Nov. 13, 1962 R. H. McKIM 3,063,588

SAFETY BOTTLE CLOSURE

Filed Oct. 10, 1960 2 Sheets-Sheet 1

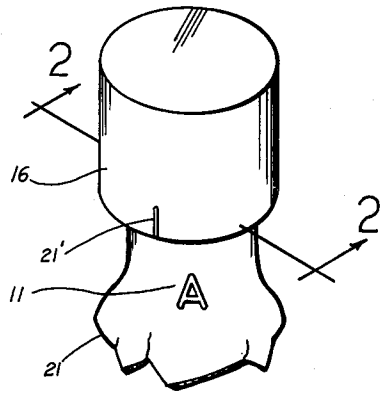

Fig. 1

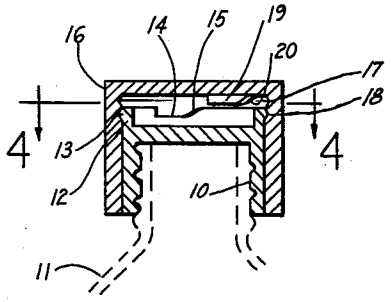

Fig. 2

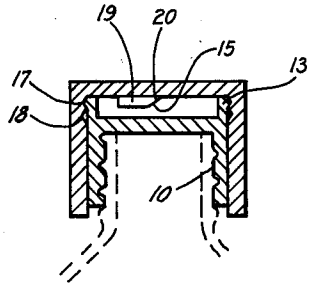

Fig. 3

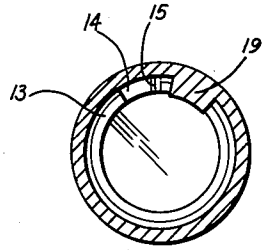

Fig. 4

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SAFETY BOTTLE CLOSURE

Filed Oct. 10, 1960 2 Sheets-Sheet 2

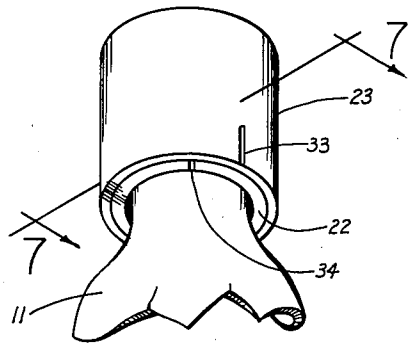

Fig. 5

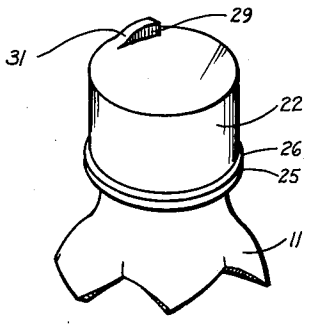

Fig. 6

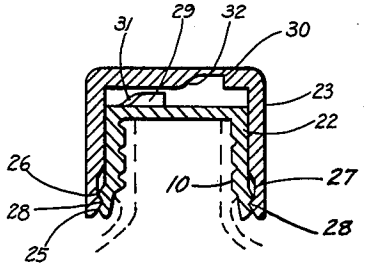

Fig. 7

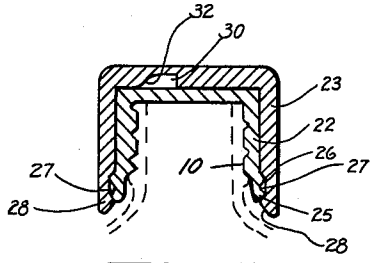

Fig. 8

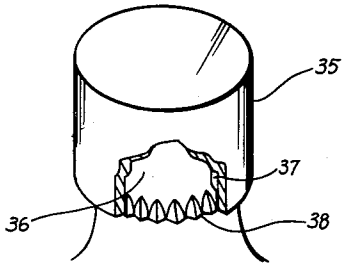

Fig. 9

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United States Patent Office

3,063,588

Patented Nov. 13, 1962

3,063,588

SAFETY BOTTLE CLOSURE

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Filed Oct. 10, 1960, Ser. No. 61,716
11 Claims. (Cl. 215—9)

This invention relates to a safety closure for a bottle or similar container.

In the year 1959, 1400 adults and children died from accidental poisoning in the United States. A large percentage of these fatalities were children under 5, who had opened bottles containing aspirin, sleeping tablets, cleaning fluid, bleaches and a large number of other toxic materials.

A primary object of this invention is to provide a safety cap closure for toxic-containing bottles which may be easily removed by responsible adults of average intelligence and strength, but which cannot be removed by children and intoxicated, sleepy or otherwise irresponsible adults.

Another object is to provide a bottle closure which can be removed only after an indexing operation requiring the application of intelligence beyond that of a child; and then only by the application of force beyond that which can be exerted by a child.

Another object of this invention is to provide a bottle closure which can be opened only by those capable of reading and following a set of instructions printed either on the bottle or in a leaflet which may be kept secret and separate from the bottle.

Another object of this invention is to provide a safety cap bottle closure which will automatically take its safety position when the closure is tightly threaded to the bottle.

Another object of this invention is to provide a safety cap bottle closure which consists of two inexpensive and simply manufactured parts.

These and other objects and advantages of the invention will appear from the ensuing description and appended claims.

The invention is illustrated by way of example in the accompanying drawings and is described in detail hereinafter. The particular constructions herein shown and described are to be construed as illustrative only, and not as limiting the invention.

In the drawings:

FIG. 1 is a view in perspective to one form of the device in position on a bottle.

FIG. 2 shows a vertical section of the device on line 2—2 of FIG. 1, with the device in its safety position.

FIG. 3 is the vertical section shown in FIG. 2, but with the device ready to be removed from the bottle.

FIG. 4 shows a horizontal section of the device on line 4—4 of FIG. 2.

FIG. 5 is a view in perspective of a modified form of the device in position on a bottle.

FIG. 6 is a view in perspective of the inner cap of the device shown in FIG. 5, with said inner cap secured to a bottle.

FIG. 7 shows a vertical section on line 7—7 of FIG. 5, with the device in its safety position.

FIG. 8 is the vertical section shown in FIG. 7, but with the device ready to be removed from the bottle.

FIG. 9 is a partially cut-away view in perspective of a further modification of the device, shown in position on a bottle.

Referring to the drawings, an inner cap **10**, provided with threads to engage the neck of a bottle **11**, and thereby to constitute a screw type closure for said bottle, has its entire side wall extended upwardly above the top of said cap to form an axially extending circumferential flange

12 at the upper end of said cap, said flange being provided with a rib **13** on it s outer surface extending circumferentially around said flange at the outer end thereof. The said rib is preferably V-shaped in cross-section with its apex extending slightly beyond the outer circumference of said flange. The flange is also provided with a notch **14** which extends axially downwardly from the upper or outer end of said flange, said notch preferably being cut through the entire wall of the circumferential flange **12** and formed preferably with a square shoulder at one side against the flange and with a sloping shoulder at its other side, said sloping shoulder constituting a cam surface **15**, which, owing to its action hereinafter explained, is positioned at the forward end (considered in a clockwise direction) of said notch **14** when seen in plan view as in FIG. 4. This inner cap **10** is made of flexible plastic material, such as polyethylene, so as to be yieldable under pressure, particularly the rib **13**.

An outer cap **16** fits telescopically over said inner cap **10** and has an inside diameter such that there is a clearance between the outer and inner caps slightly less than the thickness of the rib **13** so that, were it not for the said rib, the outer cap would be freely rotatable about the inner cap for all telescopic positions of the outer cap with reference to the inner cap. This outer cap **16** is made of a rigid material so that it cannot be pinched or squeezed inwardly to engage frictionally with the inner cap. In the inner face of the circumferential wall of said outer cap, near the upper end thereof, is an upper circumferential groove **17** and a lower circumferential groove **18**. These grooves are preferably V-shaped and are of sufficient size that the rib **13** of the inner cap **10** may be contained in either of them, as hereinafter explained, with clearance sufficient to permit the free rotation of the outer cap about the inner cap when the said rib **13** is positioned in either of said grooves. Such positioning of the rib **13** in said lower groove comes about as follows: When the outer cap is pushed downwardly over the inner cap, the rib **13** on the inner cap is temporarily deflected until it reaches the lower groove **18**, whereupon it snaps into said lower groove. In this position one assembly of the outer and inner caps is effected, this assembly and its relation to the bottle **11**, being as shown in FIG. 2. In this assembly the outer cap is freely rotatable about the inner cap.

It will be seen that in this assembly the upper groove **17** is in a position above the upper end of the circular flange **12** of the inner cap. Projecting radially inwardly from the upper groove **17** is a lug **19** which is in form and shape such that it will fit into the notch **14** in the circumferential flange **12**, said lug therefore having a cam surface **20** at its forward end to match the cam surface **15** of the notch **14**. However, in the assembly as shown in FIG. 2, the rib **13** being in the lower groove **18**, it will be seen that as the outer cap is rotated about the inner cap, the lug **19** will pass over the notch **14** without becoming engaged therein. This assembly as shown in FIG. 2 is the safety position of the device. In this position the outer cap may be spun freely and the inner cap cannot be unscrewed from the bottle **11**.

By rotating the upper cap **16** to a position wherein the lug **19** is directly over the notch **14**, when the device is in the assembly shown in FIG. 2, and then applying a sufficient amount of force downwardly against the upper cap **16**, the rib **13** on the inner cap **10** will be temporarily deflected until the downward movement of the outer cap brings the rib to the upper groove **17**, whereupon the rib **13** will snap into the upper groove **17**, the lug **19** at the same time being brought into engagement with the notch **14** and serving as a key to lock the outer and inner caps **16** and **10** into fixed engagement with each other. This affects the assembly of the device as shown in FIG. 3. In this locked position the inner cap must rotate with

the outer cap, and therefore the safety cap device can be unscrewed from the bottle by the proper turning of the outer cap.

Correspondingly, when the safety cap is returned to the bottle, and a force applied in a clockwise direction to the outer cap **16**, this force is transmitted through the locking key or lug **19** to the inner cap to tighten the inner cap on the bottle. When the inner cap thus becomes tightly closed on the bottle and the clockwise-directed force on the outer cap is continued, this force is transmitted by the coaction of the cam surfaces **15** and **20** into an action in which the outer cap is forced upwardly causing the rib **13** to be moved from out of the lower groove **18**. This action frees the lug **19** from the notch **14** and automatically returns the safety cap to its safety position when the inner cap reaches its tightened position on the bottle.

In order that one using the device may know when the lug **19** is positioned over, i.e., in alignment with, the notch **14**, suitable index marks are placed in appropriate positions on the outside of the bottle and outer cap **16**, respectively, such as the letter "A," designated by the reference number **21**, on the bottle **11**, and the vertical line **21'** on the outer cap **16**, so that when said index marks are brought into alignment with each other, the lug **19** and notch **14** are properly aligned for the forcing of the outer cap from the safety position of the device as shown in FIG. 2 to the locked position shown in FIG. 3. It will be seen that the outer cap cannot be engaged with the inner cap unless the device is properly "indexed." The bottle may be labeled with appropriate instructions for the operation of the safety can device, or such instructions may be kept in a place known only to desired parties.

If desired, the cam surfaces **15** and **20** of the notch **14** and lug **19**, respectively, may be omitted, and square shoulders provided in their stead, the same as at the opposite ends of said notch and lug. With such an arrangement, when the locked inner cap becomes tightened on the bottle, it would be necessary for the user of the device to exert an upwardly directed force on the outer cap in order to move the rib **13** from its position in the upper groove **17** to that in the lower groove **18** and thereby return the outer cap to the safety position.

In the operation of the device to move the outer cap from its freely rotatable position on the inner cap to its locked position thereon, the noise made when the rib snaps into its appropriate groove is a sharp click which is easily heard by the user of the device.

By suitable selection of flexible material for the inner cap with its rib **13** and by suitable clearances between the adjacent circumferential surfaces of the outer and inner caps **16** and **10**, in relationship to the thickness of the rib **13**, the device can be adapted to the desired downward force necessary to put the outer cap in the safety position with reference to the inner cap, and vice versa. Such selection and adaptation can be determined by routine tests not of an inventive nature. This downward force should be within the capabilities of sane and responsible adults who have occasion to use the contents of screw capped bottles, but beyond the capabilities of a child.

In the modification of my device as shown in FIG. 5 to FIG. 8, the inner cap **22**, and the outer cap **23** correspond, respectively, to inner cap **10** and outer cap **16** of the device as shown in FIG. 1 to FIG. 4. The inner cap **22** is extended axially at its lower or open end to form a circumferential rim **24** below the threaded portion of said cap, said rim being provided with a lower rib **25** and an upper rib **26** on its outer surface, said ribs being adjacent each other with a V-shaped channel therebetween, each of said ribs extending circumferentially around said rim **24**. A circumferential groove **27** on the inner surface of outer cap **23** near its lower end is of width such that the said ribs **25** and **26** on inner cap **22** can be contained therein as shown in FIG. 8. Adjacent to and below the groove **27**, the lower end of outer cap **23** is formed with inner circumferential bead **28** whose apex is approximately flush with the inner circumferential surface of outer cap **23**, so that said bead **28** can be contained in the circumferential channel that exists between the adjacent ribs **25** and **26** on inner cap **22**, said channel and said ribs being of such size that the outer cap **23** is freely rotatable about said inner cap **22** when said bead **28** is contained in said channel. A lug **29** projects upwardly from the upper wall of inner cap **22** and a notch **30**, adapted for the engagement therein of said lug **29**, is formed in the inner surface of the upper wall of outer cap **23**. Both the lug **29** and the notch **30** are provided with cam surfaces **31** and **32**, respectively, on their forward ends, the same as the cam surfaces **15** and **20** on the lug **19** and notch **14**, respectively of the structure shown in FIGS. 1–4. If desired, the lug **29** may be positioned on the upper wall of the outer cap and, correspondingly, the notch **30** may be in the upper wall of the inner cap.

In this modified structure shown in FIGS. 5–8, the outer cap **23** is made of rigid material and the inner cap **22** of flexible material, the same as the outer and inner caps of the structure shown in FIGS. 1–4. Thus, when the outer cap **23** is positioned telescopically over inner cap **22** and moved downwardly by force, the upper rib **26** on the outer circumferential wall surface of inner cap **22** first becomes temporarily deflected by the downward movement against it of the bead **28**, and then snaps into the groove **27**, the bead **28** taking a position in the circumferential channel that exists between the upper and lower ribs **26** and **25** on the inner cap **22**. This effects the assembly as shown in FIG. **7**, which assembly constitutes the safety position of this modified structure of FIGS. 5–8; for in this position, the outer cap **23** can be rotated freely about the inner cap **22**, said caps being of such length that in this position the lug **29** on the inner cap is below the upper wall of the outer cap and is out of contact therewith as the outer cap is rotated about the inner cap.

In order to lock together the outer and inner caps **23** and **22** of this modified form, the lug **29** and notch **30** are brought into vertical alignment with each other; whereupon, with proper downward force applied to the upper cap **23**, the bead **28** thereon deflects the lower rib **25** on the inner cap **22**, said bead **28** moving to below said rib **25** as the latter snaps into the groove **27**, so that the two ribs **25** and **26** both become positioned in the groove **27** in the outer cap **23**. This effects the assembly as shown in FIG. 8, which assembly constitutes the locked position of the two caps so that the inner cap may then be unscrewed from the bottle **11**. A vertical index mark **33** is provided on outer cap **23** and an appropriate index mark **34** on the lower edge of the inner cap **22**, which may be a small bead, or a small hole or other suitable marking, are so positioned that when aligned vertically with each other, the lug **29** will be in proper alignment with notch **30** to permit the effecting of the locked assembly as shown in FIG. 8.

A particular advantage residing in the modified construction shown in FIGS. 5–8 is that the upper rib **26** on the inner cap **22** may be positioned slightly below the level of the lowermost threaded portion of the inner wall of said cap so that when the inner cap has been screwed onto the bottle and the device brought into the safety position as shown in FIG. 7, said rib **26** will be reinforced and stiffened by the coaction therewith of said lowermost threaded portion on the bottle **11**, thus preventing the outer cap from being pulled upwardly and off the inner cap by any force less than that which would cause said rib **26** to be sheared off the inner cap. When, however, the inner cap is off the bottle, the flexibility of said upper rib **26** permits the effecting of the assembly into the safety position as shown in FIG. 7.

In the modified form of my device as shown in FIG. 9, the indexing operation through the alignment of index markings on the device before the outer cap may be brought into the safety (freely rotatable) position are eliminated, and no index markings attend the device. The outer cap **35**, and the inner cap **36** (shown only fragmentarily through the cut-away portion of the outer cap 35 in FIG. 9) have the same rib construction and the same groove construction, respectively, as the outer cap **16** and inner cap **10** of the form of device shown in FIGS. 1–4. The lug **19** and the notch **14** of the device as shown in FIGS. 1–4 are eliminated. In their stead are a downwardly tooth **37** projecting radially inwardly from the inner circumferential face of outer cap **35** and a series of upwardly pointed teeth **38** projecting radially outwardly from the outer circular face of inner cap **36**. The teeth **38** are adjacent each other and are arranged in a circumferential row on the inner cap. They are shaped so that the space intervening between adjacent teeth conforms to the shape of the tooth **37** on the outer cap **35**. Thus, the teeth **38** constitute what may be termed a gear circle with which the tooth **37** meshes when the outer cap is moved downwardly. The tooth **37** and the gear circle of teeth **38** are so positioned that when the inner and outer caps are in the safety position as shown in FIG. 2 (with the outer cap freely rotatable about the inner cap), the tooth **37** will be above the row of teeth **38**. When force is exerted downwardly on the outer cap **35** (to move the rib **13** on inner cap **36** out from the lower groove **18** on outer cap **35** and cause it to snap into the upper groove **17** on said outer cap to effect the locked assembly as shown in FIG. 3), the downwardly pointed tooth **37** will readily mesh between two adjacent upwardly pointed teeth **38**, with which it happens to be near, and thus lock the outer cap **35** with the inner cap **36**.

While I have shown preferred forms of my invention, it is to be understood that various changes can be made in its construction by those skilled in the art without departing from the spirit of the invention as defined in the appended claims.

I claim:

1. A safety closure for a bottle and the like, which comprises: an inner cap made of resiliently distortable substance and having a cylindrical portion which is threaded for screw engagement on the neck of said bottle to close said bottle; an outer cap made of rigid material and adapted to be positioned telescopically over said inner cap; the inside diameter of said outer cap being slightly greater than the outside diameter of said inner cap; a first engagement means to maintain said outer cap in a fixed axial relationship with reference to said inner cap while permitting said outer cap to be freely rotatable about said inner cap, said first engagement means having a portion thereof on one of the adjacent circumferential faces of one of said caps and the other portion on the adjacent circumferential face of said other cap with the portion on said inner cap being distortably yieldable to force applied in an axial direction thereto; and a second engagement means to secure said outer cap in locked engagement with said inner cap for the unscrewing of said inner cap from said bottle, said second engagement means having a portion thereof on one of the adjacent wall faces of said caps and the other portion on the adjacent wall face of said other cap, both said engagement means being operative by a required force greater than that which a child can normally exert; said first mentioned engagement means comprising a rib on the outer cylindrical face of said inner cap, integral therewith, projecting radially therefrom, and extending circumferentially therearound; the radial thickness of said rib being somewhat greater than the difference in lengths between the radii of said inner and outer caps to require that said rib be distorted and deflected against said outer cap when the latter is moved axially in its telescopic position on said inner cap; and a circumferential groove in the inner cylindrical face of said outer cap, said groove being of depth and size such that when said outer cap is moved axially while in its telescopic position on said inner cap to bring said groove and said rib contiguous to each other, the rib will snap into position within said groove and said outer cap will be freely rotatable about said inner cap; and said second mentioned engagement means includes a lug projecting from one of the adjacent wall faces of said two caps, and a notch in the other of said adjacent wall faces adapted to receive said lug when the latter is brought into axial alignment with said notch upon the rotation of said outer cap about said inner cap and upon said outer cap's being then moved axially while in its telescopic position on said inner cap to bring said lug into locking engagement with said notch; said lug and said notch being so positioned that when said rib of said first mentioned engagement means is positioned in said groove of said first mentioned engagement means and said outer cap is rotated about said inner cap, said lug will pass adjacent to but out of contact with said notch.

2. The apparatus of claim 1 with the provision of a circumferential groove in the inner cylindrical face of said outer cap adapted to have contained therein the rib of said first mentioned engagement means when said outer cap is forceably and axially moved in its telescopic position on said inner cap to bring said rib from its position wherein said outer cap is freely rotatable about said inner cap, and simultaneously therewith to bring said lug into said locking engagement with said notch.

3. The apparatus of claim 1 with the addition of a first index mark positioned on said outer cap and a second index mark positioned on an element selected from the group consisting of said bottle and an exposed or visible part of said inner cap; said index marks being so positioned in relationship to each other that when said inner cap is screwed firmly onto said bottle and the said two marks are brought into axial alignment with each other when said outer cap is in its freely rotatable relationship to said inner cap, said lug will be in axial alignment with said notch.

4. A safety closure for a bottle and the like, which comprises an inner cap made of resiliently distortable substance, formed into a hollow cylindrical portion closed at one end with a top wall, and with said cylindrical portion threaded for screw engagement on the neck of said bottle to close said bottle; an outer cap made of rigid material and formed into a hollow cylindrical portion closed at one end with a top wall and adapted to be positioned telescopically over said inner cap; the inside diameter of said outer cap being slightly greater than the outside diameter of said inner cap; a rib on the outer cylindrical face of said inner cap, integral therewith, projecting radially therefrom, and extending circumferentially therearound; the radial thickness of said rib being somewhat greater than the difference in lengths between the radii of said inner and outer caps to require that said rib be distorted and deflected against said outer cap when the latter is moved axially in its telescopic position on said inner cap; a first circumferential groove in the inner cylindrical face of said outer cap, said groove being of depth and size such that when said outer cap is moved axially while in its telescopic position on said inner cap to bring said groove and said rib contiguous to each other, the rib will snap into position within said groove and said outer cap will be freely rotatable about said inner cap; a lug projecting from one of the adjacent wall faces of said two caps, and a notch in the other of said adjacent wall faces adapted to receive said lug when the latter is brought into axial alignment with said notch upon the rotation of said outer cap about said inner cap and upon said outer cap's being then moved axially while in its telescopic position on said inner cap to bring said lug into locking engagement with said notch; said lug

and said notch being so positioned in relation to said rib that when said rib is snapped into said groove and said outer cap is rotated about said inner cap, said lug will pass adjacent to, but out of contact with, said notch; and a second circumferential groove in the inner cylindrical face of said outer cap, or like size and shape to said first groove; said second groove being positioned sufficiently near said first groove that when said lug and said notch are brought into said locking engagement with each other, said rib will be brought from out said first groove and contiguous to said second groove to snap into said second groove.

5. The apparatus of claim 4 in which said lug and said notch each has one end formed into a sloping surface to constitute coacting cam surfaces adapted to bear upon each other to raise said outer cap upwardly with respect to said inner cap upon the continued turning in a clockwise direction of said outer cap said inner cap becomes tightly closed on said bottle.

6. The apparatus of claim 4 in which the circular wall of said inner cap is extended axially upwardly beyond the top wall of said cap to constitute an axially extending circumferential flange at the upper end of said cap, and said notch is positioned in the rim of said flange, said lug being positioned on the top wall of said outer cap.

7. The apparatus of claim 6 in which said rib is positioned at the rim of said circumferential flange, thereby to constitute said rib, a circumferential radially cantilevered extension from said flange.

8. The apparatus of claim 4 in which said lug projects inwardly from the inner circular face of said outer cap and is in the form of a downwardly pointed tooth; and said notch is one of a series of notches formed between upwardly pointed teeth projecting outwardly from the outer circular face of said inner cap; said teeth being adjacent to each other in a circumferential row on said circular face to constitute a series of adjacently positioned upwardly expanding notches any one of which being adapted to receive said downwardly pointed lug in locking engagement therein when said outer cap is moved axially downwards with respect to said inner cap.

9. A safety closure for a bottle and the like, which comprises: an inner cap made of resiliently distortable substance, and having a cylindrical portion which is threaded for screw engagement on the neck of said bottle to close said bottle; an outer cap made of rigid material and adapted to be positioned telescopically over said inner cap; the inside diameter of said outer cap being slightly greater than the outside diameter of said inner cap; a first rib on the outer cylindrical face of said inner cap, integral therewith, projecting radially therefrom and extending circumferentially therearound; the radial thickness of said rib being somewhat greater than the difference in lengths between the radii of said inner and outer caps to require that said rib be distorted and deflected against said outer cap when the latter is moved axially in its telescopic position on said inner cap; said rib being positioned near the lower end of said inner cap; a second rib on said inner cap of like size, shape and character to said first rib and extending circumferentially around said inner cap below and adjacent to said first rib to form a circumferential channel between said two ribs; a circumferential groove in the inner cylindrical face of said outer cap of depth and width sufficient to contain both said first and second ribs; said groove being positioned sufficiently near the lower end of said outer cap that it forms with the rim of said outer cap a circumferential bead at said rim; said circumferential bead being adapted to be contained in said channel between said two ribs when said outer cap is forceably moved axially downwardly to cause said bead first to deflect said first rib downwardly and then to occupy said channel between said ribs as said first rib snaps into said groove; said bead being also adapted, when in said channel, to permit said outer cap to be freely rotatable about said inner cap; a lug projecting from one of the adjacent wall faces of said two caps, and a notch in the other of said adjacent wall faces adapted to receive said lug when the latter is brought into axial alignment with said notch upon the rotation of said outer cap about said inner cap, and upon said outer cap's being then moved axially downwardly to bring said lug into locking engagement with said notch; said two ribs and said groove being positioned on said inner and outer caps, respectively, such that when said lug and said notch are brought into said locking engagement with each other, said circumferential bead on said outer cap first deflects said second rib downwardly and then occupies a position below said second rib as the latter snaps into said wide groove on said outer cap.

10. The apparatus of claim 9 in which said lug and said notch each have one end formed into a sloping surface to constitute coacting cam surfaces adapted to bear upon each other to raise said outer cap upwardly with respect to said inner cap upon the continued turning in a clockwise direction of said outer cap when said inner cap becomes tightly closed on said bottle.

11. The apparatus of claim 9 in which the lower end of said inner cap extends below the threaded portion of said cap to form a circumferential rim below said threaded portion; and said first rib on said inner cap is positioned on said rim slightly below but in close proximity to the lowermost thread on the inner wall of said inner cap.

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