

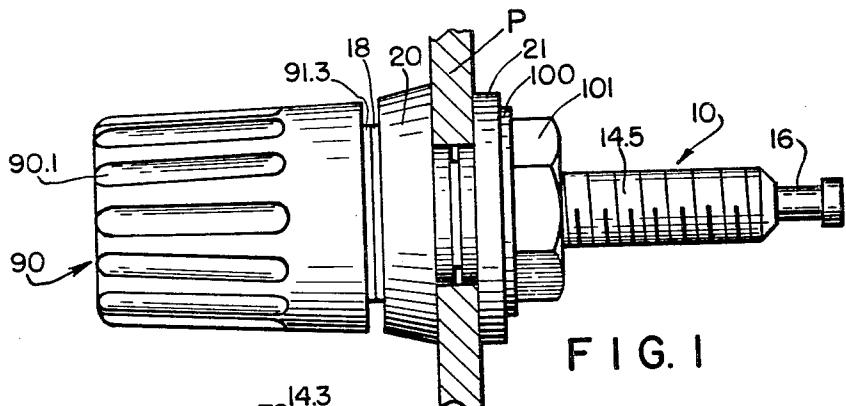
Aug. 6, 1968

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3,396,359

ELECTRICAL LEAD THROUGH CONNECTOR WITH BINDING POST AND JACK

Filed July 5, 1966



**FIG. I**

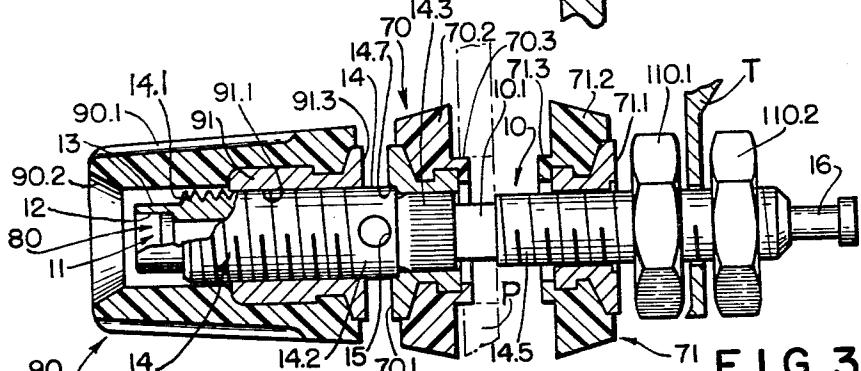


FIG. 3

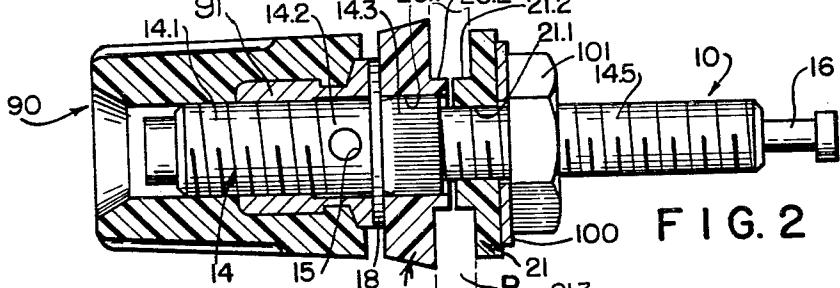
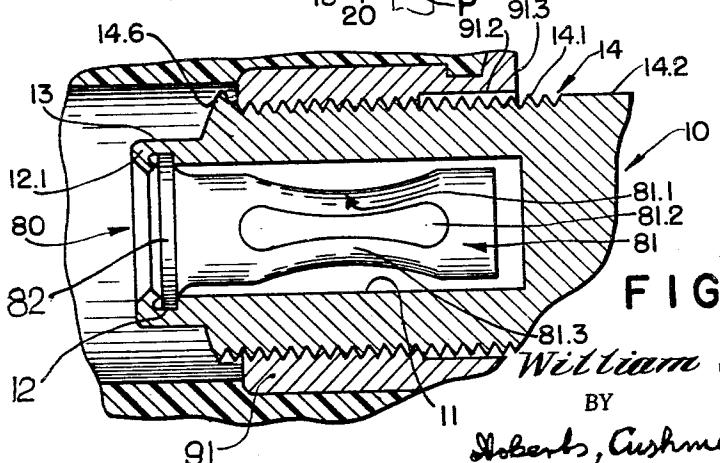


FIG. 2



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# United States Patent Office

3,396,359

Patented Aug. 6, 1968

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3,396,359

## ELECTRICAL LEAD THROUGH CONNECTOR WITH BINDING POST AND JACK

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Filed July 5, 1966, Ser. No. 562,625

2 Claims. (Cl. 339—32)

### ABSTRACT OF THE DISCLOSURE

A lead through connector has a stud with a jack and an open cap at one end which is threaded for the cap. The other end is threaded for fastening contact making nut means. Intermediate the two threads are two insulating washers, one fastened to the stud and the other loose for engagement of a panel by tightening the nut. The stud has a hole adjacent the first washer for a wire, and the cap has a metal insert for engaging the wire.

