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[54] **METHOD OF CONNECTING A CENTER CONTACT WITHIN A COAX CONNECTOR**

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[73] Assignee: **AMP Incorporated,** Harrisburg, Pa.

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[51] **Int. Cl.**....**H02g 15/00,** H01r 43/00, H05k 43/00

[58] **Field of Search**.....29/523, 520, 436, 629, 628

[56] **References Cited**

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3,426,317	2/1969	Krol	29/629 X
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Primary Examiner—Charles W. Lanham
Assistant Examiner—Robert W. Church
Attorney—William J. Keating et al.

[57] **ABSTRACT**

A method of connecting a center contact within a coax connector is disclosed which involves inserting a dielectric sleeve into one end of a coupling member for connecting high frequency coaxial cable so that the center conductor of a cable terminating in the coupling member is received in the inner end of the dielectric sleeve, inserting a center contact member into the other end of the dielectric sleeve a predetermined distance with an insertion tool for press-fitting the same over the cable center conductor in the dielectric sleeve, and removing the insertion tool whereby the center contact member is left positioned within the dielectric sleeve and firmly connected to the cable center conductor in one connector half of a coupling assembly ready for being connected to the other half thereof.

4 Claims, 3 Drawing Figures

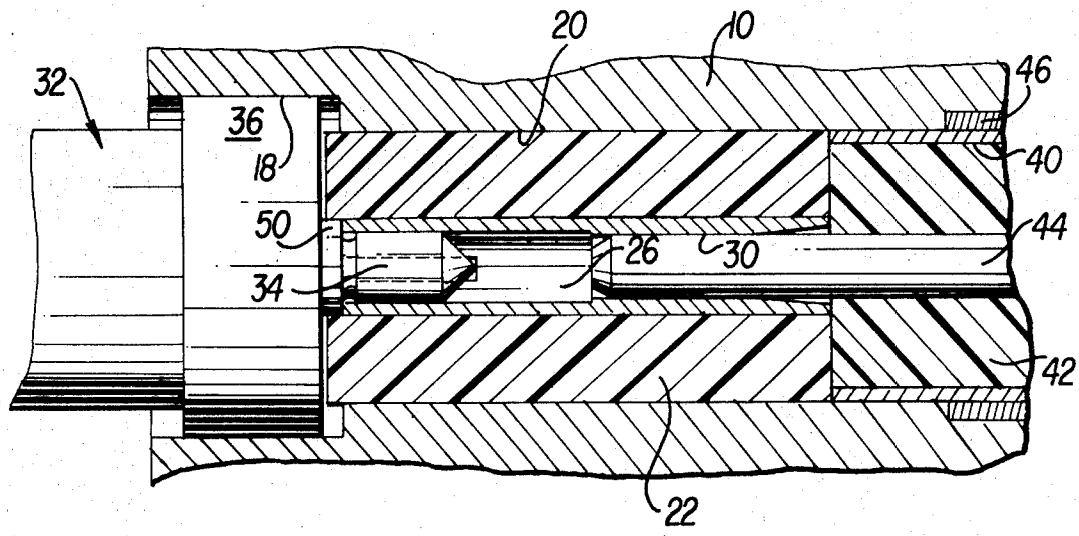


FIG. 1

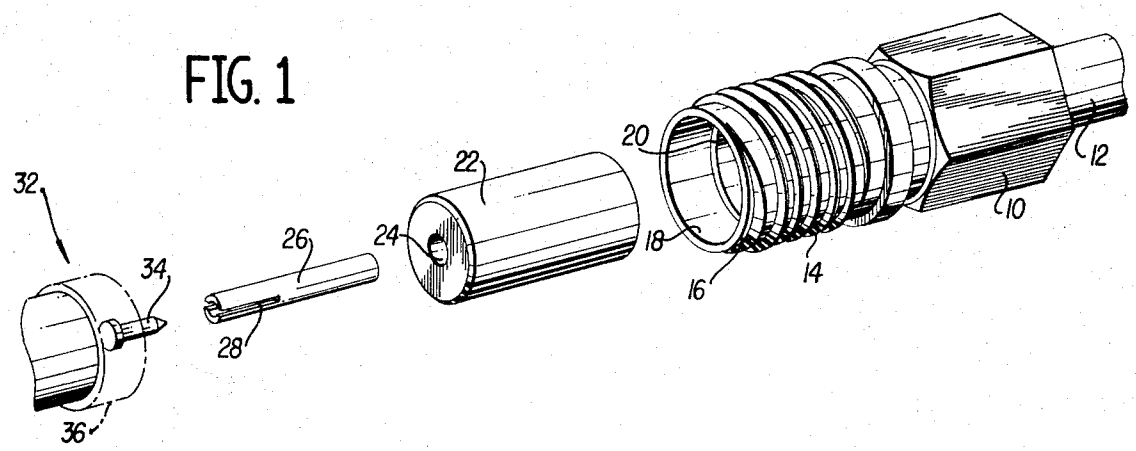
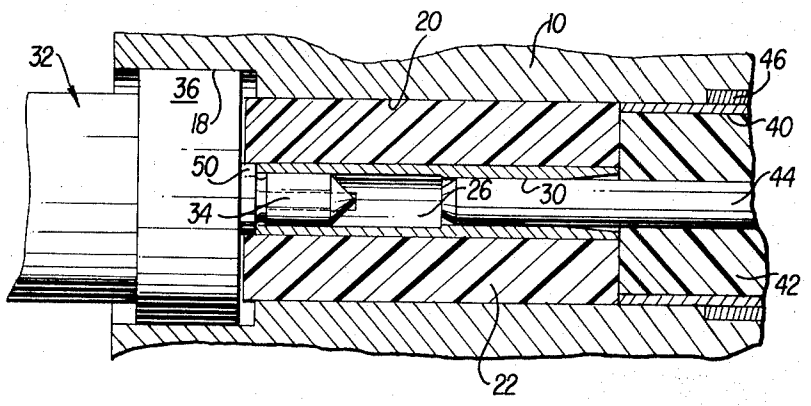


