

[54] **DEVICE FOR SEALING ELECTRICAL CONNECTORS**

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[51] Int. Cl. **H01r 13/52, B25b 27/02**

[58] Field of Search **174/20, 22 R, 23 R, 174/65 SS, 76, 77 R, 151; 277/12, 125, 227, 233; 339/60 M, 89 M, 94 R, 94 M, 218 R, 218 M, 102 R**

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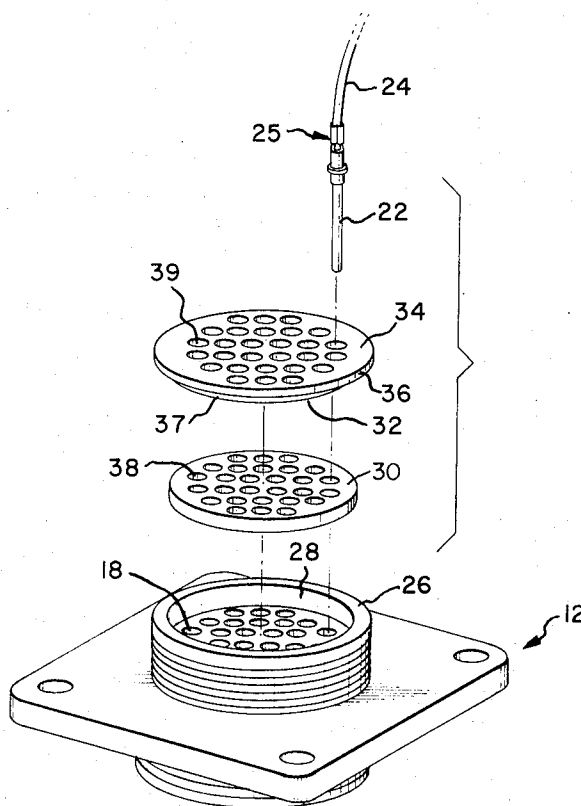
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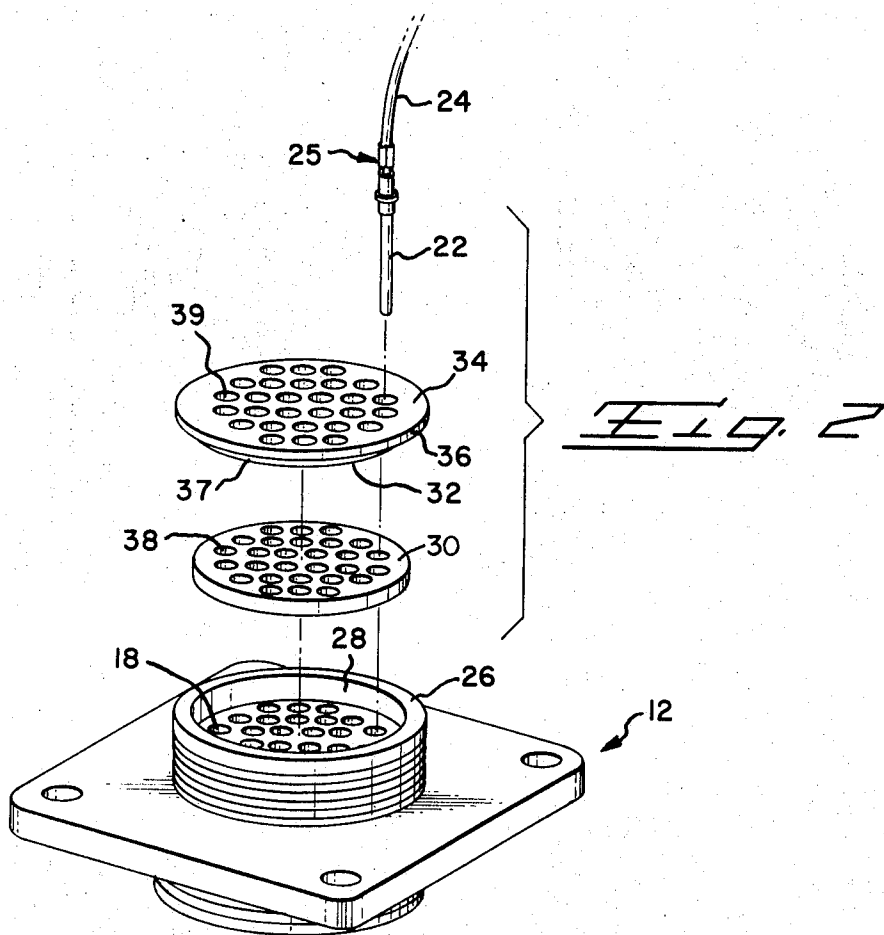