The field of art to which the present invention pertains is that of electrical connectors which are incorporated in insulating mounts.

Objects of the invention are to provide insulated lead-through conductors with binding post and jacket connectors and if desired connectors of other types conveniently arranged at either end of the conductor which can be easily and conveniently assembled, mounted, removed, and replaced; which permit electrical connections to be made conveniently, quickly, and securely; which are optimally reliable under severe operating conditions; which permit easy but secure plug-in connection into devices of this type; and which are comparatively inexpensive as to manufacture of the parts and assembly thereof.

The nature and substance of the invention may be shortly characterized as residing in the combination of a conductive stud body with a screw cap at one end, a terminal post at the other end, and intermediate threaded insulating washers or discs for engaging a mounting structure. The cap end of the stud is recessed for holding a jack structure that is especially suited for this purpose and protected by the cap, and the stud can be perforated at the jack end for a wire to be held by the screw cap. In a preferred embodiment one of the mounting washers is fixed at the jack end of the stud and the other washer can be tightened thereagainst with a support therebetween, either by its own thread or by a separate nut. The post end of the stud is threaded for the tightening washer and for additional nuts that can be used for connecting wires to the stud.

These and other advantageous objects, and aspects of inventive substance, will appear from the following description of two practical embodiments of the invention illustrating its novel characteristics.

The description refers to a drawing in which

FIG. 1 is an elevation of a preferred embodiment of the invention showing the complete stud, binding post and jack assembly, as installed through a panel opening;

FIG. 2 is an elevation of the assembly of FIG. 1 partly in longitudinal section to show component details;

FIG. 3 is an elevation similar to FIG. 2, of another embodiment of the invention; and

FIG. 4 is a fragmentary longitudinal section of the jack end of the connector with the jack proper in elevation.

The connector to be described as an example of the invention is assembled on a central supporting metal stud 10 which has at one end a recess 11 for a jack insert, which recess is initially countersunk or otherwise enlarged as at 12. The outside of the stud is reduced at that end to form a lip 13, for the purpose to be described below.

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At this recessed end, the stud 10 has a cap mounting lug 14 of larger diameter, provided successively with a cap thread 14.1, a smooth cylindrical region 14.2 and a roughened or knurled portion 14.3. In the cylindrical region 14.2, the stud has a hole 15 for receiving a wire, if desirable.

Beyond the knurled portion 14.3, the lug 14 has a binding post thread 14.5 of smaller diameter. At the end of stud 10, opposite the recess 11, is preferably provided a soldering lug or binding post 16.

Next to the cap thread portion 14.1 of the stud 10 are clamping and abutment means for mounting the connector on a panel or similar support. In the embodiment according to FIGS. 1 and 2, these consist of an annular disc 18 rigidly mounted such as by pressing, on the smooth stud length 14.2 at a point intermediate the conductor passage 15 and the knurled portion 14.3. Against the disc 18 rests a mounting washer 20 of insulating synthetic material whose central aperture 20.1 slides freely over the smaller diameter binding post thread 14.5 and which sits with press or friction fit on the knurled stud portion 14.3 as shown. This washer 20 has a reduced gripping rim 20.2 which, as shown, may fit snugly within and to project part way into an opening of a panel P. A second, smooth mounting washer 21 has a central bore 21.1 smaller than the fixed washer bore 20.1, for relatively snug sliding over the binding post thread 14.5. The loose washer 21 has at its panel-facing side a gripping rim 21.2 projecting oppositely of the fixed washer rim 20.2, both part way into the opening of panel P for centering, if desired.

In the embodiment according to FIG. 3 the knurled portion 14.3 runs directly into the smooth length 14.2 of the cap lug 14 with a stop shoulder 14.7. In this embodiment, the stud 10 has a second smooth portion 10.1 of smaller diameter than the binding post thread 14.5. As shown in FIG. 3, this reduced stud portion 10.1 is located within, and spaced all around from, the fixed and loose mounting washers which will now be described.

The pan mounting means of the embodiment according to FIG. 3 has similar left- and right-hand washers 70, 71 each consisting of a metallic insert 70.1, 71.1 respectively and, molded therearound, of similar left- and right-hand insulating flanges 70.2, 71.2 respectively provided with oppositely inwardly projecting annular rims 70.3, 71.3 dimensioned to fit within the opening of panel P, similar to the rims 20.2, 21.2 of FIG. 2. The insert 70.1 is press-seated on the knurled portion 14.3, whereas the insert 71.1 has threads and constitutes a nut on the stud thread 14.5. It will be noted that the inserts 70.1, 71.1 project beyond the insulating flanges 70.2, 71.2 outwardly towards the connecting means, in order to provide electrical contact if desired.

