

- [54] **SAFETY CLOSURE FOR CONTAINERS**
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- [73] Assignee: **Ethyl Development Corporation**, Kansas City, Mo.
- [22] Filed: **Sept. 22, 1972**
- [21] Appl. No.: **291,329**
- [52] U.S. Cl. **215/9**
- [51] Int. Cl. **B65d 55/02**
- [58] Field of Search..... 215/9, 43 A, 46 R

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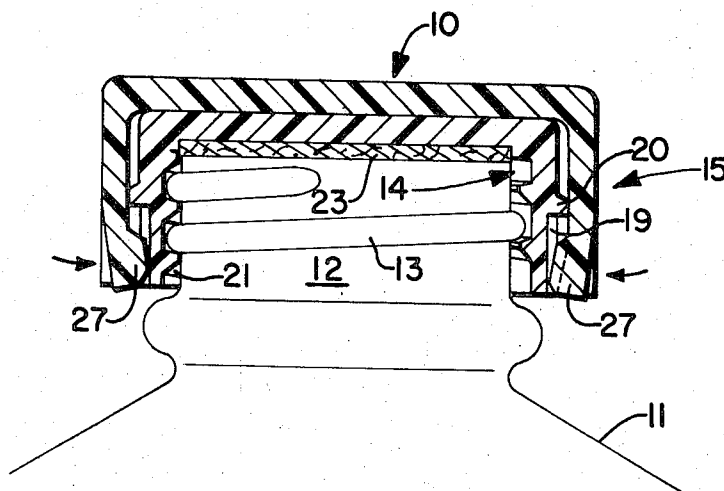
Primary Examiner—George T. Hall
Attorney, Agent, or Firm—Donald L. Johnson; John F. Sieberth; E. Donald Mays

[57] **ABSTRACT**
 A safety closure for containers having a threaded

neck, which closure includes an inner closure adapted to be threadably received on the container neck and an outer or overclosure covering, and normally freely rotatable on, the inner closure. The inner closure is provided with continuous engaging means around the lower portion of its skirt, which means are engageable by means provided on two downwardly projecting flexible tabs provided in the lower portion of the skirt of the overclosure. Application of pressure between the thumb and finger compresses the tabs of the outer closure to engage the inner closure, thereby permitting rotation of the locked inner and outer closures to remove the safety closure from the neck of the container.

A second embodiment includes a plurality of integrally formed projections on both the top surface of the inner closure and on the bottom surface of the outer closure. The projections are adapted to engage to rotate the inner closure when the outer closure is rotated to attach the safety closure to the container and to disengage when the outer closure is rotated to detach the safety closure without pressing the tabs to lock the outer closure into engagement with the inner closure.

7 Claims, 20 Drawing Figures



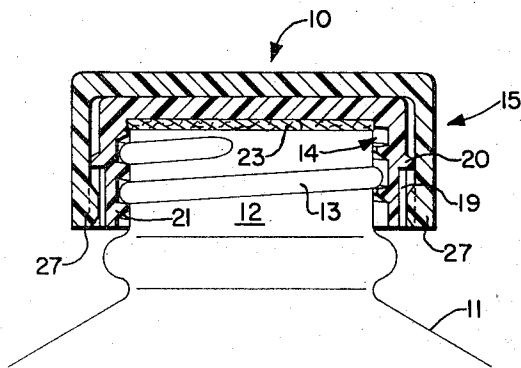


FIG. 1.

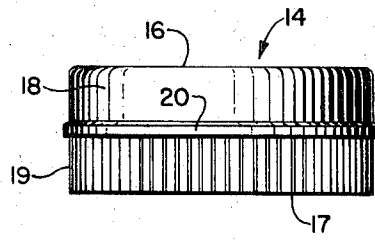


FIG. 3.

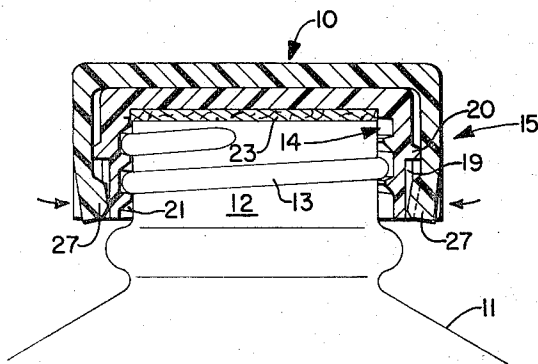


FIG. 2.

