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2,991,441

WATERTIGHT ELECTRICAL CONNECTOR

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FIG.1.

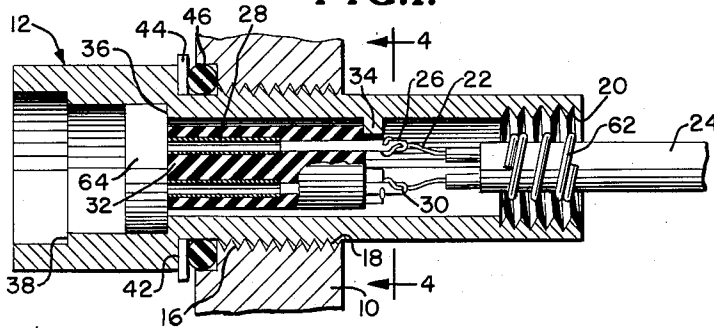


FIG.2.

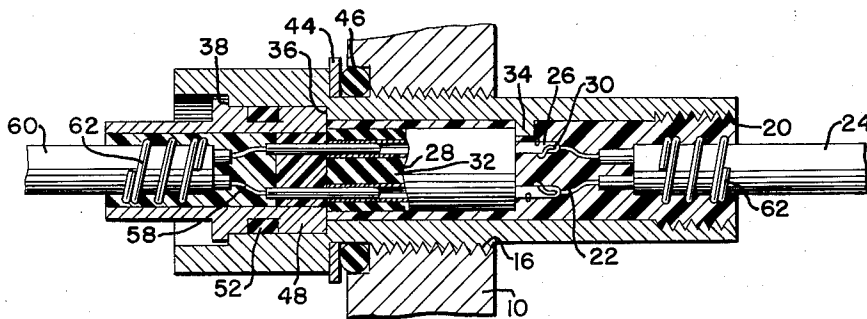


FIG.3.

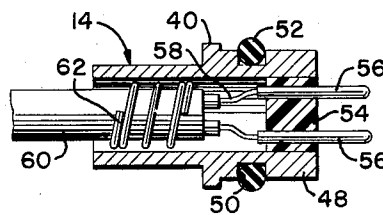
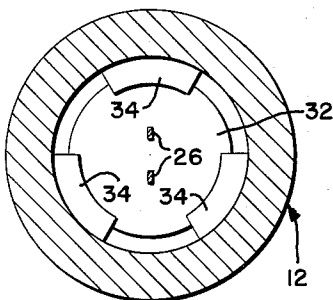


FIG.4.



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WATERTIGHT ELECTRICAL CONNECTOR

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2 Claims. (Cl. 339-106)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to a watertight connection for electrical cables and a water stop within the cable.

In mine practice as done by the Navy such as in the placing of underwater mines, the actuation of the mines, or their recovery, a drill mine or a mine using a signal rather than the actual explosive is used. Such a mine has an outside cable connection, which in order to protect the intricate and complicated machinery within the mine, must be watertight. These connections which are submerged to as much as a depth of 400 feet are subjected to high pressures with a possibility of actual breaking of the cable. The problem is to make a quick connector which will be watertight with respect to the mine but also be formed with a water stop to prevent water coming in along the wires of the cable in case of breakage of the cable.

An object of this invention is to provide a cable connector which may be passed through an opening in the mine, and which may be made watertight and at the same time provided with a water stop.

Another object of the invention is to provide a connector which provides both a water stop along the wires of the cable and a watertight seal between the connector and the mine.

Still another object is the use of an epoxy resin as a potting material to securely hold the threaded casing to the cable and at the same time provide a water stop for the wires of the cable.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing wherein:

FIG. 1 is a longitudinal section of the female portion of the connector without the potting compound;

FIG. 2 is a longitudinal section of the connector with the parts joined and the potting compound included;

FIG. 3 is a longitudinal section of the male portion of the connector without the potting compound; and

FIG. 4 is a cross-section slightly enlarged on lines 4-4 of FIG. 1.

The connector which is illustrated in the accompanying drawing wherein like parts are designated by like numbers throughout the several views is designed to be threaded into the wall 10 of a drill mine and is made up of a female section 12 and a male section 14.

