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ELECTRICAL CONNECTOR

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5 Claims. (Cl. 173-269)

This invention relates to electrical connectors, and more particularly to devices for connecting electrical units with test sets.

In testing electrical units, particularly after they have been mounted upon their panels or supporting frames in close proximity to one another, frequently only small spaces are available in which connections may be made between terminals and other parts of the units with test sets which are to perform the final testing of the units. Although there may exist such restrictions in the possibility of gaining access to the terminals of the units, it is important that the electrical connections made with the terminals are accurate and dependable so that the test performed upon the units may be efficient.

An object of the invention is to provide a connector which may be readily disposed in a limited space and which is adapted for an efficient connection with an object such as a terminal.

With this and other objects in view, the invention comprises a connector having a body of conductive material with a projection having a head portion formed integral therewith at an offset position and cooperating with a resilient element to firmly hold an object, such as a terminal, when disposed therebetween.

Other objects and advantages will be apparent from the following detailed description when considered in conjunction with the accompanying drawing, wherein

Fig. 1 is a side elevational view of the connector;

Fig. 2 is a front elevational view of the connector shown attached to a terminal and connected with a chuck of a test set, and

Fig. 3 is a side elevational view of the structure shown in Fig. 2.

Referring now to the drawing, the connector is composed of a body 10 of a suitable conductive material, the body being cylindrical in cross-section throughout the major portion of its length. Adjacent the forward end of the body, a flattened portion 11 is provided, the body adjacent the forward end of the flat portion being reduced, as shown in Figs. 1 and 3, to a portion indicated at 12 adjacent the center line of the body. The body 10 at the portion 12, is bent arcuately and has an integral projecting portion 14 circular in cross-section with a diameter approximately one-half the diameter of the body. A head portion 15 of the button type, that is cylindrical in contour, is formed integral with the portion 14 at an offset position. By the term "offset position" it is meant that the

centers of the head portion 15 and the projecting portion 14 are out of alignment, it being apparent that the projecting portion 14 is disposed adjacent the periphery of the head portion and that the latter is several times larger in diameter than the diameter of the projecting portion.

Attention is directed to the fact that the head portion 15 has inner and outer surfaces 16 and 17 respectively which are parallel with each other and are also parallel with the center line of the body 10. Furthermore, the comparative sizes of the head portion 15 and the projecting portion 14 leave but a small portion of the surface 16 occupied by the projecting portion, the major portion of the surface 16 extending inwardly toward the opposite end of the body 10 while other portions are positioned about the adjacent integral portion.

A resilient element 18 is secured to the flat portion 11 of the body 10 by suitable means such as welding or soldering, the forward free portion of the element being enlarged and substantially circular in contour as indicated at 19. The portion 19 has its center disposed adjacent the center of the head 15 and is provided with a slot 20 to receive the projecting portion 14. In other words, the portion 19 straddles the portion 14, the slot allowing free movement of the element relative to the projection.

A cover 21, of a suitable insulating material, is disposed on the body 10, covering the entire body excepting the reduced end short of the head portion 15 and the opposite end excepting a predetermined length of the body, indicated at 22, which functions as a plug in electrical connection with a socket or chuck 24. In the present illustration the socket is formed of an outer insulating sleeve having a member 25 of conductive material electrically connected to a conductor 26 of a test set (not shown) and provided with resilient portions 27 to grip the plug end 22.

At 30, a terminal is illustrated which may be a terminal of an electrical unit to be tested. This terminal is of the conventional type employed in relays and various other electrical units which constitute part of equipment in the communication arts. The terminal is provided with an aperture 31 in one end thereof of a size adapted to readily receive the head 15. As a matter of fact, the head 15 has been formed to freely pass through the aperture 31 of the standard terminal for mechanical and electrical connection of the connector with the terminal.

Upon considering the use and function of the connector, attention is first directed to the fact

