United States Patent [19]

Linkletter

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[45] **June 12, 1973**

[54] **SAFETY CLOSURE CAP**

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[21] Appl. No.: **216,712**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 27,268, April 10, 1970, abandoned.

[52] **U.S. Cl.** **215/9,** 215/95
[51] **Int. Cl.** **A61j 1/00**
[58] **Field of Search** 215/9, 95, 41

[56] **References Cited**

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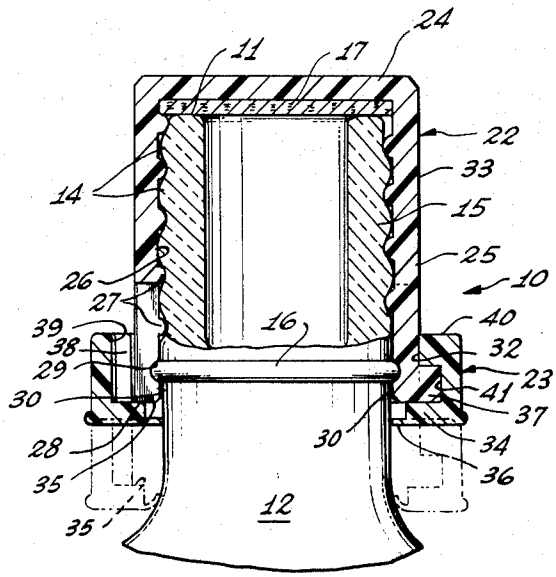
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Primary Examiner—George T. Hall
Attorney—John D. Bauersfeld

[57] **ABSTRACT**

A container safety closure cap having a closure member formed of a generally rigid material which can be locked in place on the container by a locking ring. The closure member has a peripheral lip which fits under a bead on the container, and the locking ring engages the closure member to hold the peripheral lip under the bead. Cooperating projections and grooves are carried by the closure member and locking ring to securely lock the locking ring to the closure member and prevent the closure member from being removed from the container without first unlocking the two members.