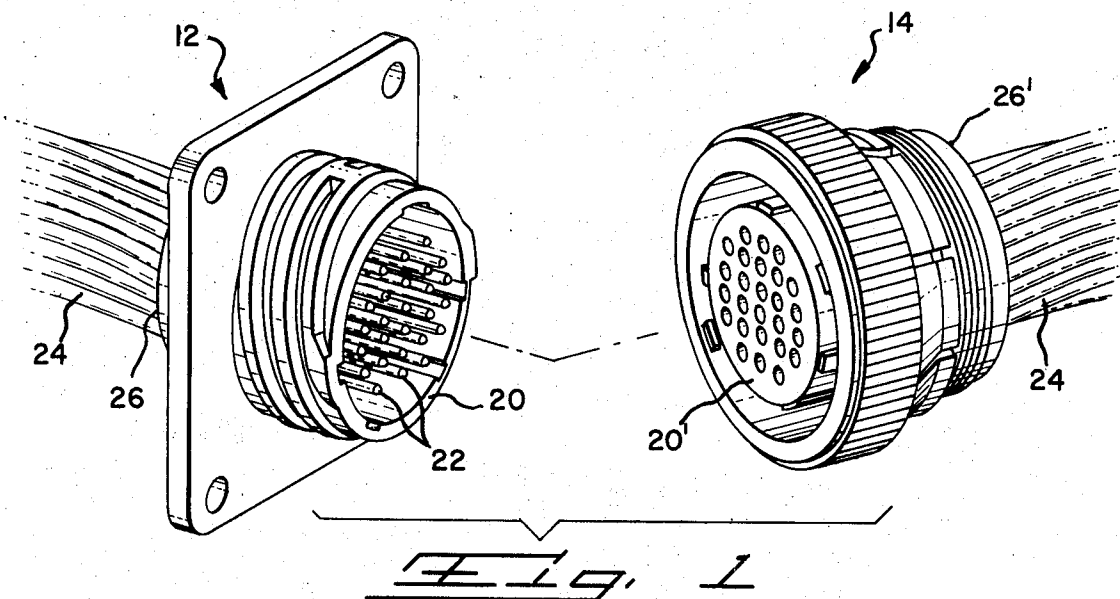
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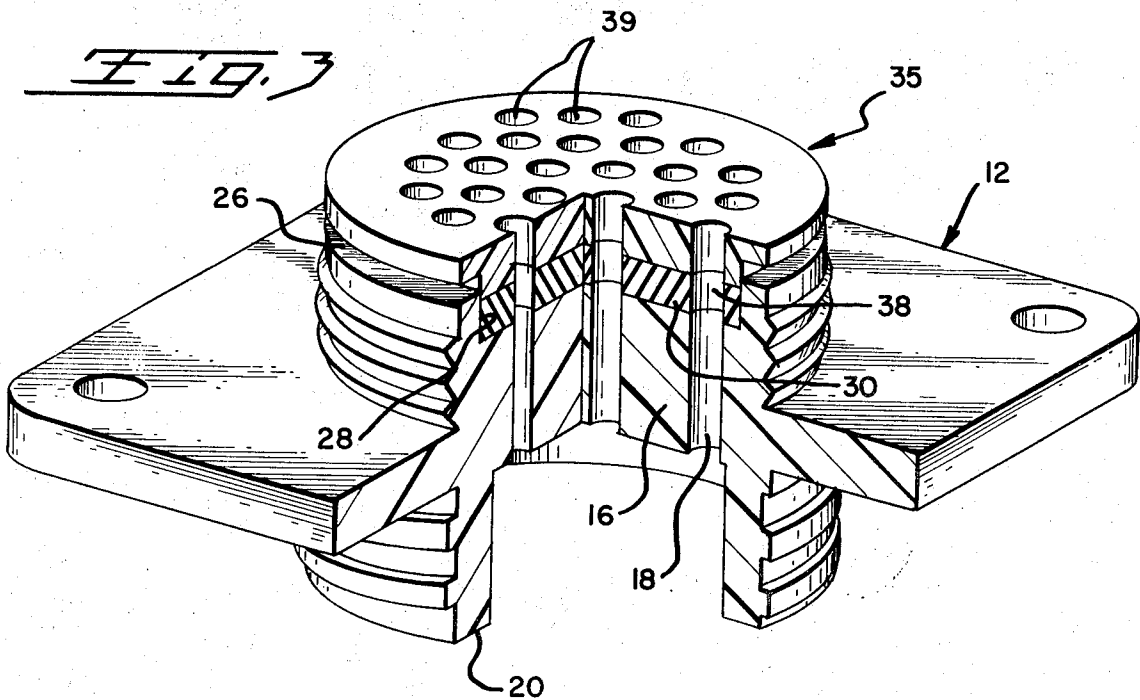
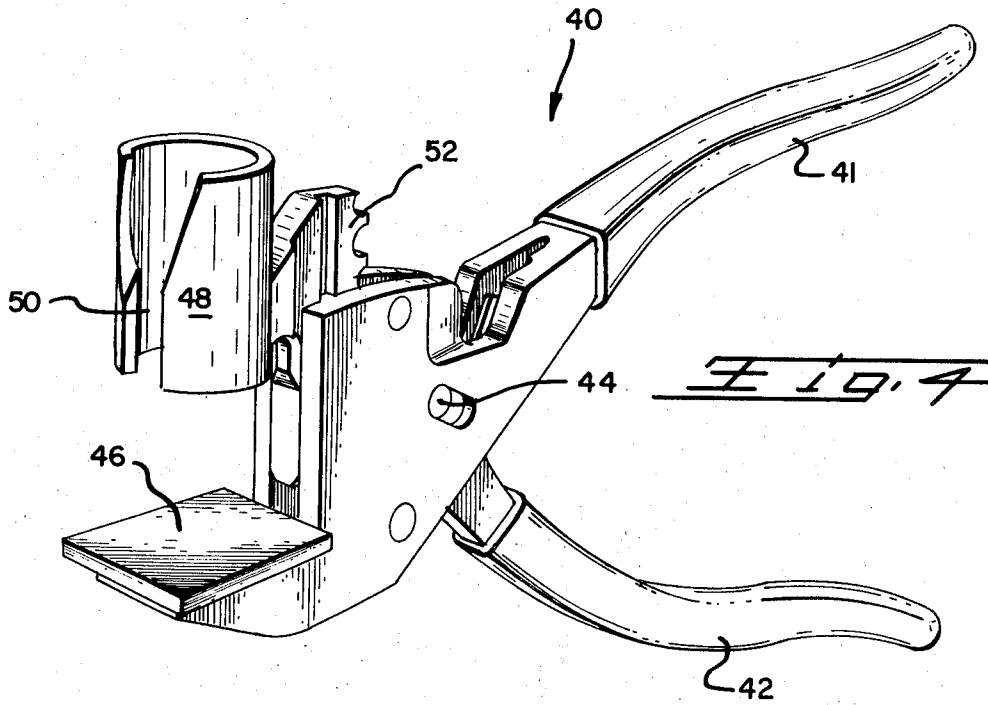
[57] **ABSTRACT**

