United States Patent [19]

Hedgewick

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[45] **Nov. 4, 1975**

[54] **SAFETY PACKAGE**

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[73] Assignee: **Reflex Corporation of Canada Limited,** Windsor, Canada

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[21] Appl. No.: **715,391**

[52] **U.S. Cl.** **215/211;** 215/222

[51] **Int. Cl.** **B65d 55/02**

[58] **Field of Search** ..... 215/9, 40, 44, DIG. 1; 220/40 S, 40

[56] **References Cited**

UNITED STATES PATENTS

907,129	12/1908	Conradson	215/44
2,776,066	1/1957	Thornton	215/9 X
2,991,902	7/1961	Lind	215/41 X
3,344,942	10/1967	Hedgewick	215/9
3,432,065	3/1969	Bugla	220/40
3,435,975	4/1969	Weigand	215/9

FOREIGN PATENTS OR APPLICATIONS

1,213,812	11/1959	France	215/DIG. 1
1,378,226	10/1964	France	215/40
878,606	6/1953	Germany	215/DIG. 1
1,107,541	5/1961	Germany	215/DIG. 1

Primary Examiner—Donald F. Norton
Attorney, Agent, or Firm—Reising, Ethington, Barnard, Perry & Brooks

[57] **ABSTRACT**

The container disclosed herein comprises a cylindrical plastic body which is molded in one piece and has circumferentially spaced radially extending projections on the upper end thereof that have notches therein. The cap comprises a one-piece plastic body having a base and a peripheral flange with circumferentially spaced lugs extending radially inwardly for engagement with the notches. An annular integral flexible web is provided on the inner surface of the base and extends downwardly and outwardly. An annular integral rib on the inner surface of the base overlies the annular flexible web and serves as a stop to prevent overflexing of the web. The cap is applied to the container by a rotating movement. The cap can only be removed from the container by applying an axial force on the periphery of the cap and thereafter rotating the cap.

