Dec. 30, 1947. H. F. SHANNON 2,433,629

BOTTLE CAP

Filed Sept. 6, 1946

Fig. 1.

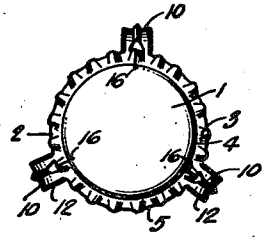
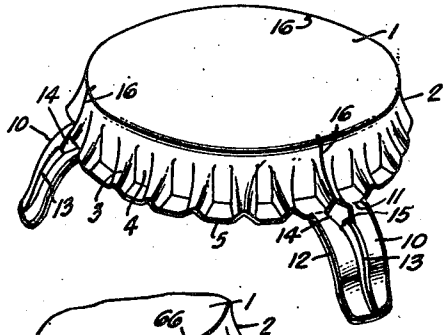


Fig. 2.



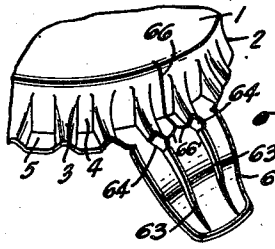


Fig. 7.

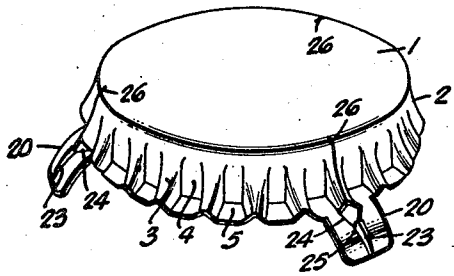


Fig. 3.

Fig. 4.

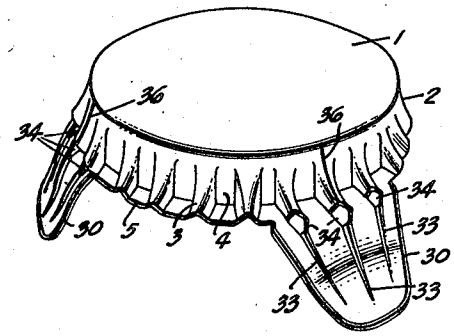
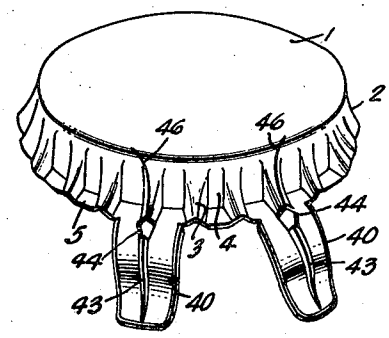


Fig. 5.



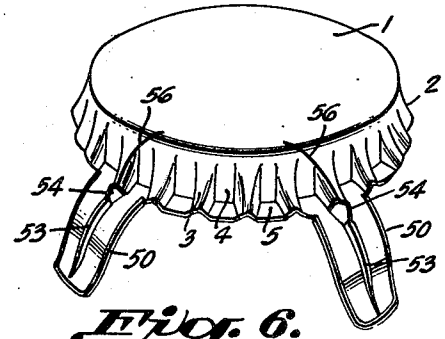


Fig. 6.

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BOTTLE CAP

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15 Claims. (Cl. 215—46)

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This invention relates to bottle caps and more particularly to that type of metallic caps known as "crown caps."

The difficulties of removing a crown cap from a bottle without the use of a suitable tool are well known, and although numerous attempts have been made heretofore to design a cap which could be removed without the use of a tool, none of these attempts has been successful for one or more reasons. In general, the caps heretofore designed do not effect an efficient closure for the bottle, or, if so, then they are too difficult to remove without the use of a tool.

It is an object of this invention to provide a crown cap which may be forced on the bottle by the capping device now generally used, which will effect an efficient closure for the bottle, and which may be easily removed from the bottle without the use of a tool.

