Sept. 2, 1947. T. BIRKENMAIER 2,426,857

ELECTRICAL CONNECTOR

Filed Jan. 17, 1945

FIG. 1.

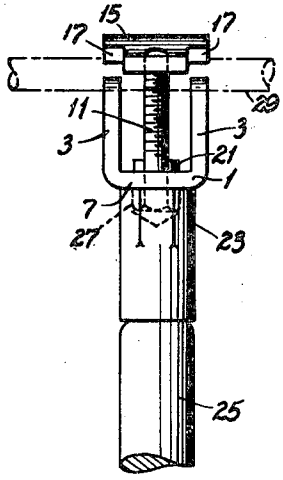


FIG. 2.

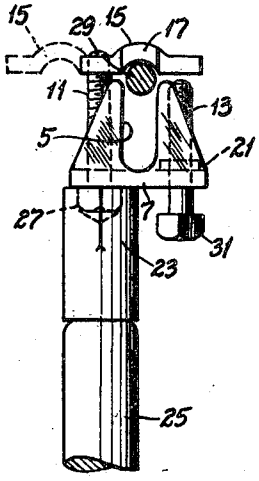


FIG. 3.

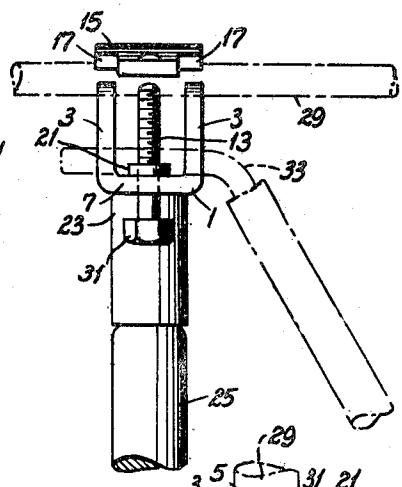


FIG. 4.

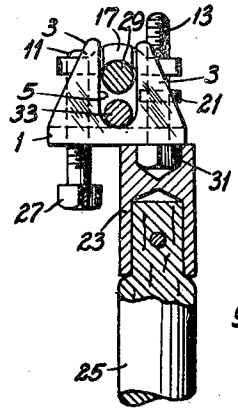


FIG. 6.

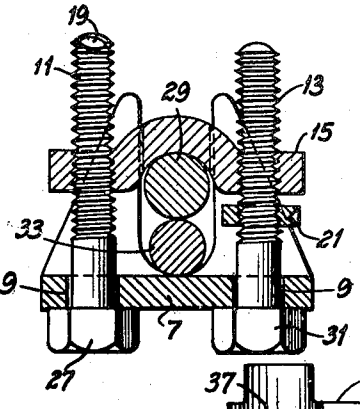


FIG. 5.

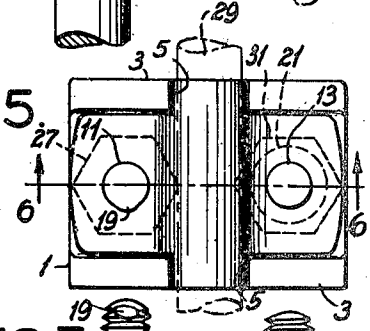


FIG. 7.

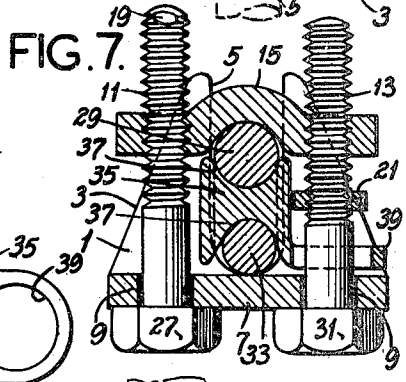


FIG. 10.

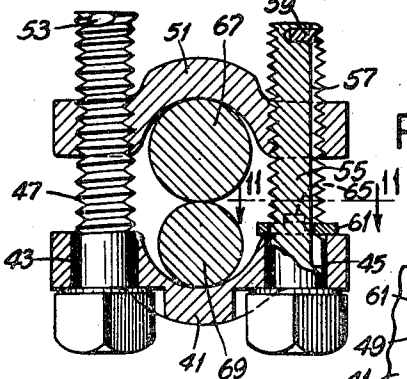


FIG. 8.

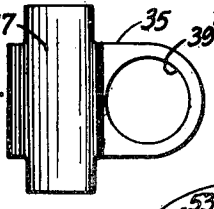


FIG. 9.

