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PUSH TOGETHER, SCREW APART CONNECTOR

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Fig. 1.

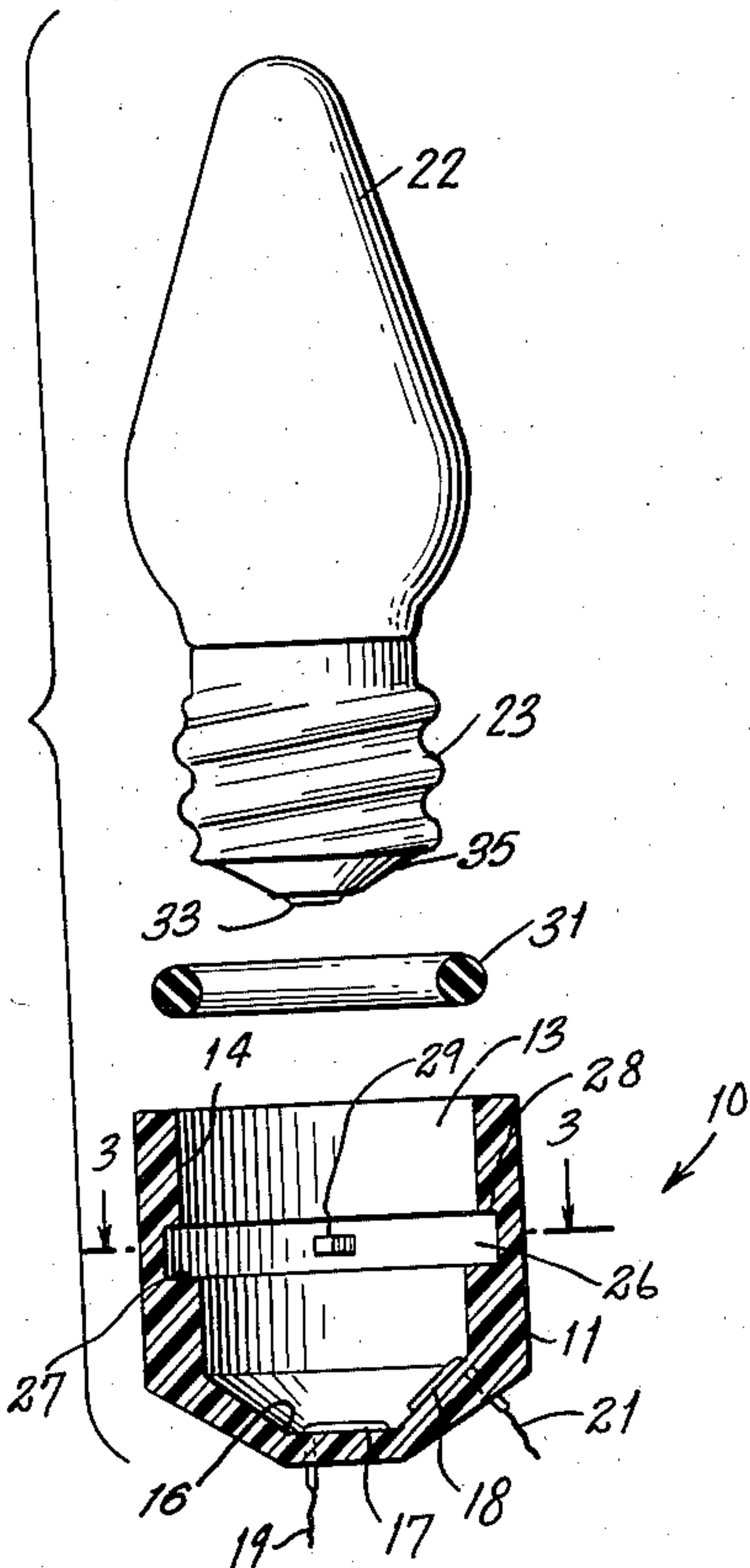


Fig. 2.

