Oct. 1, 1968 P. F. AMANN ET AL 3,404,216

INSULATED COMPRESSION SLEEVE

Filed Dec. 22, 1967

Fig. 1.

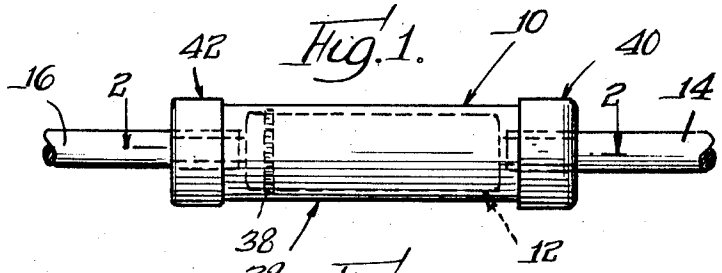


Fig. 2.

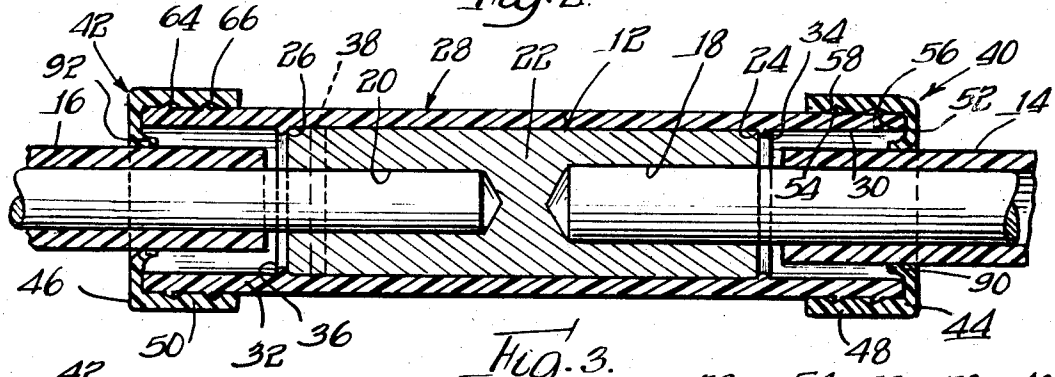


Fig. 3.

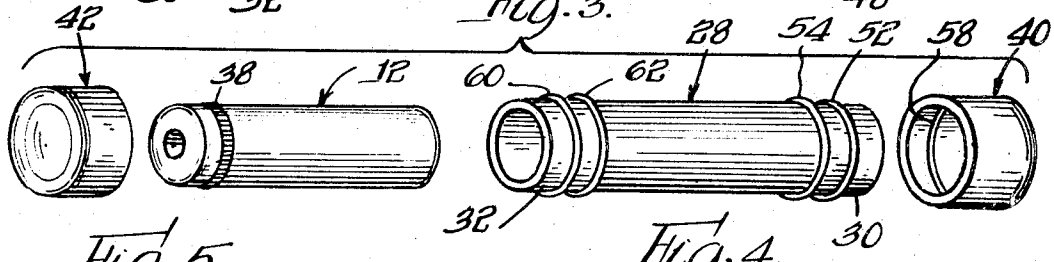


Fig. 5.

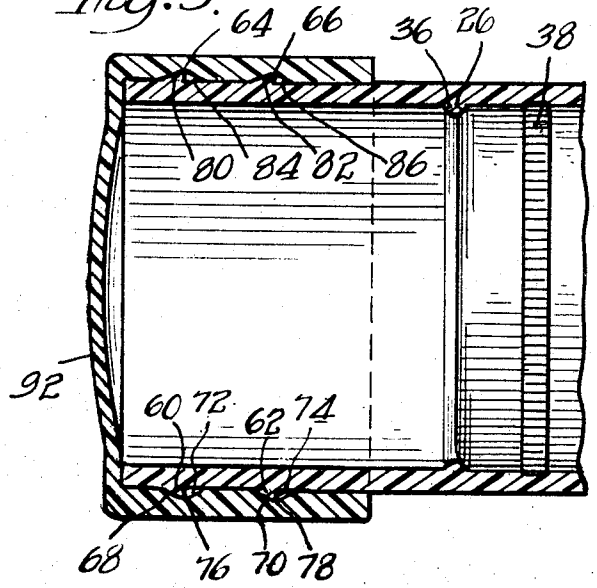
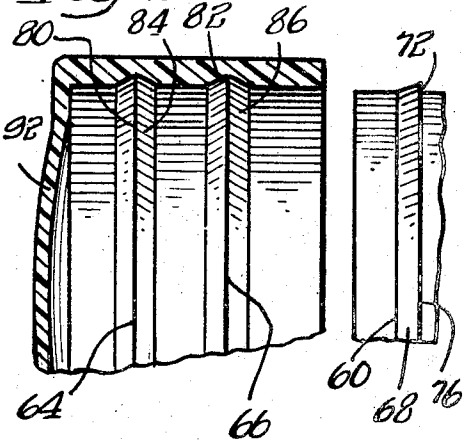


Fig. 4.



