30 can be plastic, to provide slight malleability for insertion through an opening 52 in the utility box 50 or other compartment where employed.

It will be appreciated that the present invention provides various methods for assembling and operating piping joint assemblies, including, for example, providing a fitting as described elsewhere herein, wherein the fitting has an outer wall, and an inner wall, wherein the inner wall defines a locking compartment and a pipe receiving cavity extending along a longitudinal axis of the fitting; inserting a pusher locking member into the fitting so as to be maintained within the locking compartment; and securing a release pusher to the pusher locking member, the release pusher having a substantially cylindrical outer wall having an axially outer end, a substantially cylindrical inner wall having an axially outer end, and an axially outer wall connecting the axially outer end of the outer wall and the axially outer end of the inner wall, wherein the release pusher is secured to the locking member such that the inner wall is axially movable into the cavity, and rotatable about the fitting longitudinal axis. The present invention can further include tamper-resistant features to

dissuade any unscrupulous individual from attempting to tamper with the device and/or internal components.

It will be appreciated that any and all dimensions described herein are exemplary and provided as embodiments associated with proper working operation of the present invention.

5 Further, it will be appreciated that, in one embodiment of the present invention, the members of the push connect joint assembly can be formed through hydroforming processes.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being
10 indicated by the claims of the application rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

CLAIMS:

1. A conduit device, comprising:

a fitting having an interior wall, an exterior wall, a first end wall and a second end wall, wherein the interior wall defines a cavity extending axially through the fitting; and

an adaptor having a head portion with an interior surface and an exterior surface, wherein the adaptor further has a body portion with an interior wall and an exterior wall, wherein the body portion is integrated with and extends from the head portion, wherein the head portion interior surface and body portion interior wall define an opening extending through the adaptor along an adaptor axis, and wherein the fitting is removably engageable with the adaptor head portion; and

at least one ear member extending at least radially outwardly from the outer surface of the adaptor body portion.

2. The device of claim 1, wherein the radial distance from the adaptor axis to the exterior surface of the head portion is larger than the radial distance from the adaptor axis to the exterior surface of the body portion.

3. The device of claim 1, wherein the fitting exterior wall includes a collar portion, wherein the collar portion includes an axially inner surface and an axially outer surface, wherein the axially outer surface of the collar portion has a pipe engaging portion within the fitting cavity, and wherein the collar portion axially inner surface has an adaptor engaging surface external to the fitting cavity.

4. The device of claim 1, wherein the fitting includes a wedge portion that has an external surface, wherein the external surface of the wedge portion includes a thread, and wherein the interior surface of the adaptor head portion includes a thread-receiving groove.

5. The device of claim 4, wherein the wedge portion is engageable with the adaptor interior wall.

6. The device of claim 1, further including:

at least one sealing member positioned within the fitting cavity, wherein the at least one sealing member has a substantially ring-shaped body forming an opening extending axially therethrough; and

a fastening ring positioned within the fitting cavity, wherein the fastening ring has a substantially ring-shaped body forming an opening extending axially therethrough.

7. The device of claim 1, wherein the ear member has an outer end and wherein the radial distance from the adaptor axis to the ear member outer end is larger than the radial distance from the adaptor axis to the head portion exterior surface.

8. The device of claim 1, wherein the head portion extends from the body portion to a first adaptor end, and wherein the adaptor body portion extends from the head portion to an adaptor second end, and further wherein the ear member extends at least partly axially outwardly of the adaptor first end.

9. The device of claim 1, wherein the adaptor body portion includes at least one axially extending groove.

10. The device of claim 9, wherein the at least one groove extends from the head portion to the adaptor first end.

11. The device of claim 1, wherein the adaptor body portion interior wall extends radially inwardly as it extends axially outwardly from the head portion.

12. A conduit device, comprising:

an adaptor having a head portion with an interior surface and an exterior surface, wherein the adaptor further has a body portion with an interior wall and an exterior wall, wherein the body portion is integrated with and extends from the head portion, wherein the head portion interior surface and body portion interior wall define an opening extending through the adaptor along an adaptor axis, wherein the radial distance from the adaptor axis to the exterior surface of the head portion is larger than the radial distance from the adaptor axis to the exterior surface of the body portion; and

at least one ear member extending at least radially outwardly from the outer surface of the body portion.

13. The device of claim 12, wherein the ear member has an outer end and wherein the radial distance from the adaptor axis to the ear member outer end is larger than the radial distance from the adaptor axis to the head portion exterior surface.

14. The device of claim 12, wherein the head portion extends from the body portion to a first adaptor end, and wherein the adaptor body portion extends from the head portion to an adaptor second end, and further wherein the ear member extends at least partially axially outwardly of the adaptor first end.

15. The device of claim 12, wherein the adaptor body portion includes at least one axially extending groove.

16. The device of claim 15, wherein the at least one groove extends from the head portion to the adaptor first end.

17. The device of claim 12, wherein the body portion comprises a neck portion, a shoulder portion and a ledge portion, wherein the neck portion has a neck external surface that extends
5 axially from the head portion in substantially parallel relation to adaptor axis, wherein the shoulder portion extends axially outwardly of the neck portion, and wherein the ledge portion extends axially outwardly of the shoulder portion.

