Oct. 10, 1961 G. K. DICKENSON ET AL 3,004,236

CONNECTOR PLUG ASSEMBLY

Filed Dec. 23, 1959 2 Sheets-Sheet 1

Fig. 1.

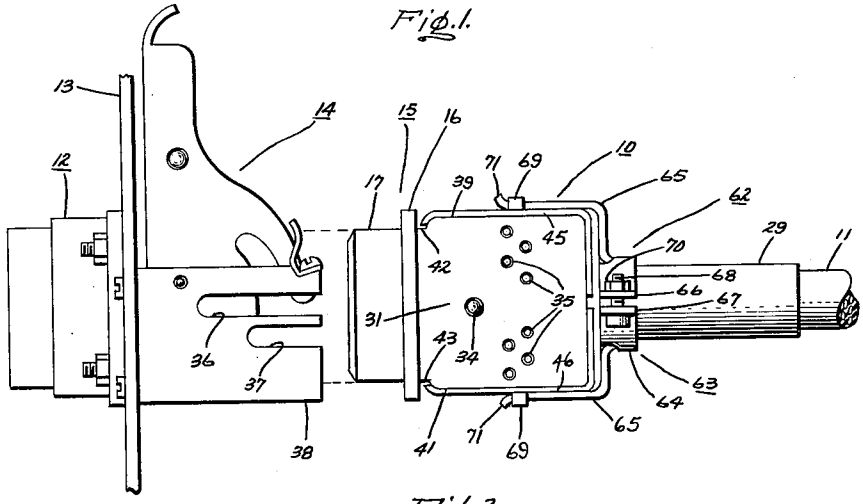


Fig. 2.

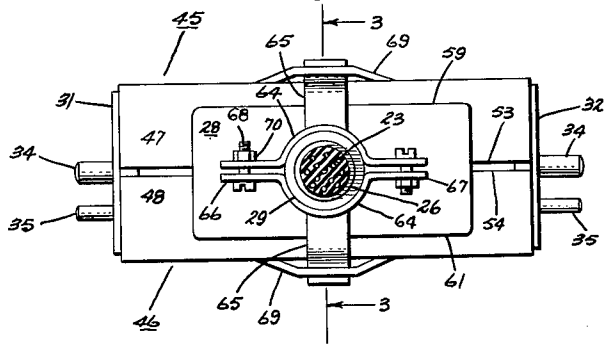
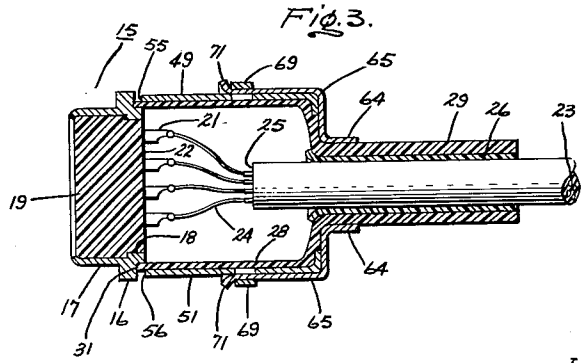


Fig. 3.



