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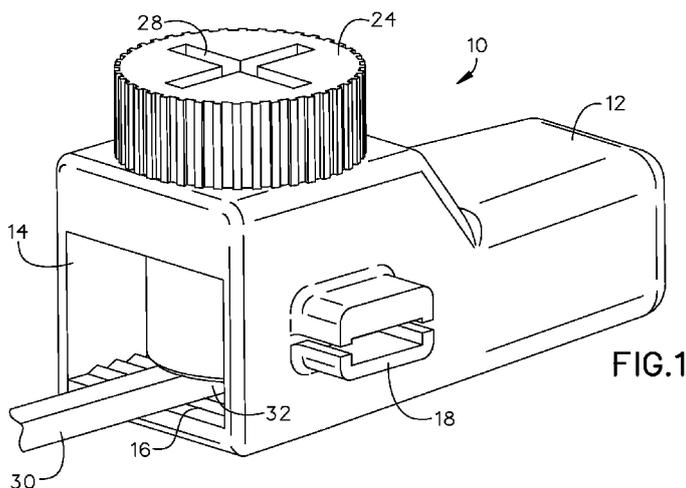
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(54) Title: ELECTRICAL WIRE CONNECTOR



(57) Abstract: This invention relates to devices that connect two electrical wires. Previously, connectors used a wire nut style connector designed to tighten onto the bare copper wires to hold the connection. This put unnecessary stress on the copper and frayed the wire. Embodiments of the present invention use a body (12) further comprising a cavity with a port (14) configured to receive the at least two electrical wires (32) twisted to form an electrical wire connection. Teeth (16) are on a bottom surface of the electrical wire connection such that the teeth obstruct movement of wire sheaths (34). A bolt (24), is detachably coupled to the body. Silicone (40) fills the cavity with the at least two electrical wires. Tightening the bolt onto the sheaths into the teeth displaces some of the silicone from the cavity and creates a watertight compartment for the at least two electrical wires.

WO 2015/073715 A1

ELECTRICAL WIRE CONNECTOR
RELATED APPLICATION

[0001] This application claims priority to provisional patent application U.S. Serial No. 61/903,725 filed on November 13, 2013, the entire contents of which is herein incorporated by reference.

BACKGROUND

[0002] The embodiments herein relate generally to systems for connecting two electrical wires.

[0003] Prior to embodiments of the disclosed invention, when making electrical connections most connectors used a wire nut style connector designed to tighten onto the bare copper wires to hold the connection. This put unnecessary stress on the copper and frays the wire. If not connected correctly, this could cause an electrical resistance point, or could come free from the copper making a loose connection point. Other endeavors in this field include: U.S. Patent 7,033,231 issued to Lu; U.S. Patent 5,137,476 issued to Noble; and U.S. Patent 4,303,295 issued to Schreder.

[0004] Schreder teaches a cavity configured to receive wires in an opening and then clamp down the wires with a screw. Noble teaches a tube configured to receive male wires and female wires and then tighten those down with a pair of screws. Lu teaches a cavity having an opening configured to receive wires, but does not teach an opening for male and female wires. However, none of these teach a deep cavity with silicone to ensure a watertight connection.

SUMMARY

[0005] An electrical wire connector is configured to secure at least two electrical wires partially covered in sheaths. The electrical wire connector includes a body further comprising a cavity with a port configured to receive the at least two electrical wires twisted to form an electrical wire connection. Teeth are on a bottom surface of the electrical wire connection; wherein the teeth obstruct movement of the sheaths. A bolt, is detachably coupled to

the body. Silicone fills the cavity with the at least two electrical wires. Tightening the bolt onto the sheaths into the teeth displaces some of the silicone from the cavity and creates a watertight compartment for the at least two electrical wires.

[0006] In some embodiments, there can be female threads on the body and bolt threads on the bolt. Coupling the bolt threads to the female threads joins the bolt to the body. The female threads and the bolt threads can have a thread size from a set consisting of: 6-32 2A, 6-32 3A, 6-40 2A, 6-40 3A, 8-32 2A, 8-32 3A, 10-24 2A, 20-24 3A, 10-32 2A, and 10-32 3A. In some embodiments, the female threads and the bolt threads have a thread size from a set consisting of: 8-32 2A and 8-32 3A.

