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[54] **CONNECTOR ASSEMBLY ADAPTED FOR USE
WITH A COAXIAL CABLE**
4 Claims, 2 Drawing Figs.

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126 J, 174/75 C, 88 C, 89**

[56]

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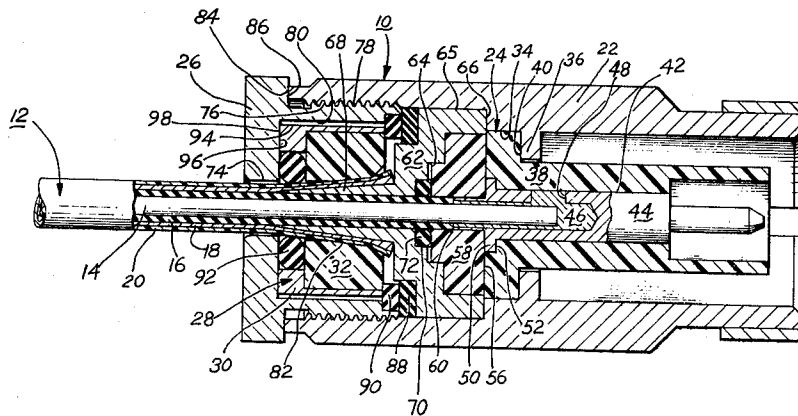
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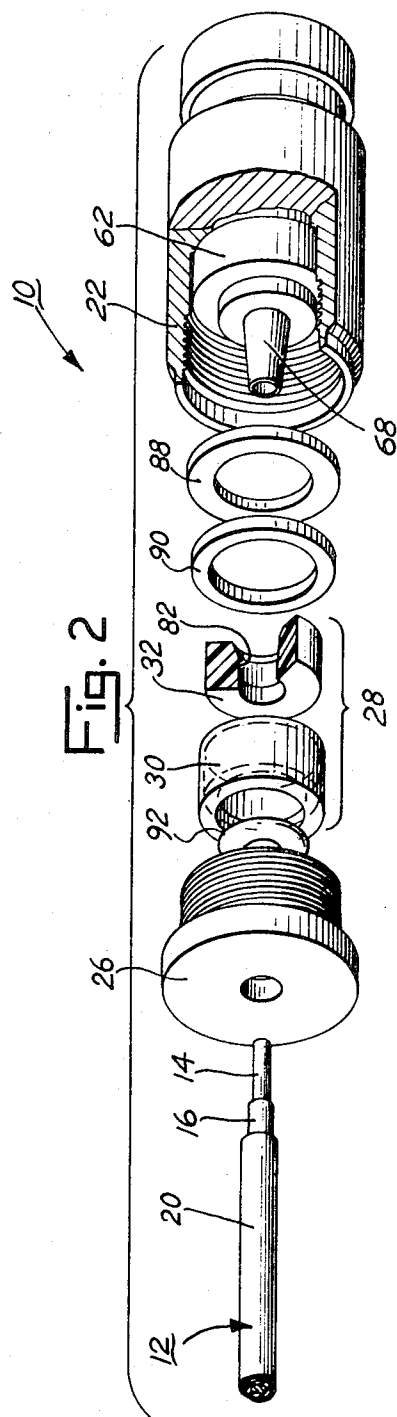
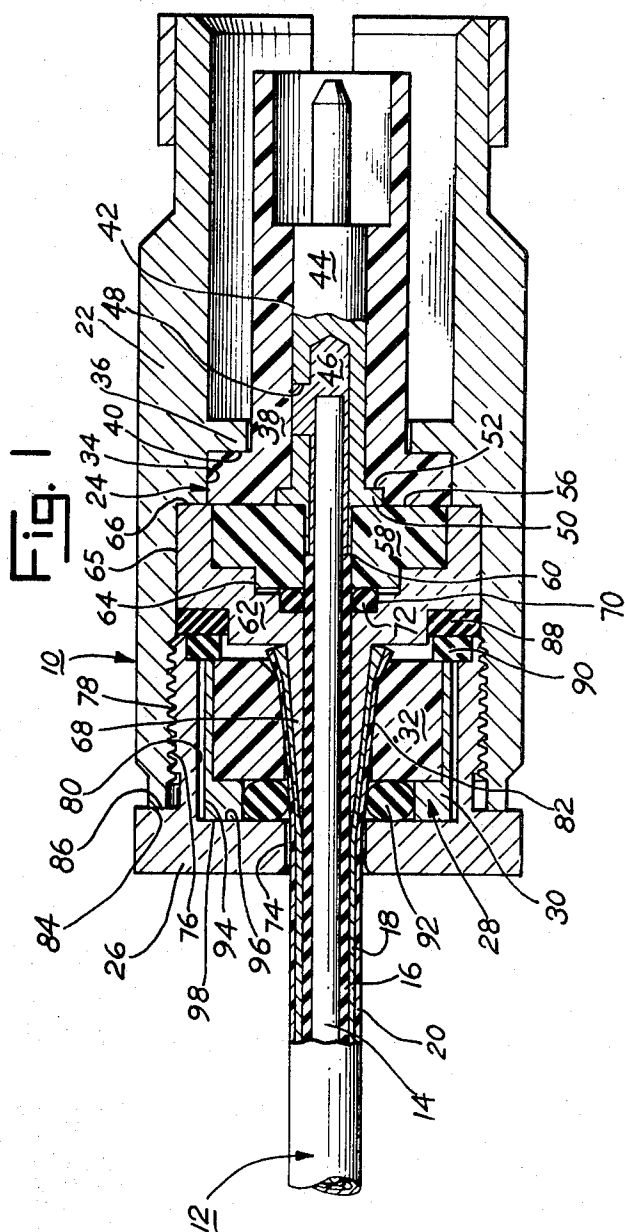
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ABSTRACT: An electrical connector assembly adapted for use with a coaxial cable to provide improved gripping of said coaxial cable.





