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Newman et al.

[11] **3,784,964**

[45] **Jan. 8, 1974**

[54] **ELECTRICAL CONNECTOR WITH RETAINER MEANS**

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[73] Assignee: **Empire Products, Inc.,** Cincinnati, Ohio

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[52] **U.S. Cl.** ..... **339/219 R**

[51] **Int. Cl.** **H01r 9/16**

[58] **Field of Search** 339/59-63, 75, 219, 272

[56] **References Cited**

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Primary Examiner—Joseph H. McGlynn

Attorney—John W. Melville et al.

[57] **ABSTRACT**

An electrical connector for terminating an electric cable, and an insulating sleeve therefor, said sleeve containing a central bore for receiving a male or female connector therein, and means securing said male or female connector against axial movement and rotation within said bore, said means comprising an insulated elongated member having major and minor body portions, wherein said minor portion engages said male or female connector and said major portion engages said sleeve in a manner to provide a seal against intrusion by moisture for said engaged connector.

11 Claims, 5 Drawing Figures

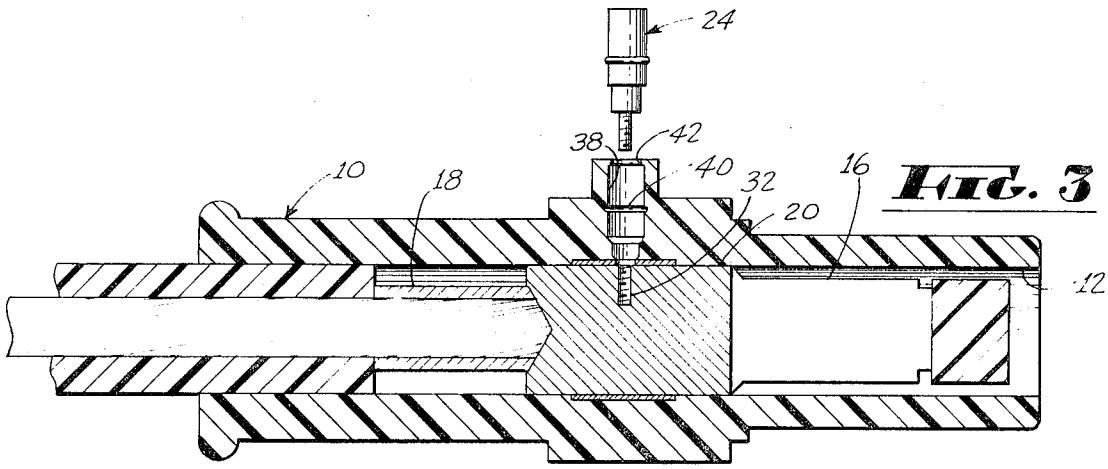


FIG. 3

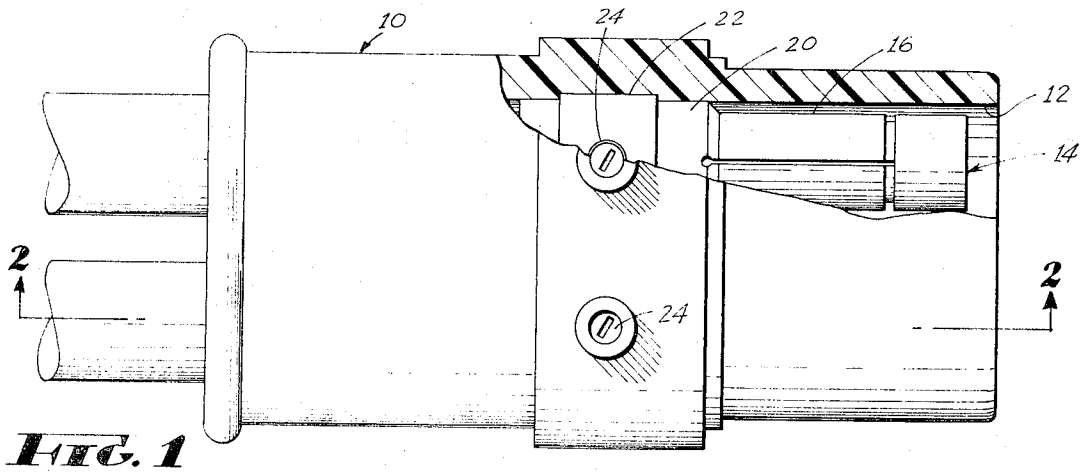


FIG. 1

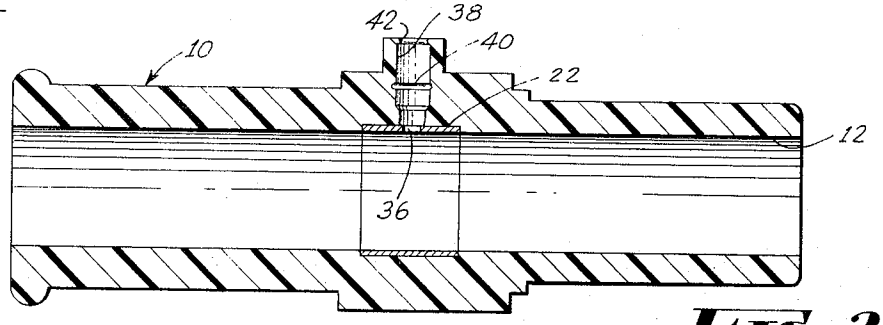


FIG. 2