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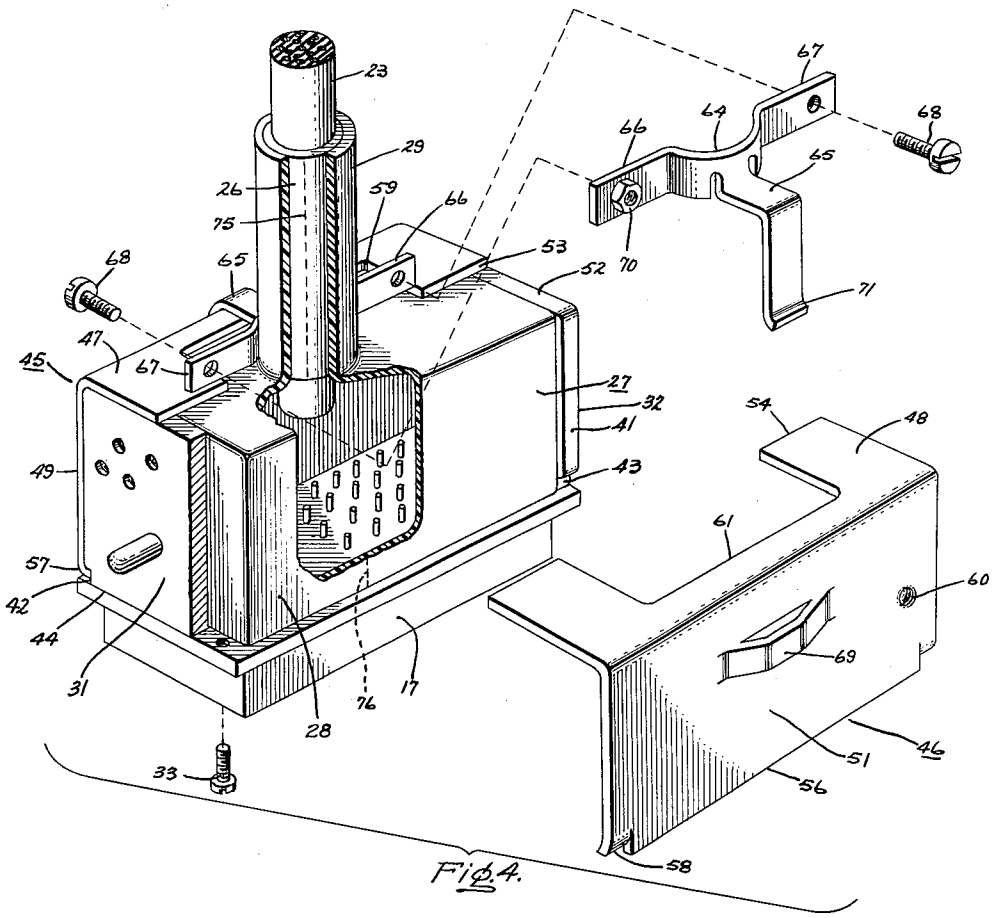


Fig. 4.

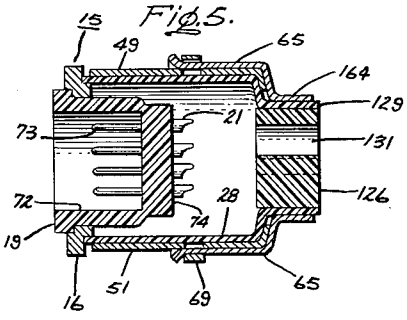


Fig. 5.

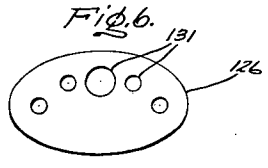


Fig. 6.

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CONNECTOR PLUG ASSEMBLY

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Filed Dec. 23, 1959, Ser. No. 861,483
4 Claims. (Cl. 339—103)

This invention relates generally to connectors for effecting interconnection between a multiple conductor cable and electrical apparatus or another cable, and more particularly to a connector plug assembly.

Multiple contact connectors are commonly employed for removably connecting multiple conductor cables to complex electronic apparatus. Since the connector plug on the end of the cable is both subject to mechanical damage, as by dropping, and to the entry of dust and other foreign matter, as by being dragged along the ground, it is generally necessary that the connector plug not only be mechanically rugged, but also incorporate means sealing the interior thereof against the entry of dust and dirt. Further, since a wide variety of cable sizes are utilized in electronic apparatus, it is desirable that connector plug assemblies be capable of accommodating such variety of cable sizes, and types, with a minimum number of components. It is additionally desirable that the connector plug assembly provide strain relief for the cable.

It is therefore an object of our invention to provide an improved connector plug assembly.

Another object of our invention is to provide an improved connector plug assembly for multiple conductor cable incorporating the desirable features set forth above.