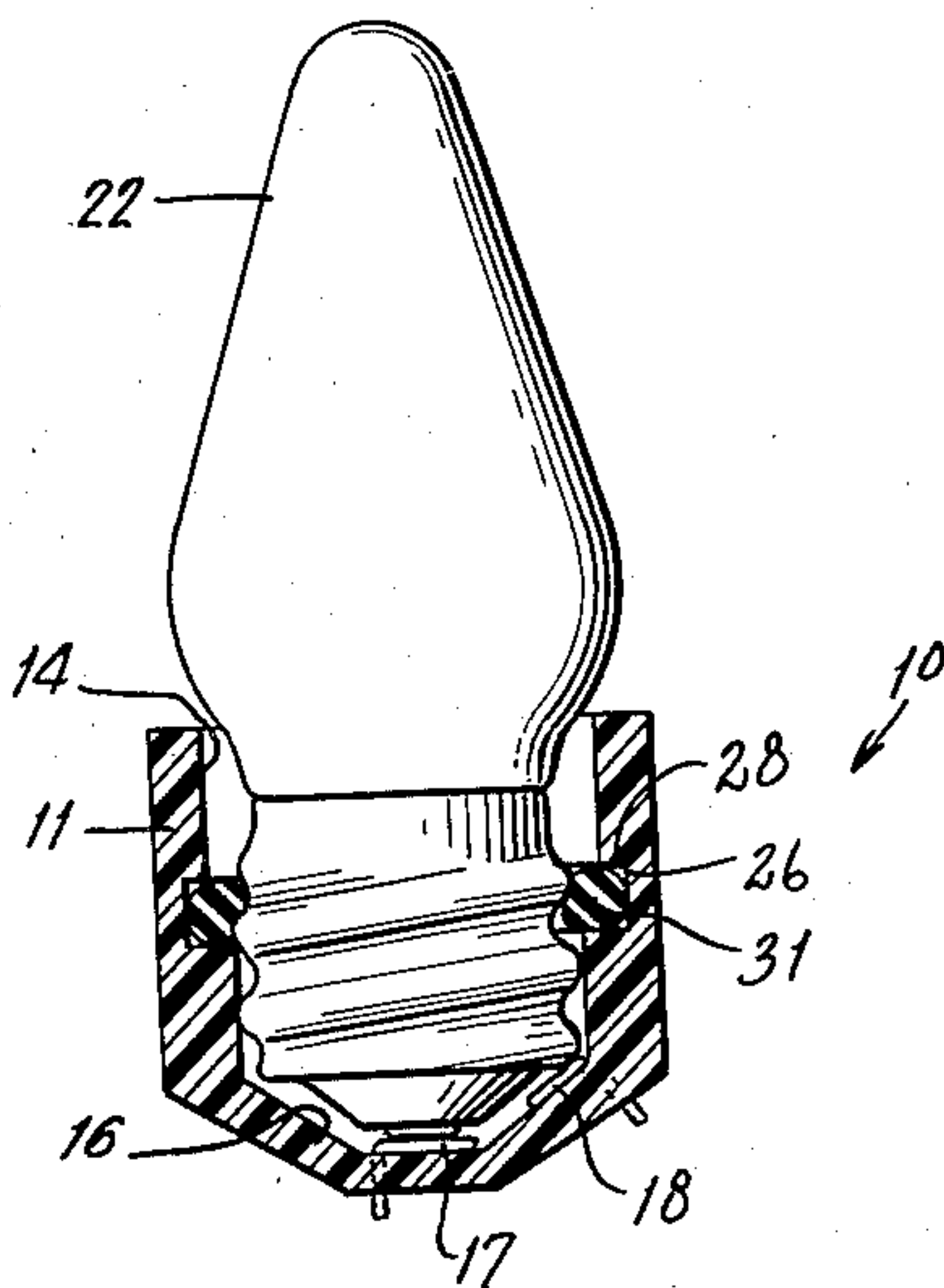


Fig. 3.