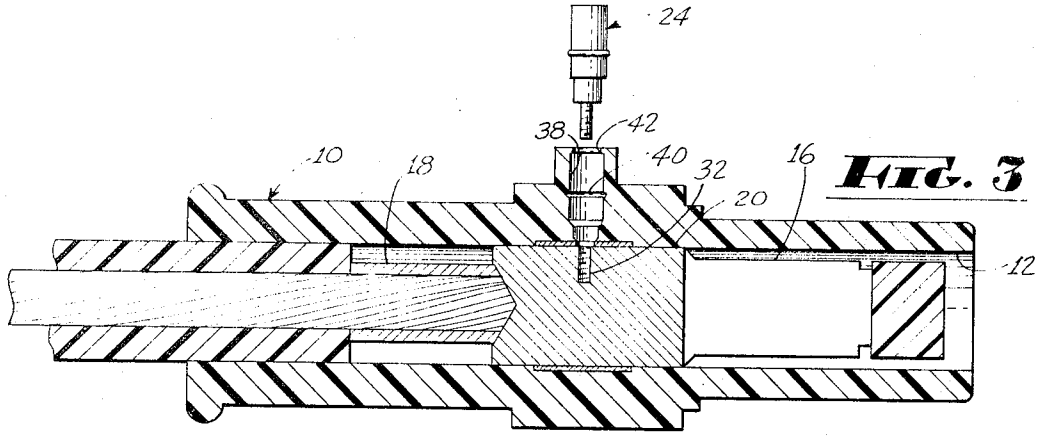


FIG. 3

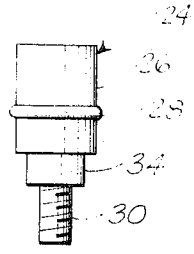


FIG. 4

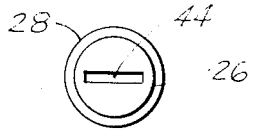


FIG. 5

ELECTRICAL CONNECTOR WITH RETAINER MEANS

BACKGROUND OF THE INVENTION

This invention relates to electrical connectors, and more particularly to electrical connector means which may be affixed to the ends of electrical cables so that releasable interconnection between lengths of cable may be made.

The electrical connector art as reflected in the patent literature has progressed from the provision of reliable, releasable, interengageable connector elements as shown, for example, in U.S. Pat. No. 2,477,818 to Murdock, and now contemplates the use of preformed insulating sleeves which may, together with the connector element, be assembled onto the end of an electrical cable as may be seen, for example, in U.S. Pat. No. 3,143,384 to R. Senior, Jr. Through the use of the teachings of such prior art, repair or replacement, or a new installation, may be made in the field by those enterprises which find it necessary or desirable to have means for releasably interengaging separate lengths of electrical cable. Among others, such enterprises include those where welding is carried out, particularly where the actual welding is likely to occur at a distance remote from the power source for the welding equipment such as may be the case in shipyards.