FIG. 2



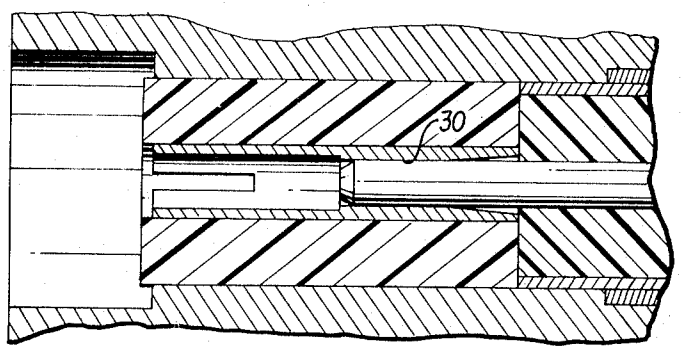


FIG. 3

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METHOD OF CONNECTING A CENTER CONTACT WITHIN A COAX CONNECTOR

BACKGROUND OF THE INVENTION

This invention relates generally to connection devices for high frequency coaxial cables and more particularly pertains to a method of connecting a center contact member within a connector half of a coupling assembly.

In the use of coupling devices for connecting coaxial cable of the type utilized to carry high frequency signals, great care must be exercised in making the connections since even slight damage to the cable can result in degradation of signals being carried thereby. Thus, every effort must be made to minimize deformation and damage of the cable to avoid creating discontinuities and incident signal loss therein. Usually, such cables are coupled through the use of connector assemblies having connector halves which are intermateable to electrically and mechanically join the cable ends and thereby define a coaxial transmission path for high frequency signals carried by the cable. Within these assemblies, a dielectric insert may be provided for enclosing a center contact member adapted to receive the respective center conductors of the coaxial cables to be joined. The positioning of this center contact member within the coaxial connector assembly and the method in which it is connected with the coaxial cable ends are difficult operations because of the poor inaccessibility of the region in which they are located, yet they are extremely important since they determine the quality of the connection and thereby will have a significant affect on the transmission characteristics of the cables.

One such center contact member connection is disclosed in the U.S. Pat. No. 3,533,051, dated Oct. 6, 1970, to G. W. Ziegler, Jr. The center contact member of that device is fitted in the bore of a dielectric insert and features a split portion at one end to define a spring contact for engagement with the center conductor of a coaxial cable in one connector half and a threaded portion at the other end for receiving a threading applied to the center conductor of the coaxial cable in the other connector half. An end wall portion at one end of the dielectric insert is adapted to catch one end of the center contact member and to limit the contact member against further displacement in that direction when it is threadably engaged upon the respective coaxial cable center conductor. Although this method of connection of the center contact member within the coaxial connector assembly has been generally successfully employed for the intended purpose, it is not entirely satisfactory because it is expensive, difficult to assemble, and most importantly, increases the possibility of damaging or deforming the center conductor during assembly and especially when the center contact member is being threaded thereupon.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide an improved method of electrically connecting a coupling member to a coaxial cable.

Another object of the present invention is to provide an improved method of connecting a center contact member within a coaxial connector.

A further object of the present invention is to provide a method of connecting a center contact member within a coaxial connector which is simple to carry out and can be reliably applied under field conditions.

