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 [21] Appl. No. **704,616**
 [22] Filed **Feb. 12, 1968**
 [45] Patented **June 29, 1971**
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[54] **SELF-LOCKING SPADE TERMINAL**
2 Claims, 6 Drawing Figs.

[52] U.S. Cl..... **339/257,**
339/277

[51] Int. Cl..... **H01r 11/22**

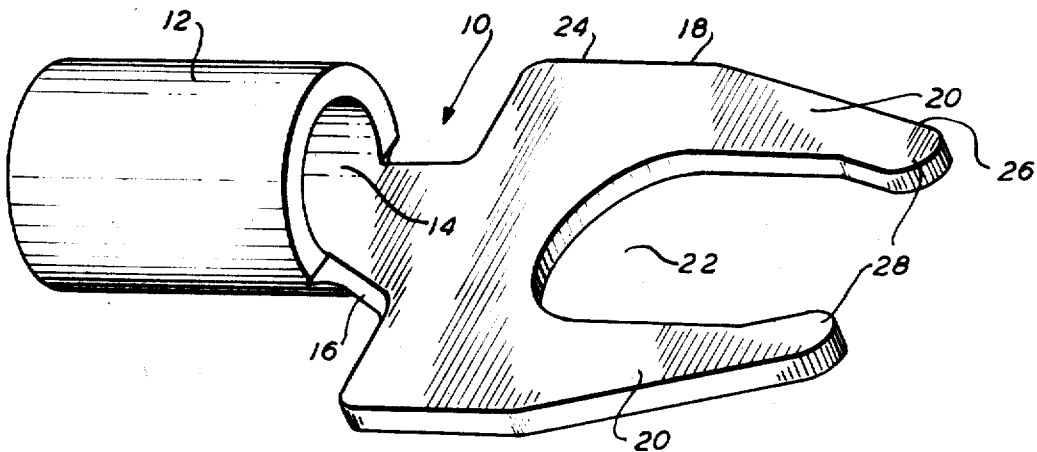
[50] Field of Search..... **339/223,**
252, 257, 263, 256, 258, 277, 24/130; 85/8.8, 51;
287/135