BRIEF DESCRIPTION OF THE FIGURES

[0007] The detailed description of some embodiments of the invention is made below with reference to the accompanying figures, wherein like numerals represent corresponding parts of the figures.

[0008] Figure 1 is a perspective view of an embodiment of the invention shown in use.

[0009] Figure 2 is a perspective view of an embodiment of the invention shown in use.

[0010] Figure 3 is an exploded view of an embodiment of the invention.

[0011] Figure 4 is a section view of an embodiment of the invention along line 4-4 in Figure 2.

[0012] Figure 5 is an exploded view of an embodiment of the invention.

[0013] Figure 6 is a perspective view of an embodiment of the invention.

[0014] Figure 7 is a section detail view of an embodiment of the invention. ;

DETAILED DESCRIPTION OF CERTAIN EMBODIMENTS

[0015] By way of example, and referring to Figure 1 and Figure 2, one embodiment of electrical wire connector 10 comprises body 12 having cavity 34 which can be accessed by port 14. A bottom surface of body 12 is mechanically coupled to teeth 16. Body 12 is

mechanically coupled to side female protrusion 18 and side male protrusion 20. Body 12 is further mechanically coupled to female threads 22.

[0016] As shown in Figure 3 and Figure 4, bolt 24 is mechanically coupled to bolt threads 26 and bolt heat slot 28. Bolt threads 26 is configured to mate with female threads to join bolt 24 to body 12. Having too small threads creates a firm seal between bolt 24 and body 12 but it takes a long time to mate bolt 24 to body 12. Having too large of threads results in a short mating time, but does not create a firm seal. A balance between these extremes can be found by using a thread size from a set consisting of: 6-32 2A, 6-32 3A, 6-40 2A, 6-40 3A, 8-32 2A, 8-32 3A, 10-24 2A, 20-24 3A, 10-32 2A, and 10-32 3A. ANSI/ASME B1.3M-1992 (R2001) provides ample details on these standard sizes. Of those, 8-32 2A, 8-32 3A were found to be the best in testing. This offers a compromise that works for many users.

[0017] A process for joining wires in a waterproof setting involves the following steps, which are not necessarily in order. First, providing electrical wire connector 10 with bolt 24 connected to body 12 where body 12 further comprises cavity 34 behind bolt 24. Next, obtaining at least two electrical wires 32 covered partially in sheaths 30. After that, twisting the at least two electrical wires 32 together. Following that, inserting the at least two electrical wires 32 into the cavity which are twisted to form an electrical wire connection. Then, filling the cavity with silicone 40. In some embodiments, cavity 34 is sold pre-filled with silicone 40. Next, clamping bolt 24 onto sheaths 30 such that the exposed ends of the at least two electrical wires 32 are entirely in cavity 34 and covered in silicone 40. Following that, displacing at least some of silicone 40 with bolt 24. This creates a watertight compartment for the electrical wire connection.

[0018] Turning to Figure 5, Figure 6, Figure 7, one advantage of the present construction is that a series of electrical wire connectors 10 can be joined in sequence. First wire connector 10A is mechanically coupled to first female protrusion 18A. Second wire connector 10B is mechanically coupled to second male protrusion 20B. A user can slide second male protrusion 20B into first female protrusion 18A to detachably couple First wire connector 10A to second wire connector 10B.

[0019] Persons of ordinary skill in the art may appreciate that numerous design configurations may be possible to enjoy the functional benefits of the inventive systems. Thus, given the wide variety of configurations and arrangements of embodiments of the present

invention the scope of the invention is reflected by the breadth of the claims below rather than narrowed by the embodiments described above.