This invention relates to a device and method for sealing openings such as found on the rear faces of electrical connectors from which a number of electrical leads emanate. More particularly, the invention relates to a layer of sealable material attached to a rigid member to form a disk which can be pressed into a recess in the rear face of a connector, the pressure causing the material to flow into passageways and openings and sealing the electrical leads therein.

3 Claims, 6 Drawing Figures







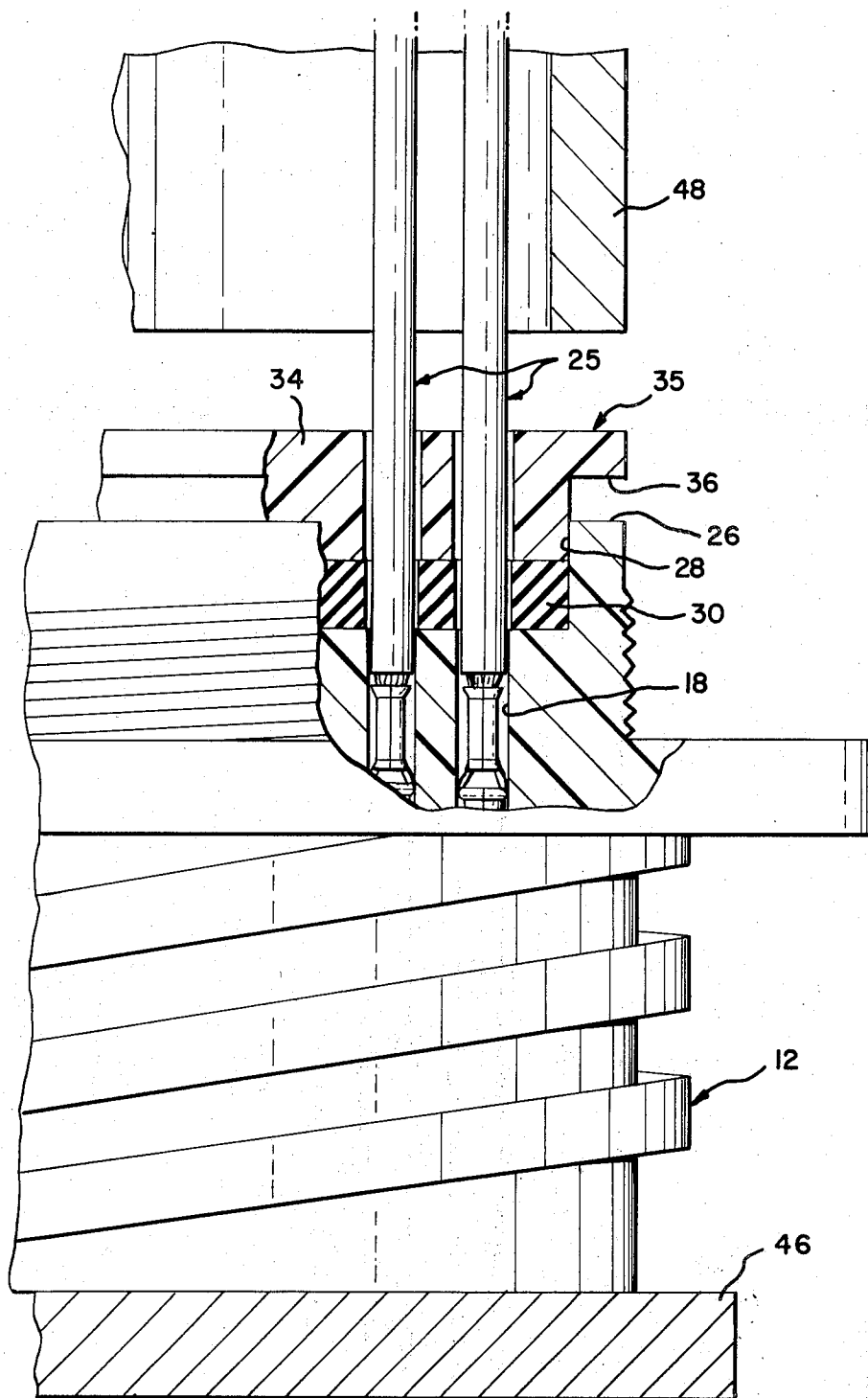


Fig. 5

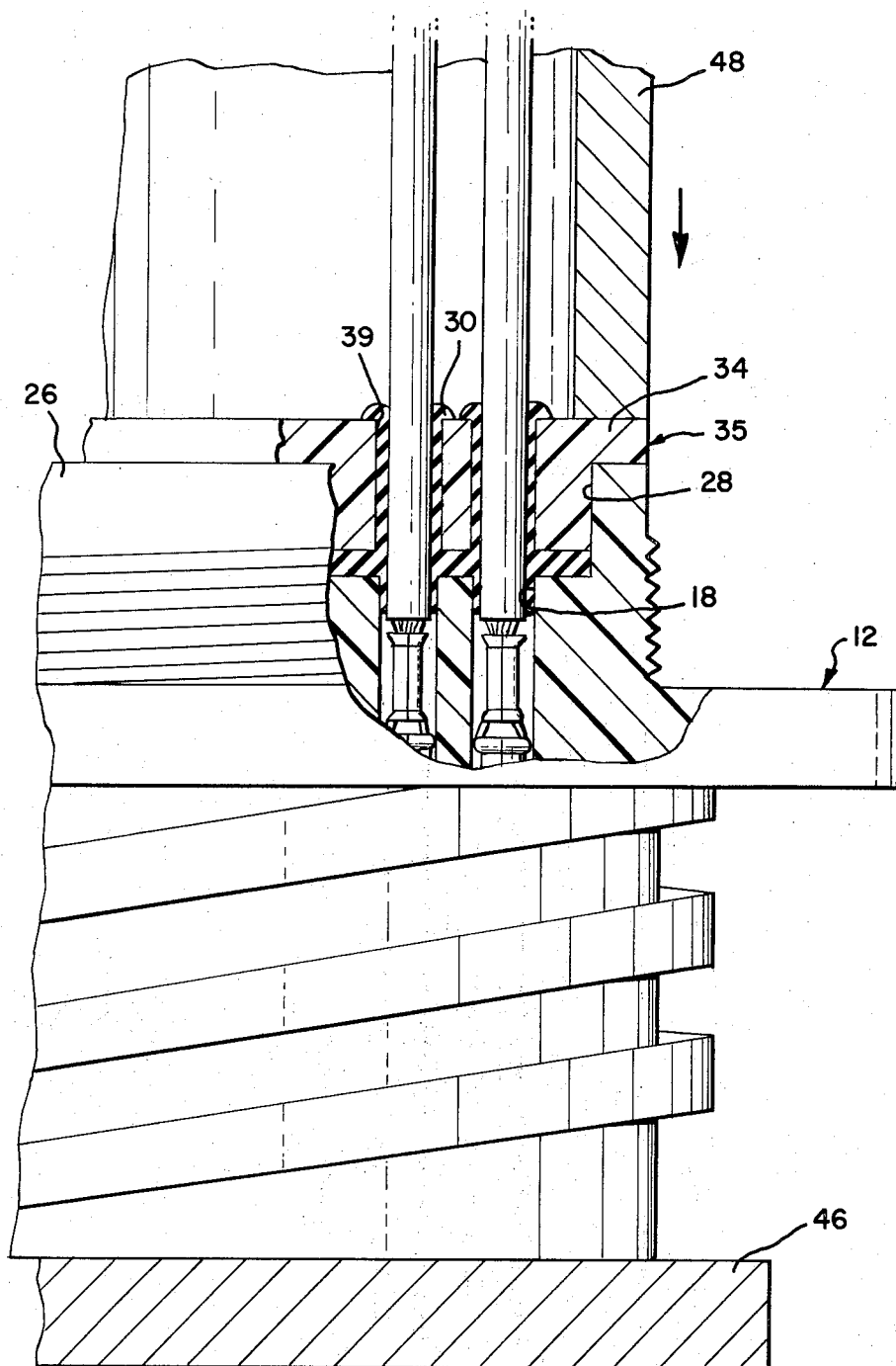


Fig. 6

DEVICE FOR SEALING ELECTRICAL CONNECTORS

BACKGROUND OF THE INVENTION

Circular electrical connectors have one or more electrical terminal contacts, crimped or otherwise fastened onto electrical conductors, retained therein. The terminal contacts are inserted into suitable passageways in the connector from the rear face and extend there-through to a mating face where they may be electrically connected with mateable terminal contacts retained in another connector. The rear faces of such connectors are often exposed and require some form of sealing. Prior art discloses various means for waterproofing or otherwise protecting the rear face of the circular connectors. The most prevalent means includes a resilient grommet, generally made from neoprene or silicone rubber, which fits over the rear face and is bonded to the connector. The grommet contains a plurality of openings to accommodate the emanating electrical leads. The grommet is first slipped over the rear end of the connector and bonded thereto. The terminal contacts and attached conductors are then pushed thru the openings in the grommet and into the passageways in the connector. Sealing of the conductors takes place via glands positioned in each of the several openings in the grommet. As is well known in the art, extreme care must be exercised when pushing the terminal contact through the grommet so the walls defining the openings will not be torn, or ripped. For this reason, expensive screw-machine terminal contacts having hooded contact times are almost exclusively used with such grommets.

