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R. B. LEWIS

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ELECTRICAL TERMINAL STUD

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Fig. 1

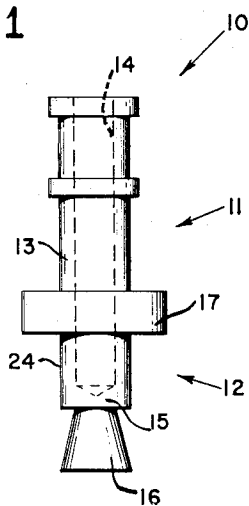


Fig. 2

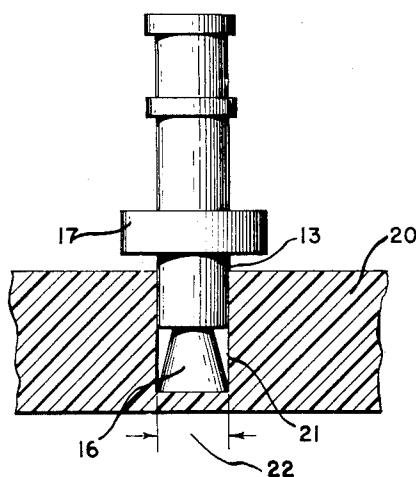


Fig. 3

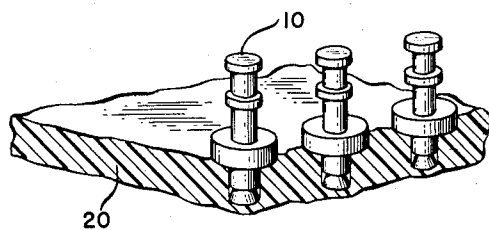
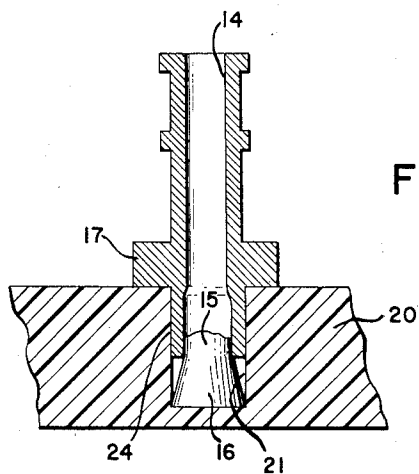


Fig. 4

INVENTOR.

Richard B. Lewis
BY

Henry Heyman

ATTORNEY

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2,899,672

ELECTRICAL TERMINAL STUD

Richard B. Lewis, Torrance, Calif., assignor to Hughes Aircraft Company, Culver City, Calif., a corporation of Delaware

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1 Claim. (Cl. 339—220)

The present invention relates to electrical terminals and more particularly to an electrical terminal stud arranged for mounting on a terminal board by having a portion of the terminal stud driven into a recess provided in the board.

Heretofore, it has become a standard industrial practice to mount electrical components on terminal boards by affixing terminal studs to the boards and electrically connecting the components thereto. Interconnection between the various components is achieved by connecting jumper wires between the terminal studs in the desired sequence.

While the use of terminal studs and boards has become widely accepted in the art, the presently available terminal studs suffer from a number of disadvantages which have limited their use. The conventional stud is mounted in a manner analogous to the mounting of a rivet, namely, by drilling a hole in the terminal board, inserting the terminal stud, and spinning over the projecting end of the stud. Such a mounting technique requires the performance of a number of steps of which the spinning-over operation is the most cumbersome and expensive. In addition, where the terminal stud is used as an electrical terminal the resulting structure has a number of defects. The resulting terminal board and stud structure can not be mounted directly against a metal panel, since short circuiting of the electrical terminals would result. While this defect may be overcome by interposing an additional sheet of insulating material between the terminal board and panel, the resulting structure is increased in size and cost. The backside of the board provides a surface along which electrical creepage paths between terminals may form. In order to provide for a secure mounting of the terminal studs, the stud must be of a size corresponding to the thickness of the terminal board to be used. Where terminal boards of various thicknesses are used a large stock of different sized terminal studs must be provided.

