United States Patent [19]

Richardson

[11] **3,855,566**

[45] **Dec. 17, 1974**

[54] **HERMAPHRODITIC CONNECTOR FOR SEISMIC CABLES**

[75] Inventor: **Jacob C. Richardson,** Houston, Tex.

[73] Assignee: **Shell Oil Company,** New York, N.Y.

[22] Filed: **Sept. 19, 1973**

[21] Appl. No.: **398,715**

Related U.S. Application Data

[63] Continuation of Ser. No. 177,718, Sept. 3, 1971.

[52] **U.S. Cl.** ..... **339/49 R,** 339/89 M

[51] **Int. Cl.** **H01r 25/00**

[58] **Field of Search** ..... 339/45, 47–49, 339/89, 90, 91, 75, 176 R, 176 M, 184 R, 184 M, 186 R, 186 M

[56] **References Cited**

UNITED STATES PATENTS

2,960,675	11/1960	Hansen	339/49 R
2,962,688	11/1960	Werner	339/89 M
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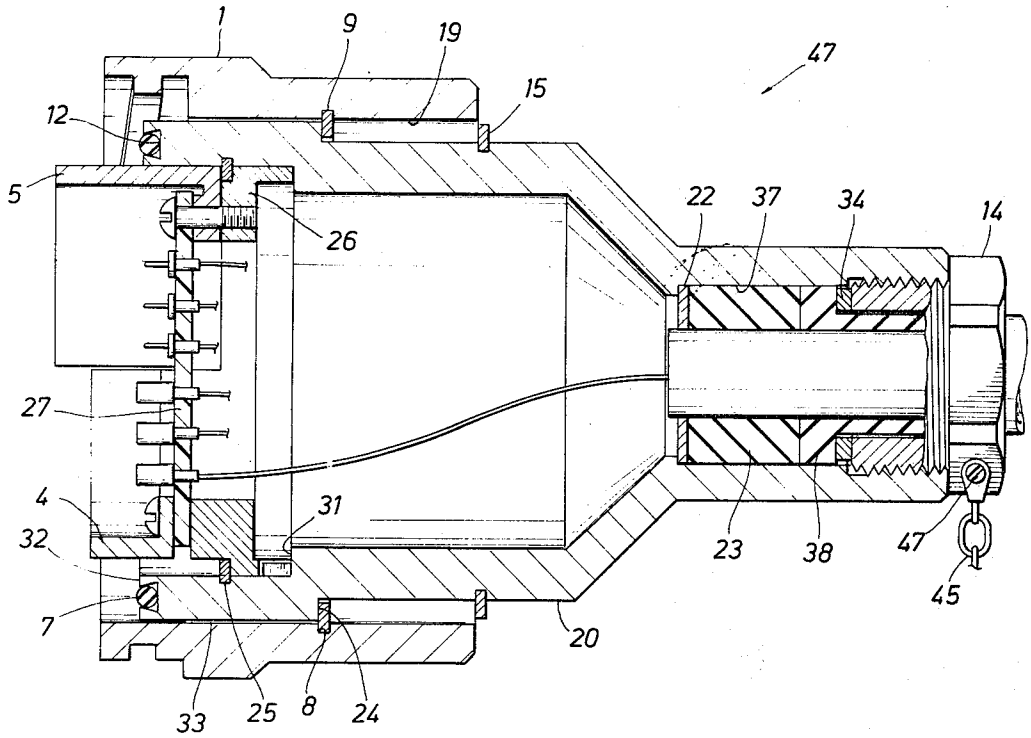
647,103	8/1962	Canada	339/49 R

Primary Examiner—Paul R. Gilliam
Assistant Examiner—Terrell P. Lewis

[57] **ABSTRACT**

A hermaphrodite connector for seismic cables having an interrupted threaded collar for fastening the two halves of the connector, one part of the interrupted thread being female and one part being male. The connector also includes means preventing any misalignment while engaging the two halves by incorporating full 360° pin protection in each connector half.

