Feb. 4, 1969 D. J. BROCKHAGE 3,425,580

LIFT-TAB CROWN CAP

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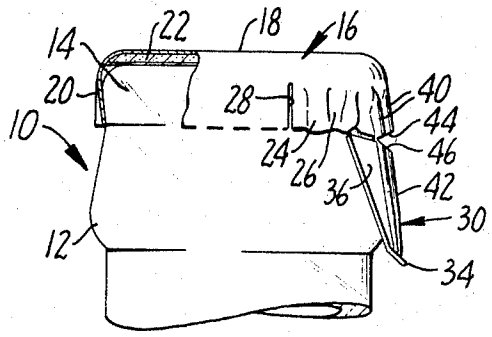


FIG. 1.

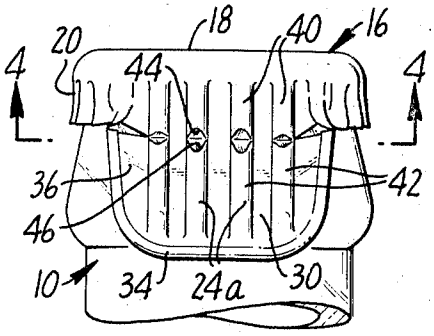


FIG. 3.

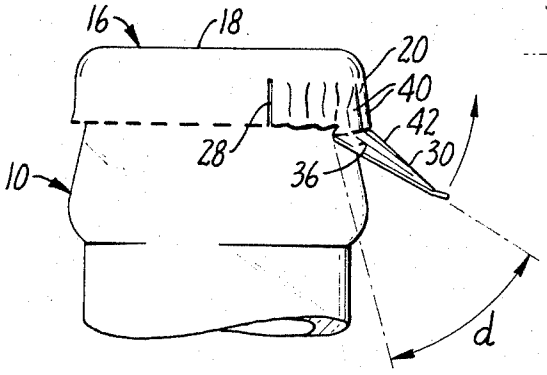


FIG. 2.

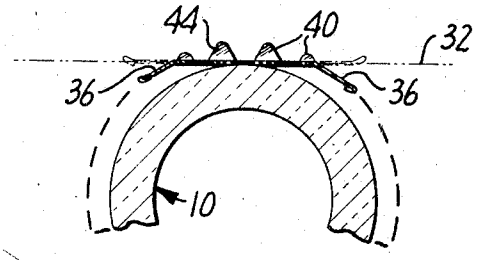


FIG. 4.

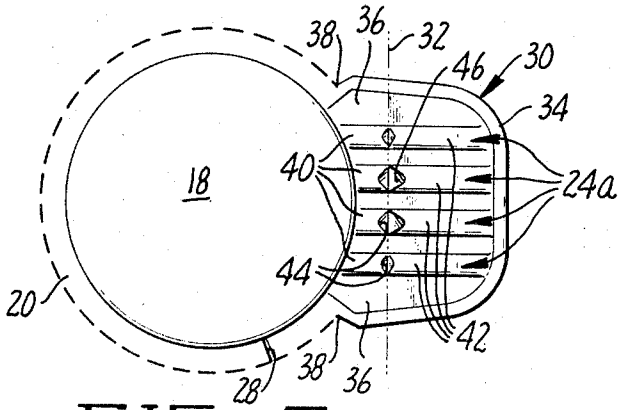


FIG. 6.

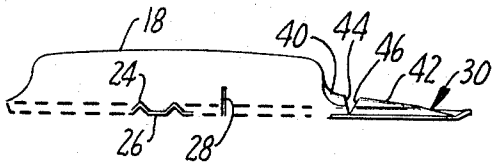


FIG. 7.

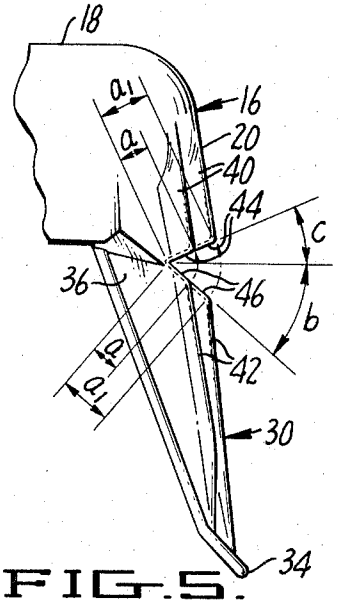


FIG. 5.

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LIFT-TAB CROWN CAP

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ABSTRACT OF THE DISCLOSURE

A crown cap having a lift-tab secured to its peripheral flange for flexible movement relative thereto through a predetermined arc and abutments on said flange and tab to limit relative movement therebetween upon the application of continued lifting force to the tab after it has moved through the predetermined arc.

