

May 5, 1970

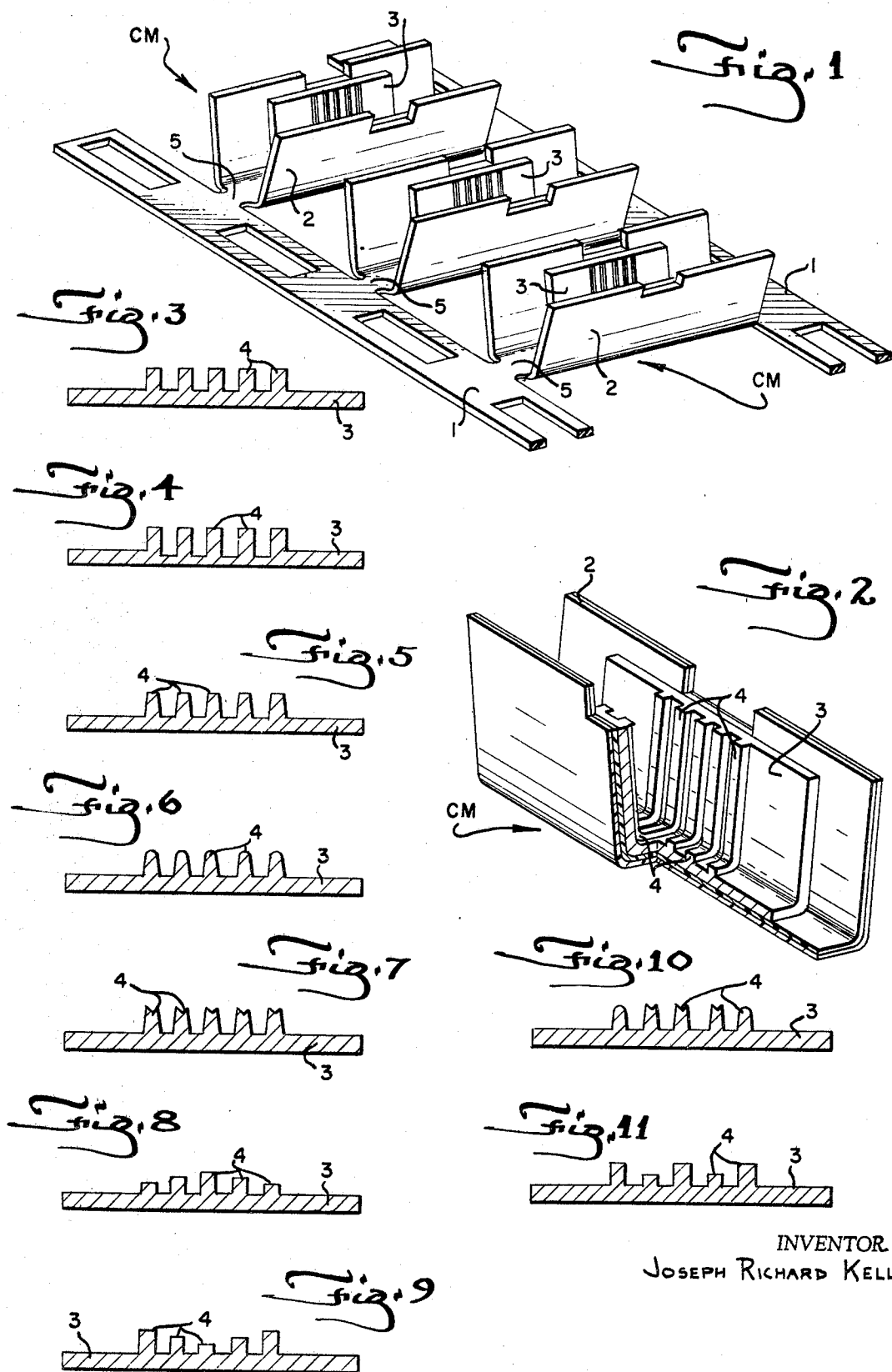
J. R. KELLER

3,510,829

ELECTRICAL CONNECTOR

Original Filed April 28, 1965

4 Sheets-Sheet 1



INVENTOR  
JOSEPH RICHARD KELLER

May 5, 1970

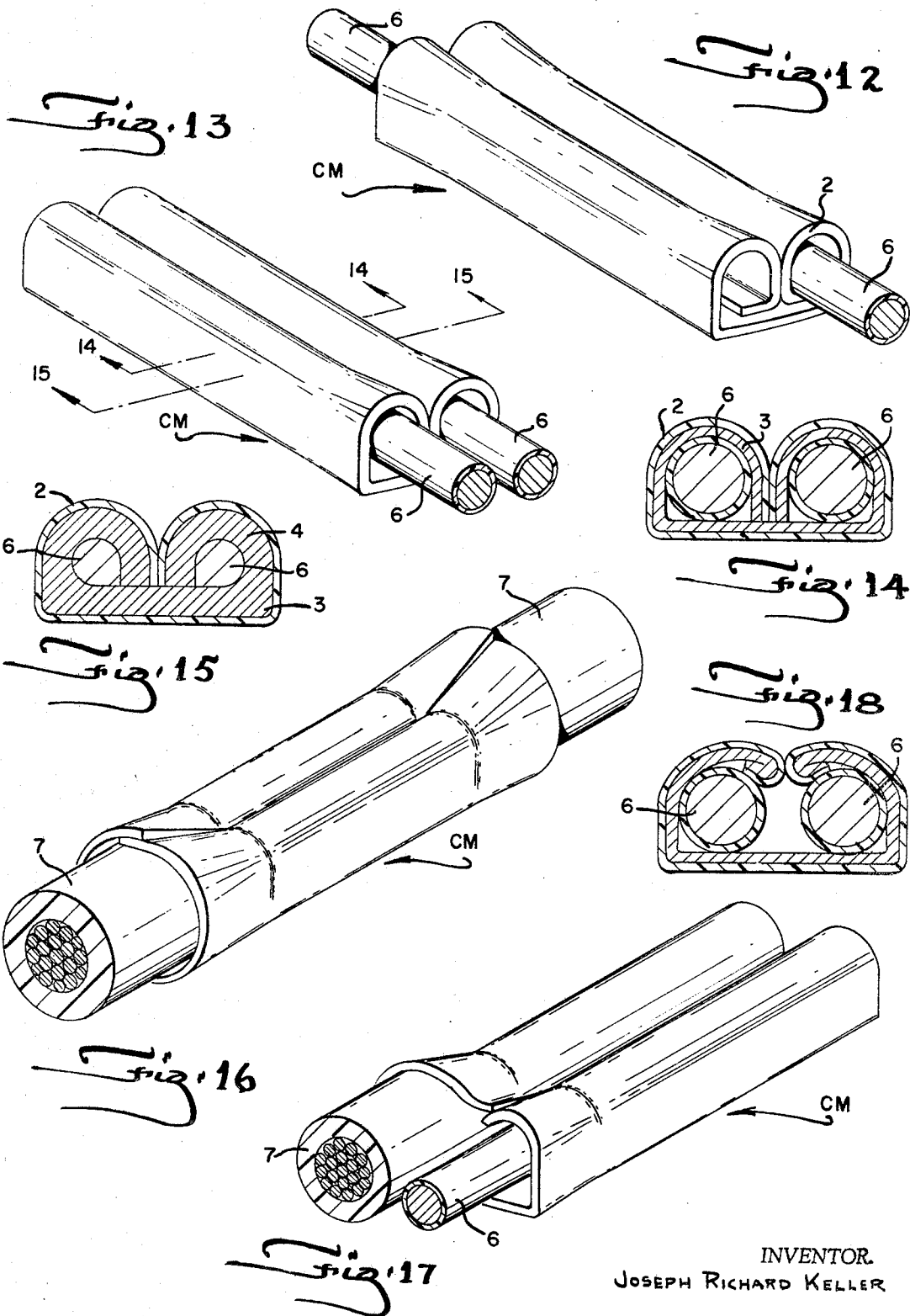
J. R. KELLER

3,510,829

ELECTRICAL CONNECTOR

