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Paullus et al.

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

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[52] **U.S. Cl.** ..... **339/102 R,** 29/268, 81/5.1 R, 81/418, 174/76, 174/77 R, 277/12, 339/89 M

[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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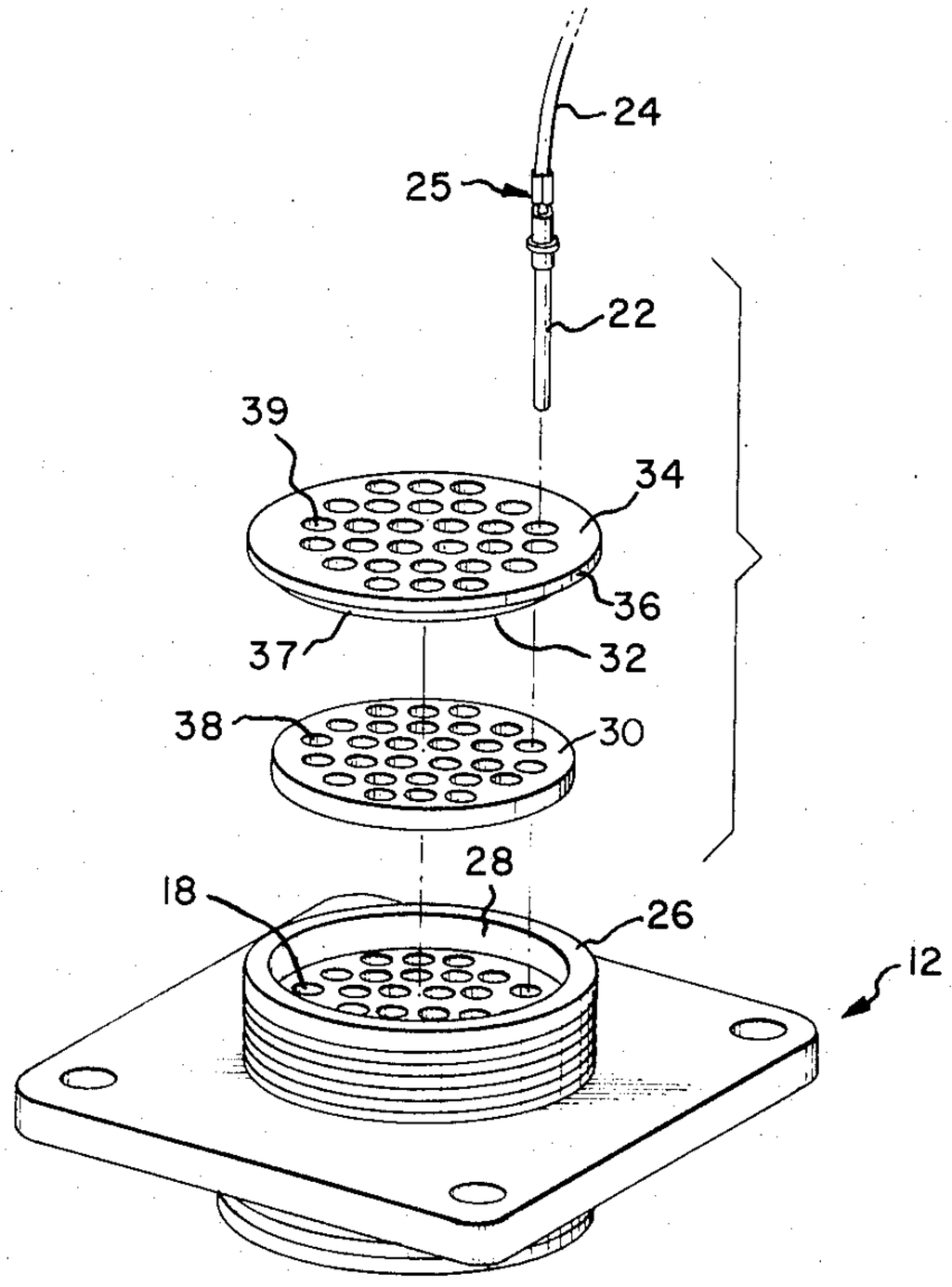
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[57] **ABSTRACT**

