United States Patent

[11] 3,630,403

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[54] **SAFETY CONTAINER CLOSURE**
16 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **215/9,** 215/43, 215/95
[51] **Int. Cl.** **B61i 1/00,** B65d 55/02
[50] **Field of Search** 215/9, 95, 43

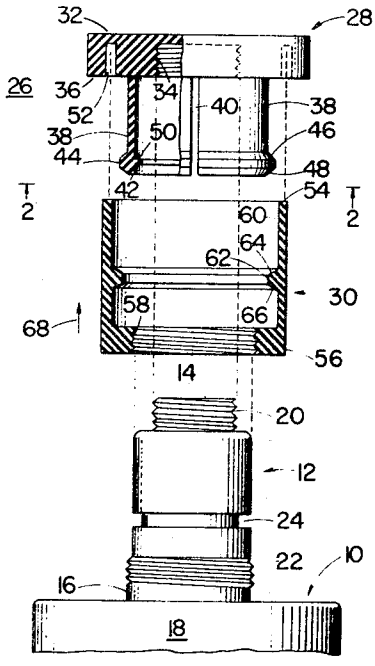
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ABSTRACT: A closure for a container having an elongated neck with first external threads adjacent its distal end and second external threads axially spaced from the first threads, the first and second threads having opposite hands. The closure comprises a cap member for closing the open end of the neck and having third internal threads for engaging the first neck threads. At least one resilient element is provided depending from the cap member in closely spaced relationship with the neck having a distal end spaced between the first and second threads. A locking member depends from the cap member in closely spaced relationship with the outer surface of the element, the locking member having fourth internal threads for engaging the second neck threads. The cap member receives a portion of the locking member so as to accommodate axial movement thereof between a first position with the fourth threads disposed intermediate the distal end of the element and the second neck threads, and a second position with the fourth threads engaging the second neck threads, and also to accommodate relative rotation of the cap and locking members. The locking member and element have cooperating locking means for inhibiting disengagement of the first and third threads and removal of the cap member from the neck when the locking member is in its second position.



2 Sheets-Sheet 1

FIG. 1

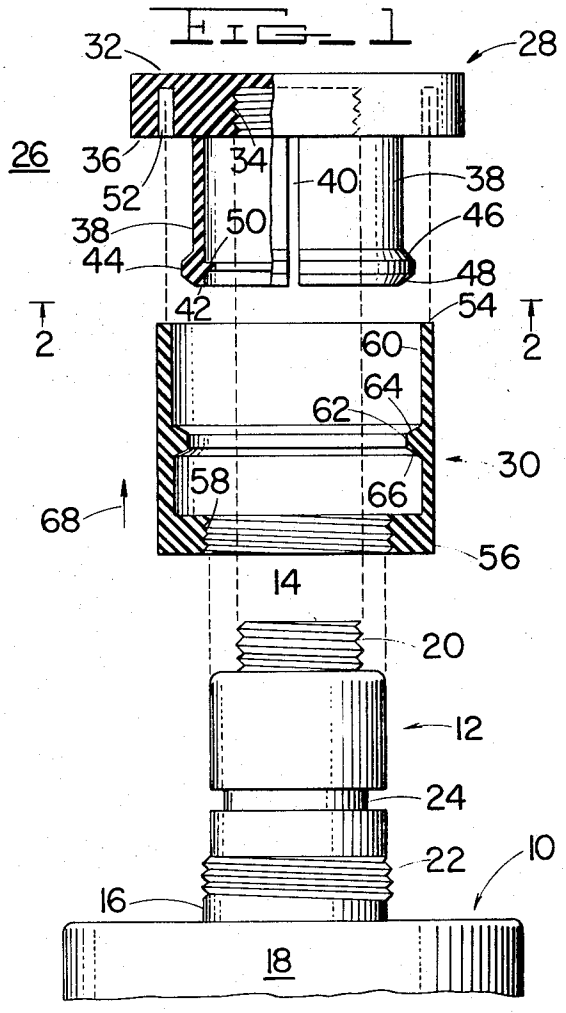
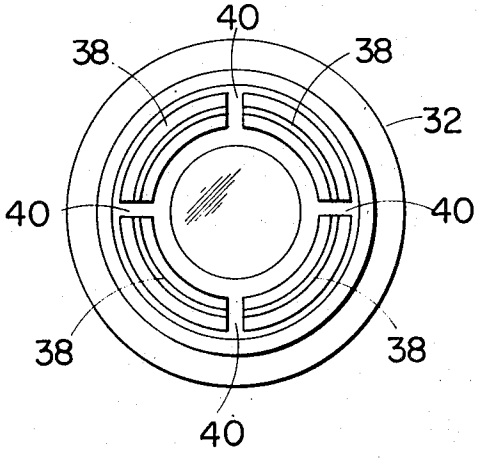