28 Claims, 8 Drawing Figures

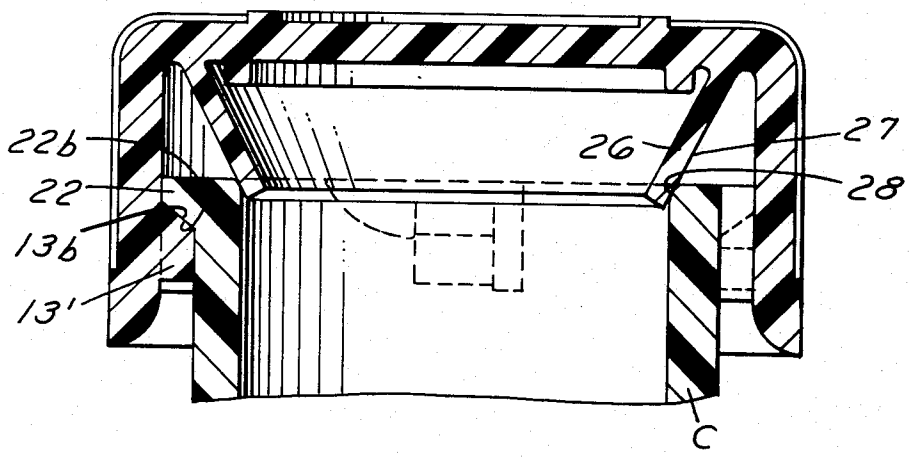

FIG. 1

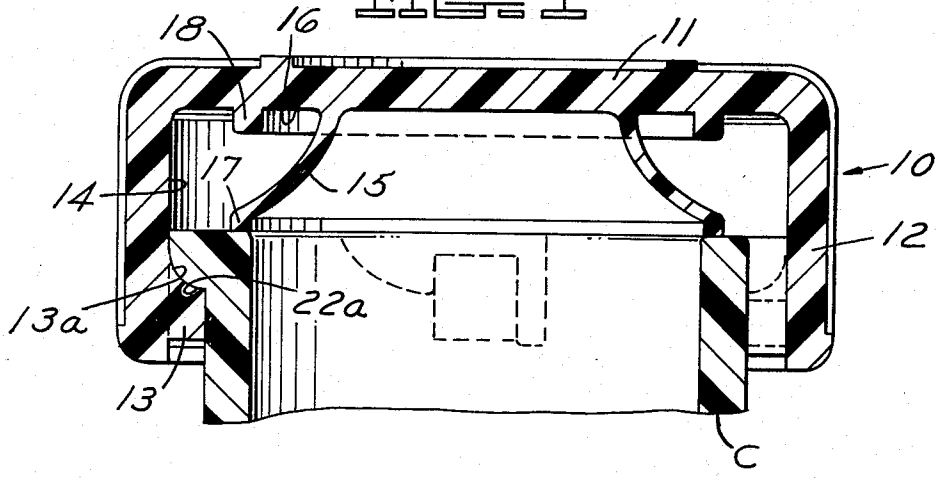

FIG. 2

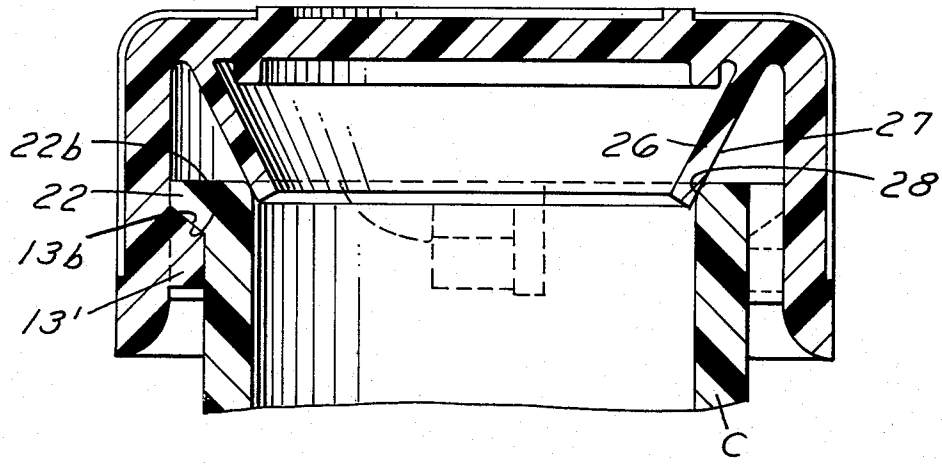

FIG. 3

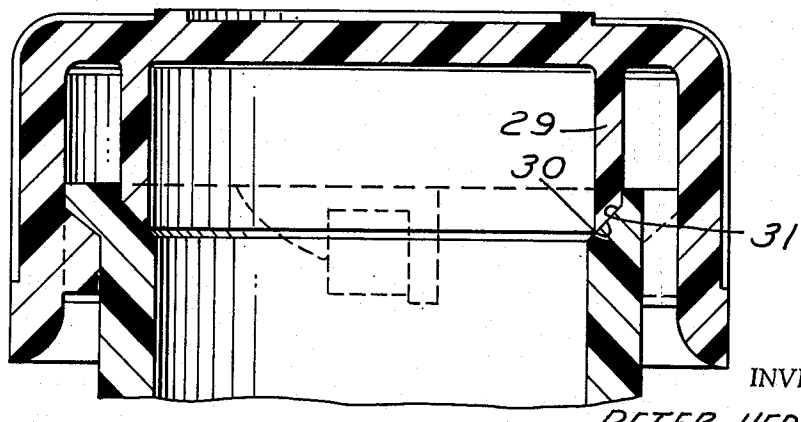

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FIG. 4

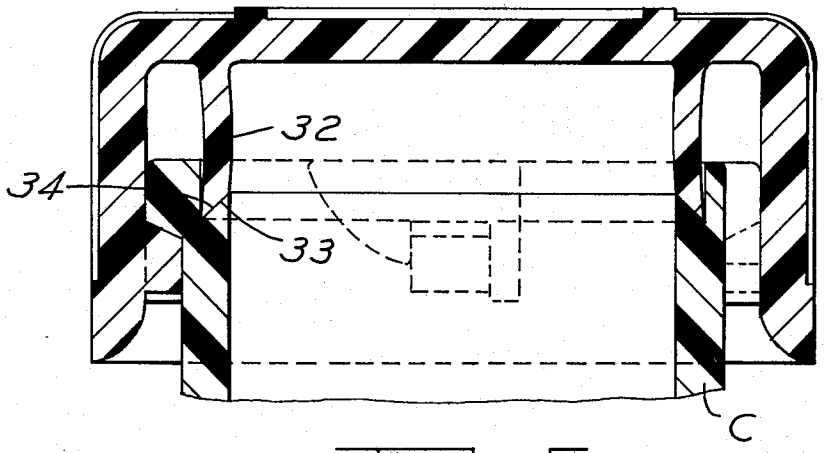


FIG. 5

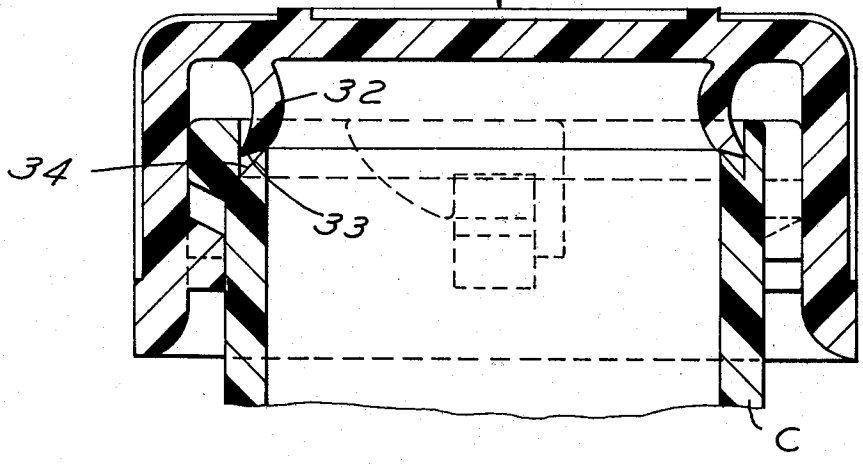


FIG. 6

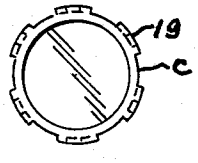


FIG. 7

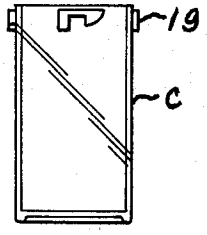
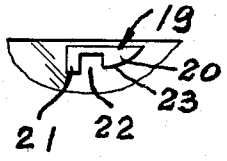


FIG. 8



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SAFETY PACKAGE

BACKGROUND OF THE INVENTION

This invention relates to safety caps and containers.

In the patent to Hedgewick U.S. Pat. No. 3,344,942, issued Oct. 3, 1967 there is disclosed and claimed a novel cap and container structure which cannot be readily opened by children, which is relatively simple and inexpensive and wherein the cap and container can each be molded in one piece.

The cap of the Hedgewick patent incorporates circumferentially spaced axial openings that overlie lugs on the cap that are adapted to engage notches on the container. The axially spaced openings make it possible to produce the cap in one piece.

Among the objects of the present invention are to provide a cap and container construction which is similar to that shown in the Hedgewick U.S. Pat. No. 3,344,942 but can be made in a mold in one piece without the use of circumferentially spaced openings overlying the lugs.