Original Filed April 28, 1965

4 Sheets-Sheet 2



INVENTOR  
JOSEPH RICHARD KELLER

May 5, 1970

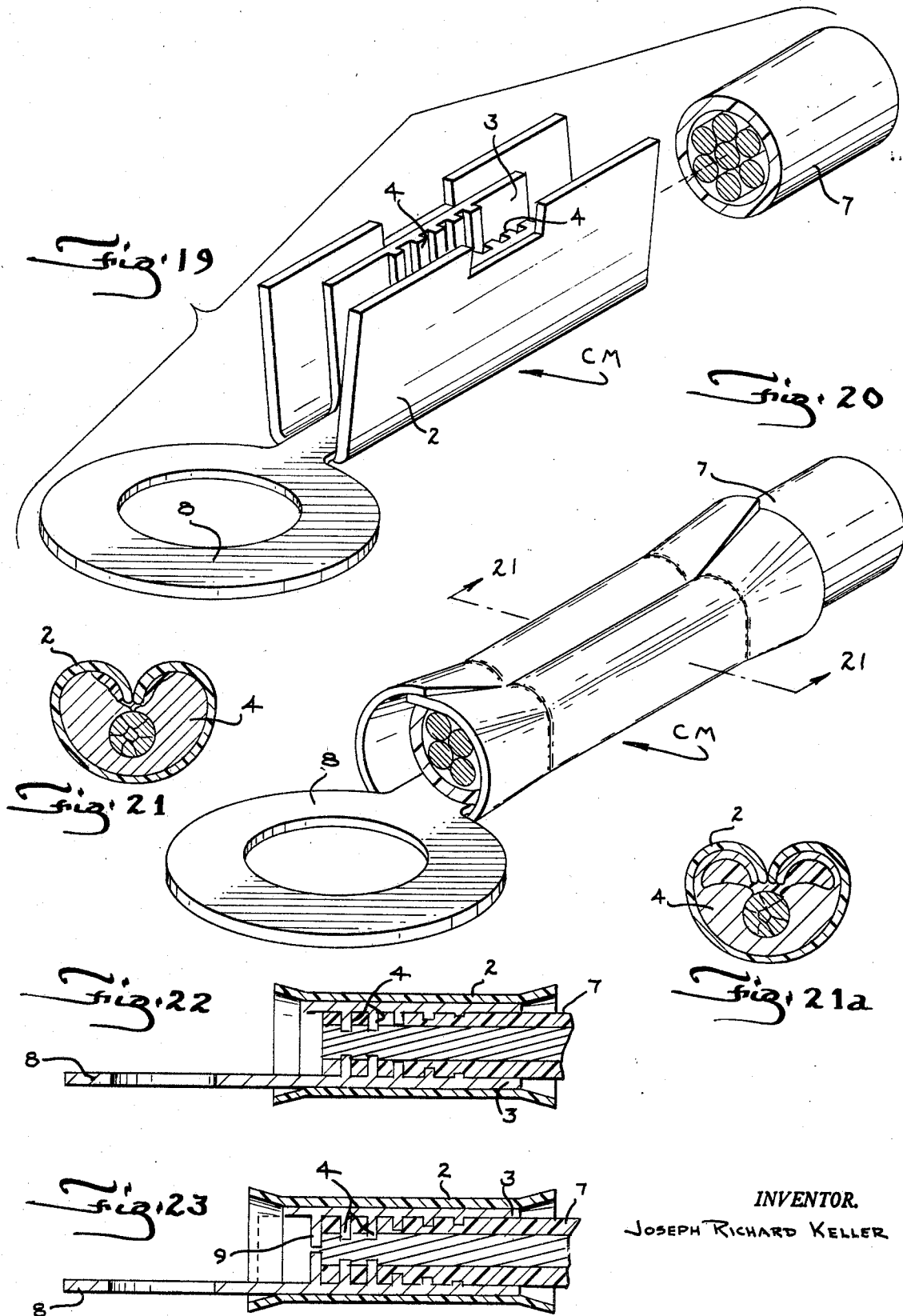
J. R. KELLER

3,510,829

ELECTRICAL CONNECTOR

Original Filed April 28, 1965

4 Sheets-Sheet 3



INVENTOR.  
JOSEPH RICHARD KELLER

May 5, 1970

