June 23, 1953 J. W. SOFFER 2,643,015

TAMPERPROOF CONTAINER CLOSURE

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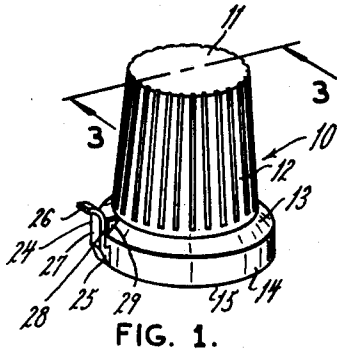

FIG. 1.

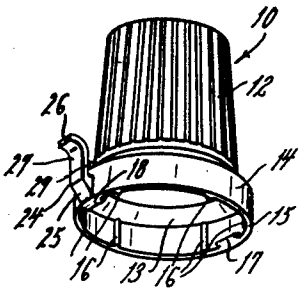

FIG. 2.

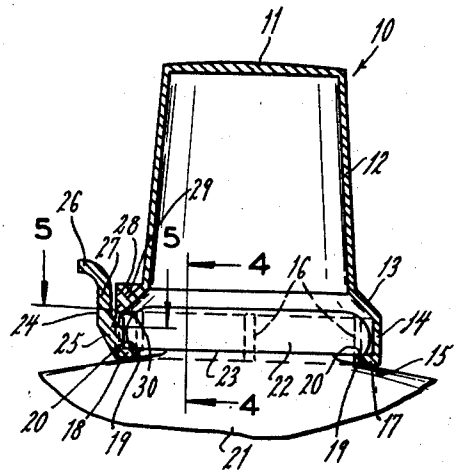

FIG. 3.

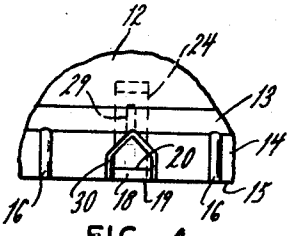

FIG. 4.

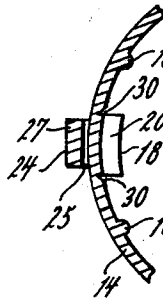

FIG. 5.

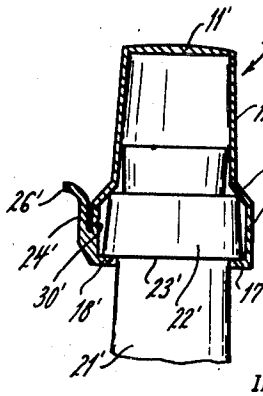

FIG. 6.

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TAMPERPROOF CONTAINER CLOSURE

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7 Claims. (Cl. 215—42)

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This invention relates to container caps or closures intended to seal against tampering, and especially to that type of closure which must be broken to permit discharge of the container's contents.

An object of this invention is to provide a molded one-piece container closure adapted to assure dealers and purchasers that the contents thereof are intact and unadulterated.

Another object is to provide a closure which cannot be removed except after breaking out a portion thereof.

Another object is to provide a closure equipped with a break-out lock portion, which closure is nevertheless usable, as a container cover or measure, after such break-out portion has been removed.

Another object is to provide a closure with a locking tooth, and convenient means for breaking said tooth from said closure.

Other objects are to provide a closure with an ambient skirt having inward-extending locking teeth, and, by elastic deformation of such skirt, to engage said teeth beneath a lip on the container mouth, from which it cannot be removed except by breaking out a noticeably large portion of such skirt.

Another object is to provide a closure having a skirt and inward-projecting locking teeth molded in a single unit, and to space such skirt outward from the mouth of the container to which such closure is attached by means of ribs, in order to permit the elastic deformation of such skirt while the ribs maintain contact with an annular flange around the mouth of such container.

In the accompanying drawing:

Fig. 1 is a perspective view showing the general external appearance of a preferred embodiment of my invention.

Fig. 2 is a perspective view seen partly from below.

