United States Patent [19]

Sedlacek

[11] **3,761,866**

[45] **Sept. 25, 1973**

[54] **CLIP TERMINAL**

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[73] Assignee: **Reliable Electric Company,** Franklin Park, Ill.

[22] Filed: **Oct. 6, 1971**

[21] Appl. No.: **186,916**

[52] **U.S. Cl.** ..... **339/97 P**

[51] **Int. Cl.** **H01r 11/20**

[58] **Field of Search** 339/95, 97–99

[56] **References Cited**

UNITED STATES PATENTS

3,605,071	9/1971	Sedlacek	339/97 P
3,521,221	7/1970	Lenaerts et al.	339/97 P

Primary Examiner—Joseph H. McGlynn

Attorney—Roy H. Olson et al.

[57] **ABSTRACT**

A clip type terminal for engaging an insulated solid conductor has a body with a notch and a narrower conductor-receiving slot at the base of the notch. The notch and slot divide the body into parallel arms that are cantilevered from a common base. The bottom of the notch has opposed coplanar edge portions that intersect the sides of the slot and the sides of the notch each at right angles, whereby those edge portions provide cutters that slice insulation from an insulated conductor that is forced from the notch into the slot.

6 Claims, 5 Drawing Figures

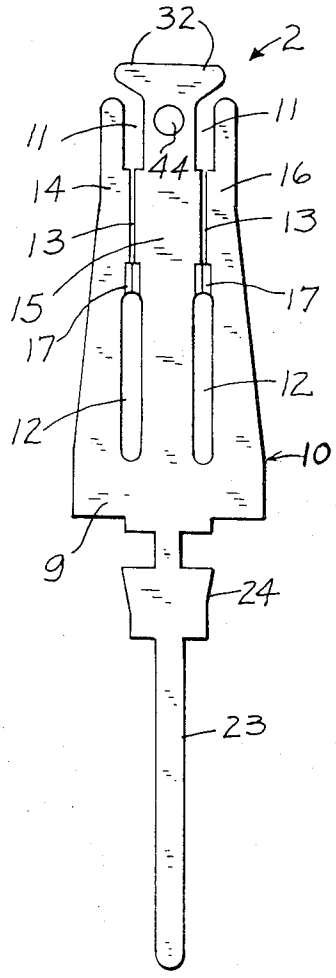


FIG. 1

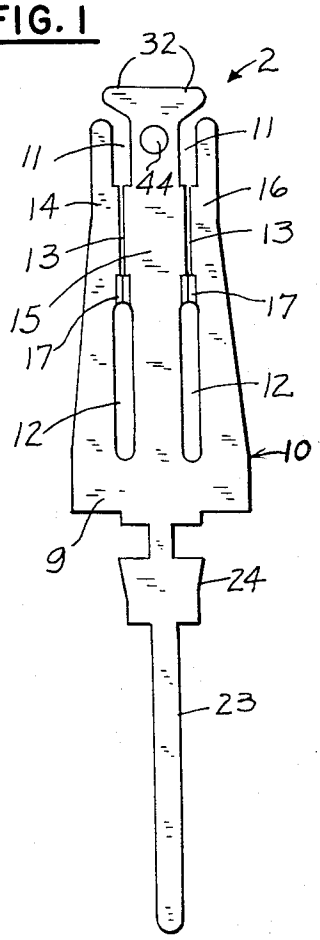


FIG. 2

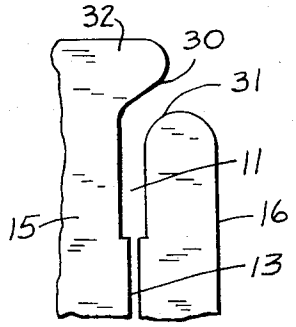


FIG. 3

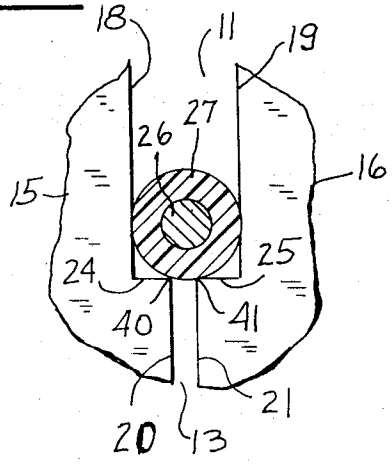


FIG. 4

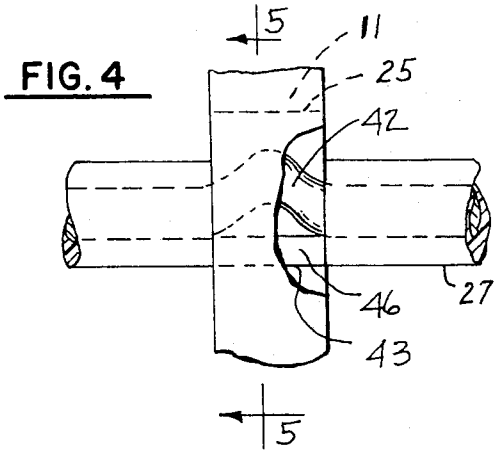
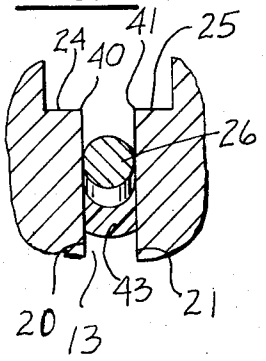