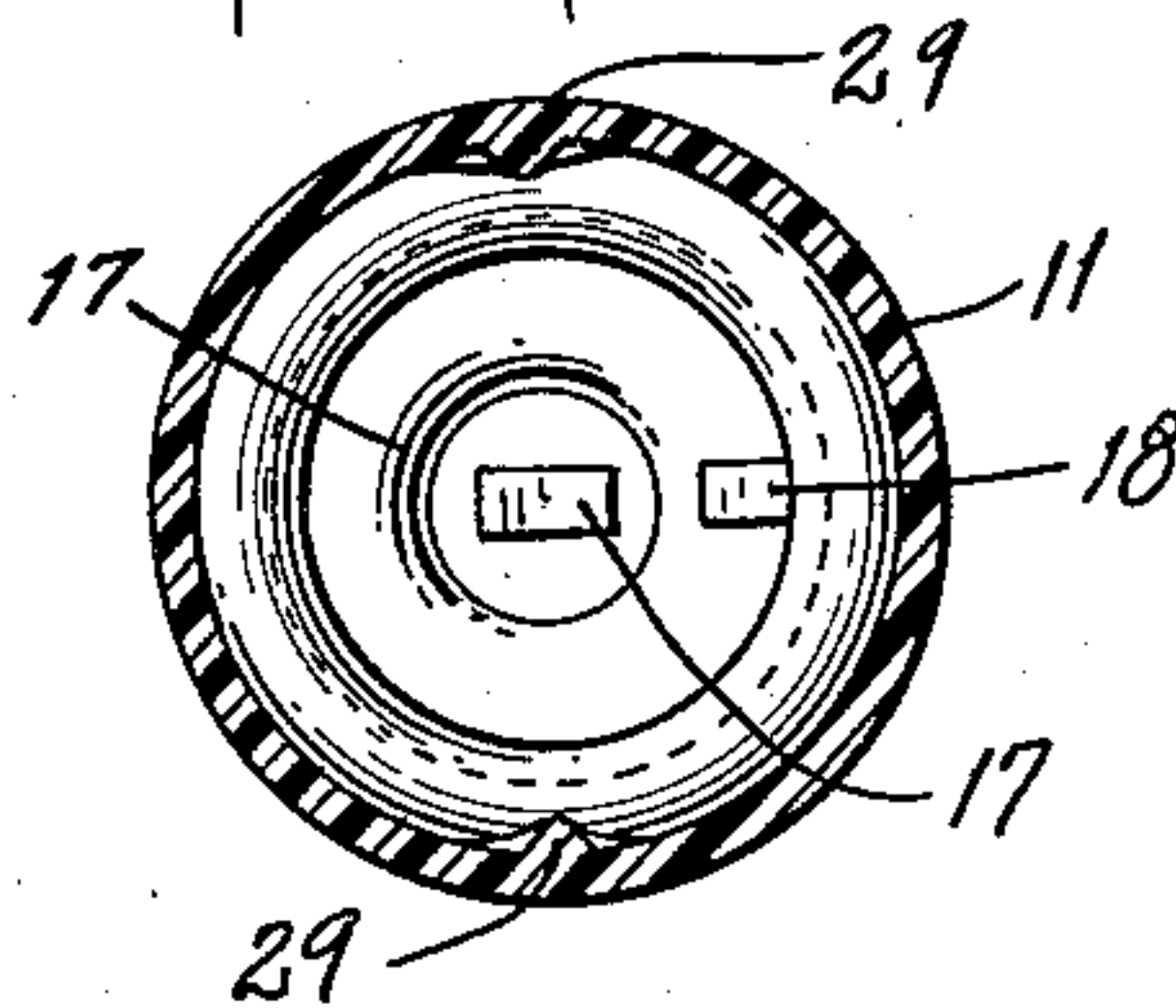


Fig. 5.

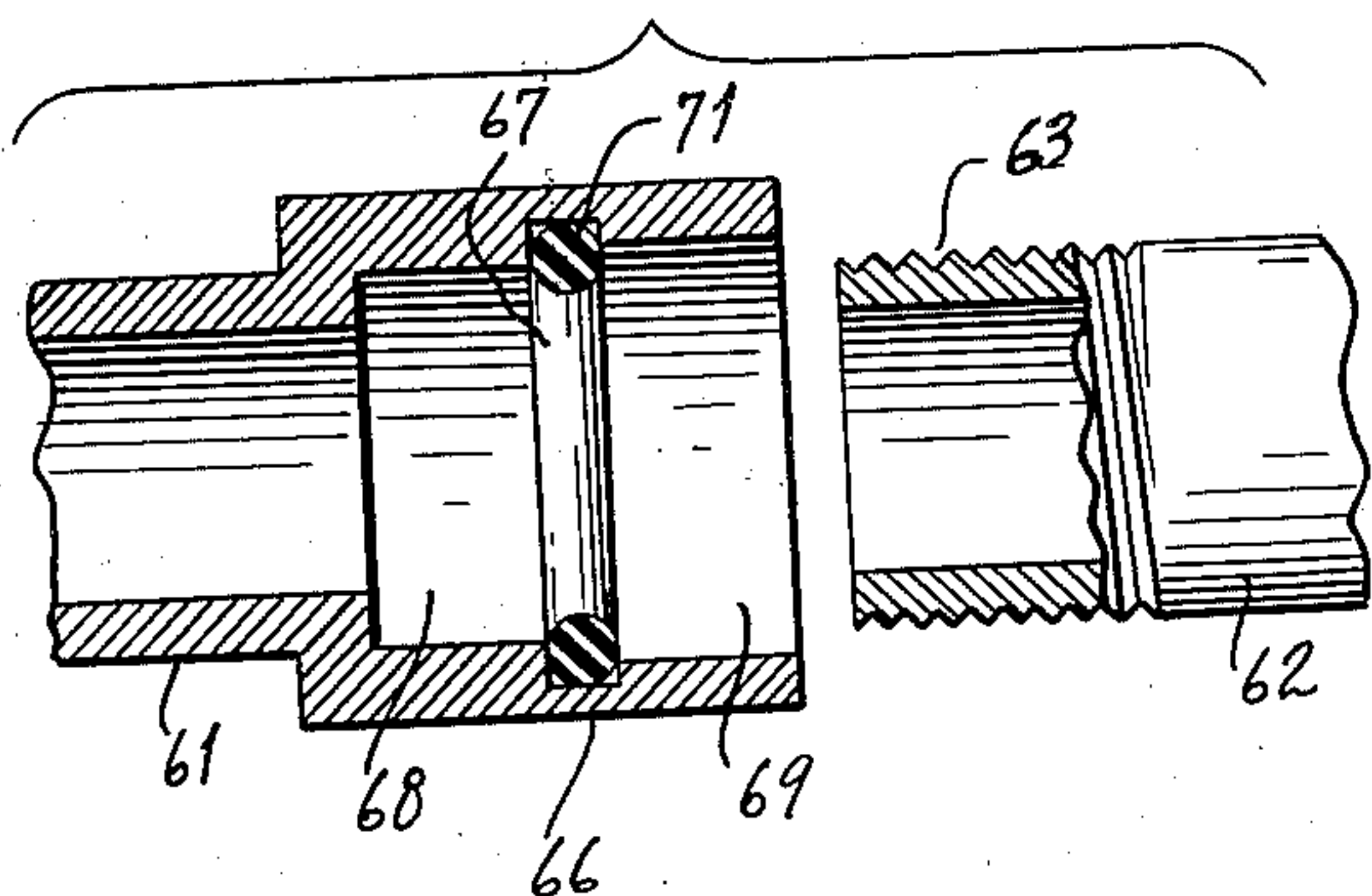
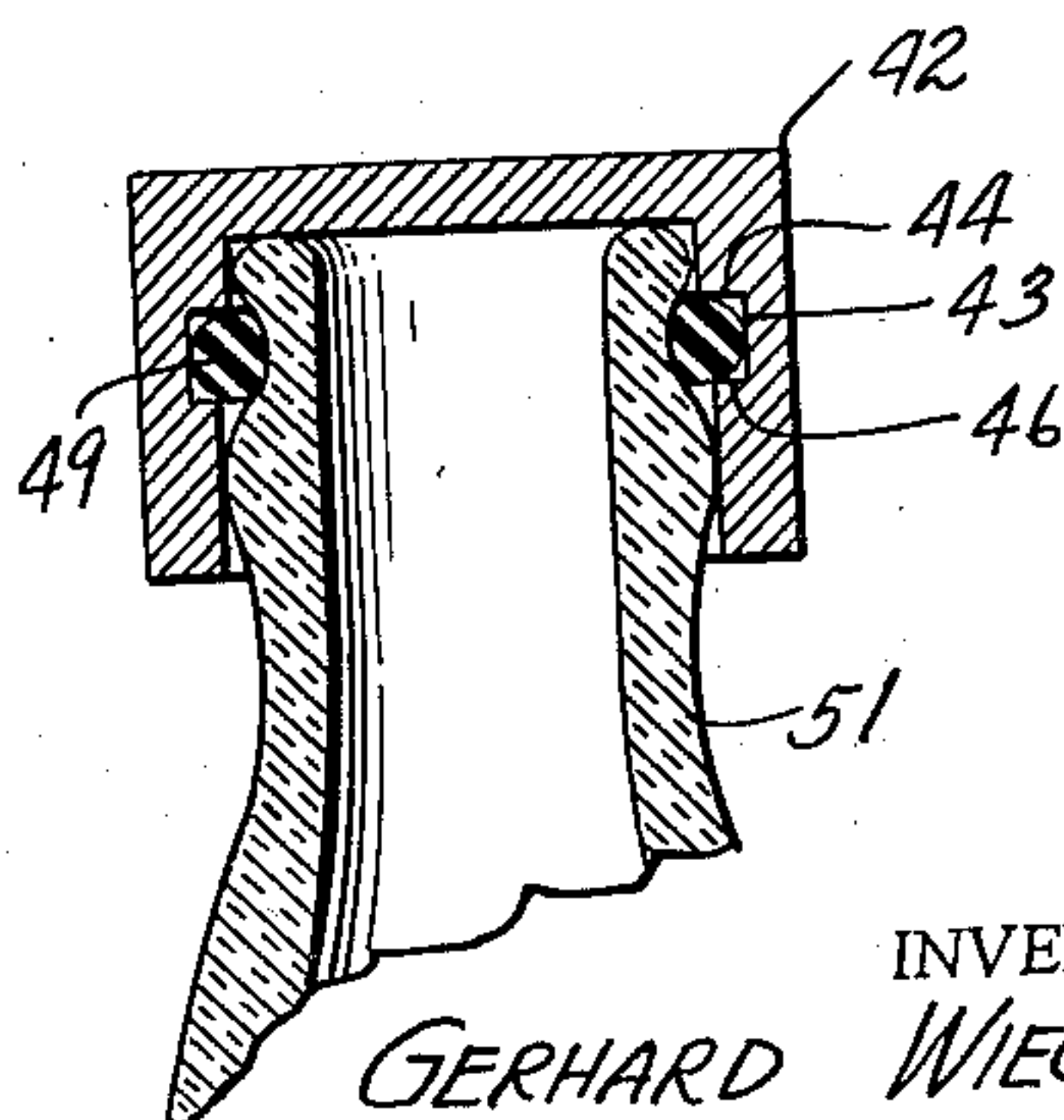


