United States Patent

Iantorno et al.

[15] **3,671,920**

[45] **June 20, 1972**

[54] INSULATED ELECTRIC TERMINAL ASSEMBLY

[72] Inventors: **James F. Iantorno,** Mamaroneck; **John Wagner,** Pleasantville; **Stephen J. Schumacher,** Larchmont, all of N.Y.

[73] Assignee: **Sealectro Corporation,** Mamaroneck, N.Y.

[22] Filed: **Oct. 19, 1970**

[21] Appl. No.: **81,961**

[52] **U.S. Cl.**.....**339/59 R,** 174/153 R, 339/126 RS, 339/221 R

[51] **Int. Cl.**.....**H01r 13/40**

[58] **Field of Search**.....339/59–61, 126, 339/220, 221; 174/153, 152

[56] **References Cited**

UNITED STATES PATENTS

2,911,460	11/1959	Oxley	174/153
3,244,801	5/1966	Dozier	339/126 T
2,918,521	12/1959	Abrams	174/152

FOREIGN PATENTS OR APPLICATIONS

918,369	2/1963	Great Britain	339/126 RS

Primary Examiner—Joseph H. McGlynn

Attorney—James M. Heilman and Heilman & Heilman

[57] **ABSTRACT**

A conductive metal terminal with contact making portions extending above and below a metal panel. A two-piece insulating assembly permits the terminal to be inserted into a hole in the metal panel. Then, upon application of a tool, the bottom half of the insulator assembly is forced toward the panel and locks the terminal into place. The bottom half of the insulator is retained in its locked position by barb-like annular flanges. The top half of the insulator rests against a flanged head on the metal terminal.

6 Claims, 10 Drawing Figures

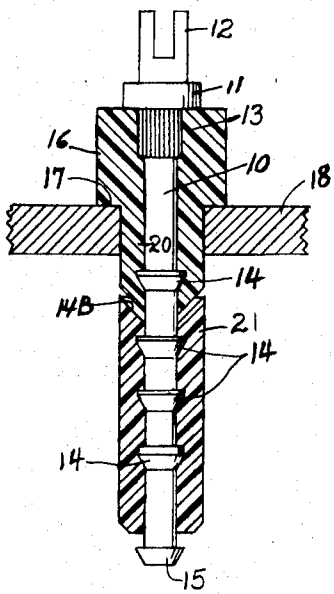


FIG. 1

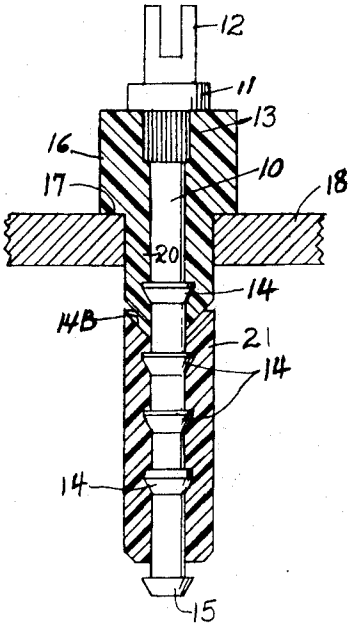


FIG. 2

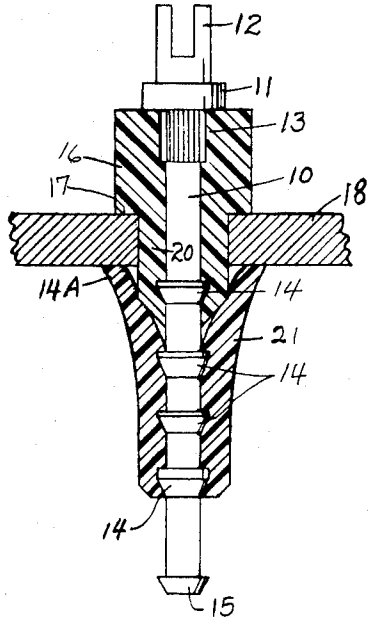


FIG. 3

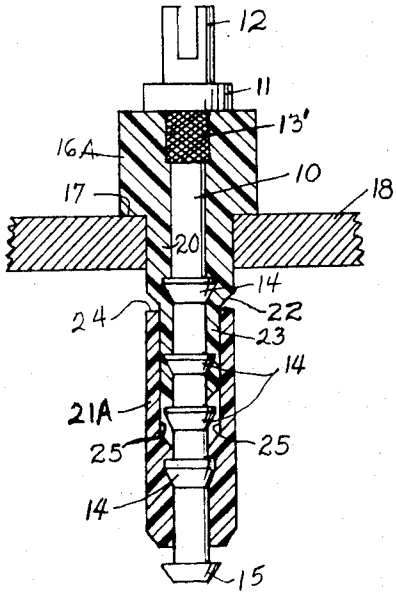
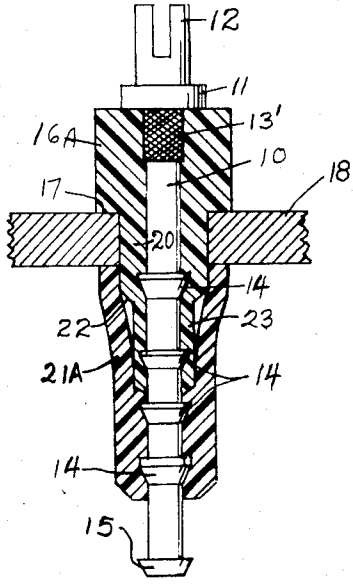