17 Claims, 11 Drawing Figures



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Fig. 2

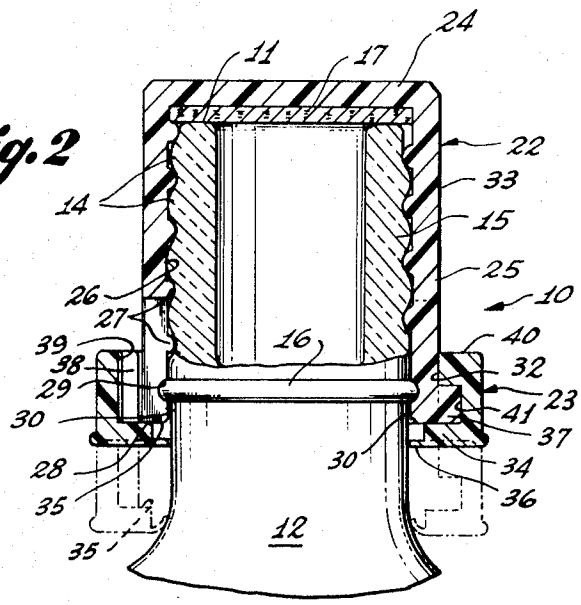


Fig. 1

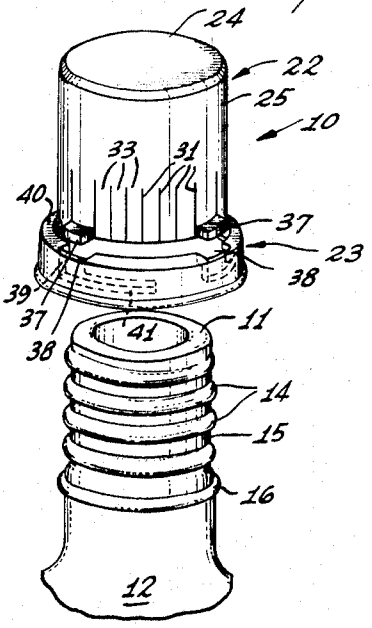


Fig. 3

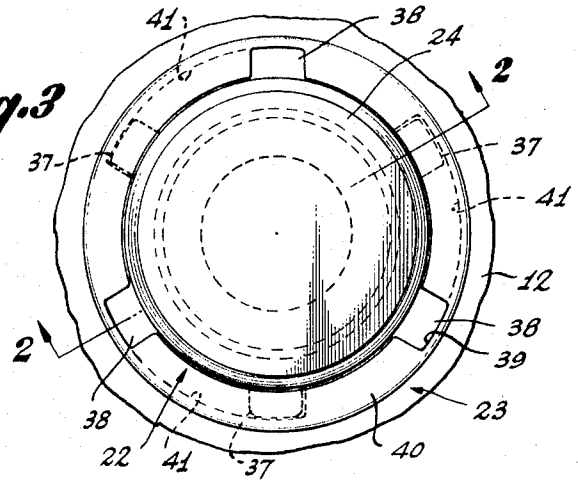


Fig. 4

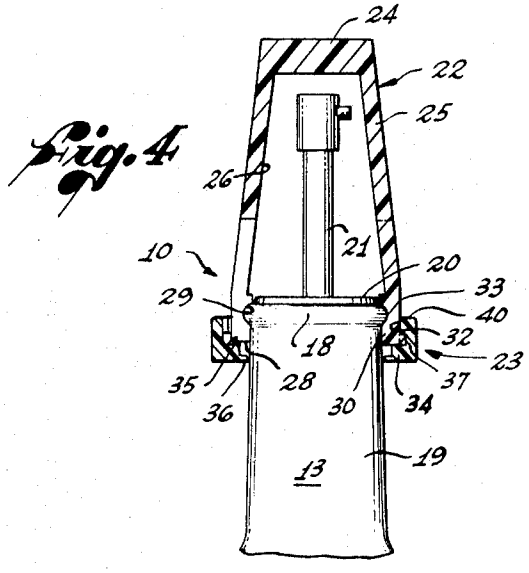
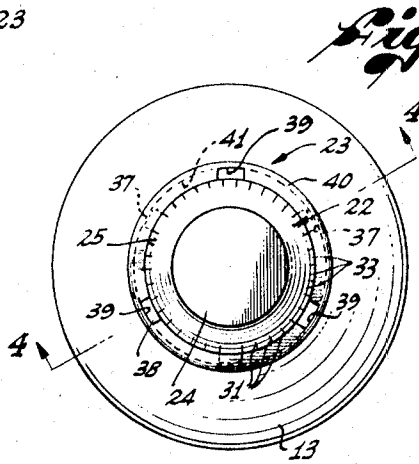


Fig. 5



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SAFETY CLOSURE CAP

This application is a continuation-in-part of my copending application, Ser. No. 27,268 now abandoned, filed Apr. 10, 1970 and the invention relates to closure caps for containers and, more particularly, to a new and improved safety closure cap construction for containers such as bottles and jars.

BACKGROUND OF THE INVENTION

With increased emphasis being placed on safety devices for containers used to store potentially harmful substances such as chemicals and drugs, there exists a need for a new and improved safety closure cap which is simple in structure, low in cost of manufacture and reliable in use. One such safety closure cap is that disclosed in U.S. Pat. No. 3,450,290, issued on June 17, 1969. The present invention constitutes an improvement over one aspect of that patent.

Many situations arise wherein a rigid closure cap must be used for drug or chemical containers. While the invention of the before-mentioned patent finds utility in many of these situations, there still remain a number of instances wherein more rigid safety closures must be used. For example, the closure caps used with aerosol or spray containers must perform the dual function of affording protection for the spray valve during storage or shipping, as well as acting as a closure cap. Similarly, many liquid containers require threaded couplings with the closure cap to ensure that a fluid-tight seal is made between the closure cap and the container. In such situations, a relatively rigid closure structure must be used to provide a high degree of clamping for a fluid-tight fit between the container and closure.

From the above, it is apparent that there exists a need for a rigid safety closure cap for containers which is simple in structure, low in cost of manufacture and yet effective to ensure that the closure will not be readily removed by a child. The present invention solves this need in a highly reliable and efficient manner, as explained hereafter.

SUMMARY OF THE INVENTION

The present invention provides a generally rigid safety closure cap, primarily intended for use with containers such as bottles and jars, which is simple in structure, low in cost of manufacture and highly reliable and efficient in use.

