(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 167 738**
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **85105340.5**

(22) Date of filing: **02.05.85**

(51) Int. Cl.⁴: **H 01 R 17/12**

(30) Priority: **04.06.84 US 616765**

(43) Date of publication of application:
15.01.86 Bulletin 86/3

(84) Designated Contracting States:
DE FR GB IT SE

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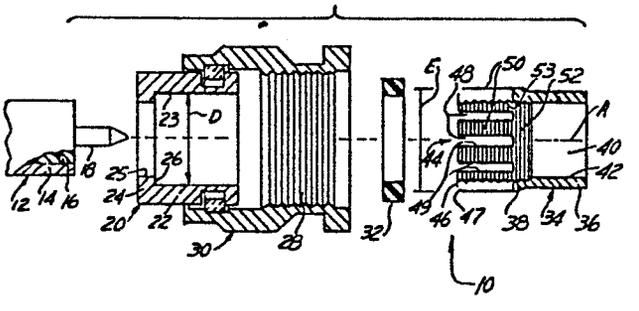
(54) **Electrical connector having means for retaining a coaxial cable.**

(57) A connector for retaining a cable end portion having a deformable outer covering comprises a locking sleeve, and a shell having a bore for receiving the cable and a plurality of longitudinal slots which define a plurality of angularly separated and radially deflectable fingers, each finger having V-shaped thread on its inner surface whereby mounting of the sleeve onto the shell deflects the fingers radially inward and the thread into gripping relation with the cable covering axial faces of the thread and radial faces of the fingers, respectively, resisting rotation and axial movement of the cable in the bore.

FIG. 1



ELECTRICAL CONNECTOR HAVING MEANS FOR RETAINING A COAXIAL CABLE

This invention relates to an electrical connector having means for axially positioning and retaining a coaxial-type cable within the connector.

The primary object of this invention is to provide a retention arrangement for semi-rigid coaxial-type cable that will eliminate the need of soldering operations to terminate a cable end portion to a connector which is common practice in the electrical connector industry. Such retention would eliminate the need for gold plating a stainless steel body, thus reducing cost.

In accord with the invention, a slotted connector shell defines a plurality of radially deflectable fingers with each finger including cable gripping teeth. A locking sleeve is disposed around the cable an end portion of which is positioned for termination in the shell, forward axial movement of the locking sleeve camming the fingers radially inward and into gripping relation with the outer covering of the cable.

An advantage of the invention is a crimp sleeve which may be easily inserted about a connector shell and driven into seated engagement by use of simple tools and yet provide a firm gripping retention which positions the end face of the cable for mating.

One way of carrying out the invention as described in detail below with reference to the drawings which illustrate specific embodiments in the invention, in which:

FIGURE 1 is an exploded view of a connector assembly.

FIGURE 2 is the connector assembly of FIGURE 1 when assembled.

FIGURE 3 is a view taken along lines III-III of FIGURE 2.

FIGURE 4 is an exploded view of an alternate connector assembly embodiment of this invention.

FIGURE 5 is the view of the connector assembly of FIGURE 5 when assembled.

FIGURE 6 is a view taken along lines VI-VI of FIGURE 5.

Turning now to the drawings, FIGURES 1-3 and 4-6, respectively, show connector assemblies having an arrangement for gripping the flexible outer covering of a coaxial-type cable to axially position the cable end in the connector, prevent rotation of the cable relative to the connector and retain the cable end portion within the connector assembly whereby to provide a reliable solderless termination.

FIGURE 1 shows a connector assembly, generally indicated at 10 positioned for assembly about a primary axis "A" to a cable 12, the cable being of the type comprising a semi-rigid conductive jacket or outer covering 14, a dielectric layer 16 and a center conductor 18 (see FIGURE 3), the connector assembly including a locking sleeve 20, a coupling nut 30 rotatably mounted to the outer periphery of the sleeve and having thread 28 for connecting to a complementary connector (not shown), and a shell 34, the locking sleeve being configured to be fit about the cable end portion and mounted to the rearward end portion.