Fig. 3 is a sectional view taken along line 3—3 of Fig. 1, showing such invention applied to the mouth of a container shown in side elevation.

Fig. 4 is a detail view along line 4—4 of Fig. 3.

Fig. 5 is a detail sectional view along line 5—5 of Fig. 3.

Fig. 6 is a diagrammatic sectional view, similar to Fig. 3, of another embodiment of my invention as applied to the mouth of a bottle shown in side elevation.

In the preferred embodiment shown in the drawings, cap 10 comprises top portion 11, ribbed frusto-conical upper sides 12, annular shoulder

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13 and depending tubular skirt 14. I make this closure from a vinyl plastic material, by injection molding; and find that it possesses adequate strength even though molded as a thin shell. The lower edge 15 of skirt 14 is intended to fit closely adjacent the upper wall of a container 21 to which applied and hereafter referred to more fully. Between lower edge 15 and shoulder 13, skirt 14 has a plurality of internal vertical ribs 16. Protruding inward from lower edge 15 are fixed tooth 17 and break-out tooth 18, whose lower faces 19 are somewhat cammed inward and upward, and whose upper faces 20 are adapted to engage and grasp the container rim or lip 22 by its under side 23.

Extending outward and upward from skirt 14 is tab or lug 24 whose thickened lower portion 25 is an outward continuation of break-out tooth 18, and whose upper end 26 is flared outward for accommodating the user's finger. The vertical mid-portion 27 of tab 24 is separate from but closely adjacent the vertical outer face 28 of stop or abutment 29. Circumscribing the intersection of lower tab portion 25 and break-out tooth 18 with skirt 14 is a line of frangibility or weakness 30 molded into said skirt.

Closure 10 is applied to container 21 by downward pressure on top 11 or shoulder 13. Ribs 16 are so spaced as to permit sliding engagement of the container lip 22 between them. The thin skirt 14 is, by these ribs 16, spaced radially outward from such container lip, which spacing leaves it free between said ribs to flex out of round under the camming forces created when lower faces 19 of teeth 17 and 18 are pressed downward against container lip 22. When the upper tooth faces 20 pass beneath the container lip 22, the original tubular shape of the skirt 14 is restored and the teeth 17 and 18 latch the closure to the container.

With regard to removal of such closure, it will be apparent that the fixed tooth 17 cannot be deflected outward except to the extent permitted by the flexing of skirt 14, of which it is a rigid part. However, break-out tooth 18 is somewhat more flexibly incorporated into skirt 14 because the line of frangibility 30 is by virtue of the reduced wall thickness there, a line of flexibility as well. It is important that this line 30 be readily frangible, so that it shall in every case break under a lesser force than would chip teeth 17 and 18. This being so, one of the problems in the development of my invention was to prevent the rotational deflection of break-out tooth 18 which might permit its withdrawal from

under lip 23 and the removal of the closure thereby.

To prevent this result, I utilize a stop or abutment 29, which is so closely adjacent tab 24 as to stop its inward movement and prevent substantial rotational deflection of tooth 18 outward and upward, whether from force applied to tooth 18 or from inward pressure on tab 24. Thus, the weakness inherent in line of frangibility 30 does not permit the withdrawal of the locking tooth; the flexibility necessary for snapping on the closure and preventing its removal thus lies largely in skirt portion 14. It may be varied in any case by modifying the factors which affect such flexibility, including the thickness of the skirt 14 and the spacing of ribs 16. Also, a gap permitting limited tooth rotation may be permitted between abutment face 28 and tab portion 27.

Said stop or abutment 29 also serves as an indication to the user to break the closure by pressure downward and outward. Shoulder 13 provides a convenient area on which to inscribe directions for breaking the closure, and the outward flaring upper end 26 of tab 24 may be utilized for the same purpose.

