SAFETY CAP UNIT

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The invention relates to a safety cap unit for containers such as bottles and the like, whereby unauthorized removal of the cap from the container is prevented. More particularly, it relates to a closure unit comprising an inner or closure cap which is used to close the open end of a container cooperatively connected with an outer or actuator cap superimposed over the inner cap, with interlocking means between the outer and inner caps to permit the two caps to be rotated in unison to lock the inner cap as a closure for the container at the time the inner cap is moved axially upward relative to the inner cap so that there is an interengagement between the outer and inner caps. The outer cap has a top wall surface of such character as to permit it to flex or give sufficiently to permit interengagement of the outer and inner caps.

9 Claims, 10 Drawing Figures
SAFETY CAP UNIT

SUMMARY OF THE INVENTION

It is recognized that there is a potential hazard, particularly for young children, if they are able to remove the closure cap from a bottle or other container which may contain medicine, a toxic material, or the like. It is therefore an object of this invention to provide a safety cap unit comprising an inner cap and an outer cap which may be operated in unison to readily secure the inner cap to the neck of the bottle or container but which inner cap cannot be unthreaded or disengaged from the neck of the bottle or container unless an upward manual pressure or pull is applied against the outer cap to produce an interengagement between the outer and inner caps so that they operate in unison to thereby disengage the inner cap from the container.

The structure is such that upon release of the manual pressure against the outer cap it will return to its normal position for subsequent application. A child under the age of six would not have the strength to apply sufficient manual pressure to pull up the outer cap relative to the inner cap, even if he understood the operation of the structure, thus, the cap is a safety factor against use by children who would normally not have the strength to operate the unit.

DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a side elevational view of the closure device forming this invention.

FIG. 2 is a view showing it applied to a bottle or container.

FIG. 3 is an exploded perspective view of the inner and outer caps, with the outer cap broken away to show the interior thereof.

FIG. 4 is a plan view taken on line 4—4 of FIG. 1.

FIG. 5 is a sectional view taken on line 5—5 of FIG. 3.

FIG. 6 is a sectional view of the outer or actuator cap prior to assembly with the inner or closure cap.

FIG. 7 is a sectional view of the inner or closure cap prior to assembly with the outer cap.

FIG. 8 is a sectional view of the two caps in assembled relation and interengaged, as when rotated counterclockwise to screw the inner cap to the container.

FIG. 9 is a sectional view showing the position of the outer cap in relation to the inner cap when the outer cap is rotated counterclockwise and overrides the inner cap, and

FIG. 10 is a sectional view showing the outer cap raised or moved upward relative to the inner cap to effect interengagement at the lower ends of said caps to permit counterclockwise rotation and unscrewing of the inner cap from the container.

The safety closure, generally indicated at 12, consists essentially of two cap members with interengaging means. The inner or closure cap is generally indicated at 14. The outer or actuator cap is generally indicated at 16 and it is superimposed over the inner cap. The caps are provided with interengaging elements and means whereby rotation of the outer or actuator cap 16 in a clockwise direction will simultaneously rotate the inner or closure cap 14 in a similar direction to effect a screwing on of the inner or closure cap 14 on the container, yet the outer or actuator cap 16 is freely rotatable counterclockwise relative to the inner or closure cap 14 until such time that the outer or actuator cap is manually lifted or elevated relative to the inner cap, although axially connected thereto, so that both caps can be rotated counterclockwise simultaneously to effect an unscrewing of the inner cap relative to the container.

The inner or closure cap 14 has an annular vertical wall or skirt 18 and a top wall 20 integrally formed therewith. The interior of the annular wall or skirt 18 is provided with a continuous internal thread 22 whereby the inner cap 14 engages the externally threaded neck of a bottle or container 24 for the purpose of closing the opening of the container. The top wall 20 of the inner cap 14 is provided with a centrally positioned post or stem 26 whereby it is connected to the outer cap, as will be more fully described hereinafter.

The outer surface of the top wall 20 of the inner cap 14 is provided with spaced ratchet teeth 28, all of which are inclined in the same direction. Each ratchet tooth has an inclined or sloping top surface 30 and a vertical edge 32 adjacent the high point of the slope. The ratchet teeth 28 are positioned adjacent the periphery of the annular wall or skirt 18. The upper portion of the vertical wall or skirt 18 adjacent the top is serrated or knurled as at 34.

