

[54] **TERMINAL CONNECTOR AND METHOD OF ATTACHING SAME TO COAXIAL CABLE**

3,757,278 9/1973 Schumacher..... 339/177 R

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[57] **ABSTRACT**

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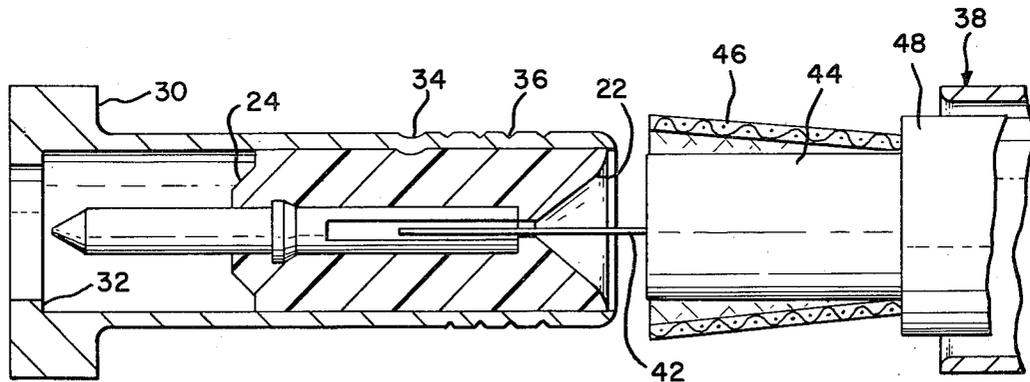
[58] **Field of Search**..... 29/628, 629; 174/75 C, 174/88 C, 89; 339/177, 276