4 Claims, 14 Drawing Figures



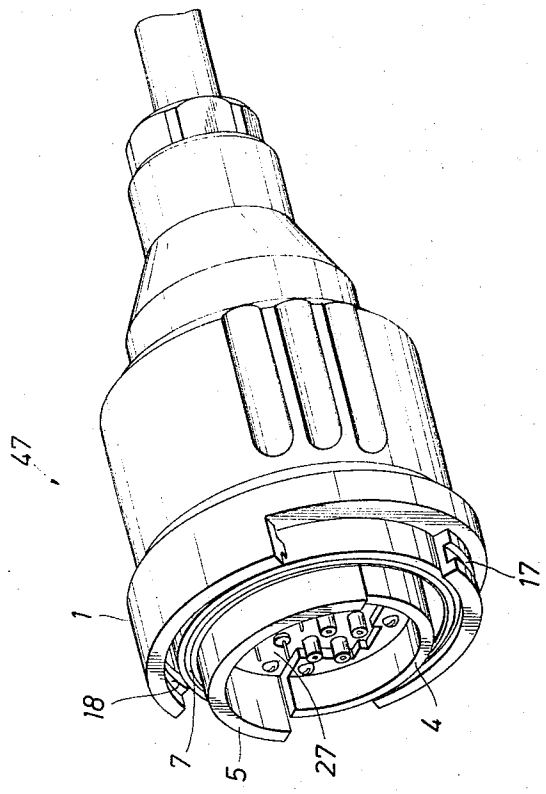


FIG. 2

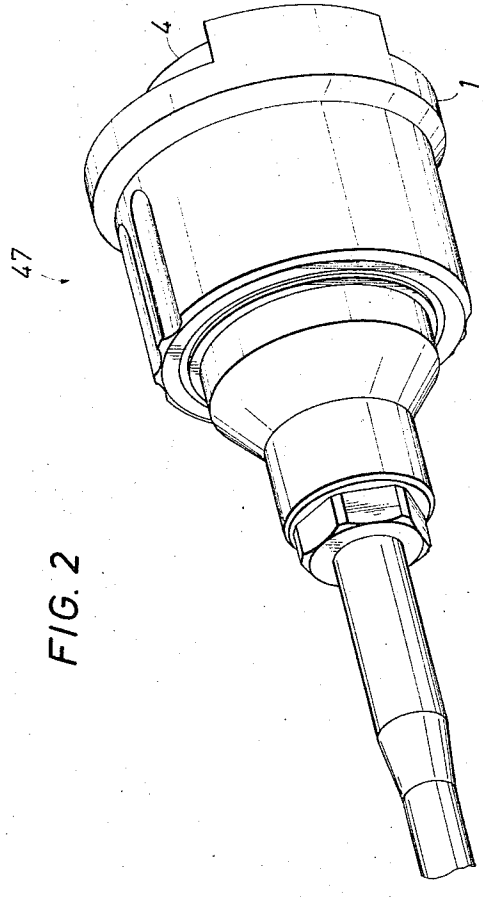


FIG. 1

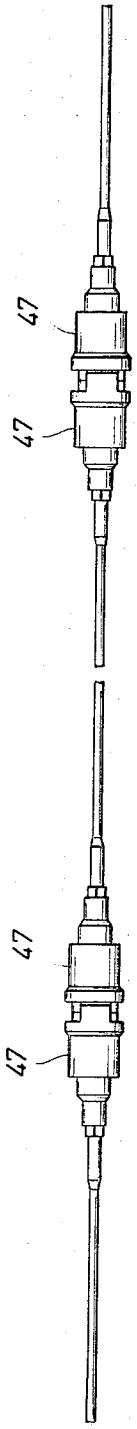


FIG. 3