Fig. 4.



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1

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PUSH TOGETHER, SCREW APART CONNECTOR

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This invention relates to improvements in connectors and more particularly to connectors having threaded mating portions so that the connector may be easily assembled by merely pushing inwardly with a straight line motion and disconnected readily only by screwing apart.

The present invention is especially adapted for use with electrical connectors of the plug and socket type, such as the insertion of an electric light bulb having a conventional screw type base into an electric light bulb socket.

The present invention is also useful for providing a simple to operate coupling for assembling tubular pipe sections carrying a fluid at low or medium pressures or for sealing the open end of a container.

Heretofore, to assemble or disassemble rigid threaded connectors one member of the connector had to be rotated relative to its mating member. The threading operation was not only time consuming, but oftentimes it was awkward such as when one member was an elongated tubular pipe section. Another example is in threading a conventional screw type base electric light bulb into a mating electric light bulb socket, especially a socket in a ceiling fixture, since oftentimes the threads do not mate on the first twist or rotation, thus requiring a fresh grip to be taken on the bulb for repositioning the thread of the bulb relative to the threads of the socket, and then rotating the bulb until the respective threads of the bulb and socket first begin to mate. To take a fresh grip on the electric light bulb so as to change the relative position of the leading threads of the screw type base to those of the socket creates the possibility that the bulb might fall to the floor and thereby be destroyed or at least damaged.

To overcome this latter disadvantage, attempts were made to provide flexible light bulb sockets to eliminate the threading of the electric light bulbs into and out of the electric lamp socket. However, this arrangement did not prove to be satisfactory since the electric light bulb was not securely held in the lamp socket and any slight force or pull separated the bulb from the socket, not only making a poor electrical connection but creating the danger of the bulb falling. Also, heat adversely affected the flexible material, giving a very short useable life.