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CONNECTOR ASSEMBLY ADAPTED FOR USE WITH A COAXIAL CABLE

BACKGROUND OF THE INVENTION

Coaxial connector assemblies are conventionally used to interconnect two ends of coaxial cable. Coaxial cable generally consists of an inner conductor, an outer conductor circumferentially disposed around the center conductor, a cylindrical dielectric occupying the space between the center and the outer conductors, and an outer cylindrical jacket over the outer conductor for its protection. The outer conductor, although in a few specific cases, may be made out of a solid metallic tube, is usually woven out of fine metallic threads in the form of a braid.

Because of the rather delicate construction of the woven metallic threads forming the braid conductor, the fastening techniques of mechanically and electrically securing the braid to the body or housing of the coaxial connection have been, at best, marginally satisfactory in terms of current specifications being invoked by the users of the coaxial connector assemblies. More specifically, the manner in which and force with which the connector assembly grips or clamps the coaxial cable has been responsible for the braid conductor breaking at or near the point of contact with the connector assembly, and generally speaking, lower than desirable gripping or holding forces by the connector assembly of the braid conductor of the coaxial cable have been experienced.

Attempts to minimize, if not eliminate, these problems have been numerous, as may be seen in the art. The present invention represents an improvement over U.S. Pat. No. 3,209,287 having the same assignee as this invention, and over the prior art in that it corrects for the above mentioned problems.

SUMMARY OF THE INVENTION

It is an object of this invention to provide an improved coaxial connector assembly.

It is an object of this invention to provide a coaxial connector assembly having improved gripping characteristics with respect to the coaxial cable connected thereto.

It is an object of this invention to provide a coaxial connector assembly having a frustoconical portion which cooperates with a retainer means and a wedge means to clamp the jacket and outer conductor of the coaxial cable therebetween.

It is an object of this invention to provide a coaxial connector assembly having a frustoconical portion against which a retainer means, which carries a sleeve member containing a resilient means, wedges the jacket and outer conductor of the coaxial cable.

It is an object of this invention to provide a coaxial connector assembly which includes an improved seal means between said assembly and the coaxial cable which it carries.

Other objects and features of this invention will be apparent from the following description of the connector assembly taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of a coaxial connector assembly and coaxial cable connected thereto.