The present invention relates to an improvement in structure and method of assembling an electrical connector element and a preformed insulating sleeve therefor onto the end of an electrical cable. In making such assemblies, it is necessary to see to it that there is a secure attachment between electrical cable and connector element. Beyond this, it is necessary also to make provision that the insulating sleeve, which is part of the assembly and provides protection against exposure to possibly harmful electrical contact by users of the equipment, be retained in place about the connector element, as well as about the juncture between connector element and conductive strands of electrical cable, so that adequate protection of user and electrical cable line are both provided.

Electrical connectors of the present invention are applicable to the single cable types, or to the two-pole connectors. In the former, interengagement and locking of the connector assembly is achieved by mating the male and female members and mutually rotating same. In the latter, such as described in co-pending application, Ser. No. 29,873, by Albert Newman, where mutual rotation is not possible, other means for locking are provided. However, with each connector, it is necessary to securely fix the contained connector within the surrounding insulating sleeve.

The present invention provides a simple, yet effective, means for securing the connector within the sleeve, so that full and complete engagement of the male and female connectors may be effected.

SUMMARY OF THE INVENTION

The present invention relates to an electrical connector assembly having a novel insulating sleeve construction whereby it may be united with an electrical connector element in a unique manner. The unity thereof is effected by an elongated member passing through said sleeve and engaging with said connector. Said member is characterized by first and second body portions wherein one of said portions engages the connector. The other portion engages said sleeve and is characterized by an annular rib which seats in a complimentary groove within the hole receiving said elongated member. This interaction of the said member and sleeve helps to hold the said member therein, thus preventing movement of the engaged connector, and protects against the intrusion of moisture into the connector.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a top view, with a portion removed, to reveal a typical two-pole male electrical connector constructed in accordance with the teachings of this invention.

FIG. 2 is a sectional view taken along line 2—2 in FIG. 1, except that only the insulating sleeve thereof is shown.

FIG. 3 is a complete sectional view taken along line 2—2 of FIG. 1.

FIG. 4 is an enlarged side view of an elongated member used in securing the connector member within the sleeve.

FIG. 5 is a top view of the elongated member shown in FIG. 4.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

The present invention relates to an insulated electrical connector for terminating an electric cable. The workers skilled in the art are familar with the fact that male and female connectors are used, and by their interengagement to form an electrical connector or assembly, electrical connection between otherwise separate lengths of electric cable may be made. However, with this understanding and the fact that the present invention is utilized similarily for both male and female electrical connectors, only a male connector has been shown. Further, while the illustrated FIGURES depict a two-pole connector, it should be understood that the present invention is also applicable to single pole connectors, and to other types not illustrated.

The two-pole male electrical connector of FIG. 1 comprises a housing or insulating sleeve **10**, which has been provided with a relatively uniform bore **12** throughout to receive the electrical connector **14**. The typical male connector **14**, illustrated in detail in FIG. **3**, comprises a split portion **16** for interengagement with a female connector, a cable receiving sleeve portion **18**, and a shank portion **20**, through which connection is made to the insulating sleeve **10**. The shank portion **20** has the largest diameter of the electrical connector **14**, and is so sized to be in sliding engagement with the bore **12**.

The insulating sleeve **10** is generally formed of a resilient material, such as neoprene, but a more rigid insulating material may be used. The bore **12** which passes therethrough includes a collar **22** molded into the interior of such insulating sleeve **10** so that the collar **22** encircles the bore **12**. The collar **22** is preferably made of metal, such as aluminum, and is molded into the sleeve **10** at such a position that when the connector **12** is assembled therein it lies contiguous with the shank portion **20** thereof. By means to be described presently, the electrical connector **14** is securely held in this protective relationship to said sleeve **10**.

This is effected by securing the connector **14** with an insulated elongated fastener member **24** passing through sleeve **10** and collar **22.** Enlarged side and top views of the said member are illustrated in FIGS. **4** and **5,** respectively. The said member **24** is insulated on at least the exposed portion so as to prevent shock hazard to an operator of the electrical connector.

Considering further the fastener member **24,** it will be seen that it comprises body portion **26,** having an annular rib **28** thereabout, and reduced end portion **30.** The end portion **30** may be threaded as shown to mate with threaded hole **32** in the shank portion **20,** or it may be smooth surfaced to be received in a complimentary hole in said shank portion. In either case, relative rotation and axial movement between the connector **14** and sleeve **10** is prevented.