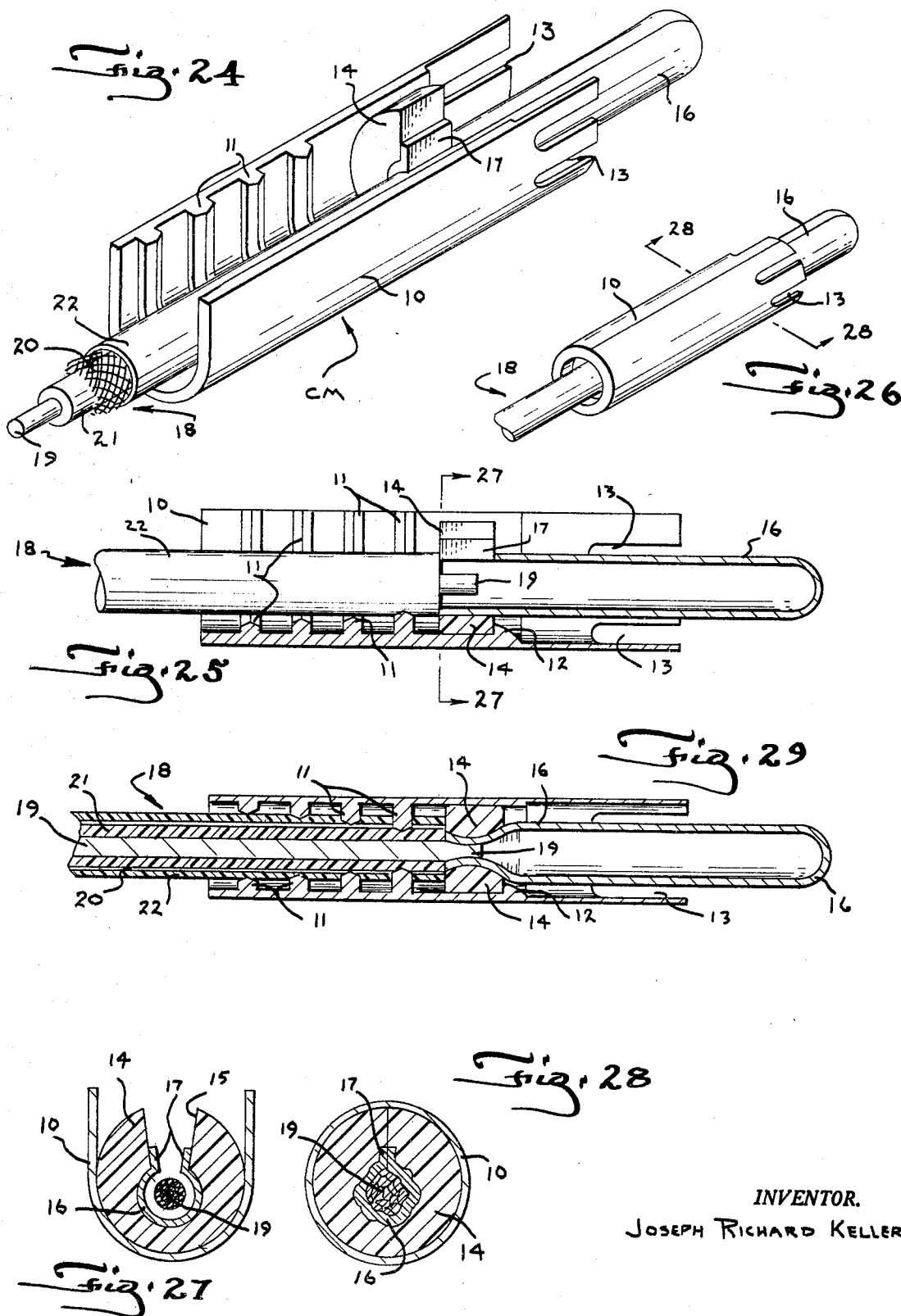
J. R. KELLER

3,510,829

ELECTRICAL CONNECTOR

Original Filed April 28, 1965

4 Sheets-Sheet 4



INVENTOR.  
JOSEPH RICHARD KELLER

1

2

3,510,829

## ELECTRICAL CONNECTOR

Joseph Richard Keller, Harrisburg, Pa., assignor to  
AMP Incorporated, Harrisburg, Pa.