Heretofore if an electric light bulb was to be used out in the open exposed to the dampness of the atmosphere or even rain, a separate sealing arrangement was necessary to prevent moisture from seeping into the socket and shorting the terminals. Similarly a threaded connector joining the abutting sections of a fluid carrying pipe, generally required a separate sealing gasket or arrangement to provide a fluid tight joint to prevent the escape and loss of any of the fluid being carried.

In the past, when using threaded connectors, especially pipe couplings, care was required to prevent damaging or nicking of the threads. If any threads were damaged, difficulty would arise in threading the mating sections as well as securing a leak proof joint.

The present invention overcomes these difficulties by providing a novel male-female type connector into which a threaded member is engaged simply by pushing the threaded member straightforwardly into the mating member. The threaded member will be retained in the receiving member notwithstanding a withdrawing force that is

2

substantially greater than the necessary insertion force. The construction of the connector is such that a substantially fluid tight seal is created in the fitting of the members.

It is therefore an object of this invention to provide a connector which may be easily assembled by pushing the members together so that a relatively strong connection is obtained without screwing or rotating either member.

A further object of this invention is to provide a connector which receives and firmly holds a threaded member, without requiring any threading operation for assembling and requires a force many times the assembling force to separate the members of the connector and yet allowing the connector to be readily screwed apart.

A still further object of the present invention is to provide a connector having a male member and a female member, one of which members is threaded, with the male member being readily inserted into the female member by a straightforward motion but requiring a force many times the assembling force to pull apart.

A still further object of the present invention is to provide a connector into which a threaded mating member is straightforwardly inserted and held in such a manner as to provide a substantially fluid tight seal at low and medium pressures.

Still another object is to provide an electric light bulb socket into which a threaded light bulb is easily and quickly inserted and which bulb is held firmly in operating position until unscrewed.

Still another object is to provide a connector that accomplishes all of the above and yet is simple in construction, inexpensive to manufacture, easy to install and manipulate, compact, and durable in use.

Other objects and advantages of the invention will be more apparent when the following description is considered in connection with the annexed drawings, in which

FIGURE 1 is an exploded elevation sectional view showing an electric light bulb socket according to the present invention into which an electric light bulb having a conventional screw type base is to be inserted;

FIGURE 2 is a similar view as FIG. 1 showing the light bulb inserted in operating position in the light bulb socket;

FIGURE 3 is a top plan sectional view of the electric light bulb socket taken along line 3-3 of FIGURE 1;

FIGURE 4 is a side elevation sectional view showing a closure according to the present invention, and

FIGURE 5 is a side elevation sectional view of a pipe coupling constructed according to the present invention joining two sections of tubing.

In accordance with the objects of this invention a novel type of connecting means is provided which is adapted to firmly hold in assembled position a mating male and female member, one of which is threaded, upon a straightforwardly inward force being applied to the members to join them in operating position. Once assembled the connection can be separated easily only by screwing apart the members, since the straight outward force required to separate the members would be many times the assembling force, such as on the order of ten times the assembling force. A resilient seal or washer fitted in a groove provides the holding force allowing easy entry of the mating member but resisting withdrawal. It should be noted that while the drawings show a male and female member being assembled with the male member being the threaded member, the invention is not so limited since the female member could equally as well be the threaded member, with the annular ring encircling the male member.

Referring now to FIGURES 1-3, an electric light socket 10 is shown constructed according to the present inven-

tion. Electric light bulb socket 10 has an outer husk or housing 11 and has an internal cylindrical, hollow cavity portion 13 having side walls 14 which extend down into the husk 11 and terminate at a bottom wall 16. Husk 11 can be made of any suitable insulating material, such as porcelain, rubber or plastic. A pair of insulated current carrying conductor wires 19 and 21 extend into cavity 13 of husk 11 and supply current to contacts 17 and 18 respectively of light bulb 22 in a well known manner, which is discussed below. Light bulb 22 has a conventional screw type base 23. While a Christmas tree type light bulb is shown, it is obvious that any type electric light bulb having a screw type base could be used and that this bulb could have any suitable desired shape, the particular light bulb used being no part of the present invention.

Side wall 14 of cavity 13 has on its interior surface a recessed groove 26 extending circumferentially about wall 14. Groove 26 has a side wall 27, closer to bottom wall 16 of cavity 13 and a side wall 28 closer to the entrance of the cavity 13. The peripheral or bottom surface of groove 26 has indentations or nibs 29 positioned therein as shown best in FIG. 3. As shown in FIGURES 1 and 2, the diameter of the cavity of husk 11 is greater above groove 26 than below it. The diameter of cavity 13 below groove 26 is slightly larger than the diameter of the screw base 23 of bulb 22, which is to be received therein.

An annular ring 31 made of a resilient type material such as rubber, plastic or composition is seated in circumferential groove 26. The cross section of ring 31 should preferably be substantially circular, rectangular or oval so as to make a good fit with the threads of base 23. The dimension of one section of annular ring 31, indicated at 38 in FIG. 1 is chosen so that its inner surface will extend into cavity 13 beyond the larger side wall of recess 26, here side wall 27, so that the inner peripheral surface of ring 31 projects beyond the surface of wall 14 and thus will engage the threads of base 23 of bulb 22.

