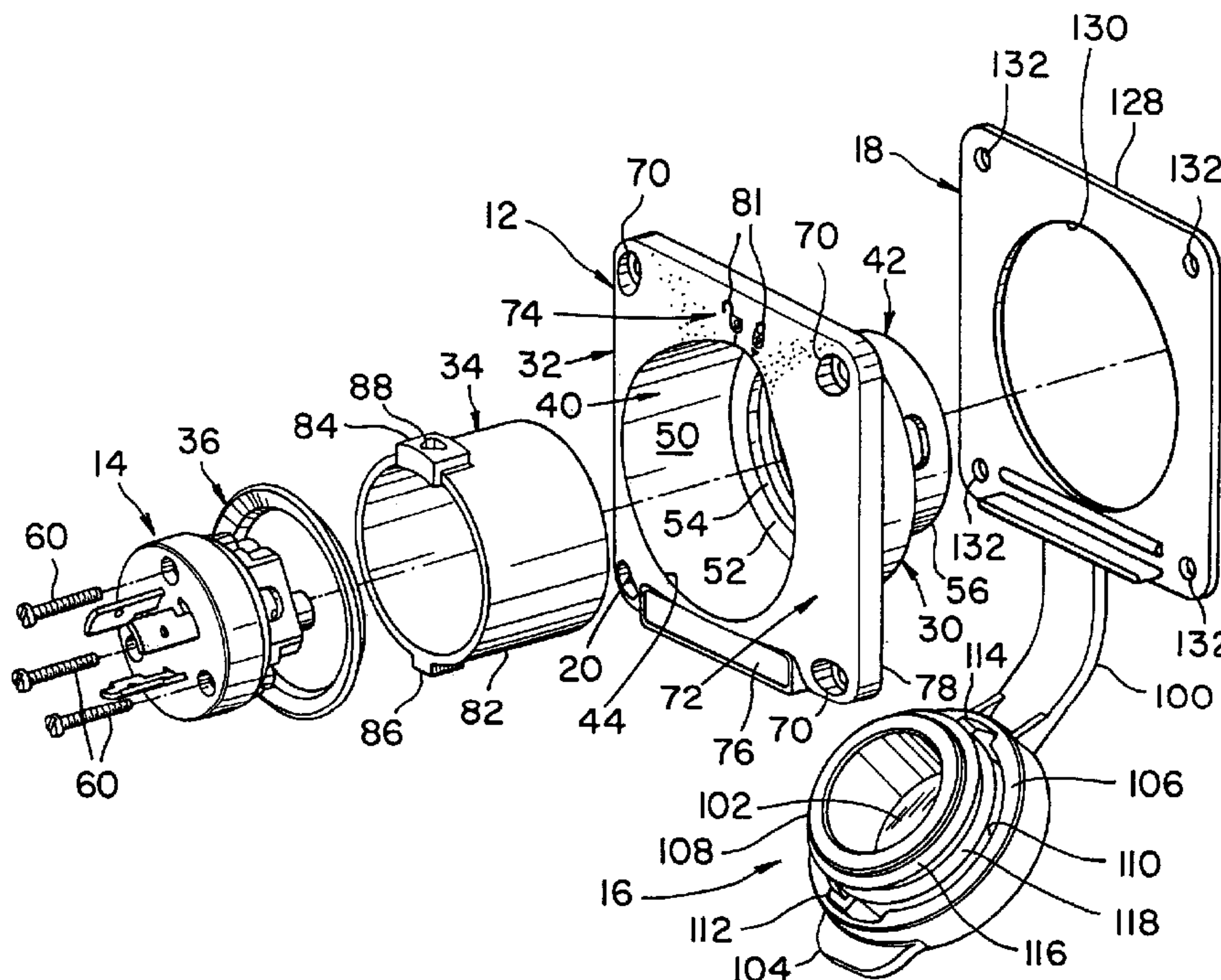




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(54) Titre : CAPUCHON AVEC JOINT D'ETANCHEITE POUR BOITIER DE CONNECTEUR ELECTRIQUE  
 (54) Title: CLOSURE CAP WITH GASKET FOR ELECTRICAL CONNECTOR HOUSING



(57) Abrégé/Abstract:

A sealing arrangement including a closure cap and an integral mounting gasket for sealing a mounted electrical connector housing. The closure cap and the gasket are formed as a one-piece, unitary member. The closure cap is designed to engage a shroud of the electrical connector housing for covering the electrical contacts of the electrical connector. The gasket is designed to seal the interface between the electrical connector housing and a wiring enclosure. The closure cap is coupled to the gasket by a strap so that the closure cap will be readily accessible to the user even when the closure cap is not being used.

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CLOSURE CAP WITH GASKET  
FOR ELECTRICAL CONNECTOR HOUSING

Abstract of the Disclosure

A sealing arrangement including a closure cap and an integral mounting gasket for sealing a mounted electrical connector housing. The closure cap and the gasket are formed as a one-piece, unitary member. The closure cap is designed to engage a shroud of the electrical connector housing for covering the electrical contacts of the electrical connector. The gasket is designed to seal the interface between the electrical connector housing and a wiring enclosure. The closure cap is coupled to the gasket by a strap so that the closure cap will be readily accessible to the user even when the closure cap is not being used.

**CLOSURE CAP WITH GASKET  
FOR ELECTRICAL CONNECTOR HOUSING**

**Field of the Invention**

The present invention generally relates to a closure cap for an electrical connector housing to protect its electrical contacts. More specifically, the present invention relates to a closure cap constructed of an elastomeric material which has an integrally formed mounting gasket.

Background of the Invention

Electrical connectors are well known in the electrical wiring industry, and can be either a male electrical connector or a female electrical connector. Male electrical connectors include at least two, and typically at least three, prongs or contacts extending from a housing for joining with a complementary number of contact holes formed in a mating female connector.

The male and female electrical connectors can take various configurations. For example, the male and female electrical connectors can be connected to the end of a multi-connector cable. Alternatively, either the male electrical connector or the female electrical connector can be mounted on a wiring enclosure or a piece of equipment. A male electrical connector, which is mounted to an enclosure or a piece of equipment, is called an inlet. A female electrical connector, which is mounted to an electrical enclosure or a piece of equipment is called a receptacle or outlet.

A shrouded male electrical connector includes a cylindrical shroud or cylinder extending from the base of the housing and encircling the prongs. The shroud is normally at least as long as the prongs and is often slightly longer than the prongs such that the prongs are slightly recessed in the shroud. The shroud primarily serves to protect the prongs from damage during shipping and handling of the electrical connector.

A mating female electrical connector or receptacle may be cylindrically shaped to be received within the shroud of the male electrical connector and a shroud with a cylindrical recess encircling the contact retainer body to receive the shroud of the male electrical connector therein.

All electrical connectors which are exposed to adverse environmental conditions require a cover or lid to seal and protect the electrical elements from grit, moisture and other elements. This is especially relevant in outdoor electrical connectors which are subject to a variety of weather conditions such as moisture, rain, snow and other environmental conditions.

Weatherproof electrical covers or arrangements are well known in the art for protecting the electrical contacts of the electrical connector. For example, U.S. Patent No. 4,553,000 to Appleton discloses an electrical connector assembly having a hinge mounted cover which is normally biased by a spring to cover the open front of the electrical connector to protect the contacts therein. The interface between the lid or cover in the electrical connector housing is typically not waterproof by itself, and thus, the cover is provided with a foam gasket or the like, to seal the interface therebetween.

While many attempts made to provide a cover or lid for the opening of the electrical connector, these prior art devices suffer from many disadvantages. Many of these prior art devices require many parts and are expensive to manufacture. In addition, many of these prior art devices use parts which wear out. Moreover, many of these prior art devices are not coupled to the electrical connector housing so as to be readily accessible even when not in use.

In view of the above, it is apparent that there exists a need for a sealing arrangement for an electrical connector housing to prevent the ingress of contaminants. This invention addresses this need in the art along with other needs and/or problems which will become apparent to those skilled in the art once given this disclosure.

**Summary of the Invention**

Accordingly, the present invention seeks to provide a sealing arrangement which provides a watertight seal to protect the electrical contacts of the electrical connector.

Another aspect of the present invention seeks to provide a sealing arrangement having a closure cap which is integrally formed with the mounting gasket for the electrical connector housing. Still another aspect of the present invention is to provide a sealing arrangement which is relatively inexpensive to manufacture and easy to install.

Yet another aspect of the present invention seeks to provide a sealing arrangement which does not utilize any movable parts which will wear out.

Further, the present invention seeks to provide a sealing arrangement in which the closure cap is coupled to the electrical connector housing in a position so as to be readily accessible even when not in use and which does not obstruct the construction of a mating electrical connector to the electrical connector housing.

Basically the invention provides a sealing arrangement for sealing a mounted electrical connector housing, comprising a closure cap including an annular sealing member constructed of a sealing material for releasably engaging the electrical connector housing, a gasket having a body portion with an opening which is sized for accommodating a portion of the mounted electrical connector through the opening of the body portion, and a strap directly attached to the closure cap and to the gasket.

Other aspects, advantages and salient features of the present invention will become apparent to those skilled in the art from the following description, which

taken in conjunction with the annexed drawings, discloses a preferred embodiment of the present invention.