18. The device of claim 17, wherein the shoulder portion has a shoulder external surface and the ledge portion has a ledge external surface, and wherein the radial distance from the
10 adaptor axis to the neck external surface is less than the radial distance from the adaptor axis to the shoulder external surface.

19. The device of claim 17, wherein the shoulder external surface has a first edge adjacent neck portion and a second edge adjacent ledge portion, and wherein the radial distance from the adaptor axis to the first edge is longer than the radial distance from the adaptor axis to the
15 second edge.

20. The device of claim 19 wherein the shoulder portion external surface extends substantially linearly from the first edge to the second edge.

21. The device of claim 19, wherein the ledge external surface extends radially inwardly from the second edge to the second end of the adaptor.

20 22. The device of claim 17, wherein the ear member has a base that is integrated with shoulder portion.

23. The device of claim 17, wherein the ear member has a base that is integrated with shoulder and ledge portions.

24. The device of claim 12, wherein the adaptor body portion interior wall extends radially
25 inwardly as it extends axially outwardly from the head portion.

25. A conduit device, comprising:

 a fitting having an interior wall, an exterior wall, a first end wall and a second end wall, wherein the interior wall defines a cavity extending axially through the fitting;

 a wedge portion integrally formed with the fitting and having an external surface,
30 wherein the external surface of the wedge portion includes a thread; and

 a collar portion integrally formed with the fitting and extending radially outwardly of the fitting exterior wall and further extending radially inwardly of the fitting interior wall, wherein the collar portion includes an axially inner surface and an axially outer surface,

wherein the axially outer surface has a pipe engaging portion within the fitting cavity, and wherein the collar portion axially inner surface has an adaptor engaging surface.

26. The device of claim 25, further including:

at least one sealing member positioned within the fitting cavity, wherein the at least
5 one sealing member has a substantially ring-shaped body forming an opening extending axially therethrough; and

a fastening ring positioned within the fitting cavity, wherein the fastening ring has a substantially ring-shaped body forming an opening extending axially therethrough.

10 27. A method for facilitating wiring protection through an electrical conduit to a utility box, comprising:

providing a fitting with an interior wall, an exterior wall, a first end wall and a second end wall, wherein the interior wall defines a cavity extending axially through the fitting, wherein the fitting includes a wedge portion having an external surface, wherein the external
15 surface of the wedge portion includes a thread;

providing an adaptor having a head portion with an interior surface and an exterior surface, wherein the adaptor further has a body portion with an interior wall and an exterior wall, wherein the body portion is integrated with and extends from the head portion, wherein the head portion interior surface and body portion interior wall define an opening extending
20 through the adaptor along an adaptor axis, wherein the radial distance from the adaptor axis to the exterior surface of the head portion is larger than the radial distance from the adaptor axis to the exterior surface of the body portion, and wherein the body portion interior surface includes a thread receiving groove;

securing the adaptor to the fitting; and

25 securing the adaptor to a utility box.

28. The method of claim 27, including providing an ear member extending at least partially radially outwardly from the outer surface of the body portion.