WHAT IS CLAIMED IS:

1. An electrical wire connector, configured to secure at least two electrical wires partially covered in sheaths; the electrical wire connector comprising:
 - a body further comprising a cavity with a port configured to receive the at least two electrical wires twisted to form an electrical wire connection;
 - teeth on a bottom surface of the electrical wire connection; wherein the teeth obstruct movement of the sheaths;
 - a bolt, detachably coupled to the body;
 - silicone, filling the cavity with the at least two electrical wires;
 - wherein tightening the bolt onto the sheaths into the teeth displaces some of the silicone from the cavity and creates a watertight compartment for the at least two electrical wires.
2. The electrical wire connector of Claim 1, further comprising:
 - female threads on the body; and
 - bolt threads on the bolt;
 - wherein coupling the bolt threads to the female threads joins the bolt to the body.
3. The electrical wire connector of Claim 2, wherein the female threads and the bolt threads have a thread size from a set consisting of: 6-32 2A, 6-32 3A, 6-40 2A, 6-40 3A, 8-32 2A, 8-32 3A, 10-24 2A, 20-24 3A, 10-32 2A, and 10-32 3A.
4. The electrical wire connector of Claim 2, wherein the female threads and the bolt threads have a thread size from a set consisting of: 8-32 2A and 8-32 3A.

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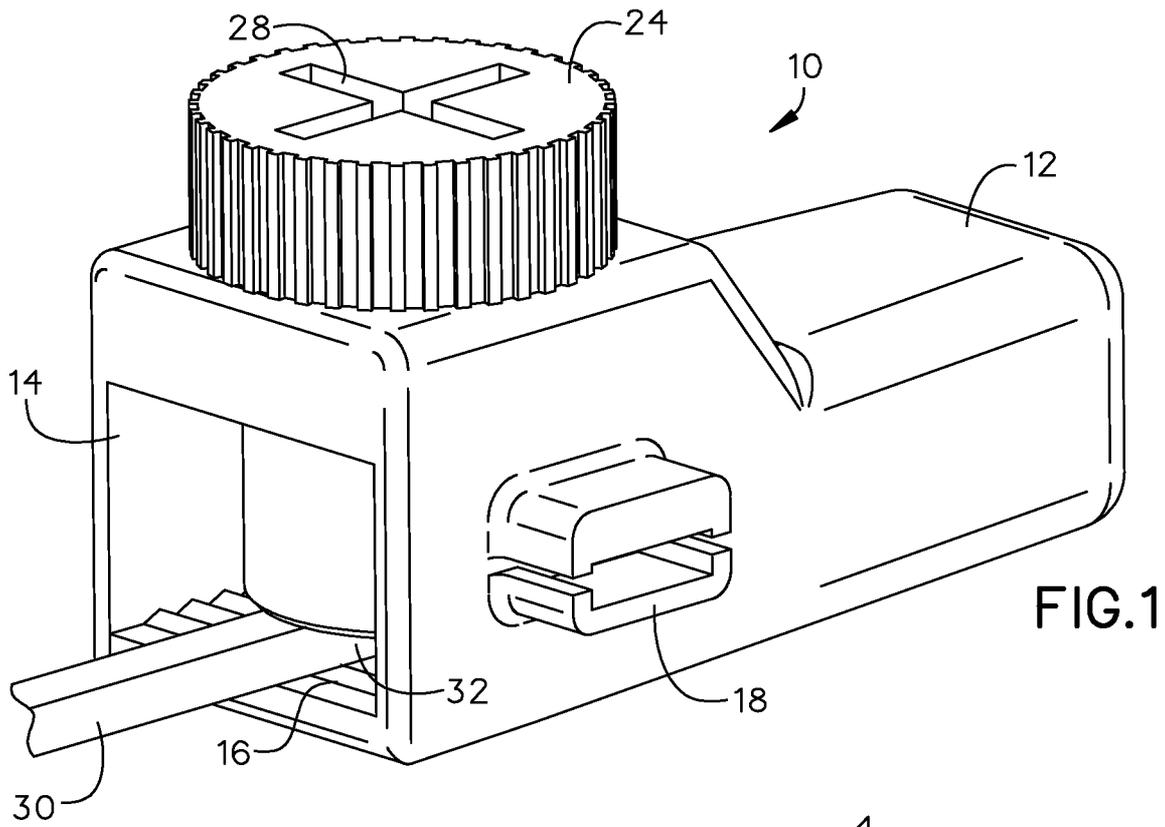


