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SAFETY BOTTLE TOP

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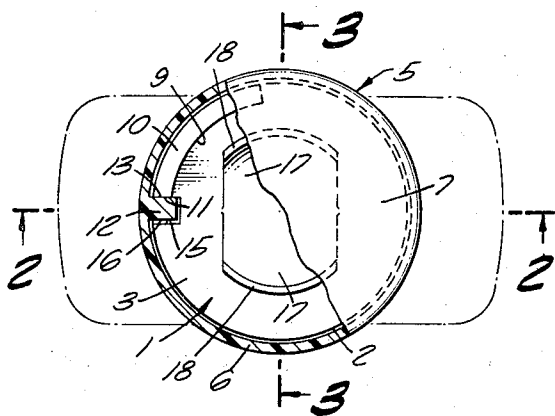


FIG. 1.

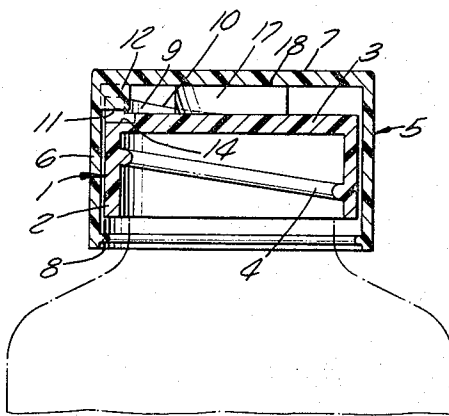


FIG. 2.

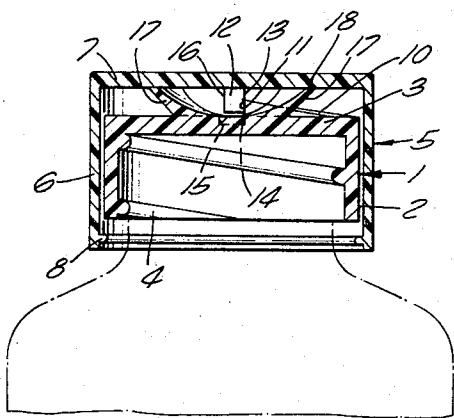


FIG. 3.

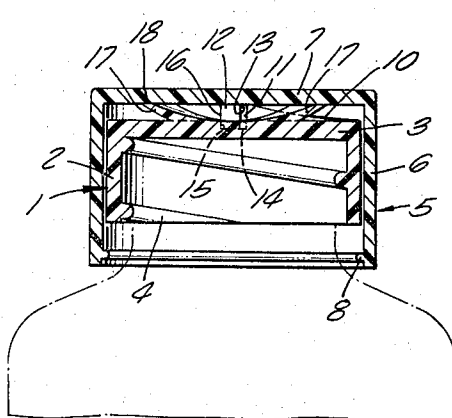


FIG. 4.

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1

3,374,912

## SAFETY BOTTLE TOP

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### ABSTRACT OF THE DISCLOSURE

A safety bottle top comprises an inner member having an end wall and a cylindrical side wall engaging the thread of a bottle, which inner member is enclosed by an outer member having an end wall and a cylindrical side wall, the two members being rotatable relative to each other and axially movable relative to each other with spring means normally holding the two walls apart. One of the two end walls has a lug in a given radial zone projecting towards the other end wall and the other end wall has a ramp in said radial zone which merges at one end with the end wall and terminates at the other end in an abutment facing in a left hand direction. Said other end wall further has a recess in said radial zone forming a second abutment facing in the right hand direction, whereby the lug means on said one end wall may engage said first abutment when the axial spacing of the two end walls is reduced to a given degree in opposition to the spring means and whereby the lug means may enter said recess to engage said second abutment when the lug means registers with said recess and the axial spacing of the two end walls is reduced to greater than said given degree in opposition to said spring means.

The present invention relates to bottle tops and more particularly to a safety bottle top which is safe in the sense that it requires the performance of certain manipulative steps in order to remove the top from the bottle.

There has long existed a problem in the bottle top field in respect of closures for bottles containing potentially harmful materials such as medicine or pills in that such bottles are often exposed to young children or to others who might inadvertently open the bottle and consume some of the material therefrom.

