

PATENT SPECIFICATION

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(54) SAFETY MEANS TO DETER CHILDREN FROM OPENING CONTAINERS

(71) We, BRISTOL-MYERS COMPANY, a corporation organised and existing under the laws of the State of Delaware, United States of America, of 345, Park Avenue, New York, New York 10022, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following Statement:—

This invention is concerned with the provision of means designed to deter children from opening bottles containing hazardous substances. The danger of small children getting into medicine cabinets and removing dangerous pills from bottles is a well-known problem. This invention seeks to minimize this possibility.

The solution to this problem is complicated by the fact that in designing safety closures for bottles it must also be taken into account that these closures should not afford an obstacle to handicapped adults. Thus, for example, though the safety closure-bottle assembly must serve as a deterrent to a child, it must not present a difficulty for old persons or adults suffering from arthritis.

According to one aspect of the invention there is provided an assembly comprising a flexible snap-on snap-off closure, together with a container having a closure receiving portion for snap-on snap-off engagement with the closure; said closure having a circular roof and a skirt extending from said roof, said skirt being provided on the inner surface thereof with means for engaging a bead on the neck of the container whereby to provide the snap-on snap-off fitting, and a tab extending outwardly from said lower marginal surface and the tab being planar and parallel to said roof; said

skirt being tapered downwardly and outwardly from said roof to the outer circumference of said lower marginal surface; the closure being so vertically dimensioned and the skirt being so tapered as to prevent a child from removing the closure from the container by gripping it between the teeth when the closure is fitted on the container; and said container being provided with a flange in the region adjacent said closure receiving portion, said flange having a flat top surface and a radially inwardly extending notch; the lower marginal surface and tab of the closure flushly contacting and being capable of sliding upon the flat top surface of said flange; the flange extending radially outwardly beyond said lower marginal surface and the tab, except where said notch is disposed, whereby the closure may be removed from the container by manually engaging the tab from below when the latter is disposed adjacent the notch.

In a second aspect of the invention there is provided a closure suitable for use in the assembly as specified in the preceding paragraph, and having features as specified for the closure therein.

Preferred features of the invention will now be described, by way of example, with reference to the accompanying drawing, in which:—

Fig. 1 is a perspective view of a safety closure-bottle assembly according to this invention;

Fig. 2 is a longitudinal sectional view through the centre of the assembly shown in Figure 1 and bisecting tab 5, and

Fig. 3 is a perspective view of the closure shown in Figures 1 and 2 and which itself forms an aspect of the invention.

Referring to the drawing, the safety closure-bottle assembly is shown generally in Figure 1 and comprises a flexible safety closure 1 and a bottle 2. Safety closure 1 (see also Figures 2 and 3) includes a roof 90

3, a skirt 4 extending from roof 3, and a tab 5. To facilitate the turning of the closure there is further made available lugs 6 which protrude outwardly slightly from the relatively low skirt 4. These are distributed about the circumference of the closure at approximately 90°, 180° and 270° relative to the tab 5. These lugs can be engaged by the nails so that the closure may be rotated for opening or closing. The shortness of skirt 4 (about one tenth the maximum diameter of the closure skirt 4) and the downward and outward taper of skirt 4, as is apparent, make it difficult for a child to get its teeth on it.

Safety closure 1 is also constructed with an inwardly extending annular bead 7 seen in the longitudinal sectional view of Fig. 2. Annular bead 7 is spaced from the lower margin of skirt 4 and is located on the internal surface of skirt 4 so as to engage bead 8 on the neck of bottle 2.

The bottle 2 of the present assembly comprises a neck portion previously mentioned and a body portion. Slightly above the base of the neck portion there is provided an annular flange 9 extending outwardly from said neck portion. Flange 9 has a flat upper surface 10 which extends outwardly well beyond the major portion of the circumference of the closure skirt 4 when the closure is seated on bottle 2. As best seen in Fig. 2, flange 9 in cross-section tapers upwardly and outwardly and thus has its thickest portion at a point adjacent the neck of the bottle. This thickness provides bulk and strength to flange 9 so as to prevent its ready fracture.

Flange 9 is also provided with a notch 11 dimensioned so as to be at least as long as tab 5 along its circumference. Notch 11 permits ready access to tab 5 from below when the latter is positioned so as to lie over notch 11. In this position tab 5 may be engaged by the thumb and the safety closure 1 forced upwardly and removed.

The neck of bottle 2, as previously noted, is provided with an outwardly extending bead 8. In applying safety closure 1 onto bottle 2 it is necessary to flex the safety closure over bead 8. When this is accomplished, annular bead 7 of the safety closure comes to rest below bead 8 of bottle 2. This relationship provides a certain amount of resistance which must be overcome in flipping the safety closure 1 upwardly.

The relative radial dimensions of the various portions of the assembly are as follows. The radial distance of flange 9 in the area of notch 11 ("r") will be no less than, and ordinarily equal to the radius of the safety closure 1 in all regions ("r") excepting in the region of tab 5. The radius of the flange 9 in all areas excepting the area of notch 11 ("r") will ordinarily be

equal to or somewhat greater than the radius of the safety closure in the area of tab 5 ("r"). The radius r^1 will always be greater than the radius r^1 of the notch 11 of flange 9 so as to permit the engagement of tab 5 when it is in position over notch 11. The above described radial dimensions ensure that tab 5 is only engageable for removal from below when positioned above notch 11 of flange 9.

Furthermore, notch 11 is dimensioned with respect to the dimension of tab 5 so that the latter is engageable from below by the thumb when it is disposed above notch 11 when the bottle is in the upright position. Ordinarily, the circumferential dimension of notch 11 will be equal to or somewhat longer than the circumferential dimension of the tab 5.

An important feature of the present invention is the relationship that exists between the surface of the lower margin of safety closure 1 and flange 9. As previously noted, flange 9 is provided with a flat and extended upper surface 10. This abuts flushly against the surface of the lower margin of safety closure 1 when the latter is in position on the bottle. This greatly reduces the possibility of obtaining a purchase on the lower margin of safety closure 1 with the thumb or even the teeth by getting them in between the said lower margin and said flat upper surface 10 of flange 9.

If desired, the flange 9 also may be provided with a stop extending upwardly from surface 10, and/or with a peripheral guard ring, as has been described in the parent copending Application No. 2890/73 (Serial No. 1 423 402).

Both safety closure 1 and bottle 2 of the present invention are each preferably molded as unitary pieces from thermoplastic resins. This has a distinct advantage, particularly with regard to bottle 2 since it makes possible the formation of the relatively extended flange 9 having a flat upper surface 10. It is not possible or practical to mold an equivalent structure in glass. A variety of thermoplastic resins are known in the prior art which are useful for this purpose. Among these mention may be made of high and low density polyethylene, polypropylene, polystyrene, and polyvinyl chloride.

In some instances, when the safety closure 1 and bottle 2 are made of certain thermoplastic resins, there is a tendency for the closure and bottle to bind, so that it may be difficult to turn the safety closure when it is seated on the bottle. To minimize this, in accordance with the present invention, different thermoplastic materials may be used for the safety closure and the bottle. This may take the form of different thermoplastic resins or different grades of the same

thermoplastic resin e.g. high and low density polyethylene.

As an alternative to or in addition to employing different thermoplastic materials for the safety closure and bottle, the binding effect noted above may be minimized by incorporating in one or both of said components a slip additive. The slip additive may be introduced into the thermoplastic material mix used to mold the safety closure prior to molding the same. In this instance it will be necessary to select a slip additive which is stable at relatively high temperatures e.g. about 500°F since temperatures of this order are reached in molding the safety closure.

To be effective for the above purposes i.e. to prevent binding between the safety closure and the bottle, the slip additive must be present in an amount of at least about 1000 ppm based on the total weight of the thermoplastic resin molding mix used to mold the safety closure and preferably between 1000 and 5000 ppm by weight of said molding mix.

A variety of slip additives well known to those skilled in the art are available for the present purposes. By way of illustration, mention may be made of the following: erucamides (e.g. erucic acid amide); silicones (e.g. dimethylpolysiloxane viscosity 20,000 to 60,000 centistokes); stearates (e.g. magnesium stearate); and oleoamides (e.g. hydrogenated tallow amide).

Another preferred feature of the present invention is the application of a substance to the safety closure which imparts to it an unpleasant taste. Often children attempt to remove a closure from a container by prying it off with their teeth. If the closure has an unpleasant taste, the likelihood that a child would keep it in his mouth long enough for him to pry it off would be reduced.

The unpleasant tasting substance may be applied to the present safety closure by impregnating or by coating. Ordinarily, it will be applied from a non-toxic solution containing about .001% to .002% by weight of the unpleasant tasting material. Ordinarily, this solution will be an aqueous solution, but other non-toxic solvents may also be used to dissolve the unpleasant tasting material. By way of illustration of said solvents, mention may be made of water, ethyl alcohol, and aqueous ethyl alcohol.

A variety of unpleasant tasting materials non-toxic in the concentrations employed in this invention are known in the prior art which are suitable for the present purposes. Among these the following may be mentioned: denatonium benzoate (BITREX), quinine, and brucine.

WHAT WE CLAIM IS:—

1. An assembly comprising a flexible

3
snap-on snap-off closure, together with a container having a closure receiving portion for snap-on snap-off engagement with the closure; said closure having a circular roof and a skirt extending from said roof, said skirt being provided on the inner surface thereof with means for engaging a bead on the neck of the container whereby to provide the snap-on snap-off fitting, and a tab extending outwardly from the lower marginal surface of the skirt with said lower marginal surface and the tab being planar and parallel to said roof; said skirt being tapered downwardly and outwardly from said roof to the outer circumference of said lower marginal surface; the closure being so vertically dimensioned and the skirt being so tapered as to prevent a child from removing the closure from the container by gripping it between the teeth when the closure is fitted on the container; and said container being provided with a flange in the region adjacent said closure receiving portion, said flange having a flat top surface and a radially inwardly extending notch; the lower marginal surface and tab of the closure flushly contacting and being capable of sliding upon the flat top surface of said flange; the flange extending radially outwardly beyond said lower marginal surface and the tab, except where said notch is disposed, whereby the closure may be removed from the container by manually engaging the tab from below when the latter is disposed adjacent the notch.

2. An assembly according to claim 1 wherein the vertical dimension of the closure is about one tenth the maximum diameter of the closure skirt.

3. An assembly according to claim 1 or 2 wherein the closure is made of substantially low density polyethylene, substantially high density polyethylene, or polypropylene.

4. An assembly according to any of claims 1 to 3 wherein the closure is impregnated or coated with a non-toxic, unpleasant tasting material to deter a child from holding the closure in its mouth.

5. An assembly according to any of claims 1 to 4 wherein said container includes a guard ring mounted about said flange for rotation thereabout, the guard ring having an opening capable of being brought into registration with the notch.

6. An assembly according to any of claims 1 to 5 wherein said container is made from a flexible polymeric material.

7. A closure, suitable for use in the assembly as claimed in any of claims 1 to 6, and having features as specified for the closure in any of claims 1 to 4.

8. A flexible snap-on snap-off closure for a bottle substantially as herein described with reference to Figure 3 of the accompanying drawings.

thermoplastic resin e.g. high and low density polyethylene.

As an alternative to or in addition to employing different thermoplastic materials for the safety closure and bottle, the binding effect noted above may be minimized by incorporating in one or both of said components a slip additive. The slip additive may be introduced into the thermoplastic material mix used to mold the safety closure prior to molding the same. In this instance it will be necessary to select a slip additive which is stable at relatively high temperatures e.g. about 500°F since temperatures of this order are reached in molding the safety closure.

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Another preferred feature of the present invention is the application of a substance to the safety closure which imparts to it an unpleasant taste. Often children attempt to remove a closure from a container by prying it off with their teeth. If the closure has an unpleasant taste, the likelihood that a child would keep it in his mouth long enough for him to pry it off would be reduced.

The unpleasant tasting substance may be applied to the present safety closure by impregnating or by coating. Ordinarily, it will be applied from a non-toxic solution containing about .001% to .002% by weight of the unpleasant tasting material. Ordinarily, this solution will be an aqueous solution, but other non-toxic solvents may also be used to dissolve the unpleasant tasting material. By way of illustration of said solvents, mention may be made of water, ethyl alcohol, and aqueous ethyl alcohol.

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2. An assembly according to claim 1 wherein the vertical dimension of the closure is about one tenth the maximum diameter of the closure skirt.

3. An assembly according to claim 1 or 2 wherein the closure is made of substantially low density polyethylene, substantially high density polyethylene, or polypropylene.

4. An assembly according to any of claims 1 to 3 wherein the closure is impregnated or coated with a non-toxic, unpleasant tasting material to deter a child from holding the closure in its mouth.

5. An assembly according to any of claims 1 to 4 wherein said container includes a guard ring mounted about said flange for rotation thereabout, the guard ring having an opening capable of being brought into registration with the notch.

6. An assembly according to any of claims 1 to 5 wherein said container is made from a flexible polymeric material.

7. A closure, suitable for use in the assembly as claimed in any of claims 1 to 6, and having features as specified for the closure in any of claims 1 to 4.

8. A flexible snap-on snap-off closure for a bottle substantially as herein described with reference to Figure 3 of the accompanying drawings.



9. An assembly comprising a closure according to claim 8 together with a bottle, substantially as herein described with reference to Figures 1 and 2 of the accompanying drawings.

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