

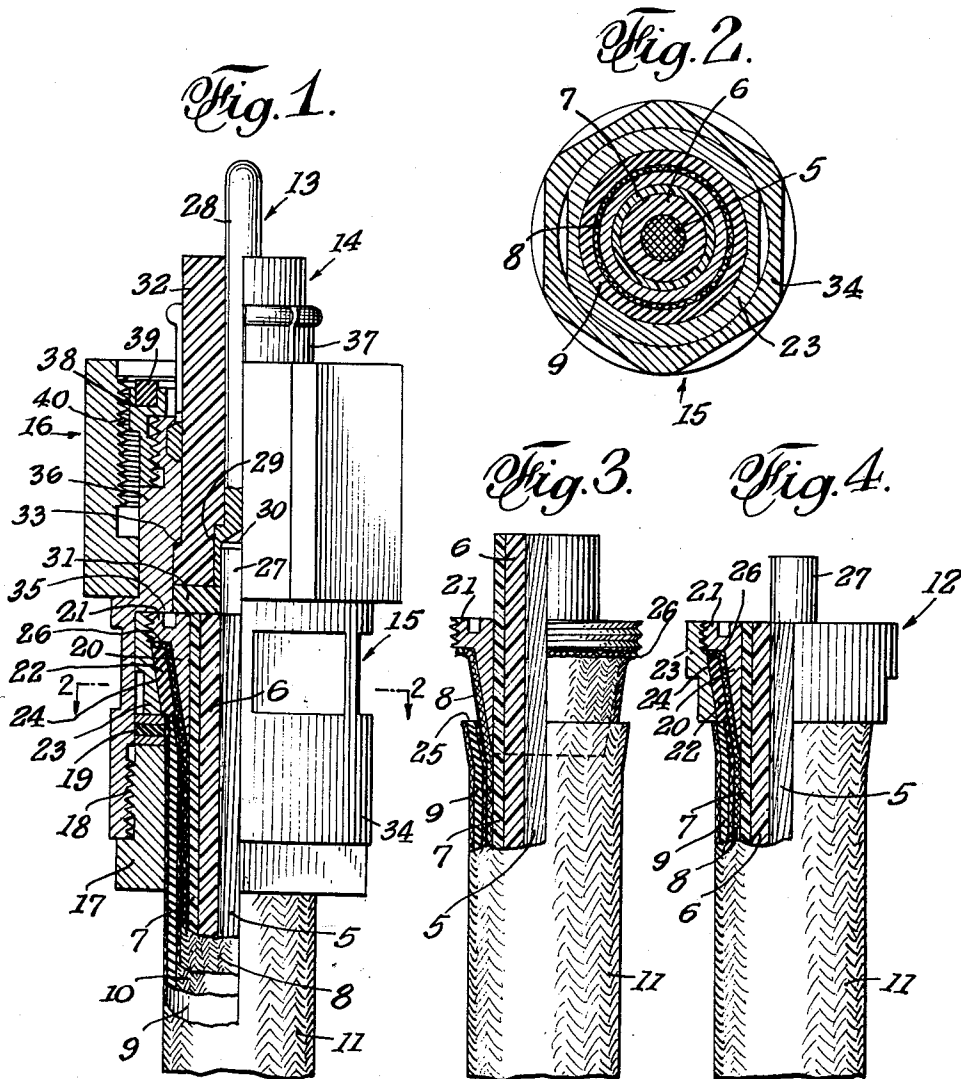
Jan. 15, 1963

J. S. OVERHOLSER

3,074,045

CABLE CONNECTOR AND METHOD OF ASSEMBLY

Filed March 21, 1960



INVENTOR.

JOHN S. OVERHOLSER

BY

C. L. Stratton

ATTORNEY

1

3,074,045

CABLE CONNECTOR AND METHOD OF ASSEMBLY

John S. Overholser, Los Angeles, Calif., assignor to Tamar Electronics, Inc., Gardena, Calif., a corporation of California

Filed Mar. 21, 1960, Ser. No. 16,454

3 Claims. (Cl. 339-177)

This invention relates to a cable connector and to a method for assembling the same.

