Feb. 2, 1965 G. A. FULLER 3,168,366

ELECTRICAL CONNECTOR ASSEMBLY

Filed June 12, 1962

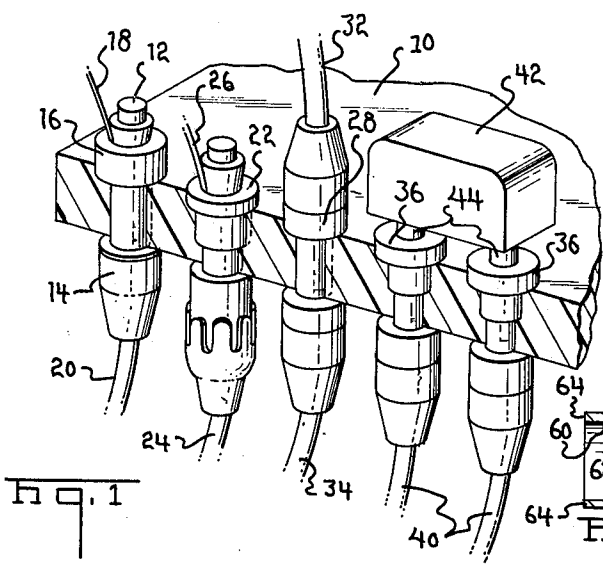

Fig. 1

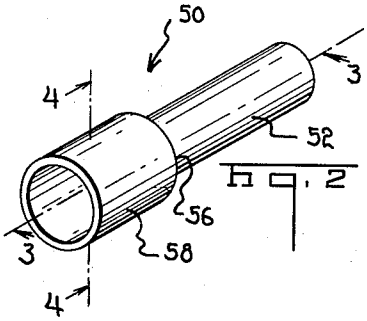

Fig. 2

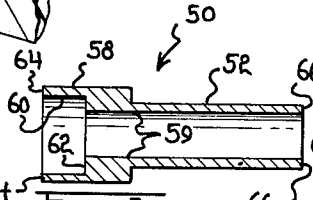

Fig. 3

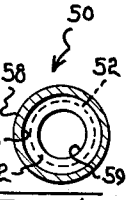

Fig. 4

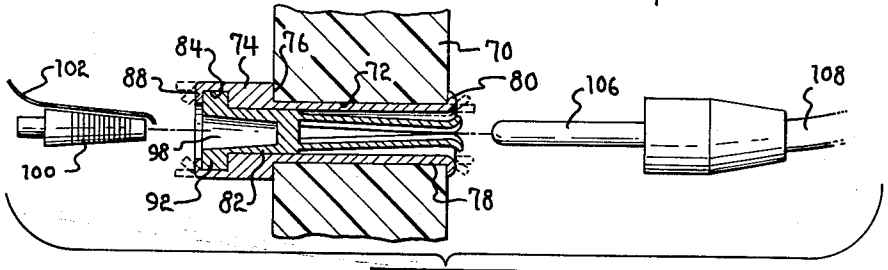

Fig. 5

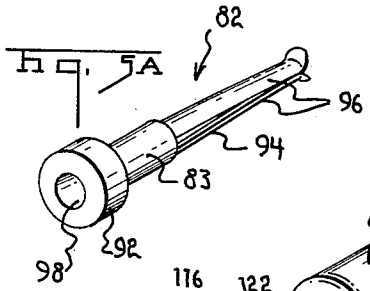

Fig. 5A

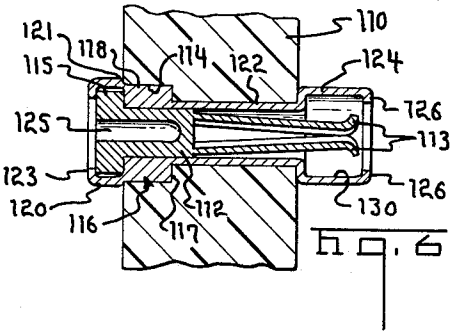

Fig. 6

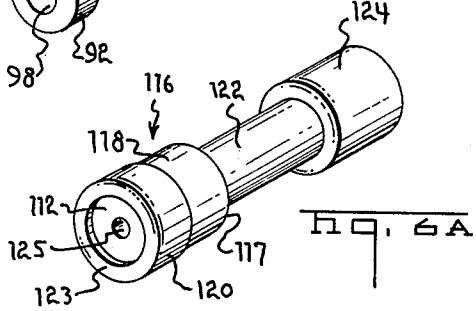

Fig. 6A

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ELECTRICAL CONNECTOR ASSEMBLY

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This invention relates to electrical connecting devices of the type employed to interconnect conductors and more particularly to connector contact assemblies and means for mounting contact assemblies in an insulating board.