FIG. 2 is a partially exploded view of the structure shown in FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIGS. 1 and 2, therein is shown a coaxial connector assembly 10 and a coaxial cable 12. The coaxial cable 12 is comprised of a center conductor 14, a dielectric separator member 16, an outer conductor (cable braid) 18, and a jacket 20. The coaxial connector assembly 10 is comprised of a housing 22, a coaxial insert 24, a retainer means 26, and a wedge means 28 including a sleeve member 30 and a resilient means 32.

The housing 22 has a bore 34 with a flange 36 for receiving a dielectric guide member 38. The dielectric guide member 38

has a flange portion 40 which engages the flange 36 to positively locate the guide member 38. The guide member 38 has a bore 42 to carry a conductive pin 44 which is soldered as at 46 to the center conductor 14. The pin 44 has an inspection hole 48 to facilitate visual verification of the solder joint prior to assembly. The pin 44 has a flange 50 which abuts a shoulder 52 of the guide member 38 to give the pin 44 a positive axial position relative to the guide member 38 and housing 22. The guide member 38 has another shoulder 56. The shoulder 56 is radially aligned with flange 50 of the pin 44 to serve as an abutment surface for the end of a guide member 58. The guide member 58 has a bore 60 which is predetermined to snugly fit around the outer diameter of the dielectric separator member 16 which separates the center and outer conductors 14 and 18, respectively. A conductive insert 62, having a stepped inner bore 64 to mate with the guide member 58, is carried in bore 65 and positively located against shoulder 66 of the housing 22. The conductive insert 62 includes a frustoconical projection 68 which is wedged between the outer conductor 18 and the dielectric separator member 16 before the pin 44 is soldered to the center conductor 14. The conductive insert 62 may further include a groove 70 for receiving an annular seal means 72 which creates a moisture barrier between the dielectric separator member 16 and the guide member 58. The retainer means 26 has a bore 74 that allows it to fit tightly around the outer periphery of the jacket 20 of the coaxial cable 12. The bore 74 is, however, predetermined to allow axial and radial movement of the retainer means 26 with respect to the coaxial cable 12. The retainer means 26 has a threaded portion 76 for threadable engagement with threaded portion 78 of the housing 22. The retainer means 26 further includes a bore 80 which carries the metal sleeve member 30 which, in turn, carries the resilient means 32. More specifically, the resilient means 32 is preferably made of an annulus of plastic material or equivalent; for example, Polypropethelene, Delrin, or Teflon may be used. The inner periphery of the resilient means 32 also has a frustoconical contour 82 to, as close as possible, match that of the frustoconical projection 68. As may be seen in FIG. 1, the outer conductor 18 and jacket 20 are sandwiched or wedged between the frustoconical surface 82 of the resilient means 32 and the frustoconical projection 68 to lock the coaxial cable 12 to the coaxial connector assembly 10. It is specifically noted that when the retainer means 26 is threaded into the housing 22 so as to have its flange 84 abut a shoulder 86 of the housing 22, the resilient means 32 is compressed within the sleeve member 30 to exert a rather large force against the jacket 20 and outer conductor 18 to hold them firmly against the frustoconical projection 68. Further, it is noted that the volume of the resilient means 32 is large when compared to the volume of the jacket material 20 against which the resilient means 32 exerts a force. Thus, as the jacket 20 ages with time and takes (what is referred to in the art as) a set, or tends to shrink, the previously compressed resilient means 32 expands to compensate for the jacket shrinkage and thereby provides a relatively constant holding force by the coaxial connector assembly 10 on the coaxial cable 12. The resilient means 32 will likewise respond to compensate for deterioration or change in the jacket 20 due to exposure to high and low temperature variations or other environmental conditions. To further assist in immunizing the interior of the coaxial connector assembly 10 from the environments in which it is frequently used, seals 88, 90, and 92 are provided.

