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Focht

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[54] **AEROSOL SAFETY CAP**

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[73] Assignee: **Precision Valve Corporation,** Yonkers, N.Y.

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[52] **U.S. Cl.** ..... **220/60 R,** 206/52 F, 222/182

[51] **Int. Cl.**..... **B65d 43/10**

[58] **Field of Search**..... 220/60, 55 R, 55 A, 55 B, 220/55 C, DIG. 20, 85 P, 60; 215/9; 222/182; 206/52 F

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[57] **ABSTRACT**

An aerosol safety cap for an aerosol container including inner and outer telescoping members. The outer member includes dependent resilient locking means which snap under the interior of the annular bead of the mounting cup of the aerosol container to affix the outer member to the container. When the inner member is telescoped into the outer member, it prevents the resilient locking means from being inwardly deflected thereby preventing removal of the cap assembly from the container. Withdrawal of the inner telescopic member permits deflection of the depending locking means to permit removal of the cap from the container. The inner member cannot be withdrawn without the aid of a prying instrument such as a coin. The cap can be doubly locked by rotating the inner member with respect to the outer member with an instrument such as a coin into a position in which it cannot be pried upwardly.

16 Claims, 5 Drawing Figures

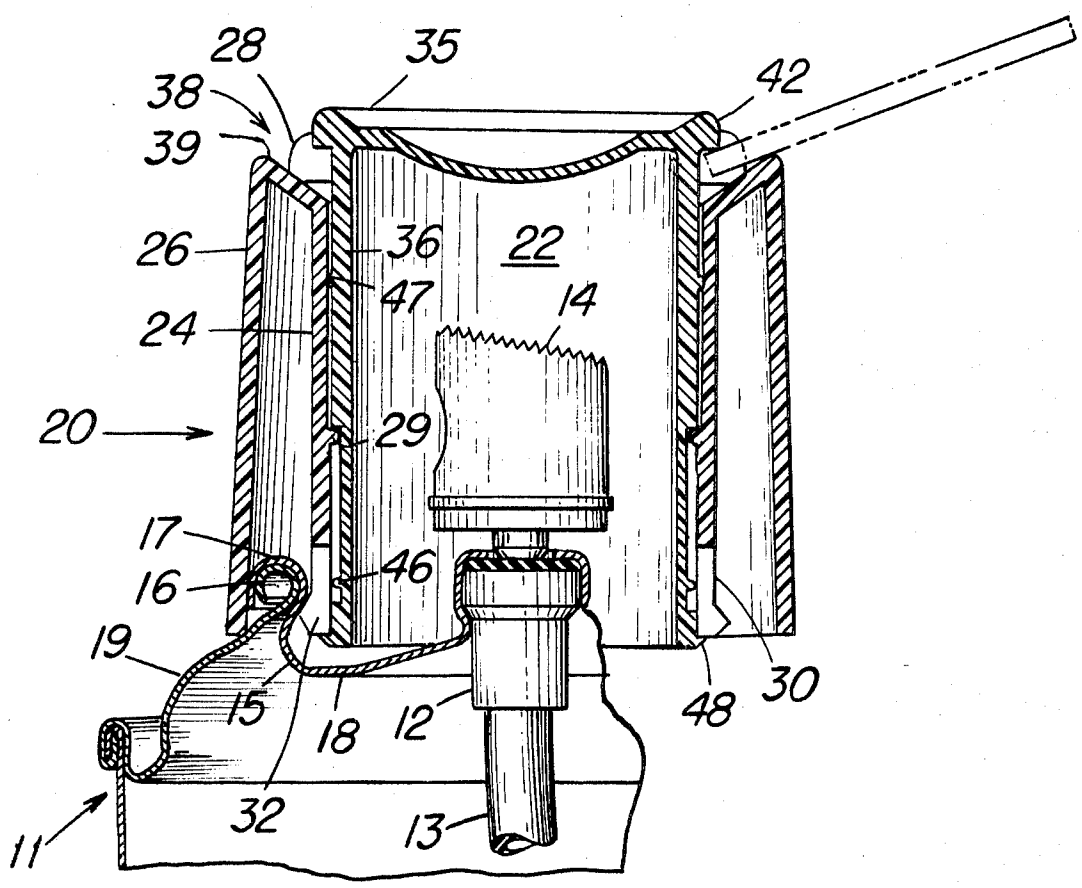


FIG. 1

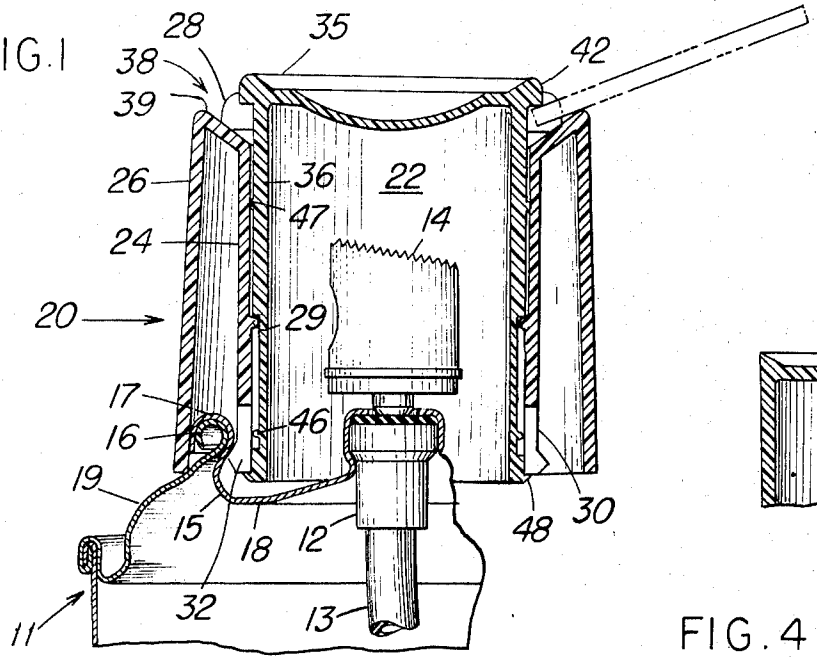


FIG. 5

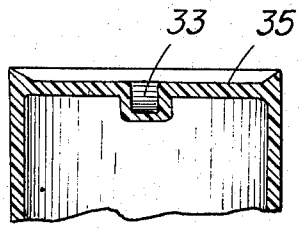
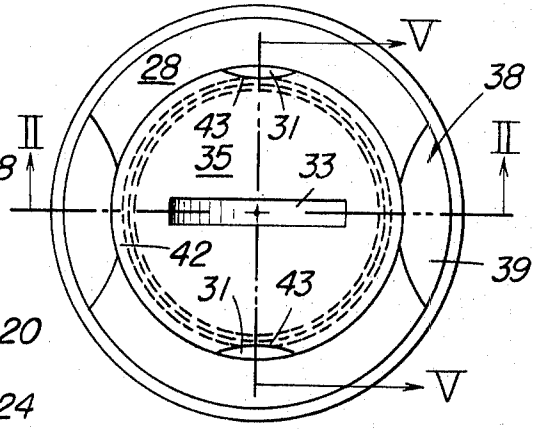


FIG. 4



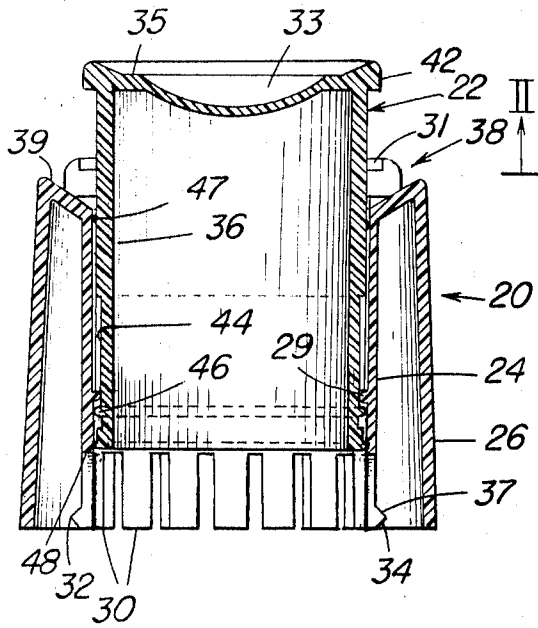
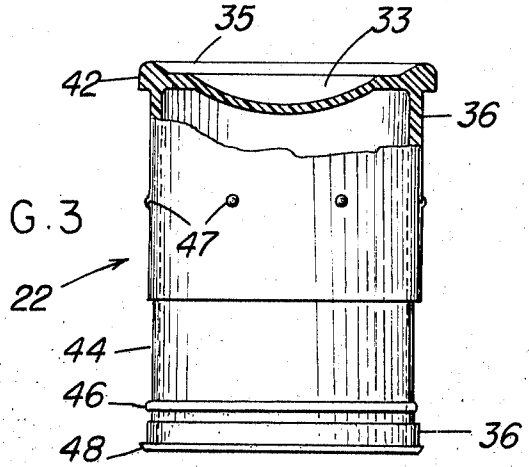


