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Callaghan et al.

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[54] **ADAPTER FOR COAXIAL CABLE CONNECTOR**

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[52] **U.S. Cl.** ..... **174/75 C,** 174/89, 339/177 R

[51] **Int. Cl.** **H02g 15/08**

[58] **Field of Search** ..... 174/21 JC, 21 C, 174/21 CA, 35 C, 71 C, 75 C, 88 C, 89; 285/12, 177; 339/60 C, 89 C, 90 C, 91 P, 94 C, 126 J, 177 R, 177 E

[56] **References Cited**

UNITED STATES PATENTS

3,196,382	7/1965	Morello	339/177 R
311,914	2/1885	Patterson	174/71 C
1,951,654	2/1934	Green	174/84 R
3,295,076	12/1966	Kraus	339/177 E

FOREIGN PATENTS OR APPLICATIONS

861,652	2/1961	Great Britain	339/177 R
1,035,543	7/1966	Great Britain	285/177

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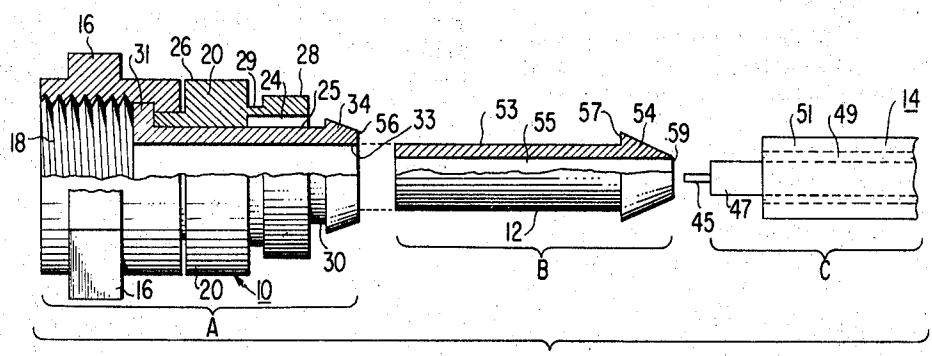
[57] **ABSTRACT**

An adapter consists of a hollow cylinder of conductive or non-conductive material adapted to fit as a sleeve within the hollow shaft portion of an F-56 male, coaxial connector. The cylinder has a shaped end which assists an RG59/U type coaxial cable to slip over the hollow shaft of the F-56 type connector with the dielectric and inner conductor fitting on the inside of the hollow cylinder and the outer conductor and outer insulation of the cable fitting over the outside of the F-type connector's hollow shaft.