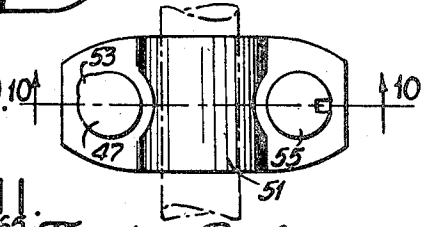
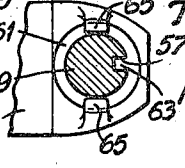


FIG. 11.



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UNITED STATES PATENT OFFICE

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ELECTRICAL CONNECTOR

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Application January 17, 1945, Serial No. 573,151

1 Claim. (Cl. 173—273)

1

This invention relates to electrical connectors, and with regard to certain more specific features, to such connectors for line wires and the like.

Among the several objects of the invention may be noted the provision of an electrical connector in which a permanent assembly of its parts is maintained during connecting and disconnecting operations; the provision of a connector of the class described which may, if desired, be supported upon and manipulated from the end of a simple extension wrench; the provision of a connector of this class which employs substantially full-round threads, thus being strong and reliable when pulled up tightly; and the provision of a connector of the class described which is economical to make. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claim.

In the accompanying drawings, in which are illustrated several of various possible embodiments of the invention,

Fig. 1 is a side elevation showing one form of the invention mounted on the end of an extension wrench and in the process of being applied to a line wire;

Fig. 2 is a right-end view of Fig. 1, showing certain alternative positions of an upper jaw;

Fig. 3 is a right-side view of Fig. 2, showing an additional line wire in position;

Fig. 4 is a view similar to Fig. 2 illustrating a tightening operation;

Fig. 5 is an enlarged top plan view of Fig. 4;

Fig. 6 is a vertical section taken on line 6—6 of Fig. 5 but showing the device in a completely tightened position;

Fig. 7 is a view similar to Fig. 6 but showing the use of an additional insert piece;

Fig. 8 is a separate plan view of said additional insert piece of Fig. 7;

Fig. 9 is a top plan view of a second form of the invention;

Fig. 10 is a vertical section taken on line 10—10 of Fig. 9; and

Fig. 11 is a horizontal detailed section taken on line 11—11 of Fig. 10.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Figs. 1–6,

2

there is shown at numeral 1 a U-shaped clevis member, the spaced, parallel side walls 3 of which have aligned, open-ended slots as indicated at 5. This forms a lower jaw. In the bottom 7 of the clevis 1 between the walls 3 are openings 9 for threaded bolts 11 and 13. These bolts are freely slidable through the openings 9 and threaded into openings on opposite sides of a saddle member 15. Member 15 constitutes an upper jaw of cruciform shape which carries tongues 17 for sliding respectively in the slots 5. Thus it has in effect opposite arms adapted slidably to be admitted between the side walls and the slots, respectively. The bolt 11 has the end of its threads deformed as indicated at 19 so as to limit outward threading action from the saddle 15 (see Figs. 1, 2 and 4). The threads of the bolt 13 are not so deformed but this bolt is provided near the lower limit of its threads with a threaded collar 21. This collar is permanently staked in its downward position. Above the staked collar 21 the bolt is threaded through the side of the saddle 15 opposite bolt 11.

Operation of this form of the invention is as follows:

The assembly is mounted on the socket end 23 of an extension wrench 25. This is done by inserting the head 27 of the bolt 11 into the socket of the wrench. The wrench may have a handle long enough to reach several feet.

The assembly may then be hoisted up to a line wire 29, for example, with the upper jaw 15 in the dotted-line position shown in Fig. 2. The slots 5 will admit the wire 29 at their upper ends, thus allowing rotation of the upper jaw 15 to the solid-line position (Fig. 2) without corresponding rotation of the lower jaw 1.

The wrench socket 23 may then be withdrawn and applied to the head 31 of the other bolt 13 as indicated in Fig. 4 preparatory to screwing the bolt 13 into its respective opening in the upper jaw 15. Before or after the wrench is transferred from the head 27 to the head 31, the wire 33 to be connected with wire 29 is laid into the slot 5 of the lower jaw 1 as indicated in Fig. 3. Or, this may be done subsequently to the operation to be mentioned next. Then with the socket 23 applied to the head 31, the bolt 13 may be threaded and drawn up as shown in Fig. 4. At this time jaw 1 may move freely up on the bolt 11. Finally the wrench may be again applied to head 27 and bolt 11 tightened up as shown in Fig. 6.

