

Jan. 31, 1967

K. M. BRANDTBERG

3,301,425

CLOSURE CAP

Filed Oct. 29, 1963

2 Sheets-Sheet 1

Fig. 1

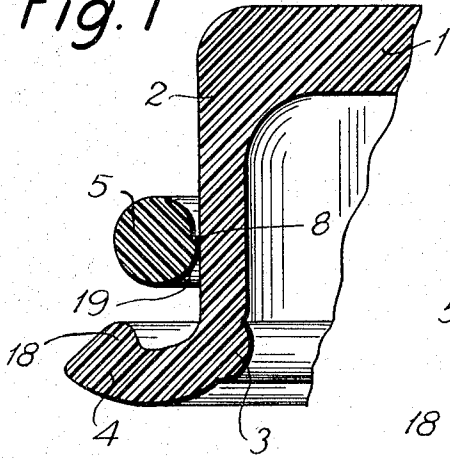


Fig. 2

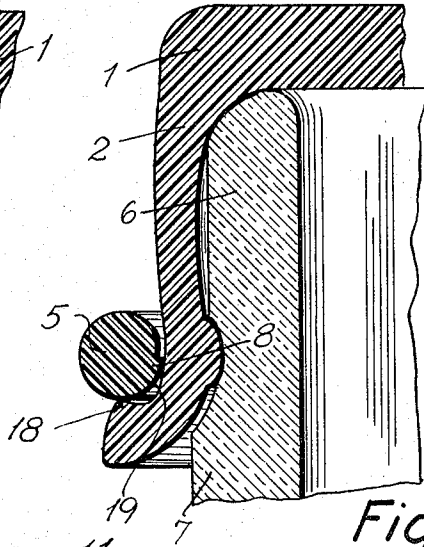


Fig. 3

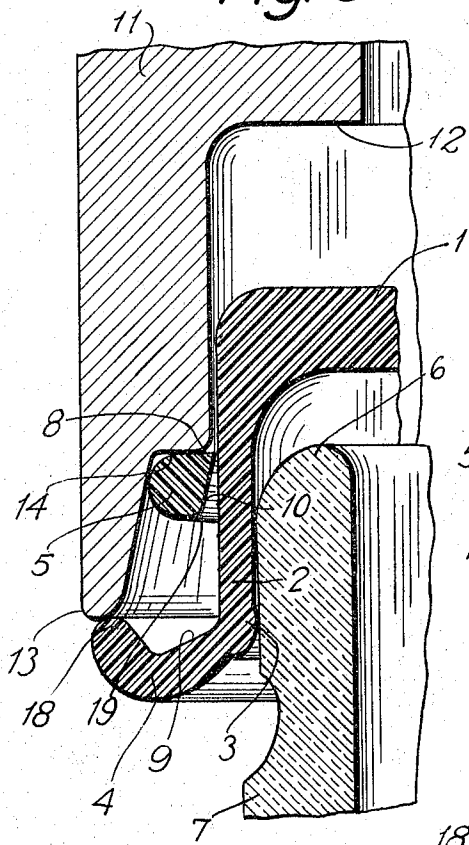


Fig. 4

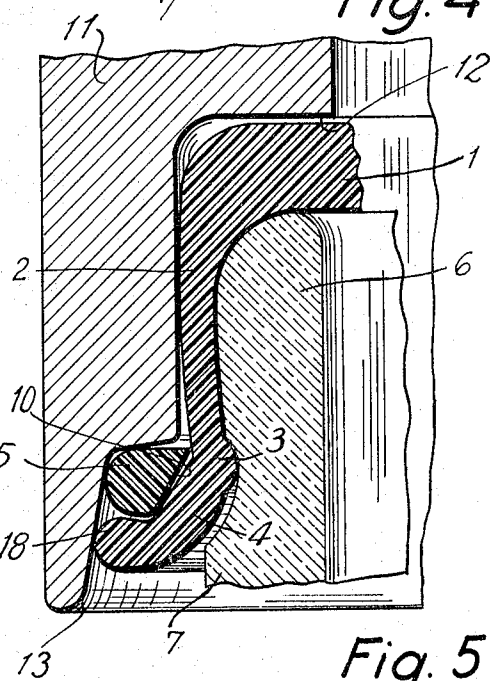
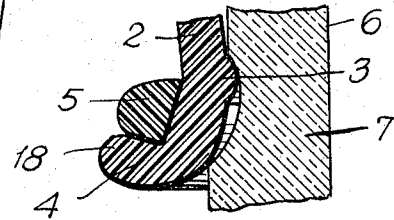


