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TERMINAL CONNECTOR

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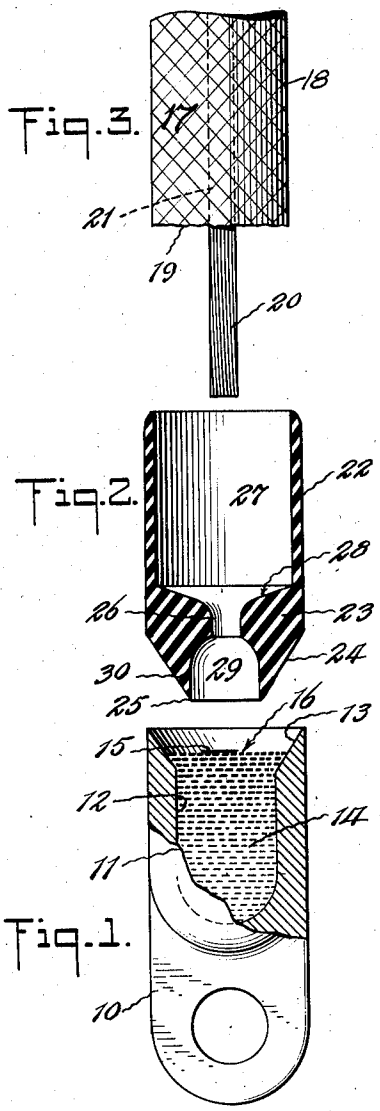


Fig. 3.

Fig. 2.

Fig. 1.

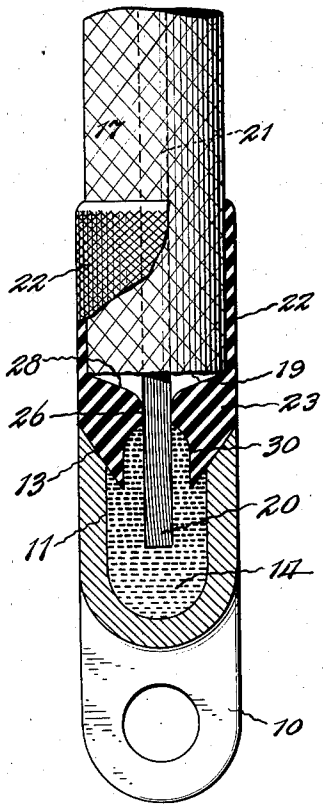


Fig. 4.

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TERMINAL CONNECTOR

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3 Claims. (Cl. 173—269)

The invention relates in general to the art of permanently connecting an insulated cable electrically and physically to another conductor lug or similar article in wiring installation of general application, and specifically relates to the soldering of an electric conductor to a lug or terminal.

The primary object of the invention is to provide a simplified and easily practiced, and thus economic, technique in fastening a cable positively and permanently to a lug or other associated article.

Another object of the invention is to provide a simple form of connector between a cable and an associated article which will provide a positive, secure and neat connection between the cable and the article. Among the other objects of the invention is to provide a form of connector, the component parts of which can be easily and economically fabricated, which will effectively insulate the joint between the cable insulation and the article, and which will tend otherwise to minimize fire hazards. The invention features a device which will have all the advantages, such as permanency of connection, inherent in a soldered connection and at the same time will provide a neat, finished appearance to the jointure of the cable with the lug or other article to which it is connected.

Broadly, I attain this invention by employing in addition to the cable only two elements, one of which is the article to which the cable is to be connected and utilizing a body of solder housed in the article, not only to provide the usual electric connection between the cable conductor and article but additionally for the purpose of securing to the article an insulating socket or cap for protecting the adjacent end of the cable insulation, and further utilizing the cap in a pressure engagement with the solder to insure a clamping of the solder in firm engagement with the bared end of the cable conductor.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawing and in part will be more fully set forth in the following particular description of one form of device embodying the invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawing:

Figs. 1, 2 and 3 constitute an exploded view of the component and prepared parts prior to their being assembled in a finished structure constituting a preferred embodiment of the invention:

Fig. 1 is a view partly in vertical section of a lug constituting a symbolic showing of any article to which an electric cable is to be connected and showing the same in position with a pool of hot solder contained in a pocket;

Fig. 2 is an axial sectional view of a cap for the end of a cable and located in position about to be intruded into the pocket of Fig. 1 when located on the end of the cable of Fig. 3;

Fig. 3 is a view in side elevation of an end of an insulated cable stripped back to form an end adapted to receive the cap of Fig. 2; and

Fig. 4 is a view largely in axial section of the completed device formed of the elements illustrated in Figs. 1, 2 and 3.

