July 26, 1966 I. O. FORMO 3,262,601

CONTAINER CLOSURE

Filed May 13 1964 2 Sheets-Sheet 1

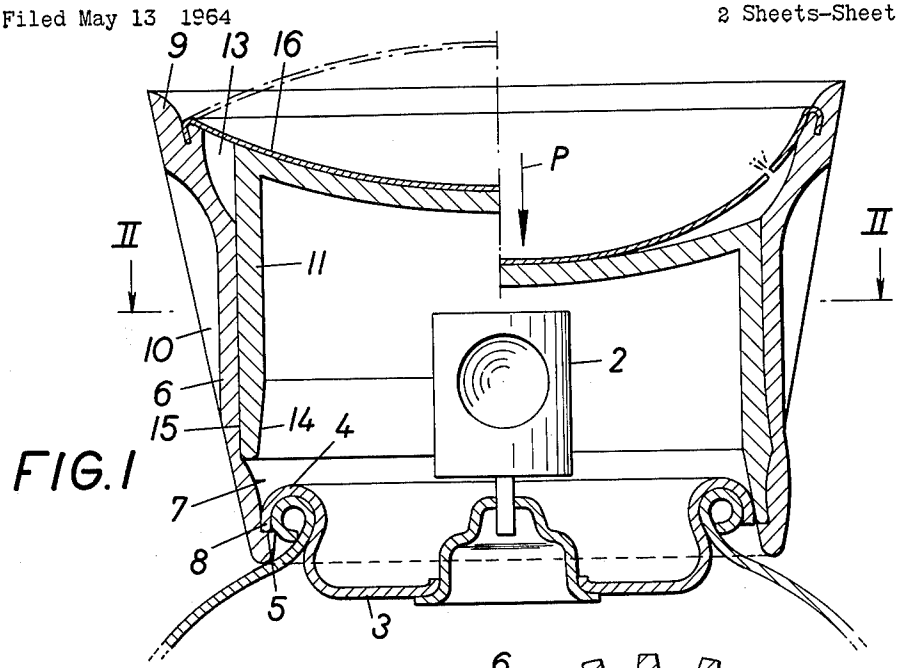

FIG. 1

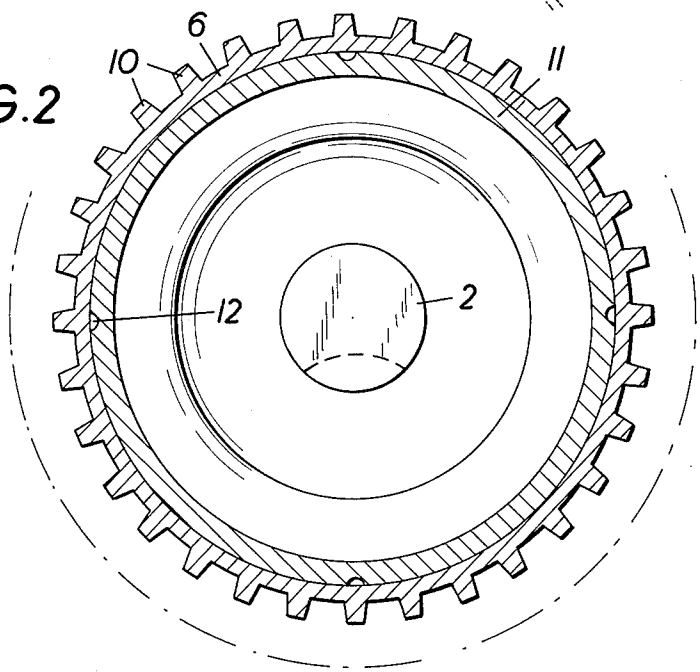

FIG. 2

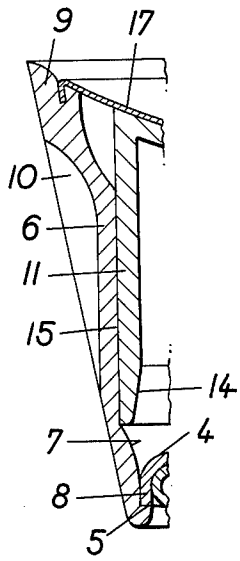

FIG. 3

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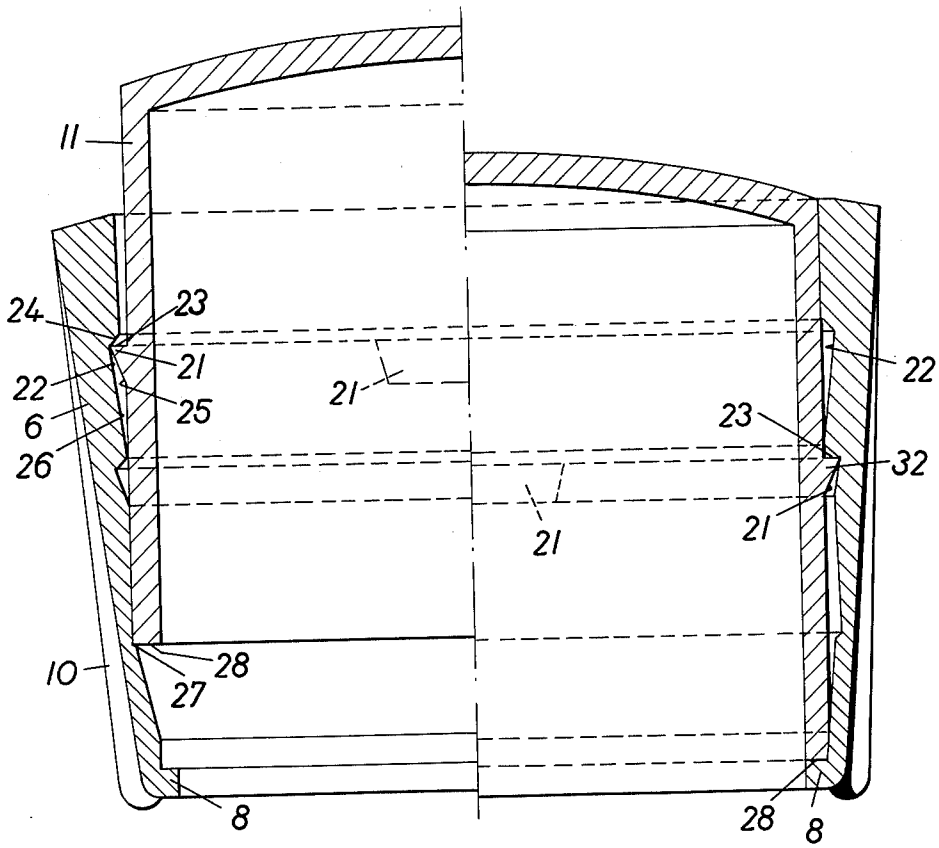
FIG. 4.



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CONTAINER CLOSURE

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13 Claims. (Cl. 220—60)

The present invention relates to caps intended for the enclosing of an outlet nozzle or other opening of a container, in particular containers which are now in common use for containing liquids or pastes, which are to be dispensed and used in portions over a long period of time, it being of importance to ascertain that the container has not been previously opened, when the same is delivered to the purchaser. Containers to receive caps according to the invention are provided with an annular surface such as the underside of a bead, around the container opening, the cap having means to engage the said surface so as to retain the said cap on the container.

According to the present invention, in a cap for enclosing a nozzle or other opening of a container and held in position thereon by an internal circumferential rib on the cap engaging an annular surface such as the underside of a bead around the container opening, the cap comprises a skirt made of a flexible material and having the internal circumferential rib or like projection formed at its lower edge, and an inverted cup-shaped member located within the skirt and slidable axially with respect thereto, the skirt and cup-shaped member being so formed relatively to each other that movement of the cup-shaped member towards the lower end of the skirt expands the said lower end to free the cap for removal, means being provided whereby a visible change in the condition of the cap produced by such movement of the cup-shaped member is such that the said cap cannot be restored to its original appearance.

The skirt and the cup-shaped member may be interconnected by connecting means which are interrupted by movement of the cup-shaped member to expand the lower edge of the skirt.

Alternatively, the skirt and the cup-shaped member may be formed with interlocking elements which engage one another when the cup-shaped member is moved to expand the lower edge of the skirt and prevent the return of the cup-shaped member to its initial position.