FIG. 2

FIG. 3



AEROSOL SAFETY CAP

The present invention relates to an aerosol safety cap and more specifically to an aerosol safety cap which can be securely locked to the annular bead of a conventional aerosol container mounting cup to prevent removal of the cap until it is unlocked. This application is a continuation-in-part of applicant's copending application Ser. No. 244,670, filed Apr. 17, 1972.

Various aerosol safety caps are known in the art. One such prior art safety cap is disclosed in U.S. Pat. No. 3,262,601 issued to I. O. Formo. Formo discloses an outer cap with an inwardly directed annular lip which is resiliently contracted for locking. Downward force on a slidable inner shell radially expands the annular lip to clear the container bead to unlock the cap.

It is an object of the present invention to provide a lockable aerosol safety cap which may be readily locked to an aerosol container to prevent actuation of the container, and which may be readily relocked after use of the container.

It is a further object of the present invention to provide a lockable aerosol safety cap which is substantially immune to removal by a child, but easily removable by an adult.

It is a still further object of the present invention to provide a lockable aerosol safety cap which may not be readily removed by hand without the use of an instrument.

Other objects, aspects and advantages of the present invention will be more apparent when the detailed description is considered in conjunction with the drawings as follows:

FIG. **1** is a cross-sectional view of an aerosol safety cap according to the present invention in a locked condition on an aerosol container;

FIG. **2** is a cross-section of the safety cap of FIG. **1** in an unlocked condition;

FIG. **3** is an elevation view partly in section of the inner cylindrical member of the safety cap of FIG. **1**;

FIG. **4** is a top plan view of the safety cap of FIG. **1**; and

FIG. **5** is a partial cross-sectional view of the inner cylindrical member taken along the plane V—V of FIG. **4**.

Referring to FIG. **1**, an embodiment of the aerosol safety cap of the present invention is shown mounted in a locked condition on a conventional aerosol container **11**. The top end **19** of container **11** is closed by a closure member in the form of a mounting cup **18** which carries the dispensing valve **12** and the actuator button **14**. The mounting cup is affixed to the mouth of the container by an outward crimp indicated at **15** under the annular rolled head **16** of the container mouth. The mounting cup **18** includes an annular bead **17** which sealingly conforms to the container annular bead **16** to complete a pressure tight joinder and seal of the mounting cup to the container mouth.

The safety cap of the present invention comprises two pieces, a double walled generally cylindrical outer member **20** and a generally cylindrical inner member **22**. The outer cylindrical member **20** includes inner and outer concentric skirts **24** and **26** integral with a bridging annular top wall **28**. The inner and outer skirts **24** and **26** are radially spaced at the lower end relative to one another a distance approximating the radial

width of the exterior of the bead **17** of the mounting cup **18** and are positioned on either side thereof.

The inner member **22** is telescopically received within the inner concentric skirt **24** and is capable of telescopic sliding motion with respect to the outer member within a range determined by limiting means to be described later. The lower portion of the inner skirt **24** is castellated by a plurality of longitudinal slots to form a plurality of spaced locking means **30**, best seen in FIG. **2**. The locking means **30** are deflectable tabs integral with the inner skirt **24**. The locking means **30** include detents or toe portions **32** which project radially of the inner skirt **24** into the space between the inner and outer skirts.

Detents **32** are formed with sloping surfaces **34** and **37**. When the safety cap has been snapped into place onto the annular bead **17**, the projecting detents **32** underlie the annular bead **17**. The upper surface **37** generally conforms to the curve of the interior of the annular bead **17** and a portion of the crimp **15**. The lower surface **34** serves as a chamfer or ramp to assist in guiding the safety cap into engagement with the mounting cup bead **17**. The lower margin of the outer wall **26** comes to rest bearing against the end wall **19** of the pressurized container to prevent movement of the safety cap with respect to the container when the safety cap is in place. The radial distance between the outermost reach of the projection **32** and the inner surface of the outer cylindrical skirt **26** is less than the radial width of the mounting cup bead **17**. Thus, placement or removal of the safety cap requires that the locking means **30** be deflected radially inwardly as the projecting detents **32** pass over the annular mounting cup bead **17**.