FIG. 2



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FIG. 3

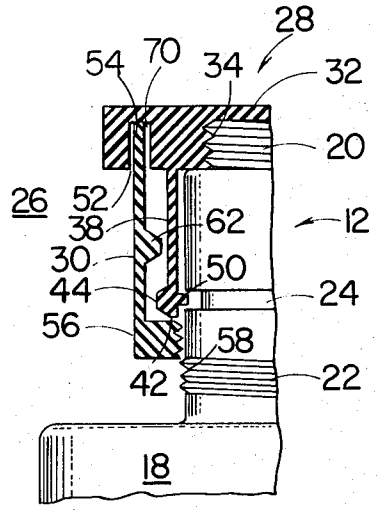


FIG. 4

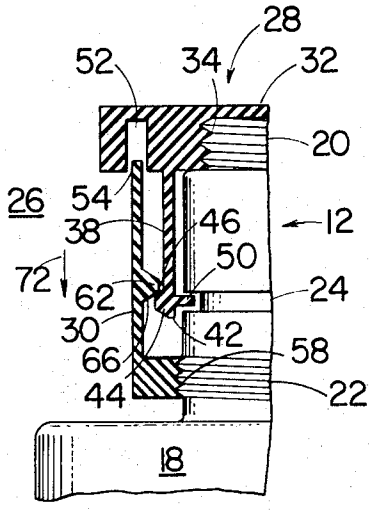


FIG. 5

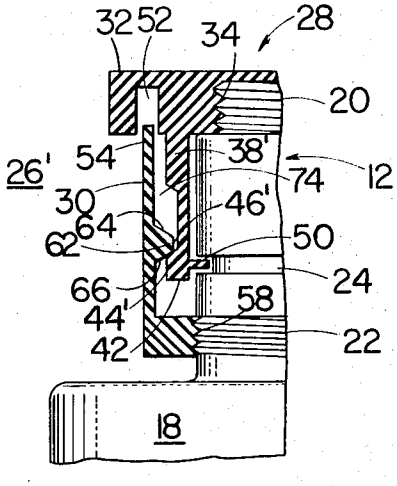
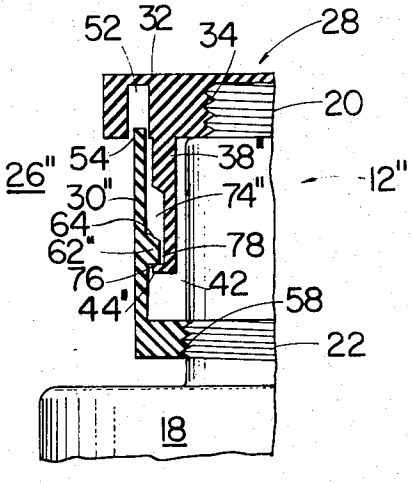


FIG. 6



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SAFETY CONTAINER CLOSURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to closures for containers, such as bottles, and more particularly to a safety closure of the type which inhibits opening of the container by small children.

2. Description of the Prior Art

Conventional bottles, such as medicine bottles, are commonly closed by a screwcap, or a plastic snap-on cap, either of which can readily be removed by small children. Numerous types of safety bottle closures have been proposed, included that shown and described in my U.S. Pat. No. 3,430,796, which are intended to inhibit opening of the container by small children. The prior safety closures known to the present applicant have been generally unsatisfactory for one or more reasons. Most such prior closures have been characterized by their complexity, difficulty of fabrication and assembly, and thus relative high cost. Further, and most importantly, while a number of such prior safety closures have been effective insofar as inhibiting removal by small children, they have been difficult for elderly persons, and particularly those suffering from arthritic conditions, to remove.

SUMMARY OF THE INVENTION

The present invention provides a safety closure for containers which consists of only two parts and which is readily fabricated and assembled at relative low cost, and which, while inhibiting removal by small children, is readily removable by adults including elderly persons and those having arthritic conditions.

In accordance with the broader aspects of the invention, a closure is provided for a container having an axially elongated neck open at its distal end, the neck having first means on its interior surface adjacent its distal end for threadingly engaging a member, and second means also on its exterior surface and axially spaced from the first means for threadingly engaging another member, the first and second means having opposite hands, i.e., right hand and left hand. The closure comprises a cap member for closing the open end of the neck and having third means thereon for threadingly engaging the first means. At least one resilient element is provided depending from the cap member in closely spaced relationship with the neck and having a distal end spaced between the first and second means. A locking member is provided also depending from the cap member in closely spaced relationship with the side of the resilient element remote from the neck, the locking member having fourth means thereon for threadingly engaging the second means. The cap member has means which receive a portion of the locking member and which accommodate axial movement of the locking member between a first position with its fourth means disposed intermediate the distal end of the resilient element and the second means, and a second position with the fourth means engaging the second means, the receiving means also accommodating relative rotation of the cap and locking members. The locking member and element have cooperating locking means thereon which inhibit disengagement of the first and third means and removal of the cap member from the neck when the locking member is in its second position, i.e., with its fourth means threadingly engaging the second means on the neck.

With this construction, the cap member is first threaded on the first external threads adjacent the distal end of the neck, and the locking member is then threaded, in the opposite direction, on the second external threads of the neck which are spaced from the first threads. With both the cap and locking members so threaded on the respective threads, the locking means prevents unthreading the cap member from the first threads at the distal end of the neck, unthreading of the locking member from the second threads in the opposite direction being required before the cap member can be unthreaded and removed from the neck. This necessity for sequentially unthreading the locking member and cap member in opposite directions inhibits the removal of the closure by small children, but presents no difficulty for adults including older persons and those suffering from arthritic conditions.

It is accordingly an object of the present invention to provide an improved safety closure for a container which inhibits opening by small children, but which can be readily opened by adults.

Another object of the invention is to provide an improved safety closure for containers characterized by its simplicity, ease of fabrication and assembly, and relative low cost.

The above-mentioned and other features and objects of this invention and the manner of attaining them will become more apparent and the invention itself will be best understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side, exploded view, partly in cross section and partly broken away, illustrating one embodiment of the invention;

FIG. 2 is a bottom end view of the cap member of FIG. 1, as viewed along the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary side view, partly in section, showing the closure of FIG. 1 after threading of the cap member onto the neck, but prior to threading of the locking member thereon;

FIG. 4 is a fragmentary side view, partly in cross section, showing the closure of FIG. 1 with both the cap member and locking member threaded on the neck;

FIG. 5 is a fragmentary side view, partly in cross section, showing a modification of the embodiment of the previous figures; and

FIG. 6 is a fragmentary side view, partly in cross section, showing another embodiment of the invention.

Referring now to FIGS. 1–4 of the drawings, a bottle **10** is shown having an axially elongated neck **12**. Neck **12** has an open distal end **14** and a proximal end **16** joined to body **18** of the bottle. Bottle **10** may be molded from glass or any suitable plastic material. First external threads **20** are formed on neck **12** adjacent distal end **14**, and second external threads **22** are also formed on neck **12** axially spaced from threads **20** and adjacent proximal end **16**. Threads **20** and **22** are of opposite hands, i.e., threads **20** may be right hand and threads **22** may be left hand. An annular groove **24** is formed in neck **12** intermediate threads **20** and **22**.

The improved safety closure of the invention, generally indicated at **26**, comprises a cap member **28** and a locking member **30**, both of which may be molded from suitable plastic material, such as polyethylene or polypropylene.

Cap member **28** comprises an annular top portion **32** having internal threads **34** formed in its bottom surface **36** for threadingly engaging threads **20** on neck **12**. Four elongated resilient elements **38** are integrally formed on and depend from bottom surface **36** of top portion **32**. Elements **38** are circumferentially spaced apart by slots **40** thus forming segments of a cylinder coaxial with threads **34** and neck **12** (FIGS. 3 and 4). Elements **38** respectively have lower distal ends **42** and projections **44** formed on their outer surfaces adjacent distal ends **42**, projections **44** respectively having upper and lower cam surfaces **46**, **48**. Elements **38** also have annular projections **50** extending inwardly from their inner surfaces, projections **50** being in radial alignment with and facing groove **24** when cap member **28** is threaded onto threads **20** of neck **12** (FIGS. 3 and 4).

An annular slot **52** is formed in bottom surface **36** of portion **32** of cap member **28** concentric with threads **32** and resilient elements **38**. Locking member **30** is annular having upper and lower ends **54** and **56**. Internal threads **58** are formed on locking member **30** adjacent its lower end **56** for threadingly engaging threads **22** in neck **12**. The inner surface **60** of

locking member 30 has an annular projection 62 formed thereon intermediate ends 54, 56 and having upper and lower cam surfaces 64, 66.

In initially assembling locking member 30 on cap member 28 (prior to assembly of closure 26 on neck 12), locking member 30 is moved toward cap member 28 in the direction shown by the arrow 68. Upper cam surface 64 of projection 62 of locking member 30 will engage lower cam surfaces 48 of projections 44, thereby resiliently biasing resilient elements 38 inwardly so that locking member projections 62 will pass projections 44, locking member projections 62 then being disposed above projections 44 and upper end 54 being loosely received in slot 52 (FIGS. 3 and 4). Inspection of FIGS. 3 and 4 will show that once locking member 30 has been so assembled on cap member 28, locking member 30 can be moved axially between a first position, as shown in FIG. 3, with internal threads 58 positioned between distal ends 42 of resilient elements 38 and neck threads 22 and a second position, as shown in FIG. 4, with internal threads 58 threadingly engaging neck threads 22, upper end 54 of locking member 30 at all times being loosely retained in slot 52 for free axial movement, slot 52 also accommodating relative rotation of cap member 28 and locking member 30.

Referring still to FIG. 3, closure 26 is assembled on neck 12 by first threading cap member 28 on upper threads 20 of neck 12. When cap member 28 has been completely threaded onto upper threads 20 by rotating cap member 28 in the respective direction, such as toward the right, resilient elements 38 will be closely spaced from the outer surface of neck 12 and projections 50 will be in alignment with and facing groove 24. With upper end 54 of locking member 30 being loosely received in slot 52, and since rotation of locking member 30 in the opposite direction is required in order to engage threads 58 with neck threads 22, upper end 54 of locking member 30 will be substantially at the bottom 70 of slot 52, and threads 58 will be positioned between distal ends 42 of resilient elements 38 and threads 22.

Locking member 20 is then rotated in the opposite direction, such as toward the left, thereby to engage threads 58 with the lower neck threads 22, thus moving locking member 30 axially downwardly in the direction shown by the arrow 72 in FIG. 4. As locking member 30 moves downwardly in response to engagement of threads 58 with neck threads 22, lower cam surface 66 of projections 62 on locking member 30 will cooperatively engage upper cam surfaces 46 of projections 44 of resilient elements 38, thereby biasing distal ends 42 radially inwardly and causing projections 50 to enter groove 24.

It will now be seen that in the assembled position of closure 26, as shown in FIG. 4, with projections 44 and 62 in engagement and with projection 50 extending into neck groove 24, any attempt to unthread cap member 28 from the upper neck threads 20 will result in projections 44 on resilient elements 38 being urged more tightly into locking engagement with projection 62 on locking member 30 which, however, is restrained against movement by engagement of its threads 58 with the lower neck threads 22. Thus, a child cannot remove the closure 26 by merely unthreading cap member 28, such unthreading being prevented so long as locking member 62 is in its second position with its threads 58 engaging lower neck threads 28.

In order to remove closure 26 from neck 12, it is first necessary to rotate locking member 30 in the opposite direction, such as toward the right, thereby to disengage its threads 58 from the lower neck threads 22, locking member 30 thus being moved upwardly to the position shown in FIG. 3. Upon disengagement of locking member threads 58 from lower neck threads 22, cap member 28 can then be unthreaded from upper neck threads 20 by rotation in the respective direction, such as toward the left, and when cap member threads 34 have been completely disengaged from upper neck threads 20, the entire closure assembly 26 can then be removed from neck 12.

Referring now to FIG. 5 in which like elements are indicated by like reference numerals and similar elements by primed reference numerals, here, resilient elements 38' respectively have axially extending grooves 74 formed therein, the bottom edge of the grooves defining locking and biasing cam surfaces 46'. In the initial assembly of locking member 30 over projections 38' (prior to positioning closure assembly 26 over neck 12), upper cam surface 64 of locking member projection 62 engages distal ends 42 of resilient elements 38, biasing them inwardly to permit projection 62 to move upwardly past projections 44' and enter grooves 74. It will be observed that once both the cap member 28 and locking member 30 have been threaded, in opposite directions, onto neck threads 20 and 22, resilient elements 38 are biased inwardly toward neck 12 by cooperative engagement of cam surfaces 66, 46' and projection 50 is again biased into groove 24. Again, an effort to unthread cap member 28 from upper neck threads 20 prior to unthreading locking member 30 from lower neck threads 22 is prevented by the locking engagement of locking member projection 62 and surfaces 46' of grooves 74 of the resilient elements 38'.

Referring now to FIG. 6 in which like elements are indicated by like reference numerals and similar elements by double-primed numerals, a closure assembly 26'' is shown in which the additional locking feature of the neck groove 24 and projections 50 on resilient elements 38 is eliminated. Here, projection 62'' on locking member 30'' has a lower radial shoulder 76 and an upper cam surface 64. Slots 74'' in resilient elements 38'' respectively have lower radial shoulders 78.

It will be seen that upon initially assembling locking member 30'' over resilient elements 38'' (prior to assembly of closure 26'' on neck 12''), cam surface 64 on projection 62'' biases distal ends 42 of resilient elements 38'' radially inwardly so that projection 62'' can pass projection 44'' and enter slots 74''. It will be seen that in the locked position of cap member 28 and locking member 30'', shoulders 76 and 78 are in locking engagement, thereby preventing unthreading of cap member 28 from upper neck threads 20 prior to unthreading of locking member 30'' from lower neck threads 22.

It will be observed that in the embodiments of FIGS. 1–5, locking member 30 may be removed from cap member 28 (when the closure assembly 26 has been removed from neck 12) by pulling locking member 30 downwardly away from cap member 28 with sufficient force so that lower cam surface 66 of locking member projection 62 cooperates with cam surfaces 46 or 46' of resilient elements 38 or 38' so as to bias the resilient elements inwardly to permit projection 62 to pass by projections 44 or 44'. In the embodiment of FIG. 6, once locking member 30'' has been assembled over resilient elements 38'', it can no longer be removed therefrom by reason of the locking engagement of shoulders 76, 78.

It will now be seen that the invention provides a safety closure for containers which comprises only two easily fabricated and assembled parts, i.e., cap member 28 and locking member 30, the closure inhibiting removal by small children by virtue of the necessity for sequentially unthreading locking member 30 in one direction and cap member 28 in the other, while being readily removable by adults including older persons and those suffering from arthritic conditions.

While there have been described above the principles of this invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of the invention.

What is claimed is:

1. A closure for a container having a portion open at one end, said portion having first means on the exterior surface thereof and adjacent said one end for threadingly engaging a member, and second means on the exterior surface thereof and axially spaced from said first means for threadingly engaging another member, said first and second means having opposite hands: said closure comprising a cap member for closing said open end of said portion and having third means

thereon for threadingly engaging said first means, at least one resilient element depending from said cap member in closely spaced relationship with said portion and having a distal end spaced between said first and second means, and a locking member depending from said cap member in closely spaced relationship with the side of said element remote from said portion, said locking member having fourth means thereon for threadingly engaging said second means, said cap member having means receiving a portion of said locking member for accommodating axial movement of said locking member between a first position with said fourth means disposed intermediate said distal end of said element and said second means, and a second position with said fourth means engaging said second means, and for accommodating relative rotation of said cap and locking member, said locking member and element having cooperating locking means thereon for inhibiting disengagement of said first and third means and removal of said cap member from said portion when said locking member is in said second position thereof.

2. The closure of claim 1 wherein said locking member is annular and has axially spaced first and second ends, said fourth means being adjacent said first end, said receiving means comprising an annular slot formed in said cap member concentric with and spaced radially outwardly from said third means and element, said second locking member end being received in said slot.

3. The closure of claim 1 wherein said first and second means comprise external threads and said third and fourth means comprise internal threads.

4. The closure of claim 1 wherein said element is integrally formed on said cap member.

5. The closure of claim 1 wherein there are a plurality of said elements, elements being axially elongated and circumferentially spaced to form segments of a cylinder.

6. The closure of claim 1 wherein said portion has means for forming a circumferential groove in its outer surface intermediate said first and second means, said element having a projection formed thereon adjacent said distal end thereof and facing said groove, said locking means including means for biasing said distal end of said element toward said neck and said projection into said groove in response to movement of said locking member from first to said second position thereof.

7. The closure of claim 1 wherein said locking member has axially spaced first and second ends and an inner surface facing the outer surface of said element, said fourth means being adjacent said first end and said receiving means receiving said second end, said locking means comprising a projection formed on said inner surface of said locking member intermediate said ends, and a shoulder on said element, said projection and shoulder engaging in said second position of said locking member.