Brief Description of the Drawings

Referring now to the drawings which form part of this original disclosure:

Figure 1 is a perspective view of an electrical connector assembly in the form of inlet or male electrical connector which is adapted to be coupled to an electrical enclosure (not shown) and having an electrical connector housing and a closure cap with integral gasket in accordance with the present invention;

Figure 2 is a perspective view of the electrical connector assembly illustrated in Figure 1 with the closure cap covering the electrical contacts of the electrical connector;

Figure 3 is an exploded perspective view of the electrical connector assembly illustrated in Figures 1 and 2 in the form of an inlet or male electrical connector;

Figure 4 is a right side elevational view of the electrical connector assembly illustrated in Figures 1-3;

Figure 5 is a right side elevational view of the electrical connector assembly illustrated in Figures 1-4, with a padlock coupled thereto;

Figure 6 is a front elevational view of the electrical connector assembly illustrated in Figures 1-5, with a padlock coupled thereto;

Figure 7 is a top plan view of the electrical connector assembly illustrated in Figure 6, with the closure cap removed for clarity;

Figure 8 is a top plan view of the electrical connector housing illustrated in Figure 7, with a padlock coupled thereto;

Figure 9 is a bottom plan view of the electrical connector assembly illustrated in Figures 1-4;

Figure 10 is a rear elevational view of the electrical connector housing illustrated in Figures 1-4 with the closure cap removed for clarity;

Figure 11 is a rear elevational view of the electrical connector housing illustrated in Figure 10 with the closure cap assembled thereto;

Figure 12 is a front elevational view of the closure cap with integral gasket in accordance with the present invention for use with the electrical connector housing of the present invention; and

Figure 13 is a side elevational view of the closure cap with integral gasket in accordance with the present invention for use with the electrical connector housing of the present invention.

#### Detailed Description of the Drawings

Referring initially to Figures 1-6, an electrical connector assembly 10 in accordance with the present invention is illustrated, and includes an electrical connector housing 12 with an electrical connector 14 mounted therein, and a closure cap 16 with an integrally formed mounting gasket 18. While electrical connector assembly 10 is illustrated in the form of an inlet with male electrical connector 14 coupled thereto, it will be apparent to those skilled in the art that the present invention can be utilized with a receptacle or female electrical connector.

Electrical connector 14 is a conventional electrical connector which is well known in the art. Thus, electrical connector 14 will not be described or illustrated in detail herein.

As seen in Figures 5, 6 and 8, electrical connector housing 12 is specially designed for receiving a locking member or mechanism such as padlock 20 or the like. Accordingly, electrical connector assembly 10 together with padlock 20 provides a security lockout mechanism to prevent unauthorized use of electrical connector 14.

Preferably, the locking mechanism is a conventional padlock 20 having a body 22 and a shackle 24. The shackle 24 of the padlock 20 extends through a part of electrical connector housing 12 as discussed below so that padlock 20 is positioned in front of the axial face of the body of electrical connector 14. In this manner, padlock 20 prevents a mating electrical connector (not shown) from being connected to electrical connector 14.

Closure cap 16 with its integral mounting gasket 18 are especially designed to provide the dual function of (1) sealing electrical connector housing 12 to a wiring enclosure (not shown) and (2) sealing electrical connector 14 from the weather. Since closure cap 16 and mounting gasket 18 are integrally formed, closure cap 16 will hang from electrical connector housing 12 even when not in use. Accordingly, closure cap 16 will always be attached to electrical connector housing 12 even when not in use. This ensures that closure cap 16 will always be readily available to the user for sealing the electrical connector contacts of electrical connector 14 whenever necessary.

Turning now to electrical connector housing 12, as best seen in Figures 3-10, electrical connector housing 12 is preferably an insulated housing having a tubular body portion 30, a mounting flange portion 32, a tubular shroud 34 and a shroud seal 36. Preferably, tubular body portion 30, mounting flange portion 32 and shroud 34 of electrical connector housing 12 are all constructed of

insulating material such as a plastic. For example, tubular body portion 30, mounting flange portion 32 and shroud 34 can be constructed of a polyester blend such as GE's Valox 3570.

Tubular body portion 30 and mounting flange portion 32 are preferably integrally molded as a one piece, unitary member by a straight draw mold process. Thus, tubular body portion 30 and mounting flange portion 32 do not have any hidden surfaces which require the use of sliders or the like during molding thereof. Tubular body portion 30 has a first open end 40 for receiving electrical connector 14 therein, a second open end 42 for receiving electrical wires (not shown) therethrough for electrically connecting with the contacts of electrical connector 14, and a tubular inner surface 44 for receiving electrical connector and shroud 34 therein.

More specifically as seen in Figures 3, 7 and 10, tubular body portion 30 includes a first cylindrical section 50 adjacent first open end 40, an annular sealing surface 52 extending radially inwardly from the inner end of first cylindrical surface 50, a second cylindrical section 54 extending from annular sealing surface 52, a third cylindrical section 56 extending concentrically from second cylindrical section 54 to second end 42, and a set of mounting lugs 58 located at the inner surface of third cylindrical surface 56.

As seen in Figures 3, 6, 10 and 11, electrical connector 12 is fixedly secured within tubular body portion 30 via screws 60, which are threadedly received within holes 62 of mounting lugs 58. Shroud 34 is press fit into second cylindrical section 54 and against third cylindrical section 56 so that shroud 34 is concentrically arranged within first cylindrical section 50 to form an annular cylindrical recess between first

cylindrical section 50 and shroud 34 for receiving a shroud of a mating electrical connector therein. The interface between shroud 34 and second cylindrical section 52 can be provided with a sealant or an adhesive as needed and/or desired.

Shroud seal 36 is mounted on shroud 34 within the annular recess of housing 12 and engages annular sealing surface 52. More specifically, when a mating shrouded electrical connector is installed into the annular recess of electrical connector housing 12, the shroud of the mating electrical connector will engage shroud seal 36 and compress shroud seal 36 against annular sealing surface 52 to create a weathertight seal therebetween when electrical connector 14 is connected to a mating electrical connector. The preferred embodiment of shroud seal 36 is disclosed in Canadian Patent No. 2,175,300 issued September 28, 2004, concurrently filed herewith in the name of John C. Anthony and entitled "Shroud Seal for Shrouded Electrical Connector", which may be referred to for further details.

As seen in Figures 1, 2 and 6, mounting flange portion 32 extends radially outwardly from tubular body portion 30 at first open end 40, and has a generally rectangular outer configuration. Mounting flange portion 32 has four mounting holes 70 for receiving screws or other suitable fasteners to couple electrical connector housing 12 to an electrical enclosure (not shown). The exterior or front surface 72 of mounting flange portion 32 is sculptured to provide a substantially smooth and attractive appearance.

As best seen in Figures 7 and 8, exterior surface 72 has a notched section 74 at its upper end such that padlock 20 can be attached to shroud 34 as discussed

below. Exterior surface 72 also has a rectangular label section 76 for mounting various pertinent information about electrical connector 14. Notched section 74 is a curved notch having its curvature lying on an imaginary cylinder extending substantially perpendicular to an imaginary cylinder extending outwardly from first cylindrical section 50. Preferably, the imaginary cylinders of notched section 74 and first cylindrical section 50 are substantially the same diameter.

When electrical connector 14 is a rotatable locking type connector, exterior surface 72 of mounting flange portion 32 is also provided with indicia 81 which indicates a locked and unlocked position. Of course, indicia 81 would not be utilized for a pin type electrical connector which does not rotate.

As seen in Figure 10, mounting flange portion 32 has an interior surface 78 for engaging gasket 18. When electrical connector housing 12 is mounted on an enclosure, gasket 18 will be squeezed between interior surface 78 of mounting flange portion 32 and the exterior surface of the enclosure. Interior surface 78 has a retaining slot 79 located at its lower edge for accommodating part of gasket 18 therein to prevent gasket 18 from being pulled out by a user grabbing closure cap 16. As seen in Figure 9, a pair of notches 80 are also formed in the bottom wall of mounting flange portion 32 for accommodating a part of cap closure 16 as discussed below.

As best seen in Figures 1, 3 and 6-8, shroud 34 has a substantially cylindrical sleeve 82 with a pair of polarizing members 84 and 86 formed at one end of sleeve 82. Polarizing members 84 and 86 are preferably spaced 180° apart. Of course, if a non-polarizing electrical connector is utilized, polarizing members 84 and 86 can

be eliminated. Moreover, if desired, only one polarizing member could be utilized or many polarizing members can be utilized on cylindrical sleeve 82 as needed and desired.

As mentioned above, shroud 34 is press fitted into second cylindrical section 54 of tubular body portion 50 so that it is rigidly coupled thereto. Polarizing member 84 includes a triangular shaped lockout hole 88 which is adapted to receive padlock 20 therethrough. When shroud 34 is press fitted into second cylindrical section 54 of tubular body portion 30, lockout hole 88 is aligned with notched section 74 as seen in Figures 1, 7 and 8. Accordingly, notched section 74 of the exterior surface of mounting flange portion 32 provides sufficient clearance for padlock 20 to be installed through lockout hole 88.

This arrangement allows the free end of shroud 34 with its polarizing members 84 and 86 to be substantially recessed from the outermost edge of exterior surface 72 of mounting flange 32 where it intersects with first cylindrical section 50 of tubular body portion 30. Since shroud 34 of electrical connector 14 does not extend outwardly from flange portion 32 of electrical housing 12, flange portion 32 protects shroud 34 so that it cannot be accidentally hit and broken by a glancing blow of a bypasser.

Although padlock 20 is illustrated, other restricted access mechanisms can be used. For example, the locking member or mechanism may be a threaded bolt threadedly connected to sleeve 82 such that the bolt sinks radially into sleeve 82 to interfere with coupling of electrical connector 14 with a mating electrical connector. Alternatively, the locking mechanism may be a rigid or flexible shaft having a coupling device or clasp to

connect the end of the shanks such as, for example, a lead security wire.