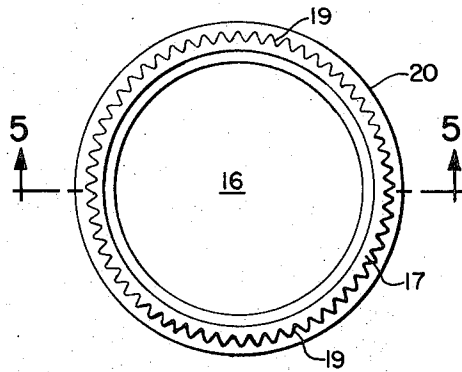


FIG. 4.

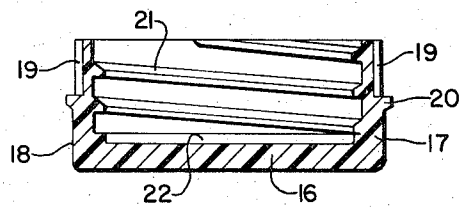


FIG. 5.

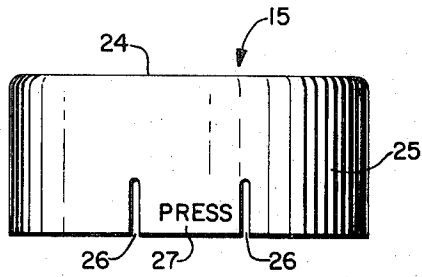


FIG. 6.

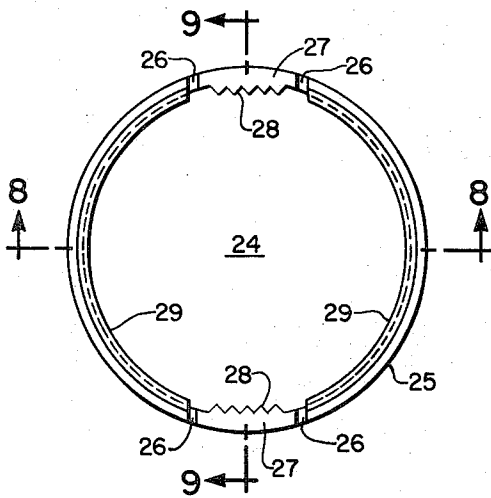


FIG. 7.

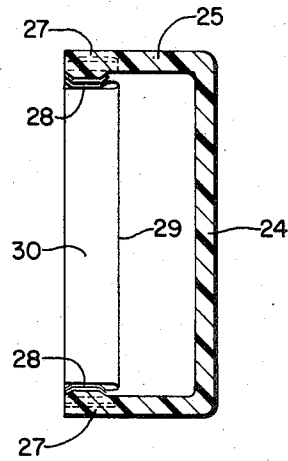


FIG. 9.

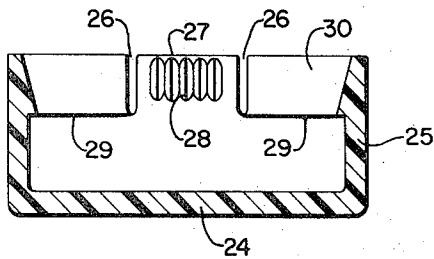


FIG. 8.

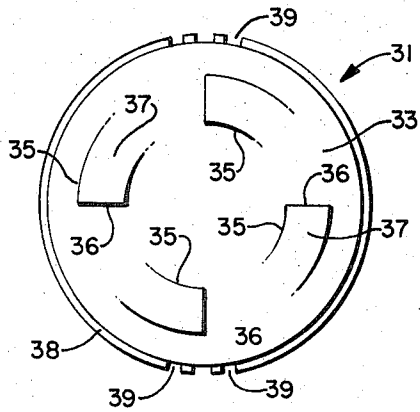


FIG. 11.

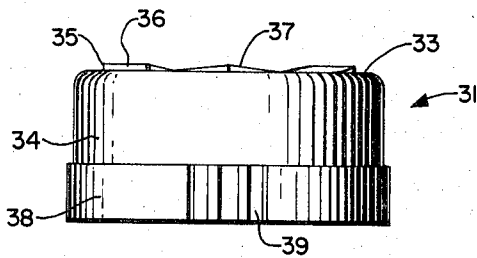


FIG. 10.