Fig. 5



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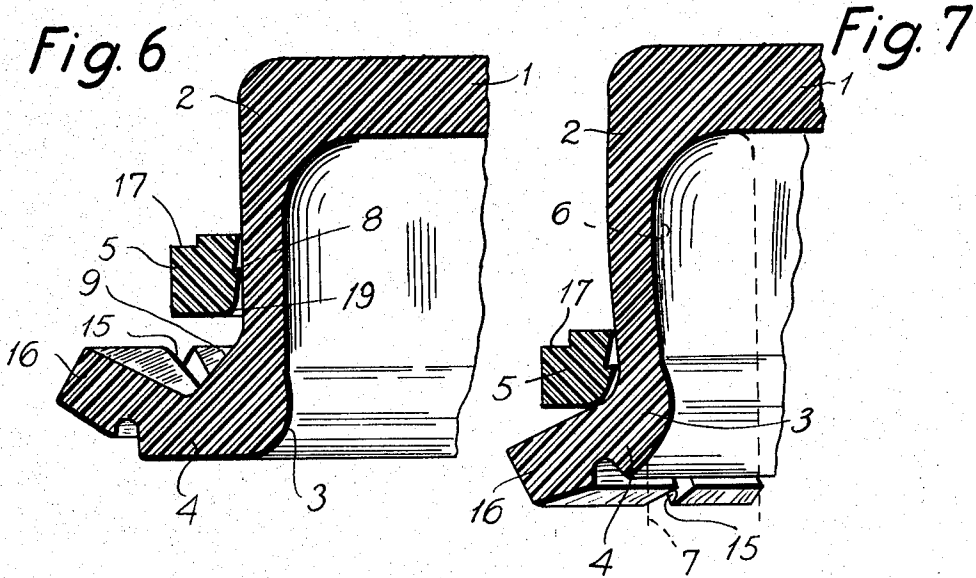


Fig. 8

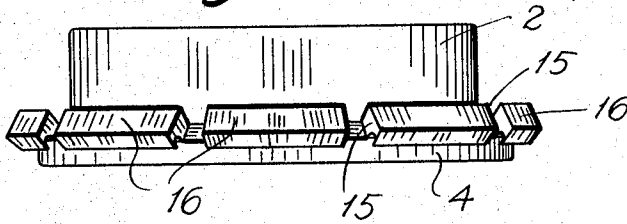
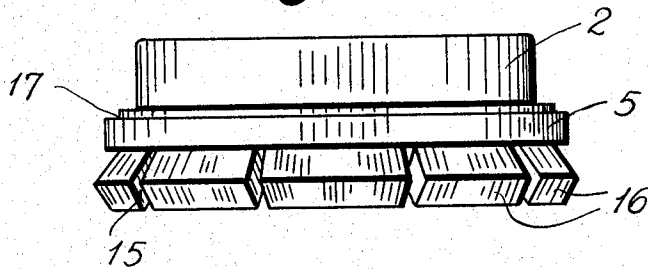


Fig. 9



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CLOSURE CAP

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4,708/62

8 Claims. (Cl. 215—45)

The invention relates to closure caps for bottles and other containers of the type with a bulbous mouth, the said caps being of the kind having a safety or reinforcement ring which on sealing of the bottle or container is passed down around a skirt of the cap which surrounds the bulbous mouth, the said ring being in the capped position located opposite a bulb provided on the inner side of the cap and engaging the bottle neck in a cavity beneath the bulbous mouth. The said ring may consist of a material such as polystyrene that will burst, or be subjected to permanent deformation when the cap is removed from the bottle or container.

It is a drawback of these closure caps that in the sealing position the ring has a tendency to slide up along the skirt of the cap, whereby the effectivity of the closure is lost.

Closures for beer and mineral water and the like are required to be air-tight and liquid-tight against a pressure about seven times that of atmospheric, and the ring therefore has to be very narrow and tightly pressing, but this renders its passage down over the skirt of the cap difficult.

The invention has for its object to provide a cap that satisfies the strict and mutually conflicting requirements to unobstructed passage of the ring down over the skirt and its retention in the sealing position.

This is accomplished thereby that the safety and reinforcement ring according to the invention has a sharp edge or a row of teeth at its smaller diameter, inclining inwardly and upwardly, and that the ring is gently rounded off at the lower part of its inner side.

The sharp, inwardly directed edge of the ring may in a special embodiment of the closure cap according to the invention be located at the center of the cross section of the ring, whereby the pressure exerted by the ring on the skirt of the cap is concentrated near the sharp edge, which may thereby in the sealing position cut its way into the cap proper and prevent the ring from sliding back up along the skirt.