The present invention involves improvements in such bottle tops in that the outer cap of the composite cap assembly in accordance with the present invention is of a typical cap configuration without outward projection and without other visible signs that denote it as a safety bottle top, thus alleviating the possibility that mere curiosity would invite an attempt to remove the safety cap from the bottle.

In addition, the safety top of the present invention, by reason of the outer top having a typical bottle top form, lends itself to automatic application of the safety top to bottles by existing automatic machinery.

An earlier approach to the problem of providing a safety bottle top having the external appearance of a typical bottle top is the subject of U.S. Patent No. 2,847,139. However, that prior attempt would provide a structure which though simple in mode of operation, is complex in terms of manufacture and assembly, as well as expensive from the standpoint of the provision of numerous components requiring special assembly technique.

The present invention has as an object the provision of a structure in which a pair of complementary inner and outer caps may be formed of moldable plastic material and the inner cap inserted into the outer cap without requiring the assembly of any other components, and all of the cooperative elements required to automatically cause unitized right-hand rotation and selective unitized left-hand rotation being incorporated within the space de-

2

fined between the assembled caps, including a spring employed to maintain a normal axial spacing between the end walls of the caps, which spring is made as a unitary element forming part of one of the end walls of one of the caps.

Other objects and advantages of the invention will be hereinafter described or will become apparent to those skilled in the art, and the novel features of the invention will be defined in the appended claims.

In the accompanying drawing:

FIG. 1 is a top plan view of a safety bottle top made in accordance with the invention with a portion of the outer member broken away, the outer cap being in position to effect right-hand rotation of the inner cap;

FIG. 2 is a diametrical sectional view as taken on the line 2-2 of FIG. 1;

FIG. 3 is a diametrical sectional view as taken on the line 3-3 of FIG. 1; and

FIG. 4 is a view corresponding to FIG. 3, but showing the outer top member in position relative to the inner top member to enable unitized left-hand rotation.

Like reference characters in the several views of the drawing and in the following description designate corresponding parts.

In the illustrative embodiment of the safety top of the invention there is an inner cap member generally denoted 1 having a cylindrical side wall 2 closed at its top by an end wall 3. Within the cylindrical side wall 2 is an internal thread 4 adapted for engagement with the typical thread at the mouth of a bottle as shown in broken lines. An outer cap member generally denoted at 5 is provided and includes a cylindrical side wall 6 and an upper end wall 7. The outer cap member 5 is loosely disposed about the side wall 2 of the inner cap member for relative rotative movement as well as for limited axial movement in accordance with one of the features of the invention.

Such axial movement is limited in one direction by a suitable inwardly projecting retainer flange 8 formed within the cylindrical side wall 6 of the outer cap 5 adapted to abut with the lower end of the side wall 2 of the inner cap 1. Means are provided for limiting axial movement of the outer cap 5 in the other direction relative to the inner cap 1, but such means being resiliently deformable to allow manual forcing of further axial movement in the direction which will move the outer cap end wall 7 toward the inner cap end wall 3.

In combination with the resilient means just referred to, means are provided for selectively locking the caps 1 and 5 together for unitized rotation relative to the bottle in a right-hand direction, that is, in a direction to tighten the inner cap 1 on the bottle, but such means being so constructed as to be rendered inoperative to cause left-hand rotation of the inner cap in response to left-hand rotation of the outer cap. In addition, the just described means includes elements cooperatively coengageable upon axial movement of the outer cap end wall 7 toward the inner cap end wall 3 so as to interlock the caps together for unitized rotation in the left-hand direction, that is, in the direction to remove the inner cap from the bottle.

The means generally referred to above comprise cooperative members on the respective end walls 3 and 7. As illustrated, the end wall 3 of the inner cap 1 has a circumferentially extended ramp 9 provided with a ramp surface 10 merging with the upper surface of the end wall 3 at one end and with a vertical abutment wall 11 at its other end. Within the outer cap 5 and disposed at the juncture of the side wall 6 and end wall 7 thereof is a lug 12 having a vertical wall 13 engageable with the vertical wall 11 of the ramp 9 so as to enable the transmission of rotation in a right-hand direction from the outer cap 5 to the inner cap 1. However, it will be noted that left-hand rotation of the outer cap 5 will cause the lug 12 to

engage the ramp surface 10, thereby moving the outer cap axially relative to the inner cap so that the lug 12 will ride over the abutment wall 11. Thus, the abutment 11 and ramp 9 together with the lug 12 in effect constitute one-way clutch means which automatically engage to cause unitized right-hand rotation of the caps but which overrun to prevent the transmission of rotation from the outer cap to the inner cap in the left-hand direction.

In order to effect such left-hand rotation, the end wall 3 of the inner cap is provided with a cavity or recess 14 having an axially extended abutment wall 15 and the lug 12 has an axially extended wall 16 engageable with the wall 15 of recess 14 upon insertion of the lug 12 into the recess 14.

In order to cause the insertion of the lug 12 into the recess 14, the outer cap 5 is adapted to be moved axially against resilient means which normally maintain the end walls 3 and 7 so spaced that the lug 12 will clear the end wall 3 of inner cap 1. In accordance with one of the features of the invention, the resilient means just referred to above is constituted by integral resilient portions formed during the molding of the cap members. In the illustrative embodiment these resilient portions are formed on the inner cap 1 in the nature of a cupped formation having arms 17, 17 projecting outwardly from the center of the end wall 3 and upwardly so as to present end surfaces 18, 18 to the underside of the end wall 7 of the outer cap 5 upon which the end wall 7 will normally rest and be free for revolution relative to the inner cap 1, except when the lug 12 is in abutting engagement with the abutment wall 11 or when the lug 12 is riding on the ramp surface 10. It is apparent that for the lug 12 to cooperate in the described manner with the two abutment walls 11 and 15, the lug and the two abutment walls must be in the same radial zone.

Referring to FIGS. 3 and 4, the caps 1 and 5 are shown in a normal relative axial relationship as maintained by the resilient arms 17 with the outer cap 5 rotated so as to dispose the lug 12 in abutting engagement with the wall 11. Thus, right-hand rotation of outer cap 5 will thereby be imparted to inner cap 1. In FIG. 4 the outer cap 5 is shown in the position that it would assume relative to the inner cap 1 following manual depression of the cap 5 against spring arms 17 so as to cause depression of the lug 12 into the recess 14, whereby the vertical wall 16 of lug 12 may be engaged with the vertical wall 15 of recess 14 so as to enable unitized left-hand rotation of the cap assembly. Under such conditions it will be noted that the resilient plastic cupped arms 17 will flex downwardly and slide outwardly relative to the undersurface of the end wall 7 of the outer cap 5. When the manual pressure holding the outer cap 5 depressed is released, the spring arms 17 will return the outer cap to the position shown in FIG. 3.

It will be noted that in the use of the present cap it is unnecessary to effect visual alignment of any complementary elements in order to effect rotation of the inner cap in either direction. Right-hand rotation of the inner cap will be automatically effected upon right-hand rotation of the outer cap. In order to condition the caps for left-hand rotation it is simply necessary to revolve the outer cap until engagement of lug 12 with the abutment wall 11 is manually detected, at which time the outer cap may be depressed, as described above, to move the lug 12 into the recess 14.

Moreover, it will be noted that in accordance with one of the features of the invention the outer cap 5 has the physical appearance of any typical cap and contains no outward projections or slots to signify that it is a safety top construction. In addition to its visual similarity to conventional tops, its structural similarity to conventional tops enables application of the top to bottles by typical high speed automatic machinery which is adapted to engage the usual cylindrical top and impart right-hand rotation thereto to apply the same to the bottle.

It will also be recognized that the inner and outer cap members are respectively adapted to be molded of suitable plastic material which should be of such strength that the cylindrical wall 6 of the outer cap cannot be readily radially deformed into frictional coengagement with the side wall of the inner cap, thereby preventing frictional driving of the inner cap in a left-hand direction which would otherwise result in its removal from the bottle.

While specific structural details have been shown and described, it should be understood that changes and alterations may be resorted to without departing from the spirit of the invention as defined in the appended claims.

