

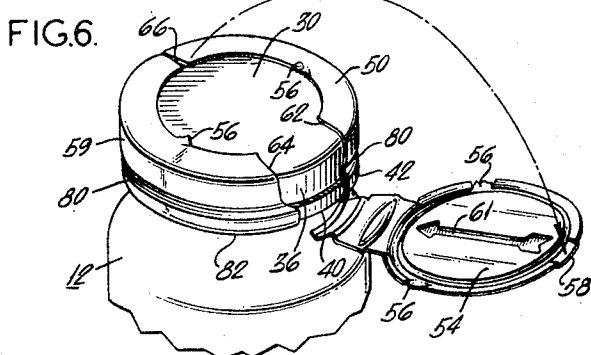
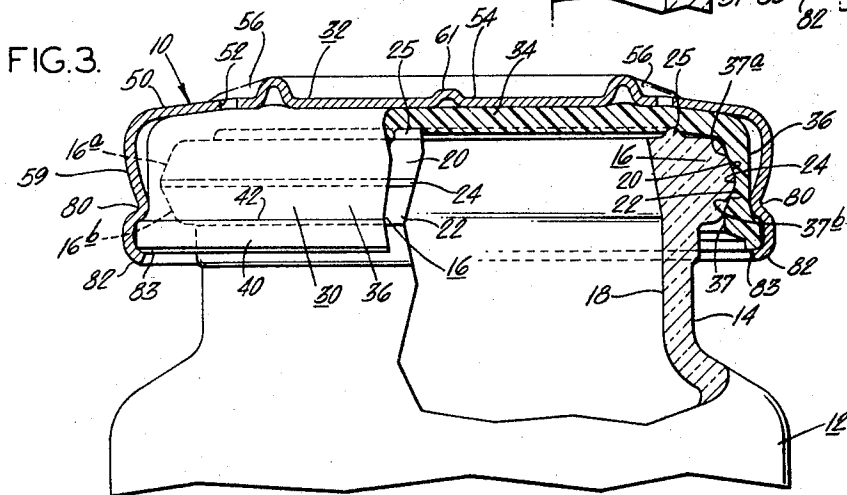
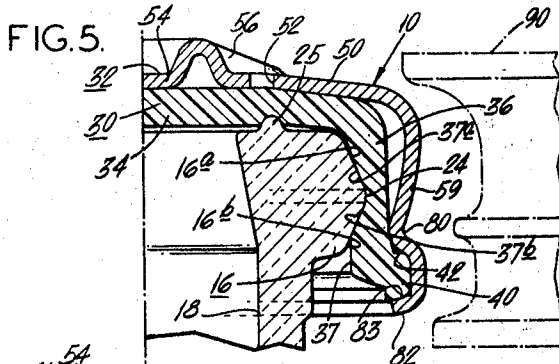
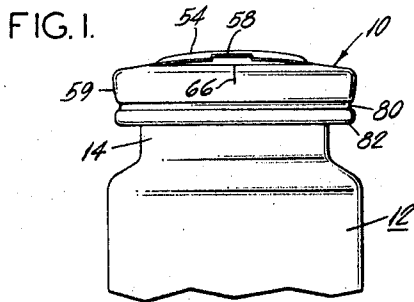
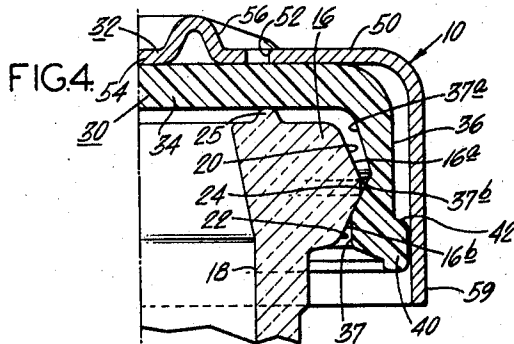
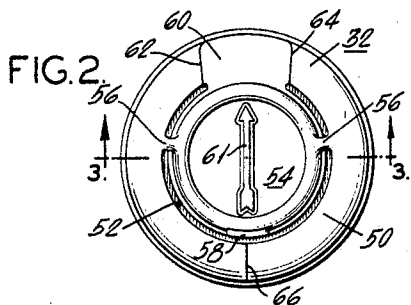
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CONTAINER CLOSURE