The usual electrical connecting device for interconnecting two or more conductors is comprised of contact components and means for mounting such components. With the so-called high reliability connecting devices, both the contact components and the mounting means are manufactured and assembled with care utilizing better grade materials and carrying close tolerances. With the usual low cost connecting devices, less care is taken both in the manufacture of components and in their assembly with a proportionate sacrifice of component life and reliability.

It is one object of the present invention to provide an improved electrical connector assembly having low cost components adapted to be easily assembled.

It is a further object to provide an improved connector assembly capable of interconnecting two electrical conductors in a reliable manner.

It is another object to provide a novel connector contact mounting means.

It is still another object of invention to provide a novel connector assembly of a simple and reliable structure capable of mechanically and electrically interconnecting individual electrical conductors through an insulating board member.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there is shown and described an illustrative embodiment of the invention; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is given for purposes of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

The foregoing objects are attained by the present invention through the provision of a novel contact component mounting means adapted to retain and secure an improved contact component within an insulating board member. The contact component mounting means is comprised of a one piece stepped cylinder of ductile material having wall sections at each end which may be formed to secure the mounting means within an insulating board and at the same time formed to secure a contact component. Due to its configuration, the mounting means of the invention is capable of being utilized in a variety of positions and additionally, in providing support for complementary connector components as well as contact protection for the component secured therein. The contact components of the invention are each comprised of conductive material formed to fit within the inside diameter of the mounting means and to accommodate in axial alignment the insertion of complementary contact members interconnecting distinct electrical conductors. As will be apparent from the description herein to follow, the connector assembly of the invention is extremely simple and may be manufactured and installed without the need for specialized tooling. It should be further apparent that many otherwise critical tolerances are eliminated by the use of the stepped cylinder mounting means in aligning and securing the contact component of the invention.

In the drawings:

FIGURE 1 is a perspective sectional view showing the invention in preferred embodiments and usese relative to interconnecting electrical conductors through an insulating board;

FIGURE 2 is a perspective view of the contact component mounting means of the invention;

FIGURE 3 is a longitudinal section of FIGURE 2 taken along lines 3—3;

FIGURE 4 is a cross section of FIGURE 2 taken along lines 4—4;

FIGURE 5 is a longitudinal section showing the connector assembly of the invention in one embodiment and in one installation in an insulating board member including complementary connector components aligned for insertion therein;

FIGURE 5A is a perspective view of the contact component shown in FIGURE 5;

FIGURE 6 is a longitudinal section of the connector assembly of the invention in a further embodiment and use; and

FIGURE 6A is a perspective of the connector assembly of FIGURE 6.

Referring now to the invention in general, and to FIGURE 1, there is shown an insulating board **10** which may be comprised of the usual insulating materials such as phenolic resin or diallyl-phthlate. Secured within board **10** are a number of contact assemblies of the type contemplated by the invention including the assemblies **16**, **22** and **28** adapted to interconnect individual conductor pairs **18–20**, **26–24** and **32–34** and further including assemblies **36** adapted to interconnect the commonly connected conductive paths **44** of component **42** to individual conductors **40**. While the use of the connector assemblies, as shown, indicates a capability of interconnecting individual conductive paths, it is contemplated that the connector assemblies may be multipled to accommodate a large number of commonly mounted conductors. This possibility is indicated by the use shown with respect to the assemblies **36** and the component **42**. The basic components of each of the assemblies shown in FIGURE 1 include a contact member mounting sleeve having an unformed configuration as shown in FIGURES 2–4 and a contact component inserted and secured within the sleeve in the manner indicated in FIGURES 5, 6 and 6A. As will be apparent from FIGURE 1, each contact assembly, such as **16**, is adapted to receive a connector portion at each end thereof, such as **12** and **14**, and interconnecting conductors, such as **18** and **20**. As will be further apparent from FIGURE 1, the contact mounting sleeve may be employed in different arrangements relative to the surfaces of the insulating board member **10** and may be formed in different manners to accommodate different connector components. As a common feature, each of the connector assemblies shown in FIGURE 1 include a substantial bearing surface with respect to board **10** capable of resisting axial and transverse movements of the connector assembly with respect to the board.

