

April 11, 1950

H. A. MILOCHE
ELECTRICAL TERMINAL

2,503,559

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FIG. 1.

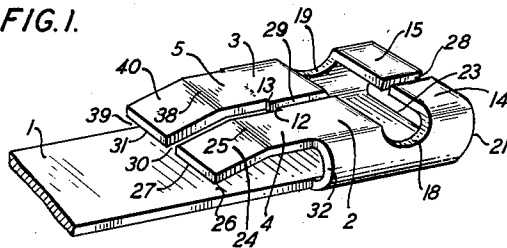


FIG. 2.

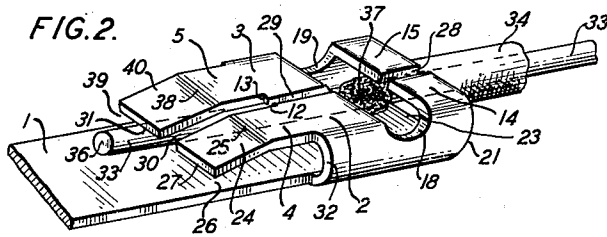


FIG. 3.

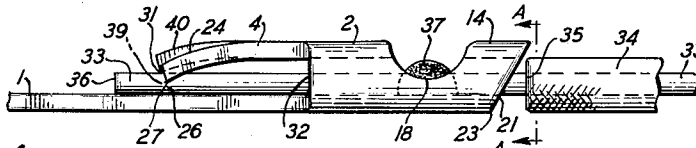


FIG. 4.

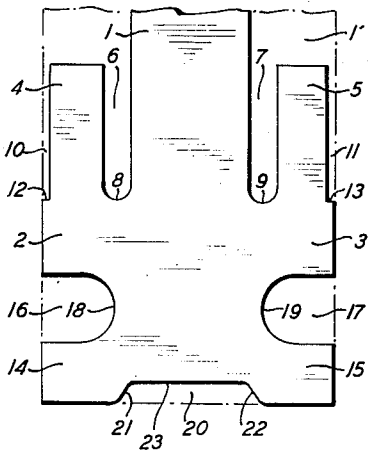


FIG. 5.

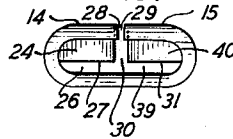


FIG. 6.

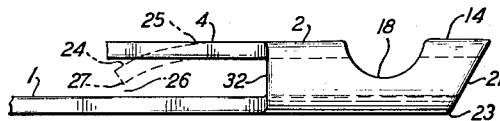
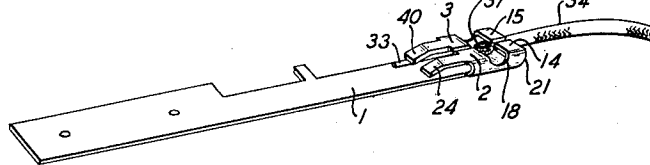


FIG. 7.



INVENTOR
H. A. MILOCHE
BY *J. W. Schmied*
AT TORNEY

UNITED STATES PATENT OFFICE

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ELECTRICAL TERMINAL

Herman A. Miloche, Teaneck, N. J., assignor to
Bell Telephone Laboratories, Incorporated, New
York, N. Y., a corporation of New York

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4 Claims. (Cl. 173—363)

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This invention relates in general to electrical connectors and is particularly adapted to relay electrical terminals.

The great extent to which relays are used today requires a constant vigilance for means of obtaining a reduction of cost in connection with the installation or the maintenance of relay apparatus. Any new devices or apparatus which satisfy this problem by contribution to its solution are recognized in the art as being substantial advancements therein.

The present most commonly used type of relay spring contact terminal takes the form of an end extension of the spring contact, having a hole punched therein. The method of connecting an insulated wire to this terminal is, in short, to strip the insulation from this wire for about $\frac{1}{2}$ " to $\frac{3}{4}$ " back from the end, to thread the bare end through the hole in the terminal, to twist the free end of the wire back over the end of the terminal, to hold the wire while soldering the wrapped wire to the terminal and to snip off the excess free bare wire beyond the soldered connection. In order to disconnect the wire, it is necessary to unsolder the bare wire and untwist it out of the hole. Succeeding connections and disconnections of the same wire would necessarily be made with a hindrance in the form of a shorter and a deformed wire.

There are some inherent problems presented by the above method which are all traceable to the type of terminal employed. It is always desired in this type of terminal connection to reduce the time and effort required to make such a connection, to eliminate tools, to facilitate successive connection and disconnection and to eliminate the wasting of wire due to the snipping operation and to eliminate the potential apparatus trouble represented by these flying bits of wire, which are a prolific source of trouble in causing short circuits and other similar inoperative or defective conditions.

By the use of the old type of terminal, the maintenance operator must insert, twist and hold. By the use of the invention herein described, the operator making the connection need only insert, and requires no more time to insert than previously. Consequently, there is a considerable saving in time and effort in this respect alone.