Coaxial cables ordinarily comprise a center conductor, a surrounding braided conductive shield, a "Teflon" core between said conductor and shield, a flexible, preferably rubber, insulating sleeve around the shield, an outer braided fabric cover over the insulating sleeve and, optionally, a braided fabric layer interposed between the shield and the insulating sleeve. The above is generally typical of coaxial cables used in the field of electronics for various purposes. The same may vary structurally but essentially includes the inner and outer conductive members and the necessary insulation therebetween and around the outer member.

When making a connection between the conductors of one cable with those of another cable, or with a fitting by means of which the respective conductors of two cables may be connected or between a coaxial cable and an instrument served thereby, it is essential for good electrical efficiency of the connection that the respective cable conductors not only be effectively physically connected but that relative movement or bending between the connected parts not affect such good connection.

Accordingly, an object of the present invention is to provide a connector of the character referred to and to a method of assembling the conductors of a coaxial cable to a fitting to obviate the above faults and to provide a connector assembly that may be carried out in an unconcealed manner insuring proper connection of the conductors of the cable and those of the fitting.

Another object of the invention is to provide a cable connector of the plug type that is adapted for separable connection with a receptacle and which insures proper physical and electrical relationship between the conductors of a cable and those of such a receptacle or comparable fitting.

My invention also has for its objects to provide a novel, economical and convenient method or process of superior utility, and to provide apparatus that is positive in operation, convenient in use, easily installed in working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also contemplates novel combinations of method steps as well as novel details of construction and novel combinations and arrangements of parts, which will appear more fully in the course of the following description, which is based on the accompanying drawing. However, said drawing merely shows and the following description merely describes the invention with respect to a preferred cable connector and method of assembly, the same, nevertheless, being given by way of illustration or example only.

In the drawing, like reference characters designate similar parts in the several views.

FIG. 1 is an elevational view, in quarter-section, of a cable connector according to the present invention.

FIG. 2 is a cross-sectional view as taken on the line 2-2 of FIG. 1.

FIGS. 3 and 4 are side elevational views, in quarter-section showing two intermediate conditions of the cable during assembly of the parts preparatory to effecting connection of the cable with a connector fitting.

2

The drawing shows a conventional coaxial cable that is wrapped with "Teflon." The cable shown comprises a central conductor 5 made of heavy strands of copper or brass wire, a "Teflon" enclosure for said conductor and preferably formed of an inner woven or braided "Teflon" core 6 (to lend flexibility to the cable) and an outer tubular sleeve or sheath 7, a braided tubular shield, brass or copper conductor 8 around the "Teflon" enclosure, a rubber sleeve 9 around said shield, a woven fabric, preferably nylon, in the form of a tube 10, interposed between the shield 8 and the rubber sleeve 9, and a somewhat similar nylon outer sheath 11 enclosing the cable. The present invention deals with means for effecting a mechanical as well as an electrical extension of the central conductor 5 and of the tubular conductor 8 while, at the same time, firmly anchoring the "Teflon" cores 6 and sheath 7.

The present connector fitting comprises, generally, means 12 that is affixed to the end of the above-described cable preparatory to completing assembly of the fitting, a probe 13 forming an extension of the conductor 5 of the cable, a "Teflon" enclosure 14 around said probe, a lock fitting 15 to connect the means 12 and the "Teflon" enclosure 14, and a connection nut 16 carried by the fitting 15 and by means of which a union connection may be effected of the present connector with a receptacle or other such device.