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3,439,825

CONTAINER CLOSURE

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6 Claims

ABSTRACT OF THE DISCLOSURE

A container closure for sealing the opening in a container such as a bottle comprising inner and outer cap members of cup-like form, the inner cap member preferably being made of plastic and the outer cap member preferably made of a metal such as aluminum. The container has a circumferentially extending bead having angularly disposed sealing surfaces adjacent the opening and the inner cap member has a radially inwardly projecting portion defining angularly oriented sealing faces adapted to snap over and engage the bead. The skirt of the outer cap member is provided with dual locking means for locking the inner cap member in place comprising a radially inwardly directed rib spaced from the lower terminal edge of the skirt which engages above a locking shoulder on the inner cap member to press the sealing faces into firm engagement with the bead of the container and a radially inwardly directed flange at the lower end of the skirt of the outer cap member engaging over the lower terminal edge of the sidewall of the inner cap member.

The present invention relates generally to container closures and more particularly to improvements in "tamper-proof" container closures.

These tamper-proof closures are generally used on bottles for pharmaceuticals or the like wherein it is essential that the container be maintained effectively sealed until it is desired to use the contents of the container. An effective seal is necessary to protect against contamination of certain types of pharmaceuticals which must be used within a prescribed time after exposure. Some prior tamper-proof closures used for this purpose consisted of an outer cap member of generally cup-like form which supported a stopper in place in the open end of a container such as a bottle. The outer cap member generally comprised an annular top having a central removable disc portion, a skirt depending from the outer peripheral edge of the top, the lower edge of the skirt adapted to be crimped or spun under a shoulder formed on the bottle to hold the cap in place over the stopper. The disc was generally connected to the outer annular top portion of the cap by means of fracturable bridges so that when it was desired to remove the outer cap, the disc was simply peeled upwardly and pulled down the side of the skirt to release the outer cap and permit the stopper to be removed permitting withdrawal of the contents. It has been found, however, that even though these container closures are referred to as "tamper-proof" they are not truly tamper proof for the reason that it is possible to pry the entire cap assembly over the top of the container without removing the disc and replace the same without giving any substantial evidence that the outer cap had been removed.

This is undesirable for the reason noted above that in some instances the contents of the container can become contaminated by the initial partial or complete removal of the cap.

In some of these prior container closures wherein the lower terminal edge of the skirt of the metal cap member was rolled under a flange on the bead surrounding the opening in the bottle, it is comparatively easy to

straighten the lower flange either partially or completely and then remove the outer cap member without having fractured the bridges holding the disc to the annular top. The outer cap could then be replaced and the flange formed over the bead on the container and except by extremely close visual inspection, there would be no evidence of the cap having once been removed. This, of course, is dangerous where the contents of the container may be contaminated if the contents are not used a short time after the seal has been broken.

The present invention provides a container closure which is truly tamper-proof and whereby it is virtually impossible to remove the container closure from the container other than by the normal process that is, by removal of the central disc and complete destruction of the outer cap member or mutilation thereof to the extent that it cannot be reassembled to its initial condition.

To this end the container closure comprises an inner cap member preferably made of plastic of cup-like form having a radially inwardly directed projection defining angularly oriented sealing faces confronting the sealing surfaces of the bead on the container adjacent the opening and a rib at its lower edge defining a shoulder spaced upwardly from the lower terminal edge of the side wall of the inner cap and an outer cap member overlying and superimposed over the inner cap member. The outer cap member has a radially inwardly circumferentially extending locking rib spaced upwardly from the lower terminal edge of the skirt which engages above the shoulder provided by the outer rim of the inner cap member to firmly seat the inner cap member against the finish on the bottle and a lower radially inwardly directed flange curled under the lower terminal edge of the skirt portion of the inner cap member. By this dual locking arrangement, even if the lower flange of the outer cap is pried outwardly by means of an instrument such as a screwdriver, a fingernail file, or the like, the locking rib still maintains the seal and prevents complete removal of the container closure. It is noted that the locking rib is relatively inaccessible and therefore cannot be deformed to permit removal of the container closure other than by the normal means, that is, removal of the central disc and mutilation of the outer cap member. Thus, the dual locking means of the present invention provides a truly tamper-proof assembly.