30

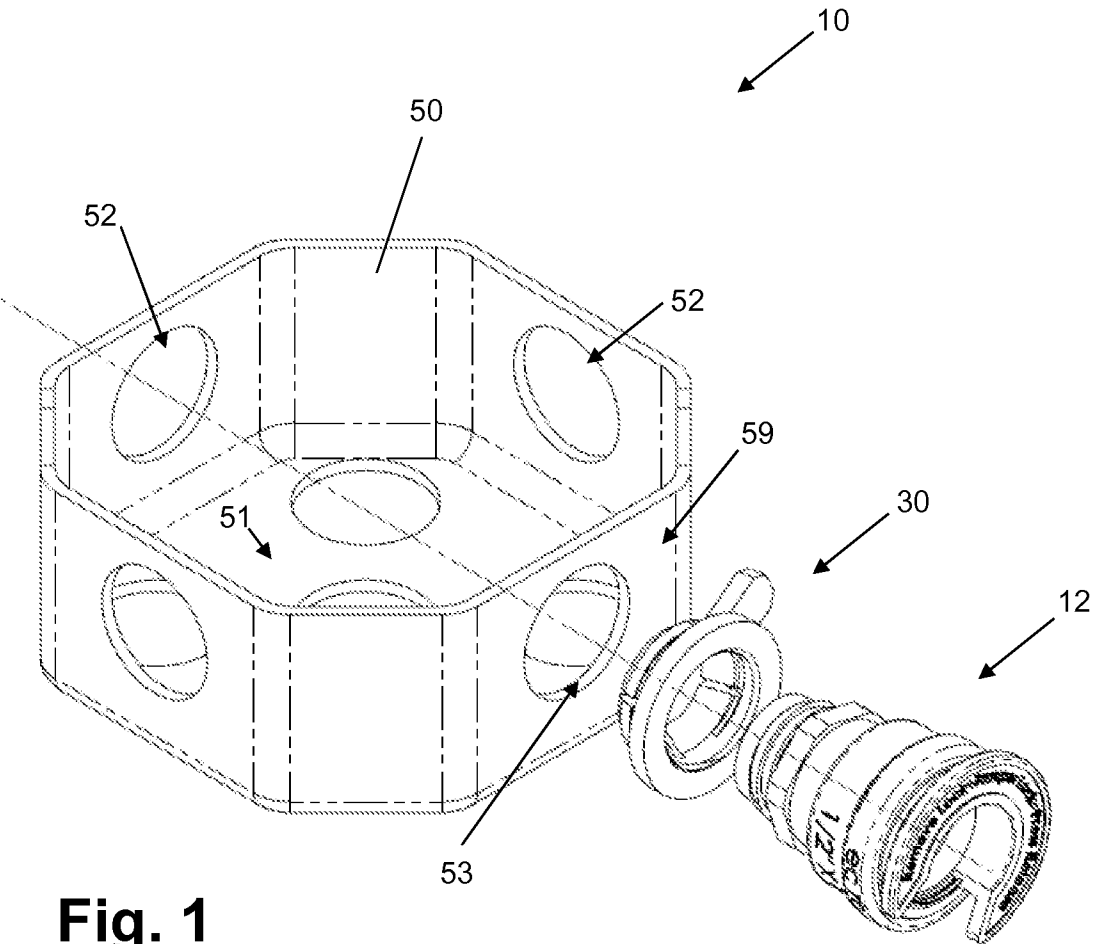


Fig. 1

Fig. 2

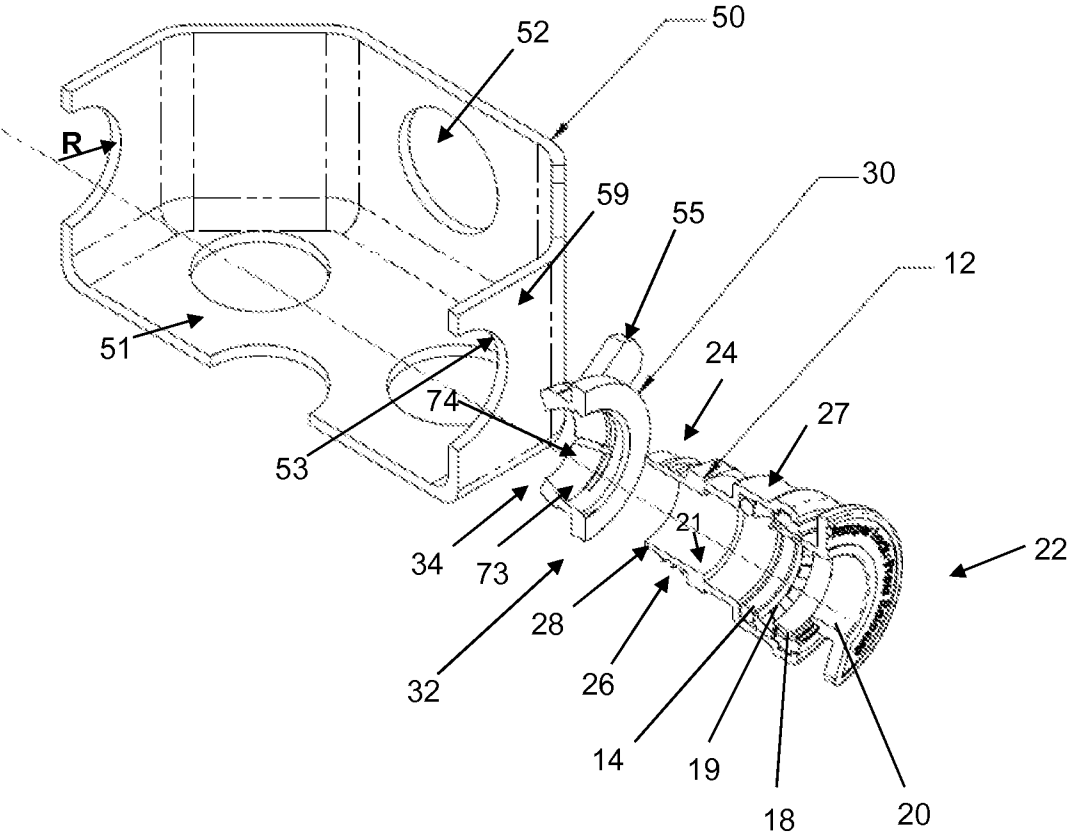


Fig. 3

