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V. J. ESPOSITO, JR

3,405,850

SCREW ACTUATED TOGGLE VALVE DISPENSING CAP

Filed June 1, 1967

FIG. 1

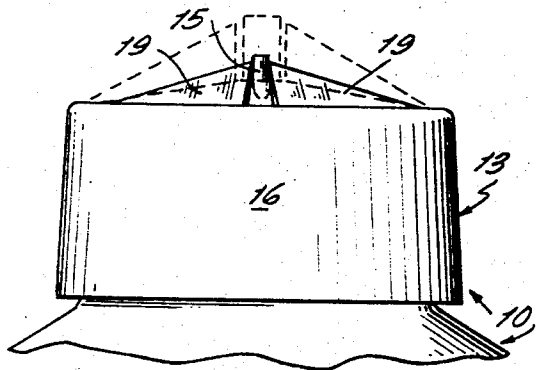


FIG. 2

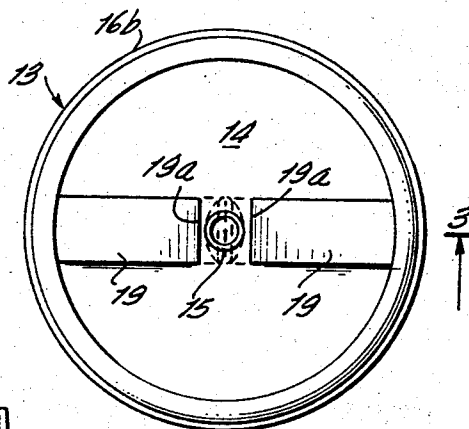


FIG. 6

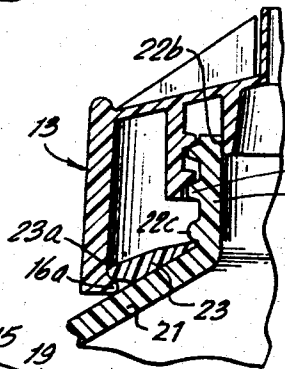
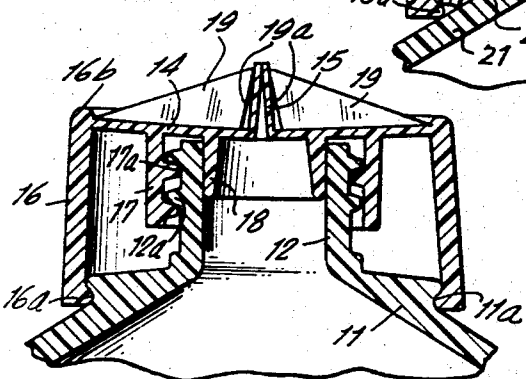


FIG. 4

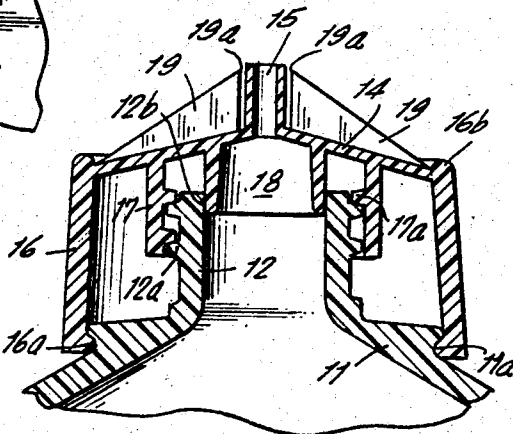


FIG. 3

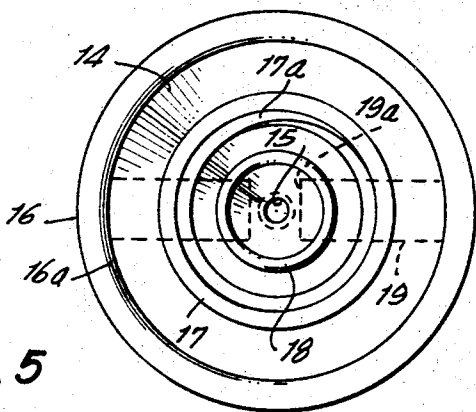


FIG. 5

INVENTOR.
VINCENT J. ESPOSITO, JR.
BY
Barnett + Barnett
ATTORNEYS

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SCREW ACTUATED TOGGLE VALVE DISPENSING CAP

Vincent J. Esposito, Jr., 31 Jackson Ave.,
Wayne, N.J. 07470

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8 Claims. (Cl. 222-498)

