Nov. 27, 1934. E. T. HAGIST 1,982,212

SOLDERLESS TERMINAL CONNECTING DEVICE FOR ELECTRICAL CONDUCTORS

Filed Sept. 23, 1933

Fig. 1.

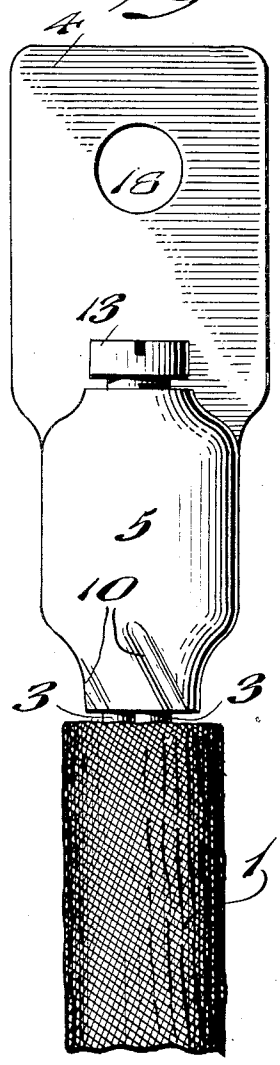


Fig. 2.

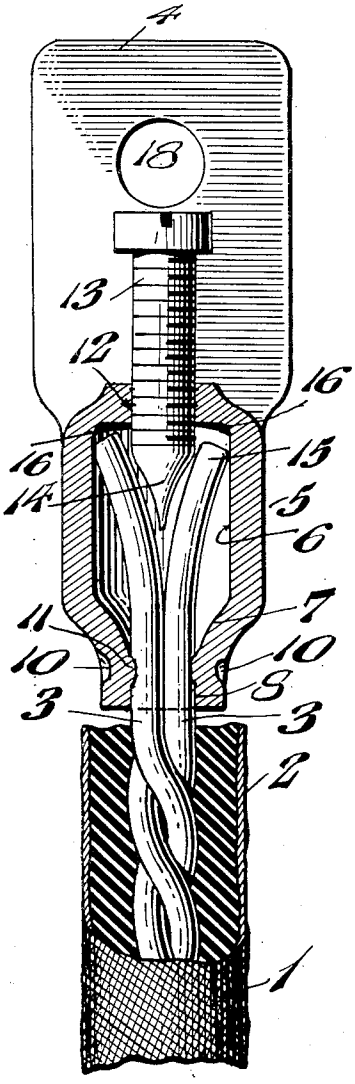


Fig. 3.

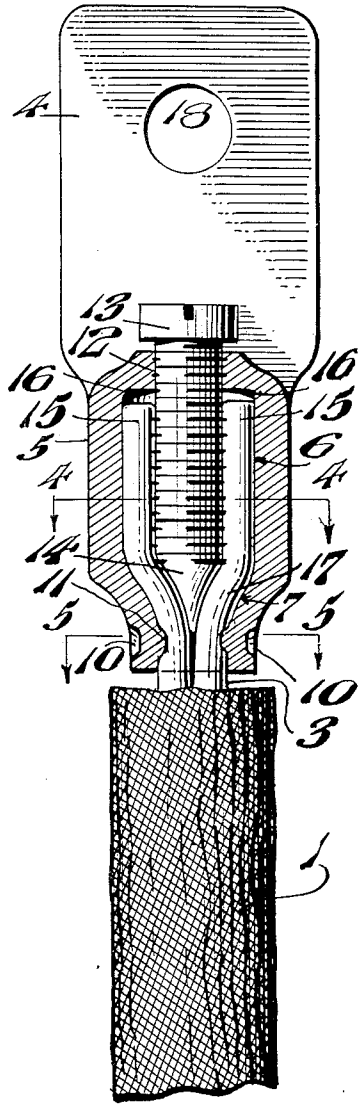


Fig. 4.

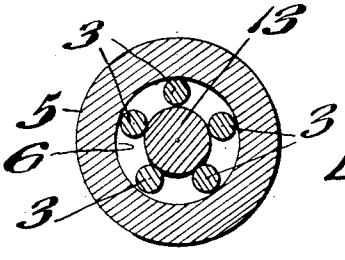
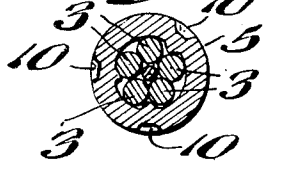


Fig. 5.



