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H. C. FITZ, JR

2,949,205

BOTTLE CAP

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Fig. 1

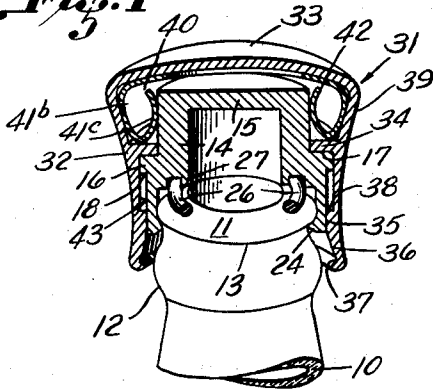


Fig. 3

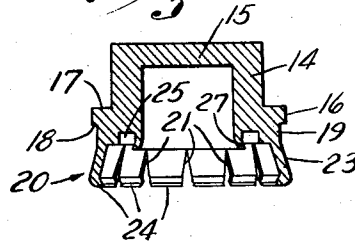


Fig. 5

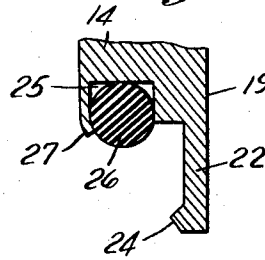


Fig. 6

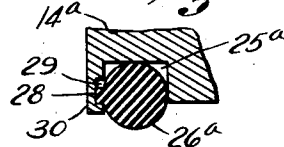


Fig. 7

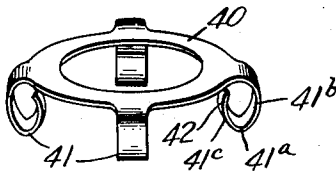
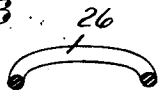
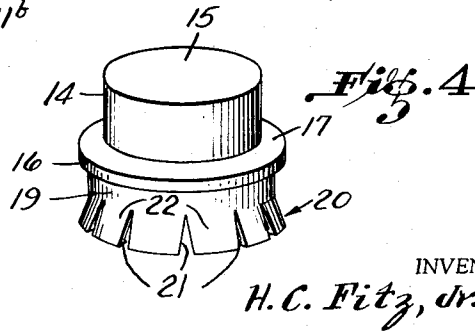


Fig. 8



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2,949,205

BOTTLE CAP

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The present invention relates to bottle cap and has for an object to provide a cap in which provision is made for the removal of the cap without destroying the same so that it may be replaceable many times upon the bottle or other container sealed thereby for the purpose of promptly re-sealing the bottle after partially removing the contents so that, particularly in the case of carbonated beverages, the gas will not be lost but the remainder of the contents may be kept in prime condition until such contents are completely exhausted from the container.

It is another object of the invention to provide a bottle cap which will avoid crimping the flange of the cap below the upper lip of the bottle to effect sealing which, in the prior art, necessitates the destruction of the cap incident to its removal from the bottle so that it is not replaceable to effectually re-seal the bottle after it has once been removed; the purpose of the invention in this respect being to provide a permanent type of cap which will not involve destruction in its removal and which may be replaced on the bottle neck in a manner to re-seal the container just as effectively as the original cap placed thereupon at the factory.

It is a further object and purpose of the invention to achieve the foregoing advantages in a bottle cap which will be of economical construction lending itself to ready operation in its application to and removal from the bottle neck and which when in place will form a highly effective seal against the escape of any liquids or gases from the container.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views:

Figure 1 is a fragmentary perspective view of a bottle neck of a conventional form having applied thereto in sealing position a bottle cap constructed in accordance with the present invention and illustrated partly broken away and partly in section;

Figure 2 is a longitudinal section taken through the bottle cap in its origin position before application to the bottle;

Figure 3 is a longitudinal sectional view taken through the sealing cap which is one member of the present invention and showing the skirt thereof in an outwardly flared or expanded condition;

Figure 4 is an isometric view of the sealing cap apart from the other members of the invention;

Figure 5 is a fragmentary longitudinal sectional view taken on an enlarged scale through a portion of the sealing cap showing a method of retaining the sealing gasket in place;

Figure 6 is a similar view showing a modified form of holding means for the sealing gasket;

Figure 7 is an isometric view of a form of resilient metal ring employed, and

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Figure 8 is an isometric view of a form of sealing gasket with parts broken away and parts shown in section.

Referring more particularly to the drawings, in Figure 1 a bottle neck 10 is illustrated as having the usual top lip 11, the circular bead 12 spaced below the same with an annular groove 13 therebetween. A conventional model cap, widely in use today, is provided with a flange which is crimped into the groove 13 or at least crimped below the top lip 11. The bottle neck illustrated is a conventional form in which carbonated beverages are being marketed.