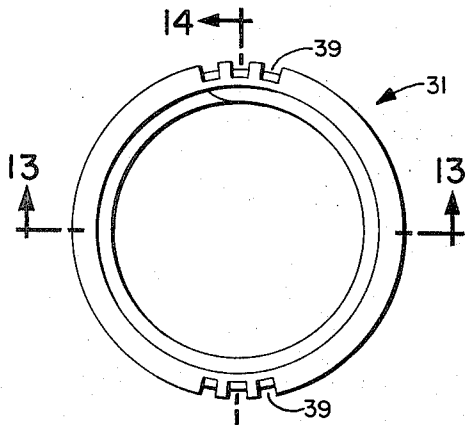


FIG. 12.

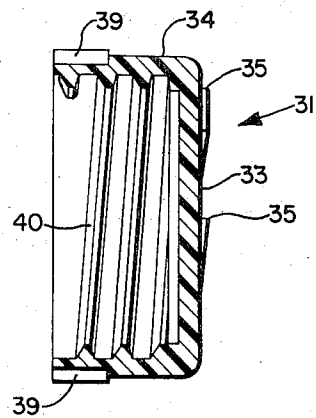


FIG. 14.

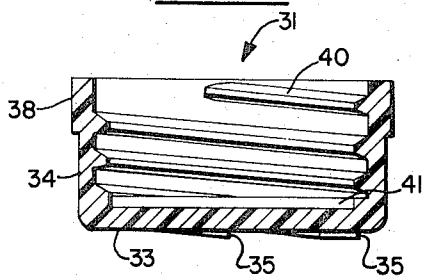


FIG. 13.

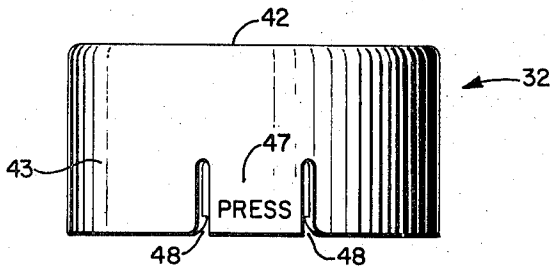


FIG. 15.

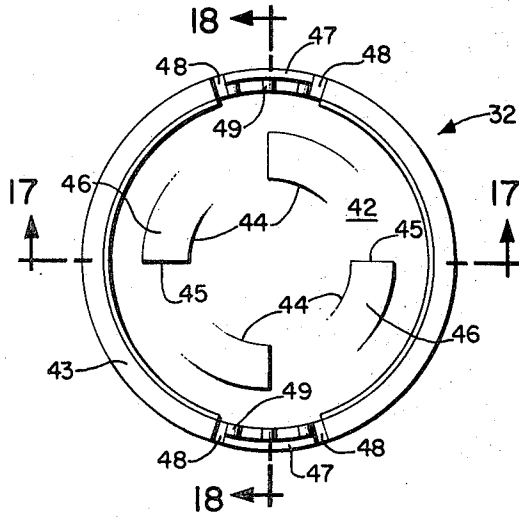


FIG. 16

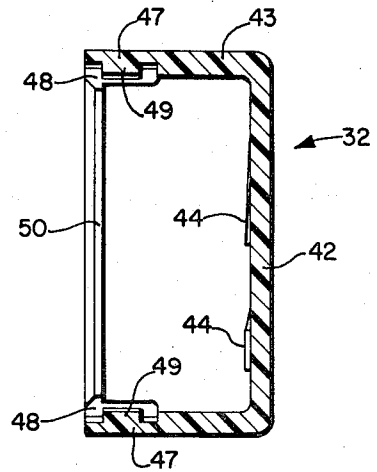


FIG. 18.

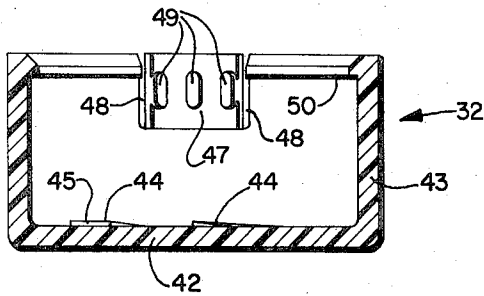


FIG. 17.