The present invention relates to a crown cap of the "pop top" type having a lift-tab to facilitate its manual removal without the employment of an opener. The invention is especially concerned with such a cap which may be applied to bottles and the like by conventional techniques and which, when applied, is not subject to inadvertent removal.

In the prior art, various crown caps of the "pop top" type have been provided. These caps, typically, provide some type of tab rigidly connected to the flange engaging crown of the cap and extending laterally therefrom whereby lifting force may be applied to the flange. When provided with such rigidly connected tabs, the tabs must project laterally from the flange in order to permit a user to insert his finger beneath the tab during cap removal. The latter characteristic is disadvantageous, however, because the tab is subject to hang up during handling of the container to which the cap is secured. Such hang up can result both in fouling of the container and cap and, possibly, inadvertent removal of the cap.

In order to avoid the shortcomings of prior art caps of the aforementioned type, efforts have been made to provide crown caps with flexible lift tabs which may assume juxtaposition with containers to which the caps are applied. These efforts have resulted in caps employing many varieties of special hinge structure for flexible attachment of the lift tab and various arrangements to facilitate cap expansion for removal upon lifting of the tab. These efforts have not, however, resulted in commercially acceptable "pop top" caps. This has apparently resulted because of the relatively complicated structures suggested by these efforts and the likelihood that they would not be suitable for application by conventional techniques. It is also possible that at least some of these efforts resulted in caps which were unsatisfactory from a sealing and/or "pop top" operational standpoint.

In summary, the crown cap of the present invention comprises a top surface having a peripheral crown engaging flange extending therefrom and a tab flexibly secured to and extending from the flange for hinging movement relative thereto through a predetermined arc. The flange and tab are provided with axially aligned ribs having opposed surfaces thereon adapted to abut to effect integral movement of the tab and flange responsive to lifting force applied to the tab after the tab is hingedly moved through the predetermined arc by lifting force.

It is a principal object of the present invention to provide a crown cap of the "pop top" type which avoids the aforementioned shortcomings of the prior art.

Another more specific object of the invention is to provide such a cap of simple construction which is well facilitated for application through the employment of conventional capping machinery.

Still another object of the invention is to provide such a cap employing a lift tab which is not subject to inadvertent fouling or removal during handling of a container to which the cap is applied.

Yet another object of the invention is to provide such a cap wherein the lift tab is flexibly secured to the crown engaging flange of the cap through a connection effecting controlled resistance to flexible movement of the tab relative to the flange.

The details of the invention and the foregoing and other objects become more apparent when viewed in light of the following description and accompanying drawing, wherein:

FIG. 1 is an elevation view, partially in section, illustrating the crown of a bottle with the cap applied thereto and the lift tab in retracted condition;

FIG. 2 is an elevational view corresponding to FIG. 1, but with the lift tab thereof in extended condition;

FIG. 3 is an elevational view similar to FIG. 1 showing the lift tab in retracted condition, as viewed from its plane surface;

FIG. 4 is a sectional view taken on the plane designated by line 4—4 in FIG. 3 illustrating, in phantom lines, the position assumed by the edge of the lift tab upon its lifting;

FIG. 5 is a partial elevational view of the cap, in the position it would assume when applied to the crown of a bottle with the lift tab in retracted condition, diagrammatically illustrating the proportions of the lift tab and cooperating crown engaging flange structure;

FIG. 6 is a plan view of the cap after its manufacture, but prior to application to the crown of a bottle or similar container; and,

FIG. 7 is an elevational view of the cap, similar to FIG. 6, after its manufacture but prior to application to the crown of a bottle or similar container.

Referring now specifically to the drawings, the numeral **10** therein designates an exemplary bottle to which the crown cap of the invention is applied. As partially illustrated, this bottle comprises a neck **12** terminating in a crown **14**. Although the cap of the invention is only illustrated in combination with the crown type bottle **10**, it is to be understood that the invention may be employed with any type of container having a peripherally flanged end which is desired to be capped.

The cap of the invention is designated in its entirety by the numeral **16** and is conventional in that it comprises an upper surface **18** having a peripheral flange **20** depending therearound and a gasket **22** confined therein. The flange **20** is crimped at regularly spaced intervals to define alternate outwardly and inwardly extending corrugations **24** and **26**, respectively, the latter of which are adapted to be squeezed beneath the crown **14** of a bottle upon application of the cap thereto. This application may be effected in conventional manner by forcing the crowning throat of a capping machine over the cap as it is applied to the crown of the bottle. The latter operation also functions to compress the gasket **22** against the crown and effect sealed closure thereof.

