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INDENTABLE JACK-TYPE CONNECTOR

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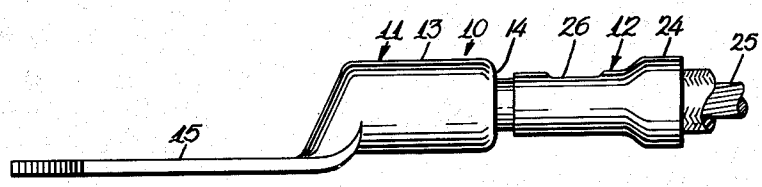



FIG. 1.

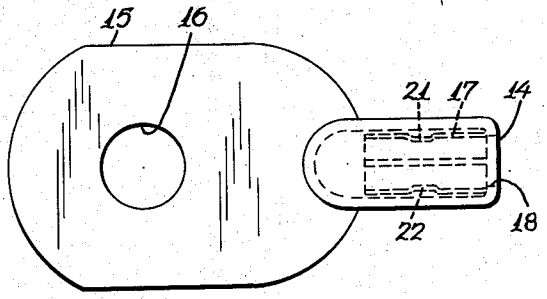



FIG. 2.

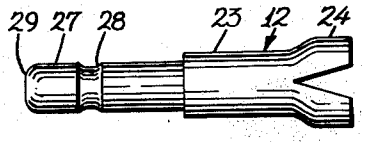



FIG. 4.

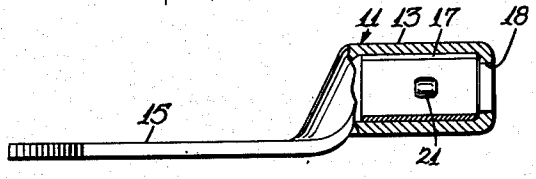



FIG. 3.

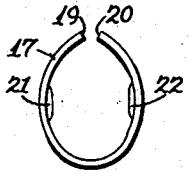



FIG. 6.

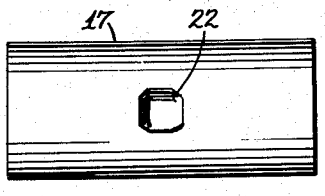



FIG. 5.

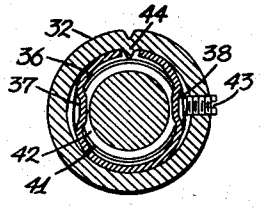



FIG. 8.

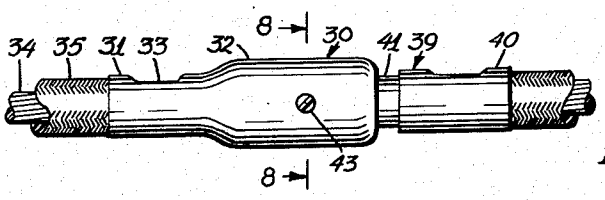



FIG. 7.

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## INDENTABLE JACK-TYPE CONNECTOR

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1 Claim. (Cl. 339—255)

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Our invention relates to connectors, and particularly to a longitudinally displaced in-line type of connector which permits quick connection and separation.

More particularly our invention relates to separable connectors employing a plug like end which engages a resilient insert contained in a receptacle made of malleable metal. Hitherto such resilient element has either formed a part of the jack or formed the receptacle itself. When formed as a part of the jack, it had to be compressed before insertion into the receptacle, and additionally made indentation or crimping difficult if not impossible. An example of this type is shown in the Rowley Patent No. 1,905,245. When the resilient element formed the receptacle itself, as shown in the Buchanan Patent No. 2,451,800, the resilient receptacle could not be readily indented or crimped as in the case where the receptacle is made of malleable metal.

Accordingly, it is a primary object of our invention to provide an in-line type of connector which can be connected or separated along its longitudinal axis, and which counterpart members can be made from a malleable metal which can be readily indented or crimped to the bared end of a conductor or swaged to form a work hardened terminal lug.

Still other objects of our invention are to provide one of the malleable connector members with a resilient securing means that engages the counterpart connector member and relieves the connection member of any transverse stress due to the securing action; to provide a securing means that can be spread apart independently of the connector member within which it is enclosed; to provide a securing means that will be completely enclosed within one of the connector members and mounted therein independently of the counterpart connector member, and which will protect the contact surfaces of the connection when made from external damage and corrosion; to provide a positive securing means to lock the connector members together; to provide a connector which requires a minimum of lateral clearance between adjacent connections, permitting an installation with a maximum number of connections in a given space; and to provide a connector which is of a simple and compact construction having a minimum number of

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separable parts which can be easily connected and separated with a predetermined force and which can be economically manufactured.

We accomplish these and other objects and obtain our new results as will be apparent from the device described in the following specification, particularly pointed out in the claim, and illustrated in the accompanying drawing, in which—

Fig. 1 is a side elevation view of a terminal type of electrical connection.

Fig. 2 is a top plan view of a terminal type of socket member.

Fig. 3 is a side elevation view of the same, partially in section, with the spring securing means mounted in position.

Fig. 4 is a side elevation view of the plug member.

Fig. 5 is a side elevation enlarged view of the spring securing means.

Fig. 6 is an end elevation view of the same,

Fig. 7 is a side elevation view of a splice type of connection.

Fig. 8 is an enlarged transverse sectional view taken along line 8—8 in Fig. 7 showing a positive locking means to secure the connector members together.

In the drawing reference numeral 10 designates a longitudinal displaced type of terminal connector comprising a socket member 11 and a plug member 12.

The socket member 11 is constructed of malleable metal tubing, preferably of soft copper, having a tubular or hollow body portion 13 with an open end 14. The remainder of the tube is swedged into a work hardened flattened lug portion 15 having an attaching aperture 16 for securement to a supporting structure, not shown.

