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Gach

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[54] CHILD-PROOF CONTAINER AND CLOSURE UNIT

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

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

[58] **Field of Search** 215/9, 44, 98

[56] **References Cited**

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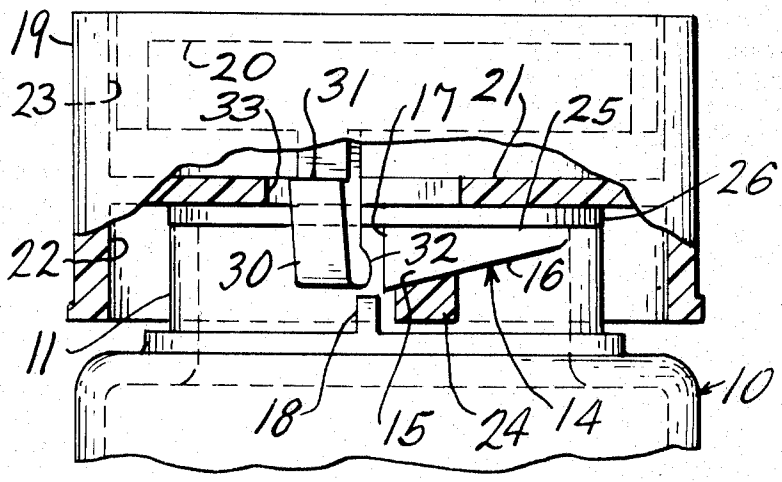
Primary Examiner—George T. Hall

Attorney—Carl F. Schaffer et al.

[57] **ABSTRACT**

An improved container and child-proof closure therefor. The container has a neck surrounding an opening. At least two flanges project from the neck. Each flange has a spirally expanding first camming surface and a downwardly directed helical second camming surface which terminates at an inwardly directed end surface. The closure comprises outer and inner members. The outer member includes lugs for engaging the second camming surface as the cap is rotated on the container neck to a locked position for holding the closure on the neck. The inner member includes resilient means which ride over the first camming surfaces and abut the flange end when the closure is rotated to the locked position to prevent removal of the closure. Movement of the inner closure member against spring means within the outer closure member permits the closure to be rotated from the locked position for removal from the container. In one embodiment, means is provided for further tightening the closure on the container after it is in the locked position.