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SOLDERLESS TERMINAL CONNECTING DEVICE FOR ELECTRICAL CONDUCTORS

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3 Claims. (Cl. 173—269)

My invention relates to a new and useful terminal connecting device particularly adapted for connecting stranded electrical cables, whereby a detachable but nevertheless firm and positive mechanical and electrical connection is made without the use of solder or other "permanent" means.

In connecting the ends of electrical cables to terminal lugs it has heretofore been the practice to employ a tubular lug of a generally cylindrical formation, into which the end of the cable to be connected is inserted, where it is retained by being soldered in position. Due to the weight of such cables and the tension under which they are used, the operation of soldering the end of the cable in the tubular lug is a difficult one and the strength of the connection as well as the efficacy of the electrical contact depends entirely upon the extent to which the outer surface of the end of the cable inserted into the tubular lug is soldered to the inner surface of said tubular lug. In order to ascertain the strength of a connection of this type, it is necessary to subject the cable to a test by attempting to pull the cable out of the lug, and in the event that the cable should part from the lug it is necessary to resolder the connection, thus wasting a great deal of time. Imperfectly soldered connections which nevertheless might withstand the test to which the cable is subjected may pull or fall apart in actual service, thus causing a short circuit and resulting in a hazard to persons and property. Furthermore, even if the cable should not part from the lug, but if, nevertheless, the soldered connection is not a perfect one, an undue resistance is set up in the circuit, thus causing loss of power and resulting in heat which may be conducted into the fusible element of the device on which the terminal is mounted, thus causing the fuse to blow out at less than its normally rated capacity, thereby resulting in unnecessary interruption of service as well as pecuniary loss and inconvenience.

It is, therefore, the principal object of my invention to overcome the foregoing and other difficulties and risks by providing an efficient and simple connecting device which will produce positive mechanical grip as well as complete electrical contact without the use of solder or other materials heretofore used in making such connections.

Another object of my invention is to produce a connecting device of this type which, while providing better grip and better contact, is less expensive to make and install than the conventional expedient of soldering the connections.

A still further object of my invention is to produce a connecting device which will permit of rapid connection and disconnection of the cable terminal from the lug mechanically without the necessity of special preparation as would be the case in disconnecting a soldered connection.

A still further object of my invention is to produce a connecting device which can be applied by the workmen in the field by the use of a simple tool, such as a screw-driver, thereby eliminating the cumbersome equipment heretofore carried when making such connections, such as the necessity of carrying a blow-torch or other equipment necessary for the melting and applying of solder.

My invention still further relates to other novel features of construction and advantage, all as hereinafter described and claimed in connection with the accompanying drawing in which:

Fig. 1 represents a side elevation of a connecting device embodying my invention shown applied to the terminal of a conventional cable.

Fig. 2 represents a view similar to Fig. 1, certain parts being shown in section illustrating the internal construction before the fastening of the end of the cable to the lug.

Fig. 3 is a view similar to Fig. 2 showing the end of the cable completely fastened to the lug.

Fig. 4 represents a section on line 4—4 of Fig. 3.

Fig. 5 represents a section on line 5—5 of Fig. 3.

Referring to the drawing in which like reference characters designate like parts, 1 designates a conventional electrical cable having the insulation 2 and the inner interwoven strands 3. 4 designates a supporting member which may be of any desired size or cross-section and which carries the hollow lug 5 which consists of the substantially cylindrical section 6 and the forwardly converging or tapering neck or reduced portion 7 which again terminates in the substantially cylindrical portion 8. The cylindrical portion 8 is of a diameter sufficient to permit of the insertion therethrough of the stripped strands 3 in their intertwined position and after the insulation 2 has been removed. The cylindrical portion 8 is crimped or indented spirally, as shown at 10, to produce the inner spiral projections 11, the direction of the crimping or grooving to produce the inner projections or ribs 11 being coincident with the direction of the twist or intertwining of the strands 3 forming the cable 1. The opposite end of the lug 5 is provided with the hub 12 which is internally threaded to engage the screw 13. The

screw 13 is also provided with a tapered end 14 which serves the purpose hereinafter set forth.