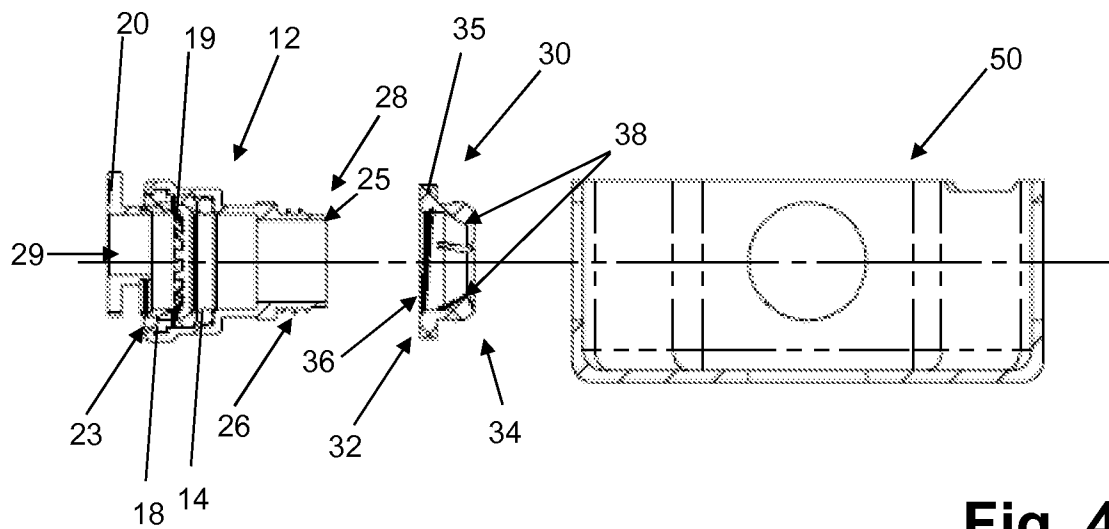
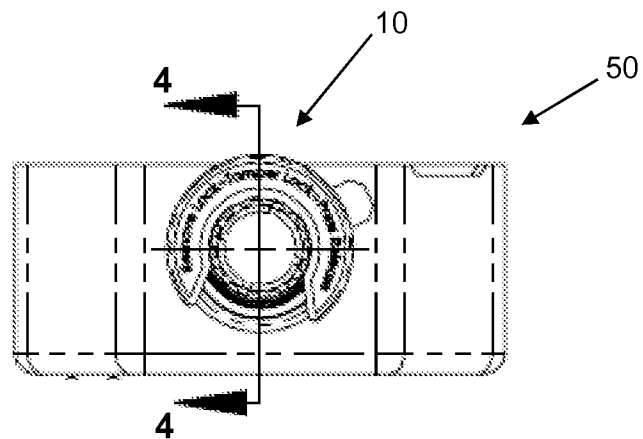
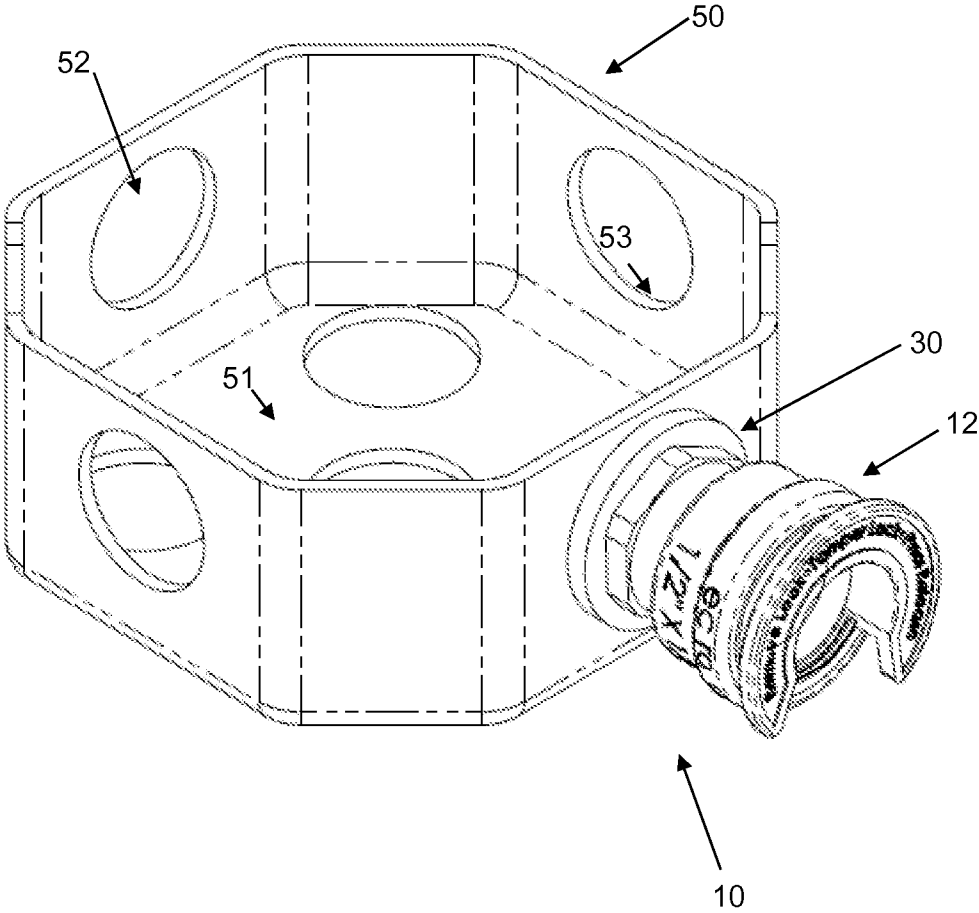


