Feb. 10, 1970 F. E. TUTTHILL 3,495,028

UNITARY HERMETIC CONNECTOR WITH CONTAINED SEALING MEANS

Original Filed Nov. 24, 1961

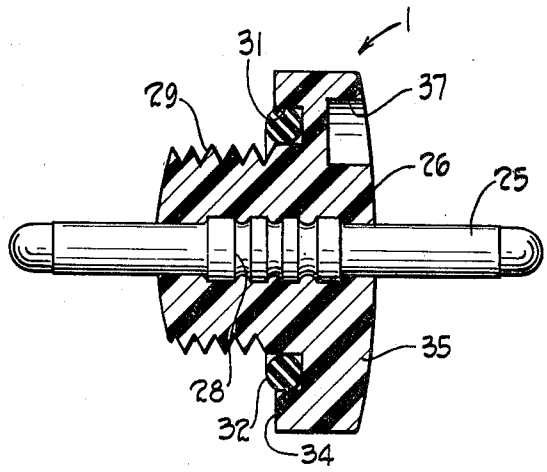


FIG. 1

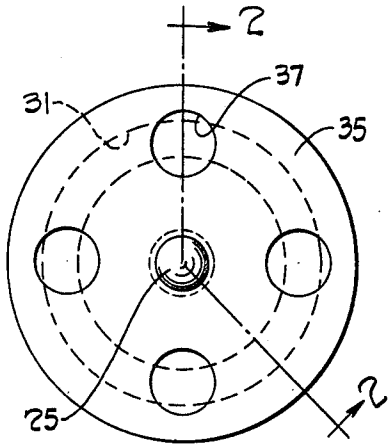


FIG. 2

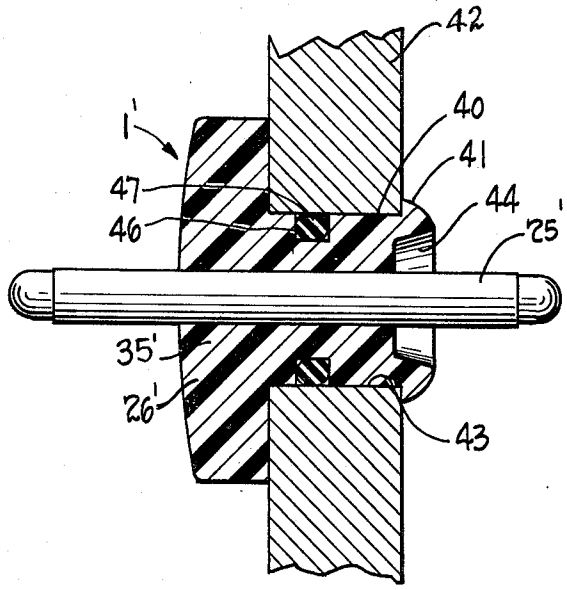


FIG. 3

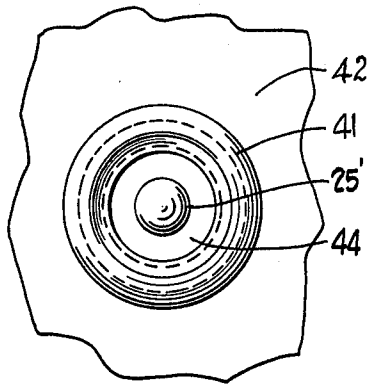


FIG. 4

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UNITARY HERMETIC CONNECTOR WITH CONTAINED SEALING MEANS

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Continuation of application Ser. No. 154,529, Nov. 24, 1961. This application Nov. 23, 1964, Ser. No. 414,520
Int. Cl. H01b 17/26; H02b 1/02
U.S. Cl. 174—153 5 Claims

This application is a continuation of applicant's copending application, Ser. No. 154,529 filed Nov. 24, 1961, now abandoned.

This invention relates to hermetic connectors and more particularly to a new unitary hermetic connector with contained sealing means for conducting electric current between the switch and motor chambers of oil filled, submersible pumps.

Submersible pumps having water tight switch chambers, with pressure responsive switches therein, and separate oil filled motor chambers are well known in the art.

In such pumps it is necessary to provide means for conducting current between the switch and the motor. Such means must effectively prevent the oil from entering the switch chamber, while at the same time effectively isolating or insulating the electric current from the brass, steel or other conductive material from which the pump and particularly the wall between the motor and switch chambers is usually formed.

Numerous means, methods, seals and connectors have been proposed for this and other similar purposes, but each has proved unsatisfactory either because of inadequate or unrealistic performance, or because of excessive cost.

The general object of this invention is, therefore, to provide a new and improved hermetic connector.