It is a further object of my invention to provide a bottle cap structure comprising a depending corrugated flange provided with at least one finger tab, said finger tab having at least one ridge therein, and at least one opening in the structure to provide means whereby the tab may be rotated to cause the ridge in the tab to engage a ridge in the flange to expand or increase the peripheral length of the same and permit easy removal of the cap from the bottle.

Another object of my invention is to provide the structure just described with a slit or slot in the portion of the flange associated with the tab, whereby the effectiveness of the seal is not reduced substantially, and whereby expansion or increase in the peripheral length of the flange is facilitated upon rotation of the tab.

Other and further objects of the invention will become apparent as the description proceeds, reference being made to the accompanying drawing forming a part of the present disclosure, wherein:

Fig. 1 is a plan view of one form of bottle cap constructed in accordance with my invention, as it appears before its application to a bottle;

Fig. 2 is a perspective view on an enlarged scale of the bottle cap illustrated in Fig. 1;

Figs. 3, 4, 5 and 6 are perspective views of modified forms of my bottle cap as each appears before its application to a bottle; and

Fig. 7 is a fragmentary view of a still further modified form of my bottle cap as it appears before its application to a bottle.

Referring to Figs. 1 to 7 of the drawing it will be seen that my improved cap structure comprises the usually flat or slightly convex upper surface

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or top 1, and a corrugated flange 2 depending therefrom. The corrugated flange 2 is made up of ridges 3 and grooves 4, and, at its lower edge is provided with the usual outwardly directed portion 5 which is forced inwardly under the bead of the bottle by the capping machine.

The structure so far described is merely the conventional crown cap and it is to be understood that a flexible sealing disc will be provided on the underside of the top 1 in the usual manner.

In accordance with my invention, I provide the conventional structure just described with one or more finger tabs integrally connected to the flange 2.

In the form of my invention illustrated in Figs. 1 and 2, three such tabs 10, equally spaced around the cap structure, are provided. The tabs 10 are of identical structure and hence a description of one will suffice for all three.

At the line of juncture, indicated by the dotted line 11, of the tab 10 with the portion 5 of the flange 2, the tab 10 has a width equal to the peripheral length of the flange covered by two grooves 4 and the intermediate ridge 3 associated therewith, and the central longitudinal line of the tab 10 coincides substantially with the corresponding line of the said ridge 3.

The tab 10 is preferably of convexo-concave form longitudinally and downwardly from the line of juncture 11, and transversely, it is preferably, but not necessarily, of generally concave form. The edges of the tab 10 are rolled slightly as indicated at 12 to add stiffness or rigidity to the tab.

The tab 10 is provided with a ridge 13 extending longitudinally and centrally thereof substantially in alignment with the ridge 3 associated therewith, and an opening 14 spaces the ridge 13 from the said ridge 3.

The opening 14 extends from adjacent the line of juncture 11 downwardly or outwardly into the tab 10 and is so dimensioned in length and width that the tab 10 may be rotated upwardly about the line of juncture 11 without engaging the lower end portion of the associated corrugation or ridge 3. Preferably the length of the opening 14 is such that the upper edge portion 15 of the ridge 13 engages the associated ridge 3 at a point or line lying between from approximately ¼ to ¾ of the height of the flange 2 above the portion 5. With respect to the bottle, this corresponds to a range from a point slightly below the major diameter of the bead of the bottle to a point adjacent the top of the bottle.

Each ridge 3 associated with a tab 10 is pref-

erably provided with a slit or slot 16 extending from the opening 14 and upwardly of the flange 2 to a point adjacent the top 1. As illustrated in Figs. 1 and 2, the slits 16 may extend slightly over into the top 1 if desired.

The slits 16 do not weaken the cap structure for the reason that the tabs 10 are connected to the flange 2 on both sides thereof and hence hold the flange together until the tabs are rotated upwardly to remove the cap from a bottle.