Still a further object of this invention is to provide a method of connecting a center contact within a coaxial connector which may easily be performed with minimal liklihood of damaging or deforming the coaxial cable center conductor while assuring a high quality connection of coaxial cables.

The foregoing and other objects are attained according to the present invention by inserting a dielectric sleeve into one end of a coupling member for connecting high frequency coaxial cable with a portion of the coaxial cable center conductor being partially received within the sleeve, removably attaching a center contact member to the end of an insertion tool, inserting said center contact member internally of the dielectric sleeve by the insertion tool, frictionally press-fitting and wiping the center contact member over the center conductor of the coaxial cable within the sleeve, and removing the insertion tool from the center contact member leaving the center contact member positioned within the dielectric sleeve for receiving the center conductor of another coaxial cable being connected thereto through the coupling member.

BRIEF DESCRIPTION OF THE DRAWINGS

Various other objects, features and attendant advantages of the present invention will be more fully appreciated as the same becomes better understood from the following detailed description when considered in connection with the accompanying drawings, wherein like reference numerals designate like or corresponding parts throughout the several views and in which:

FIG. 1 is an exploded perspective view of the various components of a coaxial connector, showing an insertion tool employed in performing the method of this invention;

FIG. 2 is a cross-sectional view of the coaxial connector shown in FIG. 1, illustrating the insertion tool positioning the center contact member within the dielectric sleeve according to this invention; and

FIG. 3 is a cross-sectional view showing the assembled coaxial connector with the center contact member engaging the center conductor of a coaxial cable after the insertion tool has been removed, whereby the assembly is ready for connection to a center conductor of another coaxial cable.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to the drawings, and more particularly to FIG. 1 thereof, there are shown in unassembled condition various components of a connector assembly including a connector half **10** for a coaxial cable **12** being exteriorly threaded at the forward end thereof as shown at **14** for matingly engaging threading of a nut of another connector half, not shown, but of conventional design. A forward body portion **16** of the connector half **10** contains a bore **18** in the front end thereof for receiving a ferrule, not shown, of the other connector plug half, and a central bore **20** of lesser diameter than bore **18** in which a dielectric insert **22** is adapted to be fitted.

The dielectric insert **22** itself is provided with a central longitudinal bore **24** whereby it forms a sleeve-like member for receiving and containing a center contact

member **26**. As illustrated, the center contact member **26** is configured to include a split portion **28** at one end thereof to define a spring contact for engagement with the center conductor of another coaxial cable to be connected with coaxial cable **12**, and at the other end has a bore **30**, as shown in FIGS. **2** and **3**, which preferably is extensive therethrough and is adapted to receive the center conductor of coaxial cable **12**, as will be described hereinbelow.

An insertion tool generally indicated by the numeral **32** includes an elongate pin member **34** at one end adapted to be received within the split end of the center contact member **26** and a wide collar portion **36** which is adapted to fit within the bore **18** of the forward body portion **16** of connector **10**.

In FIGS. **2** and **3**, it may be seen that the coaxial cable **12** includes an outer conductor **40** containing therewithin a solid dielectric sheath **42** surrounding a solid center conductor **44**. Cable of this type is frequently referred to as semi-rigid coaxial cable and is utilized for carrying radio frequency signals extending into the multi Ghz range. In the medium and larger sizes, cable of this type may include a center conductor of hollow copper tubing surrounded by a dielectric material of formed polyethylene, in turn surrounded by an outer conductor of aluminum tubing. In the smaller sizes of cable of this type, the cable center conductor may be a solid rod of copper surrounded by a dielectric material of Teflon, in turn surrounded by copper tubing. Also, in in the smaller sizes of coaxial cable, the outer diameter of the outer conductor may be on the order of one-fourth inch or smaller with the thickness of the outer conductor tubing being on the order of 0.010 of an inch. While it is contemplated that the present invention, in different sizes, may be utilized advantageously with cables of different sizes, the method of this invention has been found particularly applicable to cable of the smaller sizes mentioned, since the tolerances are such a significant portion of cable diameter in these cases as to be substantially more critical than is the case with larger sizes.

A ferrule **46** formed of a ductile material such as annealed copper is shown surrounding the outer conductor **40** the coaxial cable **12** substantially filling the space between the outer conductor and the surface of a bore in the connector **10** following a crimping operation by a technique such as disclosed in the aforementioned Ziegler, Jr. patent.

Referring specifically now to FIG. **2**, the dielectric sleeve **22** is first inserted into the central bore **20** of the connector half **10** so that an unsheathed end of the center conductor **44** of coaxial cable **12** is freely received in the bore **24** thereof. The rightward displacement of the dielectric sleeve **22** is limited by the engagement of the one end sleeve with the solid dielectric sheath **42** of the coaxial cable **12**.

