

[54] **CHILDPROOF OVERCAP FOR AEROSOL CANS**

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3,460,708 8/1969 Vollers..... 222/182 X

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[22] Filed: **Jan. 7, 1972**

[57] **ABSTRACT**

[21] Appl. No.: **216,165**

An overcap for aerosol cans comprising an inverted cup of resilient plastic having a top in the form of a shallow dome depressible downwardly to expand the lower end of a split expandable skirt and release in-turned lugs thereon from beneath a shoulder at the upper end of the can breast. The resiliency, shape, and thickness of the plastic parts is such that an adult, but not a small child, is capable of depressing the top dome to expand the skirt and release said lugs so as to permit the cap to be lifted off from the top of the aerosol can.

[52] U.S. Cl..... 222/153, 222/182, 215/9,
215/46 R

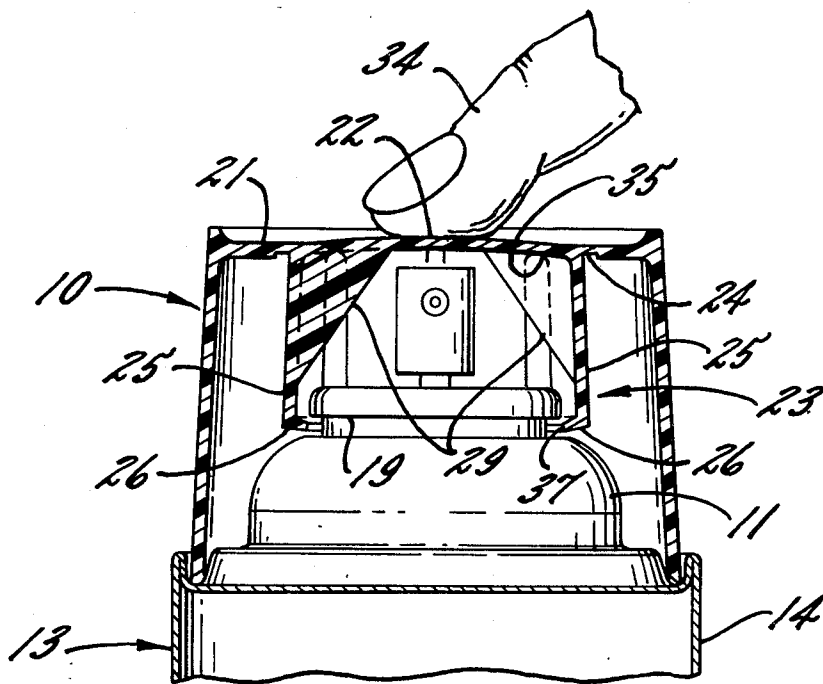
[51] Int. Cl..... **B67b 5/00**

[58] Field of Search..... 215/9, 46, 41;
220/60 A, 47; 222/182, 153

[56] **References Cited**
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3,633,789 1/1972 Markowitz..... 215/9