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



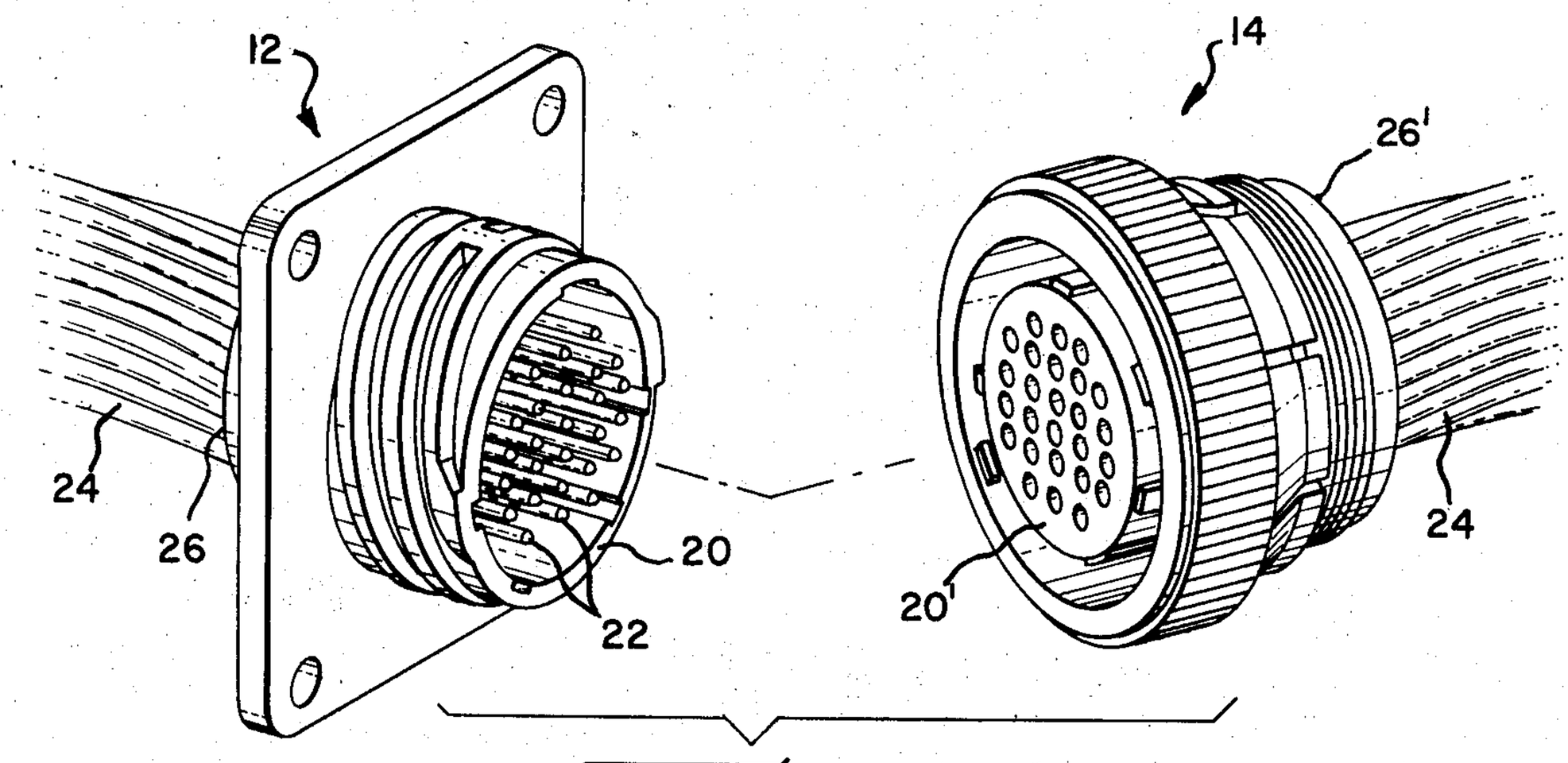


Fig. 1