Furthermore, the depending skirt may be provided with an extension which according to the invention may be adapted such that in the capped position, it is of larger maximum diameter than that of the safety or reinforcement ring, whereby it will absorb shock and other mechanical forces to which it is subjected and protect the ring so that the latter is not caused to burst prematurely.

For sealing a bottle or other container by means of the aforesaid closure cap, it is possible to use capping tools of a kind known in principle. A capping mandrel that is of particular advantage for sealing by means of the aforesaid closure cap may according to the invention be provided with two shoulders, each located at such distance from the contact surface of the mandrel that the upper shoulder will retain the ring until a conical surface of the cap has entered into it while the lower shoulder facilitates the said entry by simultaneously forcing the extension inwards in such manner that the bulb of the cap is forced into position into the cavity beneath the bulbous mouth of the bottle or container. The mandrel itself has no movable parts. It is only moved vertically in relation to the bottle after the cap having

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been loosely mounted on same and the ring again loosely mounted on the cap.

The drawing shows three different embodiments of the closure cap according to the invention.

In the drawing:

FIGURES 1 and 2 are sectional views of a closure cap of simplest design, before and after installation of a bottle, respectively.

FIGURES 3 and 4 show another closure cap at various stages of the capping operation.

FIGURE 5 shows a portion of the closure cap of FIGS. 3 and 4 in its sealing state.

FIGURES 6 and 7 are corresponding sections through a third closure cap, viewed before and after sealing, respectively.

FIGURES 8 and 9 show the closure cap of FIGS. 6 and 7 prior to and after sealing, viewed from the side on a reduced scale.

The cap consists of a disc 1 cast integral with a depending skirt 2, for example of polyethylene. At its lower end the skirt carries an inner circumferential bulb 3 and below same an outwardly projecting extension 4.

Prior to or during the capping operation a safety or reinforcement ring 5 of polystyrene or another brittle, but strong material, is passed down over the skirt 2 approximately into the position indicated in FIGURE 1.

The cap is then loosely mounted on the bulbous mouth 6 of a bottle, and the whole is passed into position on same as indicated in FIGURE 2, in which the ring 5 is resting on a circumferential shoulder 18. The capping operation may be performed by means of a capping mandrel or other similar sealing tool. The bulb 3, which during the capping operation slides down over the bulbous mouth 6, is—owing to the ring 5 being passed down into the position opposite the bulb 3 indicated in FIGURE 2—forced into the cavity in the mouth of the bottle against the underside of the bulbous mouth at a pressure that is almost equal to the pressure exerted by the ring 5 against the skirt. During the last part of its movement, the ring presses the extension 4 downwards around the bottle neck 7, whereby the lower part of the bulb 3 is swung inwards towards the bottle, thus compressing the skirt and thereby increasing the pressure exerted against the container.

In the sealing position of the cap, the hard ring 5 produces a depression in the soft skirt 2 by means of an inwardly and upwardly directed sharp edge 8 provided at the smaller diameter of the ring, whereby the ring 5 is prevented from sliding upwards along the skirt. The edge 8 need not be continuous. It may be rounded off and may, for example, be divided into a number of teeth all pointing upwards and inwards. The lower inner curvature of the ring at 19 facilitates the passage of the ring down over the skirt 2. The bottle 7 is uncapped by placing a finger or a bottle opener into position beneath the extension 4 or beneath the ring 5, and effecting a lifting movement whereby the ring is caused to burst, after which the cap again assumes the form indicated in FIGURE 1 and may be readily removed from the bottle.

If there is a pressure above atmospheric inside the bottle, the cap will have a tendency to assume the form of a barrel as a result of which, however, the edge 8 will increase its grip in the skirt 2 and thus prevent the ring 5 from creeping upwards along same.

The ring 5 not only serves to retain the cap in its position on the bottle, but as the ring will burst with certainty on the first removal of the cap, its presence also serves to guarantee that the bottle has not previously been opened, which, however, does not exclude repeated use of the cap for sealing without the ring. The cap will not in such case be of the same substantial sealing capacity as when reinforced by means of the ring.

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The ring 5 need not be only a brittle material. The material may be tough, if it is permanently deformable. Thus, an aluminium ring is acceptable and will provide a satisfactory reinforcement. When the bottle or container is uncapped, such a ring will be permanently deformed, and although it is not caused to burst, it will be so much expanded that it is unfit for further use.