The insertion tool **32** is next removably attached to the center contact member **26** by inserting the pin member **34** thereof into the split end portion of the contact member **26**. Then the center contact member **26** is inserted into the bore **24** of the dielectric sleeve **22** using the insertion tool **32**, the collar **36** of which slidably fits in the bore **18** of connector **10** to force the contact member **26** into the bore **24** until the collar **36** engages the forward end of the sleeve **22**. This action is also sufficient to press-fit the inner end of the center contact member **26** over the center conductor **44** of the coaxial cable **12** to establish a good electrical connection therewith. Thus, although visual observation of the connection is not possible, the dielectric sleeve **22** serves as a guide for the center contact member **26** and is a limit stop for limiting the insertion of the contact member so that it is always inserted into the sleeve a predetermined distance.

After the center contact member **26** has been positioned within the sleeve member **22**, the insertion tool is withdrawn from the split end portion of the center contact member leaving the contact member disposed within the sleeve **22** being press-fitted over the center conductor **44** of the coaxial cable **12**. Removal of the insertion tool **32** may be readily accomplished in the following manner. Referring again to FIG. **2**, while the pin **34** of the insertion tool **32** is slidably positioned within the split end portion **28** of the center contact member **26**, a small collar member **50** which is slightly greater in diameter than the pin **34**, preferably of substantially the same diameter as the bore **24** or the contact member **26**, is provided on the insertion tool between the pin **34** and the outer collar portion **36** so that in moving the insertion tool **32** within the bore **18** toward the dielectric sleeve **22**, the intermediate collar **50** is operative against the annular end surface of the contact member **26** for moving the contact member within the bore **24** of the sleeve **22** for press-fitting it over the center conductor **44**. Thus, upon retraction of the insertion tool **32**, the contact member-engaging collar **50** freely withdraws from the dielectric sleeve **22**. The pin **34** accordingly serves as a guide facilitating engagement of the insertion tool **32** with the contact member **26**, but is not tightly engaged therewith.

Accordingly, it may be seen that the present invention provides a novel method for connecting a center contact within a coaxial connector, providing a positive electrical connection with the center conductor of a coaxial cable therein and affording a spring contact for engagingly receiving the center conductor of another cable to be joined therewith.

An alternative method of making the connection can be accomplished by sliding the connector or coupling member **10** over the end portion of the coaxial cable **12**, on which it is loosely held, similar to the description of stringing beads over a strand. The sleeve **22** of dielectric may then be positioned to receive a portion of the center conductor **44** therein and the center contact member **26** may be connected to the end of the coaxial center conductor **44**, using the sleeve **22** as a stop and guide, as hereinbefore described. Then the conductor or coupling member **10** may be slidably positioned forwardly along the coaxial cable until it is received over the sleeve **22**, whereupon it may be crimped to the coaxial shield.

Obviously, many modifications and variations of the present invention are possible in light of the above teachings. It is to be understood, therefore, that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described herein.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A method of connecting a center contact member within a coupling member of a connector for coaxial cable comprising the steps of:

inserting a dielectric sleeve into said coupling member, partially receiving a portion of the coaxial cable center conductor within said sleeve;

inserting a center contact member into said sleeve; and

frictionally press-fitting said center contact member over said center conductor within said dielectric sleeve.

2. A method of connecting a center contact within a coaxial connector according to claim 1, wherein said step of inserting said center contact member into said dielectric sleeve comprises the steps of:

removably attaching said center contact member to one end of an insertion tool; and

inserting said insertion tool into said coupling member with said center contact member attached to one end thereof being inserted into said dielectric sleeve until a stop on said insertion tool spaced from the one end thereof contacts said dielectric sleeve.

3. A method of connecting a center contact within a coaxial connector according to claim 2 and further comprising:

removing said tool from said center contact upon frictionally press-fitting the center contact on the coaxial cable center conductor.

4. A method of connecting a center contact member within a connector for coaxial cable comprising the steps of:

inserting a dielectric sleeve into a coupling member and partially receiving a portion of a center conductor of a coaxial cable in one end of said sleeve;

removably attaching a center contact member to the end of an insertion tool having a contact member end-engaging portion and a dielectric sleeve end-engaging portion;

inserting said center contact member into the other end of said dielectric sleeve with said insertion tool and frictionally press-fitting said center contact member over the coaxial cable center conductor by moving said contact member end-engaging portion of said insertion tool against the end of said contact member until said dielectric sleeve end-contacting portion of said insertion tool contacts the end of said dielectric sleeve; and

removing said insertion tool from said center contact member.

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