12 Claims, 9 Drawing Figures



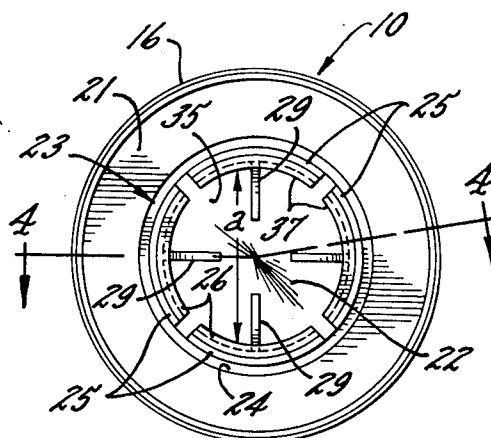
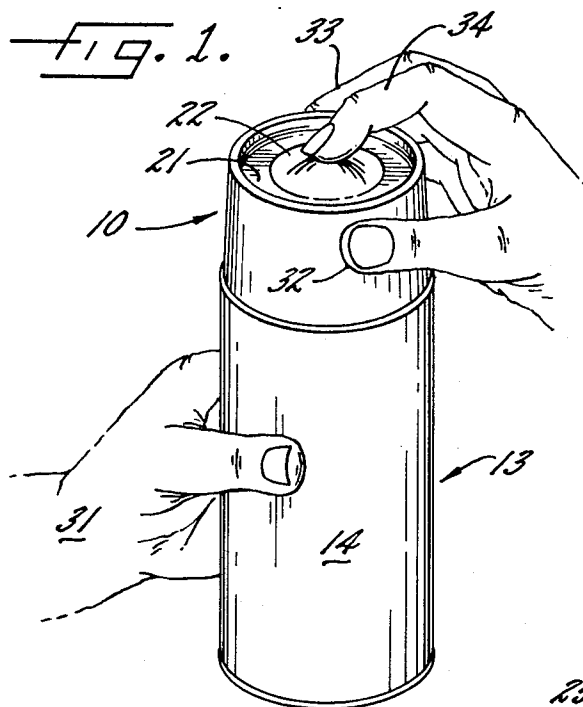


FIG. 3.

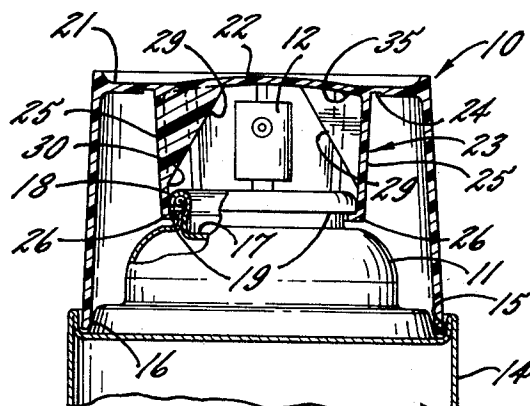


FIG. 4.

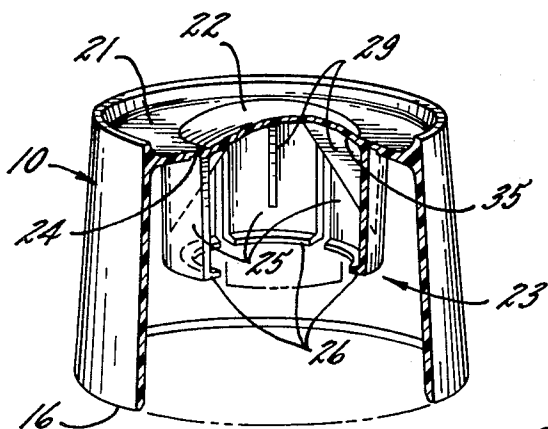


FIG. 2.

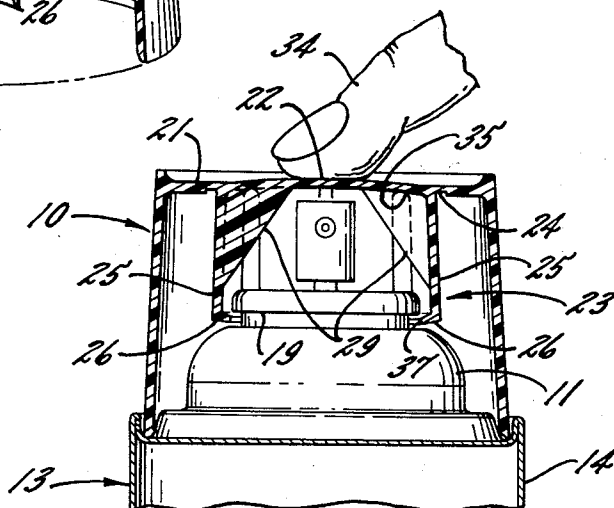


FIG. 5.