FIG. 1

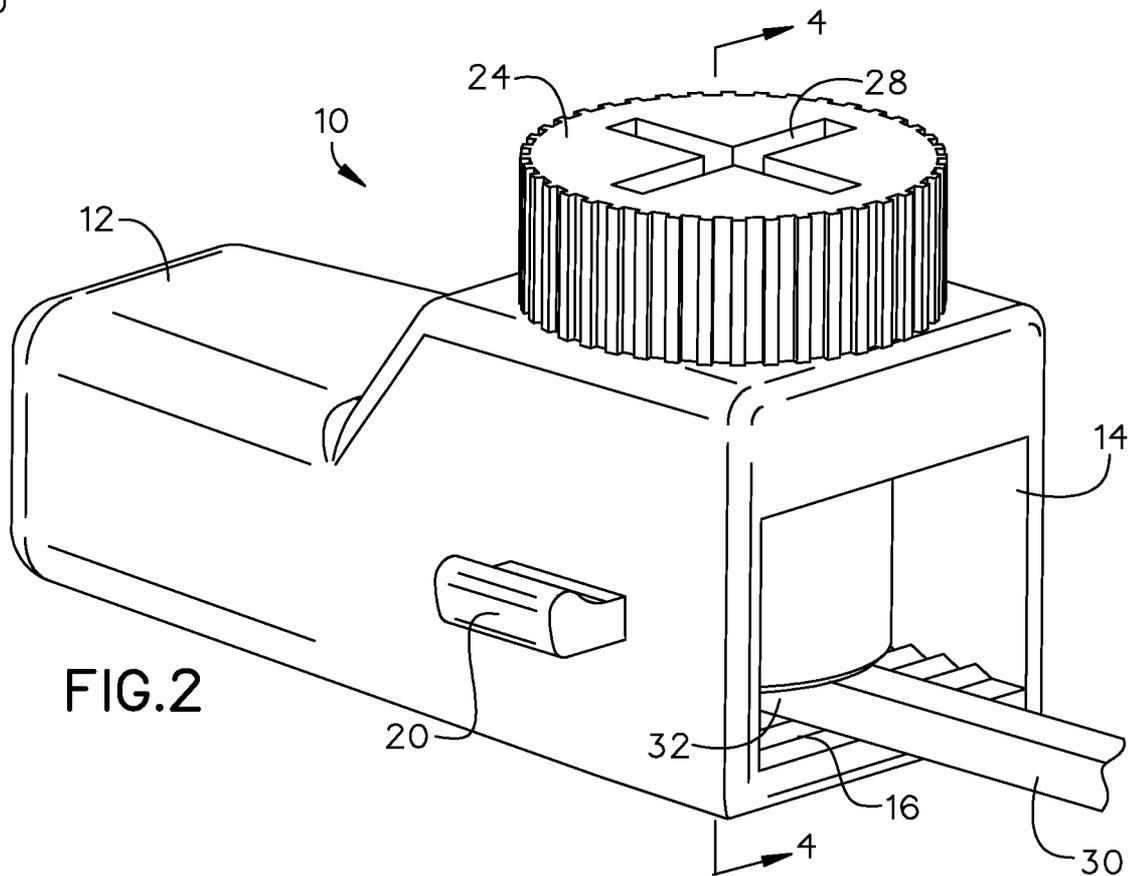


FIG. 2

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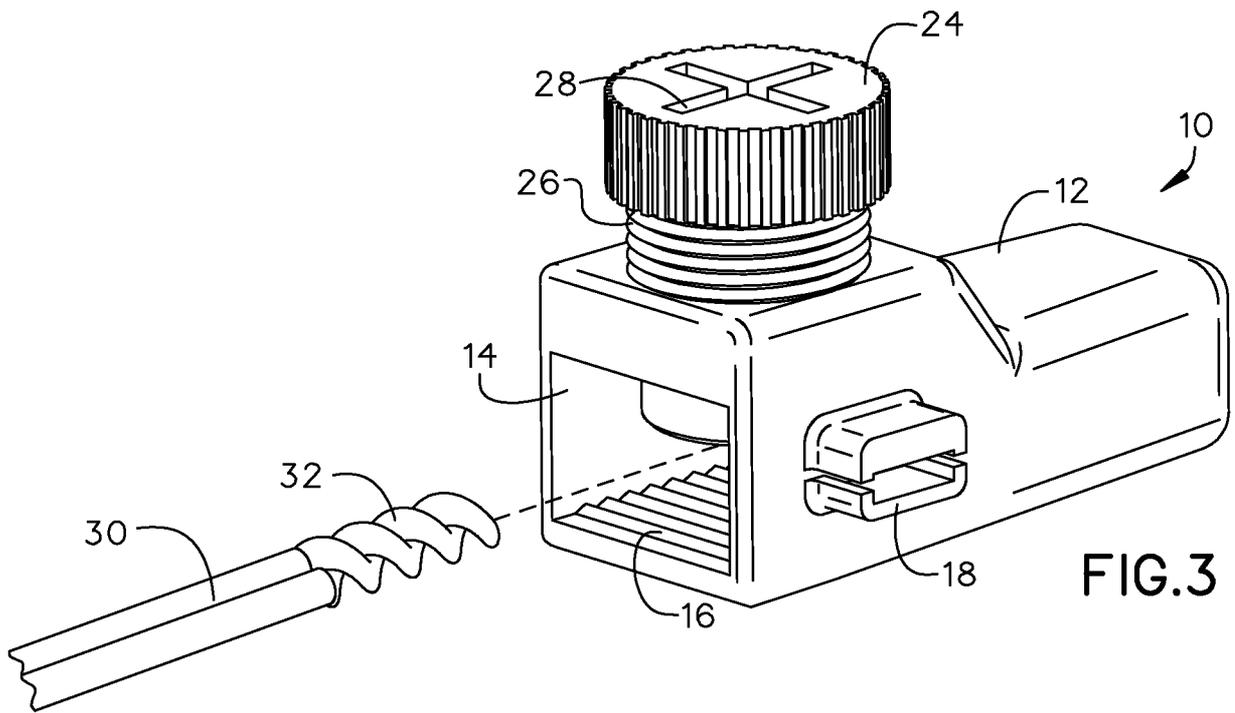