By using the old type terminal a person, in order to make successive connections and disconnections of the same wire, is confronted with an ever shorter wire due to the snipping operations and with an ever twisted and deformed end. Both of these conditions are conducive to making

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these successive operations more difficult. In addition, the snipping operation allows bits of wire to fly into adjoining apparatus as a potential threat to breakdown of that apparatus. The new terminal described herein requires no bending or twisting of the conductor and no snipping of loose ends and so not only prevents waste, but permits almost unlimited successive connecting and disconnecting of the same wire without deforming the wire or jeopardizing the operation of adjacent apparatus. In addition, the elimination of the snipping operation, of course, allows elimination of one tool required for the former type operation.

By the use of the old type of terminal, it is difficult to disconnect one wire from the terminal when more than one have been twisted thereon and soldered thereto about each other. The use of the invention herein described makes this operation relatively easier, since the wires so connected or disconnected are so done substantially independently of each other.

All of the foregoing features and advantages, as well as others, will be apparent from the following detailed description which makes reference to the following drawing, a part thereof, in which:

Fig. 1 shows an oblique view of the terminal with no attached conductors;

Fig. 2 illustrates one insulated conductor in proper connection to the terminal, showing a soldered connection of the conductor to the body of the terminal;

Fig. 3 is a side view of the illustration in Fig. 2;

Fig. 4 indicates the type of cuts necessary to be made in a blank in order to form such a terminal as illustrated in Fig. 1;

Fig. 5 is an end view of Fig. 3 along the direction A—A, with the conductor removed, showing the general nature of the cross-section of the terminal;

Fig. 6, solid lines, indicates the result of the first required folding operation in making the terminal of Fig. 1 from the cut-out blank of Fig. 4, the dotted lines indicating the bending of the finger portions, which may be done at the time of punching out the blank, as in Fig. 4; and

Fig. 7 shows the invention employed in its preferred manner as an integral part of a relay spring contact.

In Fig. 4 it is seen that from a strip of resilient metal, such as standard relay spring contact material 1', the extremities of which strip being designated by the dotted lines, a number of portions have been cut away by means of a suitable punch and die combination. There remains a

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strip portion 1 having ears 2 and 3, which ears have end extensions 4 and 5, respectively, which extensions are substantially parallel to the strip portion 1 and separated therefrom laterally by respective slots 6 and 7 whose bottoms 8 and 9 each form a side of one of the ears 2 and 3. Portions 10 and 11 are cut from either of the outside edges of the ear extensions 4 and 5, as indicated by the indents 12 and 13, respectively. Two other ears 14 and 15 are formed respectively, when slots 16 and 17 of strip material 1' are cut, the bottoms 18 and 19 of which slots 16 and 17 are separated by a greater distance than the width of the strip portion 1. A further cut-out portion 20 provides edges 21, 22 and 23.

Fig. 5 illustrates the cross-sections obtained when the ears 2 and 3 are wrapped to meet above the plane of the strip portion 1 and when the ears 14 and 15 are wrapped in the same sense to meet above the plane of the strip portion and in the same plane as the ears 2 and 3. This cross-section is shown and preferred as somewhat tubular, approaching a rectangle.

Fig. 6, in solid lines, is a side view of the result of the aforementioned wrapping operation. Here it is noted that the edges 21, 22 and 23, formed by the cut-out portion 20 in Fig. 4 produce a slanting end cross-section of the tubular portion. The ears 14 and 2 are shown in the same plane above the plane of the strip portion with the end extensions 4 and 5 also in the same plane as the ear 2, ears 15 and 3 being hidden from view by ears 14 and 2, respectively, and end extension 5 of ear 3 being hidden by end extension 4 of ear 2.

Fig. 6, in dotted lines, shows a declined portion 24 bent at point 25 on end extension 4 of ear 2 toward the strip portion 1, but not touching the strip portion 1, leaving a space 26 between the edge 27 of the declined portion 24 and the strip portion 1. The declined portion 40 of end extension 5 of ear 4 is hidden from view by the portion 24. These fingers 40 and 24 may, as previously mentioned, be bent when the blank of Fig. 4 is cut.

Fig. 1 is an oblique view of a completed terminal, as previously described. In this disclosure the ears 14 and 15, and 2 and 3 do not meet but retain separations as 28 and 29, respectively. A firmer terminal will exist if the separations 28 and 29 do not exist. The portions 10 and 11 cut away from the blank 1', as shown in Fig. 4, will provide separation 30 on Figs. 1, 2 and 5 which is wider than that of 28 or 29. In the case where separations 28 and 29 do not exist, the separation 30, being wider than either of the former separations, will insure free movement of fingers 24 and 28. Edges 31 and 27 of the declined portions 40 and 24 declined at 38 and 25 from the extensions 5 and 4 of ears 2 and 2 do not touch the strip portion as shown by the separations 39 and 26. Edge 32 is the bottom of the slot 6 cut in the blank per Fig. 4. Edges 18 and 19 are at a level between the plane of the strip portion 1 and the plane of ears 14, 15, 2 and 3 since, as explained with reference to Fig. 4, the distance between edges 18 and 19 of Fig. 4 was greater than the width of the strip portion 1.