1 Claim, 3 Drawing Figures



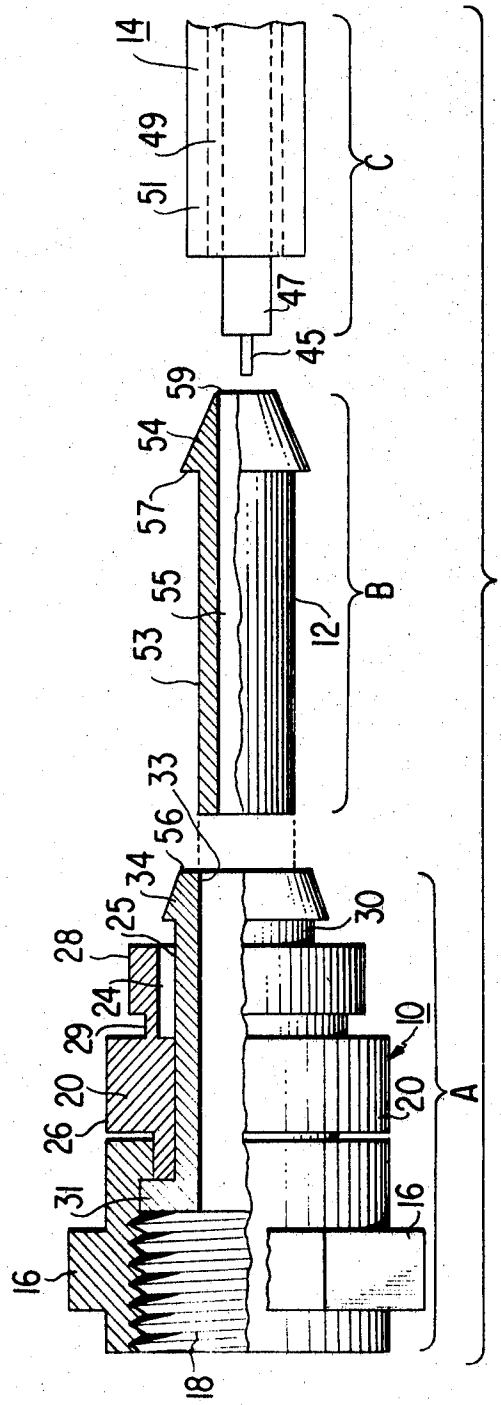


Fig. 1

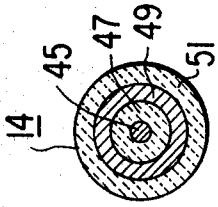


Fig. 3

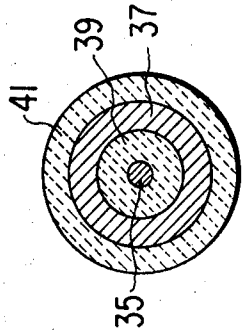


Fig. 2

ADAPTER FOR COAXIAL CABLE CONNECTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to coaxial cable connectors and more particularly to an adapter which will enable a coaxial cable connector to be used with two types of coaxial transmission lines.

2. Description of the Prior Art

At the present time, RG59/U type coaxial cable and a larger diameter foam dielectric coaxial cable is used to contact a home television antenna to a television receiver. This larger diameter foam cable is sometimes referred to as an RG6/U foam dielectric cable. In F-59 and F-56 type male connectors commonly used in television antenna accessory equipment, the center conductor of the cable serves as the center pin of the male connector. The center conductor and the inner adjacent dielectric fit into a hollow shaft of these connectors and the outer conductor and outer insulation are clamped to the outside of this shaft.

Associated with the RG59/U type coaxial cable is the F-59 connector and associated with the RG6/U larger diameter foam type of coaxial transmission line is the F-56 connector. The hollow shaft of the F-56/U male connector has an inner surface diameter of approximately 0.155 inches to accommodate the smaller diameter dielectric of the RG59/U type coaxial cable. The hollow shaft of the F-56 connector, similarly designed, has an inner surface diameter of approximately 0.195 inches to accommodate the larger diameter foam dielectric of the RG6/U type cable.

A disadvantage of the RG59/U cable is that it's attenuation per unit length is significantly greater than is the case for the RG6/U foam type cable. The RG59/U cable is sometimes preferred over the RG6/U because of its structural properties. The RG6/U cable usually has foil as the outer conductor and the RG59/U is braided wire.

If attempts are made to use an F-56 connector with the RG59/U coaxial cable, the outside diameter of the F-56 shaft is too large to allow it to slip easily between the inner dielectric and the outer conductor of the smaller RG59/U cable. Also due to the excess size of the inner diameter of the shaft of the F-56 connector, the smaller diameter of the inner dielectric of the RG59/U coaxial cable does not remain centered and the inner conductor is free to move sideways causing misalignment with the mating connector. Off center alignment of the inner connector and excess air space surrounding the cable inner dielectric causes impedance mismatch problems.

If an attempt is made to use the F-59 connector with RG6/U foam coaxial cable, the larger diameter inner dielectric of the foam cable does not fit into the aperture of the smaller F-59 connector shaft. Thus, if it is not certain which type of cable the user has or prefers, the supplier of television and FM (frequency modulated) radio reception equipment, particularly that of TV antenna accessory equipment, such as couplers, amplifiers, baluns, etc. has to supply both an F-56 and an F-59 coaxial cable connector.