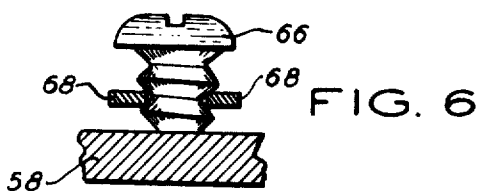
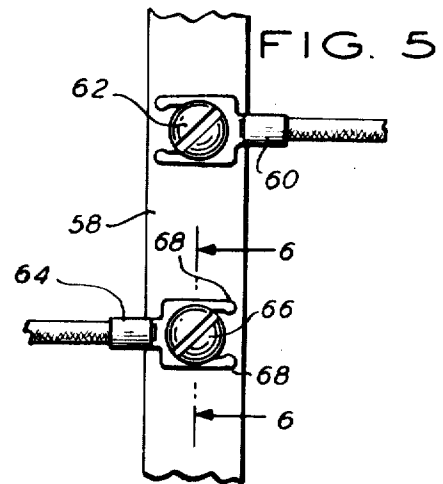
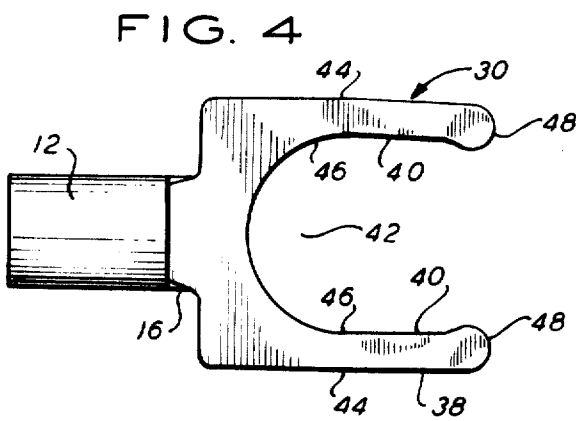
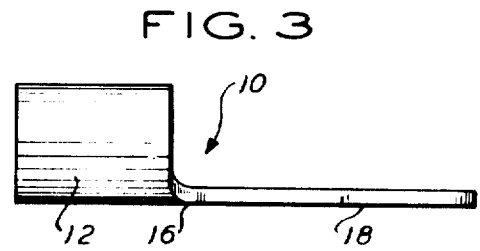
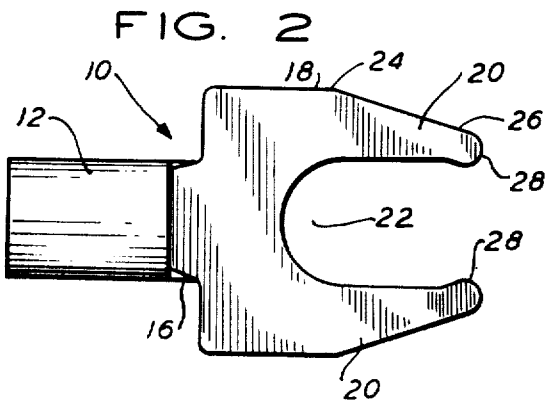
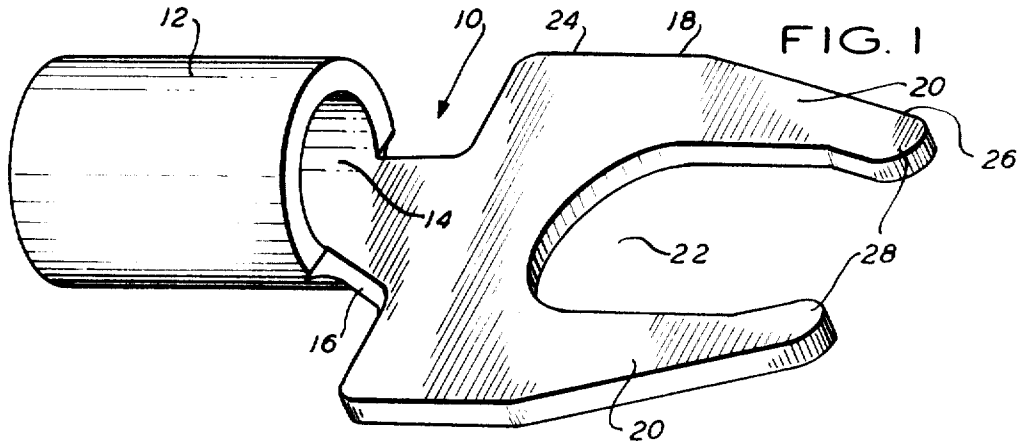
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ABSTRACT: The improved terminal has a wire barrel for mechanical deformation about a conductor placed therein and a locking spade blade at its opposite end. Locking is achieved about a terminal screw by inwardly extending nibs at the tine ends which restrict the blade slot and by the thickness of the tines which permits nesting within the thread of such screw. The resiliency of the terminal permits deflection of the tine nibs during installation.





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SELF-LOCKING SPADE TERMINAL

CROSS-REFERENCE TO RELATED APPLICATION

This application is related to copending Design Application D4800, filed on Nov. 23, 1966, by Earle Landis for Spade Terminal Connector, assigned to the Assignee of the instant invention, now abandoned

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention is directed to the field of electrical connectors of the solderless type. It finds utility in the connecting of electrical conductors to terminal blocks or the like. Terminal blocks as presently used in the electronics field are made from phenolic or other plastic materials and have therein at repetitive intervals a plurality of electrical terminal screws. Conductors must be fastened to these screws in such a manner that they may be easily installed or removed therefrom. Common practice is to provide spade terminals which are fastened to the conductors to permit them to be readily applied to the terminal screws which are tightened upon the tines of the spade terminal to retain them in contact with the terminal block.

2. Description of the Prior Art

Prior art spade terminals were fabricated with tines having parallel edges defining both the outer surface as well as the terminal screw receiving slot. These terminals had tines which were tapered at their leading edge to permit easy insertion of the tines under the terminal screw. Due to their construction, and the materials from which they were generally fabricated, it was necessary that the tines be of sufficiently great width to prevent the spreading of the tines upon the tightening of the terminal screw. In addition, the tines were of great thickness, again to prevent the tines from being deflected outwardly upon the tightening of the terminal screw. The spreading of the tines, in prior art spade terminals, caused a great deal of difficulty with respect to possible contact with adjacent terminals. In an effort to solve this problem terminal blocks were constructed with plastic, or other insulating spacers, between respective terminal screws. Such a practice was both expensive and greatly consumed the mounting space available and thus decreased the termination density which could be achieved by such devices. When such spade terminals were used in situations subject to vibration, the loosening of the terminal screw itself would permit the spade lug to separate from the terminal screw and possibly short against additional connections or produce an undesired grounding of the circuit. In an effort to prevent the unwanted separation of the spade terminal and the terminal screw some of the prior art spade terminals had upturned ends whose ends were turned at a 90° position or perpendicular to the normal plane of the main portion of the tines. Such upturning to some degree prevented the removal of the spade terminal from the terminal screw should the terminal screw become loosened. However, such an arrangement was not always satisfactory because the upturning of the tine ends reduced the possibility of stacking and required that greater spacing be provided between adjacent layers of terminal connections than would be required with a generally flat spade terminal tine. In addition, the thickness of prior art spade terminals prevented a tight fit from being achieved because it hindered the degree to which the terminal screw might be tightened.