More specifically, the invention comprises a safety closure cap which includes a generally rigid closure member having means for permitting a portion of the closure member to flex and seat in engagement with a peripheral bead carried by the container, and a locking ring which engages the closure member to lock it in position engaged with the peripheral bead to securely hold the closure member in position. Further, the invention includes a releasable coupling means for locking the locking ring to the closure member, whereby the locking ring cannot be removed from engagement with the closure member without first unlocking the coupling means.

It is therefore an object of the present invention to provide a generally rigid safety closure cap for containers which is simple in structure, low in cost of manufacture and reliable in use. It is a further object of this invention to provide a generally rigid safety closure cap which can be securely locked in place on the container, and which cannot be easily removed by a child or one unfamiliar with the closure cap operation.

The many features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings which disclose, by way of example, the principles of the invention and the best modes which have been contemplated of applying these principles.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view of one embodiment of the safety closure cap of the present invention;

FIG. 2 is a sectional view of the assembled safety closure cap of FIG. 1 locked on a threaded container and taken substantially along line 2—2 of FIG. 3;

FIG. 3 is a top plan view of the safety closure cap of FIG. 2;

FIG. 4 is a sectional view of another embodiment of the safety closure cap of the invention as applied to a spray container and taken substantially along line 4—4 of FIG. 5;

FIG. 5 is a top plan view of the safety closure cap of FIG. 4;

FIG. 6 is a cross-sectional view of a third embodiment of a safety closure cap in accordance with the invention, and shown assembled on a threaded container similar to that of FIGS. 1 through 3;

FIG. 7 is an exploded perspective view, reduced in size of the safety closure cap of FIG. 6 showing the locking ring and closure member before assembly on to the container;

FIG. 8 is a top plan view of the closure member of FIG. 7;

FIG. 9 is a fragmentary sectional view taken along line 9—9 of FIG. 7 but with the locking ring and closure member shown assembled on the container;

FIG. 10 is a cross-sectional view taken along line 10—10 of FIG. 6 with the locking ring in the unlocked position to allow removal of the closure member; and

FIG. 11 is a cross-sectional view similar to FIG. 10 but showing the locking ring in the locked position to prevent removal of the closure member.

DETAILED DESCRIPTION

As shown in the drawings, the present invention is embodied in a new and improved safety closure cap 10 for containers such as bottles and jars. In the embodiments of FIGS. 1 to 3 and 6 through 11, the safety closure cap 10 is used to close the top 11 of a threaded bottle 12 and, in the embodiment of FIGS. 4 and 5, a spray container 13.

In the embodiments of FIGS. 1 to 3 and 6 through 11, the bottle 12 is preferably made of glass and has threads 14 around a portion of the bottle neck 15 below the top 11, and a peripheral bead 16 which projects outwardly from the bottle neck below the threads. Preferably, a suitable sealing disc 17 fits within the safety closure cap 10 and overlies the top 11 of the bottle 12 when the safety closure cap is in use.

In the embodiment of FIGS. 4 and 5, the spray container 13 has a peripheral bead 18 projecting outwardly from the neck 19 just below the top 20, and carries a conventional spray device 21 which extends upwardly above the top of the spray container. In this embodiment, the spray container 13 is preferably made of

metal, although it should be appreciated that any rigid or semi-rigid material can be used to form the container of any of the illustrated embodiments, the only structural requirement for the container being that the container have a rigid peripheral bead around a portion of the neck below the top.

In accordance with the present invention, the safety closure cap **10** is simple in structure and inexpensive in cost of manufacture, yet is highly reliable and efficient in use. Toward these ends, the safety closure cap **10** includes a generally rigid closure member **22** having means for allowing a portion of the closure member to flex, and a locking ring **23** which is adapted to securely lock the closure member in position on the container.

Referring primarily to the embodiment of FIGS. **1** to **3**, the closure member **22** includes a cap section **24** from which depends a skirt section **25** having an inner wall **26** with internal threads **27** which mate with the threads **14** of the bottle **12**. Near the lower end **28** of the skirt **25**, a circumferential groove **29** extends around the inner wall **26**, and is of a size and shape sufficient to mate with and engage around the bead **16** on the container neck **15**. The portion of the skirt **25** below the circumferential groove **29** forms a peripheral lip **30**, which extends inwardly and is adapted to seat under the bead **16** on the bottle neck **15** when the closure member **22** is threaded onto the bottle **12**.