Another commonly used technique for sealing the rear faces of circular connectors is that of "potting." A flowable material, such as an epoxy resin, is poured into a recess in the rear face of an electrical connector wherein the terminal contacts with electrical conductors attached thereto have already been inserted. The material sets, either by applying heat or other commonly known setting means, forming a rigid, impervious seal. While the potting technique produces a satisfactory seal, it is time consuming, complex to apply and messy.

Accordingly, the present invention provides a sealing device consisting of a disk having one layer of an impervious, sealing material capable of flowing under pressure and retaining such shape impressed thereon by such pressure, and a second member of rigid material operable to transfer pressure applied thereto to the layer of sealing material causing such to flow into and seal openings and passageways adjacent to the layer of sealing material.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view of the electrical connectors useful in the practice of the present invention;

FIG. 2 is an exploded perspective view of the preferred embodiment of the present invention and the electrical connector of FIG. 1;

FIG. 3 is a sectional view showing the preassembled position of the preferred embodiment of the present invention in the electrical connector;

FIG. 4 illustrates the tool used in assembling the preferred embodiment of the present invention;

FIG. 5 shows the preferred embodiment of the present invention in position prior to being attached to the rear face of the electrical connector of FIG. 1; and

FIG. 6 shows the preferred embodiment of the present invention after being applied to the electrical connector of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 a pair of mateable electrical connectors of the type used herein to describe the present invention is shown. On the left is connector 12 and on the right is connector 14, the latter adapted to telescopingly mate with the former as is well known in the art. The bodies 16 (see FIG. 3) of connector 12 — connector 14 are solid with a number of passageways 18 there-through adapted to house a plurality of terminal contacts 22. These contacts can be of the pin type seen emerging from mating face 20 in connector 12 or of the socket type which is represented by circles on mating face 20' on connector 14. Electrical conductors 24, crimped or otherwise fastened to one or other type of terminal contact 22 as seen in FIG. 2, can be seen emerging from faces 26 — 26' of connector 12 and connector 14 respectively. The combination of terminal contact 22 and electrical conductor 24 is hereinafter referred to as lead 25.

FIG. 2 shows in exploded fashion the rear face 26 of connector 12 and a recess 28 therein. Directly above connector 12 is a sealing member 30 which is normally affixed to the bottom side 32 of rearward face cover and pressure plate 34 to form a sealing disk 35. Sealing member 30 is fabricated from butyl rubber or other like sticky material having the property of being able to flow under modest pressure and to hold the shape impressed upon it after pressure is released therefrom.

Pressure plate 34 has an annular flange 36 and a skirt 37, the former having a diameter at least equal to that of rearward face 26 as can be seen in FIG. 3, and the latter having a diameter equal to that of recess 28. Plate 34 is made from a rigid material such as a glass-filled nylon. Both member 30 and plate 34 have openings 38 and 39, respectively, which can be aligned with passageways 18 in connector 12 — connector 14 is seen in FIGS. 2, 3, 5 and 6.

Above pressure plate 34 and shown being aligned with one of the openings 38 — 39 and passageway 18 is lead 25.

FIG. 3 shows the positioning of sealing disk 35 into recess 28 in rear face 26 of connector 12 before pressure is applied thereto. For reasons of clarity, leads 25 have been omitted.

