United States Patent [19]

Taylor

[11] **3,729,110**

[45] **Apr. 24, 1973**

[54] SAFETY CLOSURE FOR VIALS

[76] Inventor: **Clarence R. Taylor,** 28 Woodside Dr., Penfield, N.Y. 14526

[22] Filed: **Feb. 25, 1971**

[21] Appl. No.: **118,673**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 89,872, Nov. 16, 1970, abandoned.

[52] **U.S. Cl.** **215/9,** 215/95

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

[58] **Field of Search** 215/9, 42, 95–96

[56] **References Cited**

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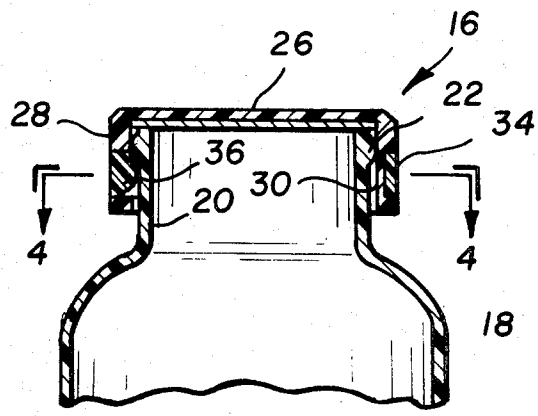
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Primary Examiner—George T. Hall
Attorney—Steve W. Gremban

[57] **ABSTRACT**

A safety closure for containers such as vials or the like, each having a preferably tubular mouth with an outer peripheral rim. The safety closure comprises a cup-shaped cap mountable on the mouth and having a projection that is movable between a normal unlatched position in which the projection is free to move in a radial direction and hence does not prevent removal of the cap from the mouth, and a latched position in which the projection is locked in place behind and in alignment with the rim and prevents removal of the cap from the mouth. The surfaces of the projection and rim are preferably shaped to interact and provide a camming action for positively forcing the cap into sealing engagement with the mouth.

9 Claims, 19 Drawing Figures



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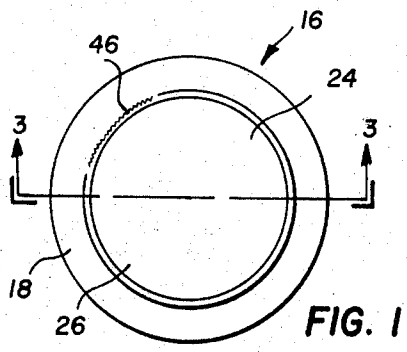


