Jan. 24, 1967 E. BENZ 3,300,073

ELASTIC CLOSURE FOR A CONTAINER OPENING

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FIG. 1

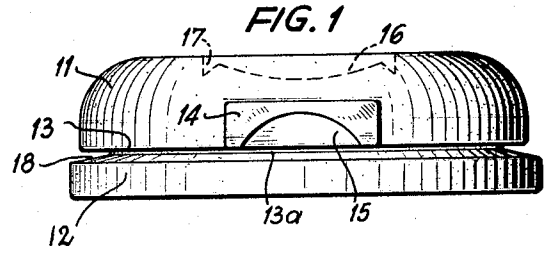


FIG. 2

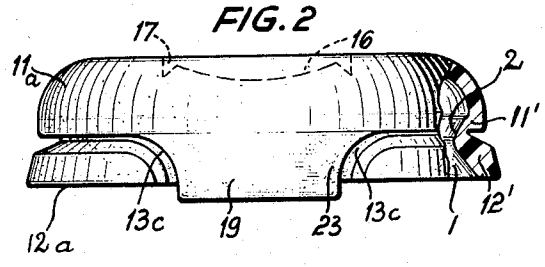


FIG. 3

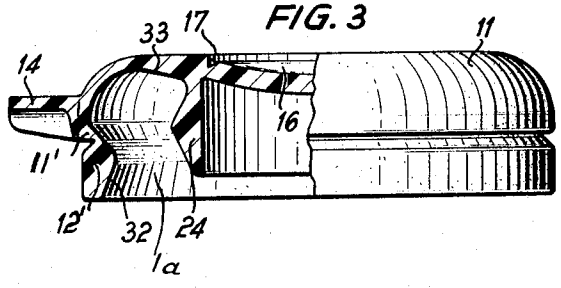
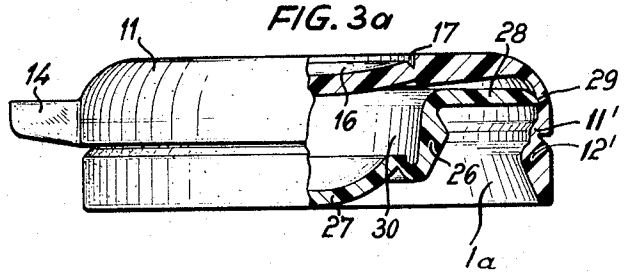


FIG. 3a



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FIG. 4

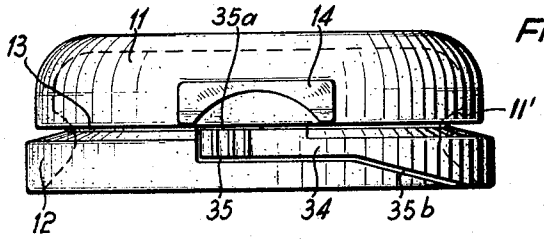


FIG. 5

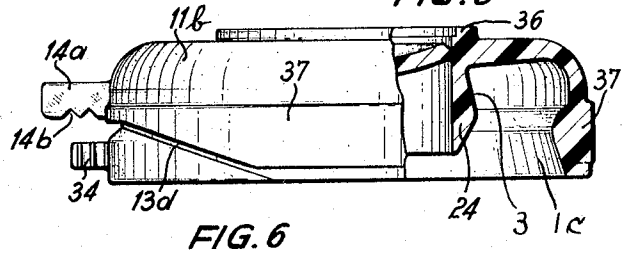


FIG. 6

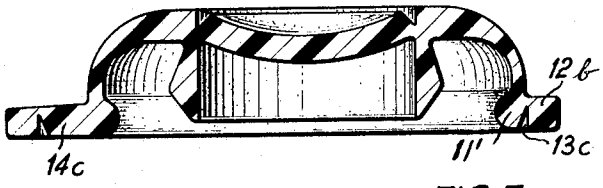
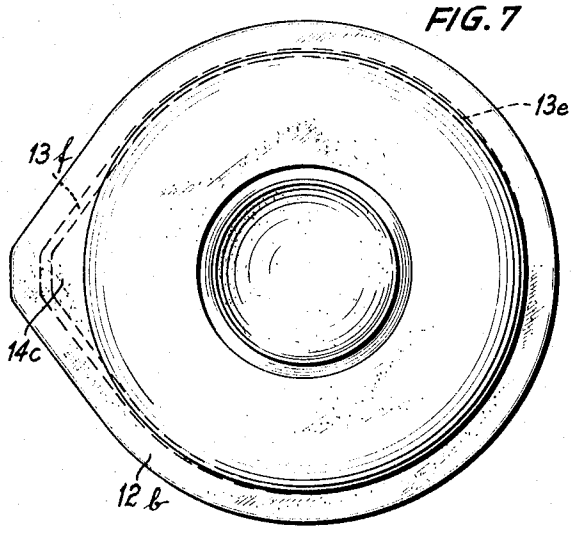


