

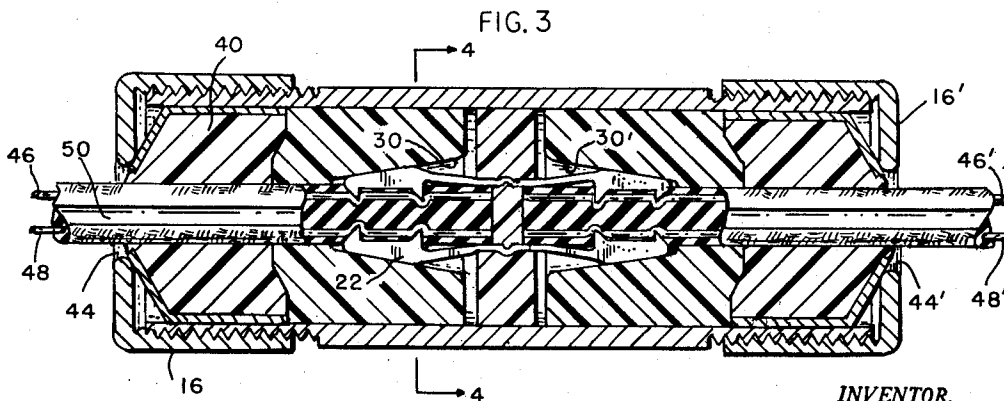
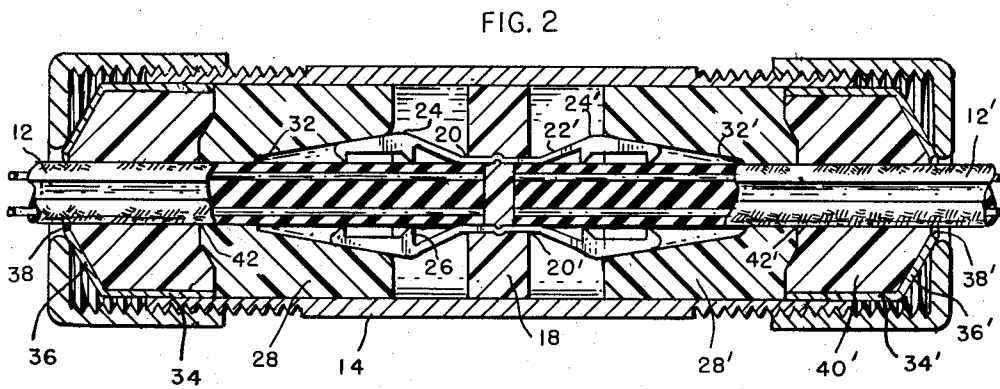
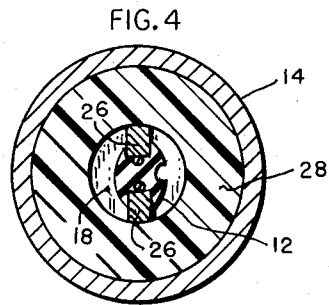
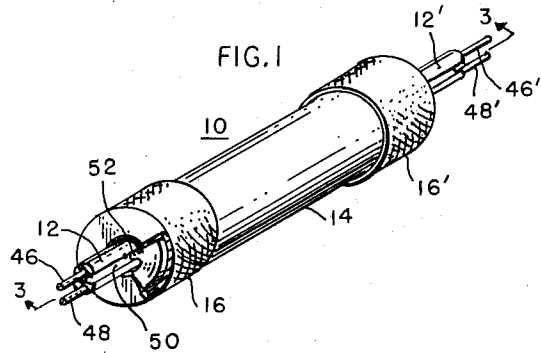
June 26, 1962

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3,041,575

CONNECTING MEANS

Filed Aug. 31, 1960



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3,041,575

CONNECTING MEANS

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Filed Aug. 31, 1960, Ser. No. 53,313

3 Claims. (Cl. 339-99)

(Granted under Title 35, U.S. Code (1952), sec. 266)

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

This invention relates to insulation piercing wire connectors of the type used for joining the ends of electric conductors to provide a continuous circuit through the conductors. More particularly the invention relates to a novel pre-assembled water-tight tubular connector into the bores of which insulated conductors are inserted and wherein the connection may be manually installed without the use of any tools.