Associated with means 12 are a compression nut 17 that has a slip fit over the coaxial cable and is provided with external threads 18, a set of compression and sealing washers 19 held in compression by said nut 17. As shown in FIG. 4, means 12 comprises an inner sleeve 20 slidably fitted over the "Teflon" sleeve 7 and having an outer taper and an end flange 21 that is provided with outer screw threads, a rubber clamping sleeve 22 that may be initially conically tapered or which may become tapered in assembly to conform to the taper of the sleeve 20 and enclosing the braided shield conductor 8 to compress the same around said sleeve 20, and a lock nut 23 engaged with the threads on the end flange 21 of the sleeve 20 and having an internal conical bore 24 that engages the outside of the clamping sleeve 22 to compress the same into locking engagement with the braided conductor 8.

When assembling the means 12 on the cable, the compression nut 17 is first strung on the cable, followed by the sealing washers 19, here shown as a compressible washer between two non-compressible metal washers, by the lock nut 23, and by the rubber clamping sleeve 22. Said sleeve, being elastic, may be stretched to fit over the cable.

Either before these elements are strung onto the cable or afterwards, the nylon fabrics 10 and 11 as well as the rubber sleeve 9 are trimmed back from the end of the cable to the line 25, exposing the braided sheath 8. In cables that are about 3/4" in outer diameter, about an inch of braiding is exposed by such trimming.

Now, the sleeve 20 is slipped over the "Teflon" tube 7 and under the braided sheath 8, the reduced end of said sleeve making it easy to insert such sleeve in the manner shown in FIG. 3. The braid is flared by the taper of said sleeve and the same is drawn up to the flange 21 and the excess cut away as shown in said FIG. 3, leaving an outwardly folded flange 26 on the end of the braid against the flange 21 of said sleeve.

The rubber clamping sleeve 22 is now slid up beyond the end 25 of the outer portion of the cable and against said outturned flange 26 of the braided shield. Finally, as shown in FIG. 4, the lock nut 23 is slid up over the sleeve 22 and the threads thereof engaged with the threads on the inner sleeve 20.

When the means 12 is thus completely assembled, the

exposed portions of the "Teflon" enclosure core 6 and tube 7 are trimmed away flush with the exposed flanged end of the sleeve 29. A soldering iron may now be used to tin-coat the protruding end 27 of the central conductor 5. The latter, as shown in FIG. 4, is now trimmed to a desired length of protrusion from the end of the means 12.

The probe 13 is shown as an end-rounded rod 28 that has an enlargement 29 on its inner end with an end recess 30 in said enlargement. Said recess is of a size to fit over the tinned end 27 of the cable conductor. Said probe is fitted to said end 27 but before this is done, a "Teflon" washer 31 is slipped over said end, the probe being bottomed on said washer, which constitutes a part of the probe enclosure 14. The probe is now soldered to the end 27 so that the same comprises an extension of the cable conductor 5.

The "Teflon" sleeve 32 of the enclosure 14 slips over the probe rod 28 and is of a length to expose the rounded tip of said rod. A shoulder 33 is provided on the outside of said sleeve, the same facing toward the probe end.

The lockfitting 15 has an internally threaded skirt portion 34 that fits over the above-described means 12 and has a shoulder 35 that bottoms on the end of said means, and a reduced extension 36 around a portion of the sleeve 32 and with an inner shoulder that engages the shoulder 33 of said sleeve to pull the same tightly down on the "Teflon" washer 31.

By slipping the washers 19 upwardly into the skirt 34 and against the adjacent end of the lock nut 23, and then engaging the threads 18 of the compression nut 17 with the internal threads of said skirt, the two members 17 and 15 cooperate to lock the assembly in compression as determined by the take-up force on the threads 18. The middle washer of the compression washers 19 being elastic, the same compresses to laterally expand into firm engagement between the bore of the lock fitting 15 and the outer face of the cable 11 immediately adjacent the end 25 thereof.

It will be seen that the fitting 15 has the dual purpose of providing a firm mechanical and electrical connection between the cable sheath 8 and said fitting 15, and a firm mechanical retention of the "Teflon" enclosure 14 around the probe 13.

The split conductor 37 around the "Teflon" enclosure 14 beyond the end of the extension 36, and the nut retainer 38 with its end sealing ring 39, are generally conventional items by means of which the connection nut 16 effects a firm mechanical and electrical connection between the probe 13 and fitting 15, on the one hand, and a connecting fitting, as suggested in the preamble to this specification. The nut 16 effects a union type of connection to such a fitting by means of its internal threads 40.

