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3,474,385

COAXIAL CABLE CONNECTOR

Filed June 8, 1967

2 Sheets-Sheet 1

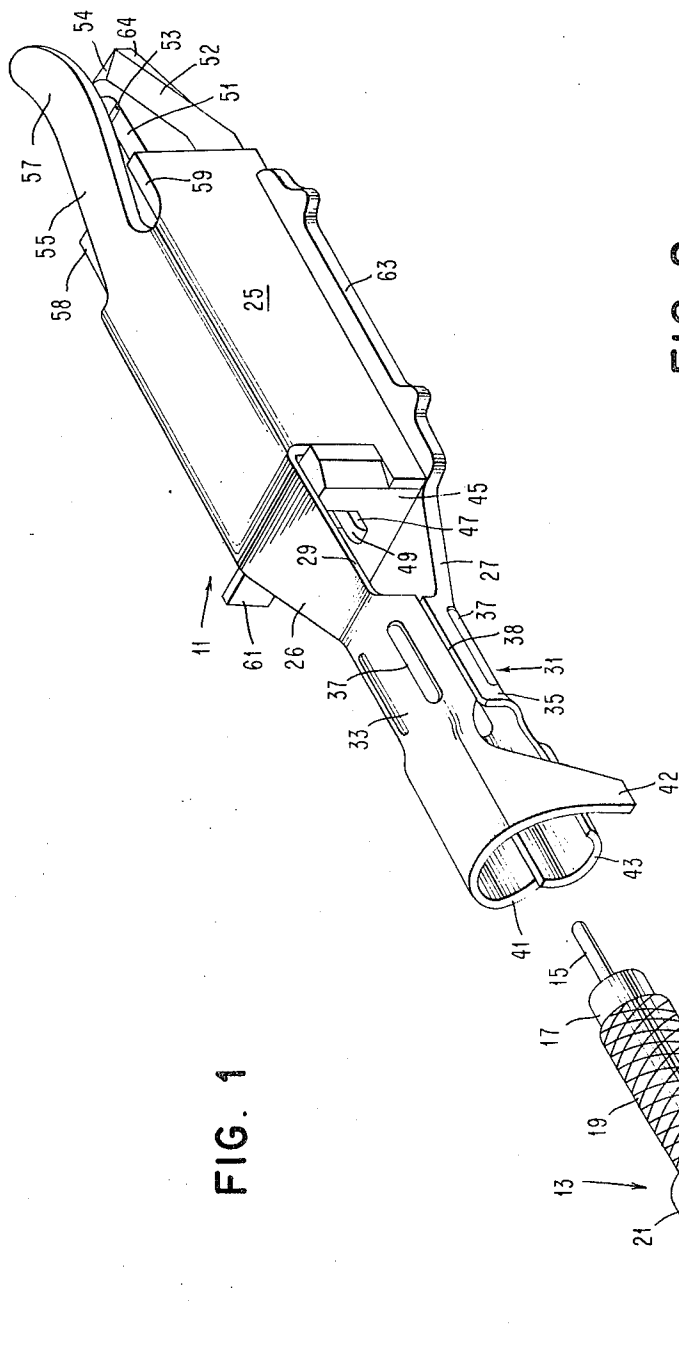
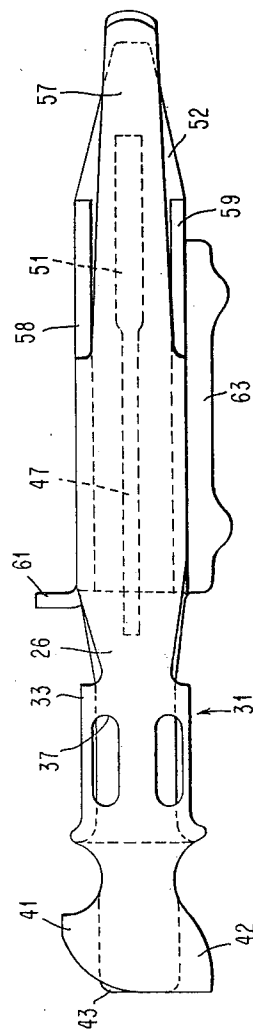