As mentioned before, the closure member **22** is formed from a generally rigid material, for example high density polyethylene, polypropylene or nylon, which normally will not be flexible to an extent sufficient to allow the lip **30** to move over the bead **16** on the bottle neck **15**. In order to enable the lip **30** to move over the bead **16**, a plurality of slits **31** are formed through the lower portion of the skirt **25**.

Each slit **31** extends upwardly from the lower end **28** of the skirt **25** to a point above the lip **30** and the circumferential groove **29**, but substantially below the cap section **24**. The slits **31** significantly increase the flexibility of the lower portion of the skirt **25** but do not affect the rigid characteristics of the skirt above the slits or the cap section **24**. As the closure member **22** is threaded onto the bottle **12** and the lip **30** engages the bead **16**, the lower portion of the skirt **25** will flex as independent fingers **33** due to the slits **31**, and will expand radially outwardly and allow the lip to pass over the bead. Due to the rigid and resilient characteristics of the material from which the closure member **22** is formed, the lower finger-like portion **33** of the skirt **25** will contact after the lip **30** has moved over the bead **16** and the circumferential groove **29** will engage around the bead with the lip seated below the bead, as illustrated in FIG. **2**.

The locking ring **23** performs the function of holding the lip **30** in position under the bead **16** after the closure member **22** has been threaded onto the bottle **12**. As seen in FIGS. **1** and **2**, the locking ring **23** is generally cylindrical in shape and has an inside upper surface **32** dimensioned to slidably engage the outside lower wall of the skirt **25** of the closure member **22**. A lower section **34** of the locking ring **23** projects radially inwardly, to an extent sufficient to allow a portion of the upper edge **35** to engage the lower end **28** of the closure member **22** when the locking ring is moved into engagement with the skirt **25**, and serves to prevent the locking ring from passing completely over the closure member.

Typically, the locking ring **23** will be formed from the same material used to form the closure member **22**, although it should be appreciated that most rigid or semi-rigid materials can be used. In order to keep the locking ring **23** from sliding off the bottle **12** when the locking ring is not in use and the bottle is tipped, a small inwardly projecting circumferential flange **36** is formed around the lower section **34** of the locking ring. Preferably, the flange **36** will have an inside diameter less than the outside diameter of the bead **18** on the bottle neck **15**, and will be flexible to allow the flange to move over the bead when the locking ring **23** is initially positioned on the bottle **12**, and to flex when the locking ring is moved away from the closure member **22**, as illustrated by the dashed lines of FIG. **2**.

The closure member **22** is also provided with a plurality of small radial projections **37** which engage cooperating lock grooves **38** carried by the locking ring **23**. The projections **37** and lock grooves **38** form a releasable coupling means for securely locking the locking ring in engagement with the closure member. In this instance, three generally rectangular projections **37** (best seen in FIGS. **1** and **3**) are carried by the closure member **22** and extend outwardly from the lower outer wall of the skirt **25** opposite the lip **30**.

The lock grooves **38** carried by the locking ring **23** are formed along the inside upper surface **32**, with each lock groove having an axial portion **39** which extends downwardly from the upper end **40** of the locking ring, and a peripheral portion **41** which extends at a right angle from the axial portion. In the embodiment of FIGS. **1** to **3**, each peripheral portion **41** extends only a short distance from the axial portion **39** in a direction opposite to the screw-on pitch direction of the threads **27** of the closure member **22**, so that when the locking ring **23** is locked to the closure member, any attempted rotation of the closure member in a direction to remove the closure member from the bottle **12** will not result in the turning of the projections **37** into the axial portions of the lock grooves **38**.

When the safety closure cap **10** is to be initially applied to the bottle **12**, the locking ring **23** is positioned over the bottle top **11**, as illustrated in FIG. **1**, and is then pushed downwardly around the bottle neck **15** to the dashed line position of FIG. **2**. Then, the closure member **22** is threaded onto the bottle **12** until the lip **30** has seated under the bead **16** on the bottle neck **15**.

In the embodiment of FIGS. **1** to **3**, the closure member **22** will preferably be proportioned and constructed so that the cap section **24** will press the sealing disc **17** tightly against the top **11** of the bottle **12** when the circumferential groove **29** has fully engaged the bead **16** and the lip **30** has seated and thereby make a fluid tight seal between the bottle and the closure member. In the embodiment of FIGS. **4** and **5**, the closure member **22** will preferably be proportioned and constructed so that the cap section **24** and the upper portion of the skirt **25** will enclose the spray device **21** above the top **20** of the spray container **13** to provide protection for the spray device during shipping and storage.

With the locking ring **23** in the dashed line position of FIG. **2**, after the closure member **22** has been threaded onto the bottle **12** and the lip **30** has seated under the bead **16**, the axial portions **39** of the lock grooves **38** of the locking ring are aligned with the projections **37**, and the locking ring is moved upwardly so that the projections move into the axial portions. The

locking ring 23 is then rotated so that the projections 37 move through the peripheral portions 41 of the lock grooves 38 to the solid line position of FIG. 2.

In the position illustrated in FIGS. 2 and 3, the inside upper surface 32 of the locking ring 23 is engaged with the outside lower wall of the skirt 25, and the upper edge 35 of the lower section 34 of the locking ring is engaged with the lower end 28 of the closure member 22. Once the locking ring 23 has been positioned and locked in engagement with the closure member 22, the closure member cannot be removed from the bottle 12 since the locking ring will prevent the fingers 33 and the lip 30 from expanding outwardly to move over the bead 16 on the bottle neck 15. Thus, with the locking ring 23 securely locked in engagement with the closure member 22, the closure member cannot be removed until the locking ring is first unlocked and pushed downwardly off the closure member.

In the embodiment of FIGS. 4 and 5, the closure member 22 performs the dual function of being a safety closure cap for the spray container 13, and of affording protection for the spray device 21 during the storage and shipping. This embodiment is generally similar in structure to that of the safety closure cap 10 of FIGS. 1 to 3, although no sealing disc 17 is provided, and the closure member 22 of FIGS. 4 and 5 does not have internal threads 14 on the skirt 25 as in the case of the embodiment of FIGS. 1 to 3.

In the embodiment of FIGS. 4 and 5, the closure member 22 is tapered slightly and has a plurality of slits 31, which, like the embodiment of FIGS. 1 to 3 form fingers 33 enabling the lip 30 to expand over the peripheral bead 18 formed just below the top 20 of the spray container 13. The locking ring 23 in this embodiment has a configuration substantially like that of the embodiment of FIGS. 1 to 3, although the peripheral portion 41 of the lock groove 38 is continuous around the locking ring 23, and is similarly used to hold and lock the closure member 22 on the spray container 13. To apply the safety closure cap 10 to the spray container 13, the locking ring 23 is pushed over the neck 19 and the closure member 22 is then pressed over the top 20 so that the lip 30 moves over and engages the underside of the bead 18. Then, after the closure member 22 is in position, the lock grooves 38 of the locking ring 23 are aligned with the projections 37, as mentioned before with reference to the embodiment of FIGS. 1 to 3, and the locking ring is moved upwardly into engagement with the skirt 25 and then turned to the locked position. Once locked, the locking ring 23 is freely rotatable relative to the closure member 22 and cannot be removed until it is first rotated so that the axial portions 39 of the lock grooves 38 are aligned with the projections 37.

FIGS. 6 through 11 illustrate a third embodiment for locking the closure member to the container wherein the locking ring is mounted on the closure member for rotational movement only. Parts of this embodiment which correspond with similar parts previously described in connection with the description of FIGS. 1 through 5 have been indicated with corresponding primed reference numerals.

Referring primarily to FIGS. 6 and 7, the locking ring 23' is rotatably mounted around the lower portion of the skirt 25' and supported therearound by the upper ends of the projections 38'. The locking ring 23' has a generally L-shaped vertical cross-section with the leg 42 supported on the upper ends of the projections and the base 43 projecting downwardly circumferentially around the projections 37'.

The inside surface 44 of the base 43 is dimensioned to abut the outer surfaces of the projections 37' which herein comprise generally rectangular raised members or lugs integrally formed on the skirt 25' and extending upwardly a short distance from the lower end 28' of the closure member 22'. In all the one preselected rotary position, the locking ring 23' engages the projections 37' to prevent radially outward flexing of the fingers 33' of the skirt 25', thereby locking the lip 30' in place below the bead 16'.