Original application Apr. 28, 1965, Ser. No. 451,394, now  
Patent No. 3,355,698, dated Nov. 28, 1967. Divided and  
this application Sept. 22, 1967, Ser. No. 669,738

Int. Cl. H01r 17/04

U.S. Cl. 339—177

13 Claims

### ABSTRACT OF THE DISCLOSURE

A coaxial connector crimpable onto inner and outer conductive members of a coaxial cable with only the inner conductive member being exposed, the connector comprises an open barrel ferrule member provided with spaced ribs for electrical engagement with the outer conductive member when the ferrule member is crimped onto the coaxial cable and a dielectric member carries a center contact which is crimped onto the inner conductive member through the dielectric member.

### Cross reference to related application

This application is a division of Ser. No. 451,394, filed Apr. 28, 1965, now Pat. No. 3,355,698.

This invention relates to electrical connectors and more particularly to electrical connectors of the type crimpable onto conductor means.

An object of the invention is to provide an electrical connector that is crimpable onto the conductive portion of conductive means.

Another object of the invention is the provision of an electrical connector having ribs disposed transversely to the direction of the axis of the electrical connector.

A further object of the invention is to provide an electrical connector having ribs that can take various forms.

An additional object of the invention is the provision of an electrical connector having ribs extending outwardly from an interior surface and insulation disposed on an exterior surface.

A still further object of the invention is to provide a pre-insulated connector for engaging the conductive portion of conductive means.

Still another object of the invention is the provision of a pre-insulated connector having transverse ribs or pressure-relieving means for engaging the conductive portion of conductive means.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there is shown and described illustrative embodiments of the invention; it is to be understood, however, that these embodiments are not intended to be exhaustive nor limiting of the invention but are given for purposes of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

The foregoing objects are achieved in the present invention through the provision of an electrical connector means having a U-shaped member provided with rib members extending outwardly from the inside surface of the U-shaped member and transverse to the axis thereof. Insulation means is disposed on the exterior surface of the U-shaped member. The connector means is crimpable onto insulated conductor means for electrical and mechanical engagement with the conductive portion of the conductor means.

In the drawings:

FIG. 1 is a perspective view of connector means in feed strip form;

FIG. 2 is a perspective view partially in section of the connector means of the present invention;

FIGS. 3 through 11 are cross sectional views of the metallic portion of the connector means illustrating various forms of the rib members extending outwardly from the surface thereof;

FIGS. 12 and 13 are perspective views of the connector means crimped onto conductor means;

FIG. 14 is a view taken along lines 14—14 of FIG. 13;

FIG. 15 is a view taken along lines 15—15 of FIG. 13;

FIGS. 16 and 17 are perspective views of the connector means crimped onto conductor means;

FIG. 18 is a cross sectional view of the connector means crimped onto conductor means;

FIG. 19 is a perspective exploded view of an embodiment of the present invention;

FIG. 20 is a perspective view of the connector means in FIG. 19 in its crimped condition onto a conductor means;

FIG. 21 is a view taken along lines 21—21 of FIG. 20;

FIG. 21a is a view similar to FIG. 21 except that the rib members do not extend to the ends of the sides of the metallic member;

FIG. 22 is a longitudinal sectional view of FIG. 20;

FIG. 23 is a view similar to FIG. 22 but is directed to another embodiment;

FIG. 24 is a perspective view of a further embodiment of the present invention;

FIG. 25 is a longitudinal cross-sectional view of FIG. 24;

FIG. 26 is a perspective view of the embodiment of FIGS. 24 and 25 in its crimped condition;

FIG. 27 is a view taken along lines 27—27 of FIG. 25;

FIG. 28 is a view taken along lines 28—28 of FIG. 26;

and

FIG. 29 is a view taken along lines 29—29 of FIG. 26.

Turning now to the drawings, there is illustrated a series of connector means CM integrally connected to slotted feed strip members 1 via insulation 2 of the connector means. Connector means CM, in feed strip form as illustrated in FIG. 1, are appropriately fed into a crimping area of an applicator completely disclosed in Ser. No. 451,601, filed Apr. 28, 1965, now Pat. No. 3,292,236, and assigned to the present assignee for successively crimping the connector means onto conductor means. Of course, the connector means may be fed into the crimping area of a crimping machine or crimping tool in any suitable manner as well as being individually placed within the crimping area of a crimping machine or crimping tool.

Connector means CM comprises a metallic member 3 formed into a U-shape having rib members 4 extending outwardly from the interior surface thereof. The rib members extend transversely with respect to the axis of U-shaped metallic sheet 3; the rib members are preferably spaced from each other with the rib members covering about half the length of metallic member 3. As can be discerned, the portions of metallic member 3 from the outermost rib members 4 to each end of metallic member 3 contain no rib members so that the rib members are disposed inwardly from each end of the metallic member.

