July 17, 1956 A. E. ANDERSON 2,755,449

ELECTRICAL CONNECTOR

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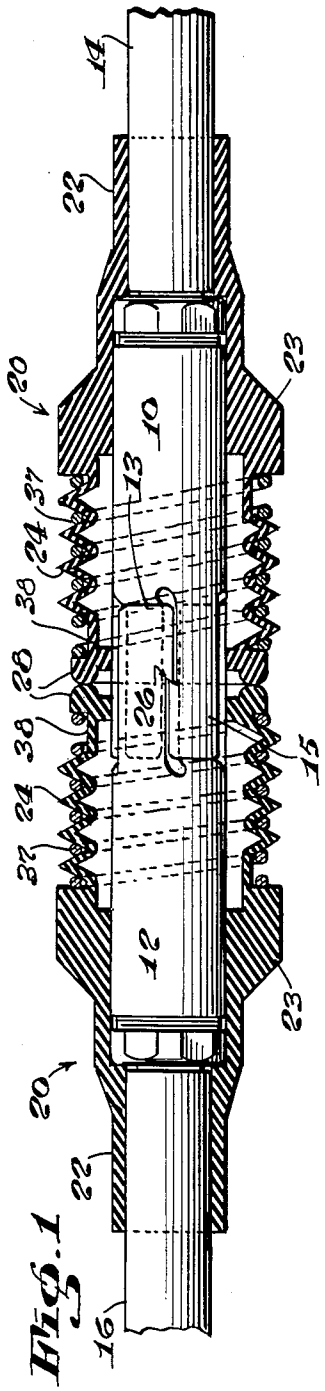

Fig. 1

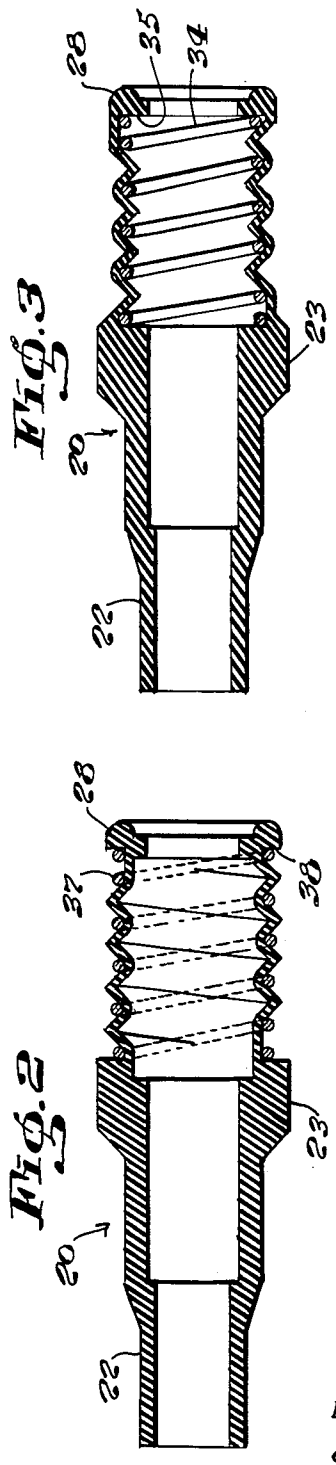

Fig. 3

Fig. 2

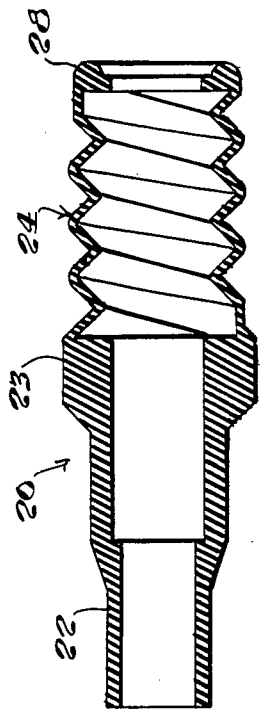

Fig. 4

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ELECTRICAL CONNECTOR

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4 Claims. (Cl. 339—47)

This invention relates to an electrical connector.