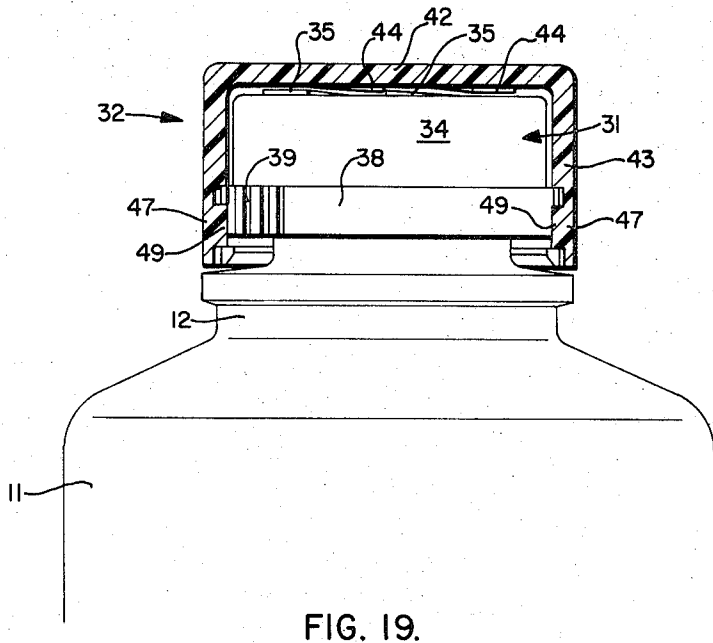


FIG. 19.

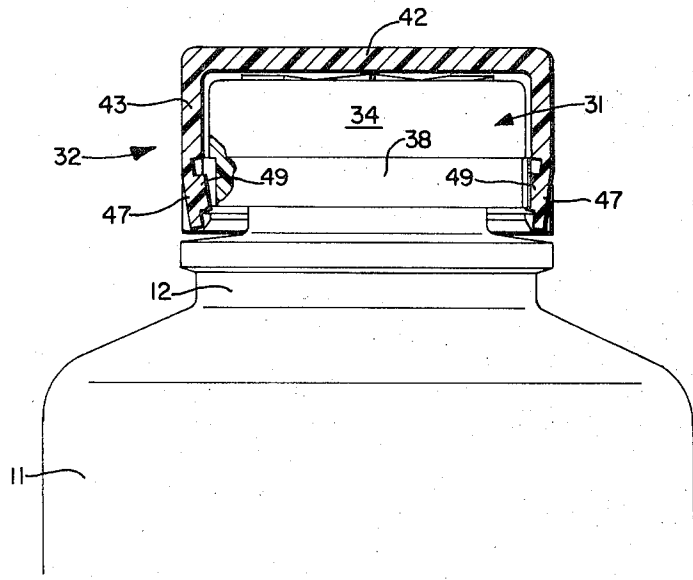


FIG. 20.

SAFETY CLOSURE FOR CONTAINERS

BACKGROUND OF THE INVENTION

Efforts have been accelerated over the past few years to provide satisfactory childproof safety closures for containers used for toxic and dangerous substances such as medicines, insecticides, cleaners and other materials which could be harmful to a child if ingested. Provisions of the Poison Prevention Packaging Act of 1970 (Public Law 91-601 of Dec. 30, 1970) require that many substances be packaged in containers having childproof closures in the near future.

Many of the childproof closures developed to date suffer from undesirable features. Often childproof container closures are designed wherein the parts forming the closure are so complex and complicated that it is not economically feasible to produce and use such closures on low-cost items such as small bottles of aspirin, cleaners and other low-cost commodities. Prior art safety closures often require such complicated movements and/or understanding of the operation that they cannot be conveniently removed by adults. Additionally, some closures require gripping forces or movements which are not convenient for aged people who most often are required to remove safety closures from medicine containers.

Another of the difficulties encountered in some prior art safety closures has been a requirement that many of these safety closures necessitate the use of special capping and/or sealing machinery in order to place the caps on the containers.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved safety closure for containers having a threaded neck.

It is another object of the present invention to provide a safety closure which is simple in construction and economical to produce.

An additional object of the present invention is to provide a safety closure having conventional helical threads which may be used on conventional containers having helically threaded necks.

A further object of the present invention is to provide a safety closure which may be easily removed from the container by an adult but is difficult or impossible to remove by a child.