In use, resilient annular ring 31 is seated in groove 26 of lamp socket 10. Base 23 of electric light bulb 22 is pushed straightforwardly into cavity 13 of husk 11 past ring 31 until terminal 33 of electric bulb 22 contacts electric contact 17 positioned at the bottom of cavity 13 and contact 18 of husk 11 makes contact with the outer terminal 35 of electric light bulb 22 as shown in FIGURE 2. The nature of the contacts positioned in electric light socket 10 may be of any form and shape and form no part of the present invention. Electric light bulb 22 is firmly held in operating position in electric light socket 10. The threads on screw type base 23 of bulb 22 compress and distort annular ring 31 when bulb 22 is in operating position. As discussed above, the diameter of cavity 13 of husk 11 below groove 26 is smaller than the diameter of cavity 13 above groove 26 thereby making lower groove wall 27 larger than upper groove wall 28. Lower groove side wall 27 extends over a substantial portion of the abutting lateral face of annular ring 31 thus tending to support annular ring 31 and limit the degree of deformation of ring 31 in the inward direction. Upper side wall 28 of groove 26 being narrower than groove side wall 27 does not support as large a surface of the abutting lateral face of ring 31. Upon a straightforward outwardly directed separating force being applied to electric light bulb 22 the lateral face of annular ring 31 abutting groove side wall 28 being only slightly supported by groove side wall 28, is deformed and thus rolls up on wall 14 abutting groove side wall 28. This deformation of annular ring 31 causes it to more firmly grip the lamp threads thus preventing the electric light bulb 22 from being easily withdrawn. However, electric light bulb 22 may be readily removed from electric light socket 10 by rotating it and unscrewing it in the normal manner.

The deformation of annular ring 31 by the threads of

the screw base 23 of electric light bulb 22 forms a tight seal against the lamp base 23 and thus tends to prevent the electric light bulb 22 from becoming loose in the electric light socket 10 due to vibration or other movement. It should also be noted that the resilient annular ring 26 provides a substantially watertight seal around the base of electric light bulb 22 thereby preventing water or moisture from entering and possibly short circuiting contacts 17 and 18 in the bottom of cavity 13 of husk 11.

As shown in FIG. 3, the indentations or nibs 29 located in the bottom of circumferential groove 26 engage resilient annular ring 31 and prevent ring 31 from rotating in the groove. Normally such indentations are not necessary to the successful operation of this invention since there is no tendency of rotation of the annular ring in normal operation as described above. However, there is a tendency for annular ring 31 to be rotated when light bulb 22 is screwed in for assembling instead of straight line movement of bulb 22 into socket 10. If desired, nibs 29 may be positioned in the side walls of groove 26 instead of the bottom of groove 26 as shown. Also, ring 31 may be prevented from rotating by other means such as making a force fit between groove 26 and ring 31.

FIGURE 4 shows another embodiment of the invention in which a rigid closure or cap 42 has a groove and cavity substantially as described above, in connection with FIGURES 1 through 3. As seen in FIG. 4, cap 42 has two different diameter bores, the greater bore diameter being below groove 43 adjacent the cap entrance and a smaller diameter bore above groove 43 closest to the closed end. Similarly as described above with respect to FIGURES 1 and 2, the groove side wall 44 being adjacent the smaller bore of the cavity is larger than the groove side wall 46, which is adjacent the larger bore of the cavity. Thus groove side wall 44 offers more support to an annular, resilient ring 49 which is seated in groove 43. Cap 42 may be used to close any type of an open container having a threaded opening, such as a bottle 51 shown in FIG. 4. Cap 42 is pushed onto the threaded male member 51, thereby firmly holding cap 42 in position. Cap 42 can be removed easily only by screwing it off in the ordinary manner.

Sealing means is thus provided for containers having a threaded opening such as jars or cans used with foods, drinks, etc. The closure shown in FIGURE 4 allows a tight seal about the edges of a container preventing dirt, moisture or water from entering the container and similarly preventing any leakage occurring from the container. This type of closure provides an economical method of assembling and capping containers in a large mass production line, since a tight seal is obtained merely by applying a small inward force to the cap forcing the resilient ring over the threads of the container.

A further embodiment of the present invention is shown in FIGURE 5 in which a coupling incorporates the present invention for joining abutting sections of pipe 61 and 62. Section 62 has a threaded edge 63. Pipe 61 terminates in a bell or female shell end 66. Shell end 66 has a circumferential groove 67 about its inner cylindrical surface and between its ends. Shell end 66 has a bore 68 inwardly of groove 67 having a diameter which is substantially equal to the outer diameter of pipe end 62, and a bore 69 outwardly from groove 67 and adjacent the outer edge which is slightly larger than bore 68. A resilient annular ring 71 is seated in groove 67. In the manner indicated above with respect to FIGURES 1, 2 and 4 threaded section 62 can be firmly connected to abutting member 61 by a relatively small inwardly directed force. Upon being so assembled, the connection is capable of withstanding a separating force that is far greater than the inward assembling force. Similarly, as described above, pipe 62 may be easily removed or separated from pipe 61 by rotating and unscrewing in the conventional manner.