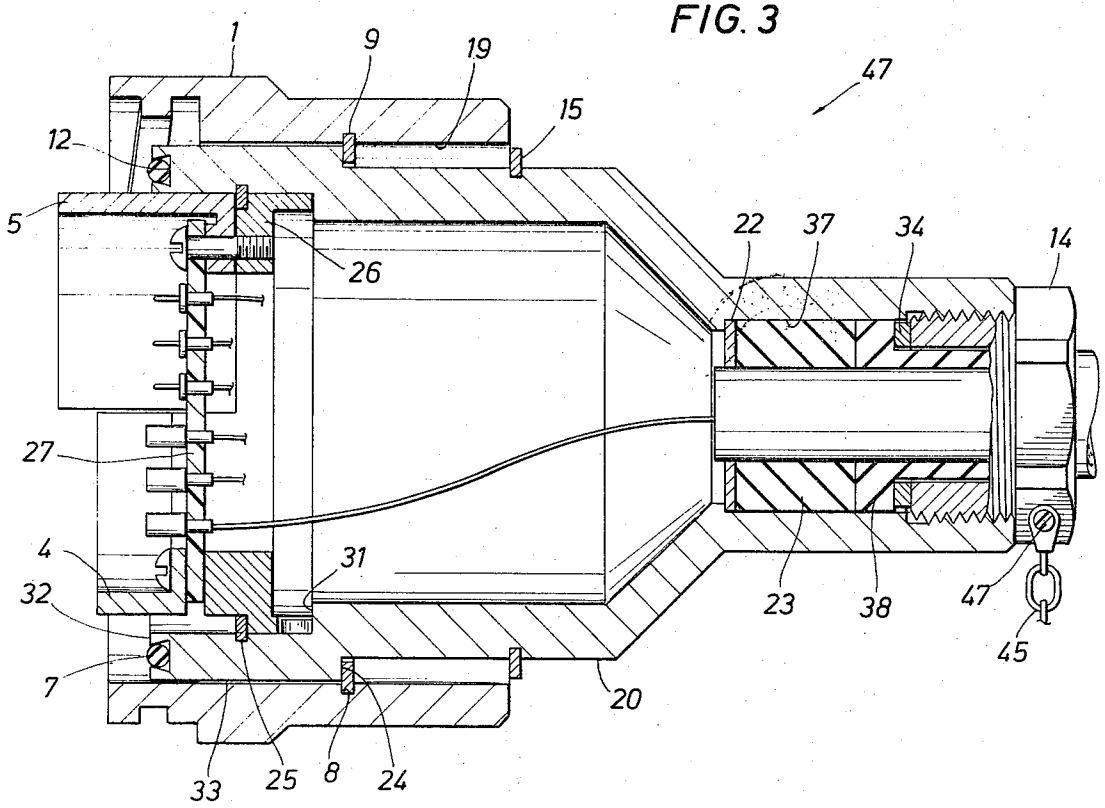


FIG. 5

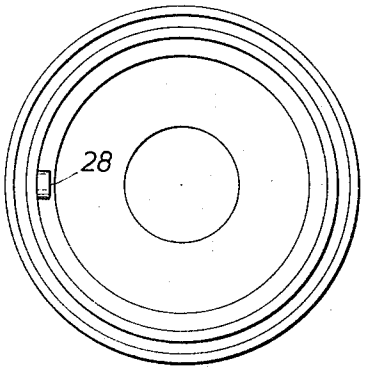


FIG. 4

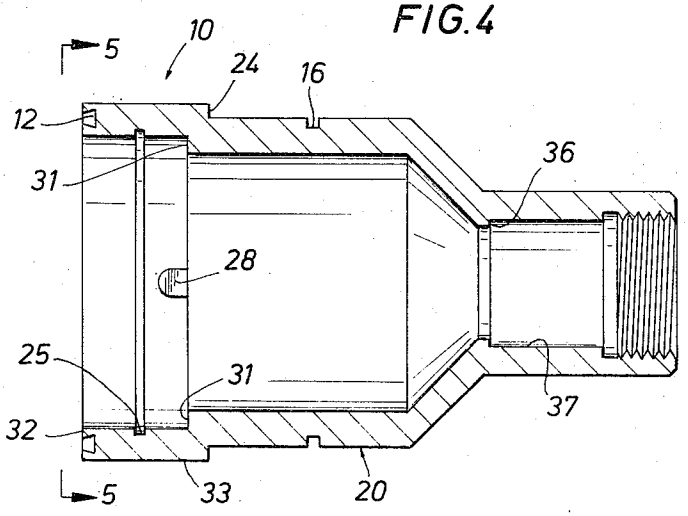
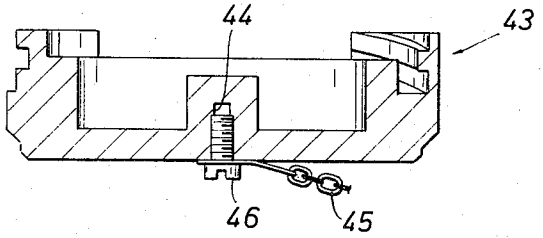