FIG. 1

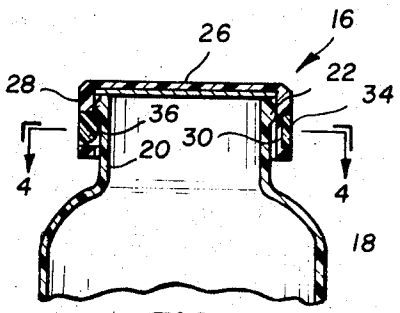


FIG. 3

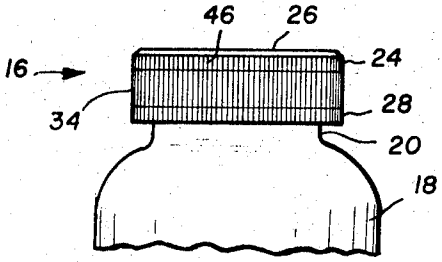


FIG. 2

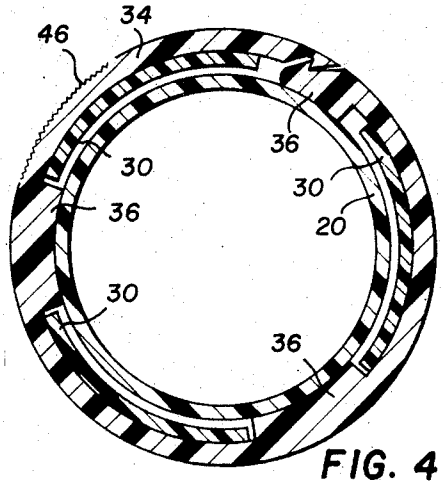


FIG. 4

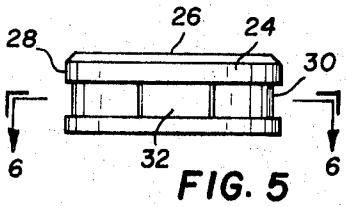


FIG. 5

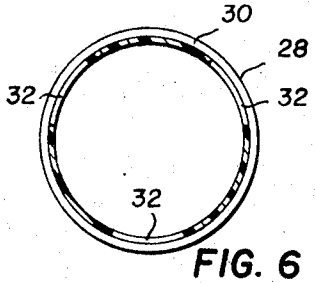


FIG. 6

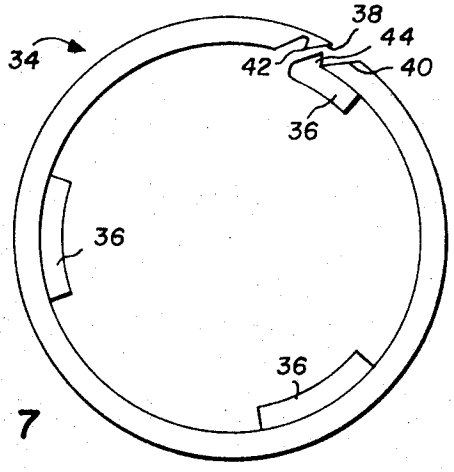


FIG. 7

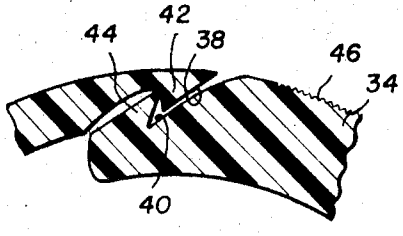


FIG. 8

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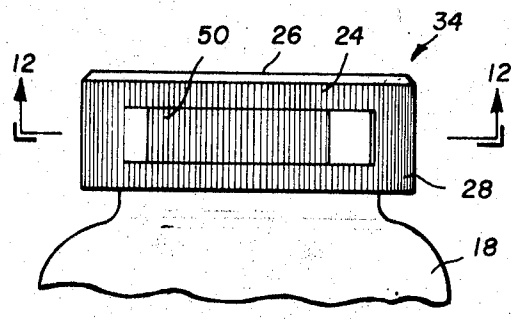