Coupling two sections of pipe in a manner described

in connection with FIGURE 5 is especially adapted for use with thin wall tubing so that the assembling force used is limited and where relatively small or medium pressures are involved or where only temporary assembly is desired. This coupling allows easy assembling of pipe sections and prevents any leak or loss of fluid carried by the pipes or prevents any impurities from entering the pipes. A proper choice of material for resilient ring 71 will insure the safe carrying of a wide variety of fluids, such as corrosive materials or water. The pipe may be of any material normally used with respect to the liquid and conditions to be met in use. While FIGURE 5 shows the connector integrally attached to one section of pipe, the connector may be separate, having two annular rings on each side so as to receive and hold in abutting relationship two mating threaded pipes.

It should be noted that the invention is not in any manner limited to a specific diameter or screw thread or to a specific size husk or female or male member. It should also be noted that the invention is not in any manner limited to the female member having the groove and resilient annular ring incorporated therein, but that the groove and resilient annular ring may be placed on the male member and the female member may be threaded instead.

Also, while the drawings show the inner diameter of each portion of the connectors to be uniform, this is not necessary as long as the side wall of the groove facing the inlet opening is smaller than the rearward side wall of the groove.

While preferred embodiments of the invention have been described above, it will be understood that many variations thereof will be readily apparent to those skilled in the art without departing from the spirit thereof. Therefore, it is intended that the foregoing description shall be deemed illustrative only and not construed in a limiting sense the present invention being defined solely by the appended claims.

What is claimed is:

1. A connector for detachably joining a mating threaded member comprising a body portion having a cylindrical surface adapted for slidably receiving said threaded member, said cylindrical surface having a circumferential groove intermediate of its ends, the diameter of the said cylindrical surface on one side of said circumferential groove being slightly larger than the diameter of the cylindrical surface on the other side of said groove so that one side wall of said groove is slightly larger than the other side wall of said groove, the smaller side wall of said groove being closer to the leading edge of cylindrical surface, an annular ring of resilient compressible material disposed within said groove, said ring having a peripheral surface extending beyond the outer edge of the larger side wall of said groove for engaging the threads of said threaded member in its mating position and to be distorted and compressed thereby, said threaded member being removably held in assembled position by being straightforwardly urged into engagement with said annular ring thereby distorting said resilient annular ring and causing said annular ring to grip the threads of said threaded member thus holding firmly said threaded member and only allowing said threaded member to be readily disassembled by screwing apart the members in a conventional manner.

2. A connection for detachably joining a mating male member and a female member comprising a first member having a generally cylindrical surface with a circumferential groove therein intermediate of its ends and with the cylindrical surface on one side of said groove having a slightly larger diameter than the cylindrical surface on the other side so that one side wall of said groove is slightly larger than the other side wall of said groove, the smaller side wall of said groove being closer to the leading edge of said cylindrical surface, an annular ring of resilient material disposed within said groove, said an-

nular ring having a peripheral surface extending beyond the outer edge of the larger side wall of said groove, and a second member having a threaded cylindrical surface adapted for slidable movement with respect to the cylindrical surface of said first member, said ring being distorted and compressed in response to engaging said threaded surface of said second member, said first and second members being readily assembled by said male member being straightforwardly inserted into said female member and into engagement with said annular ring thereby distorting said annular ring and causing said annular ring to grip the threads of said threaded member and hold said male member within said female member and only allowing said members to be readily disassembled upon screwing apart the members in a conventional manner.

3. A female connector for detachably assembling a mating threaded male member comprising a body portion having an interiorly directed cavity, a portion of which is substantially cylindrical, said connector having a circumferential groove in the cylindrical portion of said cavity, the inner diameter of said cavity on one side of said groove being slightly larger than the inner diameter of the cavity on the other side of said groove, so that one side wall of said groove is larger than the other side wall of said groove, the larger diameter cavity being adjacent the entrance of said cavity, an annular ring of resilient material disposed within said groove and having its inner peripheral surface extending beyond the upper edge of the larger side wall of said groove into said cavity so as to be subjected to a deforming force in response to said threaded male member being telescopically urged into the female connector and into engagement therewith, said annular ring gripping the threads of said threaded member and thereby securely and sealingly holding it within said female member in assembled position and preventing said threaded male member from being readily straightforwardly removed, said groove having a plurality of projections for preventing said annular ring from rotating.

4. A female connector for detachably assembling a mating threaded male member comprising a body portion having an interiorly directed cavity, with a portion having a substantially cylindrical sidewall, said sidewall having a circumferential groove therein, the inner diameter of said cavity on one side of said groove being slightly larger than the inner diameter of the cavity on the other side of said groove so that one side wall of said groove is larger than the other side wall of said groove, the larger diameter cavity being adjacent the entrance of said cavity, an annular ring of fluid impervious resilient material disposed within said groove and abutting the bottom wall of said groove, said ring having its inner peripheral surface extending beyond the upper edge of the larger side wall of said groove into said cavity, so as to be subjected to a deforming force in response to said threaded male member being telescopically urged into the female connector into engagement therewith, said annular ring gripping the threads of said threaded member and thereby securely and sealingly holding it within said female member in assembled position and preventing said threaded male member from being readily, straightforwardly removed.