Another object of this invention is to provide a new and improved hermetic connector which is easily and economically manufactured and used.

Still other objects of this invention include the provision of a new, improved and economical hermetic connector which is safe and efficient in operation and use; which effectively seals against pressures as great as twenty-five pounds per square inch; which provides an integral seat for a separate seal; which comprises a unitary body adapted to maintain the connector in position in the wall through which the connector extends and a conductor member held in position and insulated from the wall by the body member; which is formed in a single step by casting or molding a unitary body member about a conductor member; which comprises a unitary, homogeneous plastic body member which is an electrical insulator and has sufficient mechanical strength to grip and hold the connector adjacent in sealing engagement with the adjacent wall; and, which comprises a lead-in conductor and a homogeneous body member which supports and sustains the conductor, insulates the conductor from the adjacent wall, provides a seal seat and has means for effectively and efficiently gripping and holding the connector in sealing engagement with the wall through which the connector provides electrical access.

These and other objects and advantages of this invention will become apparent from the following description of preferred and modified forms thereof, reference being had to the drawings in which:

FIGURE 1 is an axial section of a hermetic connector embodying a preferred form of this invention;

FIGURE 2 is a top view of the hermetic connector shown in FIGURE 1;

FIGURE 3 is a view, similar to FIGURE 1, but showing a portion of the wall through which the connector extends, of a hermetic connector embodying a modified form of this invention; and,

FIGURE 4 is a bottom view of the hermetic connector shown in FIGURE 3.

A hermetic connector embodying this invention is indicated generally at **1**, see FIGURE 1, and comprises a pin or conduit **25** and a unitary body member **26** within which pin **25** is disposed. Pin **25** is of electrically conductive material, such as tin plated brass, and extends through body member **26** so as to be engageable at both ends by the electrical leads of the circuit for which the connector functions as a lead-in. Body member **26** functions to both electrically insulate the pin **25** from the adjacent wall through which connector **1** extends when in use and to provide the necessary mechanical strength and characteristics for securing and hold the connector in the wall and maintaining a seal between the connector and the wall.

Body **26** is cast or molded as a unitary structure, preferably about pin **25**, of nylon, acetal resin such as E. I. du Pont de Nemours Co.'s "Delrin" acetal resin, or other suitable material, and, in order to ensure a tight, permanent and leakproof seal and engagement between pin **25** and body **26**, pin **25** is preferably serrated, as by the provision of annular rings **28**, at that portion of its length which is within body **26**.

Body **26** is provided with means, such as threads **29**, for engaging complementary threads in the wall through which the connector extends when in use and holding the connector in sealing engagement therewith. Also, in order to provide an oil and moisture tight seal, body **26** is provided with an annular groove or seal **31** in which a conventional O-ring **32** is disposed to effect a seal between the adjacent wall and the connector. Preferably, groove **31** is formed in the under surface **34** of head **35** of body **26**. Connectors embodying a preferred form of this invention can effectively retain pressures as high as 25 p.s.i.

In order to provide means for readily, easily and properly seating or loosening the connector **1**, body **26** is, also, preferably provided with a plurality of equally spaced sockets **37** or other means for engagement by a complementarily shaped spanner wrench to turn the connector to advance or retract it in the threaded aperture within which it is to be disposed.

Connector **1** is economically and easily manufactured by holding pin **25** in a suitable mold and filling the mold with nylon, or other material having the properties set forth above. Connector **1** is used by disposing an ordinary O-ring in groove **31**, threading the connector into a complementary threaded aperture in the wall through which the connector is to provide the electrical lead-in, and tightening the connector by a suitable spanner wrench engaged in sockets **31**. The electrical leads or wires are then connected to the respective ends of pin **25** and the lead-in is complete.

A modified form of connector embodying this invention is indicated generally at **1'** in FIGURES 3 and 4 wherein like reference characters refer to similar parts as in FIGURES 1 and 2.

Connector **1'** comprises a pin, **25'**, and body member, **26'**. Connector **1'**, however, is adapted for use with nonthreaded apertures. To this end body member **26'** includes a head portion **35'**, a shank portion **40** and a lip **41**. Body **26'** is formed of material which functions to insulate the pin **25'** and has sufficient strength to maintain the connector in sealed engagement with the wall **42** through which it extends. In addition, body **26'** has sufficient flexibility and resiliency so that the lip can be constricted, bent back, or compressed and forced through the aperture **43** in wall **42**. The lip then regains its original shape, engaging behind the opposite side of wall

42 to maintain the connector in place. Body 26' is preferably molded, for example, of the same material as body 26.

In order to facilitate bending and displacing lip 41 so that it may be forced through the aperture 43, the adjacent end of connector 1' is cupped, as at 44, or otherwise provided with relief means inwardly adjacent lip 41.