I claim:

1. In a safety bottle top, comprising: an inner member having a cylindrical side wall provided with an internal thread for engagement with the thread of a bottle and an end wall; an outer member having a cylindrical side wall loosely disposed about said side wall of said inner member for relative rotative and axial movement of said members and an end wall; spring means normally holding said end walls spaced apart; and selectively interengageable means for locking said members together for unitized rotation relative to said bottle upon movement of said end walls toward one another; the improvement wherein said selectively interengageable means comprises: lug means on one of said end walls in a given radial zone projecting towards the other end wall; a ramp on said other end wall projecting towards said one end wall in said radial zone, said ramp merging at one end with said other end wall and at the other end terminating in an abutment wall facing in a left hand direction, said other end wall having a recess in said radial zone dimensioned to receive said lug means, said recess forming a second abutment wall facing in the right hand direction whereby said lug means on said one end wall may engage said first abutment wall when the axial spacing of the two end walls is reduced to a given degree in opposition to said spring means and whereby the lug means may enter said recess to engage said second abutment wall when the lug means registers with the recess and when the axial spacing of the two end walls is reduced to greater than said given degree in opposition to said spring means.

2. A safety bottle top, comprising: an inner cap having a cylindrical side wall provided with an internal thread engageable with the threaded end of a bottle and an end wall; said end wall adjacent its outer periphery having a circumferentially extended ramp including a ramp surface merging with said end wall and an axial abutment facing in one direction; said end wall also having at the base of said abutment a recess including an axially extended second abutment opposing the first mentioned abutment and constituting a side wall of said recess; an outer cap having a cylindrical side wall loosely disposed about said inner cap and an end wall overlying the end wall of said inner cap; said outer cap having internally thereof at the juncture of said end wall and said side wall thereof a lug having oppositely facing axially extended surfaces respectively coengageable with said abutments; spring means interposed between said end walls and normally maintaining said end walls in spaced relation so that said lug will engage said first mentioned abutment but clears the end wall of said inner cap so as to pass over said second abutment; said first mentioned abutment and said lug constituting one-way clutch means for causing unitized rotation of said caps in a right-hand direction upon rotation of said outer cap in a right-hand direction relative to said bottle while enabling free rotation of said outer cap in a left-hand direction relative to said bottle; and said second abutment and said lug constituting means coengageable responsive to axial movement of said outer cap end wall toward said inner cap end wall and deformation of said spring means to cause unitized rotation of said caps in a left-

5

hand direction upon left-hand rotation of said outer cap relative to said bottle.

3. A safety bottle top as defined in claim 2, wherein said caps are respectively composed of molded plastic material and said spring means consists of an integral spring formation composed of said plastic material disposed centrally of the end wall of one of said caps and projecting axially into sliding coengagement with the end wall of the other of said caps.

4. In a safety bottle top, comprising: an inner member having a cylindrical side wall provided with an internal thread for engagement with the thread of a bottle and an end wall; an outer member having a cylindrical side wall loosely disposed about said side wall of said inner member for relative rotative and axial movement of said members and an end wall; spring means normally holding said end walls spaced apart; and selectively interengageable means for locking said members together for unitized rotation relative to said bottle upon movement of said end walls toward one another; the improvement wherein said spring means comprises an integral formation on one of said end walls and projecting therefrom for engagement with the other of said end walls; and said member having said formation being composed of resilient plastic material, and wherein said selectively interengageable means comprises a lug on one of said end walls; a ramp on the other of said end walls having a ramp surface and an abutment sur-

6

face; said lug and said ramp constituting one-way clutch means for causing unitized rotation of said members in a right-hand direction upon rotation of said outer member in a right-hand direction relative to said bottle while allowing free rotation of said outer member in a left-hand direction relative to said inner member; said other member having a second abutment surface disposed oppositely to said first mentioned abutment surface for engagement by said lug following movement of said end walls toward one another and deformation of said formation for causing unitized rotation of said members in a left-hand direction upon rotation of said outer member in a left-hand direction relative to said bottle.

5. A safety bottle top as defined in claim 4, wherein said other member is provided with a recess at the base of the first mentioned abutment surface, and said second abutment surface is constituted by a wall defining said recess and opposing said first mentioned abutment surface.

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