FIG. 1

FIG. 2



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COAXIAL CABLE CONNECTOR

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2 Sheets-Sheet 2

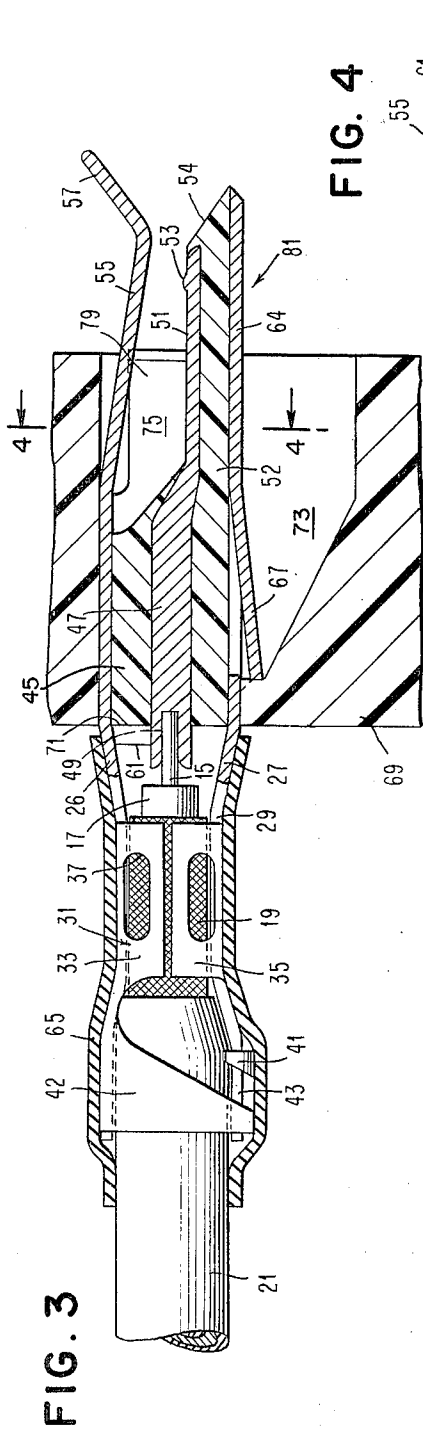
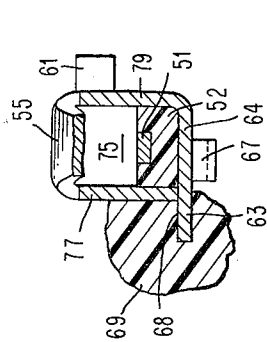
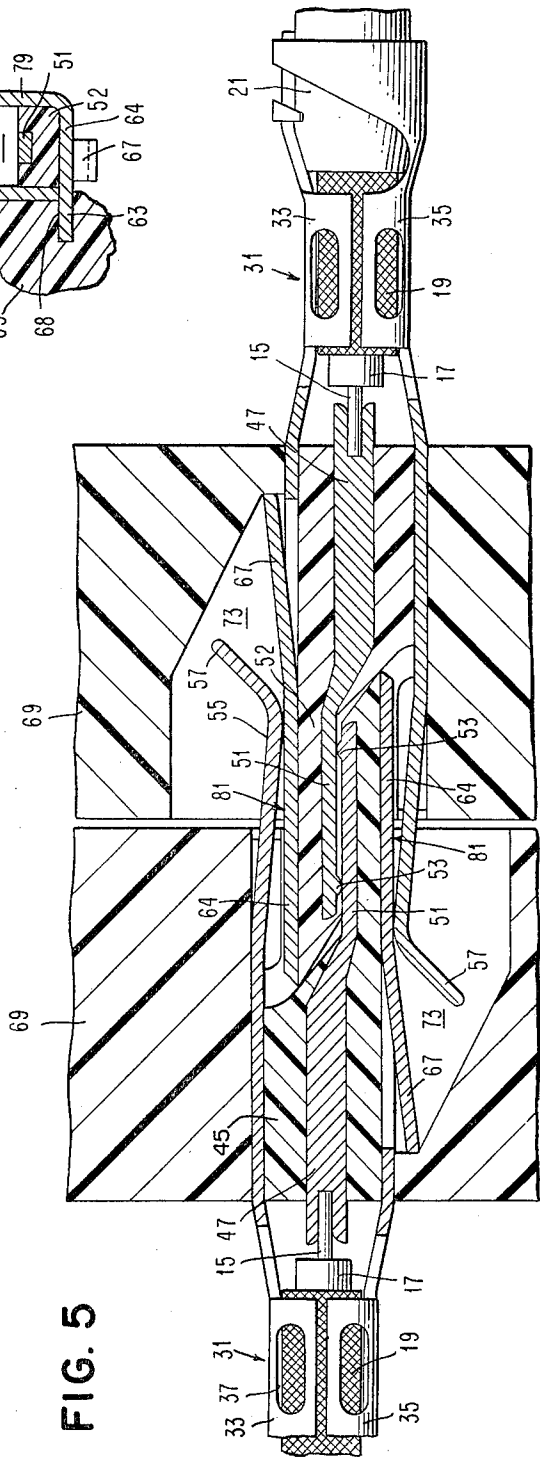