8 Claims, 8 Drawing Figures



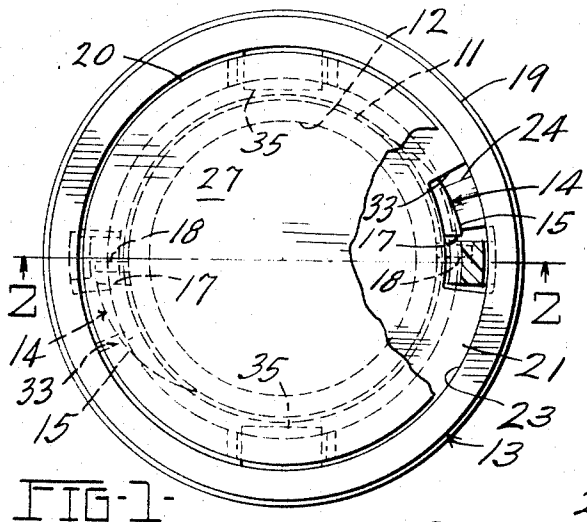


FIG-1-

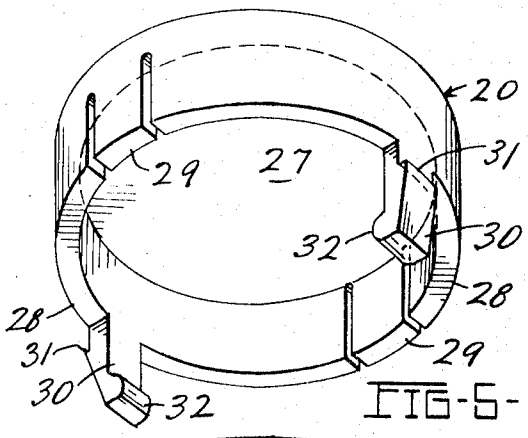


FIG-5-

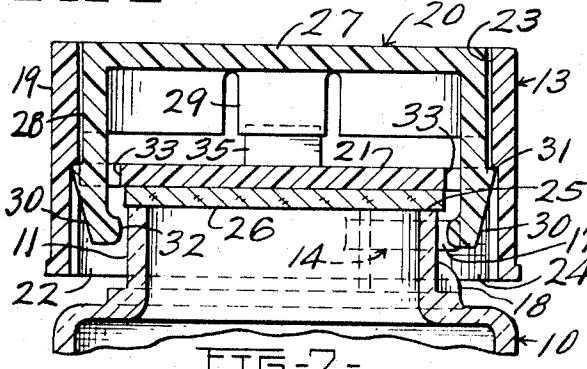


FIG-2-

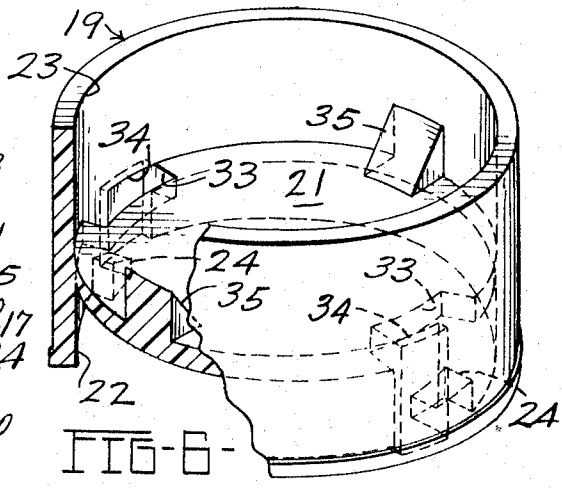


FIG-6-

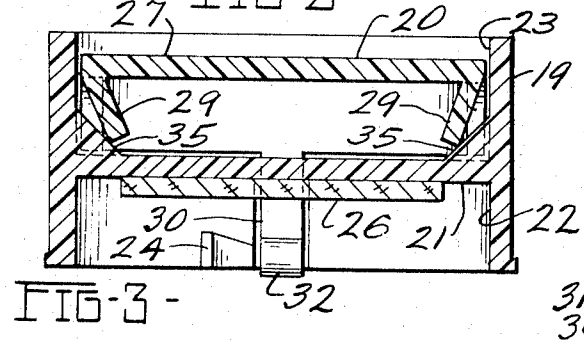


FIG-3-

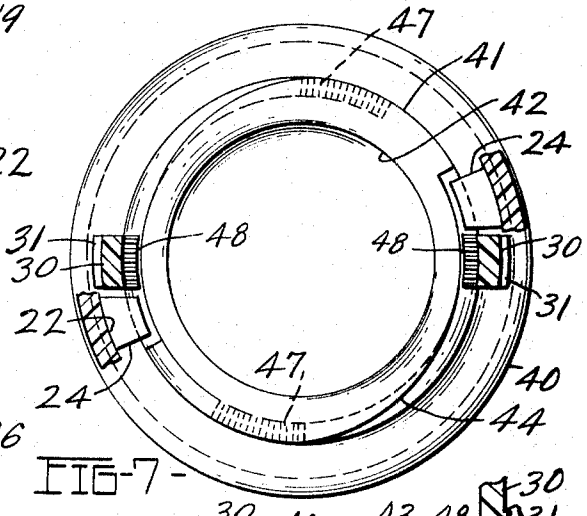


FIG-7-

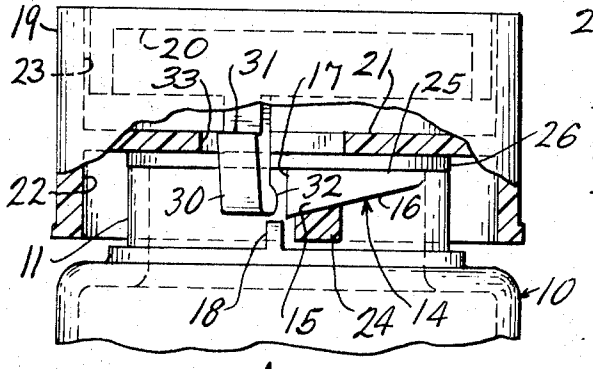


FIG-4-

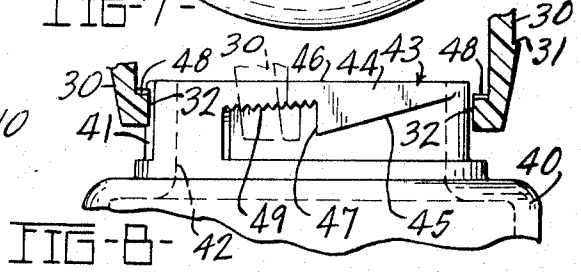


FIG-8-

CHILD-PROOF CONTAINER AND CLOSURE UNIT

BACKGROUND OF THE INVENTION

This invention relates to containers and closures therefor and more particularly to a container having a childproof closure which may be readily opened by an adult.