The safety cap of the present invention is locked to the container by preventing inward deflection of the locking means **30**. Inward deflection of the locking means **30** is prevented by the contiguous disposition of the inner cylindrical member **22** when that member is fully telescopically received within the outer member **20**. The inner cylindrical member **22** is illustrated in FIG. **3** and its relationship with the outer member is illustrated in FIGS. **1**, **2** and **4**. The inner cylindrical member **22** comprises a cylindrical wall **36** which depends from a generally circular top wall **35**. Top wall **35** extends radially outwardly of the cylindrical wall **36** to form a radial flange **42**. Top wall **35** is also provided with a slot with a curved bottom for receiving a coin, key or other implement to assist in turning the inner member **22** with respect to the outer member **20**. Cylindrical wall **36** is interrupted by a broad region of reduced diameter which forms a wide shallow groove **44**. Near the lower edge of wide shallow groove **44** is an annular bead **46**. The lower margin of the inner cylindrical member **22** is provided with an annular lip **48** which projects radially beyond the diameter of the main cylindrical wall **36**. The cylindrical wall **36** is also provided with a plurality of small projections **47**.

Before placement of the safety cap upon a container, the inner cylindrical member **22** is initially assembled with the outer member **20** in telescopic fashion. The inner cylindrical member is telescopically inserted into the bore defined by the inner wall **24** of the outer member **20**. The inner member **22** is forced into the outer member until annular bead **46** of the inner member **22** abuts the upper side of annular bead **29** which protrudes inwardly of the inner wall **24** of the outer mem-

ber **20.** Bead **46** and projections **47** of the inner member result in a slight interference fit for the inner and outer members to retain these members in an assembled but extended condition during bulk shipment and handling so that the caps are in the proper attitude for application to the containers.

The caps are applied to the container in the above described extended condition. Projections **47** on the cylindrical wall **36** of the inner member **22** tend to keep the inner member in an extended condition as an aid to manipulating the unlocked cap. In this extended condition, the locking means **30** are free to be resiliently deflected. The cap assembly is then placed upon the aerosol container with the mounting cup annular bead **17** interposed between the inner and outer walls **26** and **24** of the outer member. The resilience of the locking means permits the projecting detents **32** of the locking means to deflect and to snap into position below the mounting cup annular bead **17** when downward force is applied to the outer member. In this extended condition the cap can be easily removed and replaced by virtue of the snap-fit to the container bead.

To lock the cap, the inner member **22** is depressed to further telescope the inner member into the outer member **20** to position the lower portion of the inner member adjacent the locking means **30.** The contracted condition is shown in FIG. **1.** The safety cap cannot be removed from the aerosol container because the locking means **30** are prevented from the inward deflection necessary to allow the projecting detents **32** of the locking means **30** to pass the mounting cup annular bead **17.** When the inner member **22** is fully contracted into the outer member to accomplish locking, radial flange **42** of the top wall **35** of the inner member comes to rest within a flange receiving groove **31** in the annular top wall **28** of the outer member. Since flange **42** is received in groove **31** it cannot be grasped or otherwise withdrawn without use of a prying implement. When locked, the annular rim **48** at the lower margin of the inner member protrudes below the lower margins of the locking means **30** of the outer member to frictionally retain the inner member in the fully contracted or locked position.

The initial depression of the inner member **22** into the outer member **20** causes bead **46** of the inner member to snap below the bead **29** of the bore of the outer member. This condition is shown in FIG. **2.** Bead **29** of the outer member rides within the broad groove **44** of the inner member to permit the inner member to telescopically slide freely with respect to the outer member within longitudinal limits determined by the width of the groove **44** between annular bead **46** and the full diameter wall **36.** Thus, the inner member can be extended and retracted with respect to the outer member, but cannot be easily separated from the outer member. This assures that the caps can be repeatedly operated without fear of separation.

To unlock the safety cap of the present invention, it is necessary that the user obtain an implement such as a coin to pry the inner member upwardly. The coin is inserted into access depressions **38** on either side of the outer member and is fitted below the overhanging radial flange **42** of the inner member. Twisting the coin pries the inner member upwardly with respect to the outer member by overcoming the frictional resistance exerted by the projections **47** and by the annular bead **48** which acts against the bottom edge of locking members **30.** The inner member can then be further extracted by pulling with the fingers until the locking means **30** have been cleared for free deflection. The safety cap can then be removed by snapping it off the container.