The foregoing and other objects are provided in a safety closure for a container having a threaded neck, which closure includes an inner, generally cup-shaped closure having a circular, flat top wall and an integral, cylindrical sidewall or skirt depending from the top wall. The interior wall of the skirt is provided with threads adapted to engage the threads on the neck of the container. The exterior of the skirt is provided with an upper section having a smooth surface and a lower section having a plurality of closely spaced, vertical projections on its surface. An outwardly extending annular bead is positioned between the upper and lower sections. An outer, generally cup-shaped overclosure is received over the inner closure. The outer or overclosure has a circular, flat top wall and an integral skirt or sidewall depending from the top wall. The skirt of the overclosure is provided with opposed sets of spaced apart slits in the lower portion, the slits defining opposed, flexible tabs. The tabs are provided with a plu-

rality of inwardly projecting, vertical projections on their inner surfaces which are adapted to engage the projections on the exterior sidewall of the inner closure when pressure is applied directly to the tabs. The interior wall of the skirt is also provided with semi-circular, inwardly projecting beads between the tabs. The beads are adapted to engage the outwardly projecting annular bead provided on the inner closure to rotatably engage the inner and outer closures.

A second embodiment includes the provision of a plurality of integrally formed projections on both the top surface of the inner closure and on the bottom surface of the outer closure. The projections are adapted to engage to rotate the inner closure with the outer closure when the safety closure is being attached to, or screwed onto, the container. The projections disengage when the outer closure is rotated to remove, or to unscrew, the safety closure from the container.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional, elevational view of the safety closure of the present invention attached to the threaded neck of a container;

FIG. 2 is a view of the safety closure of the present invention similar to FIG. 1 showing the position of the tabs when pressure is applied to remove the closure from the container;

FIG. 3 is an elevational view of the inner closure portion of the safety closure;

FIG. 4 is a bottom view of the inner closure portion shown in FIG. 3;

FIG. 5 is a cross-sectional view of FIG. 4 along line 5-5;

FIG. 6 is an elevational view of the outer closure portion of the safety closure of the present invention;

FIG. 7 is a bottom view of the outer closure portion shown in FIG. 6;

FIG. 8 is a cross-sectional view taken along line 8-8 of FIG. 7;

FIG. 9 is a cross-sectional view taken along line 9-9 of FIG. 7;

FIG. 10 is an elevational view of the second embodiment of the inner closure portion of the safety closure of the present invention;

FIG. 11 is a top view of the inner closure portion shown in FIG. 10;

FIG. 12 is a bottom view of the inner closure portion shown in FIG. 10;

FIG. 13 is a cross-sectional view of FIG. 12 taken along line 13-13;

FIG. 14 is a cross-sectional view of FIG. 12 taken along line 14-14;

FIG. 15 is an elevational view of the second embodiment of the outer closure portion of the safety closure of the present invention;

FIG. 16 is a top view of the outer closure portion shown in FIG. 15;

FIG. 17 is a cross-sectional view of the outer closure portion of FIG. 16 taken along line 17-17;

FIG. 18 is a cross-sectional view taken along line 18-18 of FIG. 16;

FIG. 19 is a sectional, elevational view of the second embodiment of the safety closure of the present invention attached to a container; and

FIG. 20 is a sectional, elevational view of the second embodiment of the safety closure of the present inven-

tion similar to FIG. 19 showing the position of the tabs when pressure is applied to remove the cap from the container.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIGS. 1 and 2, the safety closure of the present invention, designated generally by the numeral 10, is shown attached to a container 11 which is provided with a neck 12 having conventional, helical threads 13 thereon. While the threads 13 as illustrated are continuous, it is understood that the threads may be interrupted, if desired. The safety closure is a two-piece closure and includes an inner closure or cap, designated generally by the numeral 14, and an outer closure or overcap, designated generally by the numeral 15, which is received over and is freely rotatable on the inner closure.