The annular skirt 18 of the inner cap is provided adjacent the bottom thereof with outwardly extending spaced projections 36 which are generally in the form of spaced vertically extending ribs positioned around the bottom of the skirt which provide intervening spaces 38 between the ribs. The ribs 36 each have their opposite corners rounded as at 39 with the top 40 of the rib sloping downwardly and outwardly.

The outer or actuator cap 16 has an annular skirt portion 42, the outer surface of which is provided with spaced ribs or serrations 44 for non-slip manual gripping. The outer cap 16 has an integrally formed top wall 46 with a central opening 48. The underside of the top wall 46 is provided with a plurality of spaced ratchet teeth 50, all sloping or inclined in the same direction, which are complementary to the ratchet teeth 28 on the inner cap. The interior wall of the skirt of the outer cap 16 adjacent the bottom thereof is provided with a continuous annular inwardly extending surface or lip 52 and is further provided with spaced inwardly extending projections 54 around the inner surface thereof. The central opening 48 of the outer or actuator cap 16 is bounded by an annular raised or ring portion 56 and spaced outwardly therefrom is another annular raised or ring portion 58 which extends above the top plane of the ring 56.

The inner and outer caps 14 and 16 are secured together as a unit by passing the central stem or post 26 of the inner cap through the opening 48 of the outer cap 16 and then spin-welding or otherwise deforming the top of the stem or post 26, as best seen in FIG. 8, to form an annular bead 60 which engages the inner ring 56 and couples the inner and outer caps relative to each other to prevent an axial separation thereby between. The caps, however, are rotative relative to each other.

One of the important features of this invention is that the top wall 46 of the outer or actuator cap 16 is of such character that under pressure it will flex inwardly, as shown in FIGS. 9 and 10. This pressure is exerted against the top wall 46 when the outer cap 16 is manu-
ally raised relative to the inner cap, such as when it is desired to couple the outer and inner caps to each other when unscrewing the inner cap from the container. It is preferred that the outer or actuator cap 16 be made of a polypropylene material so that the top wall 46 will have a sufficient “give” or flexible quality when it is needed to be operated. The inner or closure cap 14 may be made of a medium impact material, such as polystyrene. Further, by varying the thickness of the top wall 46 of the outer cap the proper amount of flexibility that is desired may be obtained, that is, by providing a top wall 46 of certain thicknesses, the amount of upward pressure that has to be exerted on the outer cap to operate the inner or closure cap can be controlled and regulated to the extent desired. For example, if it is desired that a greater physical effort be applied to couple the outer cap to the inner cap to unscrew the inner cap from the container then a thicker wall top surface would be utilized and, conversely, if it is desired to make it easier to lift the outer cap relative to the inner cap then the top wall can be of a reduced thickness. Thus, the proper strength that has to be applied for unscrewing the inner or closure cap from the container can be controlled and regulated to the extent desired.

OPERATION

With the two caps secured together forming the safety closure unit 12, the caps will normally be in the position shown in FIG. 8, in which the bottom of the skirt of the inner cap 14 is spaced above the bottom of the skirt of the outer cap 16 and the ribs 36 of the inner cap are not in engagement with the projections 54 on the outer cap 16. When it is desired to apply the inner or closure cap 14 to close the container the unit is positioned so that the closure cap 14 is in engagement with the neck of the bottle or container and then the outer or actuator cap 16 is rotated clockwise. The ratchet teeth 50 on the actuator cap 16 and the ratchet teeth 28 on the inner or closure cap 14 will be in engagement and the ratchet teeth of the two will interlock so that rotation of the actuator cap 16 will simultaneously rotate the closure cap 14 so that the closure cap 14 screws on to the container and closes the container opening. After the closure cap 14 has sealed the container opening, a further clockwise rotation of the actuator cap 16 obviously will not impart any further sealing of the closure cap on the container.

Rotating the actuator cap 16 in a counterclockwise direction, as shown in FIG. 9, will cause the ratchet teeth 50 of the actuator cap to override the ratchet teeth 28 on the closure cap 14 and no rotative movement will be imparted to the inner closure cap 14. Thus, rotation of the actuator cap 16 counter-clockwise will not cause an unscrewing of the closure cap 14 from the container. The only way to effect an unscrewing of the closure cap 14 from the container would be to manually engage the actuator cap 16 and lift or raise it relative to the closure cap 14. The lifting of the actuator cap 16 will cause the top wall 46 of the actuator cap to “give” or flex inwardly, as shown in FIG. 10, thereby raising the skirt 42 of the actuator cap relative to the closure cap 14 sufficiently so that the inward projections 54 at the bottom of the actuator cap engage the outwardly extending projections or ribs 36 on the bottom of the closure cap 14 of this couples the two caps together, so that by rotating the actuator cap 16 counterclockwise a simultaneous unitary action will be imparted to the inner closure cap 14 and thereby the inner cap can be unthreaded or unscrewed from the container. When the upward manual pressure or pull on the outer cap is released, the flexed top wall 46 of the actuator cap 16 will return to its normal unflexed position, as shown in FIG. 8, and the two caps will be ready to be operated in the manner previously described so that it can again be applied to close the container and then removed from the container in the manner described.

It will be understood that the outer or actuator cap may be formed of a suitable metal or like material in which the top wall has the flexing properties herein described and that such an outer cap may be used with an inner cap either molded of plastic material or made of a metal.

There is thus provided a safety cap of essentially a closure cap and an actuator cap which may be economically produced, which operates effectively, and in which the amount of pressure required to lift the actuator cap relative to the closure cap may be varied and controlled, thereby determinately controlling the safety factor.

What is claimed is:

1. A safety closure device including an inner or closure cap for application to a container, an outer or actuator cap superimposed on said inner cap and normally freely rotatable with respect thereto, means on the top wall of each of said caps securing said caps against unauthorized axial separation, the top wall of said outer cap being sufficiently yieldable to permit axial deflection thereof toward the top wall of the inner cap in response to the manual application of pulling up of said outer cap relative to said inner cap, said outer and inner caps having complementary engaging surfaces on the undersize of the top wall of the outer cap and on the top wall of the inner cap to cause interengagement therebetween so that the rotation of the outer cap will rotate the inner cap to secure said inner cap on the container yet permit the outer cap to be rotated in the opposite direction with respect to the inner cap without effecting an unsecremen of said inner cap from the container, said outer and inner caps having interengaging means which interengage and lock with respect to each other only when the outer cap is raised relative to said inner cap, thereby flexing the top wall of said outer cap sufficiently to cause the interengagement, said caps when thus interengaged adapted to be rotated in a direction to cause unsecremen of said inner cap relative to the container.

2. A safety closure as set forth in claim 1 in which the complementary engaging surfaces are ratchet teeth which cause rotation of the outer cap in one direction to interlock with the ratchet teeth on the inner cap to simultaneously rotate the inner cap in the same direction and permit overriding of the ratchet teeth relative to each other when rotated in the opposite direction.

3. A safety closure as set forth in claim 1 in which the inner cap has an internal thread for engagement with an external thread on the container for securement of said inner cap to said container, and in which the outer cap has inwardly extending projections adjacent the bottom thereof which interengage with the outwardly extending projections adjacent the bottom of the inner cap when the outer cap is raised relative to the inner cap.
4. A safety closure as set forth in claim 2 in which the outer cap has inwardly extending projections adjacent the bottom thereof which interengage with the outwardly extending projections adjacent the bottom of the inner cap when the outer cap is raised relative to the inner cap.

5. A safety closure as set forth in claim 4 in which the top wall of the outer cap has a central opening and in which the top wall of the inner cap has a stem extending through the central opening, which stem is deformed to form a bead to connect the two caps but to permit rotation of one relative to the other.

6. A safety closure as set forth in claim 5 in which the top wall of the outer cap is provided with an annular raised surface spaced radially from the central opening.

7. A safety closure as set forth in claim 3 in which the complementary engaging surfaces interengage when the outer cap is rotated in a clockwise direction to simultaneously rotate the inner cap in the same direction to effect a screwing on of said inner cap relative to the container and permit an overriding of said ratchet teeth when the outer cap is rotated counterclockwise without effecting an unscrewing of the inner cap from the container.

8. A safety closure as set forth in claim 1 in which the outer cap is formed of a polypropylene plastic material and in which the top wall of the outer cap is of a thickness to permit flexing of the central portion of said top wall when the outer cap is manually raised relative to the inner cap but which top wall will return to its normal unflexed position when the manual upward pressure is released from said outer cap to thereby effect disengagement between said interengaging means which interengage when the outer cap is raised.

9. A safety closure as set forth in claim 1 in which the interengaging means which engage when the outer cap is raised are positioned adjacent the bottom of the inner and outer caps and are normally positioned a distance from each other so that there is no interference therebetween during the normal rotation of the outer cap relative to the inner cap.

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