FIG. 14



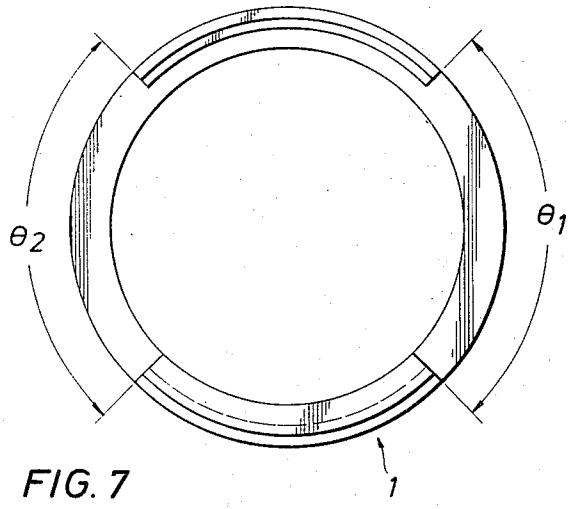


FIG. 7

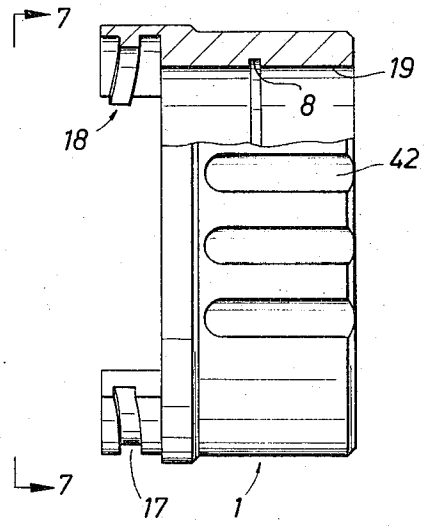


FIG. 6

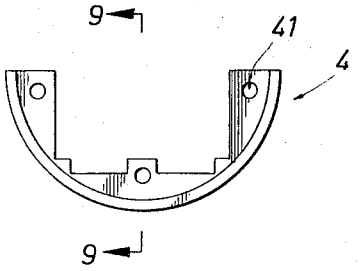


FIG. 8

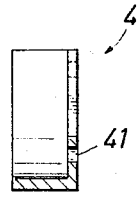


FIG. 9

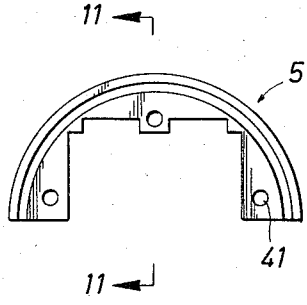


FIG. 10

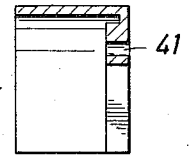


FIG. 11

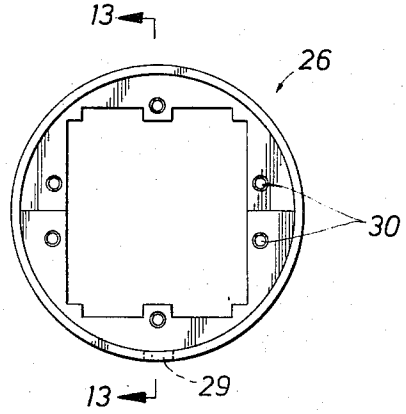


FIG. 12

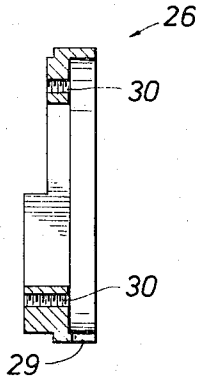


FIG. 13

HERMAPHRODITIC CONNECTOR FOR SEISMIC CABLES

This is a continuation of application Ser. No. 177,718, filed Sept. 3, 1971.

BACKGROUND OF THE INVENTION

The invention relates to a hermaphrodite connector for seismic cables and more particularly to a connector incorporating interrupted male and female threads, 360° pin protection, seal means for hermetically sealing from outside elements, lightweight construction, ease of assembly and disassembly, and simplicity of construction requiring a minimum of individual parts.

DESCRIPTION OF THE PRIOR ART

Use of an interrupted male and female thread is not new in the connector art as a method of joining connector halves. Such a method is shown in Belgium Patent 494,245 disclosing a connector having identical halves being joined by having ramp 25 of each half engage hook 24 of the other half and rotating each half such that rubber washers 21 are forced one against the other rendering the connection tight. The Belgium Patent also discloses guide means 19 for joining each half, one to the other, but, such guide means only provides 180° pin protection which allows misalignment and consequent pin damage. The "tete de chat" or collar portion of the connector is allowed to move along the longitudinal axis of the connector but is not readily removable for replacement if inadvertently damaged. A second patent, U.S. Pat. No. 3,252,124, also employs the principle of the inclined plane in its operation, but coupling rings 48 are not replaceable without complete disassembly of the electrical connector. In using such connectors for seismic cables simplicity of design and ease in replacing individual components is an absolute necessity. The U.S. patent also has the significant disadvantage of only having 180° pin protection whereas applicant's connector has absolute 360° pin protection by fully encircling the pin area of each connector half.