FIG. 4



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COAXIAL CABLE CONNECTOR

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6 Claims

ABSTRACT OF THE DISCLOSURE

This connector for a coaxial cable is comprised of a novel cable-connection section and a novel contact section providing matched impedance. The cable-connection section includes an axial conductor having a solder slot for receiving the stripped center conductor of the cable and a cylindrical conductor means having openings for soldering to the stripped shield of the cable. Heat effects simultaneous soldering. The cylindrical conductor means has a first support extension and a second extension with two arms adapted to wrap around the support extension and the outer insulation jacket of the cable. The axial conductor is mounted in a plastic insulator of rectangular cross section. The cylindrical means is a projection of a rectangular-cross-sectioned body of the connector. The end of the connector opposite the cable end includes an axial, projecting contact embedded in an extension of the plastic insulator and a leaf contact extending from the connector body. Both contacts have rounded formations. This connector is mounted in an insulating housing by means of tabs and an edge and can mate with a corresponding connector so that dual contacts are made for the signal conductor and for the ground shield of the coaxial cable. The leaf contacts provide the normal force for proper engagement of the axial contacts.

This invention relates to electrical connectors and more particularly to a coaxial cable connector.

In the past, it was customary in production to terminate a coaxial cable with crimping. This was used with alternating male and female contacts which required appreciable space. Further, the crimping gave bulky, irregularly shaped barrel structure. Both the double contacts and the crimping mitigated against impedance matching. Another disadvantage of available coaxial connectors was that the connectors were screw machined or otherwise made in a realtive expensive manner. Also, known miniature coaxial connectors often were not hermaphroditic so that there could be mating between connectors.

An object of the invention is the provision of an improved coaxial connector which avoids the above-noted disadvantages and has unique solder cable connection means.

Another object is to provide a coaxial cable connector having an improved contact section comprised of an axial contact and finger-like, leaf-spring shield contact which gives proper engagement of the axial contact.

A further object is the provision of such a connector which is hermaphroditic and thus can be mated with an identical connector which is inverted.

An additional object is to provide a matched impedance coaxial connector having an inexpensive sheet body part which is combined with an axial contact and an insulator to give improved connection to the coaxial cable and further having improved shield and center wire contacts.