Removal of the connector is accomplished reversely, that is, by backing off the bolt 11 and

then the bolt 13 and finally reapplying the wrench to the head 27 of bolt 11 for turning the upper jaw 15 from a solid-line position such as shown in Fig. 2 to the dotted-line position. This final step permits the lineman to bring the connector assembly into his possession without dropping it.

In Figs. 7 and 8 is shown an auxiliary conductor-spacing piece 35 to be employed if desired between the wires 29 and 33. This member has two grooves 37 for the wires and an eye 39 which permits it to be slipped over the bolt 13 (including the collar 21). The purpose of this piece is to allow a tight electric connection between wires without requiring the bend shown in Fig. 3. Some wires have thick insulation which requires a member such as 35. It is to be understood that the members may be used or not, as desired.

In Figs. 9–11 is shown another form of the invention consisting in a lower jaw-forming saddle 41 in which are unthreaded openings 43 and 45 for bolts 47 and 55, respectively. Bolt 47 is solid and threaded through one side of an upper jaw-forming saddle 51. It is deformed at its upper end as shown at 53 to prevent complete withdrawal from the saddle 51. This captive bolt 47 is a counterpart of captive bolt 11 in the first described form of the invention.

A second bolt 55, also threaded, passes through an opening 45 in the lower saddle 41 but it is not threaded therein. It is threaded to an opening on the opposite side of the saddle 51. This bolt 55 is also longitudinally slotted down to the base of its threads, as shown at 57. The upper end of the slot is blocked off by means of a stop pin 59. The threading cuts through the end of the pin 59 so that threading of bolt 55 into the saddle 51 is not interfered with. When the bolt 55 has been unthreaded from the saddle 51, it is free to slide down a certain distance through the lower opening 45.

The purpose of the pin 59 is to limit downward sliding as illustrated in Fig. 11, which shows a cross-section through the slot 57. As indicated at Fig. 11 the bolt 55 is surrounded by an unthreaded washer 61 having a tongue 63 extending into said slot 57. The washer is loosely held against the upper surface of the saddle 41 by means of tongues 65. These tongues 65 permit free rotation of the washer 61 but prevent its axial movement. Thus the washer may turn when the bolt 55 is rotated, due to the tongue 63 in the groove 57. However, it allows relative axial movement of the bolt 55. Also, whenever the bolt 55 is completely unthreaded from the upper saddle 53, it may slide down until the pin 59 strikes the tongue 63, which limits the downward sliding motion available. Thus bolt 55 is captive on the lower jaw.

Operation of this second form of the invention is similar to that of the first form. In open position, the bolt 55 is unthreaded from the upper saddle 51. The pin 59 rests on the tongue 63. The bolt 47 has been backed off, preferably its maximum distance. Then the assembly may be applied over a wire such as 67. The bolt 55 may then be pushed axially and then threaded through its hole in the saddle 51. Finally, after applying wire 69, the bolt 47 is tightened up to attain the position of parts shown in Fig. 10. Loosening may be accomplished by backing off the bolt 47 and then bolt 55 which finally drops down until pin 59 strikes tongue 63 but without leaving the assembly.

It will be understood that a device such as 35 may also be used in connection with the form of the invention of Figs. 9–11.

It will be noted that the members 1 and 15 in the case of the first form of the invention, and the members 51 and 41 in the case of the second form of the invention, in effect constitute paired upper and lower jaws, respectively. Also, one threaded bolt (11 or 47, as the case may be) is captive with respect to both jaws whereas the other bolt (13 or 55, as the case may be) is captive only with respect to the lower jaw.

It is to be understood that the device may be inverted for use, or applied at any angle.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

An electrical connector comprising a clevis-shaped jaw formed with spaced, parallel side walls having aligned, open-ended slots for receiving wires, a cruciform jaw having one pair of opposite arms slidably receivable between said walls and its other pair of opposite arms slidably receivable in said slots, a pair of headed bolts extending slidably through one of said jaws and threaded into the other jaw, said bolts being disposed on opposite sides of said slots, one of said bolts having means thereon remote from its head and outward from said other jaw for retaining it captive with respect to both jaws, the other bolt being freely threadable into and out of said other jaw and having means thereon intermediate said jaws for retaining it captive only with respect to said one jaw.

THEODORE BIRKENMAIER.

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