Referring now to FIGS. 3-5, the inner closure 14 is provided with a circular, flat top wall 16 which has attached thereto an integral depending annular skirt 17. The exterior wall of the annular skirt 17 has an upper cylindrical smooth section 18 and the lower portion of the skirt 17 is provided with a plurality of evenly spaced, vertically extending ribs 19 on its exterior surface. The upper and lower sections 18 and 19, respectively, of the exterior sidewall of the skirt 17 are separated by an annular, outwardly extending ring or bead 20. The interior sidewall of the skirt 17 is provided with a projecting helical thread 21 which is adapted to engage the thread 13 on container neck 12. If desired, the cap may be provided with threads adapted to engage grooves provided in the neck of the container or vice versa. The interior wall 16 of the inner closure may be provided with a cylindrical recess 22 for receiving an annular compressible gasket 23 as seen in FIGS. 1 and 2.

Referring now to FIGS. 6-9, the safety closure includes an outer closure or overcap 15 which is generally cup-shaped and has a circular, flat top wall 24 with an integrally attached, cylindrical, depending skirt 25. The lower portion of the skirt 25 is provided with two sets of opposed, spaced apart slots 26-26 which define opposed flexible tabs 27-27 in the lower section of the skirt. The interior wall of each tab 27 is provided with a plurality of vertically extending, V-shaped projections 28. The inner wall of the skirt 25 is provided with a pair of semi-circular, opposed beads 29-29 which extend continuously between opposed slots 26-26 on opposite sides of the overcap. The inner wall of the lower portion of the skirt 25 below the bead 29 is provided with an outwardly tapering surface 30, as seen more clearly in FIGS. 8 and 9.

The safety closure of the present invention may be attached to a filled container by conventional automatic capping machinery. Inner closure 14 is fed to a conventional capping machine and is screwed directly on the filled container to the desired degree of torque to insure that there will be no leakage of the product from the container. Next, the container moves along the fill line to a second conventional overcapping machine wherein the outer closure 15 is pressed down over the inner cap 14 to complete the assembly of the two-piece closure. After filling and attachment of the caps, the safety closure assumes the position shown in FIG. 1, i.e., wherein the tabs 27-27 are parallel with the sidewall of the overcap 15. In this position, the pro-

jections 28 on the inner face of the tab do not make contact with the mating projections 19 provided on the skirt of the inner cap 14. When the container is purchased, an adult can readily open the safety closure by applying pressure to the opposed tabs 27-27 by gripping the tabs between the thumb and the index or forefinger of the hand and pressing the tabs 27-27 inwardly until engagement is made between the ribs 28 on the tab and the projections 19 on the inner skirt. The position of the container and safety closure when the tabs are pressed inwardly to effect this engagement is shown in FIG. 2. By rotating the safety closure counterclockwise while applying pressure as described above, the outer closure locks to the inner closure and rotates the inner closure off the threads on the neck of the container permitting the product of the container to be removed. To re-attach the safety closure to the container, the procedure described above is repeated while rotating the safety closure in a clockwise direction.

While the foregoing embodiment of the safety closure of the present invention fills many of the needs for an adequate safety closure, it does require that the customer apply finger pressure to the tabs in order to engage the inner and outer closures when rescrowing the safety closure back onto the container. Thus, a second embodiment of the invention will be described which permits direct engagement of the inner and outer closures for screwing the safety closure onto the container whereby conventional automatic capping machinery can be used without modification, and, also, the safety closure may be more easily re-attached to the container after removal by the user.

Referring now to FIGS. 10-14, the second embodiment of the safety closure of the present invention includes an inner closure or cap, designated generally by the numeral 31, and an outer closure or overcap, designated generally by the numeral 32, as seen more clearly in FIGS. 15-18.

The inner closure 31 is provided with a circular top wall 33 which has integrally attached thereto a depending annular skirt 34. The top wall 33 is provided with a plurality of integrally formed, spaced apart, arcuate shaped, upwardly directed projections 35, which projections are provided with a rectangular front face 36 and a beveled top surface 37 which merges into the top wall 33 of the container at the rear of each of the projections.

The skirt 34 is provided with a lower section having an outwardly extending annular band 38 of increased diameter. The band 38 is provided with two sets of opposed, generally rectangular slots 39-39. The slots 39 are extended into the skirt 34 in order to provide the slots 39 with a depth equal to substantially twice the thickness of the band 38 on the lower part of the skirt. The interior sidewall of the skirt 34 is provided with a projecting helical thread 40 which is adapted to engage a helical thread (not shown) on the neck of the container. If desired, the inner surface of the top wall 33 may be provided with a circular recess 41 adapted to receive a gasket (not shown).

