

- [54] CONNECTOR ASSEMBLY
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- [58] Field of Search..... 339/89, 90, 177

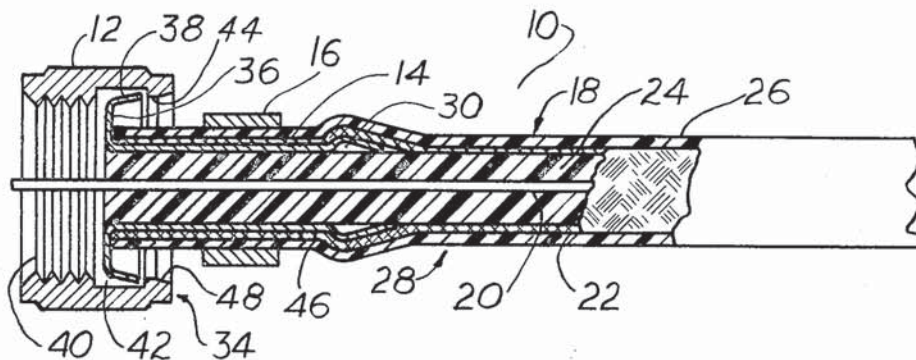
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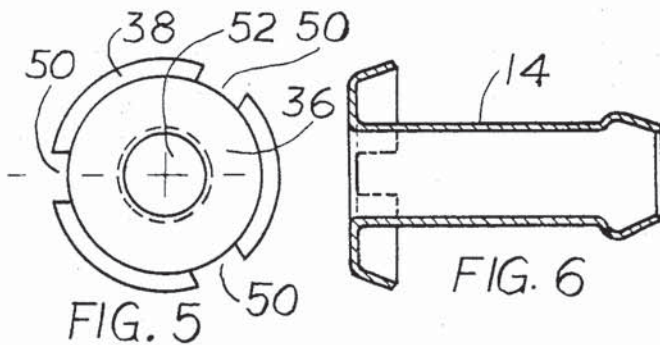
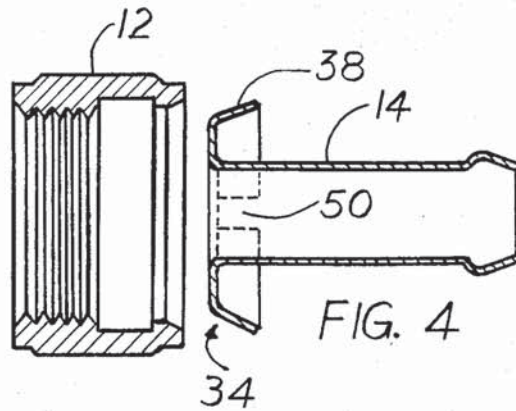
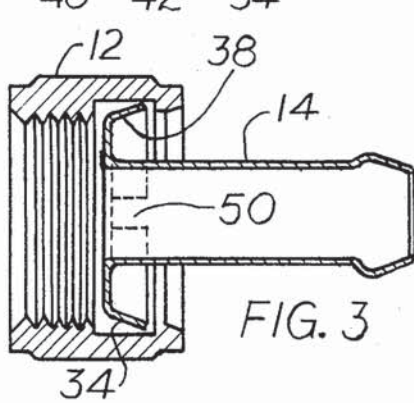
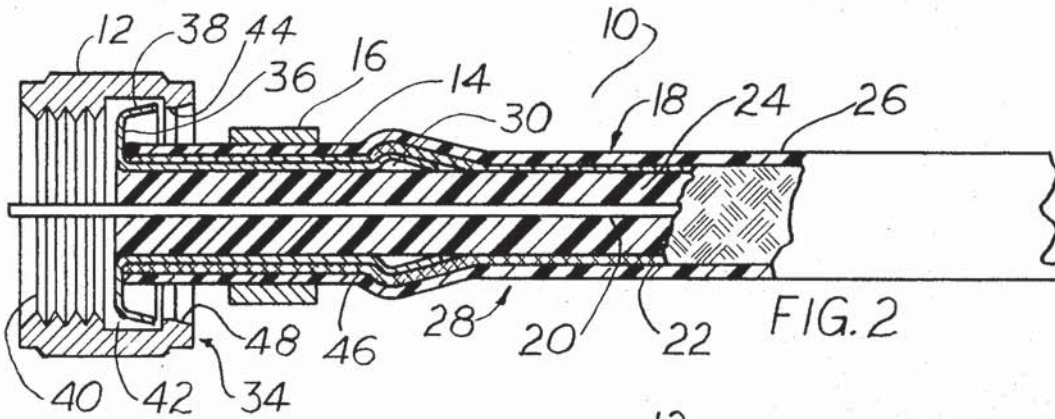
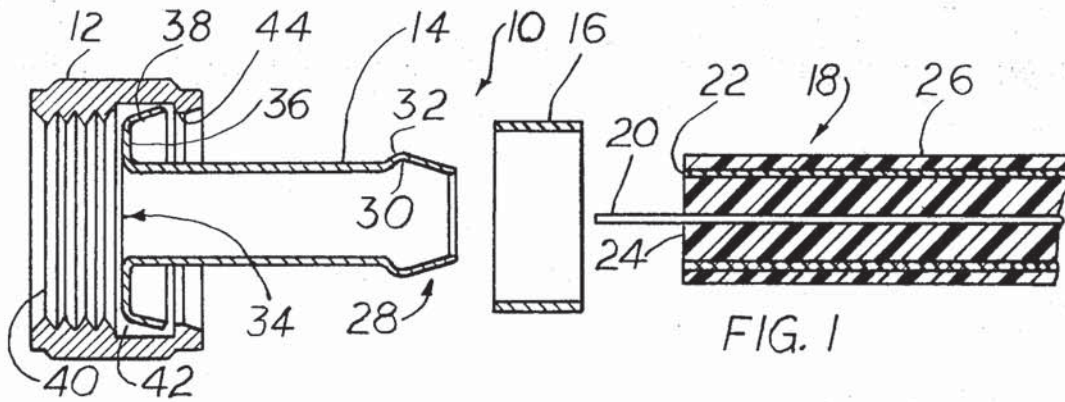
[57] ABSTRACT