FIG. 7



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FIG. 8

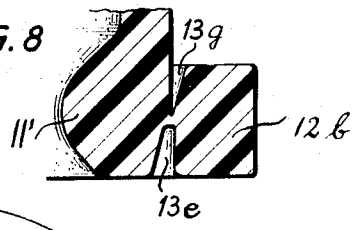


FIG. 9

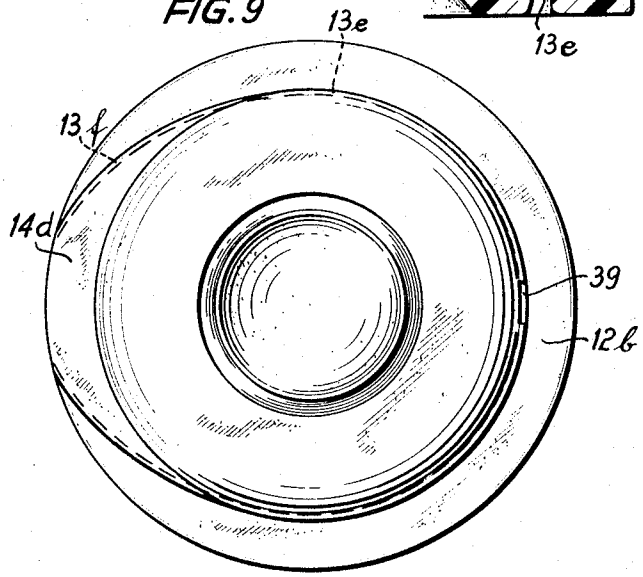
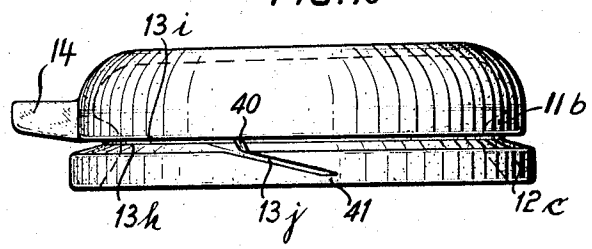


FIG. 10



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3,300,073

ELASTIC CLOSURE FOR A CONTAINER OPENING

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3 Claims. (Cl. 215—42)

The present invention relates to removable closures of elastic material, and more particularly to the type of closure which consists of a cap part and a guard ring part interconnected for easy separation by an elongated weakened closure portion. One of the closure parts has an annular bead engaging a peripheral groove in the container mouth and the cap part has a lug which may be grasped for lifting the cap part off the container mouth after separation of the cap part from the guard ring along the weakened closure portion. As long as the guard ring remains attached to the cap part and the weakened portion is not broken, the original seal of the container is maintained and tampering with its contents is impossible.

It is the primary object of this invention to provide a two-part closure with a guard ring, which securely seals the container mouth against tampering in its original position but may be readily opened and temporarily closed again after the guard ring is separated from the cap part.

Separation of the two closure parts and opening of the cap part is simply effected by upward thumb pressure on the cap part lug, causing breakage of the weakened connecting portion and subsequently lifting of the cap part.

It is another object of the invention to provide a closure which is compact and very simple to manufacture and which may neatly be placed and replaced on the container mouth without danger of accumulation of dirt, etc.

In one preferred embodiment, the closure is relatively flat and barely exceeds the height of conventional metal caps so that these plastic closures may be handled and sorted on conventional closure sorting machines.

The above and other advantages, objects and features of the present invention will be more readily understood by reference to the following detailed description of certain embodiments thereof, taken in conjunction with the accompanying drawing wherein

FIG. 1 is a side view of one embodiment of the closure of this invention;

FIG. 2 is a similar view, partly in section, of another embodiment;

FIG. 3 is a vertical section of still another embodiment;

FIG. 4 is a view similar to that of FIG. 1 of a further embodiment of the closure;

FIG. 5 is a side view, partly in section, of yet another embodiment;

FIG. 6 is a vertical section of a further embodiment;

FIG. 7 is a top view of FIG. 6;

FIG. 8 is a partial vertical section of another embodiment;

FIG. 9 is a horizontal section through both closure parts of still a further embodiment; and

FIG. 10 is a side view of another embodiment.