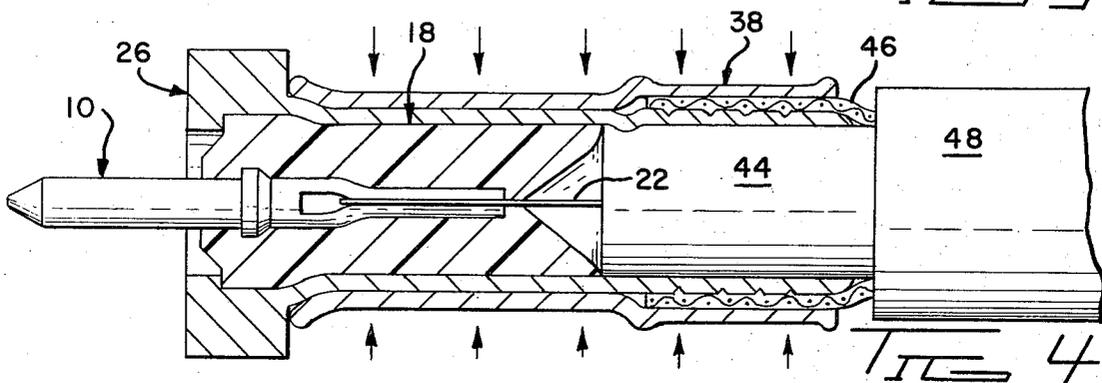
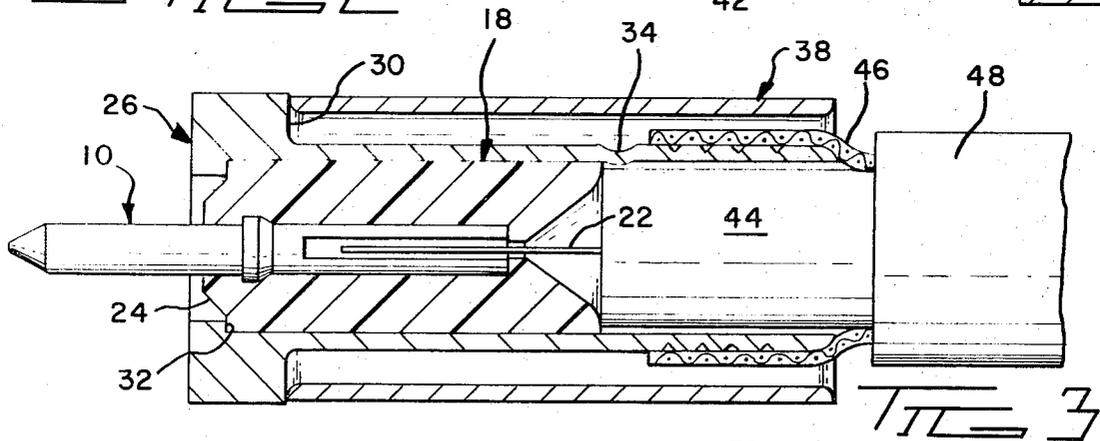
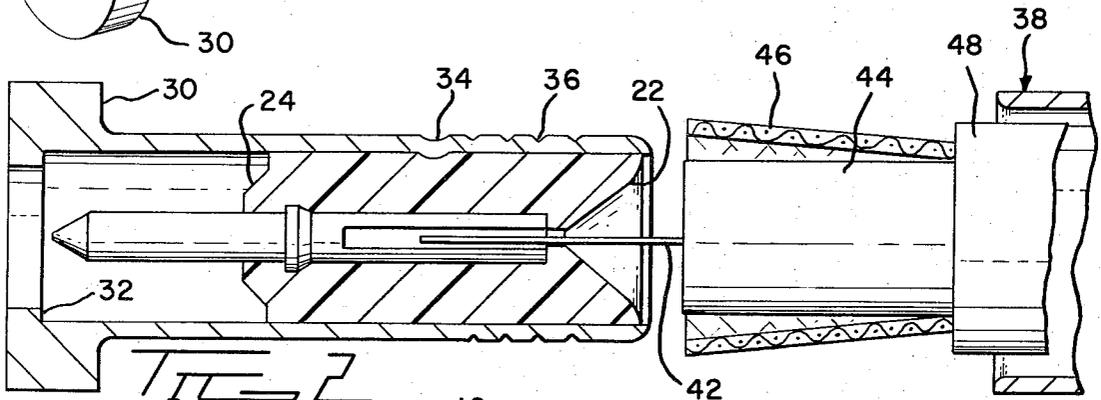
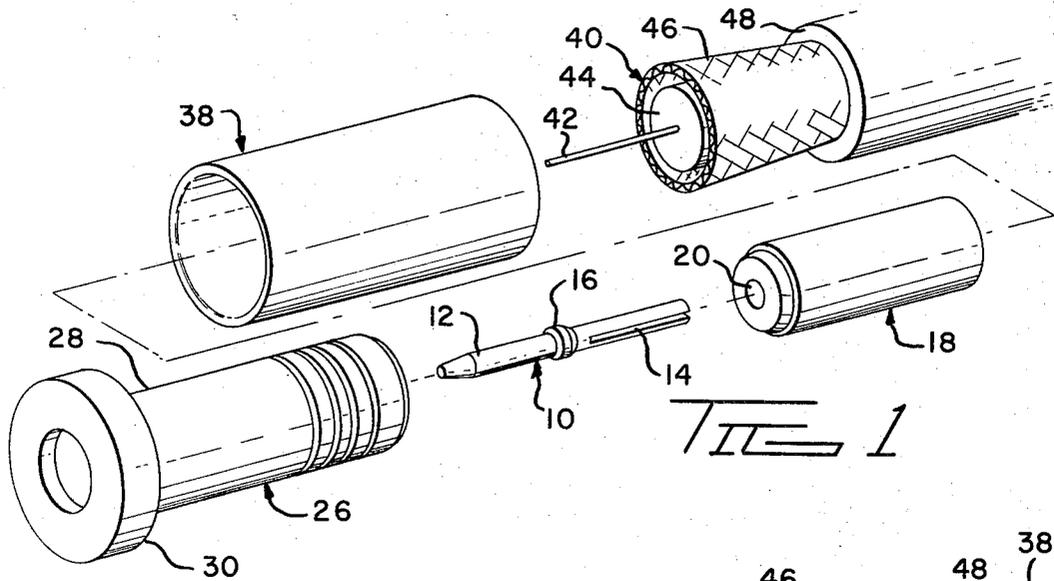
A coaxial cable terminal connector is disclosed along with a method of securing the terminal to the prepared end of a cable with a single crimping operation. The terminal includes a center contact one end of which is slotted and inserted into an axial bore of a dielectric member. The contact and member are placed in an inner ferrule member and positioned therein when the center contact of a stripped coaxial cable is inserted into the other end of the bore until a portion of the dielectric sleeve of the cable is also within the inner ferrule. An outer ferrule surrounds the inner ferrule with the cable shielding therebetween. A single crimping operation both reduces the circular section of the terminal to secure the shielding between the ferrules and transmits sufficient force to encompassingly engage the center contact with the center conductor.

[56] **References Cited**
UNITED STATES PATENTS

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3,141,924	7/1964	Forney	174/88 C X
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6 Claims, 4 Drawing Figures





TERMINAL CONNECTOR AND METHOD OF ATTACHING SAME TO COAXIAL CABLE

BACKGROUND OF THE INVENTION

1. The Field of the Invention

The present invention relates to an improved terminal connection for coaxial cables and in particular to a terminal connection which is secured to the cable in a single crimping operation.