FIG. 5



CLIP TERMINAL

BACKGROUND OF THE INVENTION

This invention relates to an improved clip type terminal for receiving an insulated wire to make electrical contact therewith.

The clip terminal of the type with which the present invention is concerned is a flat piece of metal having at least two integrally formed resilient arms which provide one or more conductor-receiving slots. The insulated wire is forced into a slot, which is of a width considerably less than the diameter of the conductor. Inserting the conductor into the slot results in a penetration of the insulation so that electrical contact is obtained between the slot edges and the conductor. In prior art clip type terminals, the entry to the slot is a V shape which causes the insulated wire to exert a camming action to force the arms apart. Such an arrangement does not always cleanly cut the insulation around the wire. Moreover, in the production of such terminals inaccuracies in locating the slot relative to the notch may impair the performance of the terminals as respects the removal of the insulation.

OBJECTS OF THE INVENTION

An object of this invention is to provide, between the arms of the terminal, a slot entry which has been found to strip away the insulation cleanly from the surface of the conductor and make good electrical contact with the conductor. For this purpose there is provided at the upper end of the slot opposed 90° corner edges. As the insulated wire is forced between the corner edges, a square notch is cut in the insulation. At the same time the resilient arms are forced apart by the camming action of the movement of the conductor so that electrical contact is made with the surface conductor.

A further object of the invention is to provide a clip terminal in which the arms have parallel edges that define side portions of a notch that is wider than said slot for receiving the insulated conductor. The base of the notch is defined by straight coplanar edge portions that intersect the side portions of the notch and the side portions of the slot substantially at right angles to each such that those straight edge portions provide spaced, opposed insulation-slicing cutters running at right angles to the longitudinal axis of an insulated wire passing from said slot into said notch. Those straight edges and the edges of the slot define the aforesaid 90° corner edges. Thus, knife edges are disposed at right angles to the axis of the insulation for maximum cutting efficiency. This is in contrast to tapered or inclined knife edges.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is an elevation of one type of clip terminal constructed in accordance with the invention;

FIG. 2 is a fragmentary portion of the upper end of the clip terminal of FIG. 1 on an enlarged scale;

FIG. 3 is a fragmentary enlargement of a portion of FIG. 2 showing the relationship of an insulated wire to the notch and the slot of the terminal;

FIG. 4 is a side elevation, partially broken away, of the insulated wire in the clip terminal; and

FIG. 5 is a fragmentary section along line 5—5 of FIG. 4.

DETAILED DESCRIPTION

Referring now to the drawing, there is shown a clip terminal **2** that comprises a flat body portion **10** of resilient metal having two notches **11, 11** at its upper part and two somewhat longer apertures **12, 12** at its lower part. A straight slot **13** connects a notch with an aperture, thus providing three resilient arms **14, 15** and **16,** the center arm **15** being wider than the other two arms **14, 16.**

The slots **13** are formed by a shearing of slitting operation after which portions adjacent to the apertures **12, 12** are upset or coined at **17.** This forces the end arms **14** and **16** away from the middle arm **15** to an extent such that the width of each slot **13** immediately adjacent the portion **17** is about 0.002 inches, and the width of the upper end of each slot is 0.009 to 0.012 inches. The slitting operation makes the edges **20, 21** of the slots **13** sharp and square.

There is thus provided a clip terminal in which the arms **14, 15, 16** are each cantilevered from a common base part **9** of the body **10.** Also, each adjacent pair of arms includes the facing edges **20, 21** defining the sides of the conductor-receiving slot **13.** This slot **13** is narrower than the conductor to be received therebetween.

Each notch **11** is wider than the slot **13** for receiving a wire conductor **26** with insulation **27** thereon. The bottom of each notch **11,** namely the part of the notch that is adjacent to the slot **13,** has straight edge portions **24, 25** that are of equal length and are coplanar and intersect the slot edges **20, 21** at right angles so as to provide 90° corner edges **40, 41** at the entrance of the slot **13.** These straight edge portions **24, 25** provide opposed insulation-slicing cutters running at right angles to the longitudinal axis of the insulated wire **26** passing from the notch **11** into the slot **13.** The sides **18, 19** of the notch **11** are preferably parallel and are also at right angles to the straight edge portions **24, 25** at least where they intersect the edge portions **24, 25.** The spacing of the sides **18, 19** may be about 0.030 inches.