The cap **16** differs from conventional caps first in that it has a slit **28** in the flange **20** and, secondly, in that it has an integrally formed lift tab **30** extending from the flange **20**. In the embodiment illustrated, the slit **28** extends from the distal edge of the flange **20** to a point thereon spaced from the surface **18** by approximately the thickness of the gasket **22**. This slit is intended to facilitate ease of expansion of the flange **20** during removal of the cap.

The formation of the tab **30** prior to application of the cap to a bottle may be observed from FIGS. 6 and 7. Here it can be seen that the tab initially extends laterally

from the flange **20** and spans a portion of the distal periphery of the flange encompassing several of the outwardly extending corrugations therein. These corrugations are designated by the numeral **24***a* so as to distinguish them from the corrugations of the flange spaced laterally from the tab. The corrugations **24***a* extend from the flange **20** longitudinally across the tab **30** and are crimped along a rectilinear line **32** spaced from the surface **18** by a distance substantially equal to that by which the distal edge of the flange **20** is spaced from the surface. A rolled edge **34** extends around the tab **30** and web sections **36** are formed along the lateral sides of the tab between the outermost corrugations **24***a* and the juncture of the tab with the flange **20**. In the preferred embodiment illustrated, the junctures between the lateral edges of the tab **34** and the flange **20** are notched inwardly, as designated by the numeral **38**. The latter provision, as will become more apparent subsequently, provides a fold point at the juncture when the tab is lifted.

Crimping of the corrugations **24***a* along line **32**, in effect, transforms each of the corrugations into a pair of axially aligned ribs having opposed spaced end surfaces. The ribs thus formed on the flange end tab are designated, respectively, by the numerals **40** and **42**. The end surfaces of the ribs **40** and **42** are designated by the numerals **44** and **46**, respectively. The crimping of the corrugations **24***a* is effected so that the surfaces **44** and **46** are of equal area, as can be seen from FIG. 5. In the latter figure, the dimensional letters *a* and a_1 illustrate that the opposed surfaces formed by crimping of each corrugation are of equal dimension. This figure also illustrates that, when the cap is applied to an upright bottles, the surfaces **44** and **46** depart from the horizontal by different angular displacements, as designated by the letters *c* and *b*, respectively. This results because the depth of the ribs **40** is greater than that of the ribs **42**. It also has the advantage that, when the cap is applied to a container and the ribs **40** and **42** are in approximate alignment (see FIG. 5), the outer extremity of each of the end surfaces **46** is inwardly spaced with respect to the line which would be defined by extension of the outer extremity of the rib **40** in alignment therewith. The latter characteristic, as will become more apparent subsequently, assures that the outer extremity of the end surfaces **46** will not interfere or hang up on the crowning throats of conventional capping machinery used for application of the cap.

When the preformed cap of FIGS. 6 and 7 is applied to the crown of a bottle with a capping machine employing a crowning throat of conventional nature, the cap assumes the condition illustrated in FIGS. 1, 3, 4 and 5. In this condition, the inwardly extending corrugations **26** of the flange **20** lockingly engage the crown **14** and the tab **30** assumes juxtaposition with the outer surface of the neck **12**. The latter position is assumed upon forcing of the tab **30** against the neck by the crowning throat of the crowning machine. This action functions to crimp the web sections **36** into a folded condition adjacent the junctures **38**.

Removal of the applied cap from the crown of a bottle is readily effected simply by applying a lifting force to the lower under surface of the tab **30**. This force functions, first, to swing or hinge the tab about the line **32** to the position illustrated in FIG. 2. During this movement, the tab swings through an angle, designated by the numeral *d*, equal to the sum of the angles *b* and *c*. This movement is relatively unrestricted, because, even after application of the cap to a bottle, the line **32** defined by the thin section across which the corrugations are crimped to form the opposed end surfaces **44** and **46** maintains a rectilinear configuration, as can be seen from FIG. 4. This line extends across a major portion of the width of the tab. Limited resistance of the tab to swinging through the angle *d* is provided by the crimped web sections **36**. These sections, upon lifting of the tab, are forced outwardly to approximately the phantom line positions illustrated in FIG. 4. Through variance of the width of these sections, control of the force required to swing the tab through the angle *d* may be effected.