ABSTRACT OF THE DISCLOSURE

A molded plastic dispensing cap having an integral valve actuated by diaphragmic deformation of a top wall. A skirt extends from the periphery of the top wall engaging the container for retention of the cap against axial displacement. An interior sleeve integral with the top wall is in threaded interengagement with the bottle neck deforming the top wall for said valve actuation on rotation of the cap.

Background of the invention

Field of the invention.—The invention relates to closures for bottles, collapsible tubes and the like containers and more particularly is directed to molded caps of elastomeric plastic resin having integral valve means for selectively dispensing fluid contents and sealing the container.

Description of the prior art.—This invention is an improvement of my prior Patent No. 3,232,499 and overcomes a problem encountered therein. The prior cap construction, being molded with the valve in open position is often stored for long periods of time in closed position with the plastic material under the stress of a closing pressure. Since this stress tends to relieve itself by cold flow, the memory may be lost to an extent that the valve remains closed when the closing pressure is subsequently released or at best the opening action is found to be sluggish.

Summary of the invention

Among the objects of the invention is to generally improve plastic molded caps of the character described, which shall comprise a single, unitary, integral, molded piece, economical to manufacture in quantity production by modern molding methods, which shall have a top wall incorporating a conduit for dispensing the fluid contents of a container and a valve structure to selectively open and close the conduit on diaphragmic deformation of the top wall from a convex to a concave position. The cap shall include an outer skirt extending from the periphery of the top wall, an intermediate concentric threaded sleeve for engaging the threaded neck of a container, and an innermost concentric sleeve for engaging the interior surface of the neck for sealing purposes. The skirt shall include means for engaging a shoulder portion of the container for retention of the cap against axial displacement and shall coact with the threaded sleeve on rotation of the cap to deform the top wall between convex open-valve and concave closed-valve positions. The skirt and sleeve coaction provides positive actuation of the valve structure to both open and closed positions obviating the cold flow problem hereinbefore mentioned.

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The cap shall be capable of use on containers provided with an integral shoulder groove for engagement by the skirt as well as on bottles of conventional construction having a neck ring which shall be utilized to retain a snap-on washer to provide the groove or undercut for the skirt engagement. The cap shall be rugged in construction, foolproof in operation, practical and efficient to a high degree in use.

Brief description of the drawings

FIG. 1 is a fragmentary elevational view of an upper portion of a container fitted with a cap constructed to embody the invention with the valve in closed position in full lines and indicated in open position in broken lines.

FIG. 2 is a top plan view of the cap shown in FIG. 1 but with the valve in open position in full lines and indicated in closed position in broken lines.

FIG. 3 is a vertical section taken on line 3—3 in FIG. 2 showing details of construction with the cap in open position.

FIG. 4 is a vertical section similar to FIG. 3 but with the cap in closed position.

FIG. 5 is a bottom view of the cap removed from the container, and

FIG. 6 is a fragmentary sectional view taken similar to FIG. 3 but showing, as a modification, a snap-on washer for adapting a bottle having a conventional neck ring to provide a groove or undercut for engagement of the skirt.

Description of the preferred embodiments

Referring in detail to the drawing, 10 generally denotes a capped container, such as a bottle, collapsible tube or the like, having a shoulder portion 11, a neck 12 formed with external threads 12a, terminating in an open mouth 12b, and fitted with a valved closure and dispensing cap 13.