Thus, the embodiment of the present invention depicted in the drawings provides an economic and efficient lockout member or mechanism for locking electrical connector 14. Moreover, the locking member or shackle 24 can be easily removed and does not interfere with the operation of the electrical connector 14 after padlock 20 is removed. By providing padlock 20 as shown, unauthorized use of the electrical connector 14 is prevented and the potential risk of injury to an operator is avoided.

#### Closure Cap with Integral Mounting Gasket

Referring now to Figures 1-3 and 11-13, closure cap 16 and integrally mounted gasket 18 forms a sealing arrangement which is designed to seal electrical connector 14 within electrical connector housing 12, and to seal electrical connector housing 12 to a wiring enclosure (not shown). Since closure cap 16 is integrally formed with mounting gasket 18, closure cap 16 will be readily accessible to the user even when closure cap 16 is not being used. Closure cap 16 and mounting gasket 18 are integrally formed as a one piece, unitary member out of a suitable sealing material such as an elastomeric material or rubber. For example, one suitable material would be EPDM/neoprene.

Closure cap 16 is connected to mounting gasket 18 via a flexible strap 100. Closure cap 16 has an outer substantially circular end wall 102, a release tab 104, a first cylindrical wall 106 and a second cylindrical wall 108. First and second cylindrical walls 106 and 108 extend substantially perpendicular to outer end wall 102 with second cylindrical wall 108 being concentrically

arranged within first cylindrical wall 106. Accordingly, first cylindrical wall 106 and second cylindrical wall together with outer end wall 102 forms an annular groove 110 which is adapted to receive the free end of shroud 34 therein.

Groove 110 is sized to frictionally receive the free end of shroud 34 such that cap 16 is frictionally retained on shroud 34. More specifically, first cylindrical wall 106 has a pair of cutouts 112 and 114 for accommodating polarizing members 84 and 86 of shroud 34. Preferably, the inner diameter of first wall 106 and the inner surface of cutouts 112 and 114 are designed to be substantially the same size as the outer surfaces of shroud 34 and polarizing members 84 and 86, respectively, so as to provide a seal therebetween.

Strap 100 and tab 104 are connected to the outer surface of first wall 106 with strap 100 and tab 104 being spaced approximately 180° apart. When closure cap 16 is installed on shroud 34 to cover electrical connector 14, tab 104 is positioned across from notched section 74 of mounting flange portion 32 such that the user can easily grab tab 104. In particular, the user can insert a finger between tab 104 and the curved surface of notched section 74 to pull closure cap 16 off of shroud 34.

Second wall 108 is a substantially cylindrical member with first and second annular ribs 116 and 118 for engaging the interior surface of shroud 34. More specifically, ribs 116 and 118 are sized to be slightly larger than the interior diameter of shroud 34 so as to provide a proper seal therebetween. This interface between rib 116 and shroud 34 is the primary seal for protecting electrical connector 14 from water and/or other contaminants. Rib 116 preferably has a triangular

cross-section which extends outwardly from second wall 108 for sealing of cap 16 with the inner surface of shroud 34. Rib 118, on the other hand, has a semi-circular cross-section which extends outwardly from second wall 108.

When closure cap 16 is properly installed on shroud 34, ribs 116 and 118 engage the inner surface of shroud 34 to provide a seal therebetween, and the free edge of shroud 34 engages the interior surface of outer end wall 102.

Referring to Figures 3 and 11-13, mounting gasket 18 is preferably substantially rectangular in shape or substantially corresponds to the outer shape of mounting flange portion 32. Mounting gasket 18 has a rectangular body portion 128 with a large center opening 130 for receiving tubular body portion 30 therethrough. Mounting gasket 18 also has four holes 132 for receiving the mounting fasteners (not shown) which are used to couple electrical connector assembly 10 to an enclosure (not shown).

Gasket 18 also preferably has a first flange 134 extending outwardly and substantially perpendicular to body portion 128 along its bottom edge at its connection with strap 100 for engaging a recess or retaining slot 79 formed in the back side or interior surface 78 of mounting flange portion 32. Gasket 18 further includes a second flange 136 extending outwardly and substantially perpendicular to body portion 128 of gasket 18. Flange 136 is substantially parallel to flange 134 and is received in a recess of the interior surface 78 of mounting flange portion 32. Flanges 134 and 136 cooperate with mounting flange portion 32 to prevent gasket 18 from being pulled out from between mounting

flange portion 32 and the enclosure (not shown) by closure cap 16.

When electrical connector assembly 10 is fixedly coupled to an enclosure (not shown), mounting gasket 18 is sandwiched between the enclosure (not shown) and the mounting flange portion 32. Accordingly, mounting gasket 18 securely fastens closure cap 16 to the enclosure (not shown) so that closure cap 16 is readily accessible.

Preferably, strap 100 is designed to break at its connection point with mounting gasket 18. Accordingly, should someone pull on the closure cap too hard, the closure cap will tear off without destroying the mounting gasket 18.

Accordingly, this arrangement ensures that closure cap 16 is always accessible for covering electrical connector 14 and cannot be easily detached. Moreover, this arrangement keeps closure cap 16 out of the way when a mating electrical connector is coupled to electrical connector 14.

#### Installation and Operation

Electrical connector assembly 10 is assembled by press fitting shroud 34 into second cylindrical section 54 of tubular body portion 30 so as to fixedly couple shroud 34 to tubular body portion 30. A sealing material and/or an adhesive may also be utilized for sealing and/or coupling the interface between shroud 34 and second cylindrical section 54 of tubular body portion 30.

Next, electrical connector 14 and shroud seal 36 are installed into tubular body portion 30. Specifically, electrical connector 14 is coupled via screws 60 which are threaded into holes 62 of lugs 58. Shroud seal 36 is installed on shroud 34 by stretching it by polarizing members 84 and 86 and onto the outer surface of shroud

34. Shroud seal 36 is pushed all the way back along shroud 34 until it engages annular sealing surface 52 of tubular body portion 30. In this position, shroud seal 36 can readily engage the shroud of a mating electrical connector.

Now, electrical connector housing 12 together with closure cap 16 and mounting gasket 18 can be coupled to an electrical enclosure. More specifically, tubular body portion 30 of electrical connector housing 12 is inserted into opening 130 of gasket 18 such that holes 132 are aligned with holes 70 of mounting flange portion 32 and flange 134 is received within retaining slot 79 formed in the back or interior surface 78 of mounting flange portion 32. In this position, closure cap 16 hangs downwardly from the bottom of electrical connector housing 12.

Now, the mounting screws (not shown) are inserted through holes 70 of mounting flange portion 32 and holes 132 of gasket 18 to fixedly secure electrical connector assembly 10 to an enclosure (not shown). Once electrical connector assembly 10 is fixedly secured to the enclosure (not shown), gasket 18 is sandwiched or squeezed between the mounting flange portion 32 of electrical connector housing 12 and the outer surface of the enclosure (not shown) with closure cap 16 hanging down therefrom.

While only one embodiment has been chosen to illustrate the present invention, it will be understood by those skilled in the art that various changes and modifications can be made herein without departing from the scope of the invention as defined in the appended claims.

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**WHAT IS CLAIMED IS:**

1. A sealing arrangement for sealing a mounted electrical connector housing, comprising:

a closure cap including an annular sealing member constructed of a sealing material for releasably engaging the electrical connector housing;

a gasket having a body portion with an opening which is sized for accommodating a portion of the mounted electrical connector through said opening of said body portion; and

a strap directly attached to said closure cap and to said gasket.

2. The sealing arrangement according to claim 1, wherein

said closure cap, said gasket and said strap are integrally formed as a one-piece, unitary member.

3. The sealing arrangement according to claim 2, wherein

said closure cap, said gasket and said strap are constructed of an elastomeric material.

4. The sealing arrangement according to claim 2, wherein

said annular sealing member is substantially cylindrical.

5. The sealing arrangement according to claim 4, wherein

said annular sealing member includes at least one outwardly extending annular rib.

6. The sealing arrangement according to claim 4, wherein

said annular sealing member includes a pair of outwardly extending annular ribs.

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7. The sealing arrangement according to claim 4, wherein

said closure cap includes an end wall with said annular sealing member extending from said end wall.

8. The sealing arrangement according to claim 7, wherein

said closure cap further includes a tab located opposite said strap for removing said closure cap from the electrical connector housing when said closure cap is coupled to the electrical connector.

9. The sealing arrangement according to claim 8, wherein

said closure cap further includes an annular wall concentric with said annular sealing member.

10. The sealing arrangement according to claim 9, wherein

said annular wall includes at least one cutout for receiving a polarizing member of the electrical connector housing when said annular wall is coupled to the electrical connector.

11. The sealing arrangement according to claim 2, wherein

said body portion of said gasket further includes a plurality of holes for receiving fasteners through said plurality of holes.

12. The sealing arrangement according to claim 2, wherein

said body portion of said gasket further includes a first outwardly extending retaining flange.

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13. The sealing arrangement according to claim 12, wherein

said body portion of said gasket further includes a second outwardly extending retaining flange.

14. The sealing arrangement according to claim 13, wherein

said first and second retaining flanges are substantially parallel to each other.

15. The sealing arrangement according to claim 13, wherein

said first retaining flange is adjacent to said strap.

16. The sealing arrangement according to claim 13, wherein

said strap is coupled to said first retaining flange and said body portion of said gasket.