Referring now to FIGS. 15-18, the second embodiment of the safety closure includes an outer closure or overcap, designated generally by the numeral 32. The outer closure is generally cup-shaped and is provided with a flat top wall 42 and a depending, integral, cylindrical skirt 43. The inner surface of the top wall 42 is

provided with a plurality of spaced apart, integrally formed, downwardly directed projections 44. The projections 44 are provided with a vertical, flat front face 45 and a sloping top surface 46 which merges into the underside of the top wall 42 of the cap at the rear of the projection. As seen in FIGS. 11 and 16, the vertical plane faces 36 of the projections 35 on the inner closure are adapted to engage the front plane surface 45 of the projections 44 on the outer closure 43 whenever the inner and outer closures are joined together, as seen in FIGS. 19 and 20. In removing the safety closure by counterclockwise rotation from the container, the beveled surfaces 46 of the projections 44 will slidably engage the beveled surfaces 37 on projections 35 on the inner cap, thus preventing any direct engagement between the lugs 35 and 46 on the respective caps. Thus, it is impossible to utilize the lugs provided on the inner and outer closures to effectively remove the safety closure from the container.

As seen in FIGS. 15-18, the outer skirt 43 is provided with opposed tabs 47-47, which tabs are defined by spaced apart slots 48-48 extending upwardly from the lower periphery of the overcap 42. The inner wall of the tabs is provided with a plurality (three in the drawings as shown) of generally rectangular bosses 48 of a width adapted to be received within the grooves or slots 39 provided in the lower portion 38 of the skirt 34 of the inner cap. The inner surface of the skirt 43 is provided with a pair of semi-circular, outwardly projecting, annular rings 50-50 adjacent the lower end thereof. The rings 50-50 are adapted to snap over, engage and retain the inner cap within the outer cap, as seen in FIGS. 19 and 20.

Referring to FIGS. 19 and 20, the inner cap 31 and outer cap 32 are assembled by machine or by hand prior to placing the safety closure on the container. The assembled two-piece closure can then be applied to the filled container by conventional capping machinery without the necessity of pressing the two tabs on each side of the overskirt inwardly since the projections provided in the inner cap and the outer cap will engage to drive the inner cap having the threads down on the container neck when downward pressure and clockwise rotation are applied to the outer closure. To remove the safety closure of the second embodiment of the invention, the customer applies finger pressure (as seen in FIG. 20) to the two tabs 47-47, thus, engaging the rectangular projections 49 with the rectangular slots 39 to lock the outer overcap to the inner closure. By maintaining pressure at these points, the outer cap is rotated counterclockwise, together with the engaged inner cap, to unscrew the locked safety closure from the container.

While the safety closure of the present invention can be made from any flexible material, e.g., plastic or flexible metal, it is preferred that the container closure be made from injection molded plastic materials. Preferably, the inner closure 14 is made by injection molding a rigid or semi-rigid plastic material such as polyvinyl chloride, polypropylene, high density polyethylene or other suitable rigid or semi-rigid plastic material. The outer closure 15 is preferably molded from flexible or semi-rigid plastic material such as high density polyethylene, low density polyethylene, plasticized polyvinyl chloride, or other plastics having sufficient flexibility to permit the springing of the opposed tabs 27-27 by reasonable finger pressure applied by an adult person. The

wall thicknesses of the skirt 25 of the overcap 15 should be designed to provide sufficient resilience to the opposed tabs 27-27 so that a child will not have sufficient strength to maintain pressure on the opposed tabs 27-27 to provide engagement with the inner cap for sufficient time to unscrew the entire safety closure.

From the foregoing, it is seen that the present invention provides a simple, two-piece plastic cap which may be produced by conventional injection molding techniques from low-cost plastic materials. Further, the safety closure of the present invention provides the added advantage in that it may be assembled to conventional threaded neck containers by conventional capping machinery. Additionally, the operational steps required to unlock the safety closure are relatively simple for an adult, but extremely difficult, if not impossible, for a child.

While the invention has been described with reference to the drawings, it is understood that the present description is only by way of example and that many variations and modifications of the construction of the present invention will be apparent to those skilled in the art. Therefore, the invention is to be limited only by the following claims.