Tests of closures made conformable with this invention have been highly satisfactory. With the line of frangibility 30 made sufficiently thin to permit easy, clean break-out of tooth 18 by the pressure of a finger on the upper tab end 26, the teeth 17 and 18 did not deflect to permit removal of such closures. When subjected to increasing pulling and side forces, the closures would fail, either in the line of frangibility 30 or by fracture of the skirt 14 itself.

It is apparent that many other uses, embodiments and modifications of my invention are possible. One shown in Fig. 6, indicating its application to bottles for fluids, including liquors, wines and medicines, comprises a closure 10' having a top portion 11', tubular or frusto-conical upper sides 12', sloping annular shoulder 13' and depending tubular skirt 14'. A plurality of fixed teeth 17' and a break-off tooth 18' protrude from the lower inner edge of skirt 14', and a tab or lug 24' extends outward from break-off tooth 18' upward closely adjacent skirt 14' and flares outward at its upper end 26'. In this embodiment, however, skirt portion 14' is of such great depth as to serve the function of the abutment 29 shown in the first embodiment. The plurality of fixed teeth 17' and the locking tooth 18' grasp the under side 23' of the annular lip 22' of bottle 21'. The shoulder 13' is shown as abutting directly upon the upper edge of annular lip 22' of such bottle 21'; this, together with the plurality of teeth 17', serves to hold the closure 10' in alignment with bottle 21', with skirt 14' spaced outward from such bottle lip 22'. Thus, flexure of skirt 14' permits the engagement of teeth 17' and 18' under said lip. Line of frangibility 30' circumscribes the intersection of tab 24' and break-out tooth 18' with skirt 14'. Though without a shoulder such as 29 or ribs such as 16, this embodiment functions in much the same manner as first described embodiment; that is, the skirt flexibility permits deflection of teeth 17' and 18' during capping; they latch under a container rim; a line of frangibility allows the removal of a break-out tooth, and by the abutment of the lug against the closure, flexure of the break-out tooth which would result from the thinned line of frangibility is restrained.

Inasmuch as the line of frangibility permits clean break-out along a pre-determined line, such a closure is well suited for re-use as a removable cap, and as a measure or "jigger" for fluids.

My invention is thus not confined to the precise details hereinabove set forth; and it is apparent that minor changes in construction, arrangement and combination of its several features may be made and substituted for those shown herein, without departing from the nature and salient principles of this invention. For example, other materials having structural properties which satisfy the needs above described might be utilized, with dimensions suitable for their use. The number, arrangement and proportions of teeth or other grasping or latching members may likewise be varied suitably for containers equipped with flanges, rims, grooves, notches, protuberances or other means to which a break-out lock may be applied.

Having thus described the present invention, what I claim and desire to secure by Letters Patent, is:

1. A closure for a container having a lip extending outward from its mouth, comprising a cap formed of thin brittle material having a depending skirt portion ambient such lip, a plurality of vertical ribs extending inward from said skirt and adapted to align said cap in spaced relation to said annular lip, a plurality of teeth extending inward from said skirt beneath such lip, the lower surfaces of said teeth being cammed to provide outward elastic deflection in capping, a tab extending outward from one of said teeth and upward beyond said skirt, a line of frangibility in said skirt circumscribing said tooth and tab and a stop molded integral with and extending above said skirt and adjacent said tab adapted to limit inward movement of said tab.

2. In a sealing closure for a container top provided with an annular lip and a groove between such lip and the body of the container, an inverted cup-like sealing structure of substantially circular transverse section, a flexible annulus of a diameter larger than the body of said cup-like structure and characterized by an angularly spaced series of rib elements adapted to hold said annulus in spaced relation to the annular lip of the container, further characterized by an angularly spaced series of normally horizontal clamping fingers each adapted to engage the groove adjacent said lip of the container, a predetermined weakened zone, substantially throughout the depth of said annulus, a lever element in line with one of said fingers and attached to a region defined by said weakened zone, said lever element adapted for movement in a downward direction to break away said weakened zone and to enable removal of the sealing element from the container, and means for blocking said lever element against any substantial upward and inward movement.