This disclosure relates to a connector assembly which utilizes a hollow coupling member or ring having an internally threaded portion at one end thereof and a cylindrical recess at the other end thereof which serves to hold one end of a tubular shaped member that is adapted to make connection to the outer conductor of a coaxial cable. The tubular shaped member not only functions to contact the outer conductor of a coaxial cable, but also serves to upset a portion of the outer conductor in order to grip the outer conductor and hold it securely connected to the coupling ring. Additionally, a ferrule is located about the dielectric casing and between the upset portion of the outer conductor and the coupling ring so as to more securely provide a firm gripping action between the tubular shaped member and the outer conductor of the coaxial cable.

- [56] **References Cited**
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1 Claim, 6 Drawing Figures





## CONNECTOR ASSEMBLY

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

This invention relates generally to electrical connectors and, more particularly, to electrical connectors that are used for co-axial cables in order to permit electrical contact to be made to the outer conductor of the co-axial cable and permit access to the center conductor of the co-axial cable.

## 2. Description of the Prior Art

In the past, electrical connectors of various complex types have been utilized to provide electrical contact to the center and outer conductors of a co-axial cable. These connectors have taken many different forms and shapes and have been generally fairly complex in structure, performance, and operation.

A need existed for providing a very simple, structural arrangement for permitting electrical contact to be made to the outer conductor of a co-axial cable while leaving open and accessible the center conductor of the co-axial wire cable. In order to accomplish this goal, various types of connectors have been designed and utilized to permit connection to the outer conductor and access to the center conductor of a co-axial cable. However, these different connector structures were relatively complex and hence costly to manufacture. Furthermore, because of the complexity of the prior art connector structures, the reliability of these structures became a major concern to connector manufacturers since the relatively complex nature of the prior art connectors resulted in a number of parts that did not always operate in the manner intended. A need existed for a simplified connector structure or assembly that could solve the problem of providing reliable electrical contact to the outer conductor of a co-axial cable and yet permit easy access to the center conductor thereof. This was especially important with the major increase in the use of co-axial cables for the cable TV industry and other applications for co-axial cables.

## SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide an improved electrical connector.

It is a further object of this invention to provide an improved electrical connector for attachment to co-axial cables.

It is a still further object of this invention to provide a simplified electrical connector assembly for attachment to the outer conductor of a co-axial cable and permit access to the center conductor of the co-axial cable.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

In accordance with one embodiment of this invention, a connector assembly is provided which comprises a hollow, coupling member and a tubular shaped member having first end means for connection to the outer conductor of a co-axial wire cable and second end means for connection to the coupling member. A hollow, ferrule shaped member is also provided as part of the connector assembly. The ferrule shaped member has an inner diameter that is greater than the outer diameter of the tubular shaped member. The ferrule shaped member is positioned over the tubular shaped member and intermediate the first end means and the

second end means of the tubular shaped member. The hollow coupling member is a coupling ring having an internally threaded portion at one end thereof. The other internal end portion of the coupling ring is provided with a cylindrical recess to hold the second end means of the tubular shaped member.

In accordance with another embodiment of this invention, a combination co-axial wire cable and connector assembly is provided, which comprises a hollow coupling member and a tubular shaped member having first end means for connection to the outer conductor of the co-axial wire cable and second end means for connection to the coupling member. A hollow, ferrule shaped member having an inner diameter greater than the outer diameter of the tubular shaped member and the outer conductor of the co-axial wire cable is positioned over the tubular shaped member intermediate the first end means and the second end means and around a dielectric casing protecting the outer conductor of the co-axial wire cable. The first end means of the tubular shaped member is provided with an annular recessed portion and an annular flared portion connected to the recessed portion. The annular recessed portion is adapted to raise a portion of the outer conductor of the co-axial wire cable and thereby grip the outer conductor. The ferrule shaped member is located between the outer surface of the annular recessed portion and the second end means of the tubular shaped member. The second end means of the tubular shaped member is provided with an annular flange and an annular flared portion connected thereto which flared portion is insertable within and connectable to the hollow coupling member.

The foregoing and other objects, features, and advantages of the invention will be apparent from the following, more particular, description of the preferred embodiments of the invention, as illustrated in the accompanying drawings.

## BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is an exploded cross-sectional view of the connector assembly of this invention and also illustrates a co-axial cable that is to be connected to the connector assembly.

FIG. 2 is a cross-sectional view of the combined co-axial cable and connector assembly shown in FIG. 1 with the connector assembly in attachment in accordance with the practice of this invention.

FIG. 3 is a cross-sectional view illustrating the coupling member and the tubular shaped member used to contact the outer conductor of the co-axial cable with the tubular shaped member being shown connected to the coupling member.

FIG. 4 is a cross-sectional view similar to FIG. 3; however, the tubular shaped member is shown not connected to the coupling member.

FIG. 5 is an elevational view end of the tubular shaped member which contains the slots, one of which is shown in dotted form in FIGS. 3 and 4.

FIG. 6 is a cross-sectional view of the tubular shaped member of FIG. 5.

## THE SPECIFICATION

Referring to FIG. 1, a connector assembly generally designated by the reference numeral 10 is shown which comprises a coupling member or ring 12, a tubular shaped member 14 connected to the coupling ring 12,

and a hollow, ferrule shaped member 16 adapted to be positioned over the tubular shaped member 14 between the ends thereof. A co-axial wire cable is generally shown by reference numeral 18. The co-axial wire cable 18 comprises a center conductor 20, a cylindrical outer conductor 22, a dielectric packing material 24 located between the center conductor 20 and the outer conductor 22, and a dielectric casing 26 located about the cylindrical outer conductor 22.

The tubular shaped member 14 has a first end 28 which is used for connection to the outer conductor 22 of the co-axial wire cable 18. The first end 28 of the tubular shaped member 14 is provided with an annular recess portion 30 and an annular flared portion 32, which together function to raise a portion of the outer conductor 22 of the co-axial wire cable 18 when connection is made between the connector assembly 10 and the co-axial wire cable 18. A second end 34 of the tubular shaped member 14 is connected to the coupling ring 12 by means of annular flange 36 and annular flared portion 38 of the second end 34 of the tubular shaped member 14. The annular flared portion 38 is insertable within and connectable to the hollow coupling ring 12.