FIG. 4



INVENTORS
JAMES LIANTORNO
JOHN WAGNER
STEPHEN J. SCHUMACHER

By James Jr. Heilman
ATTORNEY

FIG. 5

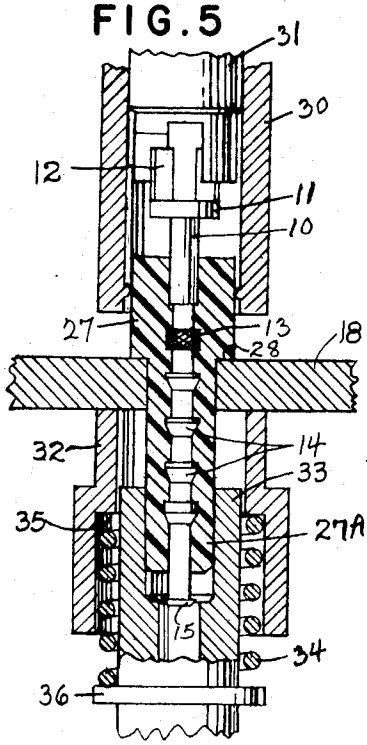


FIG. 6

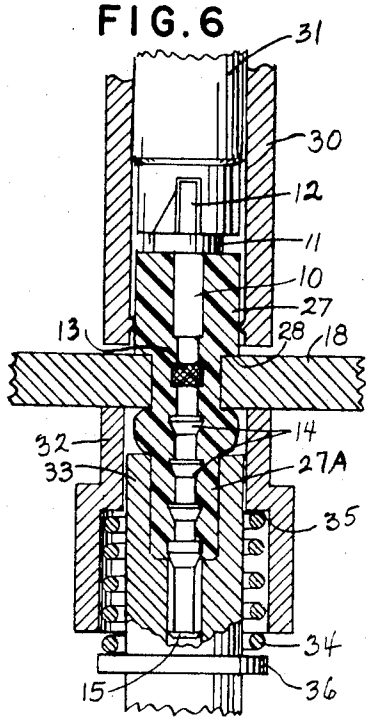


FIG. 7

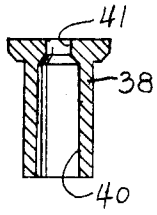


FIG. 8

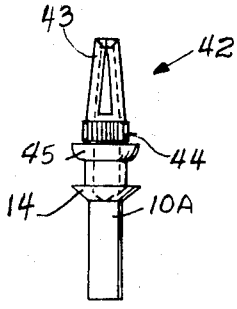


FIG. 9

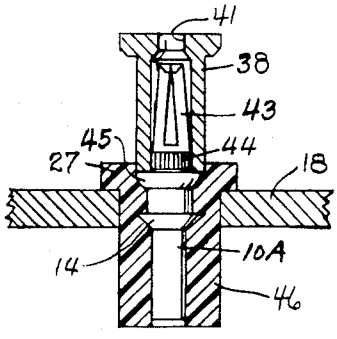
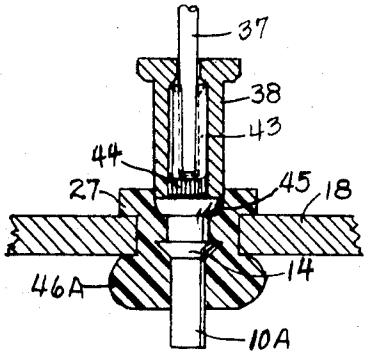


FIG. 10



INVENTORS
JAMES FIANTORNO
JOHN WAGNER
STEPHEN J. SCHUMACHER
By James M. Heilman
ATTORNEY

INSULATED ELECTRIC TERMINAL ASSEMBLY

A conductive metal terminal with contact making portions extending above and below a metal panel. A two-piece insulating assembly permits the terminal to be inserted into a hole in the metal panel. Then, upon application of a tool, the bottom half of the insulator assembly is forced toward the panel and locks the terminal into place. The bottom half of the insulator is retained in its locked position by barb-like annular flanges. The top half of the insulator rests against a flanged head on the metal terminal.