The invention comprises a sealing cap, illustrated more particularly in Figures 3 and 4, and an operating cap, illustrated in Figures 1 and 2, as being relatively movable with respect to the sealing cap; and in addition the invention also comprises the devices shown in Figures 7 and 8.

The sealing cap is illustrated in Figures 1, 2, 3 and 4 and is constructed generally of a cylindrical side wall 14, a flat top wall 15 and a skirt 20, later more particularly described.

A flange 16 outstands from the side wall 14 in spaced relation below the disc top wall 15. Such flange 16 forms a top shoulder 17 and an under shoulder 18. Below the shoulder 18 is an external concentric surface 19 and below this surface extends the outwardly and downwardly flaring skirt 20 which is sectionalized by making incisions 21 parallel with the axis of the sealing cap. Such incisions opening through the lower end of the skirt and extending up approximately to the adjacent end of the external concentric surface 19, this latter surface being concentric throughout its depth with the axis of the sealing cap. The incisions 21 divide the skirt into segments 22. As the skirt, and preferably the entire sealing cap, is made from elastic material the segments 22 can be outwardly sprung in the manner shown in Figures 3 and 4 which opens gaps between the segments 22 at the incisions 21 and also provides externally flaring segment walls extending downwardly and outwardly of the sealing cap. In other words, the segments 22 are biased to an outsprung position but the same may be distorted from this position into the straight line positions of Figures 1 and 5.

The outwardly and downwardly flaring external segment walls are indicated at 23 and at 24 are shown internal claws positioned at the lower end portions of the segments 22 so as to enter the groove 13 of the bottle neck or clamp below the bottle lip 11.

An annular recess 25 is made in the base of the side wall 14 to receive a ring gasket 26, which, as shown in Figure 5, may be retained in the recess 25 by an annular resilient claw 27.

Alternatively, as shown in Figure 6, a modified form of compressible or resilient gasket 26^a is provided with an internal circular projection 28 adapted to enter a groove 29 which runs annularly around in the internal wall 30 of the recess 25^a. Obviously other cross sections of gasket and other retaining means therefor may be provided.

The operator cap 31 is shown in Figures 1 and 2 and is slidable axially on the sealing cap. This operator cap is formed with a side wall 32 and a top wall 33. Spaced below the top wall 33 is an internal circular flange 34 which, in assembled position with the sealing cap, has its inner surface fitted to ride up and down on the external surface of the side wall 14 of the sealing cap (see the two positions represented in Figures 1 and 2).

Spaced below the internal flange 34 is an internal annular cam ring 35. At its upper portion this cam ring 35 is at its smallest diameter, such cam ring involving also the downwardly and outwardly flaring cam surface 36 which extends down to a point terminating just short

of the lower end of the operating cap where the cap terminates in an internal annular flange 37 which protects the lower portion of the sealing cap from being pushed unintentionally upward when the cap is not in use. Flange 37 also serves to insure that the lip of the bottle is centered properly when the assembly is placed on the bottle.

At the upper end of the cam ring 35 is an internal annular shoulder 38 for engaging the under surface 18 of the flange 16 of the sealing cap, as shown in Figure 2. These shoulders 18, 38 together form complementary limit stops to also limit the upward relative sliding movement of the operating cap upon the sealing cap.

Between the circular flange 34 and the circular cam ring 35, a cylindrical internal wall section 43 is provided to slide smoothly up and down on the outer cylindrical surface of the flange 16 of the sealing cap. Thus, the bearings provided by the internal circular flange 34 riding up and down on the external surface of the wall 14 and a cylindrical internal wall section 43 riding up and down on the external smooth surface of the flange 16 stabilize the operating cap in its axial movements relatively to the sealing cap.

It will be observed, particularly from Figures 1 and 2, that the outer wall section above the internal flange 34 flares upwardly and outwardly as indicated at 39 for the purpose of affording a grip to the fingers to exert lifting thrust upon the operating cap.

As shown more particularly in Figures 1, 2 and 7, a spring metal ring 40 is provided with downwardly curled spring fingers 41 having free ends 42. The ring 40 is adapted to be fitted close against the internal surface of the top wall 33 of the operating cap with the curled spring fingers 41 depending therefrom to be contained between the walls 14 and 32 of the sealing and operating caps. Unassembled, these curled spring fingers 41 may be substantially circular with a diameter somewhat in excess of the radial distance across between the walls 14 and 32 so that on assembly the fingers will be elastically stressed between these walls and consequently distorted into a modified elliptical form including a lower constricted part 41^a which is adapted to rest upon the internal flange 34 and the outer and inner flanges 41^b and 41^c.

As to materials, the sealing cap may be made from a flexible resilient plastic and the operating cap from a rigid plastic molded originally in two or more sections and united diametrically upon the included sealing cap, the sections being afterwards cemented or fused together in well-known plastic technique.