SUMMARY OF INVENTION

Briefly, in accordance with the present invention, an adapter is provided for a coupling apparatus which has a shaft member with an internal bore sufficient to hold the inner conductor and the inner dielectric of a first type of coaxial cable, the adapter serving to adapt the coupling apparatus for a second type of coaxial cable having a substantially smaller combined diameter inner conductor and inner insulator. The adapter includes a hollow cylindrical member having a uniform sleeve portion and a tapering raised end portion. The outer diameter of the sleeve portion is dimensioned to fit snugly within the internal bore of the coupling apparatus, and the thickness of the sleeve portion is made to substantially fill the gap between the bore and the outer surface of the inner insulator of the second type of cable when inserted in the bore of the shaft member of the coupling apparatus. The tapered raised end portion is adapted to spread the outer conductor of the second type of cable away from the inner dielectric.

DESCRIPTION OF THE DRAWING

The detailed description follows in conjunction with the following drawing wherein:

FIG. 1 is an assembly view of an F-56 coaxial cable connector, an adapter and RG59/U coaxial cable.

FIG. 2 is a cross-section of an RG6/U foam coaxial cable.

FIG. 3 is a cross-section of an RG59/U coaxial cable.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown in part A an F-56 male connector **10**, in part B an adapter **12**, and in part C a section of RG59/U coaxial cable **14**. Turning to part A of FIG. 1, the F-56 male connector **10** includes a nut member **16**, a cylinder member **20**, and a hollow-shaft member **30**. The nut member **16** has threads on the inner surface **18**. The cylinder member **20** extends into the nut member **16**. The shaft member **30** is pressed into the cylinder member **20** to complete the connector assembly. The cylinder member **20** has an expanded section **26** located rearward of the nut member **16**. The shaft member **30** has an expanded section **31** which is located inside the nut member **16**. The cylinder expanded section **26** and the shaft expanded section **31** serve to captivate the nut member **16** with the nut member **16** being free to rotate about the axis of cylinder member **20** and shaft member **30**. The cylinder member **20** has a hollow section **24** to accommodate the outer conductor and outer cover of the RG6/U coaxial cable.

Referring to FIG. 2, there is illustrated a cross-section of the RG6U foam type coaxial cable. This RG6/U cable includes a center conductor **35**, an outer conductor **37**, a dielectric insulator **39** therebetween and an outer dielectric cover **41**. The inner conductor **35** may, for example, be copper. The outer conductor **37** is usually of metal foil. The dielectric **39** may be foam and the outer cover **41** polyvinyl. The RG6/U cable is sold commercially, for example, by Belden Corporation of Chicago, Ill. and is known as No. 8228 foam cable. A portion of the dielectric **39** is stripped away exposing the center conductor **35** which extends into the nut member **16** to act as a pin for the F-56 coaxial cable connector. The shaft member **30** has an elongated uniform bore **33** to accommodate snugly the inner conductor **35** and dielectric **39** of the RG6/U foam cable. Shaft member **30** has a tapered section **34** at one end to assist separation between the inner foam dielectric **39** and the outer conductor **37** of the RG6/U

foam coaxial cable. The outer conductor of the RG6/U cable is usually aluminum foil and goes around and over the shaft member **30** of the connector **10** with the outer conductor **37** and the outer dielectric cover **41** being located in the hollow section **24.**

A clamping ring section **28** is held to the cylinder member **20** by a relatively thin walled holding ring **29.** A special crimping tool or pliers is used to crimp the clamping ring section **28** inward to hold the outer conductor **37** of the coaxial RG6/U cable tightly against the shaft member **30** for positive electrical and mechanical connection.

Referring to part C of FIG. **1** and to FIG. **3,** the RG59/U coaxial cable **14** has an inner conductor **45,** an inner dielectric **47,** outer conductor **49** and outer insulator **51.** The combined diameter of the center conductor **45** and the inner dielectric **47** is approximately 0.155 inches. The outer conductor **49** is usually braided wire.