The length of the tab 10 is such that an effective lever arm is provided, approximately 1½ to 2 times the height of the flange 2, and the rolled edges 12, the ridge 13, and the particular shape of the tab co-act to give the tab the requisite stiffness when it is rotated for the purpose of removing the cap from the bottle.

In all forms of the invention illustrated, the cap is shown as it appears before its application to a bottle. The cap may be applied to a bottle in the usual manner and by means of the usual capping machine.

In applying the cap to a bottle, the capping machine presses the lower portion 5 of the flange 2 under the bead of the bottle, and, at the same time, the tabs 10 are rotated downwardly slightly so that they lie alongside the neck of the bottle. Also, due to the pressure exerted by the capping machine, the ridges 3 assume substantially a V-shape rather than the U-shape illustrated in the drawing.

To remove the cap from a bottle, the lower end of a finger tab 10 is engaged by a thumb or finger and the tab is rotated upwardly about the line of juncture 11 until the upper portion 15 of the ridge 13 engages the associated ridge 3. Further upward or inward rotation of the tab causes the portion of the flange 2 adjacent the tab to be pulled or rotated outwardly from under the bead of the bottle and then upwardly. This operation tends to flatten out the said ridge 3, forces the tab apart adjacent the opening, the slit 16 is forced open slightly, and thus the peripheral length of the flange 2 is effectively increased.

In the modification illustrated in Figs. 1 and 2, it is usually not necessary to operate more than two of the tabs 10 to effect easy removal of the cap. Whether operation of one, two, or three of the tabs is necessary will depend primarily upon the strength of the person removing the cap, and to a minor extent upon the strength of the metal used in the cap.

The modified form of the invention illustrated in Fig. 3 is substantially the same as that illustrated in Figs. 1 and 2, except that the tabs 20, and necessarily also the ridges 23 therein, are shorter than the tabs 10 and ridges 13. The length of the tab 20 approximates the height of the flange 2. The openings 24 are the same as the openings 14, and the slits or slots 26 are the same as the slits 16.

The operation of this form of the device is also the same as that previously described, except that when the upper edge portion 25 of the ridge 23 engages the associated ridge 3, it is usually necessary to press the free end of the tab against a wall or the equivalent thereof to complete the operation. The latter is made necessary due to the reduction in leverage in the tab 20. The primary advantage of this modification is the saving in metal effected by reducing the length of the tab.

In the modified form of the invention illustrated in Fig. 4, the tabs 30 are substantially the same as the tabs 10 except that they are wider,

and are provided with three ridges 33 substantially in alignment with three successive ridges 3.

This form of the invention also preferably has three equally spaced tabs 30, and the openings 34 spacing the ridges 33 from the ridges 3 are the same as the openings 14.

As illustrated, the intermediate ridge 3 only, associated with each tab 30, is provided with a slit or slot 36 extending upwardly from the opening 34, and the slit 36 extends only to the top of the flange 2.

The operation of this form of the device is the same as the operation described above in connection with Figs. 1 and 2. Obviously however, a greater peripheral length of the flange 2 is pulled away from the bottle when a tab 30 is operated than when a tab 10 is operated, and for this reason, usually, the operation of one tab is sufficient to permit easy removal of the cap.

In the modified form of the invention illustrated in Fig. 5, the tabs 40 are identical in structure to the tabs 10. In this form of the invention, however, only two tabs are used, and these are spaced relatively close together.

A curved slit or slot 46 extends upwardly of the flange 2 from each opening 44 spacing the ridges 43 from their associated ridges 3. The slits 46 are oppositely and outwardly curved upwardly, and hence, together, the two slits 46 are upwardly divergent.

The tabs 40 are operated in the manner previously described, and, when so operated, due to the relatively close spacing thereof, the lower portion of the flange 2 lying between the two tabs 40 is also pulled outwardly and upwardly as well as portions of the flange directly connected to the tabs. Also, the outward curvature in the slits 46 tends to prolong the portion of the flange pulled outwardly at the outer side of each tab 40, and hence a relatively long, continuous, peripheral portion of the flange 2 is pulled outwardly from the bead of the bottle and the cap may be easily removed.