Other objectives of the present invention and the various features and details of the construction and assembly of a tamper-proof container closure in accordance with the present invention are hereinafter more fully set forth with reference to the accompanying drawings, wherein:

FIG. 1 is a side elevational view of a tamper-proof closure constructed in accordance with the present invention applied to a bottle;

FIG. 2 is a plan view of a container closure;

FIG. 3 is an enlarged sectional view taken on line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary sectional view showing the container closure prior to complete assembly thereof to the bottle;

FIG. 5 is a view similar to FIG. 4 after the locking bead and locking flange have been rolled; and

FIG. 6 is a fragmentary prospective view illustrating removal of the container closure from the bottle.

Referring now to the drawing, and particularly to FIGS. 1 and 3 thereof, there is shown a container closure 10 constructed in accordance with the present invention applied to a container, in the present instance a bottle 12. The bottle as illustrated, has a reduced neck 14, a radially outwardly projecting bead or flange 16 adjacent the opening 18, the bead as illustrated having upper and lower tapered surfaces 20 and 22 respectively which merge at a central band 24.

The bottle is also provided with an annular ring-like projection 25 above the bead 16 on which the container closure seats to effectively seal the contents.

The container closure 10 comprises, in the present instance, an inner cap member 30 which is preferably made of plastic, an outer cap member 32 preferably made of metal such as aluminum which holds the inner cap member in place by means of a dual locking means explained in more detail hereinafter. The inner cap member 30 has a generally circular top panel 34 and a side wall 36 depending from the outer peripheral edge of the top panel. The side wall 36 of the inner cap member is provided with a circumferentially extending radially inwardly directed projection 37 defining a pair of angularly disposed sealing surfaces 37a, 37b which, when the container closure is assembled to the bottle, seat against the bead 16 of the bottle. The side wall 36 of the cap is of V-shaped cross section to define the circumferentially extending angularly disposed sealing faces 36a, 36b which confront and engage the surfaces 16a and 16b of the bead 16 in the assembled relation of the container closure. The inner diameter of the annular radially inwardly projecting portion 37 of the side wall is of a smaller diameter than the band 24 of the bead so that the inner cap snaps in place over the bead in the manner illustrated in FIG. 4.

The skirt also has a circumferentially extending radially outwardly projecting band portion 40 adjacent the lower terminal edge defining a locking shoulder 42.

The outer cap member 32 consists of an annular top portion 50 defining a central circular opening 52, a removable central disc 54 connected to the annular top by fracturable bridge means 56 and a skirt 59 depending from the outer peripheral edge of the annular top portion 50. The disc has an upturned edge portion 58 diametrically opposed from the tab 60 connecting the disc to the top portion. This upturned edge 58 facilitates engagement of the disc by the user or other implement to pry the disc upwardly when it is desired to remove the outer cap member in the manner described below. As illustrated, the disc has a raised rib 61 in the form of an arrow to rigidify the disc upon actuation and also indicate which direction to pull the disc to remove the outer cap.

The outer cap member 32 is designed to be completely removed when it is desired to use the contents of the container and to this end is provided with two closely spaced score lines 62 and 64 which define therebetween the tear tab 60 and a single score line 66 opposite the tear tab portion. The score lines 62 and 64 are parallel in the annular top and the portions thereof extending downwardly along the skirt converge inwardly to provide a truncated V arrangement of score lines in the skirt of the outer cap member.

Considering now briefly the procedure for removing the container closure 10 from the bottle 12. The bottle 12 is supported with one hand of the user, for example, the left hand. The user positions a fingernail of the thumb of the right hand underneath the raised edge portion of the disc 54 and prys it upwardly to a point where he can grasp it with the thumb and forefinger. (See for example FIG. 6.) The disc 54 is then raised to initially break the bridge connections 56 to the annular top portion of the outer cap and pivot the disc about the hinge line, the embossed indicating arrow serving as a strengthening rib to prevent buckling of the disc. Now by pulling the disc in a radially outward direction, the annular top and skirt break away at the score lines to form a pull tab extension integrally connected to the disc and to the remainder of the outer cap along an extension of the score lines. By this arrangement, further pulling of the disc in the manner described causes the score lines 62 and 64 to fracture as indicated in FIG. 6 thereby separating the cap into halves so that it drops away from the neck of the bottle. Thereafter, the plastic inner cap 30 may simply be removed from the container to gain complete access to the contents.