A resilient spring element 17, shown in detail in Figures 5 and 6, is mounted within the hollow body portion 13 and retained in position therein by restricting the periphery of the open end 14, such as by peening, to form the shoulder 18. The spring element 17 has a transverse oval shape and is longitudinally split along one end to form free spaced ends 19 and 20. There is sufficient clearance between the oval shaped spring and the inner surface of the hollow body to permit the spring to be spread sufficiently apart by the insertion of the plug mem-

ber and provide the maximum gripping effect. The oval shape insures the retention of the spring within the hollow portion 13 despite its narrow diameter across the gripping sides.

Embossed portions 21 and 22 may be formed transversely on each side of the spring extending diametrically toward each other at the smaller diameter of the oval shaped spring to form inter-engaging means for securing the plug member to the socket member, as will be hereinafter described. The spring element 17 may be constructed of beryllium copper to provide good conductivity and sufficient resiliency.

The plug member 12, shown in detail in Fig. 4 comprises a sleeve portion 23 at one end having a shroud 24 to receive the insulation of the conductor 25. The plug member 12 may be made of malleable copper suitable for indentation of the sleeve portion to the bared end of the conductor as at 26. The reduced end 27 of the plug member is received within the hollow body portion 13 of the socket member and is of a cylindrical configuration having a peripheral groove 28. The groove 28 is engaged by the embossed portions 21 and 22 when the members are completely connected together. The end 29 of the plug is rounded to facilitate entry into the hollow body portion 13 and the spring therein. The reduced end 27 of the plug is work hardened when reduced to resist wear from making and separating the connection.

To make the connection, the plug member 12 is conveniently gripped by the sleeve portion 23 and inserted into the hollow body portion 13 of the socket member. The reduced end 27 of the plug member being larger than the smaller diameter of the oval spring 17, causes the spring to be spread apart insuring a wiping action. When groove 28 on the plug member is aligned with the embossed portions 21 and 22 on the spring, the spring recloses around the reduced end 27 of the plug member, securing the members together and producing multiple lines of contact along the longitudinal surface of the plug. The entire contact thus occurs completely within the hollow body member being protected against external damage and corrosion. The members can be separated by applying a predetermined pull, the spring 17 being retained within the hollow body portion, during removal of the plug member, by the shoulder 18.

In Fig. 7 is illustrated a modification using the invention in a splice type connector 30. This modification employs a malleable sleeve extension 31 integral with the hollow body portion 32 in place of the terminal lug 15 as shown in the modification in Figures 1 to 4 inclusive to permit indentation as at 33 to the bared end 34 of the insulated wire 35. As in the modification shown in Figs. 1–4 inclusive, oval shaped spring 36 having embossed portions 37 and 38 similar to spring 17 is mounted within the hollow body portion 32. The plug member 39 is similar to plug member 12, having a sleeve portion 40 terminating in a reduced end portion 41 with groove 42. The reduced end portion 41 is work hardened during machining to resist wear. While in the modification shown in Fig. 7, the shroud portion 24, as shown in Fig. 4, has been omitted from the sleeves 31 and 40, the shroud may be provided when desirable.

The operation of the modification disclosed in Figs. 7 and 8 is similar to that of the modification shown in Figs. 1 to 4 inclusive. With the sleeves 31 and 40 indented to their respective conductors, the connection is made as previously described.

Where it is necessary for any particular installation to have a positive locking means to secure the plug within the socket member after the connection has been made, a screw 43 or similar means may be provided, as illustrated in Fig. 8, extending through the hollow body portion 32 at one side. The screw may be tightened abutting the side of the spring 36 and forcing the spring against the reduced end of the plug member, locking the embossed portions 37 and 38 within the groove 42 preventing withdrawal of the plug member. To prevent the spring from turning within the hollow body 32, a portion of the body may be indented or embossed to provide a stop 44 extending between the free ends of the spring maintaining the spring in position with respect to the screw 43.

With our novel device we can obtain a connector that is constructed of malleable metal suitable for indentation to a conductor. By providing a resilient securing spring mounted within the malleable connector we can relieve the malleable connector from any stress due to the securing action between the connector counterpart members. We can work harden that portion of the malleable connector that receives wear or requires strength to support the connector to a terminal or the like. By completely enclosing the resilient securing spring within one connector member, the electrical contact areas between the counterpart connector members are protected from the weather to effectuate a more efficient connection. Where a positive locking means between the counterpart connectors is necessary for any particular installation, a screw or like means may be provided in one of the connector members to prevent separation of the connector members. Our device is simple to operate and requires a minimum lateral space, and permits the connectors to be used in terminal type and splice type of connections. By providing an in-line displaced connector separable along the longitudinal axis, we forego the necessity of slack wire to make and break the connection.

We have thus described our invention, but we desire it understood that it is not confined to the particular forms or uses shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of our invention, and, therefore, we claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claim, and by means of which, objects of our invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to attain these objects and accomplish these results.

We claim:

An electrical connector comprising a socket member and a plug member, said socket member having a hollow body with an open end, said plug member terminating in a portion for insertion into the hollow body, a tubular sheet metal spring, non-circular and uniform in cross-section, having a long and a short width and an open slot extending from one end thereof to the other, said spring engaging the walls of the socket at the long width, and providing sufficient clearance at the short width for enabling the

spring to resiliently accommodate the plug, and an inwardly projecting detent provided at the short width of the spring for engaging the plug, said hollow body provided with a peened over edge for holding the spring at the short width movably therein, said plug provided with peripherally recessed portions for engaging the detent on the spring when the plug is inserted therein.

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