March 12, 1963 W. H. TRINEN 3,081,443

INSULATED ELECTRICAL ADAPTER

Filed Jan. 26, 1960 2 Sheets-Sheet 1

FIG. 1A

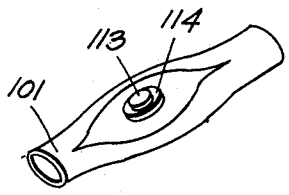


FIG. 1B

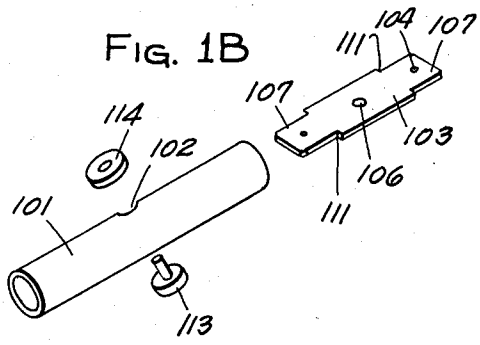


FIG. 1C

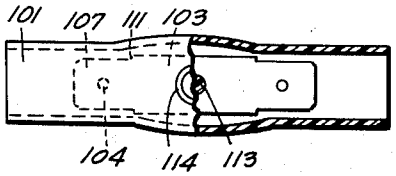


FIG. 1D

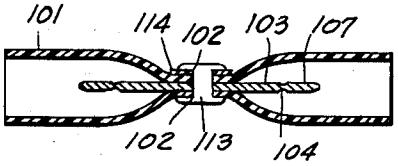


FIG. 2A

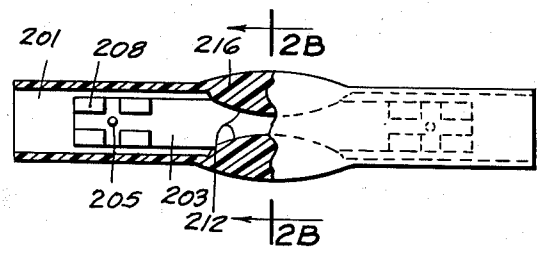


FIG. 2B

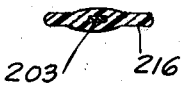


FIG. 3A

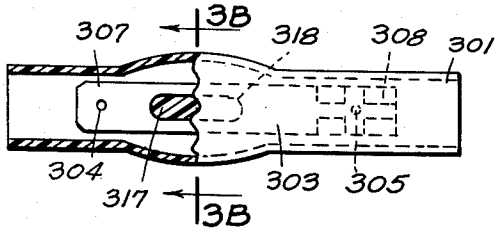
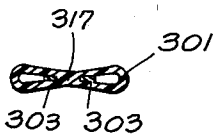


FIG. 3B



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FIG. 4

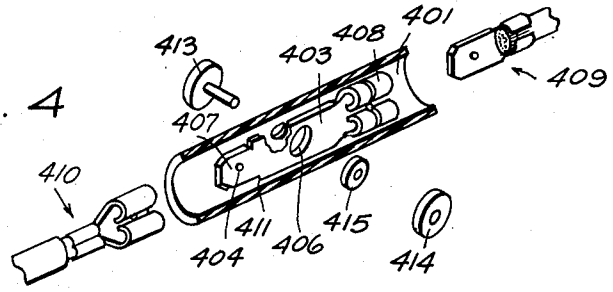


FIG. 5A

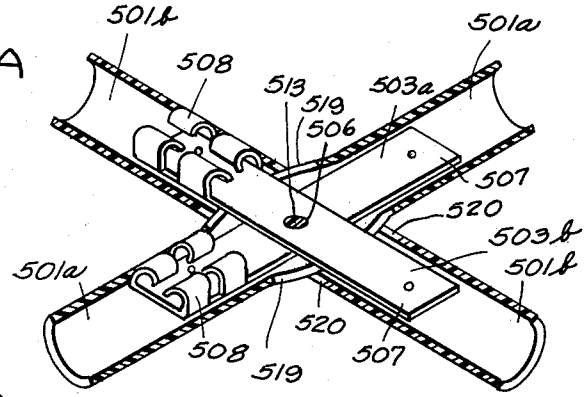


FIG. 5B

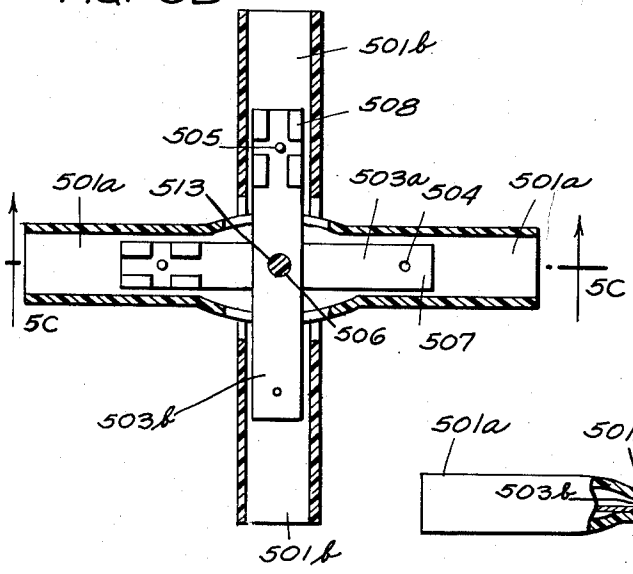
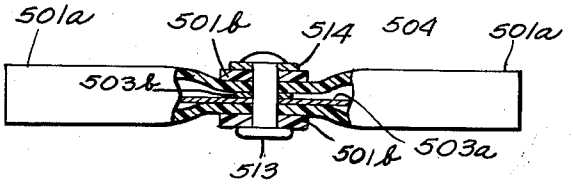