BACKGROUND OF THE INVENTION

This invention relates to an electrical terminal for installation on a metal chassis to complement the wiring of any electrical circuit including components secured to the chassis base. Many radio communication, and power supply circuits comprise circuit components mounted on both sides of a panel chassis in order to take advantage of the shielding means afforded by the conductive panel. For this reason, any terminal acting as a junction point for several circuits should be provided with extensions on both sides of the panel. Such a terminal can also be used as a support for small circuit elements such as transistors, small capacitors, and even resistors. When one or more terminals support a circuit, they must have a sturdy construction and be secured to the chassis panel in a firm, solid manner.

One of the features of the present invention is the supporting means formed by an axial clamping sleeve, forced onto the terminal and engaging the panel surface. Another feature of the invention is the plurality of barb-like annular flanges on the terminal shaft for retaining both insulator parts in their clamped position.

For a better understanding of the present invention, together with other details and features, reference is made to the following description taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE FIGURES

FIG. **1** is a partial cross sectional view of the terminal taken along an axial plane and showing the terminal assembly after insertion into a panel hole but before clamping.

FIG. **2** is a partial cross sectional view of the terminal shown in FIG. **1** but with the insulator sleeve forced into its clamping position.

FIG. **3** is a cross sectional view of an alternate form of the terminal assembly, having a clamp which seats firmly on the chassis surface. This figure shows the assembly before clamping.

FIG. **4** is a cross sectional view of the assembly shown in FIG. **3** after the axial clamp has been pushed into its locking position.

FIG. **5** is a partial cross sectional view of an alternate form of terminal wherein a single insulation cylinder is used instead of two. This view shows the terminal before clamping. Portions of the clamping tool are also shown.

FIG. **6** is a view similar to FIG. **5** but with the insulator in its clamped position.

FIG. **7** is a cross sectional view of a metal cylinder used in an alternate form which accepts a contact making conductive rod.

FIG. **8** is a side view of a spring member to be placed within the metal cylinder.

FIG. **9** is a partial cross sectional view of the assembled parts of the spring terminal before clamping.

FIG. **10** is a view similar to FIG. **9** but with all components clamped together on a chassis panel.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. **1** and **2**, the terminal assembly includes a shaft portion **10**, terminated at its upper end by a disk shoulder **11** and a bifurcated portion **12** designed to assist in retaining one or more wires for soldering. A portion of the

upper end of shaft **10** may be knurled, i.e., provided with longitudinal ridges as shown at **13**. The longitudinal ridges or protuberances permit ease of assembly of the parts yet prevents rotation after being seated. Obviously, the less effective diamond or other type knurling may be used as illustrated in FIGS. **3** and **4** at **13'**. The lower portions of shaft **10** are formed with a plurality of barb-like annular flanges **14** for engaging two deformable insulating sleeves which may be made of Teflon (Trademark DuPont Company) or polyethylene. The lower end of shaft **10** is formed with a knob **15** to aid in securing connecting wires (not shown) prior to being soldered. Any convenient form of knob **15** may be used as long as it can be forced through the two insulators.

An upper insulator **16** is formed with an axial hole for receiving shaft **10**. It also includes a shoulder **17** for limiting engagement against the panel **18** surface. Both insulators may be formed of semi-deformable material, such as, Teflon, polyethylene, or rubber having a high shear valve. A restricted cylindrical portion **20** of the upper insulator **16** passes through the hole in panel **18** and engages one of the flanges **14**. A bottom insulator **21**, also acting as a clamp is first pushed onto the lower end of the shaft **10** to the position shown in FIG. **1**. Then the assembly is entered into the hole in panel **10** and the lower insulator **21** is forced into the position shown in FIG. **2**. It is held in this position by flanges **14**. When the insulator **21** is forced into its clamping position, its upper edge rides over the tapered portion of the upper insulator and widens so that it limits against the panel surface. The upper edge **14*a*** of the lower insulator **14** flares outwardly to some extent as indicated in FIG. **2**. This is due to the internal chamfered edge **14*b*** shown in FIG. **1**. In the clamped position insulator **21** not only forms a firm shoulder for retaining the shaft in its axial position; it also compresses the lower portion of the upper insulator and forces the lesser diameter cylinder **20** into a pressurized contact with the sides of the hole in the panel, thus increasing its stability. The terminal is now ready for use.

Referring now to the alternate design shown in FIGS. **3** and **4**, all the components are the same except for insulators **16A** and **21A**. The bottom portion of the upper insulator **16A** is formed a tapered step **22** and a longer cylindrical portion **23**. The lower insulator is made with a squared-off annular surface **24** and an annular cavity **25** adjoining the lower end of the upper cylinder.