The extreme upper notch edges at **30, 31** may be either parallel or downwardly converging. Lateral extensions **32, 32** on the middle arm **15** cooperate with the rounded top of each of the outer arms **14** and **16** to facilitate entry of an insulated wire where the total wire diameter exceeds the notch width. The lower end of the body portion **10** may include a terminal end **23** to permit a soldered connection or a wire wrapped connection, and a tab **24** for securing the clip to a holder, as by wedging. In the alternative, a plurality of two clip terminals could have a common base portion.

The body portion **10** is preferably formed from spring tempered phosphor bronze strip alloy No. A having a thickness of 0.044 inches. After the stamping, slitting and upsetting operations are performed, the clip may be heat treated at 450° F for one hour for stress relief. Then the clip is electroplated with tin or other suitable metals.

As the insulated wire **26** is forced between the corner edges of the slot **13,** the edges **40, 41** in cooperation with knife-like edge portions **24,25** cut a square notch in the insulation **27.** However, when the wire **26** comes in contact with the corner edges **40, 41,** the arms will yield sufficiently to permit entry of the metallic conductor wire **26** into the slot **13** since the width of the slot at the corner edges is less than the diameter of the wire **26.** The operation is such that the edges **24, 25**

scrape or shear the insulation cleanly from the surface of the wire, thus providing good electrical contact between the wire **26** and each slot edge **20, 21** over the full width of the clip terminal. The fact that the edges **24, 25** are perpendicular to the axis of the wire **26** rather than being beveled or tapered enhances the efficiency of the insulation cutting.

FIGS. **4** and **5** show the wire conductor **26** in the clip terminal. Opposed square notches **46** are cleanly cut in the insulation on opposite sides of the wire. Generally an upwardly dissection **43** of insulation remains. A slight flattening of the wire **26** may also take place where the wire engages the edges **21, 21.** In addition the force of inserting the conductor may result in a bending of the wire as shown at **42,** particularly where smaller sizes of wires are used.

The center arm **15** may also be provided with a locator boss **44** intermediate the notches of the adjacent arms. This boss **44** may be used in conjunction with a tool of the type shown in my copending application Ser. No. 827,013, filed May 22, 1969, now U.S. Pat. No. 3,605,071, for the purpose of inserting an insulated conductor into a notch **11.**

I claim:

1. A clip terminal of the insulation-removing type comprising a flat body that includes two opposed resilient arms that are eacn cantilevered from a common part of the body, said arms having facing edges defining side portions of a conductor-receiving slot that is narrower than the diameter of a conductor to be received thereby, said arms having parallel edges that define side portions of a notch that is wider than said slot for receiving a conductor with insulation thereon, said slot extending from one end of said notch, said one end of said notch being defined by straight edge portions that intersect said side portions of the notch and said side portions of the slot substantially at right angles to each and run for the full distance between said side portions of the notch and said side portions of the slot such that said straight edge portions provide spaced, opposed insulation-slicing cutters running at right angles to the longitudinal axis of an insulated wire that is forced from said notch into said slot.

2. A clip terminal according to Claim **1** in which said straight edge portions are substantially of equal length.

3. A clip terminal according to Claim **1** in which said straight edge portions lie in substantially the same plane.

4. A clip terminal of the insulation-removing type comprising a flat body that includes two opposed resilient arms that are each cantilevered from a common part of the body, said arms having parallel edges defining side portions of a conductor-receiving slot that is narrower than the diameter of a conductor to be received thereby, said arms having parallel edges that define side portions of a notch that is wider than said slot for receiving a conductor with insulation thereon, said slot extending from one end of said notch, the end of said notch being defined by substantially straight edge portions that intersect said side portions of the slot at sharp angles not greater than substantially 90° such that the last-mentioned edge portions provide spaced opposed insulation-splicing cutters running substantially at right angles to the longitudinal axis of an insulated conductor for removing insulation from such insulated conductor passing from said notch and into said slot.

5. A clip terminal according to claim **4** further including mechanically deformed regions on said arms adjacent to said slot and remote from said notch to space the arms a predetermined distance apart at said slot.

6. A clip terminal according to claim **4** including a third resilient arm, the three arms being in the same plane and there being a slot and a notch as aforesaid between the centermost arm and each adjacent arm.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,761,866 Dated September 25, 1973

Inventor(s) William S. Sedlacek

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

The term of this patent subsequent to September 14, 1988,

has been disclaimed.

Signed and Sealed this

Twenty-seventh Day of July 1976

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks