Aug. 27, 1963 G. WIECKMANN 3,101,984

PUSH TOGETHER, SCREW APART CONNECTOR

Filed April 7, 1959

Fig. 1.

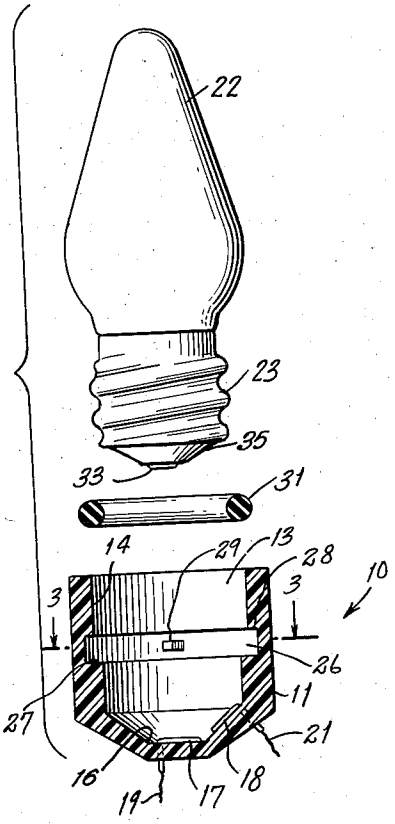


Fig. 2.

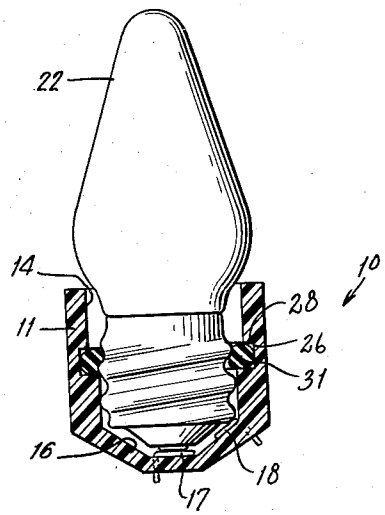


Fig. 3.

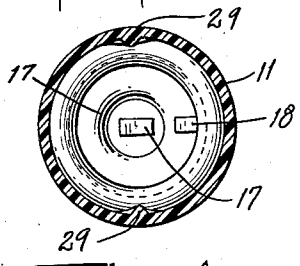


Fig. 5.

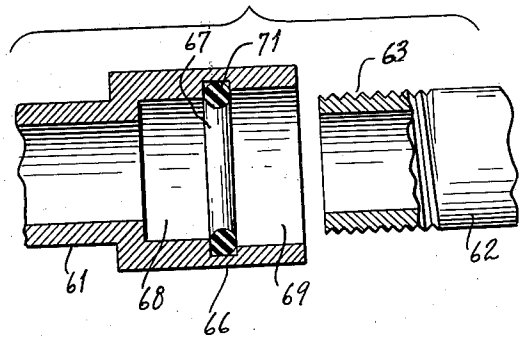
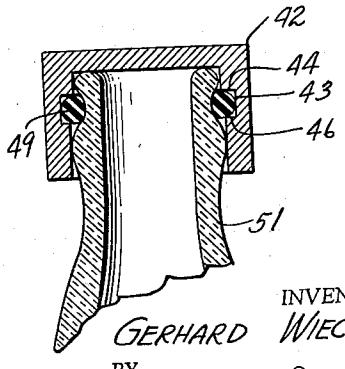


Fig. 4.



INVENTOR.
GERHARD WIECKMANN

BY Darby & Darby

ATTORNEYS

United States Patent Office 3,101,984 Patented Aug. 27, 1963

3,101,984

PUSH TOGETHER, SCREW APART CONNECTOR

Gerhard Wieckmann, Long Island City, N.Y., assignor to Gilbert Manufacturing Company, Inc., Long Island City, N.Y., a corporation of New York

Filed Apr. 7, 1959, Ser. No. 804,630
11 Claims. (Cl. 339—69)

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

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 havinng 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 annd 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 annular 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 sidewall 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 cylindical 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 havin ga 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 having 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.

References Cited in the file of this patent

UNITED STATES PATENTS

503,349	Lee	Aug. 15, 1893
1,721,365	Zwetsch	July 16, 1929
2,000,947	Hauser	May 14, 1935
2,094,629	Whittam	Oct. 5, 1937
2,119,452	Woodhead	May 31, 1938
2,701,659	Baltosser	Feb. 8, 1955
2,761,111	Klostermann	Aug. 28, 1956

FOREIGN PATENTS

5948 of 1905	Great Britain	Mar. 21, 1905