While I have illustrated and described what I now contemplate to be the best mode of carrying out my invention with respect to both the method and apparatus, the same is, of course, subject to modification without departing from the spirit and scope of my invention. Therefore, I do not wish to restrict myself to the particular method steps or combination or sequence of steps described nor to the particular form of construction illustrated and described, but desire to avail myself of all equivalents or modifications of method and apparatus that may fall within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be covered by Letters Patent is:

1. A connector for a coaxial cable having a central conductor and a braided tubular conductor therearound with insulation between the conductors, and an extension pin on the end of the central conductor of the cable, said connector comprising a metallic assembly clamped around and affixed to the end of said tubular conductor and having opposed end shoulders, compression and seal-

ing washer means disposed against one of said shoulders, an insulation sleeve around the extension pin and provided with an outer shoulder, a connector fitting having a shoulder engaged with said shoulder of the insulation sleeve and a shoulder engaged with the end shoulder of said assembly that is opposite to the washer means, said fitting having a skirt portion encircling said metallic assembly, and a compression nut connected to the skirt portion of said fitting and engaged with the washer means to press the same against said one shoulder of said assembly.

2. A connector for a coaxial cable having a central conductor and a braided tubular conductor therearound with insulation between the conductors, and an extension pin on the end of the central conductor of the cable, said connector comprising a metallic assembly clamped around and affixed to the end of said tubular conductor and having opposed end shoulders, compression and sealing washer means disposed against one of said shoulders, said assembly comprising a tapered sleeve disposed within the end of the braided tubular conductor and over the insulation between the cable conductors, and a tapered clamping nut connected to the sleeve to clamp the braided conductor between said insulation and tapered sleeve, an insulation sleeve around the extension pin and provided with an outer shoulder, a connector fitting having a shoulder engaged with said shoulder of the insulation sleeve and a shoulder engaged with the end shoulder of said assembly that is opposite to the washer means, said fitting having a skirt portion encircling said metallic assembly, and a compression nut connected to the skirt portion of said fitting and engaged with the washer means to press the same against said one shoulder of said assembly.

3. A connector for a coaxial cable having a central conductor and a braided tubular conductor therearound with insulation between the conductors, and an extension pin on the end of the central conductor of the cable, said connector comprising a metallic assembly clamped around and affixed to the end of said tubular conductor and having opposed end shoulders, compression and sealing washer means disposed against one of said shoulders, said assembly comprising a tapered sleeve disposed within the end of the braided tubular conductor and over the insulation between the cable conductors, a tapered clamping nut connected to the sleeve to clamp the braided conductor between said insulation and tapered sleeve, and a compressible sleeve interposed between the braided conductor and said clamping nut, an insulation sleeve around the extension pin and provided with an outer shoulder, a connector fitting having a shoulder engaged with said shoulder of the insulation sleeve and a shoulder engaged with the end shoulder of said assembly that is opposite to the washer means, said fitting having a skirt portion encircling said metallic assembly, and a compression nut connected to the skirt portion of said fitting and engaged with the washer means to press the same against said one shoulder of said assembly.

References Cited in the file of this patent

UNITED STATES PATENTS

1,702,756	Woodbridge	Feb. 19, 1929
2,379,942	Webber	July 10, 1945
2,435,989	Webster	Feb. 17, 1948
2,449,570	Violette	Sept. 21, 1948
2,449,983	Devol	Sept. 28, 1948
2,460,304	McGee et al.	Feb. 1, 1949
2,509,341	Goldsmith	May 30, 1950
2,552,414	Erikson et al.	May 8, 1951
2,871,283	Dickenson	Jan. 27, 1959
2,936,440	Mack et al.	May 10, 1960

FOREIGN PATENTS

1,109,812	France	Oct. 5, 1955
-----------	--------	--------------