It is, therefore, an object of the present invention to provide an electrical terminal stud which may be securely mounted in a recess in a terminal board by means of a single operation, namely, forcefully inserting the terminal stud into the recess.

Another object of the present invention is to provide a terminal stud which may be rigidly and securely fastened to a terminal board in a hole which does not extend through the board.

Yet another object of the present invention is to provide a terminal stud adapted to be mounted in a recess in a terminal board rather than in a hole, and accordingly, eliminate electrical creepage paths along the back of the board.

A further object of the present invention is to provide an electrical terminal stud which may be used with terminal boards of any thickness.

An electrical terminal stud, according to the present invention, comprises a substantially cylindrical body having a first end arranged as a terminal portion for establishing electrical connection thereto and a second end

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arranged as a retaining portion for insertion into a recess in a terminal board. A central bore concentric with the outer diameters of the stud extends through the terminal portion and into the retaining portion of the stud. This bore is closed at the retaining portion end by a frusto-conical deforming portion of smaller diameter which is integrally connected to the shell-like body portion formed by the bore. An external shoulder or flange separates the terminal end of the stud from the retaining portion.

The assembly thus described may be mounted on a terminal board by drilling a flat bottom recess of appropriate depth in the board. The retaining portion of the stud is then inserted into the recess and pressure applied to either the flange or the terminal end of the stud. If the recess and stud are appropriately dimensioned the structure will fracture about the smaller diameter of the conical portion, which will be driven into the bore as further pressure is applied to the stud. As the taper intersects the bore, the shell will flare out into the board and will tend to be firmly locked therein by the conical tapered portion of the stud. Preferably, the structure should be so dimensioned and the hole in the terminal board of such a depth that the conical section is completely within the cylindrical part when the flange comes into contact with the top surface of the board. When so secured the flange assists in maintaining the rigidity of the mounting action thus produced. It will readily be recognized that the depth of the recess originally drilled in the terminal board is determinative of the depth to which the stud may be driven in order to secure the stud.

The novel features which are believed to be characteristic of the invention, both as to its organization and method of operation, together with further objects and advantages thereof, will be better understood from the following description considered in connection with the accompanying drawing in which an embodiment of the invention is illustrated by way of example. It is to be expressly understood, however, that the drawing is for the purpose of illustration and description only, and is not intended as a definition of the limits of the invention.

Fig. 1 is a side elevational view of the electrical terminal stud of the present invention.

Fig. 2 is a view, partly in cross section, showing the terminal stud inserted in a terminal board prior to the locking operation.

Fig. 3 is a view, partly in cross section, of the terminal stud and board after the locking operation has been performed.

Fig. 4 is a perspective view, partly in cross section, illustrating a plurality of terminals mounted on a terminal board.

Referring now to the figures wherein the same reference numbers designate the same or similar elements in the several views, an electrical terminal stud 10, according to the present invention, comprises a terminal portion 11 and a retaining portion 12 both integrally fabricated preferably from a single piece of electrically conductive material. Both terminal portion 11 and retaining portion 12 have substantially circular cross sections at all planes through the terminal stud. More particularly, terminal portion 11 is adapted for use as an electrical terminal and may, accordingly, have an external configuration identical with those well known in the terminal art, such as that shown for example in the figures. Retaining portion 12 is adapted for insertion into a recess in a terminal board. As shown in Fig. 1, terminal stud 10 includes a substantially cylindrical body portion 13 forming a part of terminal portion 11 and retaining portion 12. Body portion 13 has an internal bore 14 extending from electrical terminal portion 11 toward said retaining portion 12, the bore terminating within the body section to form a thin frangible base 15 therefor.

The remainder of retaining portion 12 comprises a substantially frusto-conical deforming portion 16 having its small end positioned adjacent base 15 and being integrally connected thereto. The small end of deforming portion 16 has a diameter substantially corresponding to the diameter of bore 14, while the larger end which forms the base of terminal stud 10 has a diameter in excess of the diameter of the bore. The terminal stud thus described includes in addition a cylindrical flange portion 17 about cylinder 13 for limiting movement of terminal portion 11 with respect to a terminal board as will be more fully described hereinafter.