In the modified form of the invention illustrated in Fig. 6, the tabs 50 are identical in structure to the tabs 10 and 40 and this form of the invention differs from that illustrated in Fig. 5 in that the two tabs 50 are spaced relatively far apart, and the curved slits or slots 56 extending upwardly from the openings 54 are oppositely and inwardly curved, and thereby reversely curved with respect to the slits 46, and hence when considered together, are upwardly convergent.

In this form of the invention, when the tabs 50 are rotated upwardly and inwardly to engage the ridges 53 therein with the aligned ridges 3, the inward curvature of the slits 56 tends to prolong the portion of the flange pulled outwardly between the tabs 50, and hence a relatively long, continuous, peripheral portion of the flange 2 is pulled outwardly from the bead of the bottle and the cap may be easily removed.

In the form of the invention illustrated in Fig. 7, the tab 60 is of the same general shape and structure as the tab 10, but is wider, and is provided with two ridges 63, each substantially aligned with one of two successive ridges 3. As before, the ridges 63 are spaced from the aligned ridges 3 by openings 64 which may be the same as the openings 14.

In this form of the invention, it is preferred to locate the slit or slot 66 in the groove 4 between the two said ridges. Also, preferably, the lower end of the slit 66 is bifurcated and leads into each opening 64. The branches 66' of the slit lead-

ing into the openings 64 may be curved as illustrated.

The operation of the form of the device illustrated in Fig. 7 is substantially the same as that described above in connection with Figs. 1 and 2. Preferably, three equally spaced tabs 60 are provided, and obviously, a longer peripheral portion of the flange 2 is pulled outwardly from the bead of the bottle when a tab 60 is operated than when a tab 10 is operated. Hence, easy removal of the cap is effected when a maximum of two of the tabs 60 are operated.

From the foregoing disclosure it will be obvious that I have provided several forms of bottle caps, all having the same general mode of operation, which are cheap to manufacture, which will effect an efficient closure for the bottle, and which may be easily removed from the bottle without the use of a tool.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and have herein described in detail the preferred embodiments, but it is to be understood that I do not thereby intend to limit the invention to the specific forms disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

I claim:

1. A bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a plurality of finger tabs integrally connected to said flange; said tabs each having a ridge therein substantially in alignment with one of the ridges in said flange, and openings in said structure spacing said ridge in each said tab from its aligned ridge in said flange, each of said tabs being bendable so that the ridge in each said tab may engage its aligned ridge in said flange.

2. A bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a plurality of finger tabs integrally connected to said flange, said tabs each having a ridge therein substantially in alignment with one of the ridges in said flange, openings in said structure spacing said ridge in each said tab from its aligned ridge in said flange, each of said tabs being bendable so that the ridge in each said tab may engage its aligned ridge in said flange, and a slit extending from each said opening and upwardly of said flange.

3. A bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a plurality of finger tabs integrally connected to said flange; said tabs each having a ridge therein substantially in alignment with one of the ridges in said flange, openings in said structure spacing said ridge in each said tab from its aligned ridge in said flange; each of said tabs being bendable so that the ridge in each said tab may engage its aligned ridge in said flange, and a slit extending from each said opening and upwardly of said flange, each said slit being in one of said aligned ridges.

4. In a bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a finger tab integrally connected to said flange, said tab having a ridge therein substantially in alignment with one of the ridges in said flange, and an opening in said structure spacing said ridge in said tab from the aligned ridge in said flange, said tab being bendable so that the ridge in said tab may engage the aligned ridge in said flange.

5. In a bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a finger tab integrally connected to said flange, said tab having a ridge therein in alignment with one of the ridges in said flange, an opening in said structure spacing said ridge in said tab from the aligned ridge in said flange, said tab being bendable so that the ridge in said tab may engage the aligned ridge in said flange, and a slit extending from said opening and upwardly of said flange.