In military field operation, it is vital to repair any damage to electrical circuits immediately to preclude further damage or injury in the electrical equipment or elsewhere. In addition to the need for haste there are often adverse environmental conditions under which the repairs have to be made. Furthermore, any connection made should provide a reliable electrical continuity and good mechanical pull out strength. To meet as closely as possible all these requirements, a sealed cable connector according to this invention, is adapted for application to ends of insulated cables which can be made by hand and without preparation of the cables.

An object of this invention is to provide an improved pre-assembled electrical connector that may be put in use in a fraction of a minute.

A further object is to provide an electrical connector which may be applied to insulated cables without the use of any tools.

A further object is to provide an electrical connector which can be quickly applied without removal or stripping of the insulation covering of the connected portions of the insulated wires.

A further object is to provide an electrical connector in which all parts are assembled with the clamping member in open position and the parts are retained in assembled relation ready for use.

For a more detailed description of the invention, together with other and further objects thereof, reference is had to the following description taken in connection with the accompanying drawing, wherein:

FIG. 1 is a perspective view, partly cut away, of a connector, embodying principles of this invention, applied as a coupling for a two-conductor cable;

FIG. 2 is a view in section and partly in elevation of the tubular connector and associated connectors of FIG. 1 before being clamped into its final position;

FIG. 3 is a view in section and partly in elevation of the connector of FIG. 1 shown in operative engagement coupled on to a two-conductor cable; and

FIG. 4 is a cross-section of FIG. 3 taken on line 4-4.

In the drawing and referring first to the complete assembly of connector and conductors in FIG. 1, there is disclosed a connector 10 in clamped engagement with the insulated two-conductor cables 12 and 12' to be connected thereby. Connector 10 is formed of a cylindrical metal tubular housing 14 having at each end thereof threaded shanks on which threaded caps 16 and 16' are screwed.

A disc 18, positioned transverse to housing 14, having opposing central cavities 20 and 20', is permanently mounted within housing 14, near its midpoint. Cavities 20 and 20' are in alignment and lie close to the axis of

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housing 14. Extending through disc 18, in a region close to the peripheral edge of cavities 20 and 20', is a narrow longitudinal resilient metal strip 22 secured at its midpoint in any desired manner, as by molding or by a pre-formed slot in disc 18. An identical strip 22' is spaced diametrically opposite strip 22 and is secured to disc 18 in the same manner as the latter. Elongated strips 22 and 22' are provided with humped portions 24 midway between their extremities and their secured middle portions. Strips 22 and 22' extend radially outward from their secured portions to humps 24 and 24', and then taper toward each other from the humps to their extremities, as shown in FIGS. 2 and 3. Strips 22 and 22' are provided on their under or inner sides with radially inward projecting spaced pointed prongs 26. In the specific embodiment, described herein, four such prongs 26 are indicated on each strip, but it is understood any appropriate number of prongs may be employed. Corresponding prongs 26 on respective strips 22 and 22' are in opposition and are of such nature that they are capable of penetrating the insulation on cables 12 and 12' as hereinafter described.

A pair of identical tubular pistons 28 and 28', made of rigid insulating material, are slidably positioned within housing 14 such that their outer diameters are substantially the same as the inner diameter of the housing. Pistons 28 and 28' are normally spaced from each side of disc 18 and are each provided with a hollowed out center portion in the shape of truncated cones 30 and 30' whose respective narrow portions form channels 32 and 32' for passage of cables 12 and 12'. The surface of hollowed cones 30 and 30', adjacent their wider portion thereof, abuts the respective inward tapering surfaces of strips 22 and 22'. By such an arrangement, when the pistons 28 and 28' are axially moved toward each other, the resilient strips are forced radially inward.

The means for providing axial movement of pistons 28 and 28' includes slidable metal sleeves 34 and 34' positioned in opposite ends of connector 10 and in contact with the respective pistons. The dimensions of sleeves 34 and 34' are such that a light press fit is provided between their outside diameter and the inner surface of housing 14. Sleeves 34 and 34' have inwardly diverging end portions 36 and 36', respectively, each of which has an axial opening 38 and 38' through which respective cables 12 and 12' may be inserted.