What is claimed is:

1. In a safety closure for containers having a threaded neck, the combination comprising:
 - a. an inner, generally cup-shaped closure having a circular, flat top wall and an integral, cylindrical skirt depending from said top wall,
 - i. the interior wall of said skirt being provided with threads adapted to engage said threads on the neck of said container,
 - ii. the exterior wall of said skirt being provided with a plurality of recesses adjacent its lower end; and
 - b. an outer, generally cup-shaped overclosure received over said inner closure, said overclosure having a circular, flat top wall and an integral skirt depending from said top wall,
 - i. said skirt being provided with opposed sets of spaced apart slits in the lower portion thereof, said slits defining opposed, flexible tabs, said tabs being provided with a plurality of inwardly projecting, vertical projections on their inner surfaces adapted to engage said recesses on said skirt of said inner closure upon application of inwardly directed pressure to said tabs,
 - ii. means coupling said outer closure to said inner closure, said means permitting free rotation of said outer closure on said inner closure.
2. In a safety closure for containers having a threaded neck, the combination comprising:
 - a. an inner, generally cup-shaped closure having a circular, flat top wall and an integral, cylindrical skirt depending from said top wall,
 - i. the interior wall of said skirt being provided with threads adapted to engage said threads on the neck of said container,
 - ii. the exterior wall of said skirt being provided with an upper section having a smooth surface, a lower section having a plurality of closely spaced vertical projections on its surface, and an outwardly extending annular bead positioned between said upper and lower section; and

- b. an outer, generally cup-shaped overclosure received over said inner closure, said overclosure having a circular, flat top wall and an integral skirt depending from said top wall,
 - i. said skirt being provided with opposed sets of spaced apart slits in the lower portion thereof, said slits defining opposed, flexible tabs, said tabs being provided with a plurality of inwardly projecting, vertical projections on their inner surfaces adapted to engage said recesses on said skirt of said inner closure upon application of inwardly directed pressure to said tabs, 5
 - ii. said skirt being provided on its interior sidewall with semi-circular, inwardly projecting beads extending between said tabs, said beads adapted to engage said outwardly projecting annular bead provided on said inner closure to retain said inner closure within said outer closure. 10
- 3. In the safety closure of claim 2 wherein said inner closure is formed from a substantially rigid material and said outer closure is formed from a substantially flexible material. 20
- 4. In the safety closure of claim 2 wherein said outer closure is provided with an outwardly tapered interior sidewall below said semi-circular, inwardly projecting beads. 25
- 5. In a safety closure for containers having a threaded neck, the combination comprising:
 - a. an inner, generally cup-shaped closure having a circular, flat top wall and an integral, cylindrical skirt depending from said top wall, 30
 - i. the interior wall of said skirt being provided with threads adapted to engage said threads on the neck of said container,
 - ii. the exterior wall of said skirt being provided with an upper section having a smooth surface, a lower section having an outwardly extending annular band provided with opposed sets of slots, 35
 - iii. the top surface of said top wall being provided with a plurality of integrally formed first projections having upwardly extending front faces and beveled top surfaces which merge into said top 40

- wall; and
- b. an outer, generally cup-shaped overclosure received over said inner closure, said over-closure having a circular, flat top wall and an integral skirt depending from said top wall,
 - i. said skirt being provided with opposed sets of spaced apart slits in the lower portion thereof, said slits defining opposed, flexible tabs, said tabs being provided with a plurality of inwardly projecting vertical projections on their inner surfaces adapted to engage said slots on said exterior sidewall of said inner closure skirt upon application of inwardly directed pressure to said tabs,
 - ii. said skirt being provided on its interior sidewall with semi-circular, inwardly projecting beads extending between said tabs, said beads adapted to abut the bottom of said skirt of said inner closure to retain said inner closure within said outer closure,
 - iii. the bottom surface of said top wall being provided with a plurality of integrally formed second projections having downwardly extending front faces and beveled top surfaces which merge into said top wall, said second projections being oriented opposite said first projections and adapted to engage said first projections to rotate said inner closure upon rotation of said outer closure to attach said safety closure to said container.
- 6. In the safety closure of claim 5 wherein said first and said second projections have arcuate shaped sidewalls.
- 7. In the safety closure of claim 5 wherein said semi-circular beads are spaced from said bottom of said skirt of said inner closure to permit limited axial movement of said outer closure over said inner closure whereby sliding engagement is maintained between said first and said second projections when said outer cover is rotated in the direction for removing said safety closure from said container without applying pressure to said tabs.

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