Referring now to the invention in more detail, FIGURES 2, 3 and 4 show the connector mounting member in an unformed state in various views. As shown in FIGURE 2, the connector mounting member **50** is comprised of a stepped cylinder having a relatively small barrel portion **52** and a larger barrel portion **58** disposed to form a transverse flange **56** at their juncture. Extending within barrel portion **52** and within a substantial portion of barrel **54** is an interior sleeve **59**, shown here

as substantially cylindrical. Joining the interior sleeve 59 is a further sleeve 60 forming therewith an interior transverse flange 62. As will be apparent from FIGURES 3 and 4, the diameters of interior sleeves 59 and 60 are such that there is provided a relatively thin wall thickness at each end of member 50. It is important that the flanges formed thereby, such as 64 and 66, have an axial length sufficient to permit forming in the various manners described with respect to FIGURES 5, 6 and 6A. It is further important that the combination of wall thickness and material characteristics permit working of the flange portions 64 and 66 in the manner required without unduely weakening or fracturing such portions. The length of barrel portions 52 and 54 will vary dependent upon the thickness of the insulating board member to which a connection is to be made as well as the length of the particular connector component to be secured within the member 50. The lengths of interior sleeves 59 and 60 depend upon the length of the contact component to be inserted within member 50 and, of course, upon the lengths of the barrel portions 52 and 54.

Turning now to one use of the connector mounting member described with respect to FIGURES 2–3, there is shown in FIGURE 5, a formed connector assembly including a connector mounting member 74 and a connector component 82 secured therein against transverse or axial displacement. As indicated, member 74 is secured to insulating board 70 through aperture 72 by means of the flange or step 76 and a flange 80 formed at one end of the smaller barrel portion 78. The forming of flange 80 may be accomplished by standard eyelet techniques in the manner indicated by the dotted lines representative of the progressive wall movement occurring during forming. At the opposite end of member 74 connector component 82 is secured by means of a flange 88 folded down against the connector component flange 92 as indicated by the dotted line progressions; which operation also may be accomplished by standard eyelet techniques. Because of this, member 74 may be positively and tightly secured to the board member 70 regardless of slight variations in board thickness or in tolerance deviations in the length of barrel section 78. By the same token, contact component 82 may be positively and tightly secured within member 74 regardless of tolerance deviations in the thickness of flange 92 or in the depth of pocket 84. Due to this, components 74 and 82 may be carried in at least two dimensions with a relatively wide tolerance; any differences being accommodated automatically during the assembly of the device.

As shown in FIGURE 5A, member 82 includes a flange portion 92, a smaller barrel portion 83 and a contact portion 94 having contact fingers 96. Further included in member 82 is a tapered sleeve 98 extending within flange 92 and within a portion of barrel 83. The tapered sleeve 98 is adapted to receive a tapered post 100 having a series of serrations disposed to terminate a fine wire conductor 102 within sleeve 98. A connector of this type is generally shown in U.S. Patent No. 3,071,750 to James C. Heselwood. At the other end of member 82 contact fingers 96 are disposed to receive a standard pin contact member 106 and a conductor 108 connected thereto. With the embodiment of FIGURE 5, two assembly techniques are possible. The member 82 may be inserted and interlocked within member 74 which may be thereafter inserted within board 70, or alternatively, member 74 may be first inserted within board 70, connector component 82 being thereafter positioned and secured under flanges 88.