The hollow coupling ring 12 is provided with an internally threaded portion 40 at one end thereof and a cylindrical recess 42 at the other end thereof. The annular lip 44 is provided to define one side of the cylindrical recess 42 of the coupling ring 12. This annular lip 44 serves to engage the annular flared portion 38 of the tubular shaped member 14 to prevent the tubular shaped member 14 from being disengaged from the coupling ring 12. The annular flared portion 38 connected to the annular flange 36 which serves as the second end 34 of the tubular shaped member 14 is insertable within the cylindrical recess 42 of the coupling ring 12.

With regard to FIG. 2, similar reference numerals used in FIG. 1 are repeated in FIG. 2 to identify the similar elements shown in FIG. 1 in order to clarify the connection of the connector assembly 10 to the co-axial wire cable 18.

As is shown in FIG. 2, the ferrule shaped member 16 is located between the first end portion 28 and the second end portion 34 of the tubular shaped member 14. However, the ferrule shaped member 16 is located about and in contact with the outer surface of the dielectric casing 26. The annular recess portion 30 located at the first end 28 of the tubular shaped member 14 serves to upset a portion 46 of the outer conductor 22 as shown in this Figure, and thus serves to provide a good electrical and mechanical connection to the outer conductor 22 along this annular portion thereof.

The manner of attachment of the connector assembly 10 to the co-axial wire cable 18 is to insert the tubular shaped member 14 in between the outer conductor 22 and the dielectric packing material 24. Then, the ferrule shaped member 16 is inserted over the dielectric casing 26 in the position shown, for example, in FIG. 2. Subsequently, the coupling ring 12 is then inserted over the second end 34 of the tubular shaped member

14 with the force needed to flex the annular flared portion 38 sufficiently to permit it to contract enough to be inserted within the cylindrical recess 42 of the coupling ring 12. After insertion into the cylindrical recess 42 of the coupling ring 12, the annular flared portion 38 returns to its original unflexed position and is prevented from being removed from the coupling ring 12 because of the annular lip 44. The coupling ring 12 has a beveled portion 48 which facilitates entry of the annular flared portion 38 of the tubular shaped member 14.

With regard to FIGS. 3 and 4, FIG. 3 illustrates the tubular shaped member 14 connected to the coupling ring 12 as described above with respect to FIGS. 1 and 2, whereas FIG. 4 shows the tubular shaped member 14 prior to insertion within and connection to the coupling ring 12. The feature of significance in these two Figures is showing of one slot 50 in dotted line form at the second end 34 of the tubular shaped member 14. The slot 50 is in the annular flared portion 38 of the tubular shaped member 14.

With regard to FIG. 5, a frontal view of the tubular shaped member 14 is shown illustrating three slots 50<sup>1</sup>, 50<sup>11</sup>, and 50<sup>111</sup> separated apart by 120° with respect to each other and located in the annular flared portion 38 of the tubular shaped member 14. The view of FIG. 5 shows the outline of the annular flange 36, which is connected to the annular flared portion 38. Opening 52 is provided in the annular flange 36 in order to permit the center conductor 20 and the dielectric packing material 24 to be inserted therethrough as shown in FIG. 2.

FIG. 6 illustrates the tubular shaped member 14 by itself and has been fully described above with respect to the other Figures.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention.

We claim:

1. A tubular shaped member especially adapted to make electrical contact to the outer conductor of a co-axial wire cable comprising first end means for connection to the outer conductor of said co-axial wire cable and second end means for connecting a coupling member, said first end means of said tubular shaped member having an annular recess portion and an annular flared portion connected to said recess portion, said annular recess portion being adapted to raise a portion of the outer conductor of a co-axial wire cable, said second end means of said tubular shaped member having an annular flange and an annular flared portion connected to said annular flange, said annular flared portion being insertable within and connectable to said coupling member, said annular flared portion having slot means located therein to permit said annular flared portion to be flexed into connectable contact with said coupling member.

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