As can be perceived from FIGS. 3 through 11, rib members 4 take various forms. The rib members in FIG. 3 are of the same height and are rectangular shaped in cross section. In FIG. 4, the thickness of metallic member 3 between rib members 4 is less than that of the outermost portions beyond the rib members. Rib members 4 in FIG. 5 are of the same height and have a wedge shape

3

in cross section. The rib members in FIG. 6 are similar to those in FIG. 5 except that the tops are rounded. Likewise in FIG. 7, rib members 4 are similar to those of FIG. 5 except that the top of each rib member is provided with sharp edges. Rib members 4 in the embodiment of FIG. 8 increase in height from outermost rib members 4 to the center, while in FIG. 9, the rib members increase in height from the center to the outermost rib members. The rib members in FIG. 10 are a combination of the rib members of FIG. 6 and 7. In FIG. 11, the rib members are of alternate heights. The thin portion of metallic member 3 between rib members 4 as illustrated in FIG. 4 can of course be applied to the other embodiments. While there have been disclosed various configurations of rib members 4, other configurations of rib members can, of course, be utilized as well as combinations thereof. It is also to be understood that the number of rib members extending outwardly from the interior surface of the sheet metal member depends upon many factors such as, for example, the length of the connector member, the distance between rib members, the thickness of the rib members, etc. The height of the rib members is determined by the type of conductor means to be terminated.

A suitable insulation material 2 is disposed on the exterior surface of U-shape metallic member 3 and is preferably adhered thereto by means of a suitable adhering substance. As can be discerned from FIGS. 1 and 2, insulation 2 extends outwardly from the ends and sides of metallic member 3. The insulation material for use in conjunction with the present invention must be yieldable, must have a good coefficient of friction relative to the crimping members and must be tough. It has been found that Mylar fulfills the foregoing requirements and is therefore the insulation material that is preferably used in conjunction with the present invention; however, any other material fulfilling the foregoing requirements may be used. Insulation material 2 is preferably in laminated form with two sheets of Mylar glued together by means of a rubber based glue.

One reason for laminating the insulation material is to obviate any possibility of the insulation material having any discrepancy since any discrepancy occurring in the insulation material precludes the connector means from performing its intended function of providing a pre-insulated connector means for terminating conductor means. Therefore, in the event that one of the thin sheets of laminated plastic has a discrepancy therein, it is an extreme remote possibility that the other thin sheet of plastic material will have a discrepancy at the same location; whereas, if the insulation material was non-laminated and comprised a single sheet of material of equal thickness as that of the laminated material, a discrepancy occurring in this single sheet of insulation material would impair the insulation properties of the connection when the connector means is crimped onto a conductor means. Another reason for laminating the insulation material is that the rubber based glue allows the insulation material to flow more evenly with the metallic member during formation of the pre-insulated connector means and during the crimping operation of the connector means onto the conductor means. Thus, the inside sheet of the laminated insulation material may be impaired during the crimping operation but the outside sheet of the insulation material will not be impaired at the location of impairment of the inside sheet thereby providing an insulated connection which is highly reliable. If a single sheet of insulation material is used in place of the laminated insulation material and if the single sheet of insulation material is impaired during the crimping operation, this impairs the insulation properties of the connection thereby decreasing its reliability.

The following procedure sets forth the desirable mode for manufacturing the connector means in strip form as illustrated in FIG. 1. A strip of metal such as, for exam-

4

ple, brass is subjected to a milling operation to form a strip of ribbed material. Of course, the strip of metal can also be subjected to a rolling, skiving, extruding or any other suitable operation to form a strip of ribbed material. A profiling operation is performed on the strip of ribbed material by conventional tooling to form the profile of metallic member 3 in its desired form. Insulation means 2 is formed as a laminated structure by gluing two thin sheets of insulation material such as, for example, Mylar together to form a strip of insulation material about twice the width of the metallic strip of ribbed material. The laminated strip of insulation material is adhered to the metallic strip of ribbed material with the strip of ribbed material disposed centrally of the strip of insulation material. The combined strip of metallic ribbed material and insulation material is profiled by conventional tooling to form the sides of the insulation material into slotted feed strip members and the profiled metallic members along with the insulation material are formed into U-shaped connector means with the ends of insulation 2 being connected to feed strip members 1 via portions 5. Thus, there is formed a strip of open barrel connector means as illustrated in FIG. 1 ready to be used in the applicator mentioned hereinbefore.

The connector means described in conjunction with FIGS. 1 through 11 can be used on various types of conductor means such as for example, conventional stranded or solid wire surrounded by an insulating sheet, film insulated wire, i.e., solid wire having a thin film of insulation therearound such as for example Formvar (polyvinyl formal resin) or other suitable insulating material, or combinations of conventionally insulated conductor means. FIGS. 12 and 13 illustrate connector means CM crimped onto conductor means 6 having a thin film of insulating material thereon. FIG. 16 illustrates connector means CM crimped onto the ends of conductor means 7 which is of the type having stranded wires surrounded by an insulating sheath, and the connector means in FIG. 17 is crimped onto the ends of conductor means 6 and 7 to interconnect same.

It is desirable when crimping the open barrel connector means of the present invention to use crimping dies of the type disclosed in U.S. Pat. Nos. 2,600,012 and 2,818,632, which are assigned to the present assignee. In use, the connector means are fed or placed within the crimping area of the crimping dies, the conductor means being placed within the connector means. The crimping die of the crimping dies is operated causing the free ends of the connector means to be folded inwardly and downwardly toward the bottom of the connector means as illustrated in FIGS. 12 through 17 with each free end of the connector means circling or attempting to circle around the respective conductor means as illustrated in FIGS. 12 through 14 and 17. During the crimping operation of the connector means by the die members, the crimping pressure during a large portion of the crimping operation is on the rib members with the greatest amount of crimping pressure located at the center of the connector means, the crimping pressure decreasing from the center of the connector means outwardly toward each end thereof. Thus, at the outer ends of the connector means i.e., where no rib members are located, the crimping pressure does not exceed the compressive strength of the insulation material; however, at the center of the connector means or the area where the rib members are located, the crimping pressure is many times the allowable compressive strength of the insulating material, but this high crimping pressure does not rupture the insulation material in this area because the resultant crimping pressure is restrained longitudinally along the connector means by friction between the crimping dies and the connector means which prevents the insulation material from being impaired during the crimping operation.