In accordance with the present invention there is provided a dual locking arrangement securing the container closure over the container in a manner preventing removal thereof and tampering with the container closure except by the means indicated above.

Thus, in the conventional manner for removing the cap, there is a destruction of the outer cap and obviously a visual means is provided indicating that the seal has been broken once and thus the cap is truly tamperproof. In the present instance the dual locking means comprises a radially inwardly directed circumferentially extending rib 80 in the outer cap member which engages the inner cap member above the shoulder 42 thereby firmly pressing the sealing surfaces and faces of the bead 16 and inner cap member together whereby a circumferentially extending seal is obtained between the inner cap and bead along the frusto-conical portions of the bead. The other locking arrangement consists of a radially inturned flange 82 at the lower end of the outer cap member which overlaps the lower terminal edge 83 of the inner cap member 30 to secure the closure in place. It is noted that by this arrangement, if the lower flange is pried outwardly by means of an instrument and it is attempted to pry the closure upwardly, this would not be possible by reason of the locking rib, it being noted that prying force outwardly on the terminal flange tends to seat the locking rib 80 more firmly against the inner cap member and actually strengthen the seal between the inner cap member and the bead 16.

Furthermore, it is noted that the only way the locking rib 80 can be pried outwardly sufficiently to remove the inner and outer cap member from the container is by substantially complete mutilation of the outer cap member which, of course, gives a visual indication that the cap has been tampered with and the seal may have been broken. In view of the above discussion, it is obvious that tumbling about of the assembled cap does not result in destruction of the seal.

The outer cap member of the container closure in accordance with the present invention may be made from flat sheet material by stamping out circular blanks, the blank being formed with a plurality of score lines and thereafter stamped into a cup-like form. The outer cap member in this form has a straight-sided skirt portion as shown in FIG. 4. The container closure is then assembled to a container by positioning the inner plastic cap member over the open end of the bottle and then positioning the outer cap member in superimposed relation on the inner cap member. A suitable forming die 90 then rolls the outer cap to form the locking rib 80 at the location indicated above and the inturned radial locking flange 82 overlapping the lower terminal edge of the inner cap member. This may be done by means of a stationary die wherein the cap member is rotated or by rotating the die or forming tool with the cap stationary.

I claim:

1. For a container having an opening therein and a circumferentially extending bead adjacent the opening, a container closure assembly for sealing the opening comprising an inner cap member made of a resilient flexible material and an outer cap member engaging over the inner cap member, said inner cap member having a disc-like top panel, a side wall depending from the outer peripheral edge of the top, the inner portion of the side wall confronting and adapted to engage the bead of the container to provide a seal and a radially outwardly projecting portion adjacent the lower terminal edge of the side wall defining a circumferentially extending locking shoulder, said outer cap member comprising a top portion overlying the top panel of the inner cap member, a skirt depending from the outer peripheral edge of the outer cap member and dual locking means consisting of a radially inwardly directed flange at the lower peripheral edge of the skirt engaging over the lower terminal edge

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of the inner cap member and a radially inwardly directed circumferentially extending rib spaced upwardly from the locking flange engaging the inner cap member adjacent the locking shoulder.

2. A container closure as claimed in claim 1 wherein the bead is formed with angularly disposed circumferentially extending sealing surfaces and the inner portion of the side wall of the inner cap member has complementary angularly disposed sealing faces.

3. A container closure as claimed in claim 1 wherein the inner cap member is made of a resilient flexible material and the outer cap member is made of metal.

4. A container closure as claimed in claim 1 wherein the top portion of the outer cap member includes an outer annular portion and a central disc connected to the outer portion by fracturable bridges.

5. A container closure as claimed in claim 4 including a pair of closely spaced score lines in the annular top

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portion and skirt defining therebetween a detachable tab section connected to the removable disc.

6. A container closure as claimed in claim 5 including another score line in the cap approximately diametrically opposed from said tab and extending across the annular portion and downwardly along the skirt.

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GEORGE T. HALL, *Primary Examiner.*

U.S. Cl. X.R.

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