In the drawing, there is disclosed a lug 10 of metal or similar conducting material, it being understood that the lug is representative of any metal article intended to be connected to an electric cable. Considering the parts as illustrated in the separated showings in Figs. 1, 2 and 3, the upper end of lug 10 is recessed to provide an open top pocket or solder recess 11. The inner wall 12 of the pocket is inwardly bevelled at its upper end to provide a frustro conical seat 13. The pocket is designed to receive a pool 14 of hot solder or other initial fluid, self-hardening, fastening material, preferably, a material which will provide an electric connection between the cable conductor hereinafter described and the lug 10. An amount of solder is introduced into the pocket in forming the pool 14 so that it is in volume sufficient substantially to fill the pocket when the parts are finally assembled as shown in Fig. 4.

In order to gauge the amount of solder which must be initially introduced into the pocket an indicating line 15 is formed on the inner wall 12 to indicate the initial level 16 of the solder required to fill the finally formed closed pocket.

Referring to Fig. 3, there is shown an electric cable 17, the insulation 18 of which has been stripped back to form an end 19 leaving exposed an end 20 of the cable conductor 21. It is a feature of this disclosure that no particular care need be exercised in providing a neatly formed end at 19, it being immaterial whether or not there be present any frayed ends of the insulation.

Fitted more or less snugly on the stripped back end of the cable is a cap 22 formed of "Bakelite," rubber or other insulating material. The cap is provided at one end with a head 23, the outer end of which is of conical form with its tapered wall 24 having the inclination to the axis substantially

equal to that of the seat 13 so as to provide a snug interfitting engagement between the cap and the lug when the cap is finally seated on the lug. The conical nose thus formed at the lower end of the cap forms an annular wedge 25 designed to intrude into the solder pool 14 as hereinafter described.

The upper position of the cap 22 is of sleeve-like form and the cap is provided with a bore extending axially therethrough. This bore includes a constricted portion 26 of a diameter sufficient to receive the bared conductor 20 which closes the constricted opening more or less completely. The bore is enlarged upwardly of the constricted portion to provide a cylindrical recess 27 of a size to fit snugly but slidably on the insulation of the cable. The lower end of the recess 27 is defined by a stop wall 28 in this case slightly inclined inwardly and downwardly towards the constricted portion 26 and which stop wall 28 is designed to limit the intrusion of the cable into the cap or more accurately expressed, to limit the advance of the cap onto the prepared end of the cable.

The lower portion of the bore through the cap is enlarged from the constricted portion 26 to form a hollow dome-shaped cavity 29 at the lower end of the cap. The wall 30 outlining the side of the cavity 29 coacts with the bevelled wall 24 to form a sharp edge 31 to the annular wedge 25.

In preparing to assemble the parts of the device thus described, the cable end is formed by stripping back the insulation 18 to a distance necessary to provide for the requisite length of the exposed conductor 20. The cap is then placed on the end of the cable as by a relatively upward movement of the cap from the position shown in Fig. 2 until the end 19 of the insulation is stopped by the wall 28. The inclination of this wall 28 will assist in guiding the conductor 20 through the constriction 26 and into and through the cavity 29. The more or less frictionally tight engagement of the cap will tend to hold the cap in position on the cable for the time being.

The lug is then held in position with the pocket facing upwardly and hot solder is poured into the pocket until it reaches the level indicating line 15.

The cable with its capped end is then lowered with the wedge 25 in advance moving downward relatively from the Fig. 2 position towards the final position shown in Fig. 4 until the conical faces at the upper end of the lug 10 and the lower end of the cap interengagement and seat one in the other. During the final lowering movement of the cap, the edge 31 dips into the fluid solder causing the same to rise into the cavity 29 and up about the outer side of the wedge 25. As the cap closes onto its seat, there is developed a pressure on the solder which in turn, causes the solder to more firmly grip the conductor 20 and thus tend to establish a positive electric connection between the cable conductor and the solder and also, of course, to enhance the physical and electrical connection between the solder and the walls 12 and 30 defining the eventually closed pocket as shown in Fig. 4.

By means of a device such as is herein disclosed it is possible to provide an insulating cap or socket which can be quickly applied to the cable and which will effectively house the end of the cable and thus minimize the possibility of fire in the case of a loose connection in the presence of frayed or loose insulation covering of cotton, braid or fabric on the cable. There is also provided a clean appearance to the joint so formed even where there is a necessity for tinning. The device tends to minimize leakage of high potential along the surface of the insulation should the same become moistened.