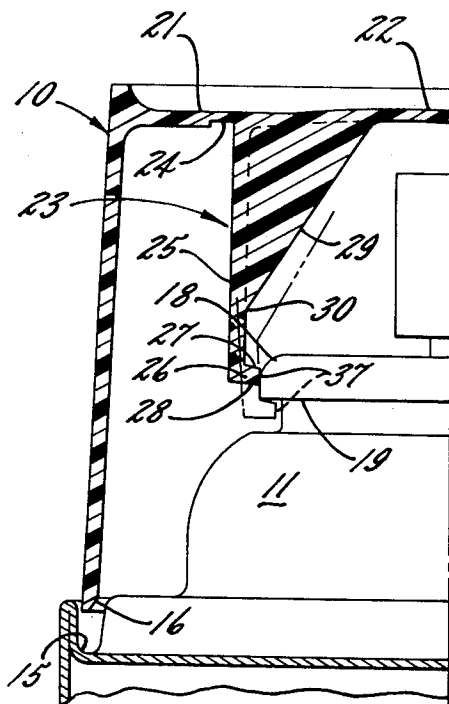


Fig. 6.

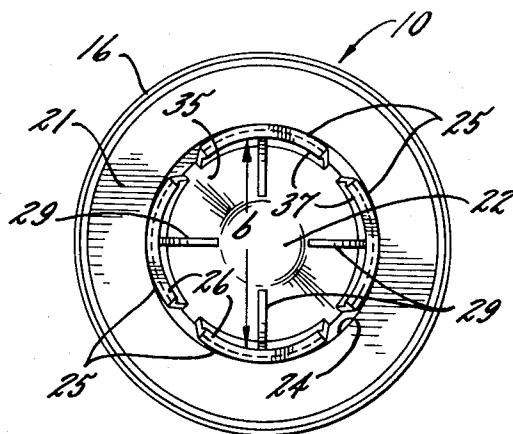


Fig. 7.

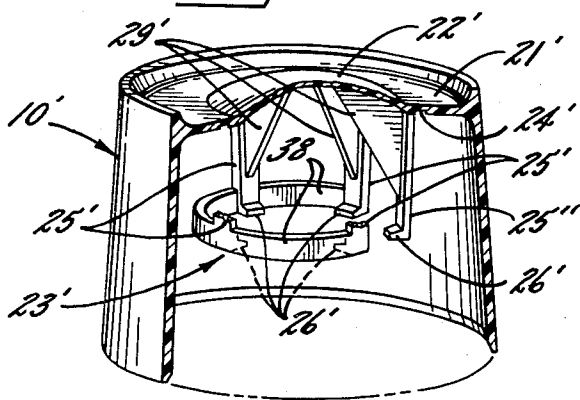


Fig. 8.

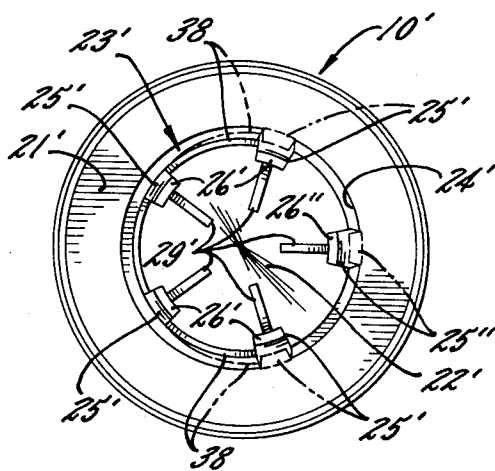


Fig. 9.

CHILDPROOF OVERCAP FOR AEROSOL CANS

BACKGROUND OF THE INVENTION

Numerous constructions, such as disclosed in *Today's Packager*, November/December 1971, have been devised for the purpose of making it difficult and preferably impossible for small children to gain access to the contents of containers having closures of molded resilient plastic. The present invention relates to the child-proofing of plastic overcaps for aerosol containers of the type comprising an inverted cup held onto the top of a can by an inner skirt gripping the lip of a breast cup surrounding the dispensing control valve.