FIG. 5C



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United States Patent Office 3,081,443
Patented Mar. 12, 1963

3,081,443

INSULATED ELECTRICAL ADAPTER

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Filed Jan. 26, 1960, Ser. No. 4,716
5 Claims. (Cl. 339—205)

This invention relates to insulated electrical adapters, or intermediate unattached connectors, which can be interposed between electrical conductors to permit their interconnection without likelihood of their coming into electrical contact with adjoining conductors or conducting surfaces, such adapters or connectors being capable of being included, on the basis of ordinary insulated wires, in runs of insulated wiring conductors which may be clamped or laced together in cable form.

The object of the invention is to provide a new and improved adapter of the foregoing character which is of economical, sturdy, and reliable construction.

Heretofore, an electrical adapter of the foregoing type has comprised a sleeve of insulating material within which an elongated blade-like conducting member is insulatedly supported by its center portion to provide respective connector ends accessible through the respective ends of the somewhat elongated enclosing insulated sleeve. Either such end has been of a male or female connector construction as desired, according to the character of the terminal affixed to the conductor with which it is to make detachable connection. For the most part, the foregoing construction has tended to be expensive because of the necessity of accurately sizing the intermediate portion of the adapting conductor blade member to retain it centrally within the enclosing insulated sleeve (usually composed of a rather tough plastic material) and has often been unsatisfactory in that, if the enclosing sleeve is somewhat oversized, it may inadvertently slide endwise out of place to leave the conducting members exposed.

According to the invention, the foregoing and related drawbacks are overcome by a simple low-cost construction wherein at least a portion of the insulating sleeve opposed to the intermediate portion of the enclosed conducting member is deformed and held securely in a deformed position to positively lock the sleeve and the enclosed conducting member against substantial endwise movement relative to each other.

In carrying out the invention the arrangement for preventing or limiting the noted longitudinal movement of the parts of the adapter or connector relative to each other takes the form of an insulated or insulatable rivet member in certain embodiments, while in other embodiments it takes the form of a portion of the insulating plastic sleeve being pressed together during the construction of the adapter and bonded together in a permanent deformed position wherein the intermediate portion of the enclosed elongated conducting member is gripped or held against longitudinal movement by virtue of the mating shapes of the parts.

In an additional embodiment of the invention, a four-way adapter is provided which includes two intersecting intermediately slit insulating sleeves (one inserted endwise through the slit in the other), through the common internal portion of which sleeves are passed two intersecting conducting members which are held in mutually contacting relationship by the holding action of the two inwardly deformed enclosing sleeves, thereby enabling four individual conductors to be interconnected in common.

The above-mentioned and other objects and features of this invention, and the manner of obtaining them, will become more apparent, and the invention will be best understood by reference to the following description

of the invention taken in conjunction with the accompanying drawings comprising FIGS. 1 to 5, wherein:

FIGS. 1A to 1D disclose a first embodiment of the invention wherein the inward deformation of the insulating sleeve to retain the conducting member is maintained by a rivet of insulating material passing through the parts;

FIGS. 2A and 2B disclose an embodiment wherein the internal conducting member is held in place by inwardly deforming opposed edge portions of the insulating sleeve and bonding them securely together;

FIGS. 3A and 3B show a further embodiment wherein the enclosed conducting member is centrally apertured and the corresponding portion of the conducting sleeve is inwardly compressed and bonded for holding purposes;

FIG. 4 shows an embodiment generally similar to FIGS. 1A to 1D but employing a metallic clamping rivet which is insulated from the enclosed conducting member by a surrounding insulator received within an opening in the conducting member; and

FIGS. 5A to 5C disclose the invention in the form of the previously noted four-way adapter.

First Embodiment—FIGS. 1A to 1D

In FIGS. 1A to 1D an insulating sleeve **101** contains blade-like connecting member **103**, somewhat shorter than the sleeve, to leave room within the sleeve for wired female terminals, such as **410** of FIG. 4, to connect with the male ends **107** and still be within the insulating ends of sleeve **101**.

As seen best in the exploded view FIG. 1B, sleeve **101** has a rivet receiving holes **102**. Connecting blade **103** has a corresponding rivet hole **106**. In the assembled insulated adapter as shown in FIG. 1D, conducting blade **103** is inserted into an open end of sleeve **101** with holes **102** and **106** coinciding, rivet **113** is placed through the holes and washer **114** and is riveted. The central portion of the sleeve is deformed inwardly and pressed tightly against the central section of the conducting blade preventing any lateral motion, and enclosing the conductor **103** entirely within the insulated protection sleeve **101**.