17. The sealing arrangement according to claim 12, wherein

said annular sealing member is substantially cylindrical.

18. The sealing arrangement according to claim 17, wherein

said annular sealing member includes at least one outwardly extending annular rib.

19. The sealing arrangement according to claim 18, wherein

said closure cap includes an end wall with said annular sealing member extending from said end wall.

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20. The sealing arrangement according to claim 19, wherein

said closure cap further includes a tab located opposite said strap for removing said closure cap from the electrical connector housing when said closure cap is coupled to the electrical connector.

21. The sealing arrangement according to claim 20, wherein

said closure cap further includes an annular wall concentric with said annular sealing member.

22. The sealing arrangement according to claim 21, wherein

said annular wall includes at least one cutout for receiving a polarizing member of the electrical connector housing when said annular wall is coupled to the electrical connector.

23. The sealing arrangement according to claim 22, wherein

said body portion of said gasket further includes a second outwardly extending retaining flange.

24. The sealing arrangement according to claim 23, wherein

said first and second retaining flanges are substantially parallel to each other.

25. The sealing arrangement according to claim 24, wherein

said first retaining flange is adjacent to said strap.

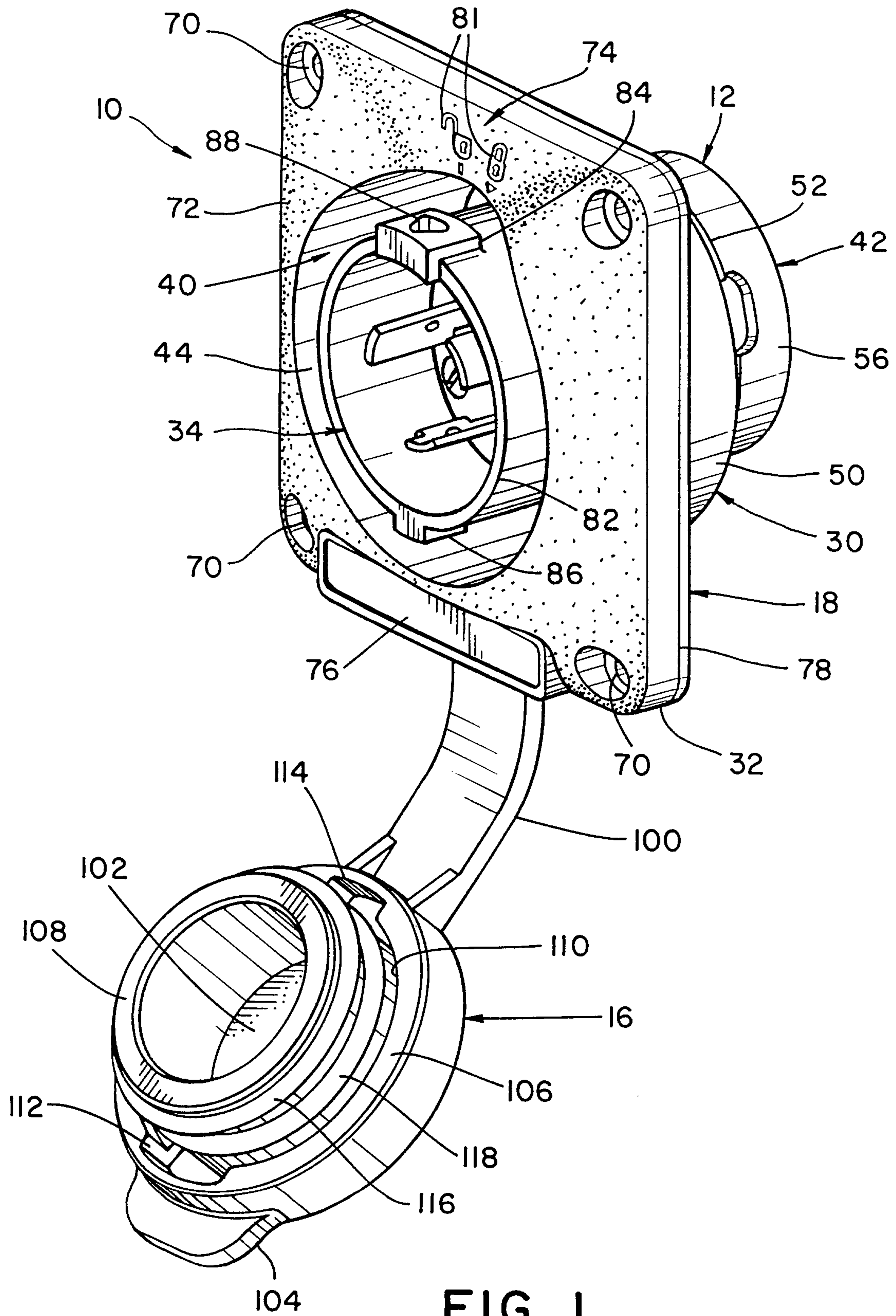


FIG. 1

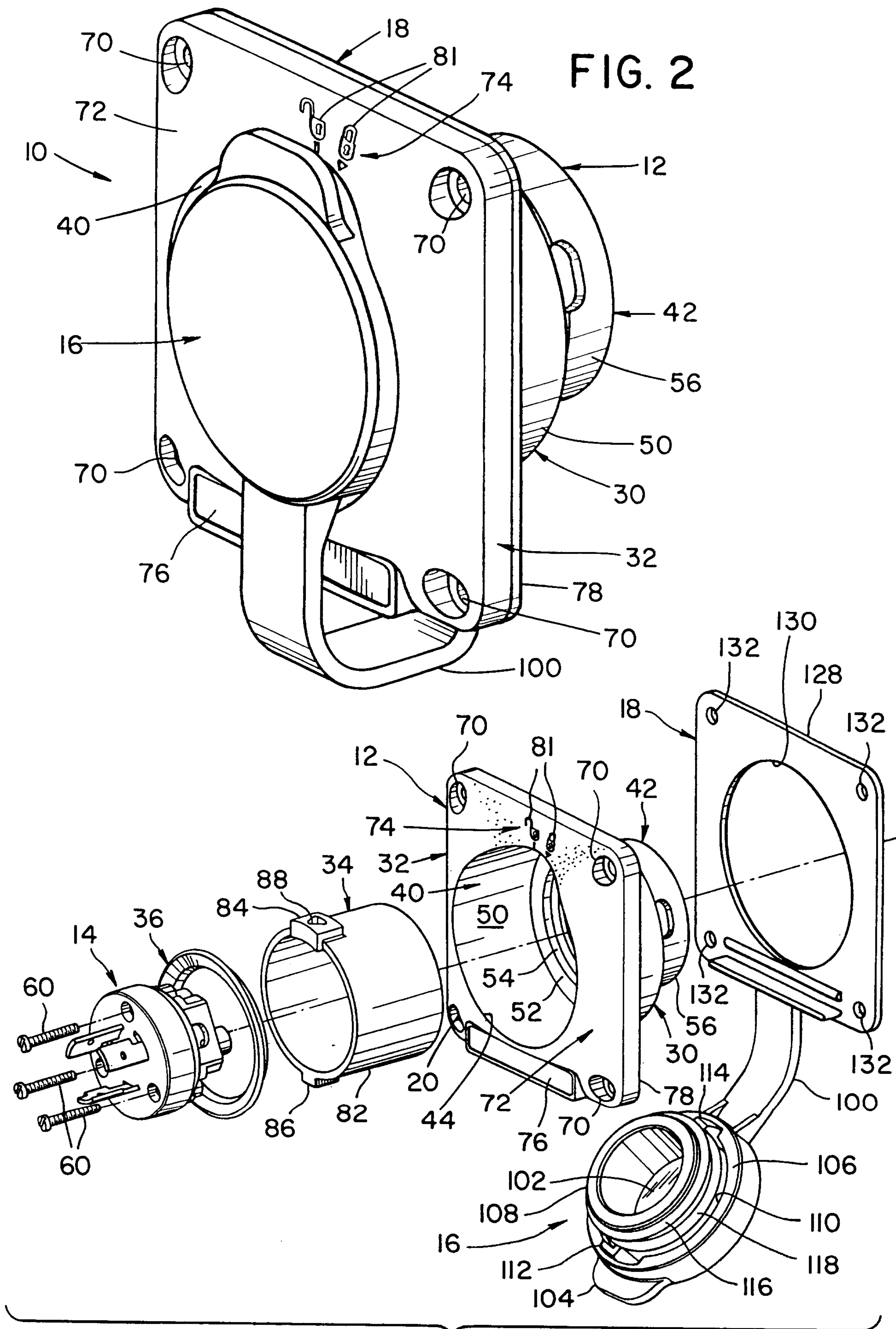


FIG. 3  
*Fulcrum & Langbehn*  
 PATENT AGENTS

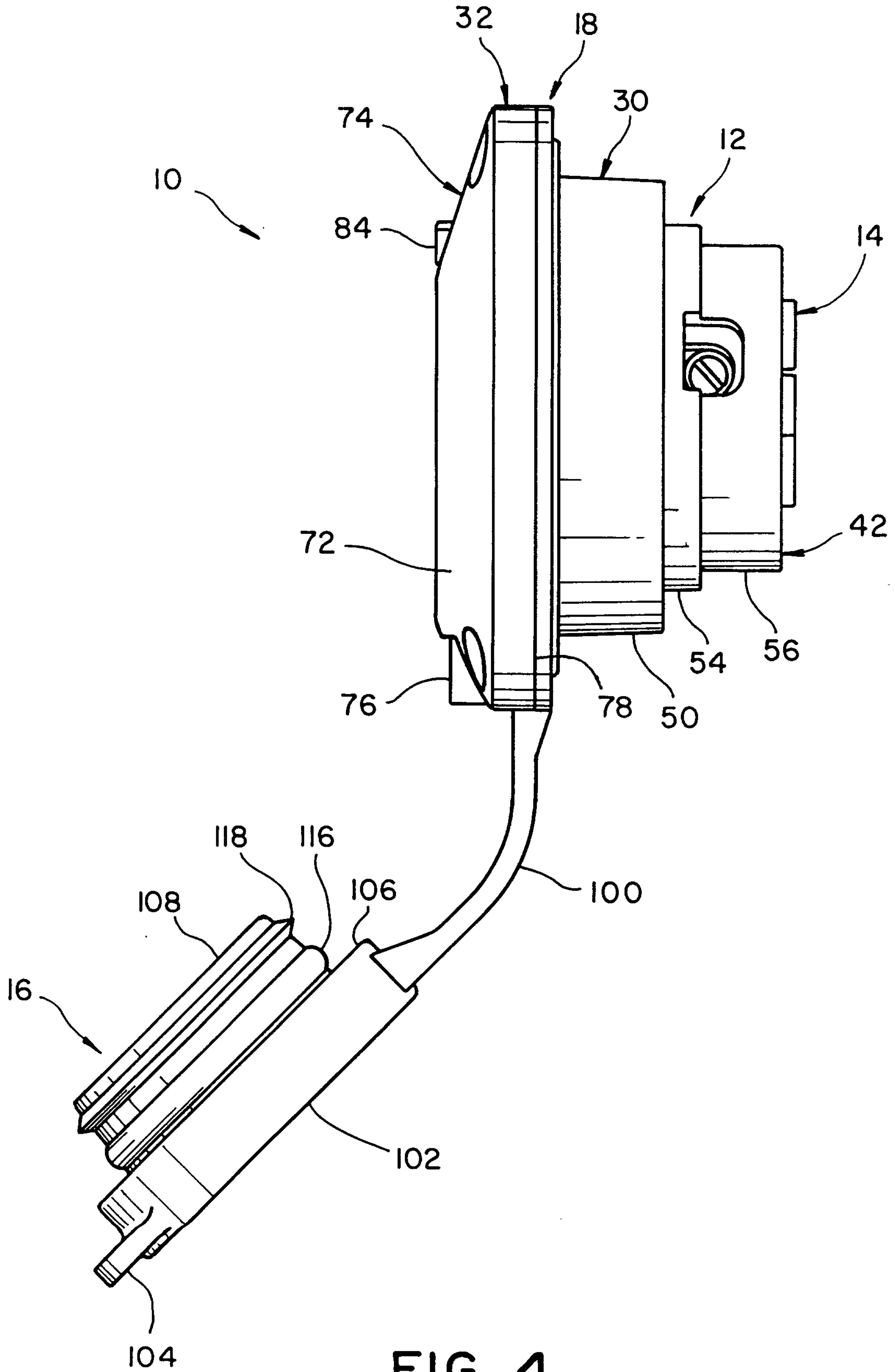


FIG. 4

*Fenley & Fitzgerald*  
PATENT AGENTS

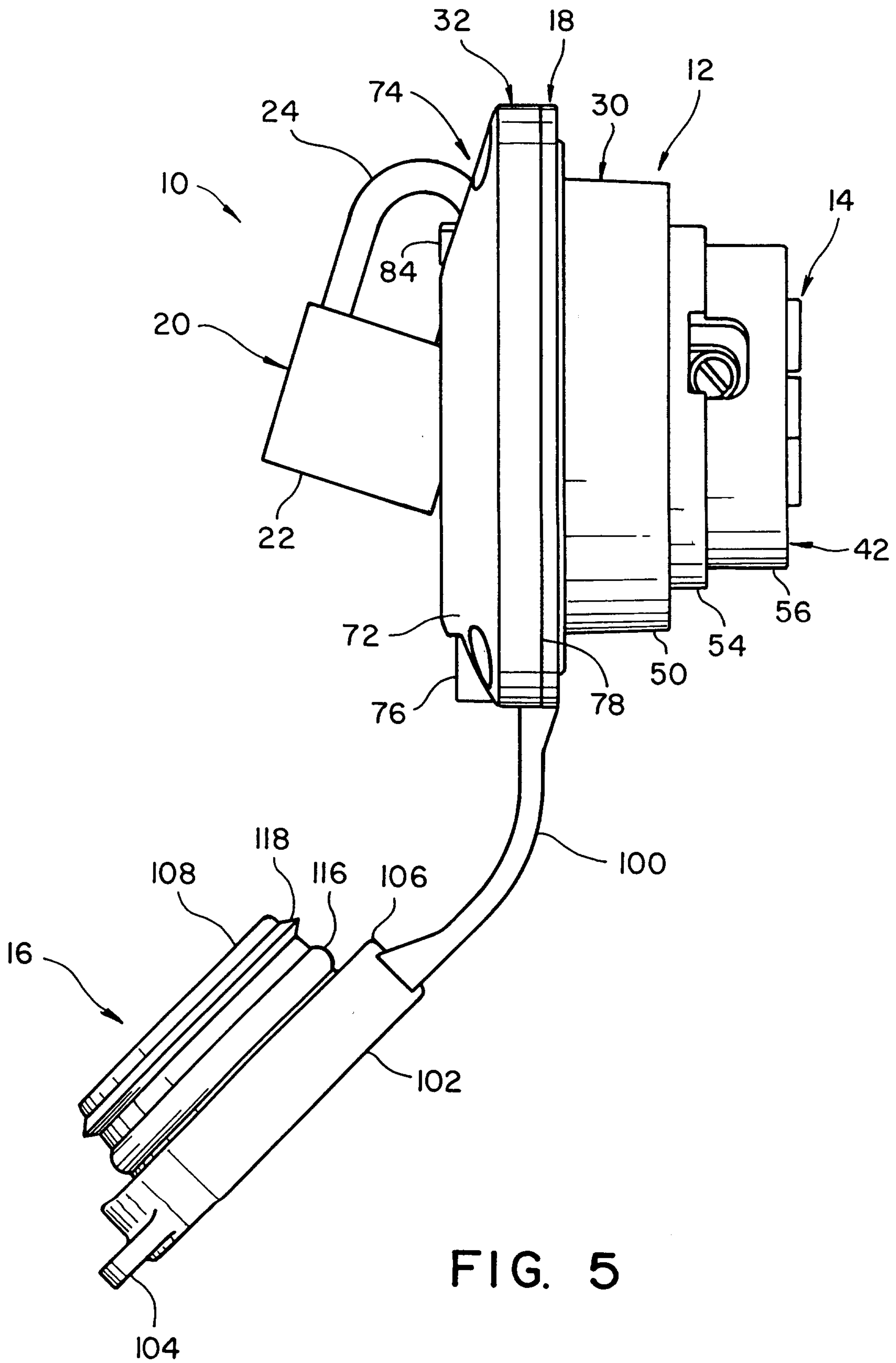


FIG. 5