The shell 34 is generally cylindrical and has a forward portion 36, a rearward portion 38 defining an opening 44 somewhat larger in diameter than a diameter defining the outer covering of the cable end portion,

and a bore 40 extending between the ends of the shell. The rearward end portion 38 of the shell 34 includes an inner surface 42, a transverse end face 46, and a plurality of slots 48 extending longitudinally inward from the end face to define a plurality of radially deflectable fingers 50 and a plurality of radial faces 49.

The locking sleeve 20 includes a generally cylindrical body 22 and an annular flange 24 having endwall 26 extending radially inward therefrom, the inner surface 23 of the body being defined by a diameter "D" slightly smaller in size than a diameter "E" defining the outer periphery of the rearward end portion, whereby the sleeve may be interference mounted onto the rearward end portion 38. The flange 24 defines a passage 25 which communicates with the interior cavity of the body and has a diameter slightly greater than that of the cable outer diameter to be slidably fit thereover.

To retain the cable end portion within the connector assembly the fingers 50 define a plurality of gripping portions 52 which extend radially inward from the inner surface 42 for gripping into the outer covering 14 of the cable when the cable end portion is inserted into the bore 40. As shown, the gripping portions comprise a helical screw thread of the type having a V-shaped cross-section and which, but for the slots 48, would form a continuous helix which spirals axially rearward from the end face 46 to a location on the inner surface 42 of the shell axially inward of the slot ends. Mounting of the sleeve onto the rearward end portion 38 drives the fingers 50 radially inward and the gripping portions 52 thereof into the outer covering of the cable. The thread form, by virtue of its V-shape

extends between opposite radial faces defining the finger and provides a pair of axial faces 53 which prevent axial movement of the cable end relative to the bore. The radial faces prevent rotational movement of the cable and relative to the bore.

The end wall 26 of annular flange 24 forms a limit on the inward axial advance of locking sleeve 20 about the rearward end portion 38 of the shell.

Tapered surfaces 47 on end faces 46 of fingers 50 define a cam which, when the fingers are driven against the locking sleeve, deflects the fingers radially inward. A washer 32 serves to seal around the shell and adjacent the locking sleeve.

FIGURE 2 shows a completed assembly wherein the locking sleeve 20 has been inserted over the rearward end portion 38 and the body 22 driven longitudinally inward of the end face 46 to drive the fingers 50 radially inward. The cable end portion is shown partially in section to show penetration of the V-shaped thread 52 into the outer covering 14. Further, endwall 26 of sleeve 20 is abutting end face 46 of shell 34.

FIGURE 3 is an end view in section showing the thread form 52 biting into the outer covering 14 of the cable. As noted, the axial faces 53 and radial faces 49 not only serve to retain within the bore 40 of the connector but prevent axial and angular movement of the cable relative thereto.

FIGURE 4 shows an alternate embodiment including a locking sleeve 54 and a shell 64 including a coupling nut 62 rotatably mounted to its outer periphery. The locking sleeve includes a generally cylindrical body 56 having an inner surface 57 and an annular flange 58 extending radially inward to define a passage 59 and an inner endwall 60. The shell 64 is generally cylindrical

slots/fingers or spacing could be other than shown depending on the gripping desired.

Having described the invention what is claimed is:

1. An electrical connector for use with a cable end portion having a resiliently deformable outer covering, comprising a shell (34, 64) having a forward end portion (36,66), a rearward end portion (38, 68) having a transverse end face (46, 76) defining an opening (44, 74) larger in size than said outer covering for receiving a cable end portion, and a bore (40, 70) extending between the ends thereof, characterized by the rearward end portion of said shell including an inner surface (42, 72) and a plurality of slots (48, 78) extending longitudinally inward from the end face to define a plurality of radially deflectable fingers (50, 80), a locking sleeve (20, 54) having an inner diameter slightly smaller in size than the outer periphery of said rearward end portion and adapted to be mounted thereto, and gripping means (52, 82) extending radially inward from the inner surface for gripping the outer covering of the cable inserted into the bore, said gripping means being adapted to be driven radially inward and within the outer covering upon mounting the locking sleeve onto the rearward end portion whereby to position and retain the cable in the bore.