FIG. 11

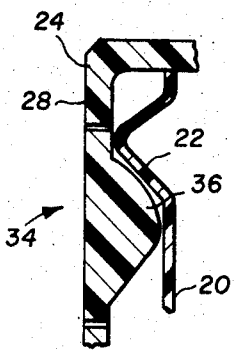


FIG. 9

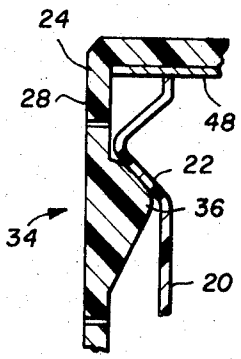


FIG. 10

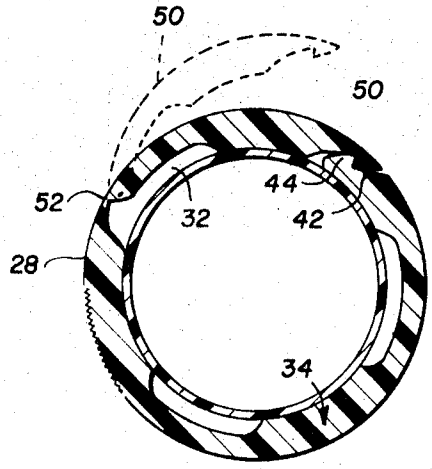


FIG. 12

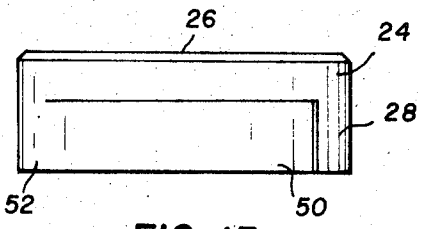


FIG. 13

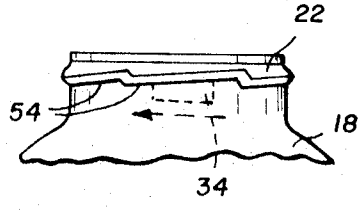


FIG. 14

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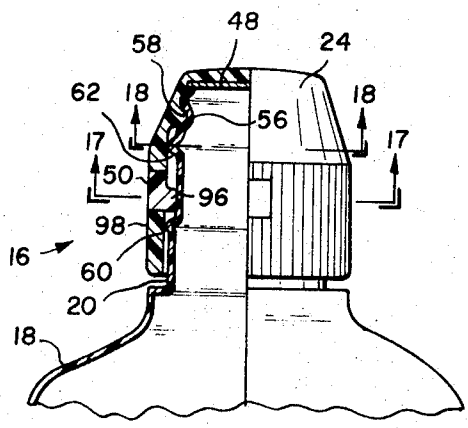


FIG. 15

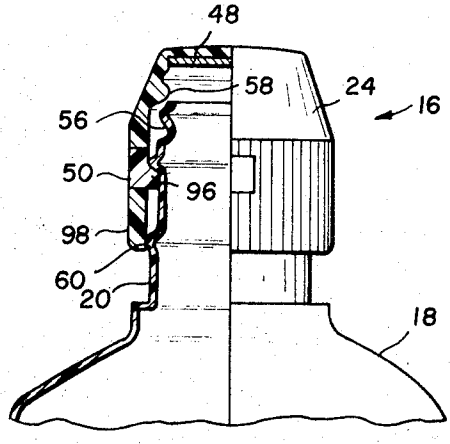


FIG. 16

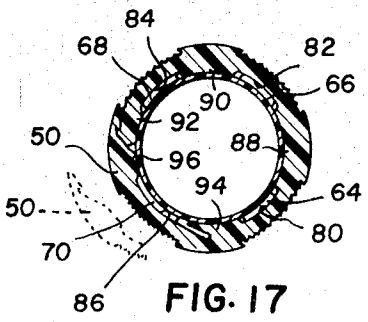


FIG. 17

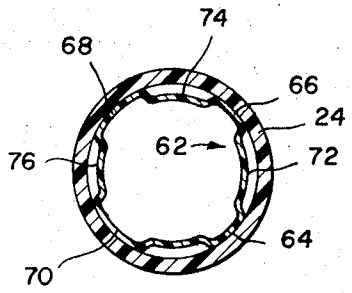


FIG. 18

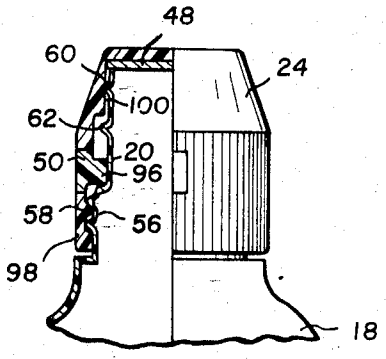


FIG. 19

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SAFETY CLOSURE FOR VIALS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of application Ser. No 89,872, now abandoned, entitled "Safety Closure for Vials," filed Nov. 16, 1970, in the name of Clarence R. Taylor. Reference is also made to co-pending U.S. Pat. application Ser. No 30,037, entitled "-Safety Closure for a Vial," filed Apr. 20, 1970, in the name of Clarence R. Taylor.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to safety closures, and more specifically to a safety closure for a vial or the like that may not be readily removed by a child.

2. Description of the Prior Art

The great advances made in the field of medicine have been accompanied by a tremendous growth in the variety and types of drugs and medicines available to and stocked by members of the public. Many of these drugs, which are normally dispensed in small capped bottles, are beneficial when taken in the proper recommended dosage, but may be exceedingly dangerous if consumed in quantities that are too large. The simple aspirin tablet, which may be helpful for alleviating headaches, is a good example of such a drug. Also, medicinal liquids are available on the market that may be safe if applied to various parts of the human body, but may be exceedingly dangerous or poisonous if taken internally. The availability of the aforementioned medicinal drugs to small children, who are unaware of the potential danger of these drugs, presents a hazard and a threat to their lives. In this day and age, with the increased number and variety of available potentially dangerous drugs on the market, young children have greater exposure to such drugs than at any other time in history.