Among the objects of the present invention are to provide a cap and container construction which is similar to that shown in the Hedgewick U.S. Pat. No. 3,344,942 but in addition produces a moisture and vapor-tight seal. In the drawings:

FIG. **1** is a fragmentary vertical sectional view of a cap and container embodying the invention.

FIG. **2** is a fragmentary vertical sectional view of a modified form of cap and container.

FIG. **3** is a fragmentary vertical sectional view of a further modified form of cap and container.

FIG. **4** is a fragmentary vertical sectional view of a further modified form of cap and container.

FIG. **5** is a vertical sectional view similar to FIG. **4** showing the relative positions of the cap and container as the cap is being removed from the container.

FIG. **6** is a plan view of the container.

FIG. **7** is a side elevational view of the container.

FIG. **8** is a fragmentary side elevational view of the upper portion of the upper end of the container shown in FIG. **4.**

Referring to FIG. **1,** the invention comprises a cap **10** that is adapted to be applied to the upper end of a container C, each of which is molded by injecting plastic into a cavity.

As shown in FIG. **1,** the cap **10** includes a base **11** and a peripheral flange **12** extending axially of the axis of the cap. A plurality of radially inwardly extending lugs or locking elements **13** are provided on the inner surface **14** of the flange **12** adjacent the lower end thereof. An integral flexible resilient annular projection or web **15** extends generally axially and radially outwardly from adjacent the periphery of the inner surface **16** of the base **11** and is formed with an enlarged rib **17** on the free end thereof that is adapted to engage the upper end or rim of the container C. The web **15** has a lesser cross section intermediate its ends so that it will flex intermediate its ends upon application of an axial force. An integral annular rib **18** extends axially from the inner surface **16** of the base **11** in generally overlying relation to the free end of the web **15.**

The upper surface **13***a* of each lug **13** extends upwardly and outwardly at an angle to the horizontal and as shown is slightly concave. Such a construction permits the cap **10** to be molded in one piece in a mold and then stripped or snapped off the mold while the plastic

is still hot. The angle which the surface forms with the horizontal preferably ranges between 5° and 45°.

The container C is generally cylindrical at least at the upper end or mouth portion and preferably throughout so that it can be made in a single cavity one-piece mold. The container C is formed at its upper end with a plurality of outwardly extending radial projections or locking elements **19.** As shown in FIG. **8,** each radial projection **19** is formed with a first portion **20** and a circumferentially spaced second portion **21** to define a notch **22.** The lower surface **23** of the first portion **20** is tapered gradually downwardly and circumferentially to blend in a smooth curve with the side wall **24** of the notch **22.** The second portion **21** extends axially a greater distance from the upper end of the container to define the side **25** of the notch **22.**

The lower surface **22***a* of each notch **22** is formed with an upwardly and outwardly extending surface that is complementary to the surface of the lug **13,** that is, forms the same angle with the horizontal.

In order to assemble the cap **10** on the container C, the cap is applied to the upper end of the container. The cap is then rotated to bring the lugs **13** into engagement with the tapered surfaces **23** of the projections **19.** Further rotation of the cap causes the lugs to follow the surfaces **23** producing a flexing of the web **15** intermediate its free edge and its base until the lugs engage the notches **22.** In this position, the cap **10** is locked on the container C by the spring force of the web **15** and the bead **17** of the web **15** is in sealing engagement with the upper surface of the container C as shown in FIG. **1.** The base **11** of the cap **10** is of such a thickness that it will flex if a force is applied at the center of the base **11.** The area of juncture of the base of the web **15** and the base **11** of the cap substantially overlies the upper end of the container.