Fig. 4

Fig. 5



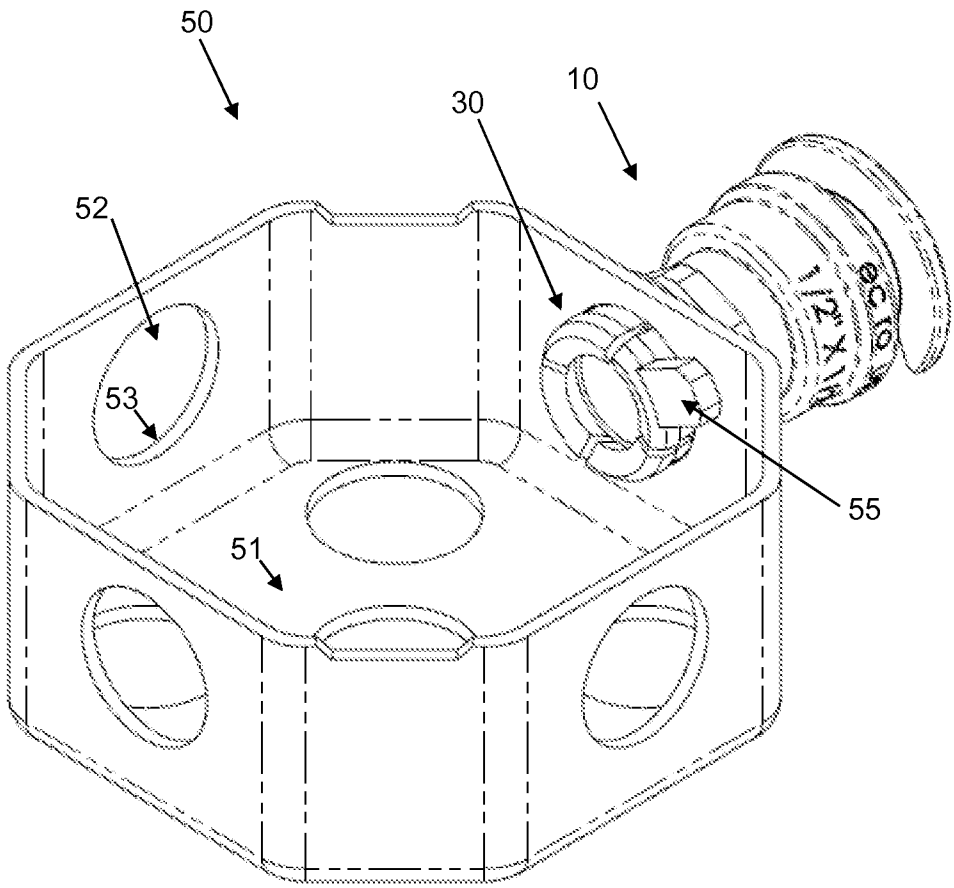


Fig. 6

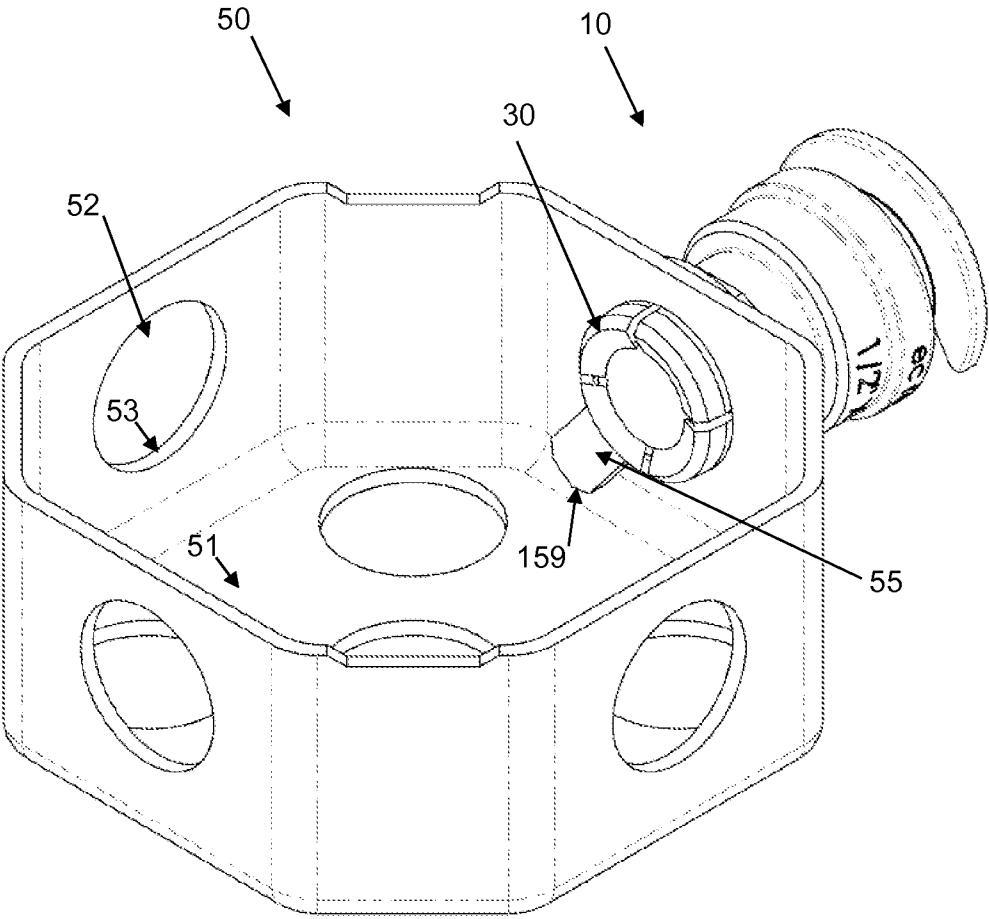


Fig. 7

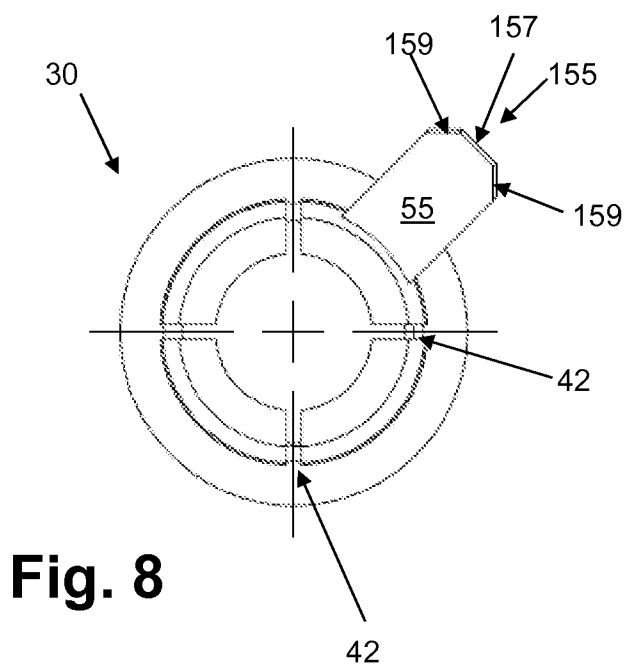


Fig. 8

