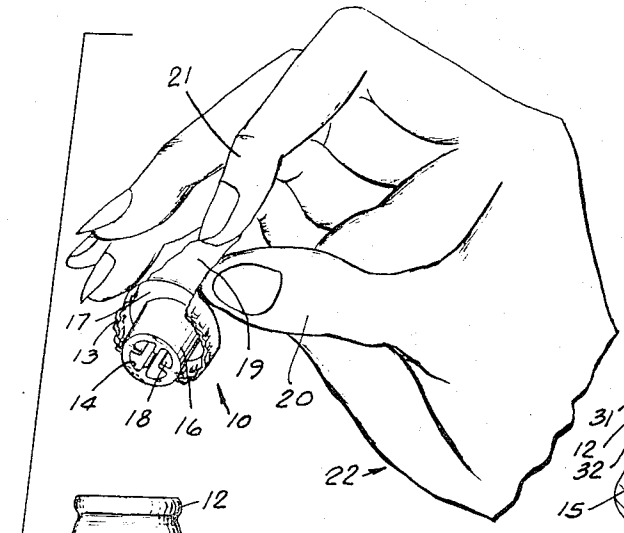
Aug. 15, 1967 A. E. HANSON 3,335,893

COMBINATION EXTERNAL AND INTERNAL CONTAINER SEAL

Filed June 16, 1965

Fig. 1



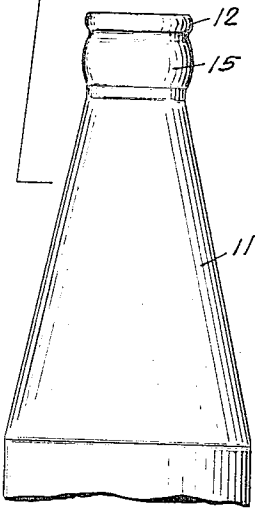


Fig. 2

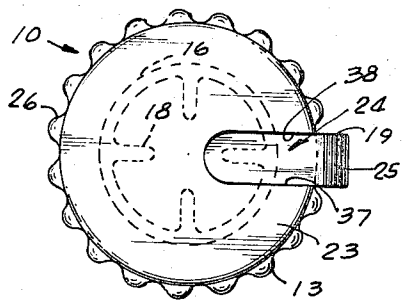


Fig. 3

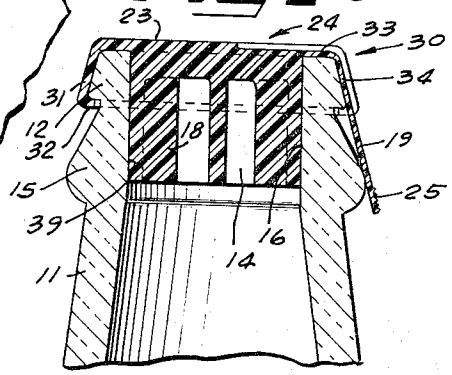
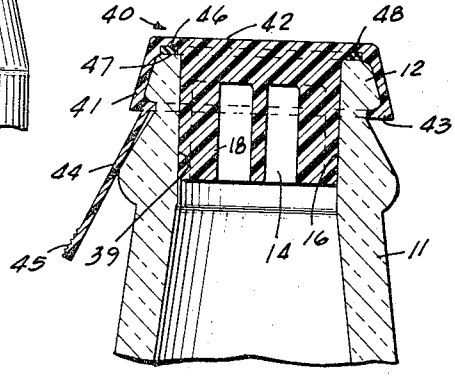


Fig. 5



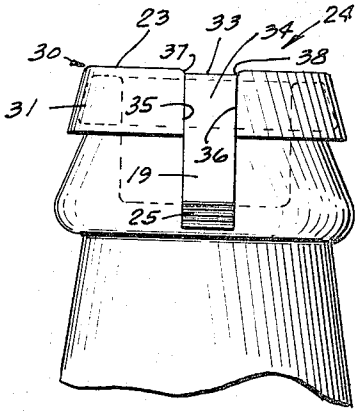


Fig. 4

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COMBINATION EXTERNAL AND INTERNAL CONTAINER SEAL

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11 Claims. (Cl. 215—46)

This invention relates to container caps and more particularly to a container cap with external and internal seals.