Most medicines and potent or harmful substances which are sold or dispensed from pharmacies and the like are packaged in bottles having screw caps or in vials having snap-off caps. Either type of container is readily openable by a small child. Containers and closures have been designed for the purpose of preventing or making difficult opening thereof or requiring the use of greater force than can be exerted by a small child. Many of these structures include very complicated provisions such as combination disks, slides and the like, which are far too expensive to manufacture for practical commercial use. It has been discovered, however, that a small child finds it difficult to open a closure for such containers when the opening thereof requires pressure in one direction and movement in a direction in right angles thereto.

SUMMARY OF THE INVENTION

According to the present invention, an improved container and closure therefor are provided which require pressure in one direction and movement in a direction at right angles thereto for opening, making such container childproof. A neck surrounding the container opening is provided with at least two projecting flanges. Each flange has a spirally expanding first camming surface and a downwardly directed helical second camming surface which terminate at an inwardly directed end.

The improved closure includes outer and inner members. Bias or spring means urges the inner closure member to a first position in the outer member and an applied pressure will move the inner closure member to a second position. The outer closure member includes at least two lugs for engaging the second camming surfaces as the cap is rotated on the container neck to a locked position. The lugs and camming surfaces cooperate for holding the closure on the container neck in a manner similar to a conventional screw cap. The inner member includes resilient arms having lugs which ride over the first camming surfaces and abut the flange ends when the closure is rotated to the locked position. When the closure is in the locked position, the lugs on the resilient arms and the inwardly directed flange end cooperate to prevent a reverse rotation of the closure for removal from the container. When the inner closure member is pushed or moved in the outer member to the second position, the lugs on the inner closure member arms move clear of the inwardly directed flange ends and no longer prevent a reverse rotational movement for removal of the closure.

In one embodiment of the invention, the lugs on the inner closure member arms are adapted to engage a downwardly directed surface provided on the closure neck when the closure is in the locked position. This surface may be roughened or serrated to assure a positive engagement with the lugs. Further rotation of the closure after it is in the locked position tightens the closure to exert a sealing force between the closure and the container.

Accordingly, it is a primary object of the invention to provide an improved child-proof container.

Another object of the invention is to provide an improved closure for a container which requires pressure in one direction and rotational movement at right angles thereto for removal from a container.

Other objects and advantages of the invention will become apparent from the following detailed description, with reference being made to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary top view of an improved child-proof container and closure constructed in accordance with the present invention;

FIG. 2 is a fragmentary cross-sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view of a closure according to the present invention, showing the inner closure member pushed to the released position;

FIG. 4 is a fragmentary elevational view of an improved container and closure therefor in accordance with the present invention;

FIG. 5 is a perspective view of an inner closure member constructed in accordance with the present invention;

FIG. 6 is a fragmentary perspective view of an outer closure member constructed in accordance with the present invention;

FIG. 7 is a fragmentary top view of a modified embodiment of a container and a closure constructed in accordance with the present invention; and

FIG. 8 is a fragmentary elevational view of the neck of the modified embodiment of a container.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIGS. 1–6, a child-proof container and closure therefor embodying the present invention are shown generally comprising a container **10** having a neck **11** which surrounds a container opening **12** and a closure unit **13** which engages the neck **11** for closing the opening **12.**

The container neck **11** is provided with a plurality of flanges **14,** two of which are shown in the drawings. The flanges **14** have a generally spirally expanding outer surface which forms a first camming surface **15.** A downwardly facing or lower surface **16** on each flange **14** is generally helically or wedge-shaped for defining a second camming surface. The first camming surface **15** and the second camming surface **16** are terminated at an inwardly directed flange end **17.** At least one stop **18** may also be provided on the container neck **11** for limiting the maximum amount of rotation of the closure unit **13** on the container neck **11.**