Our invention, in its broader aspects, provides a connector plug assembly having a base member with an insulating contact supporting member inserted therein having a plurality of contact elements depending therethrough, with portions projecting on its inner side. The base member has a pair of spaced apart side plate members extending upwardly therefrom on opposite sides of the contact supporting member and a section of electrical cable is provided having a plurality of conductors extending from one end thereof and respectively attached to the contact element projecting portions. A dust cover member is provided preferably formed of insulating material having a hollow body portion open at one end and having a sleeve portion formed on and extending from its other end. The cable extends through the sleeve portion of the dust cover member and the body portion is positioned between the side plate members with its bottom edge engaging the base member and peripherally surrounding the contact supporting member thereby closing the projecting portions of the contact elements and the cable conductors attached thereto. A pair of cooperating outer cover members are provided respectively extending between the side plate members and engaging the same, the cover members substantially enclosing and mechanically protecting the dust cover member body portion. The cover members have mating cutout portions formed therein with the dust cover sleeve portion extending through the opening defined thereby. Means are provided having a first portion clamping the dust cover sleeve portion and second portions respectively engaging the cover members thereby maintaining the connector in assembled relationship and providing strain relief for the cable.

The above-mentioned and other features and objects of this invention and the manner of attaining them will become more apparent and the invention itself will be best understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a side elevational view of the connector plug assembly of our invention;

FIG. 2 is a top view of the connector plug assembly of FIG 1;

FIG. 3 is a cross-sectional view taken along the line 3–3 of FIG. 2;

FIG. 4 is an exploded view, partly broken away, further illustrating our improved connector plug assembly;

FIG. 5 is a cross-sectional view similar to FIG. 3 but showing a modified form of our connector plug assembly; and

FIG. 6 is a fragmentary view showing the insert member of the connector plug assembly of FIG. 5.

Referring now to FIGS. 1 through 4 of the drawing, our improved connector plug assembly, generally indicated at **10**, is shown employed for connecting the conductors of cable **11** to a complementary connector **12** mounted on panel **13** of other apparatus (not shown), engagement and disengagement of the connector plug assembly with the complementary connector part **12** being facilitated by actuating mechanism **14**. The connector actuating mechanism **14** and its associated connector part **12** do not form a part of our present invention, being described and illustrated in application Serial Number 681,663, filed September 3, 1957 of Meredith D. Wamsley and assigned to the assignee of the present application.

Connector plug assembly **10** comprises a generally rectangular base member **15** which, in the embodiment of FIGS. 1 through 4, is shown as including a flat plate or flange portion **16** and a depending portion **17**. Base member **15** is preferably formed of suitable metal, such as steel, and has a generally rectangular opening **18** formed therethrough having contact supporting member **19** formed of suitable insulating material inserted therein, as shown. A plurality of contact elements extend through contact supporting member **19** and have a plurality of portions **21** projecting from its inner surface **22**. The depending portion **17** of base member **15** is adapted to be received in a complementary recess in connector **12** so that flange portion **16** abuts mounting panel **13**. The contact elements of the connector plug assembly shown in FIGS. 1 through 4 are shown as being of the female type, thus respectively receiving the complementary male contact elements of the connector part **12** positioned on the bottom of the recess which receives depending portion **17** of base member **15** (not shown). It will be readily understood however that the contact elements can equally well be of the male type.

A multiple conductor electrical cable **23** is provided having a plurality of conductors **24** extending from its end **25** and respectively connected to the contact element projecting portions **21** in any suitable manner as by soldering or crimping. An adaptor sleeve **26** formed of suitable insulating material, such as vinyl, is arranged over cable **23** adjacent end **25** and embraces the same, as shown.

A dust cover member **27** is provided formed of suitable resilient insulating material, such as vinyl. Dust cover member **27** has a generally rectangular, thin wall,

body portion 28 open at one end and having a sleeve portion 29 extending from its other end. As best seen in FIG. 3, sleeve portion 29 of dust cover member 27 is arranged over the adaptor sleeve 26, embracing the same, and the peripheral edge 31 of body portion 28 engages the upper surface of flange portion 16 of base member 15 peripherally surrounding contact supporting member 19, thereby enclosing end 25 of cable 23, the projecting portions 21 of the contact elements and the cable conductors 24 attached thereto.