The cap cannot be removed by a simple rotation so that children are deterred, if not prevented, from removing the cap. In order to remove the cap, an axial force must be provided on the periphery of the cap in the direction of the arrow as shown in FIG. **1** to cause a flexing of the web **15** and permit the lugs **13** to move axially and thereby clear the portion **20** of the projections. After this axial force is applied, the cap can be turned in the direction of the arrow shown in FIG. **1** to permit its removal. Because of the flexible nature of the base **11** of the cap, the axial force must be provided on the periphery of the cap and not at the center of the cap. This force is most conveniently applied by pressing the container against the palm of the hand. In both applying and removing the cap, the rib **18** prevents overflexing of the web **15** beyond the elastic limit which might cause a loss of resiliency or spring action of the web. In applying the cap, the greater axial extent of the portion **21** prevents turning the cap beyond the notch **22.** In removing the cap, the greater axial extent of the portion **21** prevents rotating the cap in the wrong direction for removal.

The cap **10** is made of a suitable plastic material which provides the desired flexibility of the integral web **15.** A preferred material comprises polypropylene although other materials such as polyethylene can be used. The container C is also preferably made of a plastic. A preferred plastic material comprises a high impact styrene.

In the form of the invention shown in FIG. **2,** the annular flexible web **26** is of substantially uniform thickness and extends downwardly and inwardly from the

inner surface of the base of the cap exteriorly of the stop **18**. In this form, the lower edge of the annular web extends into the open upper end of the container and the outer surface **27** thereof engages the inner edge **28** of the upper end of the container. In addition, in this form, the upper surface **13***b* of each lug **13'** is straight and extends upwardly and outwardly and the notch **22'** has a complementary surface **22***b*.

In the form of the invention shown in FIG. **3**, the annular flexible projection **29** extends substantially axially downwardly from the inner surface of the base of the cap and has an inwardly tapered lower surface **30** that engages a complementary tapered lower surface **31** on the upper end of the container. In this form, the surfaces of each lug' and notch **22'** are similar to the form of the invention shown in FIG. **2**.

In the form of the invention shown in FIGS. **4** and **5**, the annular web **32** extends axially downwardly from the inner surface of the base of the cap and has an outwardly inclined lower edge **33** which engages an annular V-shaped shoulder or groove **34** on the upper end of the container. As shown in FIG. **5**, when the cap is depressed by applying force to the outer edge thereof, the web flexes inwardly intermediate its ends inwardly to permit movement of the cap sufficiently to cause the lugs **13'** to clear the notches **22'**.

I claim:

1. A one-piece, molded plastic safety cap of the type adapted to be applied to and removed from a container by axial motion followed successively by rotative motion relative to the container, said cap comprising: a base; a peripheral flange extending axially from said base for receiving the mouth of a container; a resilient flexible member surrounded by said flange having an inner annular end molded integrally to said base and extending axially therefrom and terminating in an outer annular free end, said free end being engageable with a container when the cap is mounted thereon; and a plurality of radially inwardly projecting locking lugs on the inner surface of said flange for engaging locking means on the mouth of a container received in the flange, said locking lugs having upwardly and radially outwardly extending surfaces.

2. A one-piece molded plastic safety cap as claimed in claim **1** wherein said upper surfaces of said locking lugs are curved concavely upwardly and outwardly from the upper edge of the inner surface thereof to merge with the inner surface of the flange.

3. A one-piece molded plastic safety cap as claimed in claim **2** wherein the upper surface of each of said locking lugs lies in a plane inclined upwardly from the upper edge of the inner surface of the lug to the inner surface of the flange.

4. A one-piece molded plastic safety cap as claimed in claim **1** wherein the diameter of the inner annular end of said resilient member is less than the diameter of the outer annular free end such that the resilient flexible member extends axially and radially outwardly from said base.

5. A one-piece molded plastic safety cap as claimed in claim **1** wherein the diameter of the inner annular end of said resilient flexible member is greater than the diameter of the outer annular free end such that the resilient flexible member extends axially and radially inwardly from said base.

6. A one-piece molded plastic safety cap as claimed in claim **1** wherein the diameter of the inner annular end of said resilient flexible member is the same as the diameter of the outer annular free end.

7. A one-piece molded plastic safety cap as claimed in claim **6** wherein said resilient flexible member is cylindrical.