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INSULATED COMPRESSION SLEEVE

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ABSTRACT OF THE DISCLOSURE

There is disclosed a compression sleeve type electrical connector having a sheath or sleeve of plastic insulated material telescoped thereover. Rib means project between the connector and the sheath at opposite ends thereof for retaining the parts in assembled relationship. Caps are assembled over opposite ends of the sheath and interengaging rib and groove means are provided between the sheath and the caps for retaining the caps.

The present invention relates to a connector, and more specifically to a novel insulated compression sleeve type connector.

An important object of the present invention is to provide a novel connector construction having a substantially straight compression sleeve with a sheath of insulating material telescoped thereover, which sheath and sleeve are formed so that they may be readily assembled with each other and so that they are effectively and securely retained in assembled relationship.

A more specific object of the present invention is to provide a novel connector structure of the above described type having interengaging elements extending between the sleeve and the sheath and located for facilitating assembly and minimizing interference between the parts during assembly while being effective for retaining the parts in finally assembled condition.

Still another object of the present invention is to provide a novel connector structure of the above described type having cap means adapted to be assembled over an end of the insulating sheath, which cap means and sheath are constructed so as to facilitate assembly and so as to insure retention in assembled relationship.

Other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings wherein:

FIG. 1 is an elevational view showing a connector device incorporating features of the present invention joining adjacent ends of a pair of wires;

FIG. 2 is an enlarged sectional view taken along line 2—2 in FIG. 1;

FIG. 3 is an exploded perspective view of the connector structure shown in FIGS. 1 and 2;

FIG. 4 is an enlarged fragmentary exploded partial sectional view showing an end portion of the insulating sleeve and a complementary cap member; and

FIG. 5 is an enlarged partial sectional view showing an end portion of the connector structure.

Referring now more specifically to the drawings wherein like parts are designated by the same numerals throughout the various figures, a connector device **10** incorporating features of the present invention includes a compression sleeve **12** formed from a suitable malleable metal. Connectors of the type contemplated herein are most frequently used for joining electrical wires **14** and **16** and therefore, the metal from which the sleeve **12** is formed is preferably a good connector of electricity. For example, the sleeve **12** may be formed from aluminum, copper or brass.

The compression sleeve **12** is a cylindrical member of substantially uniform diameter throughout its length.

Axially extending bores **18** and **20** are formed in opposite end portions of the sleeve for accommodating the wires **14** and **16**. Preferably, the bores are separated by a central web **22**. Opposite end edges **24** and **26** of the compression sleeve body are rounded or beveled as shown in FIGS. 2 and 5 for the purpose described below. As will be understood, the sleeve **12** is secured to the wires by first inserting the wires into the bores and then compressing or crimping the sleeve with the aid of a suitable tool, not shown.

In order to insulate the metal body **12**, a sheath **28** of tough resilient plastic insulating material is telescoped thereover. While various insulating materials may be used, polyethylene and nylon are examples of the materials which are found to be satisfactory.

The sheath **28** has a length substantially greater than the length of the metal body **12** so that opposite end portions **30** and **32** project axially substantial distances beyond opposite ends of the metal body. These end portions define chambers adapted to contain a compound of known composition suitable for aiding and maintaining a good electrical connection between the wires and the body **12** and in resisting corrosion. The internal diameter of the sheath is the same as the external diameter of the body **12** so that there is a snug fit between these parts tending to retain the parts against axial displacement. In order positively to preclude unauthorized axial displacement of the sheath relative to the body **12**, annular ribs **34** and **36** formed integrally with the sheath project radially inwardly for engagement with opposite ends of the body **12** as shown in FIGS. 2 and 5. The axial spacing between the ribs **34** and **36** is substantially the same as the axial length of the body **12** so that the opposite ends of the body member are tightly embraced by the ribs.

As shown in FIGS. 3 and 5, an annular band of the body member **12** is knurled or formed with serrations **38** at a location closely adjacent to one end of the body member. The knurling or serrations **38** project a slight distance radially outwardly for engaging the interior surface of the sheath **28** and preventing relative rotation between the sheath and the body member.

During assembly of the parts, the body member **12** is inserted into an end of the sheath until it engages one of the internal ribs. As previously indicated, the knurling **38** is formed only adjacent one end of the body member **12** and it is preferably the opposite end of the body member which is initially inserted into the sheath so that there will be a minimum of interference between the knurling and the sheath during the assembling operation. As insertion of the body member **12** progresses, the beveled or rounded end thereof engages the internal rib or bead within the entering end portion of the sheath **28** and wedges or expands the sheath sufficiently to permit the body to pass through the bead. This wedging action of the beveled or rounded end surface enables the sleeve to be expanded without danger of injury to the bead. When the body member and sheath have been fully assembled, the expanded portion of the sheath and the bead spring back to their original diameter so that the bead engages the end of the body member in the manner described above.