that the views of the connector as shown in the drawing, are many times its actual size. In actual structure the connector is sufficiently small for insertion between closely positioned units or parts of units and the body 10 is formed of a material sufficiently conductive for its electrical purpose yet durable and rigid for the carrying out of the mechanical connections with the various parts or terminals. When it is desirable to make an electrical connection with a terminal, the connector may be moved in substantial alignment with the terminal yet sufficiently to one side thereof to position the head portion 15 at a preferred side of the terminal, until the head portion has been received in the aperture 31. The operator will be informed of the location of the head portion in the aperture by the lateral movement of that end of the connector during the sliding of the head portion on the surface of the terminal. When the head portion has been located in the aperture of the terminal, lateral pressure may be applied to the connector to move the head portion 15 through the aperture and compress the spring or resilient element 18, which is normally in the position shown in Fig. 1, where its end is resting, if desired, with suitable force against the inner surface 16 of the head. Therefore, during the movement of the head portion 15 through the aperture 31, the resilient element 18 will be forced inwardly. Then, by moving the connector longitudinally in the direction of the arrow (Figs. 2 and 3, a portion of the terminal will be positioned between the surface 16 of the head and the portion 19 of the element 18. At this time attention is directed to the relative positions of the surfaces of the terminal 30, the portion 19 and the surface 16 of the head 15. All of these surfaces are parallel one with the other and the portion 19 and the surface 16 are applying maximum surface friction coupled with the holding force from the element 18 to form, not only a positive and accurate electrical connection between the connector and the terminal, but to form a positive mechanical connection against displacement of the connector with the terminal during the testing of the unit of which the terminal is a part. At, or prior to, this connection with the terminal, the socket 24 may be connected to the plug portion 22 of the body 10. The insulated cover 21 serves an important function in protecting the connector against electrical connections with other parts which may be disposed adjacent thereto or with the hand of the operator should electrical circuits be completed through the terminal at the time of the connection.

The connector may be removed readily from the terminal by applying longitudinal movement to the connector in a direction opposite the arrow until the head portion 15 falls within the aperture 31, which action is readily noticeable through the action of the resilient element 18.

Although the connector has been illustrated for connection with a terminal having an aperture therein, it should be understood that it may be readily connected to other parts or to other types of terminals, not having apertures therein, by passing the head portion 15 over an edge of such a part or terminal to compress the element 18 so that the surface 16 of the head portion may be moved into registration with one surface of the part or terminal, the opposite surface thereof being engaged by the portion 19 of the resilient element 18. The fact that the major portion of the surface 15 as well as the portion 19 cooperate in applying maximum holding force to the part

or terminal with which they engage, any action tending to release the connector from the part or terminal increasing this holding force due to the edges of the part or terminal tends to dig into the engaging surfaces. The increased frictional force is eliminated when it is desired to remove the conductor from the part or terminal by applying lateral pressure or movement to further compress the element and remove the frictional contact of the head from the part or terminal.

Although specific improvements of the invention have been shown and described it will be understood that they are but illustrative and that various modifications may be made therein without departing from the scope and spirit of this invention as defined by the appended claims.

What is claimed is:

1. A connector for forming electrical connection with a terminal of the flat surface type located in a confined space and having an aperture therein, the connector comprising a body including an elongate handle portion and an integral head portion adapted for lateral and then longitudinal movement to move the head portion through the said aperture from a given side of the terminal and into engagement with the opposing side thereof, and an element carried by the body adapted to hold the head portion firmly against the said opposing side.

2. A connector for forming electrical connection with a terminal of the flat surface type having an aperture therein, the connector comprising a body having a handle portion, a laterally projecting portion disposed at one end of the handle portion, a head portion for movement through the aperture by lateral movement of the handle portion from a given side of the terminal to the opposing side thereof and formed integral with the lateral projecting portion at an off-center portion of the head for movement into engagement with the said opposing side by longitudinal movement of the said handle portion, and an element carried by the body adapted to hold the head portion firmly against the said opposing side.

3. A connector for forming electrical connection with a terminal of the flat surface type having an aperture therein and located in a confined space, the connector comprising a body having an elongate handle portion with a laterally projecting portion, a head portion for movement through the aperture from a given side of the terminal to the opposing side thereof and formed integral with the lateral projecting portion parallel with the body and at a position off-center the head portion, an element carried by the body adapted to hold the head portion firmly against the said opposing side, and an insulating cover for the handle portion.

4. A connector adapted for electrical connection with a terminal of the flat surface type having an aperture therein, the connector comprising an elongate body having a laterally projecting portion, a head portion for movement through the said aperture from a given side of the terminal to the opposing side thereof and formed integral with the lateral projecting portion parallel with the body and at a position off-center the head portion, and a bifurcated resilient element larger in general contour than the head, carried by the body, straddling the laterally projecting portion and adapted to cooperate with the head portion to firmly grip the terminal.

5. A connector for forming electrical connection between an electrical socket and a terminal of the flat surface type having an aperture there-

in, the connector comprising an elongate body having a laterally projecting portion at one end thereof and a plug portion at the other end thereof receivable in the electrical socket, a head portion for movement through the aperture from a given side of the terminal to the opposing side thereof and formed integral with the lateral projecting portion parallel with the body and at a

5 position off-center the head portion, and a bifurcated resilient element larger in general contour than the head, carried by the body, straddling the laterally projecting portion and adapted to cooperate with the head portion to firmly grip the terminal.

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