One of the containers for drugs presently being used is a vial of the type having a tubular mouth with or without threads provided with an outer peripheral rim, and a flexible cap having a cooperating inner peripheral bead that may be manually pressed past the rim to close the vial and manually pulled from the vial to remove the cap. During the pressing action to close the vial, the cap is deformed radially outwardly as the cap bead passes over the vial rim, and regains its normal shape due to its resilience, placing the cap bead behind and in alignment with the rim of the vial so that the cap cannot be readily removed. To remove the cap, the cap must be pried or pulled upwardly, deforming the cap as the cap bead is forced past the rim. The removal of such a cap from a vial is normally not too difficult and may be done by children, who can then partake of the contents thereof. Applicant's invention is believed to eliminate the aforementioned potential danger to children by providing a safety closure for a vial or the like which an adult may readily mount on or remove from the vial or bottle, but once the cap is mounted, it may not be readily removed by a child.

Safety closures for containers or the like are well known in the art and of varied design as shown in the July, 1969, issue of *Modern Packaging* on pages 70–75, ranging from the type in which the cap must be depressed downwardly and removed, or downwardly

and turned, to the type in which the cap is removed by thumb pressure exerted upwardly on the cap or by a pull tab integral with the cap.

SUMMARY OF THE INVENTION

The invention includes within its scope a safety closure for a vial or the like of the type having a tubular mouth, threaded or unthreaded, provided with an outer peripheral rim. The safety closure comprises a cup-shaped cap that may be releasably mounted over the mouth and rim. In one modification of the invention, the cap has a notch or opening extending through the side thereof and an annular ring supported by the cap and movable between latched and unlatched positions. In the unlatched position of the ring, a projection thereon which normally extends through the opening in the cap is free to move in a radial direction or to be withdrawn from the opening completely, thereby permitting the cap to be withdrawn from the mouth and rim. In the latched position of the ring, the projection is locked in place behind and in alignment with the rim and prevented from moving a radial direction. Accordingly, the cap and projection cannot be forced past the rim and hence are prevented from being removed from the mouth. In another embodiment of the invention, the cap is provided with a pivotal arm preferably integral with the cap and having a projection and a latch at one end. In another embodiment of the invention, the rim on the mouth is provided with a series of ramps along one edge thereof that is engageable by the projection, and upon turning the cap in the proper direction cams the projection downwardly for positively moving the cap into liquid sealing engagement with the mouth. In still another embodiment, the mouth may be provided with threads adjacent its end or base engageable by complementary threads on the cap.

Therefore, one of the objects of the present invention is to provide a safety closure for a vial or the like of the type having a mouth with an outer peripheral rim in which the safety closure is incapable of being removed from the mouth except upon special manipulation by the person removing the cap.

Another object of the invention is to provide a safety closure for a vial or the like of the type having a mouth with an outer peripheral rim in which the safety closure has a projection which in an unlatched condition of the safety closure is free to move radially, permitting the safety closure to be mounted on the mouth, and in a latched condition of the safety closure, the projection is locked and prevented from radial movement, and the safety closure is prevented from being removed from the mouth by the interference between the projection and rim.

Objects and advantages other than those set forth above will be apparent from the following description when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the detailed description of the preferred embodiments of the invention presented below, reference is made to the accompanying drawings, in which:

FIG. 1 is a top plan view of one embodiment of a safety closure of this invention;

FIG. 2 is a segmented side elevational view of the safety closure of FIG. 1;

FIG. 3 is a section view taken along line 3—3 of FIG. 1;

FIG. 4 is an enlarged section view taken along line 4—4 of FIG. 3;

FIG. 5 is a side elevational view of the safety closure of FIG. 2 with the lock ring removed;

FIG. 6 is a section view taken along line 6—6 of FIG. 5;

FIG. 7 is a top plan view of the lock ring of FIG. 4;

FIG. 8 is a segmental enlarged view in section of the latch portion of the lock ring of FIG. 7;