The length of shank 40 between head 35' and lip 41 is substantially equal to the thickness of the wall 42 through which the connector is to extend.

Also the pin 25' of connector 1' is shown with straight side walls within the body 26' and is adapted to be either press fitted into a bore formed in the body or molded into place. Alternatively, connector 1' is provided with a pin of the nature of the pin 25 in order to ensure a better engagement between the pin and body 26'. Connector 1' is also preferably provided with suitable sealing means whereby to ensure a proper seal between the connector and the wall 42. Such means preferably comprises an arcuate groove or seat 46 disposed in the shank 40 of body 26' and adapted to be laterally opposite the edge of wall 42 defining aperture 43, when the connector is properly seated in the aperture.

An O-ring 47, having a larger external diameter than the diameter of aperture 43 is disposed in groove 46 and provides a sealing engagement between connector 1' and wall 42.

Modifications, changes and improvements to the preferred and modified forms of the invention herein particularly disclosed and described may occur to those skilled in the art who come to understand the principles and precepts thereof. Accordingly, the scope of the patent issued hereon should not be limited to the specific forms of the invention herein particularly illustrated, disclosed and described but only consistent with the advance by which the invention has promoted the art.

I claim:

1. A hermetic connector for providing a lead-in through an aperture in a wall and comprising a unitary, molded body member and a pin molded therein, said pin extending through said body member for connection with electrical leads, said unitary body member having a head portion, a shank portion and a lip, said shank being adapted to extend through the wall aperture, said lip and head having a greater diameter than the diameter of the aperture through which said shank is to extend to engage the opposite sides of the wall adjacent the aperture to maintain said connector in place and in sealing engagement with the wall, relief means in said body member adjacent and radially inwardly of said lip, said unitary body member being an electrical insulator and being resilient, said lip being displaceable toward the axis of said connector to permit said lip to be forced through the aperture through which said connector is to extend, and sealing means carried by and on said member to engage and seal against the wall through which said connector is to extend.

2. In the combination of a wall and a hermetic connector extending through an aperture in said wall, the improvement that said hermetic connector comprises a unitary, molded body member and a pin molded therein, said pin extending through said body member for connection with electrical leads, said unitary body member comprising a head portion, a shank portion and a circumferential lip on said shank portion and longitudinally spaced from said head portion, said shank portion extending through said aperture, said lip and head portion having a greater diameter, respectively, than the diameter of said aperture and engaging and coacting with opposite sides of said wall to maintain said connector in sealing engagement with said wall, said body member being an electrical insulator and resilient, said lip being displaceable toward the longitudinal axis of said connector whereby said lip is formed through said aperture to position said connector in said wall, and sealing means carried by and on said body member and engaging and sealing against said wall.

3. A hermetic connector for providing a lead-in through an aperture in a wall, said connector comprising a unitary, molded body member and a pin molded therein, said pin extending through said body member for connection with electrical leads, said unitary body member having a head portion, a shank portion and a lip, said shank being adapted to extend through the wall aperture, said lip and head having a greater diameter than the diameter of the aperture through which said shank is to extend to engage the oposite sides of the wall adjacent the aperture to maintain said connector in place and in sealing engagement with the wall, relief means in said body member adjacent and radially inwardly of said lip, said unitary body member being an electrical insulator and being resilient, said lip being displaceable toward the axis of said connector to permit said lip to be forced through the aperture through which said connector is to extend, and sealing means carried by and on said body member to engage and seal against the wall through which said connector is to extend, said sealing means comprising a laterally opening groove in and circumscribing said shank and O-ring disposed in said groove and of greater thickness than the depth of said groove.

4. In the combination of a wall and a hermetic connector extending through an aperture in said wall, the improvement that said hermetic connector comprises a unitary, molded body member and a pin molded therein, said pin extending through said body member for connection with electrical leads, said unitary body member comprising a head portion, a shank portion and a circumferential lip on said shank portion and longitudinally spaced from said head portion, said shank portion extending through said aperture, said lip and head portion having a greater diameter, respectively, than the diameter of said aperture and engaging and coacting with opposite sides of said wall to maintain said connector in sealing engagement with said wall, said body member being an electrical insulator and resilient, said lip being displaceable toward the longitudinal axis of said connector whereby said lip is forced through said aperture to position said connector in said wall, and sealing means carried by and on said body member and engaging and sealing against said wall, said sealing means comprising a laterally opening groove in said shank portion of said connector adjacent said wall, and an O-ring of greater thickness than the depth of said groove, disposed in said groove and engaging and sealing between said body member and wall.

5. The combination according to claim 4 with a counterbore in said body member radially inwardly of said lip.

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