SUMMARY OF THE INVENTION

The general aim of the present invention is to modify a conventional plastic overcap of the above character in a simple manner such that when pressed onto the top of a conventional aerosol can, it cannot be removed by any combination of forces within the strength capabilities of a small child and yet may be removed easily by forces of greater magnitude capable of being applied by an adult. This objective is achieved by providing an inner skirt adapted for positive interlocking with the shoulder of the breast cup on the can but is expansible and releasable from such shoulder by downward depression of a shallow dome formed in the top of the overcap.

More particularly, an inner skirt molded integral with the underside of the cap top is split longitudinally into a plurality of angularly spaced legs having inturned lugs at their free ends which lugs snap beneath the breast shoulder as the overcap is pressed onto the can top in the conventional manner but are expanded to release the cap in response to downward depression of the top dome.

The invention also resides in the manner of stiffening the legs of the inner skirt and constructing the top wall of the cap to insure release of the locking lugs.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an aerosol can equipped with an overcap embodying the present invention and adapted to be released by the manual application of forces in the manner illustrated.

FIG. 2 is a broken away perspective of the improved overcap.

FIG. 3 is a view from the open end of the overcap with the parts in locked positions.

FIG. 4 and 5 are fragmentary diametrical sections taken along the line 4—4 of FIG. 3 with the parts of the overcap in locked and released positions.

FIG. 6 is an enlarged fragmentary view showing the parts in an intermediate position.

FIG. 7 is a view from the open end of the overcap with the parts in a released position.

FIG. 8 and 9 are views similar to FIGS. 2 and 3 of a modified form of the overcap.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The overcap incorporating the present invention is an inverted cap 10 adapted to be used in the conventional manner to cover the breast 11 and valve 12 at the top of an aerosol can 13 having a cylindrical body 14 defining at its upper end an upwardly opening groove 15. In conventional aerosol cans, the valve 12 is dis-

posed in a cup 17 smaller than the can and overcap and having a lip 18 which is rounded and turned outwardly and downwardly to define a downwardly facing shoulder 19 spaced a short distance above the top of the breast 11.

As in conventional aerosol overcaps, the present cap is substantially cylindrical and comprises a single piece molding of resilient plastic such as polypropylene adapted to be pressed onto the can top in inverted position with the cup lip 16 seating in the groove 15 as shown in FIG. 4. The bottom 21 of the inverted cup forms the top of the overcap and is generally flat except for slight upward bulging of the central area to form a shallow circular dome 22 which, in accordance with the present invention, coacts in a novel way with a generally cylindrical and longitudinally split inner skirt 23 by which the cap is fastened positively to the can top but is releasable only by the coordinated application of a unique combination of forces which can easily be exerted manually by an adult but are beyond the normal strength capabilities of a four year old child.

Herein, the dome 22 is circular and of a diameter somewhat more than half that of the top 21. It bulges upwardly substantially uniformly and is about 0.040 of an inch high and of a uniform thickness of about 0.030 of an inch. The top 21 excluding the dome is uniform in thickness, about 0.050 of an inch, except for an annular and downwardly opening groove 24 formed in the underside of the top around and near the upper end of the skirt.

The skirt 23 is molded integral with the underside of the top 21 and, at its upper end, is substantially equal in diameter to that of the dome 22. In its preferred form, the skirt is split throughout its length and thus divided into a plurality, four in the present instance, of angularly separated and parallel legs 25 projecting cantilever fashion from the underside of the top so as to be bendable radially to make their lower ends resiliently contractible to the free position shown in FIG. 3 but expandable to the position shown in FIG. 7. Preferably, the legs are arcuate in cross-section and occupy substantially the full circumference of the skirt.