3. A tamper-indicating replaceable cap for a container having a discharge portion with an outstanding lip portion, comprising a closure cap having a side wall portion of hollow cylindrical form with an inner diameter fitting freely endwise over the lip portion and being provided with an inwardly-extending retaining portion substantially in the plane of the lower margin of the side wall and engaging beneath such lip portion on application of said closure cap to such container, said closure cap being provided externally with

an integral outstanding finger lug adjacent to the edge of the side wall portion in registration with said inwardly extending retaining portion, said side wall portion having a frangible weakened zone adjacent the lug so as to provide a frangible wall portion about the finger lug adapted to be broken out upon application of force to said finger lug permitting thereby the removal with said lug of part of the wall and the said retaining portion.

4. A tamper-indicating replaceable cap for a container having a discharge portion with an outstanding lip portion, comprising a closure cap having a side wall portion of hollow cylindrical form with an inner diameter fitting freely endwise over the lip portion and being provided with opposed inwardly-extending retaining portions substantially in the plane of the lower margin of the side wall and engaging beneath such lip portion on application of said closure cap to such container, said closure cap being provided externally with an integral outstanding finger lug adjacent to the edge of the side wall portion in registration with one of the retaining portions, said side wall portion having a frangible weakened zone adjacent the lug, so as to provide a frangible wall portion about the finger lug adapted to be broken out along with said retaining portion on application of force to said finger lug thereby to release the engagement of said retaining portion beneath such container lip and permit the removal with the lug of part of the wall and the said retaining portion.

5. A tamper-indicating replaceable cap for a container having a discharge portion with an annular lip, comprising an integral molded closure cap having a top portion, a side wall, and a cavity within said side wall and extending upwardly therefrom into said top portion, the cavity being of substantially circular cross-section within the side wall, of sufficient diameter to enclose such container lip, and of a depth at least equal to the height of such container lip, the said closure cap further having retaining portions extending into the cavity inward from the side wall portion at such level as to extend beneath the greatest diameter of such container lip and adapted to grasp

such lip beneath its greatest diameter for resisting removal from the container, and a finger lug protruding outwardly from the side wall opposite and in registration with a retaining portion, the side wall being provided with a frangible weak zone adjacent its juncture with the lug and the said retaining portion, so as to provide a frangible wall portion adapted to be broken out along said juncture upon the application of force to the finger lug and to permit thereby the removal with the lug of part of the side wall and the said opposite retaining portion whereby the grasp of the cap onto the container lip is released.

6. A cap as described in claim 5, in which the said retaining portions have their lower surfaces substantially in the plane of the lower margin of the said side wall portion.

7. A cap as described in claim 5, the thickness of the said lug at its juncture with said side wall portion being greater than the thickness of the said side wall portion.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
D. 161,969	Soffer	Feb. 13, 1951
695,759	McNish	Mar. 18, 1902
1,478,140	Orr	Dec. 18, 1923
2,000,200	Teller	May 7, 1935
2,092,547	Allenbaugh	Sept. 7, 1937
2,096,324	Guthrie	Oct. 19, 1937
2,100,083	Martin	Nov. 23, 1937
2,124,873	Conner	July 26, 1938
2,157,646	Barker	May 9, 1939
2,162,711	Hamberger	June 20, 1939
2,169,686	Fabrice	Aug. 15, 1939
2,171,015	Webb	Aug. 29, 1939
2,228,542	Volkmann	Jan. 14, 1941
2,326,480	Merolle	Aug. 10, 1943
2,403,511	Enkur	July 9, 1946
2,546,566	Schweizer	Mar. 27, 1951
2,551,834	Ferguson	May 8, 1951

FOREIGN PATENTS

Number	Country	Date
270,600	Germany	Feb. 19, 1914