FIG. 9 is an enlarged segmental view of a portion of the safety closure showing the relationship of the projection and rim for a vial containing non-liquid contents such as tablets;

FIG. 10 is a view similar to FIG. 9 showing the relationship between the projection and rim for a liquid sealed vial;

FIG. 11 is a segmental side elevational view of another embodiment of the safety closure of this invention;

FIG. 12 is a section view taken along line 12—12 of FIG. 11;

FIG. 13 is a side elevational view of still another embodiment of the safety closure of this invention;

FIG. 14 is a segmental side elevational view of a modification of a vial for receiving the safety closure of this invention in which the rim is provided with a series of ramps;

FIG. 15 is a segmental side elevational view partly in section showing another embodiment of the invention for use with a vial having a threaded mouth;

FIG. 16 is a segmental side elevational view in section of a part of the structure of FIG. 15 showing the container cap unthreaded but not removable;

FIG. 17 is a section view taken substantially along line 17—17 of FIG. 15;

FIG. 18 is a section view taken substantially along line 18—18 of FIG. 15; and

FIG. 19 is a view similar to FIG. 15 showing still another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the drawings, a safety closure **16** of this invention is shown for use preferably with a plastic container **18** of the type such as a vial having a tubular mouth **20** provided with an outer peripheral rim **22** which may be solid (see FIG. 3) or the V-shaped cross-section (see FIGS. 9 and 10). In the embodiment of the invention shown in FIGS. 1 through 10, safety closure **16** comprises a cup-shaped cap **24** having a top portion **26** and an annular depending side portion **28**. The side portion **28** is further provided with a peripheral groove **30** as best seen in FIGS. 5 and 6 having one or more radially extending openings **32** therethrough. The safety closure **16** further has a lock ring **34** as best seen in FIGS. 4 and 7 that fits into groove **30** in cap **24** and has a thickness substantially equal to the depth of the groove **30** to provide a smooth peripheral surface for the cap of a predetermined radius as seen in FIG. 3. The ring **34** further has one or more radially extending projections **36** corresponding to the openings **32** in side portion **28**. The ends **38,40** of ring **34** are provided with teeth **42,44** respectively as best seen in FIGS. 4, 7, and 8 which interact to provide a latch for lock ring **34**. When the cap **24** is mounted on a vial **18** and lock ring **34** is latched as seen in FIGS. 3 and 4, the projections **36** extend through openings **32** in side portion **28** of the cap and are behind and in alignment with the vial rim **22**. In this latched position, the projections **36** are locked and prevented from moving radially outwardly. Accordingly, the projections **36** are locked behind rim **22** and the safety closure **16** cannot be removed from the vial. However, when the latch is released as seen in FIG. 7 by inserting a fingernail or the like between latch end surfaces **38,40** (see FIG. 8) and separating the latch teeth **42,44** by moving end **38** of the ring a generally radially outwardly direction, the projections **36** are free to move radially outwardly where they do not interfere with rim **22** and hence do not present an obstacle to removal of cap **24** from vial **18**. It is noted that for the best locking action, the apex of latch tooth **44** should engage the V-shaped portion at the base of the tooth **42** as best seen in FIG. 8. In order to camouflage or conceal the latch end surfaces **38,40** so that the likelihood of discovery by a child is greatly minimized, the outer periphery of the cap **24** is provided with ridges or striations **46** as seen in FIGS. 2, 4, and 8 extending completely around the periphery of the cap.

For those applications in which it is not necessary to have a sealing engagement between cap **24** and mouth **20**, such as where the vial contents are in tablet or in any other suitable non-liquid form, the tolerance between the safety closure parts and the mouth need not be held to close limits. As best seen in FIG. 9, in such applications the cap **24** need not have a resilient sealing member between cap **24** and mouth **20**, and it is not necessary for projections **36** to engage the vial rim **22**. However, for those applications in which vial **18** contains liquid, it is desirable that the safety closure **16** in its closed position be in liquid sealing engagement with mouth **20** so that the liquid contents will not flow out if the vial is tipped over. This is accomplished in this invention by providing a resilient sealing member **48** on the underside of cap top **26**, and further by manufacturing the safety closure **16** with the proper dimensions such that when the lock ring **34** is moved to its latched position, the projections **36** will engage the rims **22** and the surfaces thereof will coact (see FIG. 10) to cam cap **24** downwardly and into liquid sealing engagement with mouth **22**.