A pair of spaced apart parallel generally rectangular side plate members 31 and 32 are provided secured to flange portion 16 of base member 15 at opposite ends of opening 18 and extending upwardly therefrom. Side plate members 31 and 32 are formed of suitable metal, such as steel, and are attached to flange portion 16 of base member 15 by an suitable means, such as screws 33. It will be observed, with particular reference to FIG. 4 that the body portion 28 of the dust cover member 27 is disposed between the side plate members 32 with its opposite ends preferably respectively in engagement with their inner surfaces. Pins 34 and 35 extend outwardly from the side plate members 31 and 32 cooperating respectively with open ended slots 36 and 37 in members 38 of actuator assembly 14, as further described in the aforementioned Wamsley application, pins 34 and 35 therefore not forming a part of the present invention.

The opposite side edges 39 and 41 of each of the side plate members 31 and 32 respectively have notched portions 42 and 43 formed therein adjacent their bottom edges 44 for a purpose to be hereinafter described.

In order mechanically to protect dust cover member 27, a pair of cooperating outer cover members 45 and 46 are provided, each having a generally L-shaped cross-section, thereby defining top walls 47 and 48 and side walls 49 and 51. Cover members 45 and 46 respectively extend between side plate members 31 and 32 with their top walls 47 and 48 respectively engaging top edges 52 of the side plate members 31 and 32, and with their side walls 49 and 51 respectively engaging the opposite side walls 39 and 41. It will be seen, with particular reference to FIG. 2 that the top longitudinal edges 53 and 54 of the cover members 45 and 46 are juxtapositioned, i.e., either directly abutting or closely adjacent, as shown. As best seen in FIG. 3, the bottom edges 55 and 56 are closely adjacent the upper surface of flange portion 16 of base member 15. Cover members 45 and 46 are maintained in engagement with side plate members 31 and 32 by means of tabs 57 and 58 formed from bottom edges 55 and 56 which respectively engage the notches 42 and 43 in the side plate members 31 and 32, as shown. Each cover member 45, 46 has a dimple 60 formed in the respective side wall 49, 51 which abuts the inner surface of side plate member 41 in order to preclude sidewise movement or slipping of the cover members after complete assembly of the connector plug.

The top walls 47 and 48 of the cover members 45 and 46 have mating cut-out portions 59 and 61 respectively extending outwardly from their top longitudinal edges 53 and 54, cut-out portions 59 and 61 being in alignment, thereby defining an opening through which the sleeve portion 29 of dust cover member 27 extends, as shown.

In order to hold the connector plug 10 in assembled relation and to provide strain relief for cable 11, a pair of clamp members 62 and 63 are provided each having a clamping portion 64 and a leg portion 65. Clamping portion 64 has extensions 66 and 67 which are secured together in any suitable manner, as by threaded fasteners 68 engaging nuts 70 preferably secured to the respective extensions 66, 67, thereby holding the clamping portions 64 in clamping relationship on the sleeve portion 29 of dust cover 27, as shown. Each of the outer cover members 45 and 46 has a projection 69 formed outwardly from its side wall 49 and 51, respectively, and the leg portion 65 of the clamping members 62 and 63 respectively extend over the top walls 47 and 48 and the side walls 49 and 51 of the cover members 45 and 46, and are provided with hook portions 71 on the ends thereof which respectively engage projecting portions 69, as best seen in FIG. 3.

It will now be seen that the clamping members 62 and 63, through their clamping portions 64 effectively clamp sleeve portion 29 of dust cover 27 in turn clamping the same to cable 11, thus providing strain relief. Cooperative engagement of hook portions 71 of leg portions 65 of the clamping members 62 and 63 with projections 69 in turn maintain the cover members 45 and 46 in their assembled relation, and thus, tension exerted upon cable 11 is applied to the side plates 31 and 32 rather than on the conductors 24 and contact element projecting portions 21.