As depicted in FIG. 1C, conducting blade **103** has lateral male terminal portions **107** each with dimpled formations **104**. These dimpled terminals **107** will frictionally mate with female wired terminals **410** (see in FIG. 4) and their type of dimples **405**. On the interior ends of terminals **107** are shoulders **111** which stop the wired female terminal **410** from being inserted so far as to push against and into the deformed central area of sleeve **101**.

Rivet **113** must be non-conducting as it touches the conducting blade as well as being exposed to the outside surface, whereas washer **114** can be a conducting substance as it is electrically insulated from connection member **103** by adjacent portions of sleeve **101**. This washer is firm enough to aid in the riveting process. To prevent conductive leakage out from the deformed area, component parts fit snugly to and within each other.

Second Embodiment—FIGS. 2A and 2B

The assembled adapter in FIG. 2A comprises sleeve **201** which is similar to sleeve **101** but requiring no rivet holes. Conducting blade **203** is similar to blade **103**, but has concave side portions **212** rather than a rivet hole. Also it is shown with female terminals **208**. Sleeve **201** has been deformed (flattened into wall-to-wall contact) in each of the areas **216** to bring the sleeve material into gripping contact with the concave sides of blade **203** to hold that blade within the sleeve.

Deformation of sleeve **201** is maintained by wall-to-wall bonding, preferably by fusion under heat and pressure, but may also be accomplished by a bonding adhesive, as of the pressure-sensitive type.

Third Embodiment—FIGS. 3A and 3B

FIGS. 3A and 3B show a form of the insulated adapter wherein sleeve **301** corresponds to sleeves **101** and **201**, and blade **303** corresponds to blades **103** and **203**, but has a male terminal **307** and a female terminal **308**. Blade **303** has an elongated central aperture **318** into which a corresponding side-wall portion of sleeve **301** is deformed and bonded to hold blade **303** immobile. The deformation and bonding may be performed as described for FIGS. 2A and 2B.

Fourth Embodiment—FIG. 4

The adapter shown in exploded view FIG. 4 is a direct variation of the riveted first embodiment (FIGS. 1A to 1D) but employs a metal rivet **413** which gives a stronger grip on the parts than non-conducting rivet **113**. Insulating washer **415** is received in hole **406** to insure against contact between blade **403** and rivet **413**, but may be omitted when accurate jig assembly and firm riveting are employed. The deformed part of the sleeve and the central part of the blade are held firmly by rivet **413** between metal washer **414** and the head of the rivet.

Terminals **407** and **408** may receive and frictionally hold wired terminals **410** and **409**, respectively.

Fifth Embodiment—FIGS. 5A to 5C

FIGS. 5A to 5C depict an insulated adapter having four terminal portions in common electrical contact, with sleeves **501***a* and **501***b* having central lateral slots **519** and **520**. Sleeve **501***a* is inserted through slots **520** of sleeve **501***b* forming a cross configuration. Conducting blades **503***a* and **503***b* are inserted into their respective sleeves and the assembling and constricting of the central portion of the adapter is accomplished as described in the first embodiment.

Although the adapter of FIGS. 5A to 5C is shown with sleeve deformation maintained as shown in the first embodiment and has four terminal portions, it is contemplated that such adapter may be provided with any of the contemplated holding means and with other numbers of terminals.

While I have described above the principles of my invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of my invention.

I claim:

1. An electrical connecting device comprising: a flexible insulating sleeve open at both ends; an elongated rectangular conducting member enclosed within the sleeve and having its respective end portions terminating within the sleeve; means on each said end portion for detachably connecting electrical conductors inserted into the respective open ends of the sleeve, the said conducting member being the sole electrical connection between the said electrical conductors; and means fixedly positioning the said conducting member in the said sleeve and holding the conducting member against sliding longitudinally out of position with respect to the sleeve, comprising means for holding opposed side walls of an intermediate portion of the sleeve deformed inwardly into firm engaging relationship with the conducting member, the insulating sleeve being thereby flattened and widened at its said intermediate portion, whereby the said electrical conductors may be connected and detached from the said end portions without disturbing the relative disposition of the said conducting member within the said sleeve, wherein the said holding means comprises a clamping device, of the class including rivets, passing through an opening in the conducting member and through both said side walls of the insulating member.

2. An electrical connecting device according to claim 1, wherein the said clamping device comprises a rivet of insulating material having a head portion exposed on one side of the connecting device and a riveted portion appearing on the other side.

3. An electrical connecting device according to claim 2, wherein a washer surrounds the rivet between its riveted end and the associated outside surface of the said sleeve to transmit inward clamping action from the rivet to the sleeve.

4. An electrical connecting device according to claim 1, wherein the said clamping device includes a rivet of conducting material passing through the conducting member and disposed out of electrical contact therewith.

5. An electrical connecting device according to claim 4, which includes an insulating member interposed laterally between the said conducting member and the said rivet to inhibit relative movement of them into mutual electrical contact.

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