All of the prior art only provides 180° pin protection for each connecting half. In providing guides such that the two halves may be easily mated the prior art has inherent pin protectors over 180°. Pin protection over 180° is acceptable when mating relatively large diameter pins but when small pins are used such as those now available due to the state of the art, 180° pin protection is unacceptable. Applicant has solved this problem by providing 360° pin protection in his connector to avoid pin damage while joining the identical halves.

SUMMARY OF THE INVENTION

Applicant has advantageously solved these problems by providing a connector that is simple in design and easily serviceable under field conditions.

The applicant by providing identical halves and guide means such that the connecting halves can only engage in one position provides absolute pin protection.

Another significant advantage incorporated in applicant's invention is the use of standard O-ring face seals. Use of these seals provide a method of positive sealing against the outside environment and at the same time being an of-the-shelf item readily available and easily changed if damaged.

A further advantage that the applicant has provided is the use of a collar that is quickly removed through the use of standard snap rings as retaining devices.

A further significant advantage of applicant's invention is through the use of a short guide member and long guide member having different diameters and different heights assuring full 360° pin protection.

The connector is particularly suited for use in seismic work or in other fields where long lengths, say 500 feet or more, of cable are strung. Identical connecting halves prevent having to swap the ends as is the case where the connecting halves are not identical.

DESCRIPTION OF THE DRAWING

The invention will now be described with reference to the figures which show an embodiment of the invention in which:

FIG. **1** is a view showing the connecting halves joined together and forming part of a seismic cable;

FIG. **2** is a pictorial view of the two halves prior to being joined;

FIG. **3** is a cross-sectional view of the connector along its longitudinal centerline;

FIG. **4** is a cross-sectional view of the body of the connector;

FIG. **5** is an end view of the body of the connector;

FIG. **6** is a cross-sectional view of the collar;

FIG. **7** is an end view of the collar;

FIG. **8** is a plan view of the short guide member;

FIG. **9** is a cross-sectional view of the short guide member;

FIG. **10** is a plan view of the long guide member;

FIG. **11** is a cross-sectional view of the long guide member;

FIG. **12** is a plan view of the insert;

FIG. **13** is a cross-sectional view of the insert;

FIG. **14** is a cross-sectional view of the protective cap.

Referring to the figures and more particularly to FIG. **3** a partial cross section of the connector assembly **47** is illustrated showing the collar **1** in assembly with body **10.** In assembling the collar **1** with body **10,** the collar is slipped over body outer diameter **33** such that snap ring **9** may be inserted in groove **8** on the inside diameter **19** of collar **1.** Collar **1** is then moved forward until snap ring **9** butts against shoulder **24** of body **10.** Snap ring **15** is then installed in groove **16** on intermediate diameter **20** of body **10.** The process is simply reversed for removal of collar **1** and it can be seen that the integrity of the connector has not been impaired by this operation as would be the case by using prior art connectors. FIG. **3** further illustrates the method of effecting a seal at both ends of the connector. End face **32** of body **10** has a seal ring groove **12** in which a standard O-ring **7** is installed to effect a seal between connecting halves of the connector. Use of a standard O-ring makes for easy replacement if damage occurs and its design is such that the connector need not be disassembled if replacement is desired.

Sealing is effected at the rear or small end of the connector by using washer **22,** rubber grommet **23,** a second washer **34** installed behind end face **38** of cable sheath **35** and nut **14.** By tightening nut **14** into body **10,** washer **22** is forced against stop **36** of body **10** forcing rubber grommet **37** and end face **38** of cable against one another such that a positive seal is formed protecting the internal parts of the connector from the outside environment.