In order to prevent the reinforcement ring 5 from forcing the extension 4 down towards the wall of the bottle 7 until the bulb 3 has been brought to a position fully beneath the bulbous mouth 6, the extension 4 may be provided with a conical surface 9 for cooperating with an inner oblique surface 10 of the ring 5 as indicated in FIGURES 3-5, which also show a capping mandrel 11 with contact surface 12 and shoulders 13 and 14.

The bottle 7 is in this case introduced with mounted cap and ring into the stationary mandrel 11. As a result, the ring 5 is passed down over the skirt 2 by the shoulder 14, and the shoulder 18 provided on the extension 4 is pressed against the bottle 7 by the shoulder 13.

Directly before the sealing operation is completed, the bulb 3 has as indicated in FIGURE 4 entered into position in the cavity in the bottle beneath the bulb 6, the ring 5, by the force of friction, drawing the cap into position on the bulb 6 prior to the shoulder 12, completing the sealing operation by its exertion of pressure against the disc 1.

Simultaneously, the flat inner side 10 of the ring 5 snaps into contact with the conical surface 9 of the extension 4, whereby the said extension is squeezed into the position indicated in FIGURE 5. At the time of this operation the material of the bulb 3 is therefore compressed, thus increasing the sealing relation between the bulb 3 and the underside of the bulbous mouth 6.

The embodiment of the closure cap shown in FIGURES 6-9 has in its original configuration prior to installation, the form illustrated in FIGURES 6 and 8. The extension 4 is by means of a number of indentations 15 divided into tongues 16, which facilitate the deforming of the extension 4 around the bottle without any compression arising in a tangential direction in any of the parts of the extension 4.

The ring 5 shown in FIGURES 6-9 is of approximate square cross section, and the upwardly inclining edge 8 which prevents the ring from being pushed back up along the skirt 2 is located approximately at the central part of the ring. To facilitate the passage of the ring down over the skirt, the ring is gently rounded off below at 19.

The ring 5 has a recess 17 in its upper surface, so that it is possible to ensure by means of a mechanical feeler that the ring is inserted with the proper surface upwards on the cap.

It will be appreciated, more particularly from FIGURE 7, that the pressure by which the reinforcement ring 5 increases the pressure exerted by the bulb 3 against the bottle neck 7 indicated by a dotted line in FIGURE 7 is to a special extent provided thereby that the material of the extension 4 is swung inwards so as to compress the bulb 3.

It will also be appreciated from FIGURES 7 and 9 that the tongues 16 in the capped position have a maximum common diameter larger than that of the reinforcement ring 5 whereby the tongues will intercept lateral shock and impact forces so that the ring is protected and consequently preserved from unintentional destruction.

What I claim and desire to secure by Letters Patent is:

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1. A closure for a bottle having a mouth with an external circumferential cavity, said closure comprising a cap including a disc, and a resilient depending skirt on said disc, said skirt including a circumferential bulb facing inwardly, and an outwardly projecting extension below the bulb, the closure further comprising a reinforcing ring encircling the skirt for compressing the bulb in the cavity at the mouth of the bottle upon downward relative movement of the ring over the skirt a distance sufficient to cause the extension to be downwardly depressed and inwardly compressed, said ring being constituted of a material harder than that of the skirt and including an edge portion of sharp profile facing the skirt and inwardly and upwardly directed for locally cutting into the same when the extension is downwardly depressed and inwardly compressed to thereafter prevent upward movement of the ring on the skirt.

2. A closure as claimed in claim 1 wherein said extension has an outer diameter in the depressed and compressed state which is greater than that of the ring to thereby protect the same.

3. A closure as claimed in claim 1 wherein said ring includes a lower portion facing the skirt which is rounded to facilitate the relative downward movement of the ring on the skirt.

4. A closure as claimed in claim 1 wherein said edge portion is an annular portion located approximately centrally in the ring.

5. A closure as claimed in claim 1 wherein said ring has a substantially flat upper surface and an oblique inner surface facing the skirt, said surfaces intersecting at the upper surface to form said edge portion of sharp profile.

6. A closure as claimed in claim 5 wherein said extension includes a portion with an outward conical surface facing the ring, said conical surface and the inner surface of the ring being snapped into intimate contact when the extension is downwardly and inwardly depressed.

7. A closure as claimed in claim 1 wherein said ring is of approximately square cross-section and has an inclined inner surface facing the skirt with a radially stepped portion constituting said edge portion of sharp profile.

8. A closure as claimed in claim 1 wherein said ring has an approximately circular cross-section with a diametral stepped portion facing the skirt and constituting said edge portion of sharp profile.

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