Inserted in the recess 11 (FIGS. 3 and 4), is a connector jack 80, preferably but not necessarily of the type described in the Patent No. 3,237,140 of Warren H. West, dated Feb. 22, 1966. This jack (FIG. 4) has a sleeve 81 with an intermediate constricted region 81.1 in which are cut longitudinally extending, circumferentially distributed, closed slots 81.2 which define therebetween the spring bridges 81.3. The sleeve 81 has a diameter smaller than and a length less than the corresponding dimensions of the recess 11, whereby it is spaced from the latter's side and end walls. The jack sleeve 81 is centered in, and supported only at its outer end from the recess 11 of the stud 10 by a radially extending flange 82 received in the countersink 12 (FIG. 3) and held against the shoulder that the latter forms with the recess 11. The flange 82 is held by inturning or peening over the lip 12 of the stud countersink, as shown at 12.1 of FIG. 4. A terminal pin fastened to, such as crimped on, a conductor wire can be inserted in the jack 80.

The action of the jack 80 in releasably clamping an inserted contact pin is fully explained in the above-mentioned patent, as involving the longitudinal extension of the free end of the sleeve 81, as the spring bridges 81.3 are expanded radially by the forcing thereinto of a pin of larger diameter. The symmetrical outward movement in radial direction of the intermediate spring bridges, while the sleeve 81 as a whole expands axially will be understood to provide a desirably uncomplicated, rubbing, symmetrical, and hence certain connection.

The invention provides further an insulating enclosure for the lug 14 of the stud 10, for the jack 80 supported in the stud recess, and for a contact pin inserted into the jack. This enclosure has here the form of a cap 90 made for example of an acetal synthetic resin. It has flutes 90.1 for convenient manipulation. The cap 90 is proportioned normally to extend beyond the recessed end of the stud 10, where it has a flare 90.2 facilitating the inserting of a contact pin into the jack 80. The insulating cap 90 is rigidly molded on a metal insert in the form of a sleeve 91 formed at its inner surface with threads 91.1 engageable with the threads 14.1 of the lug 14. The insert has a smooth annulus 91.2 (FIG. 4) which clears the thread 14.1 and slides also over the smooth stud portion 14.2. At the annulus 91.2 the sleeve 91 has an end face 91.3 projecting outwardly of the cap 90, and defining a transverse surface having the function of clamping a wire conductor inserted through the hole 15. The cap 90 can be screwed tightly on a wire in hole 15, making contact at faces 91.3 and 70.1 in FIG. 3, and similarly at disc 18 and the cap insert 91 of FIG. 2.

The stud 10 constitutes an electric connector having jack, clamp, and binding post terminations and adapted to be rigidly supported on and led through a suitable opening of a board or other mounting means, the jack and clamp projecting on one side and the post at the other side of the panel P. The connector according to the invention is fastened in wall or panel mounted position as follows.

In the embodiment of FIGS. 1 and 2 a lock washer 100 and a nut 101 threaded on the binding post thread 14.5 clamp the washers 20, 21 according to FIG. 2 about the panel P, and the washer and panel assembly against the disc 18, such that the entire connector is rigidly fixed to the mounting panel with the terminals projecting therefrom.

In the embodiment according to FIG. 3 the washer 71 with the threaded insert 71.1 is tightened against the panel and the fixed washer 70 resting against the shoulder 14.7. It will be noted that a wire inserted in the hole 15 as above described can be firmly gripped between the faces 70.1 and 91.3 of the fixed washer and the cup, respectively.

The nuts 110.1, 110.2 can be used as locking means more securely to lock the stud 10 by clamping against the intermediate stop shoulder 14.7. The nuts 110.1, 110.2 can also be employed to clamp between them a wire terminal such as indicated at T of FIG. 3. A wire or wires can be soldered to lug 16 in well-known manner.

The assembly of the connector with a wall or panel member leaves the cap 90 free for manipulation, but prevented from being backed off the stud 10 by striking the end of the thread 14.1 of the stud 10. As shown at 14.6,

FIG. 4, the stacked thread end 14.6 clears the outer, plastic part of the cap whose inside diameter is greater than the outside diameter of the stacked end of the stud thread.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. An electrical connector device comprising: conductive stud means threaded adjacent its first and second ends and having a central recess at the first end;

jack contact means in the stud means recess for receiving pin contact means; cap means on the thread of the recessed stud means end and having a central opening for pin contact means to be inserted in the jack means;

intermediate the two ends of the stud means, first and second insulating mounting washer means engaging the stud means for holding a mounting structure therebetween; the cap means having a threaded metal insert with a face adjacent the first washer means; and the stud means having a hole adjacent the first washer means for receiving a conductor to be contacted and held by the insert face of the cap means.

2. An electrical connector device comprising:

conductive stud means threaded adjacent its first and second ends and having a central recess at the first end; jack contact means in the stud means recess for receiving pin contact means; cap means on the thread of the recessed stud means end and having a central opening for pin contact means to be inserted in the jack means; and intermediate the two ends of the stud means, first and second insulating mounting washer means engaging the stud means for holding a mounting structure therebetween;

the cap means having a threaded metal insert with a smooth portion clearing the stud means threads adjacent the washer means, the outside of the cap means being of insulating material with an inner free diameter at the opening greater than the diameter of the insert thread to form a shoulder on the insert; and the stud means having near the recess a stop flange facing the insert shoulder for preventing removal of the cap means.

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