SUMMARY OF THE INVENTION

The present invention overcomes the difficulties noted above with prior art spade terminals. The present invention provides a spade terminal which is self-locking in its application and which is small in size and prevents unwanted tine spreading and at the same time is small enough to provide proper nesting between respective screw thread crests thus preventing interference with the operation of the terminal screw. The spade terminal is formed from a material which is

both highly conductive and highly resilient and the tines thereof are formed to gently taper inwardly and to terminal at inwardly facing nibs. As a result of the inward sloping of the tines and the inwardly facing nibs the entrance to the terminal screw-receiving slot is made smaller than the diameter of the screw itself. Thus a snap action is achieved as the tine ends, curved nibs, are forced by the terminal screw. As the spade terminal is advanced to position the terminal screw at the end of the terminal screw-receiving slot, minimum clearance for the terminal screw is provided by permitting the ends of the lines to return to their initial position in a somewhat close relationship to one another thus preventing the unwanted removal of the spade terminal from the terminal screw. Due to the original forming of the spade terminal, and the manner in which it cooperates with the terminal screw, the tightening of the screw terminal does not cause the spreading of the tine and therefore a good mechanical, as well as electrical connection, is achieved. Further, the thickness of the tines is such as to be able to nest between the adjacent thread crests of the terminal screw and thus minimize interference between the spade terminal and to position terminal screw and permit the greatest amount of tightening to be applied to the spade terminal. It is therefore an object of this invention to provide an improved spade terminal which is self-locking.

It is still another object of this invention to provide an improved form of spade terminal having inturned end nibs to prevent the unwanted removal of the spade terminal from a terminal screw.

It is yet another object of this invention to provide an improved spade terminal having both inturned tines and inturned tine nibs to prevent unwanted removal of the spade terminal from a terminal screw.

It is yet another object of this invention to provide an improved spade terminal of small dimension to permit increasing the density of connections possible on a standard terminal board.

It is still another object of this invention to provide an improved spade terminal with a minimum of interference between the spade terminal and the terminal screw to which it is mounted.

It is yet another object of this invention to provide an improved spade terminal which is force fed and force removed from contact with the terminal screw of an electrical terminal block.

Other objects and features of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best modes which have been contemplated for carrying them out.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a prospective view showing a spade terminal constructed in accordance with the concepts of the invention.

FIG. 2 is a top plan view of the spade terminal of FIG. 1.

FIG. 3 is a side view of the terminal of FIG. 1.

FIG. 4 is a top plan view of a further embodiment of a spade terminal constructed in accordance with the concepts of the invention.

FIG. 5 is a top plan view of terminals constructed in accordance with the concepts of this invention connected to an electrical terminal block.

FIG. 6 is a side view, in section, of the terminal block and terminals of FIG. 5 taken along the lines 6-6.

Similar elements are given similar reference characters in each of the respective figures.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to FIGS. 1, 2 and 3 a first embodiment of a spade terminal 10 constructed in accordance with the concepts of the invention is shown. Spade terminal 10 has a tubular portion 12 having an aperture 14 therein arranged to receive the stripped portion of an electrical conductor (not

shown), that is, the portion of an electrical conductor whose insulation has been removed. The tubular portion 12 may be crimped about the portion of the electrical conductor having its insulation removed by mechanical means or may be soldered thereto. Extending from the tubular portion 12 is a narrow neck portion 16 which leads into the planar portion 18. The planar portion consists of the tines 20, which define a terminal screw receiving slot 22. The tines 20 have a generally parallel portion 24 and an inclined portion 26. As can be seen, the edges bounding the terminal screw-receiving slot 22 are generally parallel with the portion 24 of the tines 20. Each of the tines 20 terminates in an inwardly extending nib 28.