The terminal stud thus described may be mounted on a terminal board 20, as shown in Figs. 2 and 3, by drilling a blind hole 21 of appropriate diameter and depth into the terminal board and inserting the retaining portion 12 of the terminal stud therein. As shown in Fig. 2, blind hole 21 should have a diameter 22 substantially corresponding to the diameter of cylindrical shell 13, and a depth slightly less than the distance between the base of deforming portion 16 and the surface of flange 17 facing the terminal board. More particularly, hole 21 should be drilled to a depth appropriate to provide the locking action now to be more fully described.

With the terminal stud positioned as shown in Fig. 2, the stud may be locked in place by applying pressure between the terminal board and either flange 17 or terminal portion 11 of the stud. If hole 21 is appropriately dimensioned the retaining portion of the stud will fracture at base 15, the shell and deforming portion separating into two pieces, and deforming portion 16 will be driven into bore 14 as pressure is continued to be applied to the stud. This pressure, as shown in Fig. 3, will cause shell 24, comprising the retaining portions of cylinder 13, to flare out into the board and to be firmly locked therein by the tapered portions of deforming portion 16. At the same time the facing surface of flange 17 will be brought to rest firmly on terminal board 20 and thereby contribute to the rigidity of the resulting structure.

As will be readily understood the specific form taken by retaining portion 12 after the locking operation will depend upon the material from which terminal stud 10 is fabricated, as well as the degree of hardness of terminal board 20. For example, where terminal stud 10 was fabricated from brass, and terminal board 20 of Lucite, microscopic examination through the edge of the terminal board disclosed that cylindrical portion 24 uniformly expanded throughout its length under the applied pressure when deforming portion 16 was driven into the shell. This uniform expansion resulted in a tight lock being established between the inside walls of hole 21 and expanded shell 24.

As shown in Fig. 4, a plurality of terminal studs may readily be mounted on a terminal board by repeating the drilling and mounting operation described above. Where such a plurality of terminals is to be mounted, all of the holes may be drilled to a uniform depth at one time following which the terminals may be inserted and locked

in place. It should be noted that the mounting operation does not require access to the back side of the terminal board and accordingly the terminal panel may be mounted flush against a surface even prior to inserting and mounting terminals.

It will readily be recognized that the electrical terminal stud of the present invention is particularly adapted for manufacture by conventional automatic screw machine techniques, and that the provision of the locking means for mounting the terminal on a terminal board does not require unduly complex operations. The fact that the stud is fabricated from a single piece of material and remains a unitary structure until the mounting operation is performed considerably simplifies handling of the terminals prior to use.

There has thus been described an improved electrical terminal stud which may be securely mounted in a terminal board by means of operations performed upon only one side of the board.

What is claimed as new is:

An electrical terminal stud adapted for disposition and retention in a cylindrical recess having a transverse inner end wall, said stud comprising, in combination: an elongated cylindrical terminal portion; a cylindrical retaining portion integral with and coextensively disposed relative to said terminal portion; a cylindrical bore extending through said terminal portion and into said retaining portion, said bore having a blind inner end terminating adjacent the free end of said retaining portion; a solid frusto-conical deforming portion disposed integrally from said retaining portion, the end of said deforming portion adjacent said retaining portion having a diameter substantially equal to the diameter of said bore, the end thereof remote from said retaining portion having a diameter substantially equal to the outer diameter of said retaining portion; and a flange carried by said stud at a junction of said terminal and retaining portions, said retaining and deforming portions being adapted for disposition in said recess with said remote end of said deforming portion engaging said recess inner wall, movement of said stud into said recess causing a compressive fracture between said retaining and deforming portions and disposition of a portion of said deforming portion into said bore circumferentially to expand said retaining portion into tight contact with a cylindrical wall of said bore, said flange acting to limit the distance of said movement of said stud into said recess.

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