Due to the fact that friction is an essential ingredient

which prevents impairment of the insulation material during the crimping operation, the surface finish and fit of the dies must be correct and the surfaces of the connector means and dies must be substantially free of foreign material in order to perform most satisfactorily. The length of the connector means is dependent upon the above-mentioned parameters and its own cross section.

Since the metallic member of the connector means is elongated during the crimping operation and since the insulation material is laminated, it is believed that the metallic member and the sheets of the laminated material undergo laminar flow thereby obviating rupture of the insulated material during the crimping operation.

In the case of film insulated wire in FIGS. 12 and 13, the top edges of the rib members other than the rounded rib members are sharp thereby allowing the rib members to shear through the insulation during crimping thus permitting contact between the conductive portion and the sides of the rib members. In the case of rounded rib members, these conductor means undergo elongation during the crimping operation causing the thin film of insulation on the conductor means to open in the areas of the rib members thereby allowing the rounded top rib members to engage the conductive portions of the conductor means as illustrated in FIG. 15. In between the rib members, the insulation on the conductor means remains intact as illustrated in FIG. 14. This is also true with respect to the portions of metallic member 3 from the outermost ribs to the ends thereof. An important feature of the present invention is the fact that insulation material 2 extends beyond the corresponding ends of metallic member 3 and the area of engagement along the insulation material where the free ends are folded inwardly thereby providing an insulated connection that more than adequately insulates the connection.

In terminating conductor means 7 in FIG. 16, the non-stripped ends of these conductor means are abutted in a central location of the connector means then the connector means is crimped in the same manner as that of FIGS. 12 and 13 thereby causing conductor means 7 to be electrically spliced together via connector means CM. Rib members 4 penetrate through the insulating sheaths of conductor means 7 and they electrically engage a conductive portion thereof in the same manner that the rib members engage the conductive portions of conductor means 6 in FIGS. 12 and 13. The engagement of the rib members with the conductive portion of conductor means 7 is illustrated in FIG. 21. Between the rib members, the metallic member of the connector means engages the insulating sheaths of conductor means 7 in the same manner as that illustrated in FIG. 14. FIG. 17 merely illustrates the fact that conductor means 6 and 7 can be interconnected via connector means CM with the connector means engaging the conductive portions of conductor means 6 and 7 in the same manner as that illustrated in FIGS. 12 through 16. FIG. 18 illustrates the free ends of the connector means being bent back upon themselves which occasionally happens mainly because of the size of the wire; however, this does not prevent the connector means from being effectively crimped onto the conductor means to form an excellent mechanical and electrical connection.

Some of the advantages of using the connector means of the present invention are as follows:

Crimp height control problems are reduced, crimping pressure requirement is less, more economical, longer applicator tooling and die life, crimping dies are of simplified construction and are not complicated and existing die designs can be utilized, conductor means need not be stripped prior to terminating, retention of connector means on the conductor means does not depend upon plastic under a compressive load, solid or stranded wire can be terminated, a controlled pressure gradient in the crimp allows crimping so that the wire barrel may be deformed through insulation material without damaging the insulation material. Thus, as can be discerned, the connector

means of the present invention has a number of advantages that render the connector means highly desirable.

FIGS. 19 through 22 illustrate an embodiment of the connector means which is similar to that illustrated in FIG. 2 except that a ring tongue 8 or some similar means for connecting the connector means to a mounting post or other connector means extends outwardly from metallic member 3 and beyond one end of insulation material 2.

Rib members 4 preferably take the form illustrated in FIG. 22 in that the two rib members closest to ring tongue 8 are of the same height and the other rib members decrease in height. The tallest rib members are for penetrating through the insulating sheath and engaging the conductive portion of conductor means 7 while the other rib members penetrate into the insulating sheath for engagement therewith so as to provide a strain relief between the conductor means and connector means. FIG. 21 shows a cross section through one of the rib members and in engagement with the conductive portion of the conductor means. FIG. 21a illustrates a cross section of the connector means when the rib members do not extend to the ends of the sides of the metallic member.

FIG. 23 illustrates an embodiment of the connector means of FIGS. 19 through 22 in that rib member 9 closest to ring tongue 8 is higher than any of the other rib members and constitutes a shearing rib member so that upon the crimping dies reaching the end of their crimping position, they are held in this position for a short period of time and a minimal force is applied to the conductor means being illustrated as 7' over ring tongue 8 thereby severing the conductor means at this point from the portion of the conductor means crimped onto the connector means. This is accomplished by shearing rib member 9 almost shearing the conductor means through at this point thereby obviating having to cut or strip the conductor means in the area where the conductor means is to be terminated onto the connector means. This feature can also be applied to the connector means of FIGS. 1-18.

FIGS. 24 through 29 illustrate a further embodiment of the present invention which is directed to a coaxial connector means CCM and more particularly to coaxial connector means of the phonoplug variety. The coaxial connector means in this embodiment comprises a U-shaped barrel member 10 having spaced rib members 11 extending outwardly from the interior surface. As can be discerned, rib members 11 are of varying heights from the outermost rib member to the innermost rib member; the top of each rib member defines a sharp edge. A stop member 12 extends outwardly from the bottom surface of barrel member 10 and slots 13 are disposed in the forward portion of barrel member 10. The thickness of barrel member 10 from stop member 12 to the outer end is about four times the thickness of the portion of the barrel member containing slots 13, because the portion carrying the rib members is preferably thicker to allow proper crimping to be obtained while the thinner portion has to have spring characteristics. An insulator 14 is disposed in barrel member 10 between stop member 12 and an adjacent rib member; slot 15 is disposed in insulator 14. Insulator 14 is made of yieldable plastic material and the inner part of slot 15 is substantially circular.