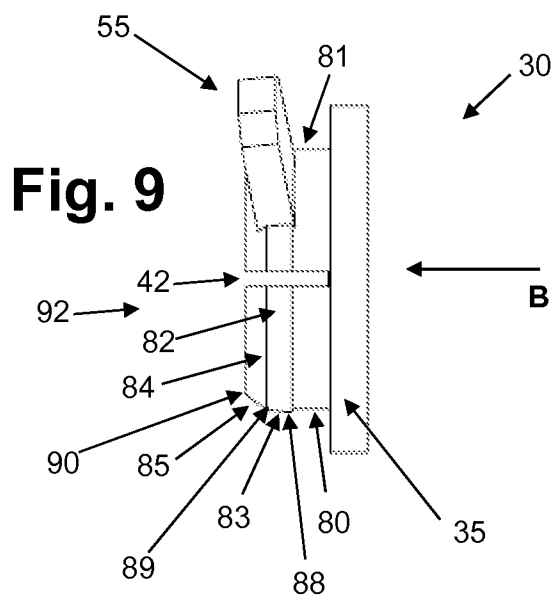


Fig. 9

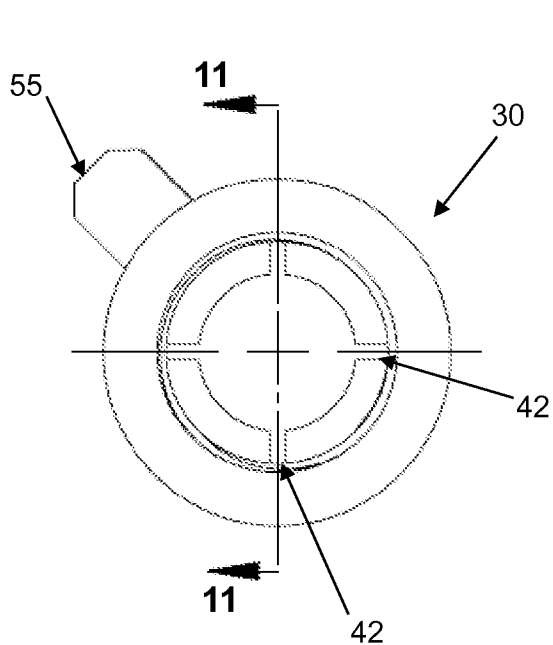


Fig. 10

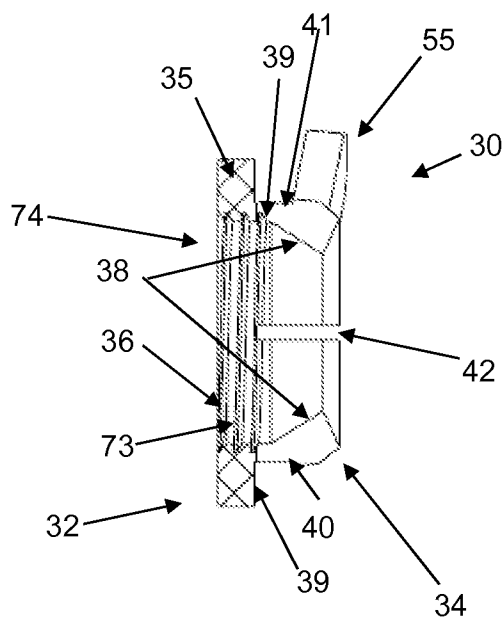


Fig. 11

Fig. 12

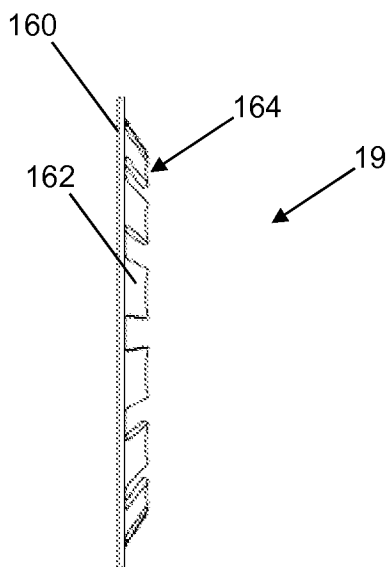