Once the tab **30** is lifted to the position illustrated in FIG. 2, continued lifting force applied thereto functions to force the opposed end surfaces **44** and **46** into engagement. Because of the equal area interrelationship of these surfaces, upon engagement the outer edges thereof assume an aligned condition. Thus, an unyielding abutting engagement is established between the surfaces and continued upward force applied to the tab functions to lift the flange **20**. Lifting of the flange effects its expansion and opening of the slit **28** and, ultimately, removal of the cap from the bottle.

The aforedescribed cap is typically fabricated of sheet metal of a type and gauge similar to that used for the fabrication of conventional bottle caps. It is to be understood, however, that this material and the structural details of the embodiment hereinbefore described are merely intended to be exemplary of the invention.

What is claimed is:

1. A crown cap comprising:

(a) a top wall;

(b) a peripheral flange depending from said top wall;

(c) a finger tab spanning a portion of the distal periphery of said flange and extending longitudinally therefrom, said tab being integrally connected to said flange by a thin section adapted to deform upon the application of lifting force to said tab to permit said tab to swing outwardly relative to said flange;

(d) a longitudinally extending corrugation integrally formed in and extending longitudinally between said flange and tab, said corrugation comprising:

(1) a first longitudinally disposed rib portion formed in said flange and extending outwardly therefrom in the portion spanned by said tab;

(2) a second longitudinally disposed rib portion integrally formed in and extending outwardly from said tab in longitudinal alignment with said first rib portion; and,

(3) a crimped portion formed in said thin section between said first and second rib portions to define opposed spaced apart end surfaces on said rib portions immediately adjacent said section, whereby:

upon application of lifting force to said tab, said tab swings outwardly relative to said flange through a predetermined arc until said end surfaces abut; and,

upon abutting of said end surfaces, continued lifting force applied to said tab is transmitted to said flange.

2. A crown cap according to claim **1**, wherein:

(a) said tab has a width appreciably greater than that of said ribs;

(b) said second rib is disposed medially of the lateral edges of said tab;

(c) said thin section extends rectilinearly between said ribs and across a major portion of the width of said tab; and,

(d) said flange has at least one slit therethrough adjacent said tab extending from a distal edge portion of said flange and across a major portion of the height thereof as measured between said distal edge portion and said top wall.

3. A crown cap according to claim **2** wherein, immediately adjacent the lateral edges of said tab, said thin section departs from a rectilinear line and conforms substantially to the peripheral shape of said flange.

4. A crown cap according to claim **1**, wherein:

(a) the end surface of said first and second ribs are of substantially equal area; and,

(b) upon abutting, the edges of said surfaces assume aligned opposed relationship.

5. A crown cap according to claim 1 wherein, upon receipt of said cap on the crown of a bottle:

(a) said flange assumes juxtaposed clamping engagement with the outer periphery of said crown; and,

(b) said tab is adapted to assume juxtaposed relationship with the outer surface of the neck of the bottle.

6. A first cap according to claim 5 wherein, upon receipt of said cap on the crown of a bottle, the outer extremity of said first rib defines a line extending over the outer extremity of end surface of said second rib when said first and second ribs are in substantially axial alignment.

7. A crown cap comprising:

(a) a top wall;

(b) a peripheral flange depending from said top wall;

(c) a finger tab spanning a portion of the distal periphery of said flange and extending longitudinally therefrom, said tab being integrally connected to said flange by a thin section adapted to deform upon the application of lifting force to said tab to permit said tab to swing outwardly relative to said flange; and,

(d) a plurality of longitudinally extending corrugations integrally formed in and extending longitudinally between said flange and tab, said corrugations each being crimped along said thin section to define opposed spaced apart end surfaces on said flange and tab immediately adjacent said section, whereby,

(1) upon application of lifting force to said tab, said tab swings outwardly relative to said flange through a predetermined arc until said opposed end surfaces abut; and,

(2) upon abutting of said end surfaces, continued lifting force applied to said tab is transmitted to said flange.

8. A crown cap according to claim 7 wherein said thin section extends rectilinearly across said corrugations.

9. A crown cap according to claim 8 wherein, immediately adjacent the lateral edges of said tab, said thin section departs from a rectilinear line and conforms substantially to the peripheral shape of said flange.

10. A crown cap according to claim 7, wherein:

(a) said opposed end surfaces are of substantially equal area; and,

(b) upon abutting, the edges of said opposed end surfaces assume aligned relationship.

11. A crown cap according to claim 7 wherein, upon receipt of said cap on the crown of a bottle:

(a) said flange assumes juxtaposed clamping engagement with the outer periphery of said crown; and,

(b) said tab is adapted to assume a position wherein said corrugations are substantially rectilinearly disposed over their entire lengths.

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DONALD F. NORTON, *Primary Examiner.*