The spacing between the most inwardly reaching portion of the nibs 28 is such that it is smaller than the remainder of the terminal screw-receiving slot 22. With this spade terminal 10 slipped over a terminal screw, a snap action will be achieved wherein the nibs 28 and the tines 20 are forced to expand to allow entrance of the terminal screw (not shown) into the terminal screw-receiving slot 22. Once the terminal screw has progressed beyond the nibs 28 the tines 20 are allowed to return to their initial position permitting the nibs 28 to block the entrance of the terminal screw-receiving slot 22 and thus prevent the unwanted removal of the spade terminal 10 from the terminal screw. As will be described later with respect to FIG. 6 the thickness of the tines 20 is such that they will nest between the adjacent crests of the terminal screw to permit maximum closure of the tines 20 and thus provide the best grasping by the spade terminal 10 of the terminal screw.

Although the tubular portion 12 is shown throughout the figures in uninsulated form, it should be readily appreciated that an insulated jacket may be provided atop the tubular portion 12 if desired.

Turning now to FIG. 4, there is shown a further form of the spade terminal 30 constructed in accordance with the concepts of the invention. Spade terminal 30 has a tubular portion 12 and from there a neck portion 16 leading to the planar portion 38. The planar portion 38 has two tines 40 which define a terminal screw-receiving slot 42. The tines 40, their outer edges 44 and inner edges 46 of tines 40, are generally parallel with one another and are generally inclined inwardly towards one another so that the entry to the terminal screw-receiving slot 42 is smaller than anywhere else along its length. Each of the tines 40 terminates in an inward nib 48. Nibs 48 as is true of nibs 28 of FIGS. 1, 2 and 3, further reduce the width of the entrance to the terminal screw-receiving slot 42 and thus permit a snap action to be achieved as the spade terminal 30 is forced upon a terminal screw (not shown). Additionally, the slight inward tilt of the tines 40 also prevents the unwanted spreading of the tines during tightening of the terminal screw which the spade terminal 30 is attached.

To also decrease the ability of the terminal tines to spread during tightening of the terminal screw the spade terminal is fabricated from material having a high yield tensile strength as well as high conductivity and is described in U.S. Pat. No. 3,39,867.

Turning now to FIGS. 5 and 6 the relationship of the thickness of the spade terminals with respect to a terminal

screw can better be appreciated. In FIG. 5 there is shown a typical installation of two spade terminals 60 and 64 to a terminal board 58. The first spade terminal 60 is held to the terminal board 58 by means of a terminal screw 62 while the second spade terminal 64 is held to the terminal board 58 by means of a second terminal screw 66. The relationship between the terminal screw 66 and the tines 68 of the spade terminal 64 may better be appreciated from a viewing of FIG. 6. As can be seen, the terminal screw 66 is in a partially tightened condition and the spade terminal 64 has been positioned so that the tines 68 extend about the terminal screw 66. The thickness of the tines 68 is so chosen that their thickness permits the nesting of the tines 68 between adjacent thread crests of terminal screw 66 and thus permits maximum grasping between the spade terminal 64 and the terminal screw 66. In addition, this type of mounting minimizes the size requirement for the spade terminal and thus increases the packing density possible.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to the preferred embodiments, it will be understood that various omissions and substitutions and changes of the form and details of the devices illustrated and in their operation may be made by those skilled in the art, without departing from the spirit of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

I claim:

1. A self-locking spade terminal fabricated from a resilient, highly conductive alloy comprising: a tubular portion adapted to receive a portion of an electrical conductor from which the insulation has been removed; a planar portion; a solid, continuous, planar transition portion extending in the same plane as said planar portion connected at a first end to said tubular portion and at a second end, opposite said first end, to said planar portion; said planar portion comprising two tines separated by a terminal screw-receiving slot; two nibs, one for each of said tines, each coupled to its associated tine adjacent the free ends thereof and partially blocking said terminal screw-receiving slot each of said nibs having a chamfered edge adjacent the coupling between said nib and its associated tine and the free end of said tine; said tines being proportioned to flex outwardly with respect to one another when the chamfered edges of said nibs are brought into contact with a terminal screw normal to the plane of said terminal and to return inwardly to their initial position when said terminal is removed from contact with said terminal screw whereby the engagement of the chamfered edges of said nibs with a terminal screw causes the outward deflection of said tines only until the terminal is advanced to place the terminal screw within the terminal screw-receiving slot permitting the tines only to return to their initial position and barring removal of the terminal from the terminal screw by the position of the nibs in the path of the terminal screw.

2. A terminal as defined in claim 1 having an insulation jacket placed about said tubular portion.