Two respective sets of deformable insulating material 40 and 40' are provided within respective sleeves 34 and 34', and have their exposed ends in abutment with respective pistons 28 and 28'. Each set of insulating material 40 and 40' has a respective axial bore 42 and 42' slightly larger than the overall outer peripheries of cables 12 and 12'.

Threaded caps 16 and 16' are provided with respective axial entrances 44 and 44' which engage, respectively, the external sections of the conical end portions 36 and 36' of sleeves 34 and 34'.

Through each end of connector 10, there is thus provided an axially aligned continuous passage, in alignment with respective cavities 20 and 20', permitting cables 12 and 12' to be oppositely disposed therein in approximate end-to-end relation. Assuming that connector 10 is to be used to join the two conductors 46 and 48 to their corresponding conductors 46' and 48', the end of insulated cable 12 is passed through entrance 44, opening 38, bore 42, channel 32 and between strips 22 and 22' into cavity 20. Likewise, the end of insulated cable 12' is inserted through entrance 44', opening 38', bore 42', channel 32' and between strips 22 and 22' into cavity 20'.

Cables 12 and 12' are of the conventional oval cross-sectional type having a groove 50 in the insulation on one side of each cable. As shown in FIG. 1, one side

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of each of the bores 42 and 42' is provided with a guide knob 52 which interfits with groove 50, so that cables 12 and 12' can only be inserted in one position into the bores. In this way, conductors 46 and 48 will only be joined to conductors 46' and 48' through strips 22 and 22'.

In use, connector 10 receives the cable ends to be spliced, without any preparation of the cables. All splices are made without removing any insulation. As indicated in FIG. 2, cables 12 and 12' are inserted through the entrances 44 and 44', far enough into connector 10, to abut respective cavities 20 and 20'. By positioning the cables along the entire length of the passages in connector 10 each cable can be gripped by both sets of prongs 26 on each side of strips 22 and 22'. After cables 12 and 12' are in place caps 16 and 16' may be simultaneously tightened, or they may be alternately rotated to bring the caps axially toward each other, best shown in FIG. 3. This action urges sleeves 34 and 34' and insulation material 40 and 40' against pistons 28 and 28' whose sloping conical surfaces 30 and 30' wedge against the respective strips 22 and 22'. As this pressure is applied, strips 22 and 22' are forced radially toward each other, and prongs 26 cut through the insulation on the conductors, firmly gripping said conductors in operative position, as shown in FIGS. 3 and 4, insuring good electrical contact while increasing the mechanical strength of the splice. At the same time, deformable material 40 and 40' are compressed around cables 12 and 12' at openings 38 and 38' in such manner to provide water-tight seals, around the cables, at the ends of connector 10, as shown in FIG. 3.

By using the connector, according to this invention, time consumed in making a splice between two-conductor cables has been as little as 10 seconds.

While there has been described what is at present a preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is therefore aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A pre-assembled connector for electrically coupling the ends of a pair of insulated conductors to provide electrically conductive joints between said conductors comprising an elongated hollow housing having aligned

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end openings, a disc of rigid insulating material positioned within said housing in the intermediate portion thereof, said disc having opposing cavities therein aligned with said end openings for receiving the ends of said conductors, a pair of diametrically opposing resilient metallic strips mounted in said disc such that their extremities extend therethrough on opposite sides of said disc, said strips being longitudinally aligned within said housing and provided with radially inward projecting prongs thereon, axially slidable pistons of rigid insulating material positioned within said housing and spaced from each side of said disc, each of said pistons provided with a hollowed out central conical portion whose respective wider portions are in opposing relation, said strips being in slidable engagement with the conical surfaces of said pistons, and independently operable adjustable means connected at each end of said housing adapted to move said pistons axially toward each other whereby said strips are forced radially inward so that said prongs come into engagement with said conductors.

2. The device of claim 1 wherein said means comprise a cap on each end of said housing threaded internally for threaded engagement with said housing which is provided with external threads at each end thereof, said caps having aligned axial openings for the passage of said conductors therethrough, slidable metal sleeves disposed within said housing having inward diverging conical end portions adjacent said caps, two bodies of insulating material having axial bores therethrough respectively positioned within said sleeves and contiguous with said respective pistons, whereby when said caps are tightened they engage said sleeves which in turn force said pistons axially toward each other.

3. The device of claim 2 wherein said bodies of insulating material are deformable.

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