FIG. 3

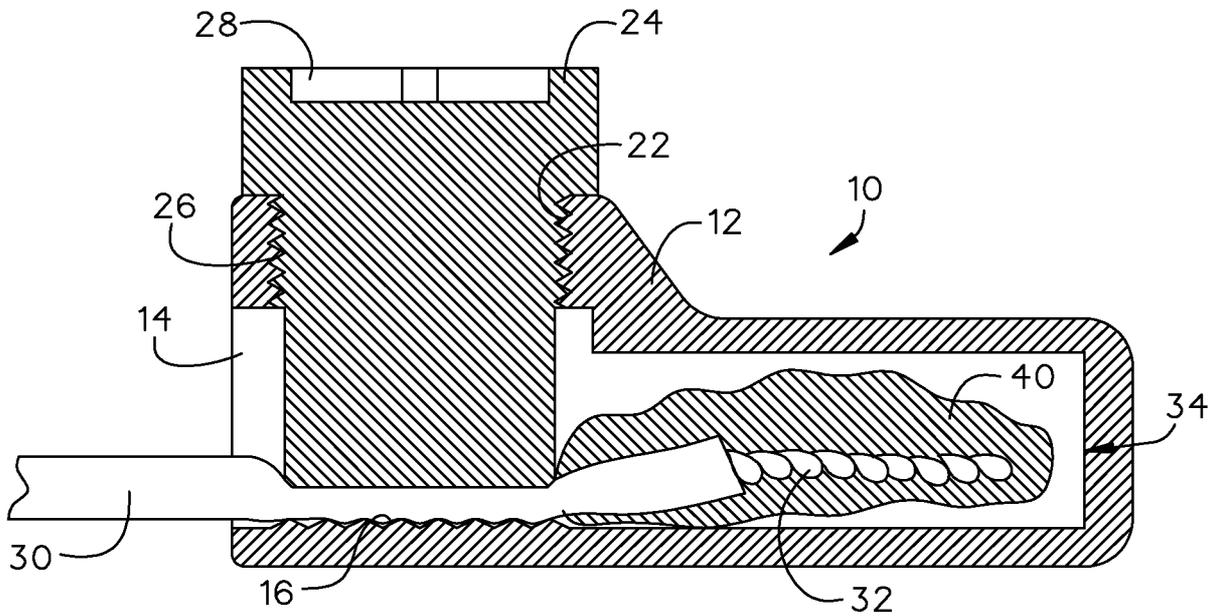


FIG. 4

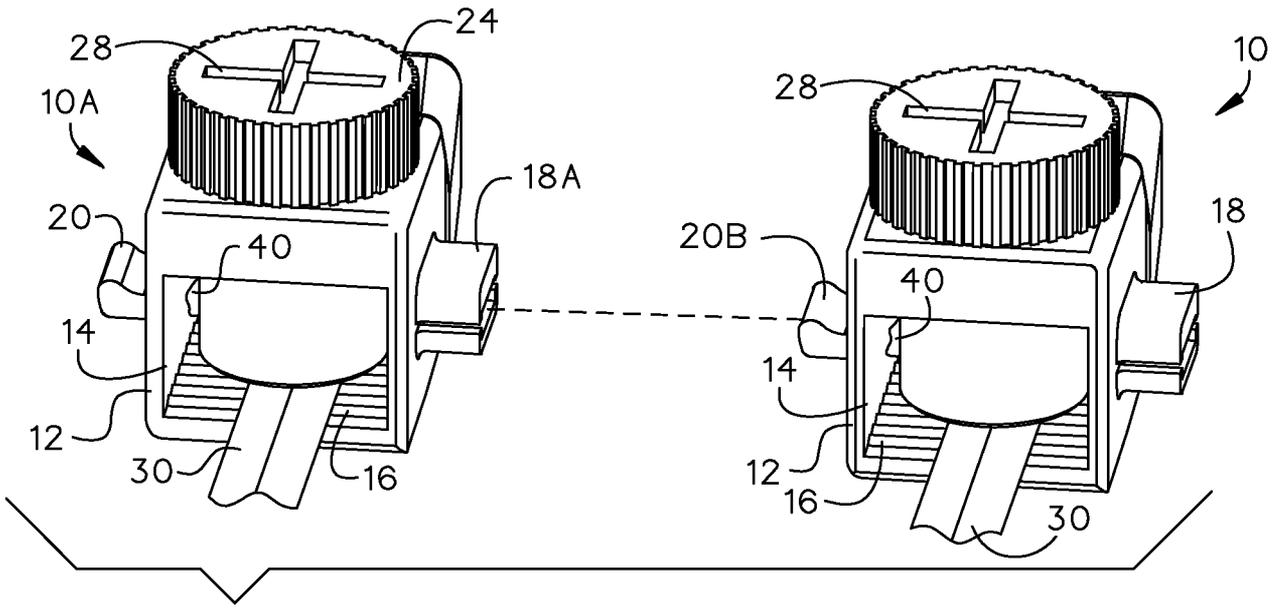


FIG. 5

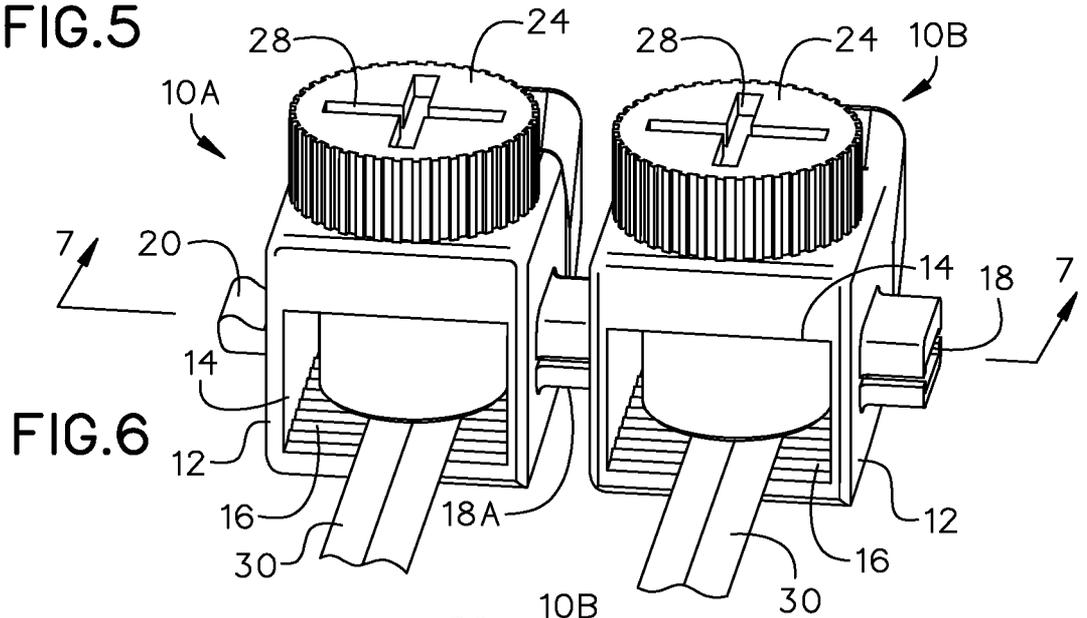


FIG. 6

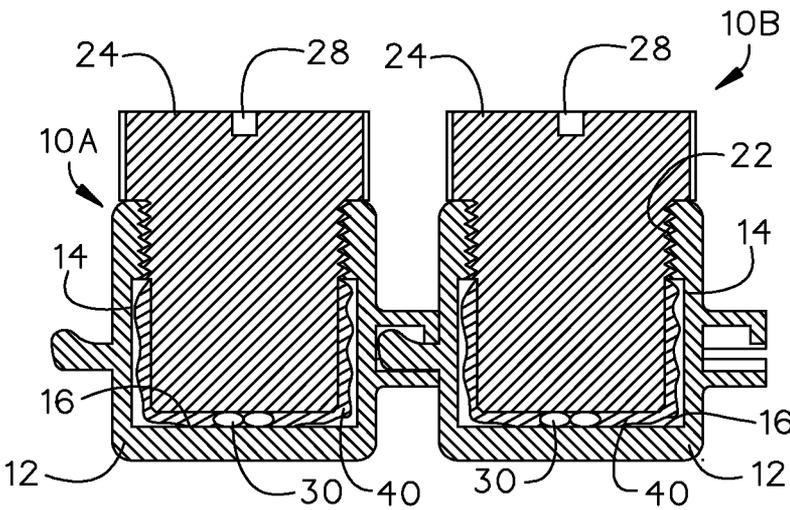


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 14/65540

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(8) - H01R 4/22, H01R 4/26, H01R 4/30, H02G 15/068, H02G 15/105 (2015.01)
 CPC - H01R 4/183, H01R 4/188, H01R 4/22, H01R 4/30, H01R 43/005, H02G 15/068
 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): H01R 4/22, H01R 4/26, H01R 4/30, H02G 15/068, H02G 15/105 (2015.01)
 CPC: H01R 4/183, 4/188, 4/22, 4/30, 43/005; H02G 15/068

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 CPC: H01R 4/10, 4/18, 4/183, 4/184, 4/185, 4/188, 4/22, 4/26, 4/30, 4/304, 4/305, 4/34, 13/58, 43/00, 43/005;