In accordance with the disclosed embodiment of the invention, a connector has an axial conductor for connection to the center conductor of a coaxial cable. The axial conductor is partially encased by a dielectric which, in

turn, is partially encased by the body part of a shield connector. The axial conductor is mounted in the dielectric with an exposed contact surface in the dielectric extension. The shield connector has a projecting curved leaf contact over the axial contact. Both contacts have rounded segments for engagement of contact sections of an identical connector. The spring leaf contact assures proper engagement by the axial contact. The shield connector has means for electrical connection to the cable ground shield and for mechanical wrap-around connection over the cable outer insulation. Electrical connection is provided by cylindrical structure having openings and by inserting into the cylindrical structure the solder-tinned woven wire shield of the coaxial cable. The center wire of the cable is received in a center solder slot of the axial conductor of the connector. Heating effects soldering at both locations. The shield connector has a tab, a projecting edge and a latch tab for positioning in a connector housing. This connector is dimensioned to give impedance and is hermaphroditic since it mates with an identical inverted connector.

The realization of the above objects, along with the features and advantages of the invention, will be apparent from the following description and the accompanying drawings in which:

FIG. 1 is a perspective view of the connector and coaxial cable which is stripped and arranged to be guided into the connector for soldering;

FIG. 2 is a top view of the connector and shows the axial conductor in dashed lines;

FIG. 3 is a partially cross-sectioned side view and shows the latching tab received in a recess in a connector housing;

FIG. 4 is a cross section along the line 4—4 of FIG. 3 and shows the exposed surface of the axial conductor and the reception of the guide edge in housing; and

FIG. 5 is a partial cross-sectioned side view of two mated connectors and shows the dual point contact of both conductors of the connector.

In FIGS. 1 and 2, the coaxial connector 11 is shown with a stripped coaxial cable 13 which is aligned for insertion into the connector. The coaxial cable is comprised of a center round-metal-wire conductor 15, a primary tubular dielectric or insulator 17, a woven-metal-wire shield 19 and an outer insulating jacket 21. The inner or primary insulation, the shield and the outer insulation are suitably stripped dimensionally lengthwise to expose the respective part which was covered.

The outer part of connector 11 is formed from sheet metal and has a rectangular body section 25, two inwardly inclined support arms 26 and 27 which form two windows (one window 29 showing) and terminate as cylindrical structure 31. The upper and lower arcuate sections 33, 35 have ports 37 and are separated by slits 38 (one appearing). This permits adjustment so that differently diametered cable shields can be guided and received. The top arcuate section 33 extends to form V-shaped, cable-gripping fingers 41, 42 which are to be bent to engage the arcuate support extension 43 from section 35 and cable sides. These fingers 41, 42 accommodate differently-diametered cables. This arrangement of fingers and the support extension provides protection against tensile and bending stresses on the cable. The ports 37 provide for applying soldering heat and inspection.

The connector body 25 encases a plastic insulator 45 which, in turn, encases the cable end of an axial rectangular conductor 47. This conductor has a cylindrical slot 49 at one end for receiving cable center wire 15. The slot 49 is provided with solder for binding to the cable center wire 15. Conductor 47 at its other end has a reduced thickness flat contact 51 which has a rounded cylindrical segment 53. This segment assures reliable en-

gement with a flat surface. Contact part 51 is mounted in an extension 52 of insulator 45 which has an inclined ramp 54 leading to the end of contact 51 embedded in insulator extension 52. Also at the other end of body 25, a shield leaf contact 55 projects integrally and terminates in a rounded, spherical segment or curved tip 57 having radius in two directions. The leaf contact is downwardly inclined and then curved upwardly so that the end of the curved tip 57 is not appreciably above the top plane of the body, while the bottom of the curved tip is appreciably below the top plane. (Note FIG. 3.) The base of the leaf contact 55 is formed by slitting the top body wall at 58 and 59. Body 25 of the one-piece outer connector part includes a retaining or stop tab 61 and a positioning edge 63. Insulator extension 52 is supported by extended body bottom wall 64 which forms a shield connecting contact surface.