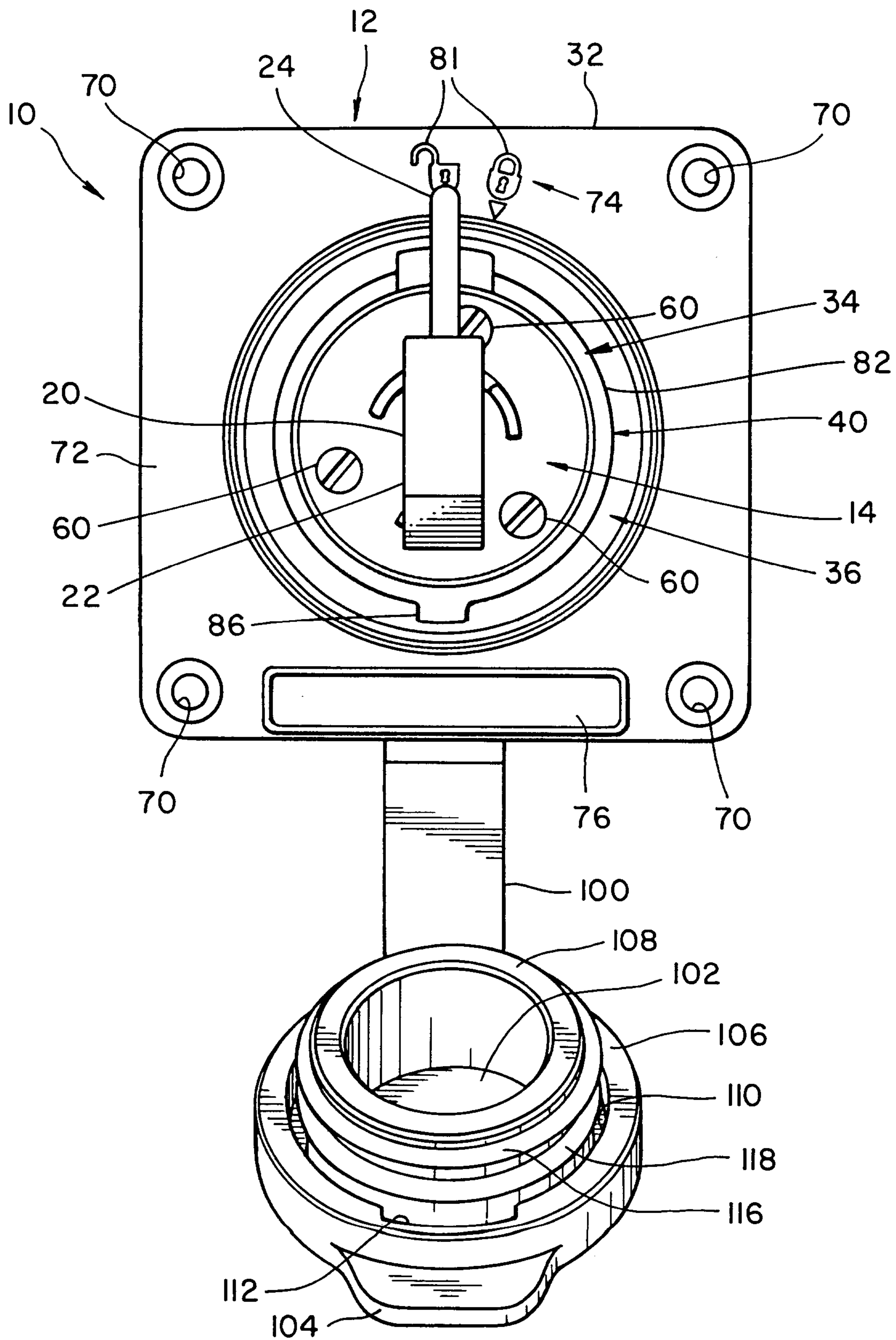


FIG. 6

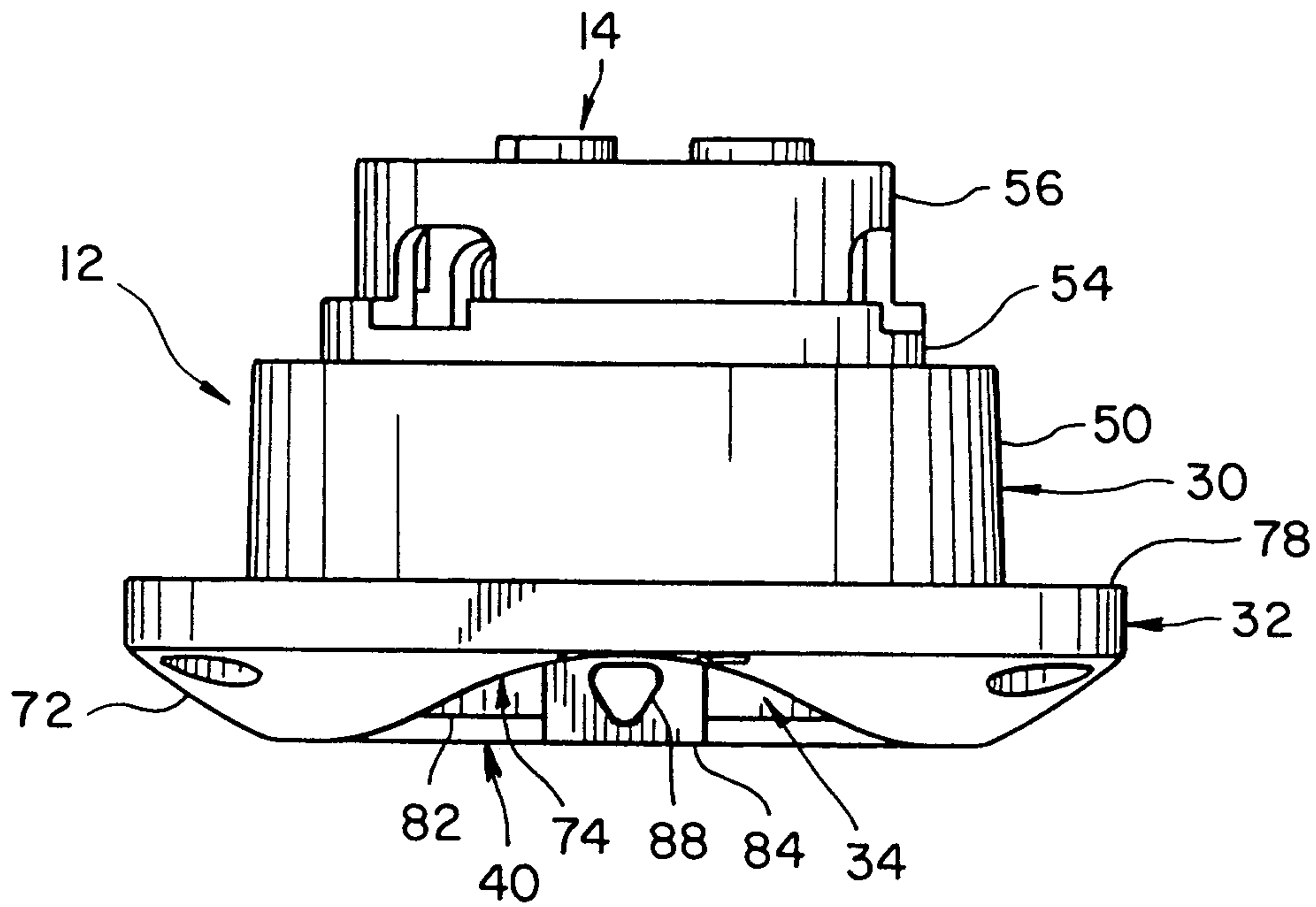


FIG. 7

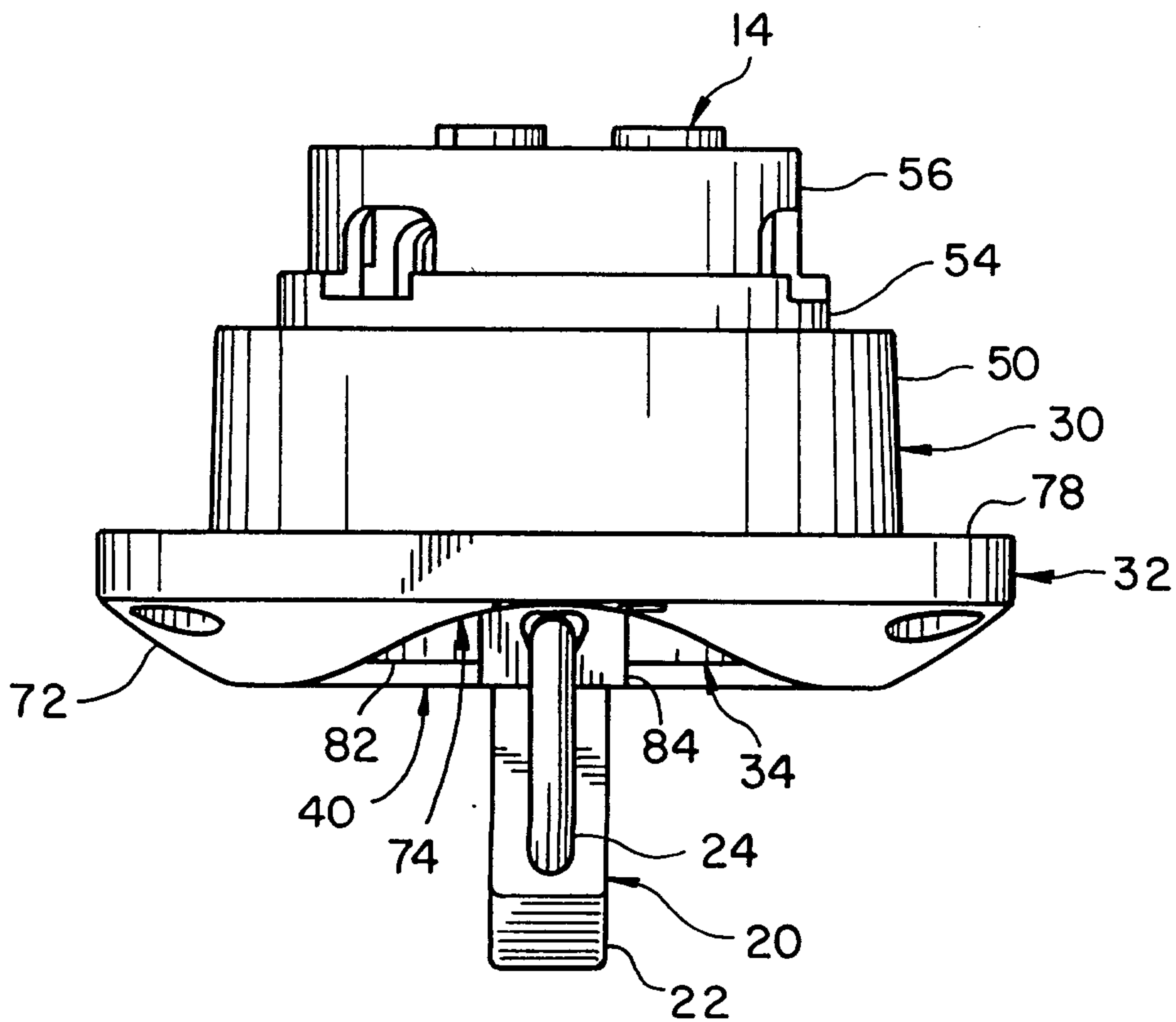


FIG. 8

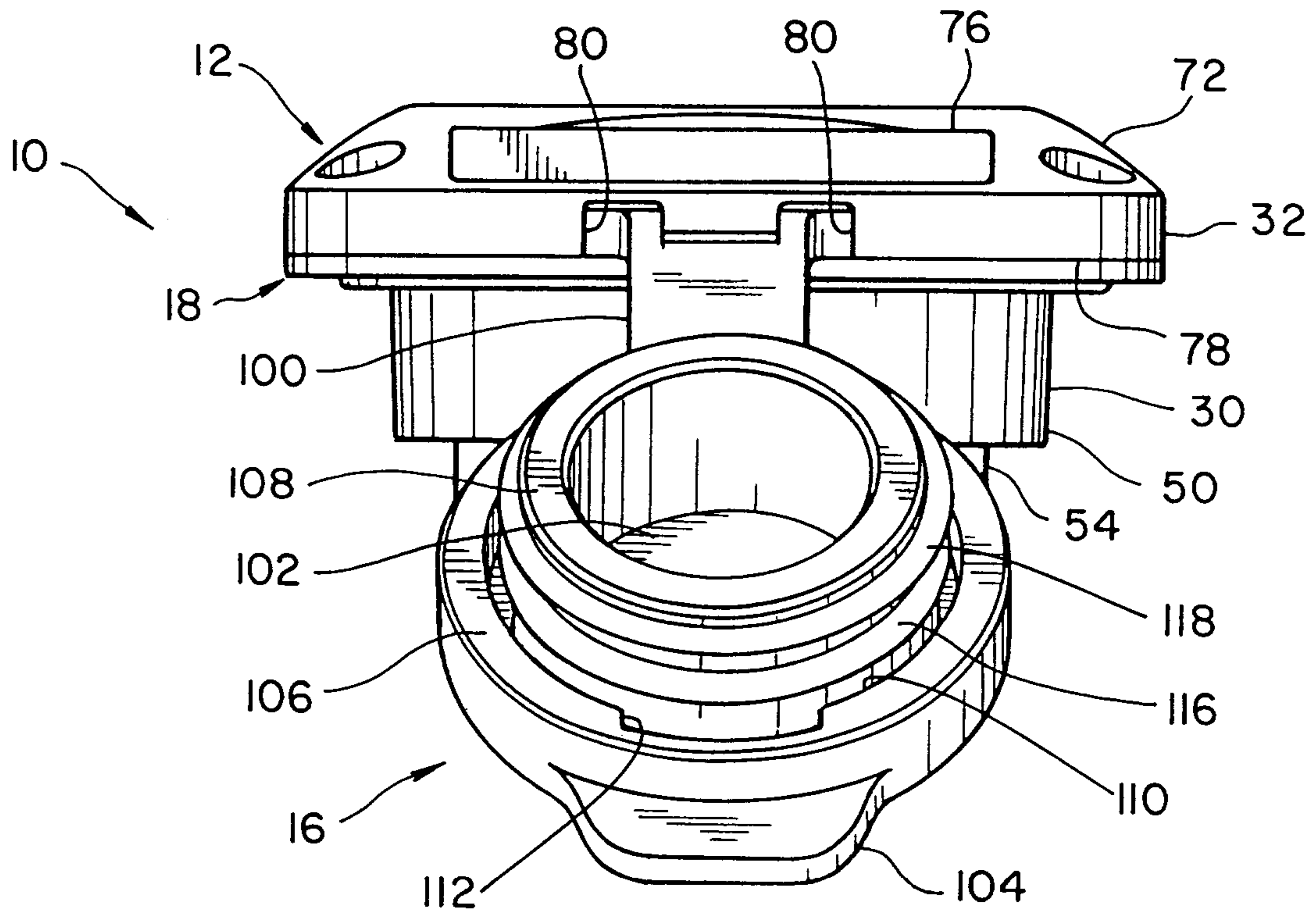


FIG. 9

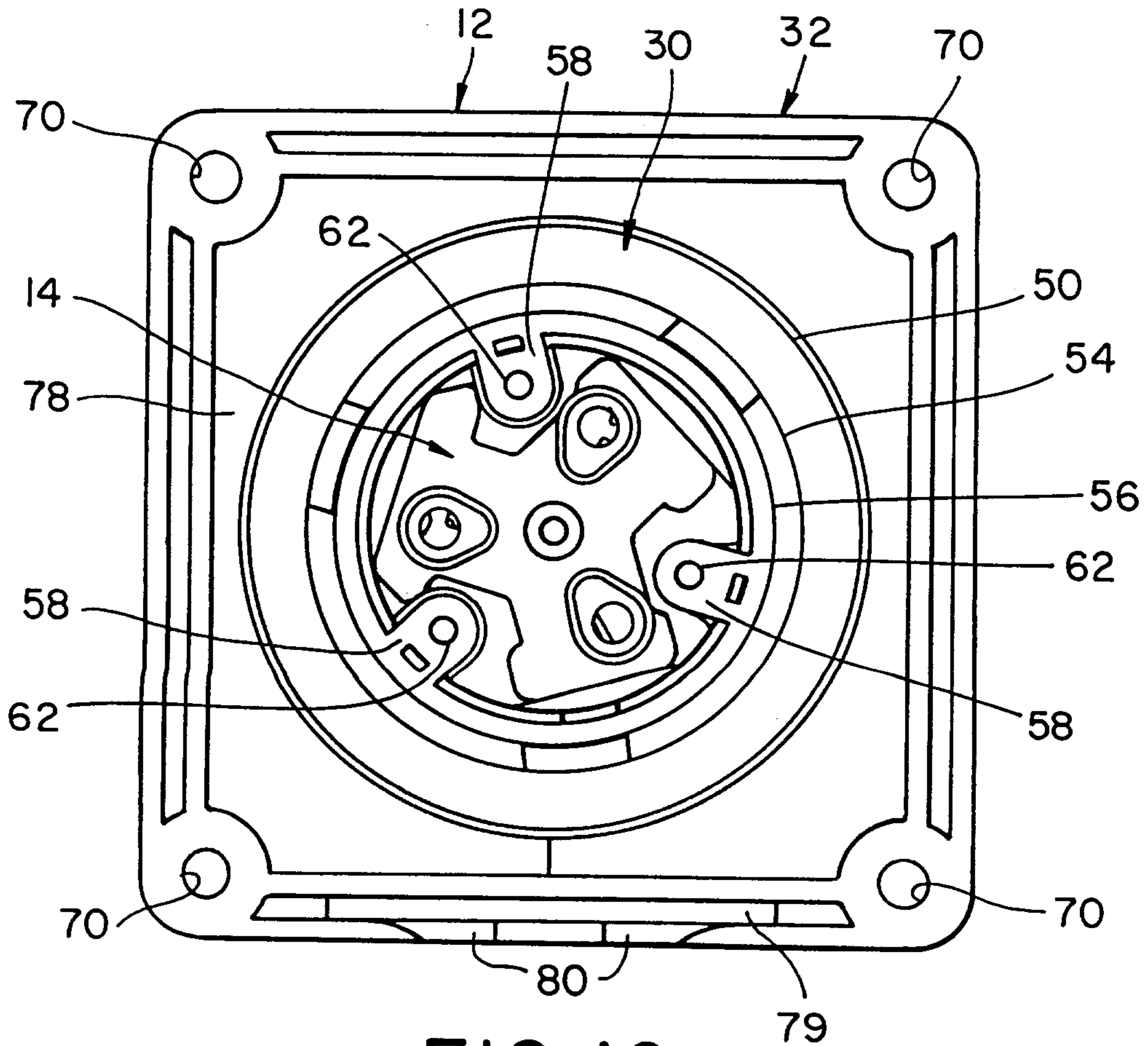


FIG. 10

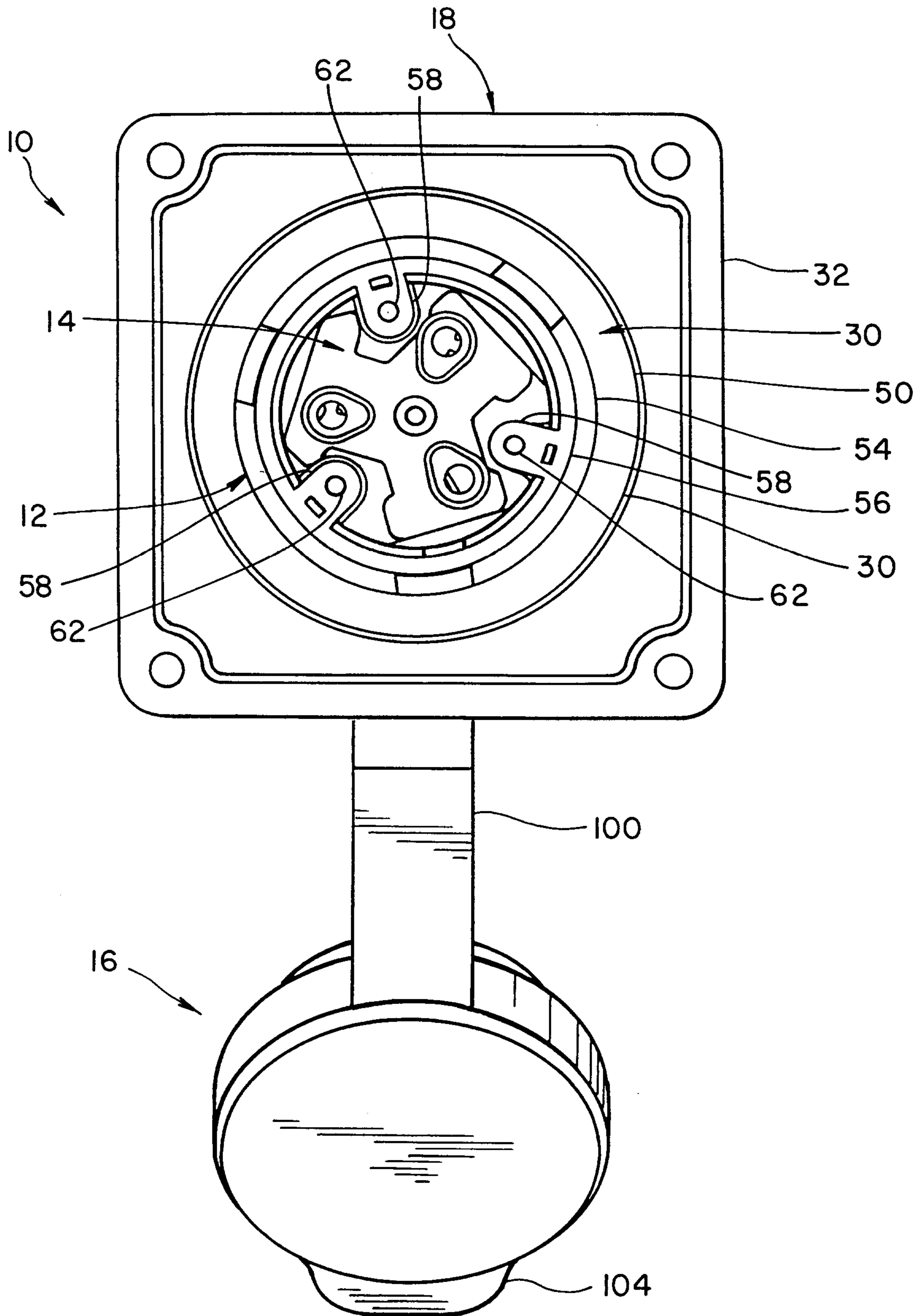


FIG. II

*Ferlayson & Junckherst*  
PATENT AGENTS

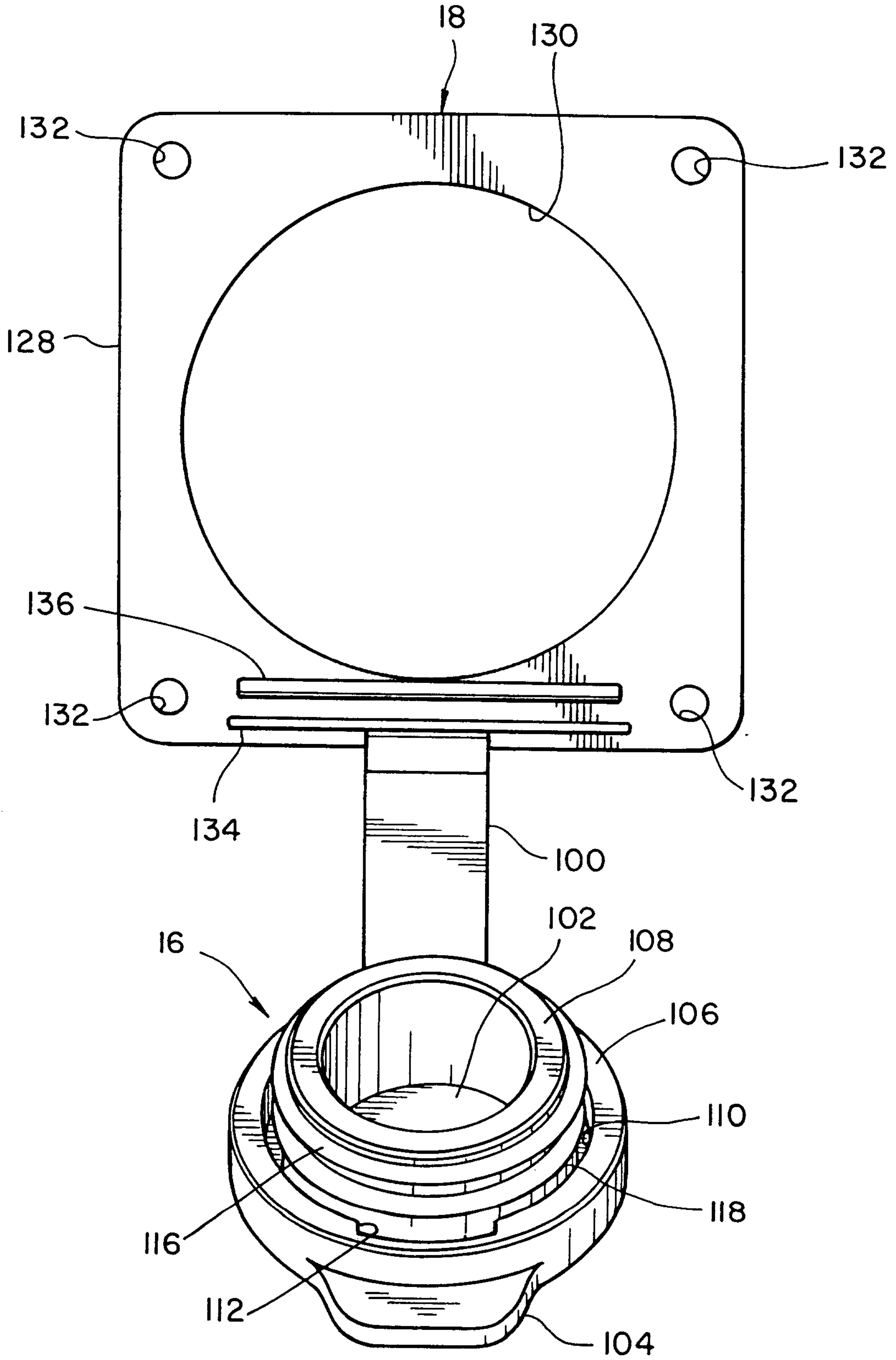


FIG. 12

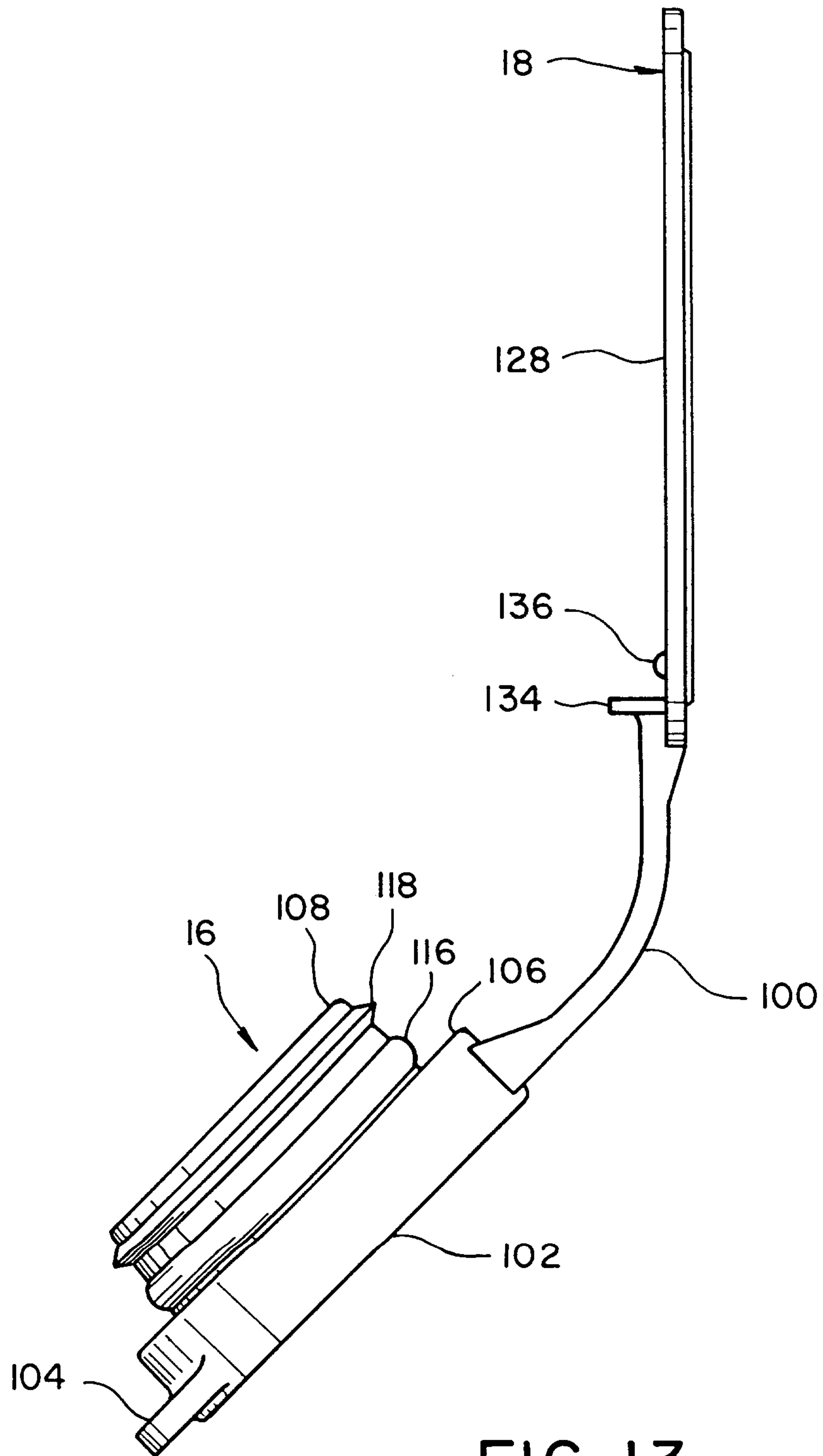


FIG. 13