8. A one-piece molded plastic safety cap as claimed in claim **7** wherein the outer annular free end of said resilient flexible member is tapered downwardly and outwardly from the inner surface of the resilient flexible member to the outer surface thereof.

9. A one-piece molded plastic safety cap as claimed in claim **7** wherein the outer annular free end of said resilient flexible member is tapered downwardly and inwardly from the outer surface of said resilient flexible member to the inner surface thereof.

10. A safety package for medicines and the like comprising: a container having a mouth portion with an annular rim; a one-piece molded plastic cap having a base with an integral peripheral flange projecting axially therefrom for receiving the mouth portion of said container; interengageable locking elements on the inner wall of the flange of the cap and the outer wall of the mouth of the container, the cap locking elements being engageable with and disengageable from the container locking elements by combined axial and rotative motion of the cap relative to the container; said cap locking elements and container locking elements being formed with complementary upwardly and radially outwardly extending mating surfaces; and a resilient flexible member on said cap having an inner annular end joined integrally to said base and extending axially therefrom and terminating in an outer annular free end; said outer annular free end being engageable with the container to bias the cap and container apart when the locking elements are engaged.

11. A safety package as claimed in claim **10** wherein the cap locking elements comprise a plurality of radially inwardly projecting locking lugs on the inner surface of said flange, and the container locking elements comprise a plurality of notches on the outer wall of the mouth of the container engageable by the locking lugs.

12. A safety package as claimed in claim **11** wherein said complementary upwardly and radially outwardly extending mating surfaces are defined by said locking lugs being curved concavely upwardly and outwardly to merge with the inner surface of the flange and the notch being complementarily, convexly curved upwardly and outwardly from the upper inner edge of the notch.

13. A safety package as claimed in claim **11** wherein said complementary upwardly and radially outwardly extending mating surfaces are defined by each of said locking lugs having a surface lying in a plane inclined upwardly and outwardly to the inner surface of the flange, and the notch being complementarily inclined upwardly and outwardly from the upper inner edge of the notch.

14. A safety package as claimed in claim **11** wherein the diameter of the inner annular end of said resilient flexible member is less than the diameter of the outer annular free end such that the resilient flexible member extends axially and radially outwardly from said base.

15. A safety package as claimed in claim **14** wherein the wall of said resilient flexible member has a portion of reduced thickness intermediate the inner annular end and the outer annular free end.

16. A safety package as claimed in claim **11** wherein the diameter of the inner annular end of said resilient

flexible member is greater than the diameter of the outer annular free end such that the resilient flexible member extends axially and radially inwardly from said base.

17. A safety package as claimed in claim **16** wherein the outer surface of said resilient flexible member engages the inner edge of said annular rim when the locking elements are engaged.

18. A safety package as claimed in claim **11** wherein the diameter of the inner annular end of said resilient flexible member is the same as the diameter of the outer annular free end.

19. A safety package as claimed in claim **18** wherein said resilient flexible member has a uniform cross section from the inner annular end to the outer annular free end.

20. A safety package as claimed in claim **19** wherein the outer annular free end of said resilient flexible member is tapered downwardly and inwardly from the outer surface of the resilient flexible member to the inner surface thereof, and the container rim has a complementary downwardly and inwardly tapered surface engageable thereby when the locking elements are engaged.

21. A safety package as claimed in claim **28** wherein the outer annular free end of said resilient flexible member is tapered downwardly and outwardly from the inner surface of the resilient flexible member to the outer surface thereof, and the inner surface of the mouth of the container is formed with an annular groove, said groove having a complementary surface tapered downwardly and outwardly from the inner wall of the mouth of the container engageable by the tapered surface of said outer annular free end.