In general, the object of the present invention is to provide a novel and improved insulated electrical connector wherein the insulation is constructed to cover the entire length of the connector to prevent the same from being accidentally short-circuited, and wherein a portion of the insulation is particularly constructed to be automatically compressed or contracted when an electrical connection is made to a second connector.

A further object of the present invention is to provide an improved insulated connector in which the contracting portion of the insulation will retain its resiliency for a long period of time, and which will not crack or wear out easily.

A still further object is to provide an insulated connector in which the contracting portion thereof is constructed to contract or be compressed in a substantially straight, longitudinal direction to permit a similar connector to make an electrical connection therewith.

With these general objects in view and such others as may hereinafter appear, the present invention consists in the insulated electrical connector and in the insulating member for such electrical connector hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the present invention:

Fig. 1 is a longitudinal sectional view showing two insulated metal connectors operatively connected together;

Fig. 2 is an annular view of an insulating member provided with an external helical spring;

Fig. 3 is a similar view showing the insulating member provided with an internal helical spring; and

Fig. 4 is a similar view showing the insulating member without a spring.

In accordance with the present invention, an electrical connector of the type comprising an elongated body portion is provided with connecting means at its forward end adapted for cooperation with another electrical connector to effect an electrical connection, and the body portion is provided with an insulating sleeve enclosing the same and normally extended beyond the connecting means of the connector. The insulating sleeve is constructed to contract longitudinally and expose the aforesaid connecting means when pressure is applied to the end portion of the sleeve by the corresponding portion of the second connector when the electrical connection is being made.

Referring now to the drawing which illustrates a preferred embodiment of the invention, 10, 12 comprise identical connectors, each having a tubular body portion to which cables 14, 16 are connected in accordance with the usual practice. The body portion of each connector is provided with fingers 13, 15 so arranged as to permit the two connectors to be moved in a longitudinal direction into telescoping engagement when the connection is made. In the illustrated embodiment of the invention, the fingers comprise semicircular elements of unequal dimensions, one finger 13 having a smaller radius in cross section than

its opposed finger 15 so that when the connection is made, the smaller fingers fit within and slidingly engage the larger radius fingers of the terminal members. Provision is also preferably made for locking the fingers in their engaged position, and as herein shown, notched portions 26 are provided along the longitudinal edges of adjacent fingers 15, and these notches are brought into engagement by imparting a slight twisting or rotary motion to the connectors, as will be apparent from an inspection of Fig. 1.

While the illustrated form of connecting means is preferably provided at the forward end of each electrical connector, it will be understood that various other forms of connecting means may be employed including, for example, that disclosed in the United States patent to Reynolds No. 2,125,816, August 2, 1938.

In accordance with the present invention, the elongated connectors 10, 12 are each provided with and enclosed within a protective insulating sleeve indicated generally at 20. The rear portion of each sleeve is preferably constructed to be substantially incompressible when the electrical connection is being made and to have a portion 22 snugly fitting about the cable end 14 and its connection to the rear of the connector, and to have a thickened portion 23 embracing and snugly fitted upon the rear of the connector itself to firmly frictionally hold the sleeve upon the connector when the electrical connection is being made. The portion 24 of the sleeve extended forwardly from the thickened portion 23 projects beyond the end of the connector and is sufficiently thin and is molded of resilient material, such as rubber, in the form of a helix to permit it to be collapsed or compressed to expose the end portion of the connector when the electrical connection is being made with the cooperating connector. The forward end portion of the sleeve is preferably provided with a rounded annular rim which affords a watertight seal between it and the correspondingly shaped rim of the sleeve upon the cooperating connector when the electrical connection is made. It has been found in practice that the helical shape of the convolutions in the forward portion of the sleeve contributes greatly to insuring the compression of the convolutions in a direction lengthwise of the connectors while maintaining the convolutions in the desired axial relationship to the connectors.