In substance and as is common to all illustrated embodiments, the closure of the invention is designed to be applied originally to the mouth of a container, such as a bottle, to close the container mouth and then to be temporarily opened and closed during the use of the contents of the container. For this purpose, the container mouth defines a peripheral groove and the closure has a cap part and a guard ring part. At least one of the closure parts is secured to the mouth by an annular bead engaging the peripheral groove at its deepest recess when the closure is originally applied to the container mouth. The cap part has a lug which may be grasped for lifting the cap part of the container mouth and thus gaining access to the interior of the container. A weakened portion interconnects the two closure parts for easy separation.

The closure parts may be made of any suitable natural or synthetic elastomer material having the required elastic properties. Useful materials include such synthetic resins as polyolefins, for instance, polypropylene and polyethylene, polyformaldehyde, polymer blends and copolymers thereof, natural rubber, butyl rubber, and other vulcanized materials, silicone rubber, and like hardenable elastomer materials generally used for closures of the present type.

In the embodiment of FIG. 1, the two-part closure is shown to comprise a fixed part **12** and a movable cap part **11** which are interconnected by weakened portion **13** produced by cutting out a portion of the closure material between the two parts. The cap part **11** has a lug **14** by which the cap may be grasped and opened. The weakened portion is weakest at **13***a* adjacent the lug, where more material is cut away and where, if desired, all material may be removed to produce a slot, thus facilitating removal of the cap from the fixed closure portion when the cap is pulled by lug **14**. Preferably, this weakest portion or slot extends laterally beyond the lug and, if desired, this extension may be unilateral so as to obtain the most favorable tear angle for the removal of the cap. As the cap is pulled by the lug, the remainder of the weakened interconnection will be torn and the entire cap will be separated from the fixed ring if the weakened portion is annular. If it does not cover the entire periphery, only a portion of the cap will be removed from the ring.

A central portion **16** of the cap part **11**, which is axially aligned with the container mouth, is of curvilinear cross-section and is separated from the remainder of the cap part by groove **17** concentric with the axis of the container mouth. In this manner, the cap part forms a spheroidal membrane which may readily yield to distortion due to increased pressure emanating from the interior of the container, due to increased temperature, for instance, without moving the rim portions of the closure engaging the container mouth, which could force the closure off the mouth. In other words, the curved central membrane of the cap prevents undesirable deformation of the closure portions which engage the container mouth and hold it on the mouth.

The embodiment of FIG. 2 is generally similar to that of FIG. 1 and like reference numerals in this and all other figures designate like parts which, therefore, do not require repeated description. In the sectional part of this figure, the closure is seen mounted on a container mouth **1** which defines a peripheral groove **2**, the deepest recess of which is engaged by the annular bead **12′** of the guard ring **12***a* of the closure. The cap **11***a* also is shown to have a bead **11′** engaging the groove **2**, a wedge-shaped cut in the beaded portion of the two closure parts providing the weakened interconnecting portion therebetween.

In this embodiment, the opening lug for the cap is constituted by a downwardly extending flap **19** arranged in a cut-out portion of the ring **12***a*. The cutout portion is produced cutting the end portions **13***c*, **13***c* between the cap and ring downwardly to the lower end of the ring. In this embodiment, the cap remains hinged to the ring.

Except for the noted differences, the embodiments of FIGS. 1 and 2 are alike and, as shown in FIG. 1, a peripheral rib **18** may project from the ring part, which serves to reinforce the closure.

In the otherwise similar embodiment of FIG. 3, the closure carries a stopper **26** which extends into the con-

tainer mouth **1***a* and has an annular flange **28** inserted into an annular groove **29** in the cap part of the closure. The stopper **26** includes a bottom **27** of curvilinear cross-section. The stopper **26** will reduce any gas diffusion from the interior of the container through the closure and will prevent it practically completely if the stopper is made of an impermeable material.

The embodiment of FIG. 4 is similar to that of FIG. 1 but the guard ring part **12** of the closure has fixed thereto a tongue **34** in juxtaposition to lug **14** of the cap part **11**. This tongue constitutes a tear strip and incisions **35**, **35***a*, **35***b* make it possible to grasp the strip by first tearing along the incisions and then to tear the ring part off the container mouth along the weakened portion **13**. The cap **11** may then be readily removed from the container mouth by pulling on lug **14** and thus disengaging the bead **11'** of the cap from the groove of the container mouth.