Referring now to FIGURES 6 and 6A, there is shown a further embodiment of the invention adapted to provide an improved clearance on one side of the insulating board member in which it is mounted, and a contact protective feature on the other side of each such member. In this embodiment, board member 110 includes an aperture 114 stepped to accommodate a considerable portion of the larger barrel 118 of contact mounting member 116 which would have an unformed shape like that shown in FIGURES 2–4. Member 116 is formed to provide a flange 120 having a portion 123 adapted to secure connector flange 115 of component 112 in the manner described with respect to the embodiment of FIGURE 5. Flange 120 further includes a portion 121 forming a flange bearing against insulating board 110. In this manner, an additional bearing area is provided serving to interlock member 116 within board 110. This feature is desirable in installations wherein the insulating board member is relatively thin, such that flange 117 has little or no material to bear against in resisting the axial force imparted by withdrawal of a contact pin from member 112. It is contemplated that the embodiment of FIGURE 6 could be made with flange 120 being relatively straight as in the manner of FIGURE 5 in uses wherein the insulating board member is sufficiently thick.

Disposed at the opposite end of member 116 is a further feature wherein the end wall section of the smaller diameter barrel 122 is formed to provide a flange 124 bearing against board 110 and a contact protective pocket 130 defined by flange extensions 126. With this arrangement the contact fingers 113 of contact component 112 are protected against accidental damage or possible misalignment. The contact component embodiment of FIGURE 6 further includes an inner sleeve 125 adapted to receive a standard split pin contact member.

With the assemblies above described, a simple two piece contact assembly may be secured to insulating boards of varying thicknesses in a manner providing reliable and stable electrical interconnections. It should be apparent from the differences between the contact components of FIGURES 5 and 6 that the assembly of the invention may be adapted to secure a variety of contact components capable of receiving connector components other than the particular post and pin shown.

In an actual unit constructed in accordance with the embodiment shown in FIGURE 5, the contact mounting member was comprised of a machined brass sleeve approximately .200 inch in length having external diameters of .070 and .040 and internal diameters of .060 and .038. The contact component secured therein was comprised of beryllium copper and included exterior sleeve diameters of .058 and .030, a bifurcated spring portion approximately .140 in length and inner tapered sleeve approximately .080 in length having an inner diameter of .020 inch. The unit was utilized to satisfactorily interconnect a No. 40 AWG insulated conductor in the tapered portion and a No. 38 AWG insulated conductor having a .020 inch diameter pin member at the spring end.

While the embodiments shown herein include circular cross-sectional configurations, it is fully contemplated that other shapes may be employed.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only.

I claim:

1. An assembly securing an electrical socket in an insulating board member including a mounting member having first and second sleeve portions of relatively thin malleable metal separated by a relatively thick portion having a flange on the exterior surface thereof and adapted to support a contact member therewithin, a contact member positioned within said mounting member, said contact member including a flange extending outwardly, contact portions at each end of the contact member adapted to receive axially forced pin members, including at one end resilient fingers extending out of the board member, the first sleeve portion of said mounting mem-

ber being formed inwardly around said contact member flange to secure the contact member therein and outwardly against the board member to secure the mounting member against axial movement in one sense relative to the board member, the second sleeve portion being formed outwardly against the board member to secure the mounting member against axial movement in the other sense relative to the board member.

2. The assembly of claim 1 wherein said second sleeve portion is further formed to extend over and in spaced relationship to said fingers.

3. The assembly of claim 1 wherein said second sleeve portion has an outside surface of a configuration to receive portions of a further contact and is further formed inwardly to define an aperture at the end thereof of reduced diameter.

References Cited in the file of this patent

UNITED STATES PATENTS

399,465	Bainbridge	Mar. 12, 1889
1,236,188	Lightfoot	Aug. 7, 1917
1,237,718	Speice	Aug. 21, 1917
2,235,275	Winning	Mar. 18, 1941
2,443,513	Quackenbush	June 15, 1948
2,510,339	Heiss	June 6, 1950
2,617,846	Field	Nov. 11, 1952
2,958,845	Dupre et al.	Nov. 1, 1960

FOREIGN PATENTS

852,707	Germany	Oct. 16, 1952
929,201	Germany	June 20, 1955
246,700	Great Britain	Feb. 4, 1926