The closure unit **13** includes an outer member **19** and an inner member **20.** The outer member **19** is generally tubular-shaped. An internal cross-web **21** extends across the middle of the outer member **19** for defining a lower cavity **22** which is adapted to receive the container neck **11** and an upper cavity **23** which is adapted to receive the inner closure member **20.** A plurality of lugs **24** project from the outer member **19** into the lower cavity **22,** one for each flange **14** on the container neck **11.** The lugs **24** are adapted to receive the container neck **11** therebetween and to engage the second camming surfaces **16** of the flanges **14** as the clo-

sure unit 13 is rotated on the container neck 11. It will be apparent that as the closure unit 13 is rotated, the lugs 24 will move along the second camming surfaces 16 to pull together an upper edge 25 of the container neck 11 and the cross-web 21. A resilient gasket or liner 26 is preferably attached to a lower surface of the cross-web 21 for engaging the edge 25 to seal the container opening 12 when the closure unit 13 is in a locked position on the container neck 11.

As best shown in FIG. 5, the inner closure member 20 is generally cup-shaped having a flat upper surface 27 and an integral depending skirt 28. The inner closure member 20 is formed from a resilient material. At least two tabs 29 are formed in the skirt 28 to function as springs, the function of which is described in detail below. At least two arms 30 depend from the skirt 28 with a separate arm provided for cooperating with each of the flanges 14 on the container neck 11. The arms 30 are each provided with a catch 31 on an exterior surface and with an inwardly directed lug 32 at the lower end.

As is best shown in FIG. 6, the web 21 in the outer closure member 19 has a plurality of openings 33, one for receiving each of the arms 30 on the inner closure member 20. A step 34 is provided in the wall of the lower cavity 22 adjacent each opening for engaging the catch 31 on the arms 30. The closure unit 13 is assembled merely by inserting the inner closure member 20 into the upper cavity 23 of the outer closure member 19 with the arms 30 passing through the openings 33 in the web 21. When the inner closure member 20 is within the upper cavity 23, the catches 31 will engage the steps 34 to retain the inner closure member 20 within the upper cavity 23. In this position, the resilient tabs 29 will rest against ramps 35 formed in the outer member 19 within the upper cavity 23. The ramps 35 may be either solid, as shown, or formed into a plurality of closely spaced ribs. Further movement of the inner closure member 20 axially towards the cross-web 21 will cause the resilient tabs 29 to deflect inwardly, as shown in FIG. 3. The resiliency of the tabs 29 biases the inner closure member to the position shown in FIG. 2 when pressure on the inner closure member 20 is released.

Turning again to FIGS. 1, 2 and 4, when the closure unit 13 is placed on the container neck 11 and rotated in a clockwise direction, as viewed from the top, the lugs 32 on the arms 30 will ride along the spiral first camming surface 15 on the flanges 14 and the arms 30 will be deflected outwardly. When the closure unit 13 is rotated completely to the locked position, the lugs 32 move past the flanges 14 and the resilient arms 30 return inwardly to their normal position. In the locked position, the lugs 24 on the outer closure member 19 abut the stop 18 on the neck 11 to prevent further rotation of the closure unit 13 and the lugs 32 on the arms 30 abut the inwardly directed flange ends 17 to prevent a reverse rotation of the closure unit 13. To open the container 10, pressure must be applied to the upper surface 27 of the inner closure unit 20 to move the lugs 32 on the arms 30 below the flanges 14. While such pressure is applied to the surface 27, the closure unit 13 is rotated in the reverse direction until the lugs 24 are clear of the second camming surface 16, permitting the closure unit 13 to be lifted from the neck 11 for opening the container 10.

In some situations, a liquid or a very fine particulate material is stored within the container 10. In such cases, it is desirable to maintain a force between the closure unit 13 and the container neck 11 so that the gasket 26 forms a positive seal against the upper edge 25 of the container neck 11. A modified container 40 which will cooperate with the closure 13 for exerting such a force is shown in FIGS. 7 and 8. In the modified embodiment, the container 40 is provided with a neck 41 surrounding a container opening 42. A plurality of flanges 43 are provided to extend substantially continuously around the neck 41. Each of the flanges 43 has a spirally expanding outer surface 44 which forms a first camming surface and a generally helical lower surface 45 which forms a second camming surface. As in the above-described embodiment, the lugs 24 on the closure unit 13 engage the second camming surface 45 for tightening the closure unit 13 against an upper edge 46 of the container neck 41. When the closure unit 13 is rotated on the container neck 41 to a locked position, the lugs 32 move past an inwardly directed end 47 on each of the flanges 43. The lugs 32 abut against the ends 47 to prevent removal of the closure unit 13. An upper surface 48 on each of the lugs 32 also contacts a downwardly facing surface 49 on the flanges 43. Both of the surfaces 48 and 49 are roughened or serrated to prevent slippage therebetween. Further rotation of the closure unit 13 after it is in the closed position causes the lugs 24 to ride further along the second camming surface 45, thereby tightening the closure unit 13 on the container 40. The flange surface 49 is preferably slightly angled to pull the inner closure member 20 downwardly into the upper cavity 23 when the closure unit 13 is tightened, deflecting the resilient tabs 29 by a small amount. The resilient tabs 29 exert a force through the arms 30 for applying a compressional sealing force on the gasket 26.