Referring to part B of FIG. **1,** the hollow cylindrical member **12** includes a uniform sleeve portion **53** and a tapered portion **54.** The adapter **12** has a uniform diameter bore **55** that extends the entire length of the adapter. The bore diameter is on the order of 0.155 inches to allow the inner dielectric **47** and the center conductor **45** of the RG59/U cable to fit snugly therein. The thickness of sleeve portion **53** is made somewhat less than 0.040 inches in order to allow the sleeve portion **53** to fit snugly between the bore **33** of shaft member **30** and the outer surface of the inner dielectric **47** of cable **14.** The tapered end section **54** first abruptly increases to a value at point **57** such that the diameter of the outer surface of the adapter **12** is approximately equal to or matches the diameter of end **56** of hollow shaft member **30.** The outer surface diameter of tapered section **54** decreases at a constant rate to end **59.** The change in diameter of section **54** is such as to provide a ramp for the spreading of the outer conductor **49** of cable **14** from the inner dielectric **47** and so that the portion **54** acts as a continuing ramp with section **34** of the connector for the spreading of the outer conductor **49** from the inner dielectric **47.**

In the connection of the RG59/U cable **14** to the connector **10,** the sleeve portion **53** of adapter **12** is slid into the bore **33** of cylindrical member **20** with the end **57** of the tapered portion **54** resting against the end **56** of cylindrical member **30.** The RG59/U cable has its center conductor **45** and inner dielectric **47** peeled away as shown in part C of FIG. **1.** The inner dielectric **47** and the center conductor **45** of cable **14** are inserted inside the bore **55** of adapter **12** with the center conductor **45** extending as a pin inside nut member **16.** The outer conductor **49** and outer insulator **51** are first forced over the tapered portion **54** of adapter **12,** over section **34** and then over the bearing surface section **25** of cylindrical member **30** with the outer conductor **49** and insulator **51** under clamping ring section **28.** The clamping ring section **28** is then crimped by pliers or a special crimping tool, to hold the outer conductor **49** and outer insulator **51** between the ring section **28** and the bearing surface section **25.**

What is claimed is:

1. In a coupling apparatus for coaxial transmission lines of the type having a center conductor, an inner insulation, an outer conductor and an outer insulation in that order, wherein said apparatus comprises a hollow shaft member having an internal bore of a diameter just sufficient to hold snugly therein the center conductor and the inner insulation of a first type of coaxial line, said shaft member having for a sufficient distance a substantially cylindrical bearing surface against which the outer conductor and the outer insulation of said first type of coaxial line may be clamped, said shaft member having adjacent said bearing surface a tapered section at one end to assist separation between the inner insulator and the outer conductor of the first type of coaxial line and the spreading of the outer conductor of said first type of coaxial line over said bearing surface, the improvement therewith for adapting said apparatus for a second type of coaxial line having a combined center conductor and inner insulator diameter substantially smaller than the combined inner insulator and center conductor diameter of said first type of coaxial line and of said bore,

said improvement comprising a hollow cylindrical member having a uniform sleeve portion and a raised tapered end portion, said outer diameter of said sleeve portion being such as to snugly fit within said bore of said first hollow shaft member and the thickness of said sleeve portion being such as to substantially fill the gap between said bore of said first hollow shaft member and the outer surface of said inner insulator of said second type of coaxial line when said second type of coaxial line is inserted in the bore of said shaft member, said raised tapered end portion located at an end of said cylindrical member having an outside diameter that increases from the extreme end to form a taper adapted to assist separation between inner insulation and outer conductor of the second type of coaxial line, said raised tapered end portion having an outside diameter at the junction with the uniform sleeve portion determined so that when said sleeve portion of said cylindrical member is fitted within said bore the raised tapered end portion matches said tapered section of said shaft member for providing a continuous ramp to assist in spreading the outer conductor and outer insulator of said second type of coaxial line from the inner insulator thereof over said tapered portion of said cylindrical member, over said tapered section and over and around said bearing surface.

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