2. The electrical connector as recited in Claim 1 wherein a coupling nut (30) is rotatably captivated to the outer periphery of said sleeve (20) for coupling to a complementary connector whereby to complete an electrical connection with the cable.

3. The electrical connector as recited in Claim 1 wherein a coupling nut (62) is rotatably captivated to the outer periphery of said shell (64) for coupling to a

8. The electrical connector as recited in Claim 7 including thread means (28, 63) operative between the coupling nut (30, 62) and said complementary connector for threadably coupling each together, the sense of said thread means and said thread form (52, 82) being of the same helical sense.

9. The electrical connector as recited in Claim 7 wherein the thread form (52, 82) spirals inwardly from the end face (46, 76) to a shell location inward of the slot (48, 78) terminations.

10. The electrical connector as recited in Claim 1 wherein the locking sleeve (20, 54) includes an annular flange (24, 58) extending radially inward with an interior end wall (26, 60) thereof being adapted to abut the end face (46, 76) whereby to define a stop and limit the inward axial advance of the locking sleeve relative to the shell (34, 64).

11. The electrical connector as recited in Claim 1 wherein the rearward end portion (38, 68) includes at least four fingers (50, 80) substantially equiangularly thereabout and the angular dimension between radial faces defining the width of each said finger is at least twice as great as that defining the width of each said slot (48, 78).