To allow expansion of the skirt 25', a series of grooves 38' are formed in the inside surface 44 of the base 43, as best seen in FIGS. 10 and 11. The grooves 38' are angularly spaced from each other and dimensioned in such a manner that when the locking ring 23' is in one preselected rotary position, the projections 37' are aligned with the grooves and can expand radially into the grooves. In all other rotary positions of the locking ring 23', however, the inside surface 44 will prevent expansion even though one or more grooves 38' are opposite the projections 37'.

As shown in FIGS. 6, 7 and 9, arcuate guide ribs 45 are provided around the outer surfaces of the projections 37' and a corresponding arcuate groove 46 is formed in the inner surface 44 of the locking ring 23' to allow smooth rotation of the ring about the closure member 22'. The locking ring 23' is restricted against upward movement relative to the closure member 22' by a series of small tabs 47 which project outwardly from the skirt 25' and abut against the upper end 48 of the leg 42 of the ring.

To assemble the locking ring 23' on the closure member 22', the ring is slipped downwardly around the skirt 25' as indicated by the arrow 49 of FIG. 7. The tabs 47 are made sufficiently flexible to permit the locking ring 23' to snap over them and seat in place against the upper surfaces of the projections 37'. The closure member 22' can then be placed on the container 12' and locked in position by initially aligning the locking ring 23' in the preselected position with the projections 37' and grooves 38' opposite each other and then rotating the ring to misalign the projections and grooves. To facilitate alignment, suitable indicia (not shown) can be provided on the locking ring 23' and closure member 22'.

With any of the embodiments illustrated in FIGS. 1 through 11, once the safety closure cap 10 has been locked in position on the container, it cannot be removed without first having knowledge of the specific operation of the locking ring 23. Any attempted rotation of the threaded closure member 22, without first unlocking and disengaging the locking ring 23, will not remove the closure member and, similarly, a simple pull on the unthreaded closure member will fail to remove it from its associated container.

Thus, the present invention provides a new and improved rigid safety closure cap 10 which is simple in structure yet reliable in operation, and which securely locks the closure member to the container so that the closure member cannot be easily removed by a child or one unfamiliar with its operation. Further, by virtue of the simplified construction, the safety closure cap 10 is inexpensive to manufacture and can be repeatedly used without affecting the rigid characteristics of the closure

member 22 or reducing the overall efficiency of the safety closure cap.

While the description above has been directed to the presently preferred embodiments of this invention, it should be apparent that modifications and variations therein may be effected without departing from the spirit and scope of the novel concepts of this invention as set forth by the following claims.

I claim:

1. A safety closure cap for a container of the type having a neck defining an open mouth, and a peripheral bead projecting outwardly around a portion of the neck below the mouth, said closure cap including:

a rigid closure member comprising:

a cap section adapted to overlie the mouth of the container;

and a rigid skirt section depending from said cap section, said skirt section having an inwardly projecting lip adjacent the lower end adapted to seat under the bead;

means for enabling said skirt section to expand radially in the area of said lip whereby said lip can pass over the bead;

a locking ring member surrounding a portion of said skirt and movable relative thereto between first and second positions, said ring engaging said skirt in the area of said expansion means to restrict expansion thereof and hold said lip under the bead in said first position;

and releasable means for locking said ring in said first position, said releasable means comprising at least one radial projection on one of said members and at least one cooperating groove in the other of said members, said projection and groove being selectively alignable and misalignable upon angular movement of said ring relative to said skirt to lock and unlock said ring in said first position.

2. A closure cap as defined in claim 1, wherein said means for enabling said skirt to expand comprise a plurality of slits through said skirt, and extending upwardly from the lower end of said skirt to a point above said lip and below said cap section.

3. A closure cap as defined in claim 2, wherein said skirt has internal threads extending downwardly from said cap section to a point above said lip.

4. A closure cap as defined in claim 1, wherein:

said projection extends outwardly from said skirt opposite said lip;

and said groove is in said ring and is adapted to receive said projection when said ring is engaged with said skirt thereby to securely lock said ring in engagement with said skirt.

5. A closure cap as defined in claim 4, wherein said groove includes a first portion extending downwardly from the upper end of said ring, and a second portion extending laterally from said first portion and along the inner periphery of said ring whereby said projection enters said first portion when said ring is positioned in engagement around said skirt and said ring can then be rotated to move said projection into said second portion.

6. A closure cap as defined in claim 4, wherein said means for enabling said skirt to expand comprise a plurality of fingers formed on said skirt and extending upwardly from the lower end of said closure member to a point above said lip and below said cap section.