A center contact 16 is hollow and has one end defining a rounded configuration while the other end has lugs 17 extending outwardly therefrom. The lugged end of center contact 16 is disposed within slot 15 of insulator 14 as illustrated in FIGS. 24, 25, and 27. Thus, center contact 16 is placed within slot 15 of insulator 14 and the insulator is placed within barrel member 10 against stop member 12. Insulator 14 is slightly larger than barrel member 10 so that the insulator fits snugly within the barrel member thereby maintaining the insulator and center contact 16 within the barrel member.

A coaxial cable means 18 is stripped so as to expose only a suitable length of center conductor 19 as illus-

trated in FIGS. 24 and 25. The coaxial cable means is placed within barrel member 10 and into engagement with insulator 14 and the lugged portion of center contact 16 so that center conductor 19 is disposed within the lugged portion thereof as illustrated in FIG. 25. The coaxial connector means with the coaxial cable means in place therein is then placed within suitable crimping dies (not shown). The crimping dies are operated to crimp the coaxial connector means onto the coaxial cable means thereby forming a crimped connection having a substantially O-configuration as illustrated in FIG. 26.

During the crimping operation, barrel member 10 is compressed around the coaxial cable means and insulator 14 causing rib members 11 to penetrate outer insulation 22 with the highest rib members engaging outer conductor 20 and the shortest rib members penetrating just into the outer insulation so as to form a strain relief between the coaxial cable means and the coaxial connector means. Center conductor 19 and inner insulation 21 supplies sufficient backup support to allow the crimp to be performed. The action of crimping is transmitted through insulator 14 which crimps the lugged portion of center contact 16 onto center conductor 19 as illustrated in FIGS. 28 and 29. Thus, the embodiment of FIG. 24 through 29 discloses a unique coaxial connector means that is crimpable onto coaxial cable means and stripping of the coaxial cable means to expose the center conductor is all the stripping operation that has to be performed.

While metallic member 3 and barrel member 10 have been disclosed as being U-shaped in configuration, it is obvious that they may take any suitable form and that crimping dies are to be used that will perform the desired crimping operation.

The present invention is useful in terminating conductor means that uses aluminum as the conductive portion. The present invention can be used in conjunction with conductor means whereby the conductive portion has been exposed via a stripping operation and, instead of ribs, these can be replaced by a thicker disposition of material in the crimping area of the connector means which would allow the crimping operation to be performed without rupturing or damaging the insulation material in the connector means and this is especially directed to the embodiments of FIGS. 2 and 19 on stripped conductor means. More than two conductor means can be terminated when using the connector means of FIG. 2 and the free ends of the connector means will eventually engage the conductor means. Extensions can be disposed on the free ends of the connector means of FIGS. 2 and 19 so as to extend outwardly from the sides where the rib members are located, because if more metal is provided in the central area of the metallic member, then this is the point of greatest pressure and at which the insulation material can support itself. Tapering of the metallic member to match the pressure gradient of the crimp allows the deformation of the metallic member through the insulation material without damaging the insulation material which has a lower yield than the metallic member.

As can be discerned, there has been disclosed a unique connector means for terminating insulating conductor means as well as a unique coaxial connector means for terminating coaxial cable means.

It will, therefore, be appreciated that the aforementioned and other desirable objects have been achieved; however, it should be emphasized that the particular embodiments of the invention which are shown and described herein, are intended as merely illustrative and not as restrictive of the invention.

What is claimed is as follows:

1. A coaxial connector adapted to be crimped onto a coaxial cable means including inner and outer conductive members separated by insulation and an insulating sheath surrounding the outer conductive member, said coaxial

connector comprising an open barrel ferrule member defining an outer contact, rib members on an interior surface of said ferrule member extending substantially transverse to a longitudinal axis thereof, insulation means in said ferrule member, a center contact in said insulation means, said center contact having an opening in alignment with the open disposition of said open barrel ferrule member so that the coaxial cable means can be moved into said connector transverse to said longitudinal axis, said ferrule member upon being crimped onto said coaxial cable means causing said rib members to penetrate said insulating sheath and electrically engage said outer conductive member, said center contact being crimped through said ferrule member and insulation means to electrically engage said inner conductive member.

2. A coaxial connector according to claim 1 wherein said ferrule member includes additional rib members parallel with respect to said first mentioned rib members to penetrate said insulating sheath without engaging said outer conductive member to provide a strain relief between said coaxial cable means and coaxial connector.

3. A coaxial connector adapted to be crimped onto inner and outer conductive members of a coaxial cable with said coaxial cable being stripped to expose only the inner conductive member, said coaxial connector comprising an open barrel ferrule member having rib members extending substantially transverse to a longitudinal axis, of said ferrule member, an insulation member disposed in said ferrule member adjacent said rib members, a center contact contained within a slot in said insulation member, said center contact having an opening at one end thereof which is disposed in the same direction as said open barrel ferrule member so that the coaxial cable can be positioned in said connector transverse to the longitudinal axis, said ferrule member being subjectable to a crimping operation causing said rib members to penetrate insulation surrounding said outer conductive member and electrically engage same and said center contact to collapse onto said inner conductive member through said ferrule member and insulation member.