8. The closure of claim 7 wherein said shoulder is defined by a projection on said outer surface of said element adjacent said distal end thereof.

9. The closure of claim 7 wherein said shoulder is defined by one side of a slot formed in said outer surface of said element, said slot having an axial length to accommodate axial movement of said projection upon movement of said locking member between said first and second positions thereof.

10. The closure of claim 7 wherein at least said projection includes cam means for biasing said distal end of said element inwardly thereby to permit said projection to pass said shoulder upon initial assembly of said locking member over said element.

11. The closure of claim 1 wherein said first and second means comprise external threads and said third and fourth means comprise internal threads, said locking member being annular and having axially spaced first and second ends, said fourth means being adjacent said first end, said receiving means comprising an annular slot formed in said cap member concentric with and spaced radially outwardly from said third means and element, said second locking member end being received in said slot, there being a plurality of said elements, said elements being axially elongated and circumferentially spaced to form segments of a cylinder concentrically surrounding said portion, said elements being integrally formed on said cap member and depending therefrom intermediate said slot and third means, said locking member concentrically surrounding said elements and having an inner surface closely spaced from the outer surface thereof, said locking means comprising an annular projection on said inner surface of said locking member intermediate said ends, and annular shoulders on said outer surface of said elements adjacent said distal ends thereof and facing said cap member, said projection and shoulders engaging in said second position of said locking member, said projection having a cam surface formed on its side facing said second end of said locking member for biasing said distal ends of said elements inwardly to permit said projection to pass said shoulders upon initial assembly of said locking member over said elements.

12. The closure of claim 11 wherein said cap member and elements, and said locking member are formed of plastic material.

13. The closure of claim 11 wherein said portion is generally cylindrical, said portion having an annular groove formed in its outer surface intermediate said first and second means, said elements respectively having annular projections formed on their inner surfaces adjacent said distal ends thereof and in radial alignment with said groove, said projection having a second cam surface formed on its side facing said first end of said locking member, said shoulders being cam surfaces cooperating with said second cam surface to bias said distal ends of said elements toward said neck and said projection into said groove in response to movement of said locking member from said first to said second position.

14. In combination a container having portion open at one end, said portion having first means on the exterior surface thereof and adjacent said distal end for threadingly engaging a member, and second means on the exterior surface thereof axially spaced from said first means for threadingly engaging another member, said first and second means having opposite hands, said portion having means for forming a circumferential groove in said outer surface thereof intermediate said first and second means, and a closure for said container comprising a cap member for closing said open end of said portion and having third means thereon for threadingly engaging said first means, at least one resilient element depending from said cap member in closely spaced relationship with said portion and having a distal end adjacent said groove-forming means, and a locking member depending from said cap member in closely spaced relationship with the side of said element remote from said portion, said locking member having fourth means thereon for threadingly engaging said second means, said cap member having means receiving a portion of said locking member for accommodating axial movement of said locking member between a first position with said fourth means disposed intermediate said distal end of said element and said second means, and a second position with said fourth means engaging said second means, and for accommodating relative rotation of said cap and locking members, said element having a projection formed therein adjacent said distal end thereof and facing said groove, said locking member and element having cooperating locking means thereon for inhibiting disengagement of said first and third means and removal of said cap member from said portion when said locking member is in said second position thereof, said locking means including means for biasing said distal end of said element toward said portion and said projection into said groove in response to movement from said first to said second position thereof.

15. The combination of claim 14 wherein said element is integrally formed on said cap member, said first and second means comprising external threads and said third and fourth means comprising internal threads, said locking member being annular and having axially spaced first and second opposite ends, said fourth means being adjacent said first end, said receiving means comprising an annular slot formed in said cap

member concentric with and spaced radially outwardly from said third means and element, said second end being received in said slot.

16. The combination of claim 15 wherein there are a plurality of said elements, said elements being axially elongated and circumferentially spaced to form segments of a cylinder concentrically surrounding said portion, said locking member concentrically surrounding said elements and having an inner surface closely spaced from the outer surface thereof, said locking means comprising an annular projection on said inner surface of said locking member intermediate said ends and annular shoulders on said outer surface of said elements, said projection and shoulders engaging in said second position of said locking member, said biasing means comprising cooperating cam surfaces on said projection and shoulders, said projection having another cam surface thereon for biasing said distal ends of said elements inwardly to permit said projection to pass said shoulders upon initial assembly of said locking member over said elements.

* * * * *