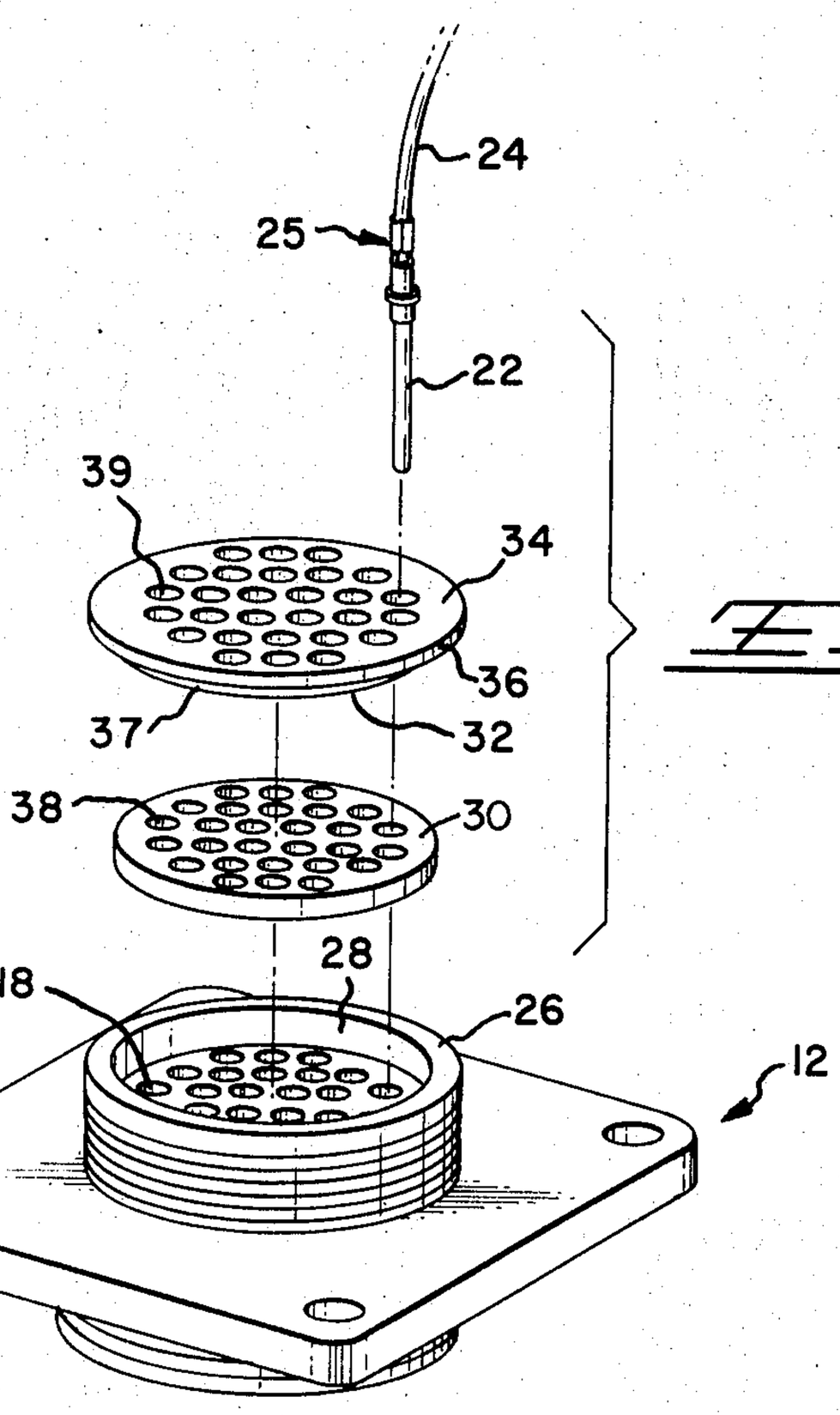


Fig. 2

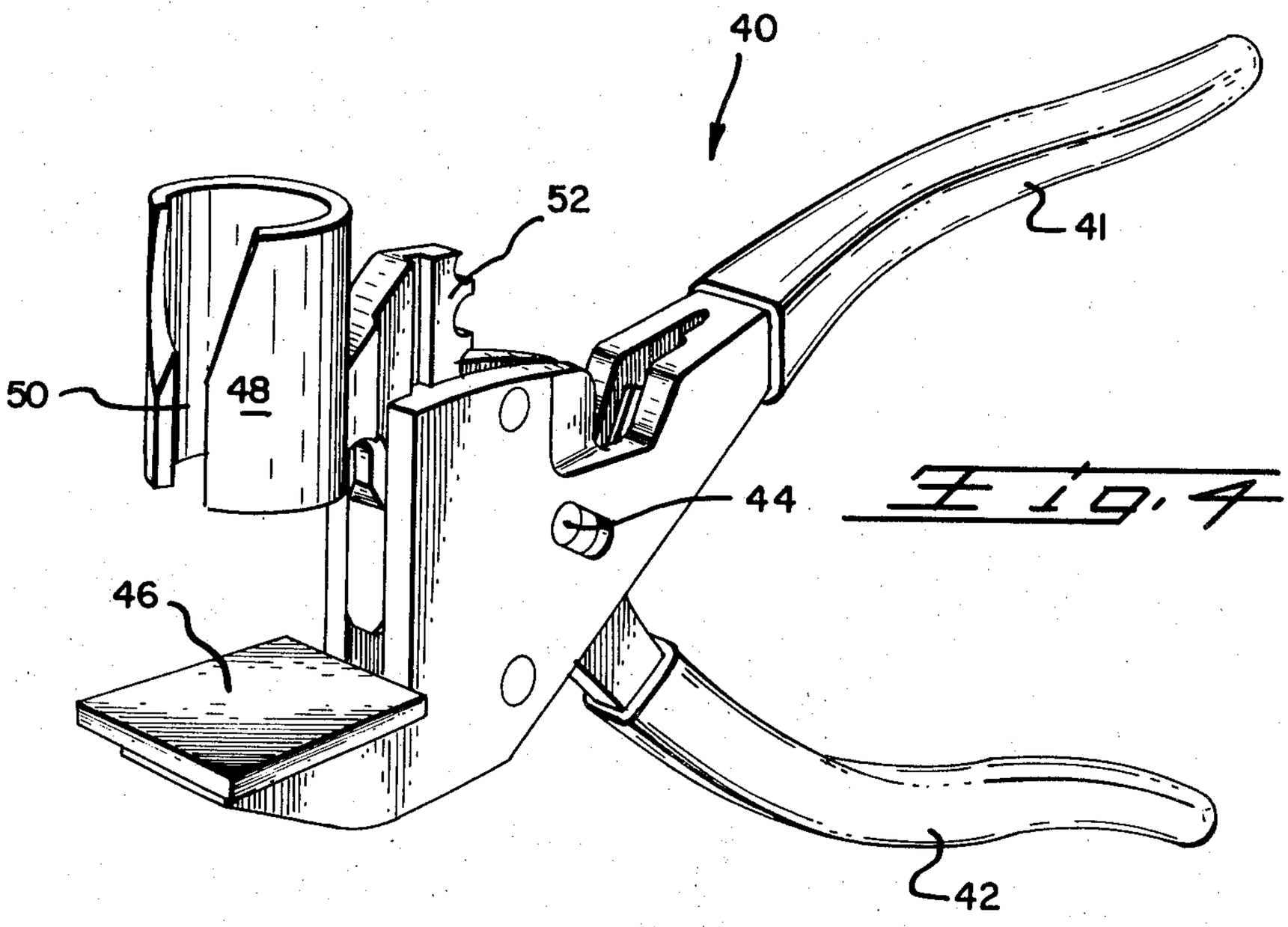