Referring to FIG. 5, an end view of body 10 and key 28 is shown. Key 28 is used to position insert 26. Insert 26 is provided with a key way 29 which mates with key 28. Insert 26 is positioned in body 10 by butting against shoulder 31 of body 10 and is held in position by snap ring 39 cooperating with groove 25 of body 10. Insert 26 is provided with tapped holes 30 to accept screws 11. Insert 26 is further provided with opening 40 being shaped such that hemaphorditic contact panel 27 can be installed in opening 40. The connector is further provided with a long guide member 5 and short guide member 4. These guide members are of different diameters and are of different heights from each other. Short guide member 4 and long guide member 5 provide complete and absolute 360° pin protection to hermaphorditic contact panel 27. Long guide member 5 is positioned with respect to contact panel 27 such that it protects the pin portion of contact panel 27 whereas, short guide member 4 protects the receptacle portion of contact panel 27. Short guide member 4 and long guide member 5 are both provided with holes 41 through which screws 11 pass and hold members 4 and 5 in place. In assembling contact panel 27 and guide members 4 and 5, long guide member 5 butts against insert 26 and contact panel 27 is then installed such that it rests on long guide member 5 and insert 26. Short guide member 4 is then installed such that it is opposite of long guide member 5 and resting on contact panel 27. Screws 11 are then inserted through holes 41 into tapped holes 30 and drawn tight completing the assembly.

In one embodiment of applicant's invention, each connecting half has 80 male and 80 female pins enabling applicant to monitor 160 separate and identifiable channels in a connector half being approximately 4 inches in length and less than 3 inches in diameter.

The collar 1 is provided with raised fluted portion 41 enabling it to be easily gripped and rotated during adverse weather conditions without undue hardship. Collar 1 as shown in FIG. 6 is further designed having interrupted male thread 17 and female thread 18. Male thread 17 is preferably a square thread with sufficient pitch such that by turning the collars less than one quarter turn the pins of contact panel 27 are in full engagement with the opposite receptacles in contact panel 27. Male thread 17 extends over an angle θ_2 which is preferably larger in magnitude than the angle θ_1 encompassed by female thread θ_1. Angle θ_2 is preferably approximately 4° larger than θ_1 enabling male thread 17 to fully cover female thread 18.

The connector is also provided with a protective cap 43 as shown in FIG. 14 in order to protect the internal parts of the connector from damage and corrosive elements when not in use. Protective cap 43 is provided with a recess 44 such that a flexible cable or chain 45 may be secured to protective cap 43 using screw 46 while the opposite end of the flexible cable is secured to nut 14 at hole 47 preventing loss of protective cap 43.

Contact panel 27 is a standard hemaphordite panel containing an equal number of male and female connections on its face. It is further provided with pins extending to the rear or varying lengths such that all wires are joined by wrapping the wire around the pin and pulling the wire in tension such that solder is not required for making an electrical contact. All wiring can be accomplished using automatic devices resulting in significant savings.

The individual parts making up the connector except for screws 11, contact panel 27, snap rings 9, 15, 39, washers 22 and 34, and nut 14 are made from synthetic material and are preferably made from polycarbonate using injection molding processes. Use of polycarbonate results in a lightweight connector resistant to corrosion and highly resistant to shocks caused by impact such as by dropping on hard surfaces. Use of metal would result in the connector being easily damaged by dropping and also in a connector that is both heavy and susceptible to corrosion.

I claim as my invention:

1. A hermaphrodite connector for multiconductor seismic cables, each half of the connector being identical and comprising:

a cylindrical body member having one end of reduced diameter for receiving said seismic cable and the other end of enlarged diameter for mounting a connector panel;

a first seal means, said first seal means being disposed in said one end of the body member and adapted to seal said body member to the outer surface of the seismic cable;

a hermaphrodite contact panel having a plurality of male and female contact pins extending from said panel, said contact panel being mounted in said other end of said body member;

a short guide member, said short guide member being mounted in the other end of said body member to surround a portion of the contact, said short guide member having a length that extends beyond said male and female contact pins;

a long guide member, said long guide member being mounted in the other end of said body member and disposed to surround an additional portion of said contact panel, said long guide member having a length that extends beyond said male and female contact pins;

an insert member, said short and long guide members and said contact panel being mounted on said insert member, said insert member having alignment means for engaging co-operating alignment means formed on the inner surface of said enlarged end of said body member, and means for retaining said insert member in said body member with said alignment means engaged;

a removable collar having both interrupted male and female threads in diametrically opposed relationship, said collar being disposed to surround the other end of said body; and

retaining means, said retaining means operably engaging both said body and said collar to retain said collar on said body while permitting limited axial movement for engaging said interrupted male and female threads.

2. The connector of claim 1 wherein said retaining means comprise a first snap ring disposed in a groove formed on the inner surface of said collar and a second snap ring disposed in a groove formed in the outer surface of said other end.

3. The connector of claim 1 wherein said retaining means comprises a snap ring disposed in a groove formed in said body.

4. The connector of claim 1 wherein said short and long guide members surround the outer periphery of the contact plate.

* * * * *