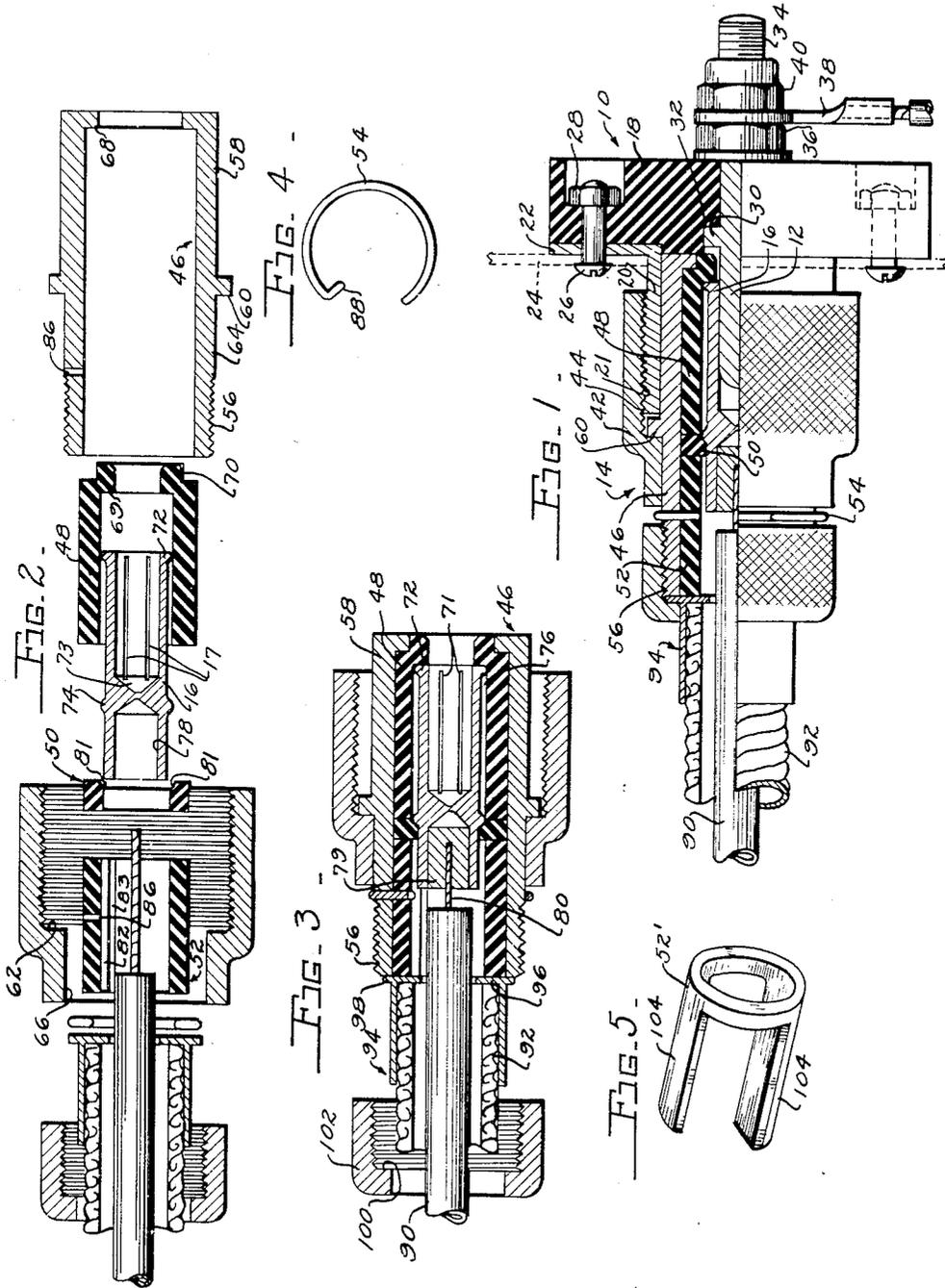


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ELECTRICAL CONNECTOR

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ELECTRICAL CONNECTOR

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1 Claim. (Cl. 173—328)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to electrical connectors of the quickly detachable type having the electrical conduit terminal or terminals protected in a housing and insulated therefrom.

It is an object of my invention to provide a connector of said classification that can be quickly and readily assembled and disassembled so as to permit the replacement of parts and inspection for defects, and yet be simple and economical to manufacture.

It is another object of my invention to provide a connector of the class specified, which is connected by threaded engagement, having the male threads on the stationary member and the female threads on the member which is attached to the flexible cable so that these threads will not be damaged by the wear and tear of handling as they come in contact with the ground or other objects during disconnection, as would be the case were the male threaded member on the flexible cable.

Other objects and advantages of my invention will be apparent from the following description and accompanying drawing, wherein like reference numerals indicate like parts throughout the several views.

Figure 1 is an assembly view, partly in elevation and partly in section, of the complete connector;

Figure 2 is an exploded view, in section, of the parts comprising the female member or socket unit;

Figure 3 is a sectioned view of the parts comprising the female member assembled together, with the rear cap disconnected;

Figure 4 is a plan view of the spring clip used for holding the parts of the female member together;

Figure 5 is a perspective view of an alternative insulator member which may be used.