The safety cap of the present invention can be relocked after use of the container by snapping it into place and locking it by forcing the inner member downwardly again. The safety cap can also be used without further resort to the locking feature by simply not depressing the inner member.

As a double lock to further insure against unwanted removal of the safety cap, the radial flange **42** of the inner member is cut away at diametrically opposed locations **43** as shown in FIG. **4.** The cut-out regions **43** correspond to the shape of the access areas **38** of the outer member. When the inner member is rotated with respect to the outer member to bring the cut-out portions **43** of the inner member flange **42** into correspondence with the access areas **38,** the cap cannot be unlocked because there is no overhanging flange to engage with a coin. Rotation of the inner member is facilitated by the slot **33** provided in the top wall **35** of the inner member. A coin or other implement can be inserted in the slot **33** and the inner member rotated toward or away from the double locked position in which the cut-out portions **43** are in alignment with the access areas **38.** The inner member is difficult to turn with respect to the outer container without use of a tool such as a coin because the inner member presents no gripping surface when contracted into the outer member.

The safety cap of the present invention provides a simple and economical solution to the problem of rendering containers child resistant not only prior to their initial use but also throughout the useful life of the container. The subject cap is virtually impossible to remove by hand alone and will resist a surprising amount of twisting and banging. Yet, the cap is easily removed by an adult knowing its manner of operation and who has a coin, key or other prying implement. The double locking feature makes the unwanted removal of the cap even more difficult by requiring the use of a coin or other implement to rotate the inner member prior to using the implement to pry the inner member up for unlocking.

The safety cap of the present invention can be adapted to be used on other than aerosol containers or can be adapted to fit an annular container bead other than the mounting cup bead of an aerosol container. Many containers employ annular beads with reentrant cross-sections similar to that shown for mounting cup beads. It is apparent that the cap of the present invention can be sized to fit such beads to prevent access to the contents of the container. For example, the cap of the present invention can be adapted for use on prescription drugs or hazardous substances by using bottles with an inwardly projecting lip or rim to which the resilient locking means of the cap can be locked.

What is claimed is:

1. A safety cap for a container having a radially inwardly projecting bead surrounding the container contents access means comprising; an outer member having resiliently inwardly deflectable locking means, said locking means being in the form of a plurality of tabs dependent from a lower portion of the outer member, said locking means including outwardly projecting por-

tions which are configured to engage below the inward projection of the container bead, and an inner member telescopically slidable with respect to said outer member into contiguous relationship with an inner surface of said locking means to prevent inward deflection of said locking means, the interior dimension defined by the inner surface of said locking means being no smaller than the corresponding exterior dimension of the portion of the inner member contiguous with said locking means.

2. A safety cap for a pressurized dispenser having a radially inwardly projecting annular bead surrounding the dispensing valve comprising; an outer member having inner and outer concentric cylindrical skirt portions integral with an annular top portion and having resiliently inwardly deflectable locking means, said locking means being in the form of a plurality of tabs dependent from a lower portion of the inner skirt, said locking means including outwardly projecting portions which are configured to engage below the inward projection of the annular bead, and an inner member telescopically slidable with respect to said outer member into contiguous relationship with an inner surface of said locking means to prevent inward deflection of said locking means, the interior dimension defined by the inner surface of said locking means being no smaller than the corresponding exterior dimension of the portion of the inner skirt contiguous with said locking means.

3. The safety cap of claim **2** wherein the outwardly projecting portions of the tabs and the outer skirt are radially spaced apart a distance less than the radial width of the annular bead to provide a snap action fit of the cap to the annular bead.

4. A safety cap for a pressurized dispenser having a radially inwardly projecting annular bead surrounding the dispensing valve comprising; an outer member having inner and outer concentric cylindrical skirt portions integral with an annular top portion and having resiliently inwardly deflectable locking means, said locking means being in the form of a plurality of tabs dependent from a lower portion of the inner skirt, said locking means including outwardly projecting portions which are configured to engage below the inward projection of the annular bead, and an inner member telescopically slidable with respect to said outer member into contiguous relationship with an inner surface of said locking means to prevent inward deflection of said locking means, the interior dimension defined by the inner surface of said locking means being no smaller than the corresponding exterior dimension of the portion of the inner skirt contiguous with said locking means, and wherein the upper portion of said inner member includes a radial flange and the top portion of the outer member includes depressions to permit access to the underside of said flange by an implement for prying the inner member upwardly.