Various forms of caps have been utilized to seal containers such as glass or plastic bottles holding beer or other carbonated beverages under pressure. Under such conditions it is very desirable to employ a cap which will maintain a reliable seal and yet may be quickly removed when it is desired to discharge contents from the bottle.

One of the most effective types of container seals used heretofore is a tubular plug of cork or rubber having a diameter slightly larger than the inside diameter of a container neck and which is forcefully fitted thereon. Because of the stiffness of the plug inside the container neck, and the very tight seal obtained, a bottle-opener must be used to disengage the plug and remove the seal. In some cases, the surface of the cap is scored to form score lines of least resistance which allows a ripping or tearing of a portion of the cap along the score lines so as to effect removal of the cap from the container. However, the score lines have a tendency to weaken the cap, thereby making this arrangement somewhat less than desirable when it is required to reliably seal containers under pressure.

It is, therefore, an object of the present invention to provide a reliable seal for containers which may be readily removed.

Another object of this invention is to provide a reusable seal for containers.

A further object of this invention is to provide a cap with a break away seal wherein the sealing capability of the cap is not impaired.

A still further object of the present invention is to provide a resilient cap for containers with an integral internal and external seal and wherein the container may be readily unsealed.

Other objects and advantages of this invention and a fuller understanding of the nature thereof may be had by referring to the claims and to the following detailed description taken in conjunction with the accompanying drawings.

FIGURE 1 is a partial schematic illustration of a cap with a break away seal being removed from a container.

FIGURE 2 is a plan view showing the cap formed with a break away seal area and a crimped skirt.

FIGURE 3 is a sectional view illustrating the cap in sealing engagement with a container, the cap having a smooth skirt.

FIGURE 4 is a fragmented elevational view of a cap constructed according to the present invention in sealing position on a container.

FIGURE 5 is a sectional view illustrating an alternative embodiment.

As is illustrated in the drawings, and as will be more specifically described, the invention contemplates a cap for containers having a neck rim wherein the cap includes an external and an internal seal, and is preferably

formed of a resilient material such as polyethylene, polypropylene or polystyrene as an integral unit. The internal seal is formed of a plug-like wall which resiliently and securely seals within the container neck and which may be readily removed when desired. This is accomplished by a number of resilient fins which extend inwardly from an outside wall of the plug and allow the plug to easily enter the neck of the container and form an efficient seal therewith.

In the preferred embodiment of the invention one portion of the cap is formed with a thin wall providing a path of least resistance to tearing. This thin wall section is formed by a cavity in the cap, thus allowing the strength of the cap to be maintained.

In another embodiment the cap is formed with an integral lift tab which flexes the cap to disengage the cap from the neck rim and to thereby remove the plug from within the container neck.

Referring now to FIGURE 1 there is shown a container cap **10** which has just been removed from a container **11** having a neck rim **12**. The container cap **10** has a skirt **13**, slightly flared and forming a seal around the neck rim **12**, and a plug **14** to enter and seal inside a neck **15** of the container **11**.

The plug **14** includes a wall **16** projecting from a floor **17** of the container cap **10**, and a number of fins **18** extending radially from the wall **16** to the inner portion of the plug **14**. The fins **18** strengthen the plug **14** so that when the cap **10** is placed on the container **11** the wall **16** will be securely seated against the inner portion of the container neck **15**. In addition to strengthening the plug **14**, it may be noted that the fins **18** are not interconnected so as to allow the wall **16** to yield, and thereby permit the cap **10** to be readily placed on and removed from the container **11**.

In FIGURE 1 the cap **10** is shown as having been just removed from the container **11** by grasping a tab **19** between a thumb **20** and a forefinger **21** of a hand **22** and by pulling upwardly to tear through a portion of the skirt **13** to release the firm engagement of the skirt **13** with the neck rim **12**. It can readily be seen that the tab **19** is an extension of the skirt **13**, and if desired, instead of forming an extension the skirt **13** itself may be formed with serrations or other gripping surfaces to allow the gripping of the skirt and tearing away of the skirt seal.