In using my novel connector the stripped or bare strands 3 are inserted into the hollow lug 5 until the upper edges 15 thereof are about to abut against the shoulder 16 of the lug 5. With the cable held in this position the screw 13 is turned by means of a screw-driver, or the like, to force the tapered pointed portion 14 thereof in between the strands 3 of the cable 1, as best seen in Figs. 2 and 5. As the screw 13 progresses it deflects the strands 3 from the position shown in Fig. 2 to the position shown in Fig. 3 wherein the strands 3 are tightly wedged between the shank of the screw 13 and the cylindrical or rectilinear portion 6 of the lug 5. In this position the threads of the screw 13 bite into the strands of the wire 3, thus establishing a firm mechanical and positive electrical contact. At the same time the tapered portion 14 of the screw 13 binds against the correspondingly deflected portions 17 which are wedged between the tapered portion 14 of the screw 13 and the tapering or neck portion 7 of the hollow lug 5. The ribs 11 during the operation of tightening the screw 13 wedge between the strands 3 and prevent the slipping or rotation thereof during the turning of the screw 13 or the turning or slipping of said strands due to external forces while the cable is in service, thus producing a more permanent connection. The deflected portion 17 of the cable 3 also serves to reinforce the connection against any rectilinear tension further to safeguard against the possibility of the cable pulling out of the lug. It will thus be seen that by means of the lug 5, with its narrowed or reduced portion 7, its cylindrical portion 8, as well as the spiral ribs 11, I have produced a connecting device which is secured to the end of a cable by means of the screw 13 so as to produce a connection which is permanent and yet detachable and one which affords positive and complete electrical contact by the wedging of the strands against the entire surface area of the lug 5, as shown in Fig. 3, together with the biting of the screw 13 into the strands and the threaded engagement of said screw with the upper portion of said lug. It will further be seen that the deflected portion 17 of the strands 3 wedged as they are against the reduced portion 7 of the lug 5 serves to prevent the cable from pulling out of the lug under any condition and that the spiral ribs 11 serve to prevent the rotation of the strands during the turning of the screw 13, thus facilitating the making of the connection and guarding against the accidental loosening thereof in service due to external forces. It will also be seen that the workmen making the connection need have no more than a screw-driver with which to turn the screw 13 and that by this means the cumbersome equipment and paraphernalia required for the making of soldered connections is entirely eliminated. The screw 13 and/or the lug 5 may be made of material that has a high coefficient of conduction or may be made of insulated material, as may be desired. The biting of the screw 13 into the strands 3 during the application of the connecting device exerts a pull on the strands in a direction opposite to the direction of the movement of the screw itself, thus facilitating the making of the connection and offsetting any tendency on the part of the strands to be pushed out of the lug 5 during the turning of the screw 13. The supporting plate or member 4 may be provided with a suitable aperture 18 which would permit the fastening together of two cables by means of a rivet, or the like, passing through the apertures 18 of two superimposed supporting members 4 or for securing or fastening of the support 4 to any other desired point.

While I have shown and described the grooves 10 and corresponding ribs 11 as oblique or spiral, it is to be understood that it is within the scope of my invention to make these grooves and ribs rectilinear or of any other desired contour which in practice may prove advantageous.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A connecting device for electrical conductors, comprising a body portion having an internally threaded hub at one end thereof, and an internally cylindrical unthreaded inlet at the other end thereof, said inlet merging into an inwardly flaring portion which merges into an enlarged internally cylindrical chamber, in combination with a screw adapted to engage said hub, said screw comprising a cylindrical threaded shank adapted to cut a thread into and thus engage strands of wire inserted into said cylindrical chamber through said inlet and having an unthreaded tapering end portion adapted frictionally to press the corresponding portions of said strands against said inwardly flaring portion.

2. A connecting device for electrical conductors, comprising a body portion having an internally threaded hub at one end thereof, and an internally cylindrical unthreaded inlet at the other end thereof, said inlet merging into an inwardly flaring portion which merges into an enlarged internally cylindrical chamber, in combination with a screw adapted to engage said hub, said screw comprising a cylindrical threaded shank adapted to cut a thread into and thus engage strands of wire inserted into said cylindrical chamber through said inlet and having an unthreaded tapering end portion adapted frictionally to press the corresponding portions of said strands against said inwardly flaring portion, there being an inwardly extending rib formed on the inner surface of said inlet.

3. A connecting device for electrical conductors, comprising a body portion having an internally threaded hub at one end thereof, and an internally cylindrical unthreaded inlet at the other end thereof, said inlet merging into an inwardly flaring portion which merges into an enlarged internally cylindrical chamber, in combination with a screw adapted to engage said hub, said screw comprising a cylindrical threaded shank adapted to cut a thread into and thus engage strands of wire inserted into said cylindrical chamber through said inlet and having an unthreaded tapering end portion adapted frictionally to press the corresponding portions of said strands against said inwardly flaring portion, there being an inwardly extending spiral rib formed on the inner surface of said inlet.

EMIL T. HAGIST.