7. A safety closure cap as defined in claim 1, wherein:

said projection is carried by said skirt and extends radially outwardly opposite said lip;

and said groove is in the inner surface of said ring.

8. A closure cap as defined in claim 7 in which said groove in said ring is adapted to receive said projection when said projection and groove are aligned thereby to unlock said ring and allow expansion of said skirt.

9. A closure cap as defined in claim 8, wherein:

said ring is rotatably mounted on said closure member;

and a plurality of projections and grooves are provided, said ring being locked in said first position when at least one of said projections and grooves is misaligned.

10. A safety closure cap as defined in claim 7, wherein said groove includes an axial portion and a peripheral portion whereby said projection is positioned into said axial portion by aligning said projection with said axial portion and moving said ring into engagement with said skirt, and said ring is then rotated relative to said skirt to move said projection into said peripheral portion thereby locking said ring in engagement with said skirt.

11. A safety closure cap as defined in claim 10, wherein said ring has a generally flexible inwardly projecting circumferential flange having an internal diameter less than the external diameter of said bead.

12. A safety closure cap for closing a container of the type having a neck defining an open mouth, and a peripheral bead projecting outwardly around a portion of said neck below said mouth, said closure cap including:

a rigid closure member to be positioned on said container, comprising:

a cap section adapted to overlie said mouth;

a generally cylindrical and rigid skirt section depending from said cap section;

an inwardly projecting lip formed adjacent the lower end of said skirt and adapted to seat under said bead;

and a plurality of slits extending through said skirt upwardly from the lower end of said closure member to a point above said lip and below said cap section whereby said skirt can expand radially outwardly in the area of said lip as said closure member is positioned on said container and said lip passes over said container bead;

a locking ring movable relative to said skirt and dimensioned to surround and engage a portion of said skirt adjacent said lip whereby said ring can be engaged with said skirt to hold said lip in position under said bead when said closure member is in position on said container;

and releasable locking means for locking said ring in engagement with said skirt whereby said closure member cannot be removed from said container without releasing said locking means and moving said ring out of engagement with said skirt, said locking means comprising:

at least one radial projection carried by said closure member;

and at least one cooperating groove carried by said ring, said projection and groove being selectively alignable and misalignable upon angular movement of said ring relative to said skirt to lock and unlock said ring in engagement with said skirt.

13. A safety closure cap as defined in claim 12, wherein said container has external threads and said

closure member has mating internal threads carried by said skirt and extending downwardly from said cap section to a point above said lip.

14. A safety closure cap as defined in claim **12**, wherein said skirt has a circumferential groove above said lip, said circumferential grove being adapted to receive and engage around said bead to seat said lip under said bead.

15. A safety closure cap for closing a container of the type having a neck defining an open mouth, and a peripheral bead projecting outwardly around a portion of said neck below said mouth, said closure cap including:

a rigid closure member to be positioned on said container, comprising:

a cap section adapted to overlie said mouth;

a generally cylindrical and rigid skirt section depending from said cap section;

an inwardly projecting lip formed adjacent the lower end of said skirt and adapted to seat under said bead;

and a plurality of slits extending through said skirt upwardly from the lower end of said closure member to a point above said lip and below said cap section whereby said skirt can expand radially outwardly in the area of said lip as said closure member is positioned on said container and said lip passes over said container bead;

a locking ring rotatable relative to said skirt and dimensioned to surround and engage a portion of said skirt adjacent said lip whereby said ring can be engaged with said skirt to hold said lip in position under said bead when said closure member is in position on said container;

and releasable locking means for locking said ring in engagement with said skirt whereby said closure member cannot be removed from said container without releasing said locking means, said locking means comprising:

a plurality of radial projections carried by said closure member;

and a plurality of cooperating grooves in said ring, said projections and grooves being selectively alignable and misalignable upon angular rotation of said ring relative to said skirt to lock and unlock said ring in engagement with said skirt.

16. A closure cap as defined in claim **15** in which said ring is locked in engagement with said skirt when at least one of said projections is misaligned with its cooperating groove.

17. A closure cap as defined in claim **16** in which said projections comprise lugs spaced around said skirt opposite said lip and said grooves comprise cut-out portions formed in the inner periphery of said ring.

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