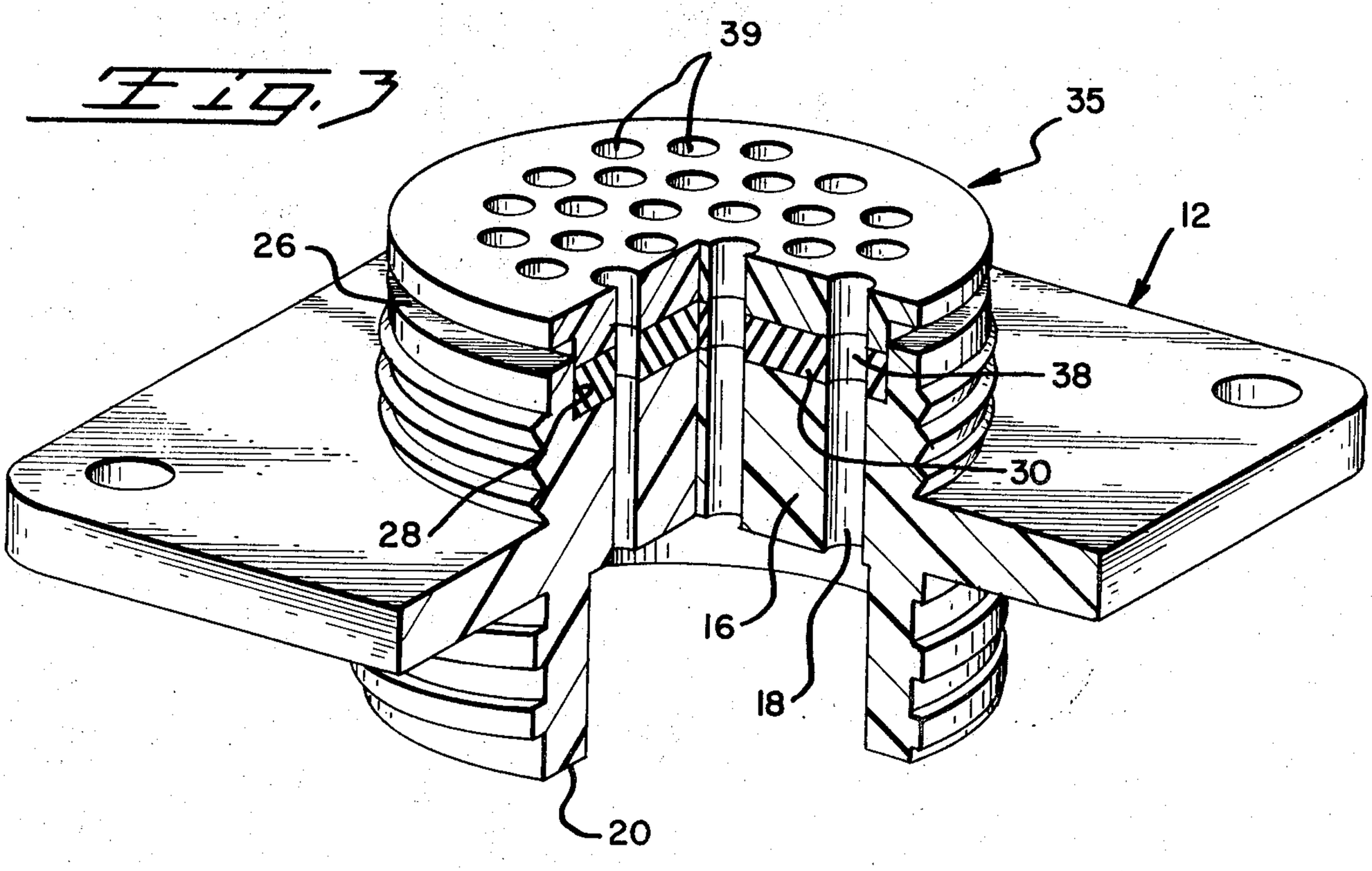