5. The safety cap of claim **4** wherein the outer member includes a groove in the top portion for receiving the flange of the inner member to limit access to the flange to the region of said depressions.

6. The safety cap of claim **5** wherein the inner and outer members are relatively rotatable and said flange is interrupted in the regions overlying said depressions in at least one attitude of relative rotational positioning of the inner and outer members.

7. The safety cap of claim **6** wherein the inner member includes means for receiving an implement to aid in relative rotation of the inner and outer members.

8. A safety cap for a pressurized dispenser having a radially inwardly projecting annular bead surrounding the dispensing valve comprising; an outer member having inner and outer concentric cylindrical skirt portions integral with an annular top portion and having resiliently inwardly deflectable locking means, said locking means being in the form of a plurality of tabs dependent from a lower portion of the inner skirt, said locking means including outwardly projecting portions which are configured to engage below the inward projection of the annular bead, and an inner member telescopically slidable with respect to said outer member into contiguous relationship with an inner surface of said locking means to prevent inward deflection of said locking means, the interior dimension defined by the inner surface of said locking means being no smaller than the corresponding exterior dimension of the portion of the inner skirt contiguous with said locking means, and wherein the inner surface of the inner skirt portion and the outer surface of the inner member are provided with a cooperating ridge and groove to limit the extent of relative telescopic motion.

9. A safety cap for a pressurized dispenser having an inwardly extending annular bead surrounding the dispensing valve comprising; an outer member having inner and outer concentric cylindrical skirt portions integral with an annular top portion and having resiliently inwardly deflectable locking means, said locking means being in the form of a plurality of tabs dependent from a lower portion of the inner skirt, said locking means including outwardly projecting portions which are configured to engage below the annular bead, and an inner member telescopically slidable with respect to said outer member into contiguous relationship with an inner surface of said locking means to prevent inward deflection of said locking means, the interior dimension defined by the inner surface of said locking means being no smaller than the corresponding exterior dimension of the portion of the inner member contiguous with said locking means, and wherein the lower margin of the inner member includes an annular bead adapted to snap below the lower portion of the locking means of the outer member when the members are telescoped together to retain the members telescoped.

10. A relockable safety cap for enclosing the contents access means of a container, the exterior of said container having a radially inwardly projecting annular bead surrounding the container contents access means, said safety cap comprising:

an outer member including a cylindrical skirt and resiliently inwardly deflectable locking means in the form of a plurality of tabs depending from said skirt, said locking means including outwardly projecting portions which are configured to engage below the inward projection of said annular bead when the outer member is positioned on the container; and

an inner member enclosing the container contents access means, said inner member inlcuding a top wall and a depending cylindrical sidewall telescopically slidable within said cylindrical skirt into contiguous relationship with an inner surface of said locking means to maintain the outer surface portions of said locking means in engagement with said

annular bead when said sidewall is telescoped downwardly within said cylindrical skirt to lock the safety cap to the container and telescoped upwardly to release the locking means and unlock the safety cap from the container when said inner member is withdrawn from contiguous relationship with said locking means, the interior dimension defined by the inner surface of said locking means being no smaller than the corresponding exterior dimension of the portion of said cylindrical skirt contiguous with said locking means and said inner member sidewall being substantially enclosed by said outer member when telescoped downwardly within said inner skirt.

11. The safety cap of claim **10** wherein the upper portion of said outer member includes a top surface portion; the upper portion of said inner member includes a radially outwardly extending flange; and the top surface portion of the outer member includes depressions to permit access to the underside of said flange by an implement for prying the inner member upwardly.

12. The safety cap of claim **11** wherein the outer member includes a groove in the top surface portion for receiving the flange of the inner member to limit access to the flange to the region of said depressions.

13. The safety cap of claim **12** wherein the inner and outer members are relatively rotatable and said flange is interrupted in the regions overlying said depressions in at least one attitude of relative rotational positioning of the inner and outer members.

14. The safety cap of claim **13** wherein the inner member includes means for receiving the implement to aid in relative rotation of the inner and outer members.

15. The safety cap of claim **10** wherein the inner surface of the cylindrical skirt and the outer surface of the inner member sidewall are provided with a cooperating ridge and groove to limit the extent of relative telescopic motion.

16. The safety cap of claim **10** wherein the lower margin of the inner member sidewall includes an annular bead adapted to snap below the lower portion of the locking means of the outer member when the members are telescoped together to retain the members telescoped.

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