Caps or closure elements **40** and **42** are assembled over the opposite end portions **30** and **32** of the sheath so as to retain the aforementioned compound material therein and also for preventing the entry of moisture and other foreign substances. The cap members respectively have end walls **44** and **46** and cylindrical side walls **48** and **50**. The internal diameter of the cap member side walls is the same as the external diameter of the sheath **28** so that these parts fit snugly together. In order more positively to retain the cap members on the sheath, spaced

outwardly extending annular ribs **52** and **54** are formed on the sheath end portion **30** for engaging in complementary grooves **56** and **58** in the cap member side wall **48**. Substantially identical but oppositely disposed annular ribs **60** and **62** are formed on the sheath end portion **32** for engaging in grooves **64** and **66** in the cap member side wall **50**.

The construction of the ribs **60** and **62** and grooves **64** and **66** is shown in greater detail in FIGS. 4 and 5. Upon referring to these figures it is seen that the ribs **60** and **62** are not only axially spaced from each other but are also axially spaced a substantial distance from the internal rib **36** and the end of the body member **12**. Furthermore, the ribs **60** and **62** have beveled cam faces or surfaces **68** and **70** facing generally toward the outer end of the structure and second faces **72** and **74** extending generally radially or perpendicularly with respect to the sheath and intersecting the beveled surfaces at sharp edges **76** and **78**. The grooves **64** and **66** respectively have first inclined surfaces **80** and **82** for substantially mating with the inclined surfaces **68** and **70** of the ribs. However, rather than having generally radially extending surfaces corresponding to the surfaces **72** and **74** of the ribs, the grooves have second beveled or inclined surfaces **84** and **86** so that each groove has a generally V-shaped cross-sectional configuration.

The aforementioned construction and location of the ribs and grooves on the sheath and cap members enables the cap members to be easily assembled and securely retained. In addition, the construction enables the cap members which are preferably molded to be removed from the mold without damage. During assembly of the cap member, the inclined surfaces **68** and **70** engage the interior of the cap member with a wedging action which tends to expand the cap member and to collapse the outer end of the sheath. Since, as indicated above, the ribs are spaced axially outwardly a substantial distance from the end of the body member, such radial collapsing of the sheath is permitted since it receives little internal support from the body member. In the embodiment shown, the rib **62** and the corresponding rib **54** at the opposite end of the sheath are spaced a distance equal to about the radius of the sheath. After the cap is fully assembled, the relatively sharp edges **76** and **78** of the ribs aggressively engage the walls **84** and **86** of the grooves so as to positively prevent unauthorized removal of the cap member.

The end walls **44** and **46** of the cap member have central portions **90** and **92** which are relatively thin. The thickness of the material is reduced sufficiently so that these central portions may be easily punctured when the wires **14** and **16** are inserted into the connector. Furthermore, the thin wall portions conform to and snugly grip the wires so as effectively to seal the interior of the connector.

While a preferred embodiment of the present invention has been shown and described herein it is obvious that many structural details may be changed without departing from the spirit and scope of the appended claims.

We claim:

1. A connector comprising an elongated cylindrical metal body having a predetermined length and a substantially uniform diameter throughout its length, axially extending bore means in said body for accommodating a wire or the like, a sheath of tough resilient electrical insulating material snugly fitting over said body, said sheath including first and second annular internal rib means spaced apart a distance substantially equal to said predetermined length and having an internal diameter less than said diameter of the body, said rib means respectively engaging opposite ends of the body and retaining the body against axial movement within the sheath, said sheath including a tubular end portion projecting axially beyond one end of the body a substantial distance, and a closure member of resilient electrical insulating material having a cylindrical side wall portion snugly telescopically fitting with said tubular sheath end portion, interengaging annular rib means and annular groove means respectively on said sheath end portion and in said side wall portion releasably retaining said closure member, said groove means including surfaces inclined oppositely from a plane perpendicular to the longitudinal axis of the sheath and presenting a generally V-shaped cross-section and the rib means including intersecting surfaces presenting a relatively sharp edge engaging said V-shaped surfaces for retaining said closure member, said body including beveled surface means extending from its outer circumference axially outwardly and radially inwardly at an end thereof for engaging and expanding one of said internal rib means during initial assembly of the body with the sheath for permitting the body to be slipped axially into the sheath, and radially projecting serrations on said body and spaced axially from said last mentioned end of the body and only substantially at the opposite end of the body, said serrations engaging said sheath and preventing relative rotation between the sheath and the body.

2. A connector, as defined in claim **1**, wherein said sheath includes a pair of said tubular end portions respectively projecting axially beyond opposite ends of the body distances at least substantially as great as the radius of said sheath, said connector further including a pair of said closure members respectively having cylindrical side wall portions telescoping over said tubular end portions of the sheath, said annular rib means being located on and integral with both of said sheath tubular end portions, said annular groove means being located in said side wall portions of both of said closure members, said annular rib means on each sheath tubular end portion including a pair of axially spaced annular ribs each including a beveled surface facing generally toward an outer end of its sheath end portion and a substantially radially extending surface intersecting said beveled surface, and each of said groove means in each of said closure member side wall portions including a pair of axially spaced annular grooves receiving said pair of annular ribs and respectively defined by surfaces presenting a V-shaped cross-section.

References Cited

UNITED STATES PATENTS

2,981,787	4/1961	Brautigam et al.	174—84
3,065,292	11/1962	Chickvary	174—84
3,213,186	10/1965	Raila et al.	174—84

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