The ring 40 is preferably of metal including the curled spring fingers, but it is conceivable that this also may be made from a polyethylene or similar flexible and resilient plastic. The gasket 26 will preferably be of rubber and will protrude below its recess 25 for a sufficient distance to admit of its compression downwardly against the bottle lip 11.

In the use of the device, the parts will normally be in the position of Figure 2, that is, the operating cap will be raised to its uppermost position whereby the cam ring 35 will be withdrawn upwardly from the skirt 20 of the sealing cap. In this position the diametrically wider lower portion of the cam surface 36 is concentrically outward of the segments 22 of the skirt 20 so that no restraint is put thereby upon the segments 22 which are allowed to expand freely under their own inherent elasticity into the space provided by the lower internal portion of the operating cap. In this position of Figure 2, the stops 18, 38 prevent dismemberment of the two caps. In rising the internal flange 34 has pushed upwardly therewith the ring 40 and its spring fingers 41 by engagement with the constricted lower portions 41^a of these fingers. In the uppermost position of Figure 2, it will also be seen that the inner flanges 41^c have risen to a large extent above the confines of the wall 14

and have therefore expanded at their upper free portions where they, at least to a slight extent, overlap the top wall 15. By reason of their inherent elasticity, these fingers tend to expand diametrically and they exert considerable elastic thrust against the internal surface of the operating cap side wall and also against the upper edge or corner between the walls 14 and 15 of the sealing cap. This spring tension must be overcome in forcing the operating cap downwardly upon the sealing cap.

In the condition of Figure 2, the device is applied to the bottle neck with the gasket 26 engaging the lip 11. As the sealing cap becomes arrested in movement by this engagement of the sealing gasket 26 upon the bottle lip 11, continuance of the thrust downwardly upon the top wall 33 of the operating cap will cause the elastic tension of the spring fingers to be overcome and allow the operating cap to descend relatively and axially upon the sealing cap; in this action, the inner flanges 41^c being compressed toward the outer flanges 41^b and thus the fingers are placed under still greater tension. Also, in the descending movement of the operating cap, the bowed or convex surfaces of the inner flanges 41^c will be brought into more extensive frictional engagement with the outer surface of the side wall 14 of the sealing cap. Thus, increasing frictional and elastic action will be brought to bear which must be overcome in the effort to push the operating cap downwardly which is done until the internal flange 34 strikes the shoulder 17. During the course of this movement the internal cam ring 35 has proceeded downwardly over the outwardly flaring surfaces 23 of the outsprung segments 22 of the skirt 20, forcing the segments 22 inwardly to close the gaps at 21 and form a substantially continuous internal flange or claw 24 which has been forced into the groove 13 or below the lip 11. It will be understood that these actions can only be achieved by such downward thrust as will elastically stress and physically distort the ring gasket 26 so as to form a tight seal all around against the upper lip 11 of the bottle neck 10.

In removing the cap, the fingers are applied to the external wall surface 39 and the operating cap 31 pulled upwardly while the claws 24 retain the sealing cap against movement. As the operating cap rises relatively, the cam ring 35 will be shifted above the concentric line of the segments 22 enabling these segments to expand and withdraw the claws 24 from binding engagement with the bottle neck. In the same movement the sealing cap will be entrained with the operating cap when the shoulders 38, 18 engage one another and therefore in the same movement the sealing cap may be lifted off the bottle.

The sealing cap of this invention will therefore seal the bottle with complete effectiveness and it will be positively locked on the bottle and cannot be blown off by the pressure of the gas in the bottle. The sealing cap is easily applied to the bottle. Only one motion is required to place the bottle cap in position. This motion is simply pushing on the operating cap on the top of the bottle. Very little force is required in the original capping or subsequent re-capping operations.

The device is of inexpensive materials and the manufacture is not complicated.

No essential parts of the sealing or operating mechanism are in the center of the cap and it is thus easy to adapt the device to incorporate a "syphon" device to remove the beverage without removing the cap. In this connection, it will be noted particularly from Figure 7 that the ring form of the spring device 40 leaves the entire center of the device open to receive a "syphon" therethrough.

Although I have disclosed herein the best form of the invention known to me at this time, I reserve the right to all such modifications and changes as may come within the scope of the following claims.

What is claimed is:

1. A bottle cap comprising a sealing cap having a sealing means and a normally outsprung holding means, an operating cap slidable relatively to the sealing cap and having a part to slide over and compress the holding means, and spring fingers fitted under compression between the two caps to develop frictional and elastic resistance to the relative movement of the caps.

2. A bottle cap as claimed in claim 1 further comprising an internal flange on the operating cap upon which the spring fingers are seated.

3. A bottle cap as claimed in claim 1 further comprising means for causing the spring fingers to move

with the operating cap, said fingers having inner and outer flanges with the inner flanges sliding up and down on the external wall of the sealing cap and in the outer position of the operating cap said inner flanges adapted to expand inwardly in the space above the wall of the sealing cap.

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