22. A safety package comprising: a container having a mouth portion with an annular rim; a one-piece cap having a base with a peripheral flange projecting axially therefrom for receiving said mouth portion; interengageable locking elements on the outer wall of the mouth of the container and inner wall of the flange of the cap, the cap locking elements being spaced peripherally from each other and engageable with and disengageable from the container locking elements by combined axial and rotative motion of the cap relative to the container; a resilient flexible member formed on the base of the cap having an inner annular end joined integrally to the base of the cap and extending axially therefrom and terminating in an outer annular free end, said inner annular end at the juncture with the base having a diameter at least as large as that of the outer annular free end, said outer annular free end being engageable with the container to exert a biasing force in an axial direction between the cap and container when the locking elements are engaged; wherein the diameter of said inner annular end is greater than the diameter of the outer annular free end in the unstressed condition of the resilient flexible member such that the resilient flexible member extends axially and radially inwardly from the base.

23. A safety package as claimed in claim **22** wherein the outer surface of the resilient flexible member engages the inner edge of said annular rim.

24. A safety package comprising: a container having a mouth portion with an annular rim; a one-piece cap having a base with a peripheral flange projecting axially therefrom for receiving said mouth portion; interengageable locking elements on the outer wall of the mouth of the container and inner wall of the flange of the cap, the cap locking elements being spaced peripherally from each other and engageable with and disengageable from the container locking elements by combined axial and rotative motion of the cap relative to the container; a resilient flexible member formed on the base of the cap having an inner annular end joined integrally to the base of the cap and extending axially therefrom and terminating in an outer annular free end, said inner annular end at the juncture with the base having a diameter at least as large as that of the outer annular free end, said outer annular free end being engageable with the container to exert a biasing force in an axial direction between the cap and container when the locking elements are engaged; wherein the diameter of said inner annular end is the same as the diameter of said outer annular free end and said resilient flexible member is cylindrical: and wherein the outer annular free end of said resilient flexible member is tapered downwardly and outwardly from the inner surface of the resilient flexible member to the outer surface thereof, and the inner surface of the mouth of the container is formed with an annular groove, said groove having a complementary surface tapered downwardly and outwardly from the inner wall of the mouth of the container engageable by the tapered surface of said outer annular free end.

25. A one-piece molded plastic safety cap of the type adapted to be applied to and removed from a container by axial motion followed successively by rotative motioin relative to such container, said cap comprising: a base, a peripheral flange extending axially from said base for receiving the mouth fo a container; a plurality of peripherally spaced locking elements projecting from the inner surface of said flange; a resilient flexible member surrounded by said flange having an inner annular end molded to one of said flange and base and extending axially from said base and terminating in an outer annular free end, the diameter of said inner annular end being greater than the diameter of the outer annular free end in the unstressed condition of said resilient flexible member, said outer annular free end being engageable with a container when the cap is mounted thereon; and said flexible member comprising means for exerting an axial biasing force between the cap and container.

26. A one-piece molded plastic safety cap as claimed in claim **25** further including an integral annular stop member on the base of the cap projecting axially therefrom for engagement with the resilient flexible member to limit flexing of said resilient flexible member.

27. A one-piece molded plastic safety cap as claimed in claim **26** wherein the diameter of said inner annular end is greater than the diameter of said stop member.

28. A one-piece molded plastic safety cap of the type adapted to be applied to and removed from a container by axial motion followed successively by rotative motion relative to such container, said cap comprising: a base; a peripheral flange extending axially from said base for receiving the mouth of a container; a plurality of peripherally spaced locking elements on the inner surface of said flange; a resilient flexible member surrounded by said flange having an inner annular end molded to one of said flange and base and extending axially from said base and terminating in an outer annular free end, said inner annular end being molded to said base and the diameter of the inner annular end of said resilient flexible member being substantially the same as the diameter of the outer annular free end

wherein said resilient flexible member is cylindrical; the outer annular free end of said resilient flexible member being tapered downwardly and outwardly from the inner surface of the resilient flexible member to the outer surface thereof, and said outer annular free end being engageable with a container when the cap is mounted thereon, said flexible member comprising means for exerting an axial biasing force between the cap and container.

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