When the above described assembly is to be secured to a panel **10**, it is first positioned in the hole as shown in FIG. **3**. Then the lower insulator **21A** is forced into the position shown in FIG. **4**, eliminating space **25**, and seating edge **24** of the lower insulator firmly against the bottom surface of panel **18**. Again, the pressure exerted on cylinder **20** by the upper portion of the lower insulator causes the cylinder to expand slightly and fill the hole in panel **18** by pressure contact.

The terminal assembly shown in FIGS. **5** and **6** forms another alternate design. In these figures parts of the clamping tool are also shown. The shaft **10** is substantially the same, including a knurled portion **13**, barb-like annular flanges **14**, and a lower end portion **15**. The upper end portion is provided with a shoulder **11** and a bifurcated terminal **12**. The insulator is made in one piece, having, as before an upper portion **27** with a shoulder **28** which limits against the top of the panel **18**. The lower portion of the insulator is the same diameter as the hole in the panel and extends for a considerable distance below the surface of the panel. The insulator is formed with an axial hole which receives the shaft **10** and its retaining flanges **14**.

In order to clamp this form of terminal in position, an upper tool cylinder **30** contains a hollowed portion which is placed over the top end of the terminal. A plug **31** is secured inside the cylinder **30** and engages the bifurcated end **12** and the shoulder **11**. At the lower end of the terminal a similar cylindrical tool **32** fits over the lower end of the insulator **27A** and a spring coupled plunger **33** surrounds a portion of the insulator. Spring **34** is a compression helix and engages a step **35** inside cylinder **32** at its upper end and a flange **36** at its lower

end. When the two ends of the tool are brought together by an arbor press, the spring **34** first moves cylinder **32** to limit at the underside of the panel. The upper plunger first pushes the terminal shaft **10** all the way into the insulator **27** until the flange **11** is firmly seated on the top surface of the insulator. Then the lower plunger **33** forces the intermediate section of the insulator into an expanded bulbous part **27B** which is retained in the position shown in FIG. **6** by means of the barb-like flanges **14**. The tool portions may now be removed, leaving the terminal firmly secured to the panel **18**.

The terminal assemblies shown in FIGS. **1** through **6** include ends for soldering to conductive wires. It is also convenient to use a spring clip device which will make temporary contact with a conductive tip **37** which may be manually pushed into contact. Such a terminal is illustrated in FIGS. **7** through **10**. The upper casing **38** is shown in FIG. **7** and includes a hollow cylinder having a hollow bore **40** with a smaller opening **41** at its upper end. The spring clip **42** is shown in FIG. **8** and includes a plurality of inwardly positioned spring fingers **43** for gripping the tip **37** (see FIG. **10**). The fingers **43** are formed integral with a short shaft **10A** having one or more barb-like flanges **14**. The casing **38** is secured to the spring clip assembly by a force fit; pressing the casing over a shoulder **44** which may have knurled ridges to insure a permanent junction. Another shoulder **45** may be formed as shown to limit casing **38** and to insure a firm fit in its final insulator mounting.

The casing **38** and shaft **10A** are next forced into a hole insulator **46** and the assembly is then put into a hole in a panel **18**. At this stage the components occupy the relative positions as indicated in FIG. **9**. The assembly is now ready for the crimping action. A tool, similar to the tool indicated in FIGS. **5** and **6**, is placed over the upper and lower parts and the lower end of the deformable insulator **46** is forced upwardly to create a bulge **46A** (see FIG. **10**). This bulge retains the terminal assembly in its clamped position.

Experience has shown that the success or failure of any of the disclosed terminal assemblies depends upon the degree of deformation applied to the insulator. Teflon (polytetrafluoroethylene) has been used and has given excellent results. Other substances, such as polyethylene and rubber may require larger or smaller barb-like flanges than those shown in the figures.

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

1. An insulated terminal assembly for mounting within a hole a panel comprising: a first insulator bushing formed of resilient deformable material and provided with an axial hole therethrough and an external shoulder for limiting against the panel surface; a conductive shaft positioned in the hole and having a disk shoulder making contact with the top surface of the insulator, said shaft including a plurality of barb-like flanges on the shaft; a second insulator bushing also made of a resilient deformable material positioned around the lower portion of the first insulator for forced engagement with some of said barb-like flanges and for clamping action with the bottom surface of the panel.

2. The assembly of claim **1** wherein said shaft has a knurled portion for contact with the hole surface of said insulator with a shoulder.

3. The assembly of claim **1** wherein one of the ends of said shaft is formed with a bifurcated portion to aid in securing a conductive wire.

4. The assembly of claim **1** wherein said first insulator is formed with a tapered outside surface below the panel hole, said second insulator being adapted to ride over the tapered portion when the second insulator is forced into a clamped position.

5. The assembly of claim **1** wherein the upper edge of the second insulator is formed with a reentrant chamfer.

6. The assembly of claim **1** wherein the upper edge of the second insulator is formed with a flat end, the surface of which is substantially at right angles to the outside surface of the second insulator.

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