In the embodiment of the invention shown in FIGS. 11 and 12, the side portion **28** of cap **24** is provided with at least one integral rigid projection **34**, and preferably diametrically opposed therefrom with a hinged arm **50**. The hinge **52** may be of any suitable type, and in this application is shown in FIG. 12 as comprising an integrally formed, necked-down portion of the side **28**, commonly referred to in the industry as a living hinge. The arm **50** has an intermediate projection **34** and a latch tooth **42** at one end, and may be movable from an unlatched position as seen dotted in FIG. 12 to a latched position as seen in full lines in FIG. 12 in which latch tooth **42** engages tooth **44** which is integral with side portion **28**, and the movable projection **34** extends through a corresponding opening **32** in side portion **28** of cap **24**.

In the embodiment of the invention shown in FIG. 13, the cap **24** is similar to the cap shown in FIGS. 11

and 12, except that the hinge arm 50 is formed along the lower end of side portion 28, instead of displaced therefrom.

In FIG. 14, a modified form of vial 18 is shown in which rim 22 is provided with a series of ramps 54 along its lower edge. Accordingly, when safety closure 16 is secured to vial 18, the projections 34 on cap 24 will assume a position substantially as shown dotted in FIG. 14. Accordingly, when the safety closure 16 is turned in the direction of the dotted arrow, projections 34 engage ramps 54 and are cammed downwardly, moving cap 24 into sealing engagement with mouth 20.

In the modification of the invention illustrated in FIGS. 15 through 18, parts similar to parts shown in FIGS. 1 through 14 will be denoted by the same numerals. The safety closure 16 is shown in connection with a vial 18 having a tubular mouth 20 provided with a peripheral thread 56 at one end for receiving matching threads 58 on cap 24. The mouth has a peripheral seal ring 60 at its opposite end or base, and a peripheral blocking rim 62 interposed between seal ring 60 and thread 56. The rim 62 as best seen in FIG. 18 has a plurality of radially extending, spaced projections 64,66,68, and 70 defining recesses 72,74,76, and 78 therebetween. With arm 50 in its unlatched position as seen dotted in FIG. 17, projections 64,66,68, and 70 correspond to recesses 80,82,84, and 86 respectively on the cap and are of smaller width to permit the projections to pass therethrough. Also, projections 88,90,92, and 94 on cap 24 correspond to recesses 72,74,76, and 78 respectively and are of smaller width to permit the projections to pass therethrough. With arm 50 in its latched position as seen in FIG. 17, the total width of a projection 96 on arm 50 and the adjacent projection 92 on cap 24 is wider than the corresponding recess 76 in rim 62, and hence withdrawal of cap 24 past the rim is prevented. To use the safety closure, arm 50 is unlatched and cap 24 slidably moved onto mouth 20 and manually oriented so that cap projections 88,90,92, and 94 pass through the complementary recesses 72,74,76, and 78 respectively in rim 62, and the threads 56,58 on the mouth and cap respectively are moved into engagement. The cap 24 is then turned in the proper cap tightening direction until the cap is fully tightened as seen in FIG. 15. In this position, the cap is liquid tight by virtue of gasket 48 engaging the end of mouth 20, and seal ring 60 engaging the inner periphery of a skirt 98 on cap 24. Now with the cap arm 50 still latched, if cap 24 is unscrewed as seen in FIG. 16, it cannot be removed from mouth 20 by virtue of cap projection 96 which along with projection 92 cannot pass through complementary recess 76 in rim 62. Although cap 24 is unscrewed, any liquid in the container cannot leak out due to the continued seal between seal ring 60 and skirt 98 on the cap. To remove cap 24, it is necessary to unlatch arm 50 and move it to its unlatched position to manually rotate cap 24 until the fixed cap projections 88,90,92, and 94 align with complementary recesses 72,74,76, and 78 respectively blocking rim 62, and then to slide or withdraw cap 24 from mouth 20. The safety closure illustrated in FIG. 19 is similar to the closure illustrated in FIGS. 15 through 18, except that the position of the threaded portions 56,58 and seal ring 60 on mouth 20 are reversed. In this embodiment, the thread 58 is provided on skirt 98 and is engageable with a complementary thread 56 at the base of mouth 20. The seal ring 60 is adjacent the free end of mouth 20 and slidably engages a complementary inner peripheral surface 100 on cap 24. The blocking rim 62 and cap projections 88,90,92,94, and 96 are substantially in the same positions as shown in FIGS. 15, 17, and 18. The operation of this closure is substantially identical to the operation of the closure described in FIGS. 15 through 18.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described hereinabove.