2. The Prior Art

The known terminal connections for coaxial cables have required several assembly and crimping steps. The conventional method of assembly has been to place a center contact on the center conductor of a prestripped coaxial cable and crimp the contact to the conductor. The contact is next inserted into a tubular insulating member which is then inserted into a first metal ferrule. The shielding of the coaxial cable is placed in contact with the outer surface of the first metal ferrule and surrounded by a second annular ferrule of malleable metal. A second crimping step is carried out to join the ferrules and shielding. Examples of this multi-step assembly of terminals on coaxial cables may be found in U.S. Pat. Nos. 2,901,528 and 3,551,882.

SUMMARY OF THE PRESENT INVENTION

The present invention is a terminal connection for coaxial cable and includes a center contact, one end of which is slotted to receive the center conductor of the cable and the other end of which is formed for mating contact with a cooperating terminal connection; a cylindrical dielectric member having an axial bore adapted to receive the contact pin therein; an inner ferrule having a cylindrical body portion with an outer and an inner annular flange at one end thereof; and a cylindrical outer ferrule. The center contact is placed in the dielectric member and the assembly thereof is placed in one end of the inner ferrule. The center conductor of a prestripped coaxial cable is received in the slotted portion of the contact, the shielding conductor engaging the outer surface of the inner ferrule body, and the outer ferrule is positioned to surround the shielding conductor. The thus assembled terminal connection and cable are secured together with a single crimping operation which both reduces the circular section of the terminal and engages the split ends of the contact with the conductor.

It is an object of the invention to produce a terminal connection for coaxial cables which can be secured to both the center conductor and the shielding of such a cable in a single crimping operation.

It is another object of the present invention to produce a coaxial cable terminal connection having a slotted center contact adapted to receive the center conductor of the coaxial cable and to be joined therewith by a crimping force applied to the outside of the assembled terminal connection.

It is a further object of the present invention to produce a coaxial cable terminal connection which may be readily and economically produced and engaged with a coaxial cable.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view showing the principal components of the subject terminal connector and a coaxial cable;

FIG. 2 is a longitudinal sectional view showing the first step in mounting the subject terminal connector on a coaxial cable;

FIG. 3 is a longitudinal sectional view showing the subject terminal connector positioned on a coaxial cable prior to crimping; and

FIG. 4 is a longitudinal sectional view showing the subject terminal connector after crimping.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the subject terminal connector includes a center contact pin 10 having one end 12 adapted to make proper electrical contact with a complementing coaxial cable receptacle and a slot 14 in the other end extending transversely across the circumference of the pin. The slot is adapted to receive the center conductor of a coaxial cable therein. An annular barb 16 projects outwardly from a central portion of the pin and is tapered toward the slotted end of the pin. Cylindrical plug 18 is formed of dielectric material, such as Teflon, and has an axial through passage 20 adapted to receive the center contact therein. One end of the plug has a conically shaped recess 22 while the other end 24 of the plug can be profiled as desired. The inner ferrule 26 includes a cylindrical body 28 one end of which has an integral outer annular flange 30 and an integral inner annular flange 32. The body is also provided with one or more inwardly directed dimples 34 and outer annular grooves 36. The outer ferrule 38 is simply an open ended cylindrical member formed from malleable metal.

The coaxial cable 40 is conventional and includes a central conductor 42 fixedly mounted in a dielectric sleeve 44 which is in turn surrounded by braided shielding 46 and covered by an insulating layer 48.

The pin 10 is preassembled in the plug 18 by forcing the pin, slotted end first, into the axial bore in the plug. The taper of the barb 16 aids in this insertion and the barb prevents the withdrawal of the pin from the plug. The assembly of the pin 10 and plug 18 is fitted into the body portion 28 of the inner ferrule 26 with the conically recessed end 22 of the plug positioned to be closely adjacent the end of the body 28. The plug is held in this position against free movement by dimple 34.

The end of the coaxial cable is prepared by stripping the insulation 48, shielding 46, and dielectric sleeve 44 in stepped configuration as shown. The shielding 46 should also be slightly flared to aid in the subsequent assembly.

The subject terminal connector is assembled on a coaxial cable in the following manner: the outer ferrule 38 is slipped over the stripped end of the coaxial cable (FIG. 2). The cable is then aligned with the terminal connector and the center conductor 42 is guided by the conical surface 22 into the through passage 20 and between the two portions of the slotted end 14 of pin 10. Continued relative movement of the cable and connector brings dielectric sleeve 44 of the cable into contact with plug 18 and drives the latter into the inner ferrule 26 until end 24 of the plug 18 engages inner flange 32. The flared braid 46 slides over the outer surface of the inner ferrule 26 during this movement. The outer ferrule 38 is then moved forward until it engages outer annular flange 30, FIG. 3. The terminal connector is now ready for crimping.