6. In a bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a finger tab integrally connected to said flange, said tab having a ridge therein substantially in alignment with one of the ridges in said flange, an opening in said structure spacing said ridge in said tab from the aligned ridge in said flange, said tab being bendable so that the ridge in said tab may engage the aligned ridge in said flange, and a slit in said flange extending upwardly in said ridge.

7. In a bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a finger tab integrally connected to said flange, said tab having a plurality of ridges therein, each of said ridges in said tab being substantially aligned with a ridge in said flange, and openings in said structure spacing each said ridge in said tab from its aligned ridge in said flange, said tab being bendable so that each said ridge in said tab may engage its aligned ridge in said flange.

8. In a bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a finger tab integrally connected to said flange, said tab having a plurality of ridges therein, each of said ridges in said tab being substantially aligned with a ridge in said flange, openings in said structure spacing each said ridge in said tab from its aligned ridge in said flange, said tab being bendable so that each said ridge in said tab may engage its aligned ridge in said flange, and a slit extending from at least one said openings and upwardly of said flange.

9. In a bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a finger tab integrally connected to said flange, said tab having a plurality of ridges therein, each of said ridges in said tab being substantially aligned with a ridge in said flange, openings in said structure spacing each said ridge in said tab from its aligned ridge in said flange, said tab being bendable so that each said ridge in said tab may engage its aligned ridge in said flange, and a slit in said flange extending upwardly in at least one of said aligned ridges.

10. In a bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a finger tab integrally connected to said flange, said tab having two ridges therein, each of said ridges in said tab being substantially aligned with a ridge in said flange, openings in said structure spacing each said ridge in said tab from its aligned ridge in said flange, said tab being bendable so that each said ridge in said tab may engage its aligned ridge in said flange, and a slit in said flange between said aligned ridges.

11. A bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, two finger tabs integrally connected to said flange, said tabs each having a ridge therein substantially aligned with a ridge in said flange, openings in said structure spacing each

said ridge in said tabs from its aligned ridge in said flange, each of said tabs being bendable so that the ridge in each said tab may engage its aligned ridge in said flange, and a curved slit in each of said aligned ridges in said flange.

12. In a bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a finger tab integrally connected to said flange, said tab having a ridge therein substantially aligned with a ridge in said flange, an opening in said structure spacing said ridge in said tab from its aligned ridge in said flange, said tab being bendable so that the ridge in said tab may engage its aligned ridge in said flange, and a curved slit in said aligned ridge in said flange.

13. A bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, two finger tabs integrally connected to said flange, said tabs being spaced relatively close together, said tabs each having a ridge therein substantially aligned with a ridge in said flange, openings in said structure spacing each said ridge in said tabs from its aligned ridge in said flange, each of said tabs being bendable so that the ridge in each said tab may engage its aligned ridge in said flange, and slits in each of said aligned ridges in said flange, said slits being upwardly divergent.

14. In a bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a finger tab connected to said flange, said tab having a ridge therein in alignment with one of the ridges in said flange, and an opening in said structure adjacent the line of juncture of said tab with said flange, said opening spacing the ridge in said tab from its aligned

ridge in said flange, said opening providing means whereby said tab may be rotated about said line of juncture to engage said ridge in said tab with its aligned ridge in said flange.

15. In a bottle cap comprising a structure having a depending corrugated flange including ridges and grooves, a finger tab connected to said flange, said tab having a ridge therein in alignment with one of the ridges in said flange, an opening in said structure adjacent the line of juncture of said tab with said flange, said opening spacing the ridge in said tab from its aligned ridge in said flange, said opening providing means whereby said tab may be rotated about said line of juncture to engage said ridge in said tab with its aligned ridge in said flange, and a slit extending from said opening and upwardly of said flange.

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