Referring to Figure 1, the connector will be seen to comprise two units—a rigidly connected unit 10 having an electrical contact plug element 12 and a unit 14 adapted to be connected to the loose end of a conduit having a female electrical contact element 16 adapted to mate with plug element 12.

The rigidly connected unit further comprises a base block 18 of suitable insulating material such as "Bakelite" and a housing member 20 having male threads 21. The housing member, as illus-

trated, is provided with a flange 22 adapted to adjoin the base block 18 in complementary relation. The unit 10 is adapted to be fixedly secured, as illustrated, to a structural member 24 by means of bolt 26 passed through registering openings in the structural member, flange and base block and secured by nut 28. The male plug element 12 is provided with a lug or flange 30 adapted to be received in a complementally shaped recess 32 in the base block so as to provide a means for limiting axial displacement of the plug in one direction. The male plug element is further provided with a threaded rear portion 34, or binding post, and is fixedly secured to the base block 18 by nut 36. Terminal 38 of one end of the electrical conduit to be connected is then secured to the binding post 34 by means of nut 40.

The flexibly connected socket unit 14 comprises (best seen in Figure 2) in addition to the electrical contact element 16, a housing 42 with knurled exterior and having female threads 44 complementary to the male threads 21 on the jack housing, a cylindrical shell member 46, a series of cylindrical insulating elements 48, 50, and 52, and a spring clip 54. The cylindrical shell member 46 has a threaded rear portion 56 and a front portion 58 of an outside diameter that is complementary to the inside diameter of the jack housing 20. Said member is further provided with an outwardly presenting flange portion 60 adapted to abut the inner shoulder 62 of the female housing member, and a cylindrical portion 64 intermediate said flange portion and said rear threaded portion, which portion is of a diameter complementary to the inside diameter 66 of the rear portion of the female housing member. Said shell member is also provided with an inwardly presenting flange 68 at its fore end which serves as an abutment for limiting the motion in a forward direction of the cylindrical insulator 48, which has an outside wall complementary to the inside of said shell.

Similar to the shell 46, the insulator 48 has an inwardly presenting flange 69 at its fore end providing a seat which serves to limit the motion in a forward direction of the female contact member 16. The insulator 48 is further provided with a cylindrical extension 70 at its fore end extending so as to be flush with the fore end of the shell member 46 and abutting the insulating base block 18 of the jack unit when the two units are connected together (Figure 1).

Adapted to be received within insulator 48 is the female electrical contact element 16. At

the fore end of said contact is an outwardly presenting flange portion 72 which is adapted to engage the inwardly presenting flange 69 of conductor 48. It is thus seen that the contact element 16, insulator 48 and shell 46 have corresponding seating portions at their fore ends so as to "nest" together in assembly.

The female electrical contact element is formed with a cylindrical wall having longitudinal slots 71 intermediate the ends therefor. Adjacent the bottom of the cylindrical socket 73 of said contact element is a second outwardly presenting flange portion 74. The flange portions 72 and 74 are adapted to engage the inner circumference of the insulator member 48 to provide a space 76 between the wall of the electrical contact member and the insulator so that the segmented sides of the female contact element may be bulged outwardly in response to the insertion of the male plug 12, thereby providing good friction engagement. At the rear end of the female contact member is provided a socket portion 78 to which the other end 80 of the electrical conduit to be connected is secured as by soldering at 79.

The second insulating member 50 has, at the fore end of its inner circumference, a recess 81 which is adapted to engage the flange 74 on the contact member. The outer circumference of this insulator is complementary to the inner circumference of the cylindrical shell 46, and the inner circumference of the insulator is complementary to the outer wall of the socket portion 78 of the contact element so as to align same. The third insulator 52, formed of split halves 82 and 83 as illustrated, also has an outer circumference complementary to the inner circumference of said metallic cylinder and is of a length sufficient when the three insulators are arranged in the shell in end-to-end relation, to extend so as to be flush with the rear end of the shell member. It will thus be seen that the insulators provide continuous insulation throughout the length of the socket unit, and that insulator 48 is adapted to abut base block 18 so as to provide continuous insulation throughout the length of the connector when the two units are connected together. Insulator 52 is preferably made with its inner circumference spaced from the socket portion 78 of the contact element so that no difficulty will be encountered in assembly, should solder be inadvertently smeared on the outside of the contact element.

The female member comprising parts 14, 46, 48, 50, and 52 may be loosely assembled for warehouse stocking or during electrical installation and repair, as shown in Figure 3, and are secured in such assembled relation by providing registering apertures 86 in the cylindrical shell 46 and the insulator 52, for receiving the inwardly presenting pronged end 88 of spring clip 54. In lieu of fastening with a spring clip, the apertures 86 may be extended through the opposite sides of shell 46 and insulator 52, and a cotter pin may be used for this purpose. The aperture 86 is located so that the spring, as thus secured, provides an abutment for the rear end of the female housing 42, to also hold it in loose assembly with the other parts during warehouse stocking, installation, or repair, if desired.