In the embodimentof FIG. 5, the weakened portion is formed by an obliquely inclined incision **13***d* extending down to the lower edge of the ring part of the closure. The tear strip **34** is arranged below the opening lug **14***a* and when the closure is to be opened, the tear strip is pulled along incision **13***d* and the lug **14***a* is pulled up. Alternatively, the lug may be pulled up without pulling on the tear strip **34**, thus tearing the cap along incision **13***d*.

In this embodiment, the lug **14***a* has a series of gripping grooves **14***b* on its underside for engagement with a bottle opener which may be used to open the closure by exerting an upward lever action on the lug.

The oblique inclination of incision **13***d* has the advantage of causing a relatively small weakening of the ring bead, which would be caused, for instance, by a perpendicularly extending incision and thus makes this embodiment particularly useful for the closure of bottles, the contents of which produce a fluid pressure against their closure.

As shown in FIG. 5, the closure is mounted on a container mouth **1***c* with an undercut opening **3** engaged by a conforming flange **24** integral with the cap part **11***b* and extending into the undercut opening. It is advantageous to provide such a cap with an annular reinforcing rib **36** generally in alignment with the annular flange **24**. When this closure is mounted on the container mouth, downward pressure on the reinforcing rib **36** will depress the annular flange **24** whereupon the flange will snap back with a pre-stress against the upper edge of the container mouth when the pressure on the reinforcing rib is released.

In the embodiments illustrated in FIGS. 6 to 9, the annular beaded portion **11''** of the cap part of the closure engages the peripheral groove of the container mouth and is surrounded by the guard ring part **12***b* of the closure. In these embodiments, the weakened closure portion interconnecting the two closure parts is very weak, being formed by a deep vertical incision **13***e* between the beaded portion **11''** of the cap and the upper rim of ring **12***b* adjacent the beaded cap portion.

As will be seen from the top view in FIG. 7, the guard ring **12***b* is connected to the opening lug **14***c* of the cap by a weakened portion **13***f* produced by tangentially extending incisions conforming to the configuration of the lug.

A modification of the incision forming the weakened interconnecting portion of the closure of FIGS. 6 and 7 is illustrated in FIG. 8 wherein the lower incision penetrates only about half way into the closure material and an upper incision **13***g* is made into the material to produce a centrally extending weakened annular portion between the guard ring **12***b* and the beaded portion **11''** of the cap part of the closure.

In the modification of FIG. 9, the opening lug **14***d*, which is integral with the cap part of the closure, does not project beyond the ring closure part **12***b* but conforms

to its periphery so that the entire closure is circular. Incisions **13***e* and **13**[f] are similar to those shown in FIG. 7 so that the lug may be readily separated from the guard ring **12***b* and the cap torn off the ring along the annular weakened portion interconnecting the cap and the ring. Separation of the two closure parts is facilitated by providing a short fully broken section **39** in the weakened connecting portion, this broken section being positioned diametrically opposite the lug **14***d* in the illustrated embodiment.

The weakened connecting portion between the two closure parts may extend adjacent the entire periphery of the two parts so that the two will be fully separated when pulled apart. However, it is also possible to leave a short section along the periphery of the closure, for instance, at the opening lug, without weakening whereby a loop will remain which may be used, for instance, to place the cap on the container mouth and thus have it ready for re-closure.

The closure embodiments of FIGS. 6 to 9 are relatively flat, i.e. the ratio of the closure diameter to its height is at least about 3:1. By mounting the guard ring of the closure about the annular beaded closure portion engaging the container mouth groove, the elastic pressure of the beaded closure portion against the container mouth is considerably enhanced when the closure is originally applied to the mouth and before the guard ring is removed during actual use of the container. This, of course, increases the effectiveness of the closure. Also, the flat configuration of the entire closure and its rib-like rim constituted by the guard ring produces a simplified closure configuration, which is easy to manufacture and also makes it possible to sort the closures before use in known sorting machines. Furthermore, less material is used in such closures, thus making them more economical, and the weakened connecting portion between the two closure parts is not subjected to any fluid pressure from the contents of the container and may, therefore, be made particularly thin and weak, to facilitate the separation of the guard ring from the closure.