The crimping of the terminal connector is effected by well known means, for example as taught by U.S. Pat. No. 3,010,183. Force is applied to the terminal connector, as schematically indicated by arrows in FIG. 4, to deform the outer and inner ferrules and transmit a crimping force to the slotted end of the center contact pin to fix it on the center conductor of the cable. The original round shape of the terminal connector is reduced in circular configuration during crimping. Both the outer and inner ferrules and the center contact pin are thus secured to the shielding and center conductor, respectively, of the cable in a single operation.

The embodiment of the inventive terminal connector shown and discussed is the plug or male half of a disconnectable coaxial connector. However, it is understood that the inventive concept may also be applied to the receptacle or female half of a disconnectable coaxial connector, or to any other connector configuration adapted to a particular function, without departing from the spirit or essential characteristics of the present invention. The present embodiment is therefore intended to be illustrative by way of a specific example and not as a limitation to the changes of configuration which fall within the scope of the invention.

What is claimed is:

1. A terminal connector for coaxial cables of the type having a center conductor, an insulating sleeve surrounding said conductor, a shielding layer surrounding said sleeve, and an insulating layer enclosing said shield, said connection comprising:
 - a. a center contact having one end portion adapted to engage a mating terminal and a slotted opposite end portion adapted to receive said center conductor;
 - b. a cylindrical dielectric member having a conical recess in one end thereof and an axial bore extending from said recess through said member, said center contact mounted with force fit in said bore with its slotted end directed toward said recess;
 - c. an inner ferrule having a cylindrical body portion with integral outer and inner flanges radially extending outwardly and inwardly, respectively, from one end thereof, said dielectric member mounted in said body portion of said inner ferrule with said recess adjacent the other end of said body portion, said body portion adapted to receive said insulating sleeve of the coaxial cable therein abutting said dielectric member and to drive the latter into abutting contact with said inner flange, said shielding layer of said cable surrounding the outer surface of said body portion; and
 - d. a cylindrical outer ferrule encircling said shielding layer and said inner ferrule with one end of said outer ferrule abutting said outer flange of said inner ferrule, whereby said terminal connector is secured to said coaxial cable in a single operation by applying a crimping force to said outer ferrule at least adjacent said flanged end of said inner ferrule, with said crimping causing said slotted end portion of the center contact to encompassingly engage said center conductor, and adjacent the other end portion of said outer ferrule with said crimping causing said braided shield to be secured

- between said inner ferrule and said outer ferrule.
2. A terminal connector according to claim 1 wherein said body portion of said inner ferrule further comprises:
 - at least one inwardly directed dimple engaging said dielectric member and hold it within said body portion against free movement.
 3. A terminal connector according to claim 1 wherein said body portion of said inner ferrule further comprises:
 - at least one annular serration on the outer surface thereof grippingly engaging said shielding layer.
 4. A terminal connector according to claim 1 wherein said center contact is a plug or male contact.
 5. A terminal connector according to claim 1 wherein said center contact is a receptacle or female contact.
 6. A method for attaching a terminal connector to coaxial or shielded cable, of the type having an inner conductor concentrically surrounded by a dielectric shield, an outer conductor and an insulating layer, in a single crimping operation, comprising the steps of:
 - a. providing a terminal connector of the type having a center contact one end of which is profiled for mating with a cooperating contact and the other end of which is slotted across its diameter, a dielectric member having a conical recess in one end and an axial bore therethrough adapted to receive said center contact therein with said slotted end directed toward said recess, an inner ferrule having a body portion with integral outer and inner radial flanges on one end thereof and adapted to receive said dielectric member therein with said recess substantially aligned with the other end of said inner ferrule, and a cylindrical outer ferrule;
 - b. preparing said coaxial cable by stripping so that a portion of the center conductor is uncovered and a portion of said outer conductor is exposed and flared;
 - c. inserting the prepared end of said cable through said outer ferrule;
 - d. moving said cable and said terminal connector together axially so that said center conductor is guided by said conical recess and bore to lie within the slotted end of said center contact;
 - e. continuing said axial movement bringing said dielectric member and dielectric shield together in abutting relationship and driving said member against said inwardly directed radial flange of said inner ferrule while said flared outer conductor slides over the outer surface of said inner ferrule;
 - f. sliding said outer ferrule over said outer conductor into abutting relationship with said outwardly directed flange of said inner ferrule; and
 - g. crimping said terminal connector to reduce the circular area thereof whereby crimping force is transmitted through said dielectric member to collapse the slotted end of said central contact into connection with said inner conductor.

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