Cap 13 may be molded as an integral unit of a suitable elastomeric material, such as, rubber, polyolefins, polyvinyls, polyurethanes, ethylvinylacetate and the like, to comprise a deformable diaphragmic top wall 14 formed with an exterior axial or central spout 15 for dispensing fluid contents from the capped container 10 therethrough. An outer skirt 16 extends downwardly from the periphery of top wall 14 and may also extend slightly above the upfacing surface thereof as a peripheral rim or bead 16b for cap 13. An intermediate interior flange or sleeve 17 and an inner interior flange or sleeve 18 also extend from top wall 14. To this end, as is clear from FIGS. 2 and 3, top wall 14 is molded into a generally convex contour and carries a pair of toggle bosses 19 symmetrically formed on the exterior surface and along a diameter thereof spaced on opposite sides of spout 15. Toggle bosses 19 may be triangular or wedge shaped to provide opposing edges 19a spaced above top wall 14 serving as a pair of jaws between which spout 16 extends and which are adapted to be brought together to pinch off and close spout 16 when top wall 14 is deformed to the concave position shown in FIG. 4.

To provide relative movement of top wall 14 between

the convex and concave configurations shown in FIGS. 3 and 4, respectively, intermediate sleeve 17 has internal threads 17a for engaging external threads 12a on neck 12 and outer skirt 16 is retained in a fixed axial position with respect to neck 12. This may be accomplished by any suitable means, as for example, a tongue and groove interengagement between container and cap permitting rotation of cap 13 but preventing axial displacement of the periphery of top wall 14 with respect to neck 12. One such tongue and groove interengagement is shown in FIGS. 3 and 4 as an integral undercut groove 11a formed in container shoulder portion 11 positioned for engagement by a radially inwardly projecting flange 16a formed adjacent the bottom edge of skirt 16. FIG. 6 shows a modified construction for providing the skirt retaining groove which is hereinafter more fully described.

Inner sleeve 18 is sized and shaped to snugly fit into and abut the interior surface of neck 12 for preventing leakage and evaporation of the fluid contents through the threaded and tongue and groove interconnections.

The operation of capped container 10 will now be apparent. Cap 13, molded as the one-piece integral structure hereinbefore described, is affixed to neck 12 of a container filled with a fluid contents and provided with a shoulder portion groove 11a by a downwardly twisting motion which serves to first engage sleeve threads 17a with neck threads 12a and then snap flange 16a into groove 11a while inner sleeve 18 is telescoped into the container open mouth 12b. By further rotating cap 13 in a clockwise direction, the threaded engagement of sleeve 17 and neck 12 deforms top wall 14 from its normally open convex configuration shown in FIG. 3 to the concave configuration shown in FIG. 4 wherein opposing edges or jaws 19a of toggle bosses 19 are brought together clamping off spout 15. It will be apparent that in this closed position downward pressure is also being exerted by the bottom of skirt 16 against shoulder portion 11 creating sufficient friction to retain cap 13 against accidental rotation in a counterclockwise direction. Capped container 10 may be stored and shipped in this closed position.

The fluid contents of capped container 10 is readily dispensed through spout 15 by rotating cap 13 merely approximately one half turn in the conventional counterclockwise direction whereby top wall 14 is urged into its convex configuration shown in FIG. 3. The relative axial position of cap 13 with respect to neck 12 is retained by the engagement of flange 16a in groove 11a. The dispensing of the fluid contents may be aided by the use of deformable wall containers, as for example, collapsible tubes for tooth paste, shampoo in paste form and other products of like consistency, which may be squeezed through open spout 15, and plastic bottles for liquid detergents and the like, which may be dispensed a few drops at a time or in a stream through open spout 15 by application of suitable pressure to the container walls. After use, closing of spout 15 is again accomplished by a one half clockwise turn of cap 13.