It sometimes happens that when the capped cable end is intruded into the hot solder, the lower end of the cable insulation softens and often melts with the result that some of this insulation runs down the conductor 20 and into the solder. This tends to reduce the adhesion between the solder and the conductor. This is avoided in the illustrated form of the present disclosure, due to the fact that the constriction at 26 is more or less closed by the conductor, thus trapping any fluid in the pocket above the wall 24.

The heating of the intruded end of the cable by the heat conductor up through the conductor 20 from the hot solder has an advantage in that it tends to cause the cable insulation to distend and expand into permanent bending engagement with the inner wall of the recess 27 and thus locks the cable to the cap. In this way any strain on the device incidental to bending the cable will be contributed over the larger area at the cap rather than at the smaller area defining the juncture of the bared end of the conductor with the solder.

While the preferred final construction shows the solder up to the construction, it is understood that there is no necessity of completely filling the cavity 29 with solder.

The device is formed primarily of two elements in addition to the cable, and one of the elements may be the lug or other equivalent article of commerce to which cables are to be connected. These coacting parts are of simple construction and can be readily manufactured with standard machinery and with dies of the type now in use for manufacturing similar devices.

The assembly is free of screw connections, is free of any necessity for refined machining operations and is free of any securing means, except that provided by the solder. The solder when it hardens locks the lug to the conductor and the cable hold to its conductor locks the cap to the lug. Considering the arrangement in Fig. 4, the lug 10 cannot be lowered away from the cable because a pull on its conductor would simply cause the cable end 19 to press more firmly against the stop wall 28. The cap 22 cannot be elevated towards the cable because it is limited in this direction by the stop wall 28 and cannot be lowered because of the pressure of the lug 10. It is thus seen that the solder forms in effect an enlargement at the lower end of the conductor which coacts with the enlargement provided by the cable insulation to hold the head 23 in that position which it occupies on the hardening of the solder.

The device also has the advantage of facilitating the axial alignment of the intruded end of the cable 17 and the exposed end of its conductor 20 relative to the axis of the lug 10 so that the lug will form in effect a centered continuation of the cable. Differently expressed, the lug aligns the cap and the cap aligns the cable so that all parts of the connector are automatically set in axial alignment simply by the insertion of the cap into the pocket end of the lug.

While there have been shown, described and pointed out in the annexed claims, certain novel features of the invention, it will be understood that various omissions, substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled

in the art without departing from the spirit of the invention.

We claim:

1. In the art of uniting an article provided with a solder containing pocket to an insulated cable having one end of its conductor exposed and which cable has a cap slidably mounted thereon with a head fashioned to intrude into the pocket and provided at its intruded end with a cavity, the method which consists in holding the article with its pocket upwardly exposed, forming in the pocket a pool of soft, self-hardening solder to a predetermined level substantially but not completely filling the pocket, locating said end of the cable with its cap above the article, forcing the exposed end of the conductor and the head axially downwardly into the pool of soft solder, to close the pocket and to displace some of the solder to force the solder upwardly into the cavity and into snug engagement with the end of the conductor so intruded therein to a point above said pool level, and holding the article, cable and cap so located until the solder hardens.

2. A terminal for an electric cable comprising two telescopic members, one constituting a lug of conducting material having a solder receiving recess in one end, and having a frusto-conical seat outlining the upper portion of the recess, a pool of liquid solder in said recess initially having its level not lower than the bottom of the seat, the other member being tubular and having at one end thereof a cone-like nose adapted to fit on said seat and fashioned to intrude telescopically into the recess to intrude into the solder therein during the assembling of the terminal and said other member having the end of its bore at the nose enlarged to form a cavity into which the solder is pressed upwardly from the recess by the nose.

3. An electric cable terminal comprising the end of an insulated cable having a bare cable conductor projecting beyond its insulation, a cap having a bore extending therethrough and providing at one end an enlarged recess into which the insulated cable end is intruded, said bore including a constricted portion of a diameter to receive the bare conductor which substantially closes the constricted opening, a lug provided with an open top recess outlined at its upper end by a frusto-conical seat, a pool of liquid solder in the recess and initially filling the same to a level just below its open top, the lower end of the cap having the constricted bore being of frusto-conical form intruded into the open top of the recess and telescopically fitting said seat to form a closure for the recess, and said cap when so seated intruding the bare conducting into the pool, and said cap as it moves down into its seated position acting on the liquid solder in the pool to elevate the same to insure a clamping of the solder in firm engagement with the bared end of the cable conductor at the constricted portion of the bore of the cap.

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