FIGURE 2 illustrates the cap **10** having a top surface **23** with a depressed cavity **24** formed in a portion of the surface **23**. Extending from the cavity **24** is the tab **19** with a number of serrations **25** provided as a gripping surface thereon. As shown in FIGURE 2 the skirt **13** has a series of crimps **26** molded therein to increase the strength of the skirt **13** and to assure a snap positive seal as the skirt **13** is forced over the neck rim **12**. It is, of course, not necessary that the crimps **26** always be formed in the skirt as they may only be necessary when it is required to seal containers under extreme pressures. In FIGURE 3 there is shown a container cap **30** having a smooth noncrimped skirt **31** which firmly grips the neck rim **12** of a container **11**. In the magnified view of FIGURE 3 the skirt **31** is shown as terminating in a lip **32** frictionally engaged and seated beneath the neck rim **12**. In all other aspects the container cap **30** is constructed similar to the cap **10**. That is, the cap **30** has a top surface **23** in which there is formed a cavity **24**, the cavity **24** extending from the top surface **23** and along a portion of the skirt **31**. It may be noted from FIGURE 3 that forming the cavity

24 along a portion of the top surface 23 is a thin wall section 33 which is thinner than the adjacent wall sections forming the top surface 23. Similarly, a thin wall section 34 which is thinner than the adjacent wall portions of the skirt 31 provides the cavity 24 along the skirt 31. This is clearly shown in FIGURE 4 where the thin wall section 33 is illustrated below adjacent portions of the top surface 23, the thin wall section 33 continuing along the skirt 31 in a depressed wall section 34 to thus form the cavity 24. The thin wall section 34 on the skirt 31 ends in a tab 19 with the gripping serrations 25.

It can be seen that the thin wall sections 33 and 34 provide lines of least resistance to tearing at skirt edges 35, 36 and at top surface edges 37, 38. Although the edges 35, 36 and 37, 38 provide a low resistance tearing path along the skirt 31 and a portion of the top surface 23, they do not lessen the sealing qualities of the cap. This is evident from FIGURE 3, where it is seen that the plug 14 seals inside the container neck 15, while the skirt 31 and the lip 32 firmly grasp around the rim 12, with the thin wall sections 33 and 34 forming only a very small part of the seal. Also, since the cavity 24 is molded in as the cap 30 is formed, the cavity 24 presents a very strong channel-like structure when viewed from inside the container 11. Therefore, by placing the thin wall sections 33 and 34 on the neck rim 12 where they are removed from direct pressures from inside the container 11, and in view of the structurally sound channellike section formed by the cavity 24, the sealing qualities of the caps 10 and 30 have not in any way been diminished by the formation of a break area thereon. However, the cavity 24 does provide the low tearing resistance edges 35, 36, and 37, 38, and by gripping the tab 19 at the serrations 25 and pulling upwards the thin wall section 34 and 33 can be torn away from the skirt 31 and along a portion of the top surface 23. As diagrammatically shown in FIGURE 1, this operation loosens the grip of the skirt 31 or 13 on the neck rim 12 sufficiently to allow continued pulling on the tab 19 to extract the plug 14 from within the container 11, without the tab detaching from the top surface 23.

Referring again to FIGURE 3, there is clearly illustrated the plug 14 having the wall 16 in firm sealing engagement with container neck wall 39, the plug 14 also including four fins 18 which extend radially inward from the wall 16. The fins 18 not only strengthen the plug 14 to maintain the wall 16 in sealing engagement with the container neck wall 39, but the fins 18 also allow more even yielding of the wall 16, thereby permitting the plug 14 to be readily inserted into and removed from the container 11.

As an example of container caps formed in accordance with the principles of the present invention, the following table lists the absolute and relative dimensions of the important portions thereof for several types of plastic materials. It is understood that other types of resilient material may be employed and that future thermoplastic developments and improvements could permit, in accordance with the principles herein disclosed, the formation of thinner wall cross sectional areas than is possible at this time.

Material	Thickness of Skirt Wall 31 (inches)	Thickness of Wall Sections 33 and 34 at Tearing Edges 35, 36 and 37, 38 (inches)
Polyethylene ASTM Type I.	0.065	20–25% of Wall 31, 0.013–0.016.
Polypropylene	0.042	12–20% of Wall 31, 0.005–0.0084.
Polyethylene ASTM Type II.	0.050	15–20% of Wall 31, 0.007–0.010.

It has been determined that forming the cap of polypropylene provides a very thin wall section which enables a quick metal-like shear to be obtained when the tab is pulled to break the seal. Somewhat similar although slightly more elastic results are obtained with polyethylene because of the pliability and toughness of polyethylene when formed in relatively thin sections.