Referring to FIG. 3, it can be seen that center conductor 15 has been soldered in axial slot 49 of axial pin 47 and that arcuate sections 33, 35 have been soldered to the woven-metal shield 19, which was previously tinned. Application of heat by a heated air blower, induction means or otherwise effects the solder joints which can be observed through slots or ports 37 and windows 29. Thereafter, a clear insulating tubing 65 which is made from a heat-shrinkable plastic is slipped into place to cover arms 26, 27, arcuate sections 33, 35, fingers 41, 42. These fingers have been bent to engage insulating jacket 21 and support extension 43 and now, since offset, have edges closely adjacent. The tubing 65, thus placed, is heated and shrinks to engage the mentioned, encased parts as well as the end of outer insulating jacket 21. This tubing 65 is used when exterior insulation is required.

From FIGS. 3 and 4, it is apparent that the lateral keying edge 63, retaining stop tab 61 and latching tab 67 have been positioned respectively in a mating groove 68 in insulating and supporting housing 69, against wall 71 of housing 69 and in the recess 73 in housing 69. A recess 75 is provided bounded by the inner surfaces of center contact 51, the extended connector side walls 77 and 79, leaf contact 55 and the insulator so that a mating center contact 51 and insulator extension 52 can be inserted via ramp 54 causing flexing of leaf contacts 55 when rounded segments 53 engage the flat sides of mating center contacts. At this point the spherical segments 57 of leaf contacts 55 will have a similar point-tip engagement.

The bottom contact wall 64, insulator extension 52 and flat axial contact can be referred to as an insulated axial-leaf contact section 81 having leaf contact wall.

In FIG. 5, the above-described coaxial connector is shown mated with an inverted or oppositely-arranged corresponding connector, both mounted in housings 69. It is to be noted that the center contact 51, insulator extension 52 and the body contact wall 64 are received in recesses 75 while leaf contacts 55 fit in recesses 73 above-mentioned. Leaf contact 55 has its curved tip 57 engaging the wall of the 180° rotated body 25 of the other connector and thus is slightly flexed giving reliable point contact. Likewise, the rounded segments 53 of axial conductors 47 are engaged with respective flat mating surfaces of the other axial conductor to give reliable point contact due to the urging of leaf spring contacts. Thus, a hermaphroditic coaxial connector has been provided which gives dual contact for both the axial conductors 47 and the leaf conductors 55. Dual reliability is thus achieved.

It is to be noted that keying of the connector housings causes the contacts to mate properly. The contact of the axial members is made through normal forces supplied by the leaf spring contacts. The outer leaf contacts engage through spring leaf deflections along the opposing rigid box section or body. The one piece outer member provides dual shield contact, latching and keying members, cable termination, and support at the cable insulation. Dimensioning of parts including the rectangular

sections give close impedance matching. Soldering is achieved at the same time for the center conductor and shield conductor.

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

What is claimed is:

1. A connector for a coaxial cable comprised of:

an axial metal conductor having at one end an axial cylindrical slot for insertion of the center round wire of a coaxial cable and a contact part of the other end;

a plastic insulator encasing said axial conductor except for said contact part;

metal shield connection means mounted on said insulator and having a contact section at one end;

said shield connection means having at its other end cylindrical structure for the receiving of, and the bonding to, the shield of a coaxial cable;

said cylindrical structure having longitudinal slots therein for exposing the soldering of the shield of a coaxial cable;

an integral axially extending part of said cylindrical structure for receiving a coaxial cable; and

an integral opposed support of said cylindrical structure which flares into a circumferential V-shape for engaging the outer insulation of a coaxial cable and the axially extending part.

2. The connector according to claim 1 and being further characterized by:

said shield connection means having a retaining tab integral with said other end and a projecting lengthwise orienting edge respectively adapted to engage the side wall and a groove of a mounting block, and said shield connection means having a latch tab depending from said one end for engaging a recess wall of a mounting block.