The closure embodiment illustrated in FIG. 10 is like that of FIG. 1 or 3 but the incisions **13***h*, **13***i*, and **13***j* are so designed that lifting of the cap part **11** by lug **14** first causes separation of the closure parts along lines **13***h* and **13***i*, a reinforcement at **40** then guiding the separation along line **13***j* down to the non-weakened small section **41**. Only when this latter section is forcefully split will the guard ring be fully separated from the cap part so that the cap part may be removed from the container mouth.

Preferably, the oblique incision **13***j* is spaced from the opening lug **14** by about 160°.

All of the closures described and illustrated hereinabove may be readily opened without tools and may be closed again while being safe against tampering as long as the guard ring remains attached to the removable cap part of the closure. The cap part can be opened only after the guard ring has been separated from the cap part along the weakened portion interconnecting the same.

It may be pointed out that a characteristic feature, especially of the closure design of FIGS. 1 to 5 and 10 is the feature that the beaded guard ring is arranged so high that it engages, in its original state, the deepest recess of the peripheral groove in the container mouth.

Thus, according to this invention, the weakened closure portion between the guard ring and the cap part, i.e. the part which, after separating both parts and removal from the container mouth, may be replaced on said container mouth to again close the container, is provided in such a manner that, on opening the container, part of the entire bead of the closure remains attached to the cap part while the other part may remain at the container mouth. Both beaded parts together firmly press the closure on the container mouth and thus achieve satisfactory, pressure-resistant sealing of the container. After

separating the beaded closure along the weakened portion the partly or completely removed cap part is still provided with a small and readily yielding beaded part which permits easy closing and opening of the container by hand.

In principle the novel features of the present invention are not only that the entire bead of the closure is divided in two parts by an incision but also that the entire bead of the closure and thus the guard ring are designed very compact and sturdy. In contrast to heretofore used closures, the closure according to the present invention engages only the first peripheral groove of the container mouth which groove is arranged directly at the mouth, and not any subjacent groove. Thus the closure according to the present invention represents in fact a so-called crown bottle cap.

In addition to the design of the closure according to the present invention as they have been described hereinbefore, there may be mentioned a design wherein lug **14** may be arranged below weakened portion **13**, i.e. between the end portions **13***c*, **13***c* of FIG. 2.

According to another design, for instance, a narrow tongue **34** may be provided below lug **14** which yields, on tearing, a slot passing above lug **14**. As a result thereof cap **11** can readily be removed by pressing upon lug **14**.

In order to compensate for the weakening of the beaded guard ring part **12** by providing tongue **34**, the beaded part **11'** may be thickened and thus strengthened at the place above tongue **34**.

It may be mentioned that the closures according to the present invention can be provided with a gas- and aroma-tight coating, for instance, by immersion. The stopper **27** inside the closure may be provided with a rubber-elastic filler to achieve gas- and aroma-tightness.

The central portion **16** of the cap part **17** (FIGS. 1 and 2) may be separated from the cap part not only by groove **17** provided at the outside of the cap but by a groove provided at the inside of the cap or by two or more grooves to yield the membrane-like central portion **16**.

Stopper **26** (FIG. 3) may consist of a material different from that of the closure itself.

The incision **13***d* (FIG. 5) may not only be obliquely inclined in a straight line but may also have a wave-like form.

Of course, many changes and variations may be made in the construction of the closure in accordance with the principles set forth herein and in the claims annexed hereto.

I claim:

1. A container closure of elastic material having an internal plug stopper portion for a container having a mouth with a peripheral groove adjacent said mouth comprising

(a) an initially sealable, removable and later reuseable cap part,

(b) a separable tamperproof guard ring part below said cap part having upper outer and lower outer edges,

(c) a weakened, inwardly recessed peripheral part interconnecting said cap and guard ring parts, said peripheral part having a wall strength substantially weaker than the strengths of the walls of said cap and guard ring parts,

(d) an annular bead on the inner wall of said peripheral part and extending into said cap and guard ring parts, said bead being adapted to sealably engage the deepest recess in a peripheral groove of a container sealable with a crown-cap and said bead dividing when said guard ring is separated from the cap part to leave part of the entire bead of the closure attached to the cap part,

(e) an opening lug integral with the periphery of said cap part and adapted so that when the lug is forced away from the container mouth the weakened peripheral part of the stopper tears, the guard ring part separates from the cap part, and the cap is removed from the mouth of the container.

2. The closure according to claim **1** wherein the periphery of the guard ring includes an incision passing at an inclined angle downwardly from the upper edge of said ring toward the lower edge of the ring in a direction away from said lug part and extending inwardly from the periphery.

3. The closure according to claim **2** wherein the incision is spaced from the opening lug by about 160°.

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