FIGURE 5 illustrates an alternative arrangement wherein container cap 40 is shown in sealing position on a container 11 having a neck rim 12. The cap 40 also includes a plug 14 with a wall 16 maintained by the fins 18 in resilient sealing engagement with a container neck wall 39. A skirt 41 extends from a top surface 42 and firmly grips the neck rim 12, with a lip 43 securely seated beneath the rim 12. Depending from one small portion of the skirt 41 is a leverage tab 44 which has a gripping surface 45 at one end thereof.

It is evident that by lifting up the leverage tab 44 to unseat the lip 43 from beneath the rim 12 and to also thereby flex the skirt 41 from its gripping engagement with the rim 12, the cap 40 which is formed of a resilient material may be readily removed from sealing engagement with the container 11. Depending on the density of material chosen for the cap 40, a washer-like seal may be required to efficiently cap and seal the container 11. In such circumstances, there is provided an annular groove 46 formed in the container cap 40 immediately above a top ledge 47 of the neck rim 12. Within this annular groove 46 there is imbedded a resilient ring or washer 48 which is so sized as to be compressed by the top ledge 47 when the container cap 40 is placed on the container 11. While in most cases the washer 48 is not required, a similar arrangement can be provided for the embodiments shown in FIGURES 1–4.

Although the drawings and specification present a detailed disclosure of preferred embodiments of the present invention, it is to be understood that the invention is not limited to the specific forms disclosed, but covers all modifications, changes and alternative constructions falling within the scope of the principles taught by the invention.

I claim as my invention:

1. An external and internal seal for containers such as bottles having a neck rim comprising:
   - an external cap including a skirt terminating in a lip, said skirt flexed to firmly grip said rim with said lip frictionally seated beneath said rim;
   - a wall depending from said cap and protruding within said container in sealing engagement with said neck;
   - a tab projecting from said flexed skirt; and
   - a thin wall section in said cap extending along said skirt to said tab forming a path of least tearing resistance to allow the lifting of said tab to break away said skirt and disengage said wall from inside said container neck.

2. An external and internal seal for containers such as bottles having a neck rim comprising:
   - an external cap including a skirt terminating in a lip, said skirt flexed to firmly grip said rim with said lip frictionally seated beneath said rim;
   - a wall depending from said cap and protruding within said container in sealing engagement with said neck;
   - a plurality of fins radially extending inwardly from said wall to resiliently seat said wall against said container neck; and
   - a thin wall section in said cap extending along a portion of said skirt and forming a path of least tearing resistance to allow said portion to be broken away from said skirt and thereby disengage said wall from inside said container neck.

3. An external and internal seal for containers such as bottles having a neck rim comprising:
   - an external cap including a skirt terminating in a lip, said skirt flexed to firmly grip said rim with said lip frictionally seated beneath said rim;
   - a wall depending from said cap and protruding within said container in sealing engagement with said neck;

a plurality of fins radially extending inwardly from said wall, each of said fins radially terminating at separate locations within said wall to seat said wall against said container neck and to allow said wall to be readily engaged and disengaged from said container neck;

a tab projecting from said flared skirt; and

a thin wall section in said cap extending along a portion of said skirt to said tab and forming a path of least tearing resistance to allow said portion to be broken away from said skirt and thereby disengage said wall from inside said container neck.

4. An external and internal seal for containers such as bottles having a neck rim comprising:

an external cap including a skirt terminating in a lip, said skirt flexed to firmly grip said rim with said lip frictionally seated beneath said rim;

a wall depending from said cap and protruding within said container in sealing engagement with said neck;

a plurality of fins radially extending inwardly from said wall, each of said fins radially terminating at separate locations within said wall to seat said wall against said container neck and to allow said wall to be readily engaged and disengaged from said container neck; and

a thin wall section in said cap extending along a portion of said skirt and forming a path of least tearing resistance to allow said portion to be broken away from said skirt and thereby disengage said wall from inside said container neck.

