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J. B. MILLER ET AL

2,259,261

ELECTRICAL CONNECTOR

Filed June 8, 1938

Fig. 1.

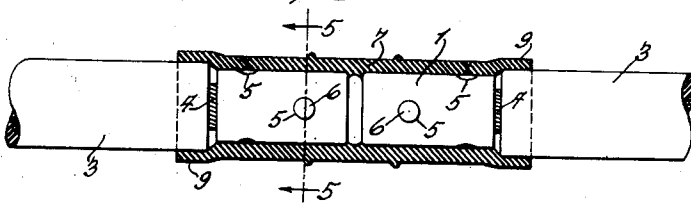


Fig. 2.

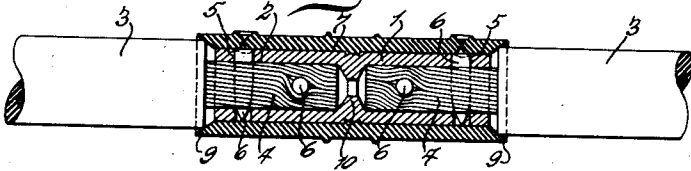


Fig. 3.

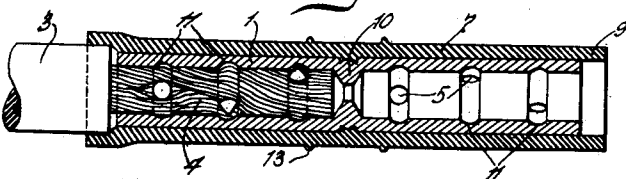


Fig. 4.

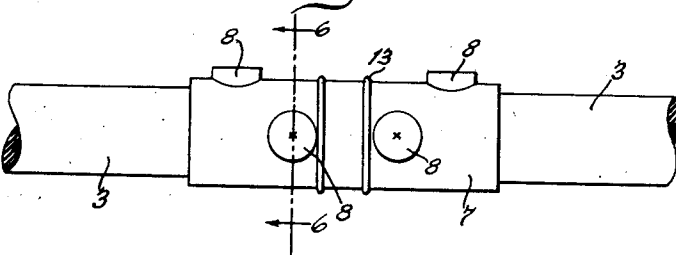


Fig. 5.



Fig. 7.

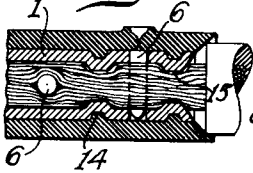


Fig. 6.



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## UNITED STATES PATENT OFFICE

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## ELECTRICAL CONNECTOR

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3 Claims. (Cl. 174-84)

This invention pertains to electrical connectors and more particularly to connectors adapted for making mechanical and electrical connection between two cables or similar conductors.

One of the objects of this invention is to provide a connector of improved construction in such simple form as to be easy to manufacture and easy to operate.

Another object is to provide such a connector which may be used to connect stranded cables and which may make a connection both mechanically and electrically secure without the necessity of soldering.

Another object is to provide such a connector which shall provide a completely insulated joint.

Further objects will appear from the following description taken in connection with the accompanying drawing in which

Figure 1 is a view partly in section illustrating a connection between cables by using a connector embodying this invention;

Figure 2 is a similar view showing a section through the connecting sleeve;

Figure 3 is a view similar to Figure 2 showing a modified form of insulating cover;

Figure 4 is a side view of the complete connection;

Figure 5 is a section on line 5-5 of Figure 1;

Figure 6 is a section on line 6-6 of Figure 4;

Figure 7 is a sectional view illustrating another way of forming the conducting body of the connector.

Referring to the accompanying drawing, 1 designates a conducting body providing the main body of the connector. In the embodiment shown this is in the form of a sleeve provided at each end thereof with a bore 2 adapted to receive the bared end of a cable 3. In the embodiment illustrated the sleeve 1 is provided with a bore 2 at each end thereof, said bores extending oppositely to each other. These are preferably sized to such dimensions as snugly to fit the conductor to which they are to be applied. As shown in Figure 2, the end of each cable 3 is stripped of insulation for an appropriate distance sufficient to insert the stripped end 4 into the bore 2. The bores 2 may be separated from each other by a dam or partition 10 to prevent inserting one of the conductors 4 too far and thereby leave insufficient room for the other.

The sleeve 1 is provided with expander-receiving openings 5. In the embodiment illustrated these are in the form of drilled holes. In each bore two or more sets of such openings are provided, each directed across the bore and the dif-

ferent openings in the same bore being directed transversely of each other. As shown in Figure 2, these openings are formed simply by drilling through the sleeve at two or more places in each bore, the drilled holes being directed at right angles to each other in each bore.

In order to secure the cable in the bore 2, expanders in the form of tapered pins 6 are driven through the holes 5 and into the body of the stranded cable. Each pin enters between the several strands of the cable and wedges said strands apart and against the walls of the bore 2 with a considerable pressure so as to make good electrical contact. Since in each bore the pins 6 are driven transversely of each other, the strands of the cable are distorted in passing around the different pins in such a manner as to form a secure mechanical interlock between the strands and the pins and thereby securely to lock the cable in the connecting sleeve against a mechanical pull axially thereof.