To impart to the legs desired resistance to outward bending while providing for uniform expansion of their lower ends in releasing the cap as later described, the upper end portion of each leg is reinforced, preferably on its inner side by a gusset 29 about as thick as the leg disposed in a radial plane and molded integral at its upper end with the underside of the top and along one side with the leg. Herein, each gusset is triangular in shape and of a length about two thirds that of its attached leg 25. It is disposed on the inner side of the leg and its upper end extends inwardly part way to the center of the dome 22. The apex 30 at the lower end of the triangular merges with the leg at a point somewhat short of the end of the leg.

The resiliency of the reinforced legs is utilized to effect releasable and positive interlocking of their lower free ends with the shoulder 19 of the can top through the provision of an arcuate lug 26 on the end of each leg projecting inwardly therefrom and shaped and positioned axially of the cap relative to the lip 16 for engagement with and outward camming by the rounded lip 18 of the cup 17 (FIG. 6) as the cap is pressed onto the can and approaches its seated position. In this movement, the lugs 26 pass the shoulder and, by virtue of the resiliency of the legs 25, then bent outwardly by

the cam 18, and snap in beneath the shoulder (FIG. 4) just as the cup lip 16 reaches the groove 15 and becomes seated therein. Herein, the lower surfaces 28 of the lugs 26 are disposed normal to the cap axis while the upper surfaces 27 preferably slope inwardly and downwardly at a small angle so as to coact with the shoulder 19 in utilizing the resiliency of the legs 25 to effect firm seating of the cap lip in the can groove as the lugs are forced in beneath the shoulder.

With the lugs thus pressed in beneath the shoulder, the cap will be locked positively to the can and so securely that it cannot be separated from the can by a direct axial pull of the magnitude capable of being exerted by an adult. The cap may, however, be removed easily by a unique and coordinated combination of three forces which an adult is capable of exerting in the manner illustrated in FIG. 1. To effect such release, the can is grasped by one hand 31 of the user while the overcap is gripped on opposite sides between the thumb 32 and the middle finger 33 of the user's other hand thus leaving the forefinger 34 free and above the dome 22. In this position (FIG. 1) an adult may press downwardly on the center of the dome 22 and exert with his forefinger a force sufficient to flex the dome downwardly and partially collapse the same as shown in FIG. 5. This results in a decrease in the inclination of the areas 35 all around the underside of the dome to which the upper ends of the legs and the gussets 29 are fixed. This change in inclination of the surface 35 from that shown in FIG. 2 to that shown in FIG. 5 results in outward radial swinging of all of the legs 25 as shown in FIGS. 5 and 7, thus expanding the lower end of the skirt 23 and increasing the diameter a (FIG. 3) of the circle defined by the lug ends 37 when the legs are free to the diameter b . The lugs 26 are thus withdrawn radially from beneath the shoulder 19. With the lock formed by the lugs thus released, the cap may be lifted upwardly and easily removed from the can top.

Such removal of the overcap may be effected by a somewhat lesser depression of the dome since, during the lifting, the shoulder 19 acting on the upper sloping surfaces 27 of the lugs 26 will cam the legs 25 outwardly and allow the lugs to pass as the cap is lifted off from the can.

To reduce the force required to be exerted in depressing the dome, the thickness of the top 22 is reduced by forming the shallow annular groove 24 around the underside of the top in the area immediately surrounding the upper ends of the lugs so that the collapsing force applied to the dome to release the lugs 26 is confined to the area of the dome. The necessary expansion of the lug end of the skirt 23 is thus achieved without the necessity of depressing the entire area of the top 22. Such weakening of the top 22 surrounding the area of attachment of the skirt 23 thereto is also advantageous in increasing the resistance of positive lock formed by the skirt 23 and the lugs 26 to release by an axially directed pull applied between the can and the overcap in an attempt to separate the two.

FIGS. 8 and 9 show a modification in which the parts corresponding to those above described are indicated by primed numerals. In this, legs 25' of relatively narrow circumferential width are employed and are reinforced by triangular gussets 29'. Most of the legs 25' are joined at their lower ends by an arcuate band 38 while leaving one or more legs 25'' free for independent bending. With this arrangement most of the out-

ward bending of the legs in response to depression of the dome 22' as shown in phantom in FIG. 9, occurs at the free leg 25'' and at those connected to the end of the band 38. It has been found that the outward swinging of only three of the legs and withdrawal of their lugs 26' from beneath the shoulder 19' is sufficient to enable an adult to separate the overcap from the can top after depression of the dome in the manner described above.