Referring particularly to FIG. 1, the female section is formed of a substantially cylindrical sleeve, formed with centrally located exterior threads 16 fitting the threaded opening 18 in the wall 10 of a drill mine. The inside section which is that section at the right end of the sleeve in FIGS. 1 and 2 is interiorly threaded at 20 and houses the ends of the wires 22 of the cable 24. The flat extensions 26 of tubes 28 extend into this inside section and are connected to the wires 22 by receiving the wires through a hole 30 and having the ends of the wires 22 wrapped about the extensions 26 and soldered thereto.

A plug 32 of insulating material such as Bakelite

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houses the tubes 28 and is seated against three arcuate interiorly projecting rim sections 34 (FIG. 4) which aligns the end of the tubes with the annular interior shoulder 36. Extending outwardly of the drill mine and to the left as viewed in FIGS. 1 and 2, an enlarged portion of the sleeve is adapted to receive the male section 14. Starting with the interior shoulder 36, the sleeve with an enlarged bore extends to a second shoulder 38 upon which the annular stepped collar 40 of the male section seats. The enlarged section of the sleeve has an annular exterior shoulder 42 against which rests a washer 44, which in turn contacts an O-ring 46. The O-ring 46 is compressed against the wall 10 and forms a seal between the female section and the wall of the drill mine, the washer serving to prevent rupturing of the soft O-ring seal when the female section is threaded into the wall opening 18.

A male section (FIG. 3) is in the form of a sleeve having an annular collar 48 at one end, and a second stepped annular collar 40 (above referred to) fitting the interior contour of the female section. Between the collars an annular exterior groove 50 carries an O-ring 52 which contacts the inner surface of the sleeve or female section 12 to effect a sealing relation between the male and female sections. Carried within the male section 14 and flush with the end is a plug 54 which locates and supports a pair of contact pins 56 to which are connected wires 58 of a cable 60. Closely wrapped about the ends of the cables 24 and 60 and housed entirely within the respective sections of the connector is a wire 62. This wire is tightly wrapped, three full turns for a definite purpose, disclosed hereafter.

After the wires 22 and 58 are connected respectively to the tubes and pins the interior space left between the inner surface of the female and male sections and the inwardly carried tubes, pins and ends of cable, is potted with an epoxy resin. The resin, in liquid form, is poured into the cable end of the male section, the plug 54 sealing the end and preventing escape of the potting compound. With the female section a removable disc 64 formed of a substance to which the potting material will not adhere is firmly held against the shoulder 36 and the potting compound poured in at the cable end to completely fill the sleeve. The interior threads 20 and the coiled wire 62 serve to bind the cable, potting compound and connector together, particularly preventing any turning of the cable when the female section is threaded into the wall 10. The potting compound forms a water stop should the cable break while the O-rings provide a seal between the connector and the wall of the mine as well as between the sections of the connector.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A watertight cable connector, comprising a female section, a male section having an O-ring seal, said male section to be friction fitted to said female section, a plug of insulating material in said female section, tubes housed within said plug and each tube having one of its ends flush with the end of the plug, a wire cable having its end within the female section and having its individual wires electrically connected to said tubes in said female section, said cable extending beyond said female section, potting means securing the end of the cable within said female section to said female section and in watertight sealing relationship with said female section, said potting means embedding the electrical connections between said

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tubes and the individual wires of said cable, a plug in said male section, pins mounted in said last named plug extending beyond the plug and the male section for insertion into the tubes of said female section, a wire cable having its end within said male section and having its individual wires electrically connected to the pins in said male section, second potting means securing the cable end and plug in said male section in watertight sealing relation, said second potting means embedding the uninsulated portion of the individual wires of the cable in said male section and all portions of the pins within the confines of said male section, the portions of said pins extending beyond the male section being of less length than the length of the tubes within the plug to cause the exposed ends of the pins to be housed entirely within the tubes, so that all individual wires, pins and tubes are embedded in insulating material, and a pair of wire coils, each of said coils being tightly wrapped around each cable end within the confines of the male and female sections respectively and the center turns thereof equally separated from each other, the individual turns of the coils being embedded in the potting means securing the cable end to a depth substantially equal to the diameter

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of the coil wire, said potting means engaging each turn of the coil throughout the entire circumference of the turn to secure the cable ends respectively to the male and female section in watertight relation therewith.

2. A watertight cable connector according to claim 1 wherein the ends of the cables are concentrically mounted in the male and female sections, all portions of the cable ends and the tightly wrapped coil being spaced from the male and female sections.

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