With regard to the assembly of the coaxial connector assembly 10 with the coaxial cable 12, it is emphasized that while the retainer means 26 is being threaded into the housing 22, relative rotation is maintained between the retainer means 26 and the wedge means 28. The relative rotation is accomplished by providing a clearance between the outer periphery 94 of the sleeve member 30 and the bore 80 of the retainer means 26, and by having smooth surface finishes on surface 96 of the sleeve member 30 and surface 98 of the retainer means 26. This relative rotation allows the wedge means 28 to remain

in a fixed place and exert an axial clamping or gripping force on the coaxial cable 12 while the retainer means 26 is being threadably secured to the housing 22 which eliminates the probability of twisting and tearing the outer conductor 18 and jacket 20 during installation of the coaxial cable 12 with the coaxial connector assembly 10. Another advantage of this invention results from the fact that the retainer means 26 has the flange 84 which upon assembly with the housing 22 abuts shoulder 86 of the housing 22, thereby eliminating any requirement to torque the retainer means 26 to a specific predetermined value. In essence, the abutment of flange 84 and shoulder 86 automatically insure the proper holding force of the wedge means 28 on the jacket 20 and outer conductor 18 of the coaxial cable 12.

While the specific details have been herein shown and described, the invention is not confined thereto, as other substitutions can be made within the spirit and scope of the invention.

We claim:

1. An electrical connector adapted for use with a coaxial cable, said coaxial cable including an inner and an outer conductor separated by an insulator means and a jacket over said outer conductor, said connector comprising:

a housing;

a coaxial insert suitably installed within said housing, said coaxial insert including inner and outer conductors for receiving, respectively, said inner and outer conductors of said coaxial cable, said outer conductor of said coaxial insert having a frustoconical projection;

retainer means operative connected to said housing;

wedge means carried within said retainer means to wedge said jacket and said outer conductor of said coaxial cable to said frustoconical projection, said wedge means including a sleeve member carried by said retainer means and being generally cup-shaped and circumferentially free to allow rotation of said retainer means relative to said sleeve member, and resilient means carried in said sleeve member and having an interior frustoconical surface for locking said jacket and said outer conductor of said coaxial cable to said frustoconical projection; and

first seal means carried in an annular groove formed by said retainer means, said sleeve member and said resilient means.

2. The electrical connector, as recited in claim 1, further including second seal means interposed between said retainer means, said sleeve means, said resilient means and said coaxial insert.

3. The electrical connector, as recited in claim 1, wherein said resilient means is specifically shaped so that, when said retaining means abuts said housing, said resilient means will exert a sufficient force against said outer conductor and said jacket of said coaxial cable to firmly hold the coaxial cable in

place and, simultaneously, prevent damage to said coaxial cable.

4. In an electrical connector for use with a coaxial cable having inner and outer conductors, an insulating layer between said inner and outer conductors, and an insulating jacket surrounding said outer conductor:

an annular, electrically conductive housing;

a conductor pin within said housing for receiving said inner conductor;

means insulating said conductor pin from the wall of the housing;

an annular conical member disposed within said housing between said insulating layer and said outer conductor, said conical member being in electrical contact with the wall of the housing;

a resilient annular member circumscribing said conical member, said outer conductor and said jacket being disposed between the outer circumferential surface of said conical member and the inner circumferential surface of said resilient annular member; retaining means carried by said housing and movable relative thereto along the axis of the housing, said retaining means and said housing having opposite abutment surfaces thereon;

said retaining means exerting an increasing axially directed force on said resilient annular member as the abutment surface on the retaining means is advanced toward the abutment surface on the housing to compress said annular member axially to permit the latter to expand radially, whereby said annular member exerts an increasing radial force on said outer conductor and jacket to retain the latter against the conical member;

the axially directed force exerted by the retaining means on said resilient annular member being limited by the engagement of the abutment surface on the retaining means with the abutment surface on said housing to thereby limit the radially directed force exerted by said resilient annular member on said outer conductor and said insulating jacket to a predetermine maximum level;

said retaining means including a portion engaging the inner circumferential surface of said housing; and

a sleeve circumscribing the outer circumferential surface of said resilient annular member to limit radial outwardly expansion of the latter to permit relative movement between the retaining means and the housing;

said sleeve having an inwardly extending projection between the end of said annular resilient member and said retaining means; and

an annular seal disposed in the cavity defined by said inwardly extending projection, the retaining means, the end of said annular resilient member and said insulating jacket.

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