In Figure 3 the body 1 is lengthened somewhat to permit a longer stripped end 4 of the conductor to be inserted, and more than two expanders are shown. It is advantageous thus to lengthen the connection and increase the number of anchoring expanders where the connection is to be subjected to a heavy pull. In such a case the bore 2 may be provided with one or more internal recesses shown as annular grooves 11 aligned with the openings 5 so that the pressure developed by inserting the expander will force the strands to bulge or kink into the groove 11 and thereby provide an additional interlock.

In order to insulate the joint when finished, the sleeve 1 may be provided with an insulating cover 7. This may be constructed of soft rubber and vulcanized in place on the sleeve so as to form a secure bond therewith. The sleeve may be made plain as shown in Figure 3 or it may be provided with indicating bosses 8 at holes 5 so as to indicate where the pins 6 are to be driven. In placing the cover 7 upon the sleeve the bosses 8 may be formed solid. In such cases the pins 6 may be pointed or otherwise sharpened so that they may be driven through the rubber of the bosses 8 and into the openings 5. In such a case the pin is forced clear through the rubber by means of a nail set or the like after which the perforated rubber closes over the pin so as to insulate the head thereof. These pins may be formed of a length substantially equal to the outside diameter of the sleeve 1 so that the pin may be completely housed within the cover 7. In the embodiment of Figure 3 any suitable kind of

marking may be placed upon the outside of the cover 7 to indicate the location of the holes 5.

The cover 7 may be formed with its ends 9 extending beyond the ends of the sleeve 1 to a sufficient extent that the insulated portion of the cable 3 may be inserted within the projecting end 9 of the cover. The cover, being elastic, will then embrace the insulated portion of the cable 3 with a resilient pressure so as to render the joint substantially watertight. The cover 7 may be formed either of resilient material, such as rubber, or of rigid material such as Bakelite or other molded insulation. In the latter case bevelling the inner surfaces of the ends 9, as shown in Figure 2, provides a wedging seat against which the end of the insulation of the cable 3 may be forced.

In order to provide a guide for the wireman to enable him to determine accurately how far to strip the ends 4 of insulation, indicating marks, such as the ridges 13 may be provided on the cover 7 at such a distance from the end thereof that the wireman may gauge the length to be stripped from the end to said ridge.

In the embodiment of Figure 7 the sleeve 1 has formed therein one or more external grooves 14. These may be formed by rolling or any other suitable process so as to form on the inside of the sleeve creasing ridges 15. The ridges 15 may be spaced along the sleeve so as to provide therebetween an internal groove of any desired width and the expanders 6 may be inserted in the groove so formed as illustrated in Figure 7. This construction provides means for causing the strands of the conductor to be twisted into irregular forms so as to provide a secure mechanical interlock.

It will be seen that this invention provides a cable connection which is simple to operate and which makes a strong mechanical connection to the cable while at the same time forcing the same against the conducting body of the sleeve in such a manner as to make good electrical contact. Accordingly, the use of solder is rendered unnecessary. The insulating cover is permanently assembled with the connector so that linemen may carry a supply of such connectors already insulated which may be applied by simply driving two or more pins for each cable connected. The insulating cover, when complete, overlaps the insulated portion of the cable so as to make a substantially continuous insulating covering and at the same time a water-tight joint.

While this invention has been described as a unitary structure, it will be understood that certain individual features or sub-combinations of

this device may be useful by themselves, without reference to other features or the complete combination, and that the employment of such individual features or sub-combinations is contemplated by this invention and within the scope of the appended claims.

It is obvious that various changes may be made, within the scope of the appended claims, in the details of construction without departing from the spirit of this invention; it is to be understood, therefore, that this invention is not limited to the specific details shown or described.

Having thus described the invention, what is claimed is:

1. An electrical connector of the character described, comprising, a conducting sleeve having oppositely extending bores adapted to receive conductors, said body having expander-receiving openings directed transversely of said bores and in each bore transversely of each other, and a resilient insulating cover for said sleeve extending over and concealing said openings and having indicators to locate said openings and tending to close over expanders driven through said cover into said openings.

2. In combination with a stranded electric conductor, an electrical connector of the character described comprising, a conducting body having a bore adapted to receive a bare end of the conductor, said body having internal recesses and expander-receiving openings aligned respectively with said recesses and directed transversely of said bore and transversely of each other, and expanders driven through said openings to penetrate the conductor between the strands thereof and expand the same by forcing the strands outwardly against the walls of said bore and into said recesses and into good electrical contact with said body, the different expanders penetrating between different groups of strands and expanding the conductor in different directions.

3. As an article of manufacture, an electrical connector of the character described, comprising, a conducting body provided with a bore adapted to receive a bare end of a stranded conductor, said body having a plurality of internal recesses and expander-receiving openings aligned with said recesses directed transversely of said bore and of each other, and spaced from one another axially along said bore whereby expanders driven through said openings into the conductor will expand the strands thereof into said recesses in different directions at different points.

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