It will be appreciated that various changes and modifications may be made in the above-described child-proof container and closure without departing from the spirit and the scope of the claimed invention.

What I claim is:

1. A child-proof container and closure unit comprising, in combination, a container including a body having a neck defining a container opening, at least two flanges projecting from said neck, said flanges each having a spirally expanding outer edge defining a first camming surface, a helical lower edge defining a second camming surface and an inwardly directed end extending between said first and second camming surfaces and said neck, and a closure unit comprising inner and outer members, said outer member having a generally tubular shape and an internal cross-web defining an upper cavity adapted to receive said inner member and a lower cavity adapted to receive said bottle neck, means retaining said inner member in said upper cavity for axial movement between first and second positions, biasing means for urging said inner member to said first position, said inner member having at least two resilient arms which project through openings in said cross-web for receiving said bottle neck and said flanges therebetween, said arms having first lugs for engaging said first camming surfaces when said inner member is in said first position for deflecting said resilient arms outwardly as said closure unit is rotated on said bottle neck toward a locked position, each of said resilient arms moving past said flange end and having

inwardly as said closure unit is rotated on said bottle neck to the locked position whereby said first lugs abut said flange ends to prevent rotation of said closure unit in an opposite direction, said first lugs on said arms being moved below said flanges when said inner member is moved to said second position, and at least two second lugs on said outer member projecting inwardly into said lower cavity, said second lugs being positioned to receive said container neck therebetween and to engage said second camming surfaces when said closure unit is rotated on said container neck to the locked position for camming said closure unit to a position closing the container opening, whereby said closure unit can be rotated from the locked position for removal from said container neck only when said inner member is in said second position.

2. A child-proof container and closure unit, as set forth in claim **1**, wherein said means retaining said inner member in said upper cavity comprises a plurality of downwardly facing steps in the interior wall of said outer member, one of said steps being adjacent each arm receiving opening in said cross-web, and a catch on each of said arms, said catches engaging said steps when said inner member is in said first position to retain said inner member in said upper cavity.

3. A child-proof container and closure unit, as set forth in claim **1**, wherein said biasing means comprises a plurality of downwardly directed resilient tabs on said inner member, and a like plurality of ramps formed in said upper cavity of said outer member, said tabs abutting said ramps when said inner member is in the first position and said ramps deflecting said resilient tabs as said inner member is moved to the second position whereby the resiliency of said tabs urges said inner member to the first position.

4. A child-proof container and closure unit, as set forth in claim **1**, and including a gasket attached to said cross-web in said lower cavity, said gasket closing the container opening when said closure unit is in the locked position.

5. A child-proof container and closure unit, as set forth in claim **1**, and including means on said container neck for limiting the maximum rotation of said closure unit on said container neck.

6. A child-proof container and closure unit, as set forth in claim **5**, wherein said rotation limiting means comprises a stop formed on said container neck, said stop abutting one of said second lugs when said closure unit is in the locked position.

7. A child-proof container and closure unit, as set forth in claim **1**, and including at least two additional downwardly facing surfaces on said container neck with one of said additional surfaces adjacent the end of each flange for engaging an upwardly facing surface on each of said first lugs when said closure unit is in the locked position, and means for preventing slippage between said additional surfaces and said first lugs whereby said closure unit may be rotated for tightening while in the locked position and, when said closure unit is tightened, said first lugs engage said additional surfaces to prevent loosening of said closure unit.

8. A child-proof container and closure unit, as set forth in claim **7**, and including a gasket attached to said cross-web in said lower cavity, said gasket sealing the container opening when said closure unit is tightened.

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