It may be readily observed from the description thus far that when the cooperating connectors are operatively connected together the contacting annular rims 28 may become disaligned, and consequently an imperfect seal between said connectors may result. The present novel rounded ends of the annular rims 28 eliminate the possibility of such imperfect seals being formed. It will be observed that when the rounded ends of cooperating connectors are pressed together, one end portion will roll upon the other and a firm water-tight seal is constantly maintained between said ends. Thus, a substantially perfect seal is always achieved when the connectors are connected. A further advantage of this novel feature is that said connectors may be rapidly connected without regard to the alignment of the rims 28, and the user may always be assured of a proper, satisfactory seal.

In the modified form of the invention illustrated in Fig. 2, an external helical spring 37 is mounted to encircle the helically corrugated portion 24 of the sleeve 20 and increases the resistance of the sleeve to compression, thereby contributing to the maintenance of a watertight contact between the cooperating rims of the two sleeves when the electrical connection is made. In order to secure the spring 37 in operative position, the annular rims 28 are provided with external annular grooves 38 as shown. The compressive force of the aforementioned helical springs may be varied according to the size and manner in which the present connector is utilized in order

to assure a completely insulated and efficient joint between said connected connectors.

In another modified form of the invention as illustrated in Fig. 3, in order to assure an even more efficient joint between cooperating connectors, a helical spring 34 is provided to fit internally within said sleeve to further increase the resiliency and resistance of compression of the helical portion of the sleeve. In order to secure the internally positioned spring within the corrugated portion of the sleeve, the annular rim 28 is provided with an annular groove 35 into which the end of the helical spring may be fitted and securely retained.

As a result of the provision of the springs in the constructions illustrated in Figs. 2 and 3, the rim portions 28 of the two cooperating sleeves are pressed together with increased force preventing the insulating sleeves from being pulled accidentally apart to expose the metal contacting elements of the connected connectors or to allow moisture to enter.

It will be observed that the present invention provides a connector having superior dimensional stability, is longer wearing and permits helical springs to be used either externally or internally to thereby increase the pressure exerted by one insulated connector against a cooperating insulated connector when the same are operatively connected together to assure a fully insulated electrical connection between the same.

In practice, the sleeve member 20 is preferably of rubber and the entire sleeve molded into the shape disclosed in the drawings. Thus, the present sleeves are relatively inexpensive to manufacture and are highly efficient for use with numerous types of electrical connectors.

While the preferred embodiments of the present invention have been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. An electrical connector comprising an elongated body portion provided with a forward terminal portion constructed for telescopic engagement with a corresponding terminal of a second connector, said body portion being provided with an elongated resilient insulating sleeve having its rear portion snugly fitting on the rear of the body portion and having its forward end flexible and corrugated in helical form, the forward end of the sleeve normally projecting beyond the forward end of the connector and the helical structure of the sleeve facilitating an even compression of the sleeve to expose the forward end of the connector when an electrical connection is made, said helically formed end being molded to provide fixed corrugations when the sleeve is extended and capable of being uniformly compressed when a connection is made.

2. An electrical connector as defined in claim 1 wherein the helically corrugated sleeve is provided with a spring surrounding the sleeve with individual convolutions of the spring disposed within the bottom of the helical corrugations.

3. An electrical connector comprising an elongated body portion provided with a forward terminal portion constructed for telescopic engagement with the corresponding terminal of a second connector, said body portion being provided with an elongated resilient insulating sleeve having its rear portion relatively thick and having a shoulder on the forward end thereof, and having its forward end substantially thinner than the rear portion and corrugated in helical form, the forward end of said helical portion of the sleeve being provided with an annular end lip having a rear shoulder and a rounded forward portion and a coil spring disposed around said helical portion of the sleeve with individual convolutions of the spring disposed in the bottom of the helical convolutions and with the rear and forward convolutions of the spring engaging the shoulder portions of the rear portion of the sleeve and the forward annular end portion, respectively, said helically formed end being molded to provide fixed corrugations when the sleeve is extended and capable of being uniformly compressed when a connection is made.

4. An electrical connector as defined in claim 1 wherein the helically corrugated forward portion of the sleeve is provided with a coil spring within the same and with individual convolutions of the spring disposed within individual corrugations of the sleeve.

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