We claim:

1. An overcap for providing a childproof covering for the top of a conventional aerosol can having a dome-shaped breast with an annular groove at the bottom edge and a smaller cylindrical cup at the top with the lip thereof rounded outwardly and downwardly to a downwardly facing shoulder, said overcap being molded of resilient plastic and comprising an inverted generally cylindrical cup having a generally flat top spaced above said shoulder when the cup lip is pressed into said groove, a generally cylindrical skirt integral with and depending from the underside of said top and split longitudinally to provide a plurality of legs individually flexible radially so as to be expanded in passing said breast cup as the cap is pressed onto said can, inwardly turned lugs at the free ends of said legs adapted to pass and snap in beneath said shoulder and lock the cap securely to the can, said top having a shallow upwardly bulging dome sufficiently thin and flexible to be depressible downwardly by a manually exerted force whereby to decrease the inclination of the undersurface of said top and whereby swing said legs and lugs radially and outwardly to thereby release the cap from said shoulder, the lengths of said legs and lugs and the contour of said dome being so correlated with the resiliency of the plastic that said force required to release the cap is greater than that capable of being exerted by a child gripping the cap but less than an adult is capable of exerting by similar grasping of the cap while lifting the cap upwardly.

2. An overcap as defined in claim 1 in which said dome is the central area of said top and its diameter is approximately equal to that of the upper end of said skirt.

3. An overcap as defined in claim 1 in which said legs are or arcuate radial cross-section.

4. An overcap as defined in claim 3 in which said inwardly turned lugs extend around the free arcuate ends of said legs.

5. An overcap as defined in claim 1 in which the upper end portions of said legs are stiffened by members integral with said top and the sides of said skirt.

6. An overcap as defined in claim 5 in which each of said members is a gusset decreasing in width downwardly from said top.

7. An overcap as defined in claim 1 in which said top is of reduced thickness around the periphery of said dome whereby to confine the depression of said dome substantially to the area of the upper end of said skirt.

8. An aerosol overcap as defined in claim 1 in which the areas of said top at and adjacent the junctions with said legs is made substantially thinner than the area surrounding said dome.

9. An overcap as defined in claim 1 in which the upper surfaces of said lugs slope inwardly and downwardly so as to coact with said shoulder in effecting firm sealing of the cap lip in said can groove.

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10. An overcap as defined in claim 1 in which the axial spacing of the upper surfaces of said lugs equals the spacing of said shoulder above the bottom of said groove.

11. A childproof overcap for a conventional aerosol can comprising an inverted cap of molded resilient plastic having a generally flat top with a center area in the form of a shallow upwardly bulging dome adapted to be flexed downwardly by pressure capable of being applied by the forefinger of an adult while grasping the cup between his thumb and another finger, said pressure being greater than a small child is capable of exerting, a plurality of separate radially bendable legs integral with the underside of said cup top and projecting cantilever fashion approximately parallel to and along the cup axis from points angularly spaced around the periphery of said center area, and intumed lugs on the

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free ends of said fingers adapted to be spread apart and to snap in beneath the breast shoulder of said can when the cup is pressed onto the can end, the resistance of said legs to outward bending when said lugs are engaging said shoulder being sufficient to prevent an adult from lifting and pulling the overcap off from said can and said legs and lugs being swung outwardly enough to release the overcap under said adult exerted pressure applied to and depressing said dome.

12. An aerosol overcap as defined in claim 9 in which at least a pair of said depending legs on diametrically opposite sides of said cup are integrally connected by an arcuate band and two pairs of each lugs are separated from each other in response to depression of said dome far enough to release such lugs from said shoulder.

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