FIG. 4 illustrates one embodiment of a tool 40 suitable for applying pressure to the assembly shown in FIG. 3. The tool consists of a pair of arms 41, 42 pivotally connected at pin 44. Arm 41 terminates in plate 46 and arm 42 terminates in a cylinder 48 which has a longitudinal slot 50 shaped like a funnel. Tool 40 shows a rack at 52, which cooperates with a gear (not shown) on arm 42 so that the space between plate 46 and cylinder 48 can be adjusted.

UTILIZATION OF THE PREFERRED EMBODIMENT

In the utilization of sealing disk 35, the disk is placed partly into recess 28 manually. Leads 25 are then threaded through openings 38 and 39 in disk 35 and

pushed into passageways 18 in connector 12 (or connector 14 as the case may be). FIG. 5 shows the aforementioned assembly placed on plate 46 of tool 40. Leads 25 have been fed through cylinder 48 via slot 50, the cone portion of the funnel shaped slot facilitating that process.

Cylinder 48 is now brought to bear down on sealing disk 35 as seen in FIG. 6. This pressure, transferred from plate 34, causes the sealing member 30 to extrude or flow into and fill up openings 39 in pressure plate 34 and into passageways 18 in connector 12. At the same time, pressure plate 34 is being wedged into recess 28. Tool 40 may now be removed from the connector whose rearward face 26 is sealed against water, dust and other contaminants.

As is now apparent, the present invention provides a simple device and means for sealing a surface. Although the device is suited for an unbroken surface, its novelty makes it well adapted to uneven surfaces where the sealing layer can flow into pits, openings, cracks and so forth. Quite obviously the device is extremely well adapted to sealing electrical connectors as shown and described above. And as is also apparent, the present invention is insensitive to and unaffected by tears and rips which may be imparted to the walls of the openings in the disk as terminal contacts are pushed through. Further, the device is very simple to assemble and does not require post-assembly bonding, heating or chemical treating. Yet another advantage of the present invention is that it is non-contaminating and safe to handle and use.

Although the invention has been described with reference to the embodiment illustrated, it will be appreciated by those skilled in the art that additions, modifications, substitutions, deletions and other changes not specifically described may be made which fall within the spirit of the invention as defined in the following claims.

What is claimed is:

1. A multi-contact electrical connector housing, said housing being adapted to receive electrical contact terminals which are crimped onto wires, said housing comprising:

- a molded block of hard plastic insulating material, said block having a mating face and a rearward face,
- a plurality of contact-receiving cavities extending through said block from said rearward face to said mating face, an axial flange extending around the periphery of said rearward face, said flange defining an enclosure extending continuously around said cavities,
- a sealing member of flowable material in said enclosure

sure against said rearward face, said sealing member having a thickness which is less than the height of said flange whereby said sealing member is received from the edge of said flange, said sealing member having first openings therein in alignment with said cavities, and

a pressure plate member in said enclosure, said pressure plate member fitting snugly within said enclosure and having a radially extending flange, said flange being spaced from said edge, said pressure plate member being of a hard plastic material and having second openings therein

which are in alignment with said first openings and said cavities whereby, upon inserting said terminals through said openings and into said cavities and thereafter pressing said pressure plate member into said enclosure until said radially extending flange is seated against said edge of said axial flange, said sealing member is compressed and caused to flow into said second openings and into said cavities, and circumferential seals are thereby formed around said terminals.

2. A connector housing as set forth in claim 1, said connector housing being cylindrical.

3. A sealed multi-contact electrical connector, said connector comprising:

- a generally cylindrical insulating housing, said housing being of a hard plastic material and having a mating face and a rearward face, a plurality of cavities extending through said housing from said rearward face to said mating face, an axially extending circular flange extending from said rearward face, said flange defining an enclosure surrounding said cavities.

- a pressure plate member in said enclosure, said pressure plate member comprising a disc snugly fitted within said enclosure, said disc being spaced from said rearward face and having a radially extending flange, said radially extending flange being against the edge of said circular flange, said pressure plate member having a plurality of openings therein in alignment with said cavities,

- an electrical contact terminal having a wire secured thereto in each of said cavities, said wires extending through said openings, and

- a compressed matrix of sealing material between said rearward face and said pressure plate member, said sealing material being extruded through said openings and onto external surface portions of said pressure plate member, said sealing material forming a seal around said wires and terminals.

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