Fig. 4

Fig. 3



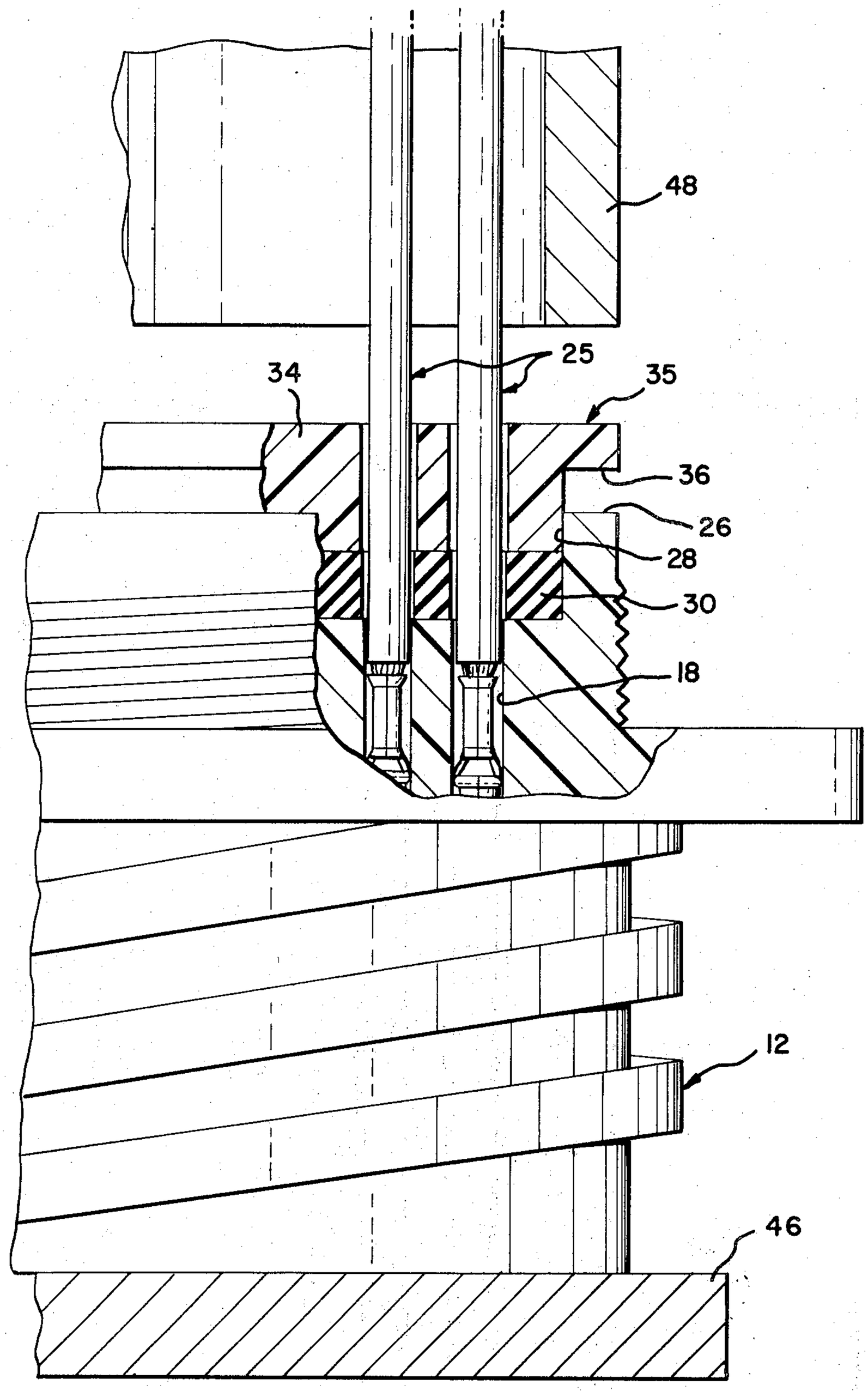


Fig. 5

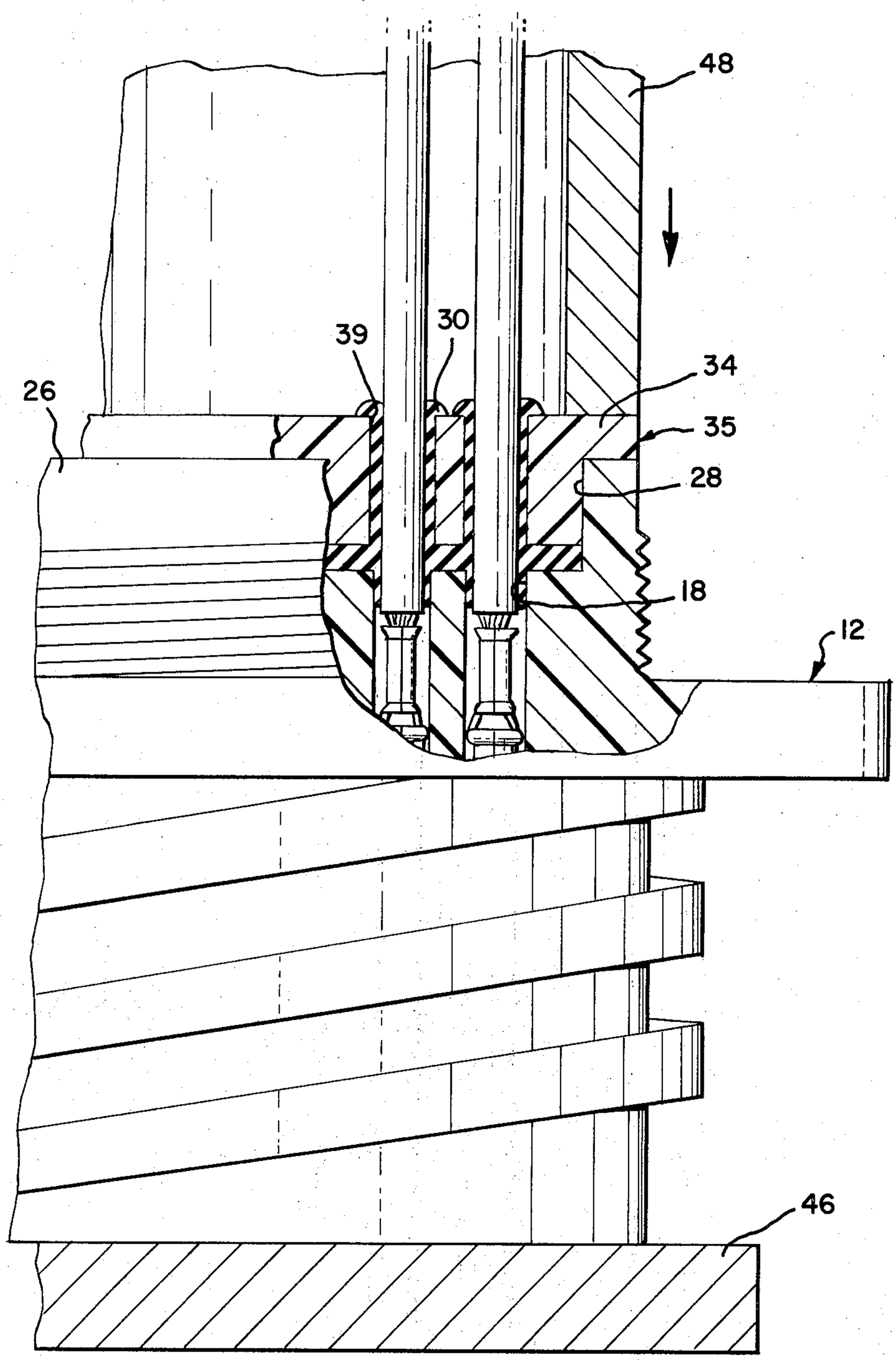


Fig. 6

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 therethrough 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 tines 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** therethrough 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 diametr 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 contaminents.

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 imaprted 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 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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