5. An external and internal seal for containers such as bottles having a neck rim comprising:

an external cap including a skirt terminating in a lip, said skirt flexed to firmly grip said rim with said lip frictionally seated beneath said rim;

a wall depending from said cap and protruding within said container in sealing engagement with said neck;

a plurality of fins radially extending inwardly from said wall, each of said fins radially terminating at separate locations within said wall to seat said wall against said container neck and to allow said wall to be readily engaged and disengaged from said container neck; and

a thin wall section in said cap extending from above said neck rim and along a portion of said skirt and forming a path of least tearing resistance to allow said wall section to be broken away from said skirt and from above said neck rim to unseat said lip, the continued pulling of said wall section disengaging said wall from inside said container neck.

6. An external and internal seal of resilient plastic material for containers such as bottles having a neck rim comprising:

a resilient external cap including a skirt terminating in a lip, said skirt flexed to firmly grip said rim with said lip frictionally seated beneath said rim;

an integral tubular plug depending from said cap and having a wall protruding within said container in sealing engagement with said neck;

a plurality of fins integral with said plug, each of said fins radially extending inwardly from said plug wall and terminating at separate locations within said plug to seat said wall against said container neck and to allow said plug to be readily engaged and disengaged from said container neck;

an internal tab projecting from said skirt; and

a thin wall section in said cap extending from above said neck rim and along a portion of said skirt to said tab and forming a path of least tearing resistance to allow said wall section to be broken away from said skirt and from above said neck rim to unseat said lip as said tab is pulled, the continued pulling of said tab thereby disengaging said wall section from inside said container neck.

7. An external and internal seal of resilient plastic material for containers such as bottles having a neck rim comprising:

a resilient external cap including a skirt gripping said rim;

a wall depending from said cap and protruding within said container in sealing engagement with said neck;

a tab projecting from said skirt; and

a thin wall section in said cap having a thickness between 12% and 25% of the thickness of said skirt and of the adjacent portions of said cap, said thin wall section extending along said skirt to said tab and the junction of said thin wall portion alone being imperforate and forming tearing edges to allow the lifting of said tab to break away said skirt and disengage said wall from inside said container neck.

8. An external and internal seal of resilient plastic material for containers such as bottles having a neck rim comprising:

an external cap formed of polypropylene including a skirt firmly gripping said rim;

an integral tubular plug depending from said cap and having a wall protruding within said container in sealing engagement with said neck;

an integral tab projecting from said skirt; and

a thin wall section in said cap having a thickness between 12% and 20% of the thickness of said skirt and of the adjacent portions of said cap, said thin wall section extending along a portion of said skirt and the junction of said thin wall portion alone being imperforate and forming tearing edges to allow said portion to be broken away from said skirt and thereby disengage said wall from inside said container neck.

9. An external cap seal formed of elastomeric material for containers such as bottles having a neck rim comprising:

an external cap forming a seal around said rim, said cap including thick and thin wall portions;

a gripping surface on one portion of said differential wall thickness to enable said portion to be torn away from the remaining portion of said cap and thereby break said container seal, and the junction of said thin wall portion alone being imperforate and forming tearing edges to allow the lifting of said gripping surface to disengage said thick and thin wall portions.

10. A cap seal formed of elastomeric material for containers such as bottles having a neck rim comprising:

an external cap forming a seal around said rim, said cap including a differential wall thickness wherein a first portion of said wall is formed with a thickness between 12% and 25% of the remaining portion of said wall,

said first wall portion having a gripping surface to enable said first portion to be torn away from the remaining portion of said wall and thereby break said cap seal from said container and the junction between the differential thickness wall portions alone being imperforate and forming tearing edges to allow the lifting of said gripping surface to disengage said differential wall portions from one another.

11. A cap seal formed of polypropylene for containers such as bottles having a neck rim comprising:

an external cap forming a seal around said rim, said cap including a differential wall thickness wherein a first portion of said wall has a thickness between 12% and20% of the thickness of the remaining portion of said wall,

a gripping surface on said first wall portion to enable said first portion to be torn away from the remaining portion of said wall and thereby break said cap seal from said container, and the junction of said differential wall portions alone being imperforate and forming tearing edges to allow the lifting of said

gripping surface to disengage the differential wall portions from one another.

References Cited

UNITED STATES PATENTS

2,370,732	3/1945	Johnson	215—40
3,032,226	5/1962	Terwilliger	215—46

3,142,402	7/1964	Fox	215—46 XR
3,186,736	6/1965	Salminen	215—47 XR

FOREIGN PATENTS

69,938	10/1958	France.
640,407	5/1962	Italy.

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