4. A coaxial connector comprising an open barrel ferrule member, a series of rib members extending outwardly from an interior surface of said ferrule member transverse to a longitudinal axis thereof, an insulation member in said ferrule member adjacent said rib members and having a slot disposed therein, and a center contact in said slot and having an opening in alignment with said slot.

5. In a device for terminating coaxial cable, a first member forming an outer conductor, a second member forming an inner conductor, and an insulating member fitted within the first member and about a portion of the second member to mechanically hold said first and second members together in relative positions to define a coaxial connector, each of said members including an opening extending along one side thereof and extending laterally of a longitudinal axis of said members in general alignment to receive a coaxial cable inserted within said connector transverse to the length axis of each of said members.

6. The device of claim 5 wherein said first member includes means on the inner surface thereof operable to penetrate an outer insulating sheath on the coaxial cable and engage the outer conductor of the cable to connect said outer conductor of the cable to the first member.

7. In a connector device for coaxial cable, an outer conductive member, an inner conductive member, and an insulating member fitted within the outer conductive member and extending along a portion of the inner conductive member, each of said members having an opening extending laterally of a longitudinal axis of said connector device whereby to receive a coaxial cable inserted transverse to the length axes of said members, said inner conductive member portion including a surface configuration conforming to the said opening of said insulat-

ing member to increase the area of engagement with said insulating member and facilitate closure of said inner conductive member opening by a forced engagement closing said insulating member around said portion of said inner conductive member.

8. In a device for terminating coaxial cable, a tubular inner conductive member formed of sheet metal and including an end portion having an opening therein to receive the inner conductor of a coaxial cable inserted transverse to the length axis of said member, an insulating insert surrounding a portion of said inner conductive member adjacent said opening therein, and an outer conductive member surrounding said insert along the length thereof, said outer conductive member including a further portion extending in surrounding relationship along a substantial portion of said inner conductive member but spaced therefrom and an additional portion extending oppositely thereto and having an opening therein to receive the insertion of a cable transverse to the length axis of said outer conductive member, the said inner conductive member end portion, the said insert and the said outer conductive member having material characteristics permitting a deformation of said members into a configuration defining a coaxial connector.

9. A coaxial connector comprising a first ferrule member and a second ferrule member, insulation means in engagement with said ferrule members to position said ferrule members from one another so that said first ferrule member is positioned closer to a longitudinal axis of said coaxial connector than said second ferrule member, said ferrule members and said insulation means having aligned openings laterally positioned with respect to said longitudinal axis of said coaxial connector to receive a coaxial cable inserted within said connector in a direction transverse to the length axes of each of said ferrule members and said insulation means.

10. In a connector device for coaxial cable, an outer conductive member, an inner conductive member, and an insulating member fitted within the outer conductive member and extending along a portion of the inner conductive member, each of said members having an opening extending laterally of a longitudinal axis of said connector device whereby to receive a coaxial cable inserted into the connector device transverse to the length axes of said members, said inner conductive member portion including a surface configuration conforming to the said opening of said insulating member, said insulating member opening having opposing surfaces that are moved into engagement when said insulating member is closed around the inner conductive member portion via crimping pressure being applied to said outer conductive member.

11. A method of crimping a coaxial connector having inner and outer conductive members having aligned openings laterally of a longitudinal axis of the connector and being separated from each other via insulation means

onto inner and outer conductor members of a coaxial cable, said method comprising the steps of moving the coaxial cable transverse the length axes of the conductive members, positioning the inner and outer conductor members of the coaxial cable respectively in the openings of the inner and outer conductive members of the coaxial connector, applying compressive pressure simultaneously to the conductive members, and deforming the conductive members into surrounding engagement with the respective inner and outer conductor members of the coaxial cable with the outer conductive member assuming a substantially concentric configuration around the coaxial cable.

12. In a connector device for coaxial cable having inner and outer conductors separated by insulation, an outer conductive member of open barrel ferrule form, an inner conductive member, and an insulating member of substantially U-shaped cross-sectional configuration fitted within the outer conductive member and extending along at least a portion of the inner conductive member, each of said members having an opening extending laterally of a longitudinal axis of said connector device, said openings being aligned so as to receive a coaxial cable inserted into the connector device transverse to the length axes of said members, said inner conductive member portion including a surface configuration conforming to the interior surface of said insulating member, said insulating member opening having opposing surfaces that are moved into engagement when said insulating member is closed around the inner conductive member portion via crimping pressure being applied to said outer conductive member.

13. A coaxial connector comprising an outer member defining an outer contact member and having a ferrule member of U-shaped configuration, rib members provided by a section toward one end of said ferrule member, said rib members being directed inwardly toward a longitudinal axis of said ferrule member and transverse to said longitudinal axis, an insulation member disposed along an area of said outer member and spaced from said section having said rib members, and an inner member defining a center contact member being carried by said insulation member and maintaining said center contact member insulated and spaced from said outer contact member.

#### References Cited

##### UNITED STATES PATENTS

|           |         |                |         |
|-----------|---------|----------------|---------|
| 2,800,638 | 7/1957  | Hammell        | 339—276 |
| 3,154,362 | 10/1964 | Blonder et al. | 339—97  |
| 3,259,874 | 7/1966  | Esser.         |         |
| 3,295,094 | 12/1966 | DeLyon et al.  | 339—177 |

MARVIN A. CHAMPION, Primary Examiner

J. H. McGLYNN, Assistant Examiner