In Figs. 2 and 3 an insulated conductor 33 (which may have a cross-section of any shape) has been stripped of its insulation 34 back to a point 35, sufficient to allow the end 36 of conductor 33 to extend beyond the edge 31 of the declined portion 40 and to allow the point 35, to which the insulation 34 was cut back, to rest

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against the slanting end of the tubular portion formed by edges 21, 22 and 23. The end 36 of the conductor 33 is inserted into the tubular portion at the slanting end, so as to extend to the left and beyond the edge 31 of the declined portion 40 by forcing its way underneath the edge 31 from right to left against the resilient tension in this portion 40, the spacing 39 being less than the diameter of the conductor 33. The portion 40 will be strong enough in resilient tension to hold the conductor 33 in position while conductor 33 is soldered to the body of the terminal at 37, but will not be so strong as to deform or injure the conductor while being inserted or removed.

Fig. 3 shows that when conductor 33 is extending under edge 31 of declined portion 40, the declined portion 24 of end extension 4 of ear 2 is in its normal position and capable of allowing a second conductor to be connected to the terminal in a similar but substantially independent manner as that described above for conductor 33.

The purpose of the slanting end formed by edges 21, 22 and 23 is to facilitate the injecting of the end 36 of the conductor 33 into the tubular portion.

Fig. 7 illustrates the invention employed as an integral part of a relay spring contact member. In this embodiment of the invention, the terminal elements are punched out at the same time as the spring contact member is made. It is within the scope of this invention to employ the terminal as a separate piece of apparatus, such as that shown in Fig. 1, and attach it to another piece of apparatus by spot welding or a similar method.

The scope of the invention is not limited to the embodiment described in this specification and drawings, since obvious variations therefrom may be produced without departing from the spirit of this invention. The following claims determine the limits of the scope of this invention.

What is claimed is:

1. A flat strip portion comprising an end portion having at least one ear forming in cooperation with the ear end of said strip portion a cylindrical cross-section of said strip portion comprising two substantially parallel flat sides connected by a curved side, said ear including a flat resilient finger portion extending as a cantilever beyond the said cylindrical section and declined toward the said strip portion, the said declined end of said finger portion including a sharp edge for gripping a conductor extending into and through said cylindrical section.

2. A flat strip portion comprising an end portion having two ears, each ear located on a lateral edge of said end portion and located laterally opposite the other of said ears, each of said ears forming in cooperation with the ear end of said strip portion a cylindrical cross-section of said strip portion comprising two substantially parallel flat sides connected by a curved side, the lateral edges of said ears located adjacent to each other, each of said ears including a flat resilient finger portion extending as a cantilever beyond the said cylindrical section and declined toward the said strip portion, the said declined end of said finger portion including a sharp edge for gripping a conductor extending into and through said cylindrical section and between said declined end of said finger portion and said strip portion, the declined end of said finger portion being separated normally from the said strip portion by a distance less than the diameter of said conductor.

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3. A flat strip portion comprising an end portion having two ears, each ear located on a lateral edge of said end portion and located laterally opposite the other of said ears, each of said ears forming in cooperation with the ear end of said strip portion a cylindrical cross-section of said strip portion comprising two substantially parallel flat sides connected by a curved side, the lateral edges of said ears located adjacent to each other, each of said ears including a flat resilient finger portion extending as a cantilever beyond the said cylindrical section and declined toward the said strip portion, the said declined end of said finger portion including a sharp edge for gripping a conductor extending into and through said cylindrical section and between said declined end of said finger portion and said strip portion, the declined end of said finger portion being separated normally from the said strip portion by a distance less than the diameter of said conductor, and each of said ears having an aperture therein opening on an edge of said ear other than an end edge thereof, by reason of which aperture said conductor may be soldered, or other similar process, to the said cylindrical section.

4. A flat strip portion comprising an end portion having two ears, each ear located on a lateral edge of said end portion and located laterally opposite the other of said ears, each of said ears forming in cooperation with the ear end of said strip portion a cylindrical cross-section of said strip portion comprising two substantially parallel flat sides connected by a curved side, the

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lateral edges of said ears located adjacent to each other in a plane substantially parallel to the plane of said strip portion, each of said ears including a flat resilient finger portion extending as a cantilever beyond the said cylindrical section and declined toward the said strip portion, the said declined end of said finger portion including a sharp edge for gripping a conductor extending into and through said cylindrical section and between said declined end of said finger portion and said strip portion, the declined end of said finger portion being separated normally from the said strip portion by a distance less than the diameter of said conductor, and each of said ears having an aperture therein opening on an edge of said ear other than an end edge thereof, by reason of which aperture said conductor may be soldered, or other similar process, to the said cylindrical section.

HERMAN A. MILOCHE.

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