The insulated cable 90 containing the wire 80 is conventionally enclosed in flexible metallic shielding 92 to which is attached, as by soldering, a ferrule member 94 having an inwardly presenting flange 96 protecting the connector parts from the rough fore end of the shielding, and an out-

wardly presenting flange 98 coplanar with flange 96. The outer flange faces provide an abutment for the flush rear ends of shell 46 and insulator 52. The rear face of flange 98 provides an abutment for the inner rear shoulder 100 of a screw cap 102, having threads complementary to the rear threaded portion 56 of the shell 46. Screw cap 102 is provided with knurled exterior to facilitate rotation. When the screw cap 102 is threaded to the rear portion 56 of the cylinder, the assembly to the cable 90 of the female part of the connector, or socket unit, is completed.

While the spring clip serves to secure together the parts during warehouse stocking, etc., it is not considered dependable for conditions of use, and therefore the screw cap which is already present for the purpose of securing the shielding to the connector, is made to perform a double function of adjustably clamping together the parts of the connector. The spring clip then performs no appreciable function during use, but is conveniently allowed to remain in position, so as to be available for use during disconnection and repair. Apertures 86 are made sufficiently large that the prong 88 is loosely received therein, allowing sufficient play that shell 46 and insulator 52 are movable relative to each other for sufficient distance to enable clamping together of the parts by screw cap 102.

It is thus seen that a separable electrical connector unit is provided wherein the electrical contacting element 16 is secured to the shell 46 in insulated fixed axial relation through the mutual cooperation of the various parts by the abutting engagement of screw cap 102 when the same is threaded on the rear portion of the shell; and that the housing 42 is rotatably mounted on the shell 46 so as to bring the contacting element 16 into mating engagement with the contacting element 12 when the housing 42 is connected to housing 20. It will also be appreciated that the electrical contacting element 16, the insulator 48, and the shell 46 "nest" together, and that insulators 50 and 52 further "nest" within the shell 46 and abut the contacting element 16 to secure same in fixed axial relation to the shell 46 when insulator 52 and shell 46 are connected together, as by the spring clip 54 or the screw cap 102.

Furthermore, the connector just described is novelly constructed so that it may be assembled and disassembled with a minimum of operations and with no transverse or lateral movement of any of the parts. The operations of assembly and disassembly of the component parts constituting the connector unit also require no work internally of the connector except the soldering and, since the parts are connected in fixed relation by a single connector means, the operations are such that they can be performed with a minimum of approach positions, thereby making the connector desirable for use in narrow places such as channeled structural members.

It is to be noted that in assembling the parts together, insulator 50 is mounted on contact element 16 before soldering wire 80 and that insulator 52 is preferably made in halves to provide access to socket 78 for soldering the wire 80. In the event that there is sufficient relative displacement between conductor 90 and shielding 92, it is feasible to make insulator 52 as a one-piece cylinder and slip it back over cable 90 to provide access for soldering. However, the shielding and cable being more or less fixed to the structure in which the wiring is installed often precludes this, and it is therefore preferable to construct the

insulator in halves for utility under all conditions.

Insulators 50 and 52 may be constructed together as one member, in which case the member would again preferably be made of split halves.

As an alternative construction of the insulator member 52, there is shown in Figure 5 an insulator member 52' made of one piece and yet providing access to socket 78 for soldering by virtue of the cut-away sides, leaving only prongs 104 for spacing between insulator 50 and flange 96 on ferrule 94. It will likewise be obvious that insulators 50 and 52' may be constructed together as one member.

While my invention has been described and illustrated with reference to its use as a connector for a single conduit, it will readily be understood that it can be constructed as a suitable connector for a plurality of electrical conduits wherein the terminals of the conduits are connected to a plurality of contact elements that are clamped between two insulators having a corresponding plurality of openings to receive in abutting engagement the opposite ends of the contacting elements. The terms and expressions used herein are descriptive only, the invention including such variations and equivalents as may be included within the appended claim.

I claim:

In an electric cable connector, a hollow cylindrical contact element having longitudinal slits through the cylinder wall at circumferentially spaced intervals, an axially extending cable electrically joined to said element, axially adjacent insulating sleeves freely surrounding said element, inwardly extending shoulder portions formed in said insulating sleeves, shoulder portions on said contact element embraced between said sleeve shoulder portions, a metal shell slidably surrounding said insulating sleeves, an inturned annular rib at one end of said shell and an externally threaded portion at the other end, a nut fitted to said threaded portion, a cable housing surrounding said cable, an outwardly extending flange on said cable housing adjacent the end of said insulating sleeves, an inturned rib on the outer end of said nut, said cable housing flange being confined between said inturned rib and the threaded end of said shell, said flange and said insulating sleeves being embraced between the inturned rib of said nut and the inturned rib of said shell, and a spring snap ring secured to said shell adjacent the inner end of said nut, a portion of said ring extending through said shell and into an insulating sleeve.

GEORGE E. WEIDNER.