The embodiment of FIGS. 1 through 4, inclusive, shows a connector plug assembly having a male depending portion 17 incorporating female-type contact elements connected to a multiple conductor cable. As shown in FIG. 5, in which like elements are indicated by like reference numerals, our invention is equally applicable to a connector plug assembly having a female recess for receiving a complementary male connector portion, and having male-type contact elements. The embodiment of FIG. 5 is further suitable for use with one or more coaxial cables. Here, the base member 15 does not have the depending portion 17 of the previous figures and the contact supporting member 19 has a recess 72 formed therein with male contact elements 73 positioned therein and extending through bottom portion 74 as shown. In order to accommodate one or more coaxial cables, the sleeve member 26 of FIGS. 1 through 4 takes the form of an insert member 126, which may be elliptical in form, as shown in FIG. 6, and which is formed of suitable insulating material, such as rubber or neoprene. In this embodiment, the sleeve portion 129 of dust cover member 27 is enlarged to conform to and embrace the insert member 126, and likewise, the clamping portions 164 of the clamping members 62 and 63 are enlarged to engage and clamp sleeve portion 129 of dust cover 27. Insert member 126 has suitable openings 131 extending therethrough for accommodating the coaxial cable. It will again be understood that female-type contact elements may be employed in the embodiment of FIG. 5. Apart from the foregoing, the embodiment of FIG. 5 is identical to that shown in the previous figures.

In assembling our improved connector plug assembly, the cable 23 is inserted through the sleeve portion 29 of the dust cover member 27 and in turn through the sleeve member 26 with the conductor ends 24 being soldered or crimped to the contact element projecting portions 21. The sleeve member 26 is then moved down the cable 23 toward end 25 and the dust cover member 27 is in turn moved down the cable allowing the sleeve portion 29 to fit over and embrace the sleeve member 26 and the bottom peripheral edge of the body portion 28 to seat against the plate or mounting flange portion 16 of base member 15. The cover members 45 and 46 are then installed followed by installation of the clamping members 62 and 63. It will be observed that the clamping members 62 and 63 serve a three-fold purpose; they hold the dust cover 27 and adaptor sleeve 26 in place, they hold the outer cover members 45 and 46 in place, and further, they provide strain relief for the cable 23. The assembly procedure for the embodiment of FIG. 5 is the same as for the embodiments of FIGS. 1 through 4. While the foregoing envisions assembly of the sleeve member 26 or adaptor 126 and the dust cover member 27 on the cable 23 or coaxial cable as the case may be, prior to connection of the conductors 24 to the contact elements 21, installation of these elements after wiring of the connector plug is simply accomplished by merely

slitting the sleeve member **26** and the dust cover member **27** as suggested by the dashed lines **75** and **76**, it being understood that sleeve member **26** should be rotated with respect to sleeve member **29** of dust cover member **27** so that the two slits will not be adjacent.

It will now be readily comprehended that we have provided an improved multiple contact connector plug assembly in which the requisite mechanical protection, sealing against the entrance of dust, flexibility, and cable strain relief, is provided in a simple, readily manufactured and assembled device. An additional feature of our invention is the fact that it does not discriminate between male and female connectors, or male and female contact elements.

While we have described above the principles of our invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of our invention.

What is claimed is:

1. A connector plug assembly comprising: a base member having an insulating contact supporting member inserted therein with a plurality of contact elements extending therethrough with portions projecting on its inner side, said base member having a pair of spaced side plate members extending upwardly therefrom on opposite sides of said contact supporting member; a section of electrical cable having a plurality of conductors extending from one end thereof and respectively attached to said contact element projecting portions; a dust cover member having a hollow body portion open at one end and having a sleeve portion formed on and extending from its other end, said cable extending through said sleeve portion, said body portion being positioned between said side plate members with its bottom edge engaging said base member and peripherally surrounding said contact supporting member thereby enclosing said projecting portions of said contact elements and said conductors attached thereto; a pair of cooperating outer cover members respectively extending between said side plate members and engaging the same thereby substantially enclosing said dust cover member body portion, said cover members having mating cut-out portions formed therein with said dust cover sleeve portion extending through the opening defined thereby; and means having a first portion clamping said dust cover sleeve portion and second portions respectively engaging said cover members thereby maintaining said connector in assembled relationship and providing strain relief for said cable.