FIG. 6 shows a modified embodiment of the invention utilizing cap 13 in combination with a container having a conventional shoulder portion 21 instead of shoulder portion 11 and its integrally formed groove 11a. The container also has a neck 22 formed with external threads 22a terminating in an open mouth 22b and having a conventional neck ring 22c adjacent shoulder portion 21. Neck ring 22c retains a snap-on washer 23 which may be shaped to abut shoulder portion 21 and has a rim edge 23a spaced from the latter to provide an annular groove therebetween for engaging flange 16a of skirt 16 in the same manner and for the same purpose as groove 11a hereinbefore described.

The improved capped containers herein disclosed are seen to achieve the several objects of the invention and to be well adapted to meet conditions of practical use. As various possible embodiments might be made in this in-

vention, and as various changes might be made in the disclosed constructions, it is to be understood that all matters herein set forth or shown in the accompanying drawing are to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A closure and dispensing cap molded as an integral structure of elastomeric material comprising a skirt for concentrically fitting about a neck of a container in spaced relation thereto, a top wall at an upper end of the skirt for extending across a mouth of the neck, said top wall being formed with a central upwardly projecting spout having a bore extending through the top wall for dispensing therethrough fluid contents from the container, said top wall being molded into a normally substantially convex configuration and being resiliently deformable into a concave configuration, a pair of spaced toggle bosses positioned on the exterior surface of the top wall on opposite sides of said spout, said toggle bosses having opposing portions positioned to be brought together and clampingly constrict said spout closing said bore when the top wall is deformed into said concave configuration, said skirt having means for engaging a shoulder portion of the container for retaining the cap against axial movement with respect to said neck and permitting rotation thereof, and means extending from said top wall for contacting with the neck to selectively deform the top wall to said convex and concave configurations on rotation of the cap on the neck.

2. The closure and dispensing cap defined in claim 1 in which an inner sleeve extends from said top wall sized and shaped to snugly telescope into the mouth of said neck in stopper fashion for sealing the container against the leakage and evaporation of the fluid contents.

3. The closure and dispensing cap defined in claim 1 in which said last mentioned means is a sleeve having internal threads for engaging external threads provided on said neck.

4. The closure and dispensing cap defined in claim 1 in which said container shoulder portion engaging means comprises a radially inwardly extending flange formed at the bottom of said skirt for engaging a companion annular groove formed on said shoulder portion.

5. A container and cap combination, the container having a neck terminating in an open mouth and extending from a shoulder portion, said neck being formed with external threads, a lateral annular groove formed in said shoulder portion concentric with said neck, the cap being molded as an integral structure of elastomeric material comprising a skirt concentrically fitting about said neck in spaced relation thereto and having a bottom edge abutting said shoulder portion and a radially inwardly extending flange engaging said lateral annular groove retaining the cap for rotation on the container against axial movement with respect to said neck, a top wall at an upper end of the skirt extending across said mouth, said top wall being formed with a central upwardly projecting spout having a bore extending through the top wall for dispensing therethrough fluid contents from the container, said top wall being molded into a normally substantially convex configuration and being resiliently deformable into a concave configuration, a pair of spaced toggle bosses positioned on the top wall at opposite sides of said spout and having opposing portions to be brought together and clampingly constrict said spout closing said bore when the top wall is deformed into said concave configuration, and a sleeve extending from said top wall having internal threads engaging said neck threads, said sleeve and neck threading engagement serving to deform the top wall to said convex and concave configurations on selective rotation of the cap on the neck.

6. The container and cap combination defined in claim 5 in which said lateral annular groove is integrally formed in the shoulder portion of the container.

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7. The container and cap combination defined in claim 5 in which said container neck is formed with a neck ring below said external threads, a washer retained on the neck by said neck ring adjacent said shoulder portion and having a rim edge spaced from said shoulder portion providing said lateral annular groove therebetween. 5

8. The container and cap combination defined in claim 5 in which an inner sleeve extends from said top wall sized and shaped to snugly telescope into said mouth in stopper fashion for sealing the container against leakage 10 and evaporation of the fluid contents.

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ROBERT B. REEVES, *Primary Examiner.*K. N. LEIMER, *Assistant Examiner.*