5. An electric light bulb socket for receiving an electric light bulb having a conventional screw type base comprising a body portion, said body portion having an internal cavity with substantially cylindrical side walls and a bottom wall, and a plurality of contact members adjacent said bottom wall, a plurality of current carrying wires passing through said bottom wall into said cavity, each of said conductors making electrical contact with a respective said contact, a circumferential groove in said cylindrical side wall, said groove having one side wall larger than the other side wall with the smaller side wall closer to the entrance of said cavity, a toroidal member

of resilient material disposed within said groove having its inner peripheral surface extending beyond the upper edge of said larger side wall of said groove and being subjected to a deforming force in response to said screw base of said electric light bulb being pushed into said socket into engagement with said toroidal member for causing said toroidal member to grip the threads of the screw base thereby holding it within said socket and allowing said light bulb to be readily removed only by unscrewing in the conventional manner.

6. A connection for detachably assembling a mating male member and female member each having a corresponding mating surface, comprising one member having a groove in its said mating surface, said groove having one side wall larger than the other side wall, a second member having its said mating surface threaded, and a fluid impervious flexible compressible member seated within said groove and abutting all of its walls and having a peripheral surface extending beyond the other edge of said larger side wall of said groove, said flexible member being held in compression within said groove to act as a holding and sealing element when said mating members are in mating position, said flexible member also being deformable to a greater degree in response to a straight forward separating force than a straight forward assembling force, said mating members being readily assembled by said male member being straight forwardly and telescopically inserted into said female member in a direction of movement towards the larger side wall of said groove, thereby compressing said flexible member and causing it to firmly grip the threads of said threaded member and only allowing the assembled members to be readily disassembled by unthreading the members.

7. A push together screw apart connection comprising telescopic parts including a tubular member having a circumferential groove therein, said circumferential groove having one side wall slightly larger than the other side wall, a second member having a threaded surface mating with a surface of said tubular member and a toroidal sealing element of compressible resilient material seated within said groove and having a peripheral surface compressed and distorted by engagement with said threaded surface for acting as a sealing and clamping element of said threaded surface, said mating members being readily assembled by respective axial movement in a direction towards the larger side wall of said groove for engaging and compressing the toroidal element and causing said element to firmly grip the threads of said threaded member and only allowing the assembled member to be readily disassembled by unthreading.

8. A connector for detachably joining a coacting mating threaded member comprising a body portion having a generally cylindrical surface for telescopic assembly with said threaded member, said surface having a circumferential groove therein intermediate of its ends, said groove having one side wall slightly larger than the other side wall, and means disposed within said groove having a flexible portion projecting beyond the outer edge of the larger side wall of said groove for sealingly engaging the threaded portion of said threaded member when said member is mounted in assembled position relative to said connector, said flexible portion of said means being forced toward said larger side wall of said groove when said threaded member is assembled and slidably yielding for allowing said member to be assembled, said flexible portion being distorted and firmly clamping the threads of said threaded member responsive to longitudinal disassembling movement of said member, whereby said threaded member may be easily disengaged from said connector only by an ordinary unscrewing operation.

9. A connector for detachably joining a coacting mating threaded member comprising a body portion hav-

ing a generally cylindrical surface for telescopic assembly with said threaded member, said surface having a circumferential groove therein intermediate of its ends, with the cylindrical surface adjacent one side of said groove being slightly larger in diameter than the cylindrical surface on the other side so that one side wall of said groove is slightly larger than the other side wall of said groove, a toroidal sealing member of flexible material disposed within said groove, said member having a peripheral yieldable surface extending beyond the outer edge of the larger side wall of said groove for sealingly clamping the threads of said threaded member when said threaded member is in assembled position, said sealing member being urged towards the larger side wall of said groove in response to said threaded member being telescopically assembled relative to said connector and thereby distorting said member for sealingly clamping the threads of said threaded member whereby said threaded member may be disengaged from said connector by ordinary unscrewing operation.

10. A connector for detachably joining a co-acting mating threaded member comprising a body portion having an unthreaded cylindrical surface for telescopic assembly with said threaded member, spaced apart supporting surfaces circumferentially carried on said cylindrical surface and substantially at right angles thereto, one of said supporting surfaces being of a greater height than the other, and flexible sealing means carried on said cylindrical surface between said supporting surfaces and protruding therefrom for sealingly clamping the threaded surface of said threaded member when said threaded member is operatively telescopically assembled relative to said connector, said supporting surfaces limiting longitudinal deformation of said flexible means in the longitudinal direction toward said larger surface more than in the opposite direction so that in response to longitudinal movement in the opposite direction said flexible means deforms and securely clamps the thread of said threaded member whereby said threaded member can be readily removed in the opposite direction only by a conventional unthreading operation.

11. In telescoping male and female members a rib extending from a telescoping surface on one member, a cylindrical surface on said other member in telescopic assembly with said rib, spaced apart supporting surfaces circumferentially carried on said cylindrical surface and substantially at right angles thereto, one of said supporting surfaces being of a greater height than the other, and flexible sealing means carried on said cylindrical surface between said supporting surfaces and protruding therefrom for sealingly clamping the rib when said one member is in telescopic relation to said other member, said supporting surfaces limiting longitudinal deformation of said flexible means in the longitudinal direction towards the supporting surface having the greater height more than in the opposite direction, so that in response to longitudinal movement in the opposite direction said flexible means deforms and securely clamps to the rib.

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