3. A connector for a coaxial cable and formed to provide electrical connection with a similar inverted connector when in mating holders comprised of:

an axial metal conductor having at one end an axial cylindrical slot for insertion of the center round wire of a coaxial cable and an axial contact part at the other end,

a plastic insulator of square cross-section encasing said axial conductor except for said contact part under which an insulator extension projects,

metal shield connection means mounted on said insulator and having a leaf contact section at one end projecting over said axial contact part so that a recess is formed,

said shield connection means having at its other end structure for bonding to the tubular shield of a coaxial cable,

said shield connection means having a flat engagement wall opposite said leaf contact section so that the leaf contact section of another inverted connector can be engaged for connection to the shield of a coaxial cable,

said recess being formed below said leaf contact and above said axial conductor for insertion of part of an axial conductor of another inverted connector, and

said leaf contact section being formed so that said axial conductor will properly engage another axial conductor by the forces exerted by the leaf contacts.

4. A connector for a coaxial cable and formed to provide electrical connection with a similar inverted connector when in mating holders comprised of:

an axial metal conductor having at one end means for engaging the center round wire of a coaxial cable and an axial contact part at the other end,

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a plastic insulator of square cross section encasing said axial conductor except for said axial contact part,
 metal shield connection means having a body part mounted on said insulator and having a leaf contact section at one end projecting over said axial contact part,
 an axial contact section comprising a portion of said body part, an extension of said plastic insulator and said axial contact part,
 said shield connection means having at its other end cylindrical structure for engaging the shield of a coaxial cable,
 said shield connection means having a flat engagement wall opposite said leaf contact section so that the leaf contact section of a corresponding connector can be engaged for connection to the shield of a coaxial cable, and
 said leaf contact section and said axial contact section forming a recess which has a vertical dimension less than the axial contact section so that spring forces are exerted when a like inverted axial contact section is mated.

5. The connector according to claim 4 and being further characterized by:
 said shield connection means having a retaining tab integral with said other end and adapted to engage the side wall of a mounting block,
 said shield connection means having a latch tab depending from said one end for engaging a recess wall of a mounting block, and
 said shield connection means having a lateral edge for engaging a slot in a mounting block.

6. A connector for a coaxial cable and formed to provide electrical connection with a similar inverted connector when in mating holders comprised of:
 an axial metal conductor having at one end an axial cylindrical slot for insertion of the center round wire of a coaxial cable and an axial contact part at the other end,
 a plastic insulator of square cross-section encasing said axial conductor except for said contact part.
 a one-piece, sheet metal shield connection means having a square-shaped body part mounted on said insulator and having a leaf contact section at one end projecting over said axial contact part so that a recess is formed,
 said shield connection means having at its other end

cylindrical structure for bonding to the shield of a coaxial cable,
 said shield connection means having a flat engagement wall opposite said leaf contact section so that the leaf contact section of another connector can be engaged for connection to the shield of a coaxial cable,
 said cylindrical structure having longitudinal slots therein for exposing the soldering to the tubular shield of a coaxial cable,
 said cylindrical structure having integral support structure which flares into circumferential fingers for engaging the opposed structure extension and the outer insulation of a coaxial cable,
 said shield connection means having a retaining tab integral with said other end and adapted to engage the side wall of a mounting block,
 said shield connection means having a latch tab depending from said one end for engaging a recess wall of a mounting block,
 said shield connection means having a lateral edge for engaging a slot in a mounting block,
 said axial contact part having at its end a rounded shape for reliable contact with a corresponding contact part,
 said leaf contact having a flat strip terminating in a rounded segment at its end for point contact, and
 said recess being dimensioned so that the leaf contact section will exert a force on a corresponding inserted contact section.

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U.S. Cl. X.R.

339—177

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,474,385

October 21, 1969

Frank P. Cefarelli et al.

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 14, "of", second occurrence, should read -- at --.

Signed and sealed this 24th day of February 1970.

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

WILLIAM E. SCHUYLER, JR.

Commissioner of Patents