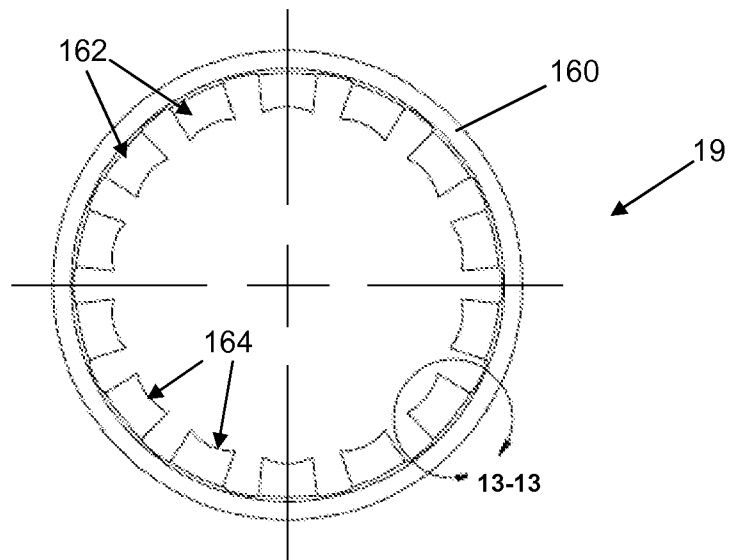


Fig. 14

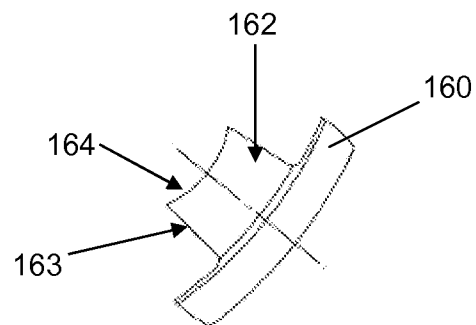


Fig. 13

Fig. 16

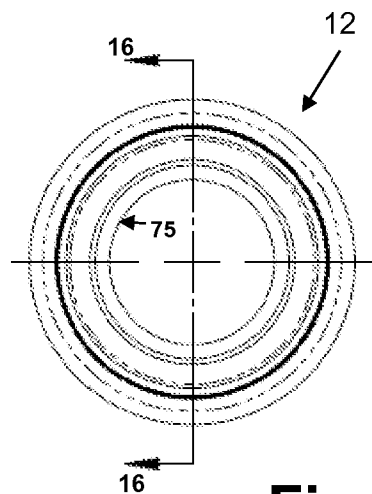
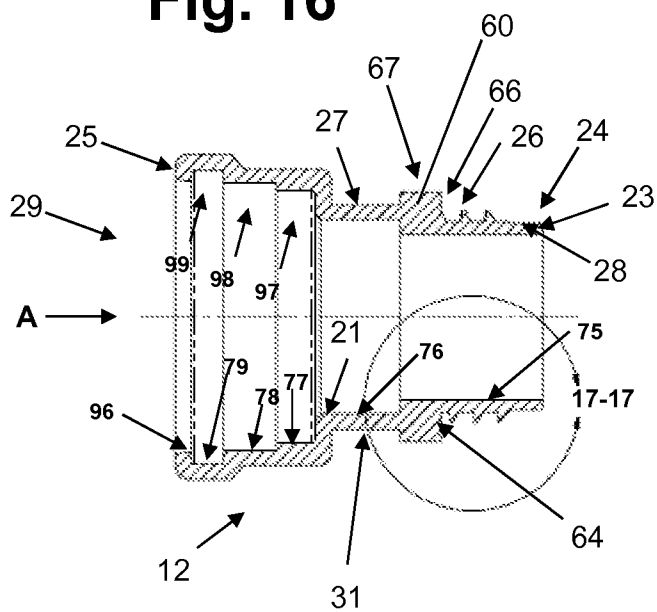