 H02G 15/04, 15/068, 15/072, 15/10, 15/103, 15/105, 15/107; USPC: 439/147, 29/869

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 PatBase, Google (web, scholar, patent)
 Search terms used: Wires, cables, secure, couple, attach, splice, join, combine, connect, coupler, clamp, holder, junction, screw, bolt, sheath, insulation, silicone, twist

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,756,972 A (Vranicar et al.) 26 May 1998 (26.05.1998), entire document especially Fig. 3-5 and col 9, ln 4-8, col 10, ln 17-25, col 12, ln 42-59 and col 13, ln 53-62	1-4
Y	US 2012/0034796 A1 (Joye) 09 February 2012 (09.02.2012), para [0040], [0046]-[0052]; Fig 4D, 4E, 5A	1-4
Y	US 3,426,321 A (Peterson, Jr.) 08 October 1965 (08.10.1965), entire document, especially col 3, ln 26-31	3, 4
Y	US RE37,340 E (King, Jr.) 28 August 2001 (28.08.2001), entire document especially Fig. 1-3 and col 2, ln 14-20, col 5, ln 40 to col 6, ln 16	1-4
Y	US 2009/0088032 A1 (Keeven et al.) 02 April 2009 (02.04.2009), entire document	1-4

Further documents are listed in the continuation of Box C.

* Special categories of cited documents:
 "A" document defining the general state of the art which is not considered to be of particular relevance
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 "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
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Date of the actual completion of the international search 21 January 2015 (21.01.2015)	Date of mailing of the international search report 06 FEB 2015
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