In the embodiment shown in FIG. **4,** an intermediate body portion **34** has been illustrated. To give added rigidity to the assembly, the diameter of said intermediate portion **34** should be such as to fit securely in the hole **36** provided in collar **22.** In other words, this fixes the member **24** in relation to the more rigid metallic collar **22.**

The sleeve **10** is provided with a complimentary configured hole **38,** aligned with hole **36,** to receive the member **24.** An annular groove **40** is provided midway to receive the rib **28** when the fastener member **24** is fully received in hole **38.** This seating arrangement, i.e., rib **28** in groove **40,** helps to provide a seal against the intrusion of moisture to the said connector **14.**

Additionally, the opening of **38** is slightly restricted by the inclusion of annular rib **42.** Since the rib **42** is flexible in the manner of the sleeve **10,** it will not prevent the insertion of the member **24** into hole **38;** however, it prevents the premature withdrawal therefrom. In other words, some positive action on the member **24** is required to dismember the electrical connector from the sleeve. In the situation as illustrated, slot **44** may be provided in the body portion **26** to insert a tool, such as a screwdriver, to effect rotation of the member **24.**

While the foregoing represents the preferred embodiment of this invention, it is believed that changes and modifications may be made therein, particularly by one skilled in the art. Accordingly, no limitation is intended to be imposed thereon, except as set forth in the appended claims.

We claim:

1. An electrical connector comprising connector means adapted for interengagement with a mating connector means, a preformed insulating housing having a passageway therethrough, said connector means being disposed within said passageway, one-piece removable securing means for fixing said connector means in relation to said insulating housing against axial and rotational movement, said housing having a wall portion with a hole therethrough, one end of said hole communicating with the exterior of said housing, the other end of said hole communicating with said passage, said hole having an annular groove at a position between its ends, said connector means having a hole extending thereinto and in coaxial alignment with said hole in said housing wall portion, said securing means comprising an elongated member having first and second portions, said second portion having an annular rib thereabout, said securing means being insertable in said housing wall portion hole to a position wherein said first portion of said securing means is just nicely received within said hole in said connector means and said second portion of said securing means is just nicely received in said hole in said housing wall portion with said annular rib engaged in said annular groove.

2. The structure claimed in claim **1** including a collar affixed to said housing within said passageway and encircling said passageway, said connecting means extending through said collar, said collar having a perforation in coaxial alignment with said hole in said housing wall portion and said hole in said connector means, said securing means passing through said perforation in said collar.

3. The structure claimed in claim **1** wherein said hole in said connector means is internally threaded, said first portion of said securing means being of circular cross section and externally threaded, said first portion of said securing means being threadedly engaged in said connector means hole.

4. The structure claimed in claim **1** wherein said housing is made of resilient material, said end of said hole in said wall portion thereof which communicates with the exterior of said housing being provided with an annular rim projecting toward the axis of said last mentioned hole, said rim overlying the free end of said second portion of said securing means.

5. The structure claimed in claim **1** including means on the free end of said second portion of said securing means for engagement thereof by an appropriate tool for the installation and removal of said securing means.

6. The structure claimed in claim **2** wherein said hole in said connector means is internally threaded, said first portion of said securing means being of circular cross section and externally threaded, said first portion of said securing means being threadedly engaged in said connector means hole.

7. The structure claimed in claim **6** wherein said second portion of said securing means is of circular cross section, said first portion of said securing means being of lesser diameter than said second portion.

8. The structure claim in claim **6** wherein said housing is made of resilient material, said end of said hole in said wall portion thereof which communicates with the exterior of said housing being provided with an annular rim projecting toward the axis of said last mentioned hole, said rim overlying the free end of said second portion of said securing means.

9. The structure claimed in claim **7** wherein said securing means has an intermediate portion of circular cross section between said first and second portions, said intermediate portion having a diameter greater than that of said first portion and less than that of said second portion, said intermediate portion extending through said perforation in said collar.

10. The structure claimed in claim **8** including means on the free end of said second portion of said securing means for engagement thereof by an appropriate tool for the installation and removal of said securing means.

11. The electrical connector claimed in claim **2** wherein said collar is metallic.

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