2. A connector plug assembly comprising: a generally rectangular base member having a plurality of contact elements extending therethrough with portions projecting on its inner side, said base member having a pair of spaced parallel plate members extending upwardly from its inner side respectively on opposite sides of said contact elements projecting portions; a section of electrical cable having a plurality of conductors extending from one end thereof and respectively attached to said projecting portions of said contact elements; an insulating sleeve member embracing cable adjacent said one end; a dust cover member formed of insulating material having a generally rectangular hollow body portion open at one end and having a sleeve portion formed on and extending from its other end, said dust cover member having its sleeve portion embracing said sleeve member and its body portion positioned between said side plate members with its bottom edge engaging said inner base member side around said projecting portions of said contact elements thereby enclosing the same and the said conductors attached thereto; a pair of outer cover members respectively extending between said side plate members and engaging the same with their top edges closely adjacent each other and their bottom edges respectively closely adjacent said inner base member sides thereby essentially enclosing said dust cover member body portion, said cover members respectively having mating cut-out portions formed in their top edges with said dust cover sleeve portion extending through the opening defined thereby; and a pair of clamp members respectively having portions clamping said dust cover sleeve portion and leg portions extending over said outer cover members and engaging portions thereon thereby maintaining said connector in assembled relationship and providing strain relief for said cable.

3. A connector plug assembly comprising: a generally rectangular metal base member having an opening formed therethrough; a contact supporting member formed of insulating material secured in said opening and having a plurality of contact elements extending therethrough with portions projecting on its inner side; a pair of upstanding generally rectangular metal side plate members secured to said base member at opposite ends of said opening; a section of electrical cable having a plurality of conductors extending from one end thereof and respectively attached to said projecting portions of said contact elements; a sleeve member formed of insulating material embracing said cable adjacent said one end; a dust cover member formed of resilient insulating material having a generally rectangular hollow body portion open at one end and having a sleeve portion formed on and extending from its other end, the walls of said body portion being relatively thin, said dust cover member having its sleeve portion embracing said sleeve member and its body portion positioned between said side plate members with its corresponding opposite ends respectively engaging the same and with its bottom marginal edge engaging said base member around the periphery of said opening thereby enclosing said projecting portions of said contact elements and the said conductors attached thereto; a pair of cooperating outer metal cover members each having a generally L-shaped cross-section defining top and side walls, said outer cover members extending between said side plate members with their top and side walls respectively engaging the top and side outer edges thereof and having their top edges closely adjacent each other and their bottom edges respectively closely adjacent said base member thereby essentially enclosing said dust cover member body portion, said cover members being respectively removably secured to said side plate members adjacent said base member, each of said outer cover members having projecting portions formed from their side walls and extending outwardly therefrom substantially midway between their sides, said cover members respectively having mating cut-out portions formed in their top walls extending inwardly from their top edges with said dust cover sleeve portion extending through the opening defined thereby; and a pair of clamp members respectively having portions clamping said dust cover sleeve portion and hook portions extending over the top and side walls of said outer cover members and engaging said projecting portions thereby maintaining said connector in assembled relationship and providing strain relief for said cable.

4. A connector plug assembly comprising: a generally rectangular base member having a generally rectangular insulating contact supporting member inserted therein with a plurality of contact elements extending therethrough, said base member having a pair of spaced parallel side plate members extending upwardly therefrom on opposite sides of said contact supporting member; a dust cover member formed of resilient insulating material having a generally rectangular hollow body portion open at one end and having a sleeve portion formed on and extending from its other end, an inner sleeve member within and embraced by said dust cover sleeve member for admitting an electrical cable to the interior of said connector assembly, said body portion being positioned between said side members with the edge of its open end engaging said base member and peripherally surrounding said contact supporting member; a pair of cooperating outer cover members respectively extending between said

side plate members and engaging the same, said cover members being in longitudinal juxtaposition with their outer edges respectively contiguous to said base member thereby substantially enclosing said dust cover member body portion, the adjacent edges of said cover members having mating cut-out portions formed therein with said dust cover member sleeve portion extending therethrough; and a pair of clamping members respectively having first portions embracing and clamping said dust cover sleeve portions and leg portions respectively extending over said cover members and engaging projections thereon thereby maintaining said connector in assembled relationship.

References Cited in the file of this patent

UNITED STATES PATENTS

1,874,334	Nero	Aug. 30, 1932
1,949,596	Anderson	Mar. 6, 1934
2,750,572	Fox	June 12, 1956