Fig. 15

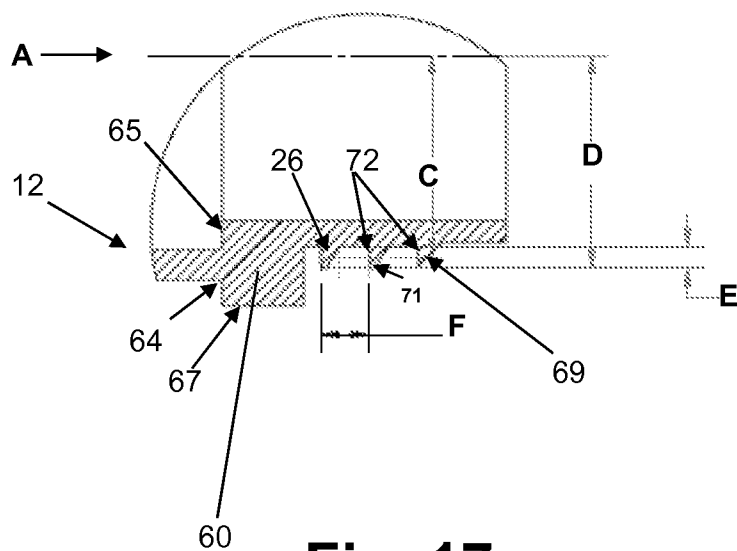


Fig. 17

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 15/41701

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - H02G 3/06 (2015.01) CPC - H02G 3/065 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC(8): H02G3/06 (2015.01) CPC: H02G3/065 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched CPC: F16L37/091, F16L37/0982, H02G3/0691, F16L33/24, F16L37/008. USPC: 174/654, 174/669, 285/154.1, 285/206, 285/921. IPC(8): F16L37/00 (2015.01) Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Google (Web, Patents, Scholar, Books), PatBase		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,068,496 A (FAVALORA) 26 November 1991 (26.11.1991), Figs. 3-4, 8; col 2 lns 55-58, 62-68, col 3 lns 1-5, 8-11, 14-22, col 4 lns 3-11, 13-17, col 5 lns 57-60.	1-2, 8-10, 12, 14-16
Y		6, 25-26
A		17-23, 27-28
X	US 1,745,941 A (METCALF) 04 February 1930 (04.02.1930); Fig. 1-3, 5; pg 1 ln 20-26, 30-32, 36-41, 53-54	1
Y		4-5, 11, 24
A		3, 7, 13
Y	US 6,988,746 B2 (OLSON) 24 January 2006 (24.01.2006), Fig. 6; col 4 lns 65-67, col 6 lns 47-52, col 6 lns 2-6, 41-52.	4-6, 11, 24-26
Y	US 4,002,358 A (STREIT) 11 January 1977 (11.01.1977), Fig. 6; col 3 lns 3-5, 45-48, 55-60, col 4 lns 4-7, col 5 lns 32-34.	25-26
A	US 2,823,932 A (SCHIGUT) 18 February 1958 (18.02.1958), Figs. 1-3, col 3 lns 1-6, 12-16, 52-58.	7, 13
A	US 4,738,636 A (BOLANTE) 19 April 1988 (19.04.1988), Figs. 1-2, 4	1-28
A	US 5,037,318 A (ROBERTSON) 06 August 1991 (06.08.1991), Abstract, Fig. 1	1-28
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 01 December 2015 (01.12.2015)		Date of mailing of the international search report 29 DEC 2015
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300		Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 15/41701

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-24, directed to a conduit device comprising an adaptor that mates with an electrical conduit device and thereafter receives a conduit-receiving fitting member.

Group II: Claim 25-28 directed to a conduit device comprising an adaptor and fitting, where the fitting has a tapered face that acts upon tangs of an adaptor, splaying them outwardly inside the conduit box and thereby anchoring the adaptor to the conduit box.

--- See Supplemental Sheet ---

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

--- Continuation of Box III ---

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

SPECIAL TECHNICAL FEATURES

The invention of Group I includes the special technical feature of at least one ear member extending at least radially outwardly from the outer surface of the adaptor body portion, not required by the claims of Group II.

The invention of Group II includes the special technical feature of a wedge portion integrally formed with the fitting and having an external surface, wherein the external surface of the wedge portion includes a thread, not required by the claims of Group I.

COMMON TECHNICAL FEATURES

Groups I-II share the common technical features of a fitting with an interior wall, an exterior wall, a first end wall and a second end wall and an adaptor having a head portion with an interior surface and an exterior surface, wherein the adaptor further has a body portion with an interior wall and an exterior wall, wherein the body portion is integrated with and extends from the head portion, wherein the head portion interior surface and body portion interior wall define an opening extending through the adaptor along an adaptor axis.

However, this shared technical feature does not represent a contribution over prior art as being anticipated by US 7,597,361 B2 to Theilen (hereinafter ?Theilen?), which discloses a fitting (member with male and female threads, receing a pipe via the latter; see 18, fig 2) and an adaptor (a piece for mating said fitting to a bored bulkhead; see 40, fig 2).

Therefore, Groups I-II lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.