FIG. 1

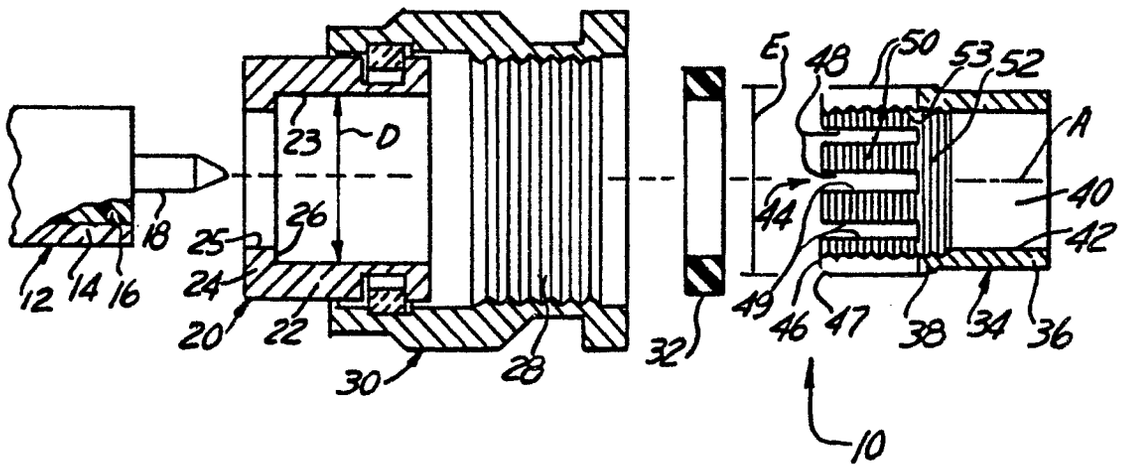


FIG. 2

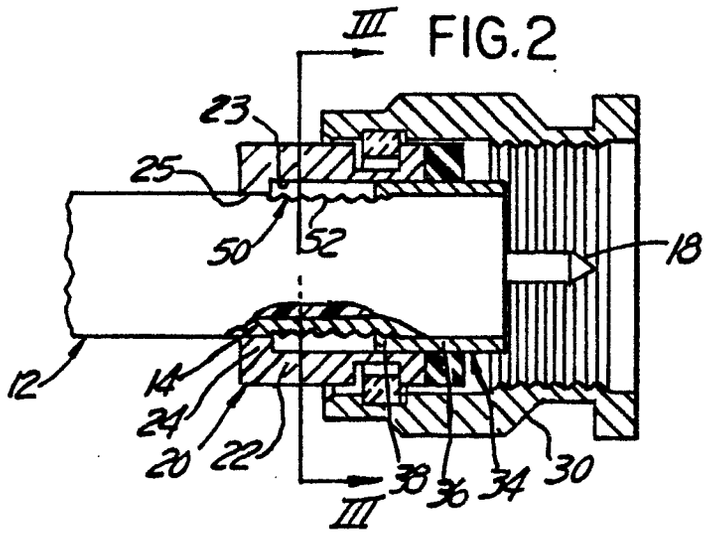


FIG. 3

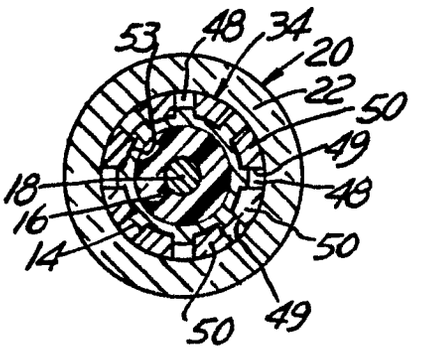


FIG.4

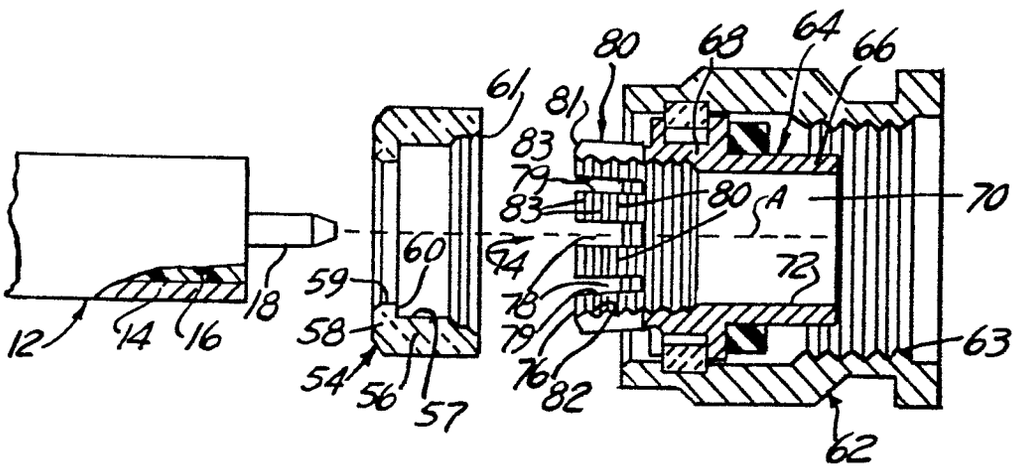


FIG.5

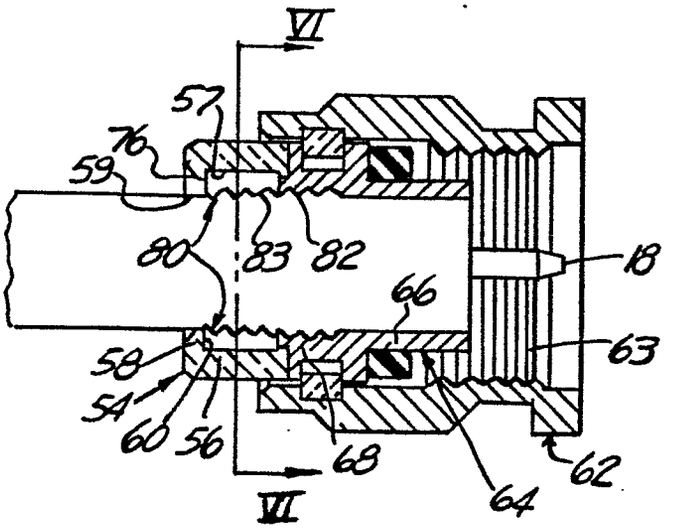


FIG.6