I claim:

1. In a safety closure for a mouth on a container, the combination comprising:

a cap adapted to be mounted on the mouth, said cap having a top portion and an annular side portion depending therefrom, said side portion having an outer peripheral recess and an opening extending through said side portion in register with said recess; and

latch means for latching said cap to said mouth, said latch means comprising an arcuate member encircling said side portion and having a projection in register with said cap opening, said arcuate member further having end portions adjacent one another, and cooperating latch elements on said end portions, said arcuate member being movable between a latched position, in which said latch elements are releasably secured together causing said projection to extend through said opening and cooperate with the container mouth to prevent removal of the cap, and an unlatched position, in which said latch elements are released and said projection is adapted to be moved out of said opening.

2. In a releasable safety closure for a tubular mouth on a container or the like in which the mouth has an outer peripheral rim, the combination comprising;

a cap adapted to be mounted on the mouth, said cap having a top portion and an annular side portion depending therefrom, said side portion having an opening extending therethrough and a first latch element adjacent said opening; and

latch means for latching said cap to said mouth, said latch means comprising an arcuate member mountable in said opening and having a projection, said arcuate member having one end pivotally connected to said cap and a second latch element on its opposite end, said arcuate member being movable between a latched position, in which said first and second latch elements are releasably secured together causing said projection to extend through said opening and cooperate with the container mouth to prevent removal of the cap, and an unlatched position, in which said latch elements are released and said projection is adapted to be moved out of said opening.

3. In a releasable safety closure for a tubular mouth on a container or the like in which the mouth has an outer peripheral rim having a plurality of first radially extending spaced projections defining first recesses therebetween, and further has a threaded portion, the combination comprising:

a cup-shaped cap adapted to be mounted on the mouth over the rim thereof and having a thread engageable with said threaded portion on the mouth, said cap having an opening extending therethrough, and a plurality of second radially extending spaced projections adapted to pass through said first recesses, said second projections defining second recesses therebetween through which said first projections are adapted to pass; and

latch means for said cap having a third projection in register with said cap opening, said latch means being movable between a latched position, in which said third projection is locked in a position extending through said opening beneath and in alignment with the rim to prevent removal of the closure from the mouth, and in unlatched position, in which said third projection is unlocked and may be moved radially outwardly to permit removal of the closure from the mouth.

4. The invention according to claim 1 wherein said latch elements comprises a tooth on one of said end portions engageable with a tooth on the other of said end portions.

5. The invention according to claim 1 wherein said recess has a depth substantially equal to the thickness of said side portion has a peripheral recess in which said arcuate member is mounted, and said arcuate member.

6. The invention according to claim 2 wherein said latch elements comprises a tooth on one of said end portions engageable with a tooth on the other of said end portions.

7. The invention according to claim 3 wherein said third projection in said latched position of said latch means is adjacent one of said second projections, and said second and third projections are unable to pass through any of said first recesses whereby said cap cannot be removed from the mouth.

8. The invention according to claim 3 wherein said cap has a top and an annular side portion depending therefrom having a peripheral recess and an opening extending through said side portion in register with said recess, said latch means comprises an arcuate member mountable in said recess with said third projection radially extending therefrom.

9. The invention according to claim 8 wherein said third projection in said latched position of said latch means is adjacent one of said second projections, and said second and third projections are unable to pass through any of said third recesses whereby said cap cannot be removed from the mouth.

* * * * *