The cap may be made in various shapes, according to the container on which it is to be used, and possibly also the ornamental considerations which it is desired to benefit. Most conveniently, from a manufacturing point of view, it is to make the skirt with an internal diameter which decreases towards the end adjacent to the container mouth, at the same time as the cup-shaped member is made with an approximately constant diameter along its entire axial length.

The invention is illustrated on the accompanying drawings which show by way of example, three embodiments of a cap according to the invention, and in which:

FIGURE 1 is an axial sectional view of one form of cap, the cup-shaped member being shown in different positions on opposite sides of the vertical centre line;

FIGURE 2 is a sectional view taken along the line II—II of FIGURE 1;

FIGURE 3 is a part sectional view, corresponding to the left half of FIGURE 1, illustrating a second embodiment; and

FIGURE 4 is an axial sectional view, similar to FIGURE 1, illustrating a third embodiment of the cap according to the invention.

Referring to FIGURE 1 of the drawings, 1 is a container which, in the usual manner, is provided with a dispensing device 2, such as a spray nozzle for the atomizing of the container contents. The dispensing device is mounted in a closure 3 for the container, and around the closure the container 1 is provided with a bead-like collar 4 having a flat undersurface 5.

A cap to cover and protect the dispensing device 2 comprises a skirt 6, which, preferably, is made of a hard but flexible plastic material. At the end adjacent the container, the skirt terminates in an inwardly directed circumferential rib or like annular projection 7, which has a flat surface 8 adapted to engage the flat undersurface 5 of the bead-like collar 4 on the container 1. Preferably, the skirt is substantially cylindrical and terminates, at the end remote from the annular projection 7, in a collar 9, a number of reinforcing ribs 10 being provided in spaced relation around the outer wall of the skirt 6. A member 11 of inverse cup-shape is located within the skirt 6 and has an exterior diameter substantially equal to the interior diameter of the skirt 6, so that the member 11 may slide axially of the skirt. Axially extending grooves 12 are arranged in spaced relation around the exterior surface of the member 11, for the purpose of relieving excessive pressure which may build up inside the cap to the annular space 13 defined between the collar 9 at the top of the skirt and the top portion of the member 11. The free lower edge of the member 11 may have a tapering cross section, produced by an oblique face 14 on the inside and a slightly concave oblique face 15 on the outside, defining a surface essentially complementary to the shape of the projection 7 of the skirt 6.

The cup-shaped member 11 is so formed as to be more rigid than the skirt, or the skirt may be provided with slits extending upwardly from its lower edge to reduce its resistance to radial expansion.

In FIGURE 1 a foil 16 is shown as being secured in a groove formed in the collar 9 and following the top surface of the member 11 when the cap is in position for storing, as shown to the left in full lines in FIGURE 1. In FIGURE 3, the member 11 is shown as being provided with a thin circumferential flange 17, the circumference of which is secured in the collar 9.

The central part of the foil 16 may be secured to, or may merely lie against, the closed end surface of the cup-shaped member 11.

When the cap is to be removed, a manual pressure is exerted in the direction indicated by an arrow P in FIGURE 1, on the top surface of the member 11, with the result that that member slides downwardly in the skirt 6. The wall of the member 11 expands the lower, inwardly directed portion 7 of the skirt wall with the result that the surface 8 is disengaged from the surface 5, thereby releasing the cap. When the member 11 is depressed in this manner, the foil 16 of FIGURE 1, or the flange 17 of FIGURE 3, is subjected to such a tension that it either breaks or is torn from the collar 9, thereby indicating that the cap has been operated for the purpose of opening. The cap is now free, and may be removed, so that the discharging device 2 may be operated.

By returning the member 11 upwardly in the skirt, the portion 7 of the skirt is, due to its elasticity, returning to its initial, inwardly directed position, with the result that the cap may again be forced downwardly around the bead 4 and the surface 8 re-engaged with the undersurface 5 of the bead. The foil 16 or the flange 17 remains, however, in its broken or torn condition, thereby indicating that the cap has been removed.

As shown in dotted lines to the left in FIGURE 1, the foil 16 may, due to an excessive pressure appearing

within the cap, for instance caused by a leakage of the contents of the container through the device **2**, bulge upwardly and thereby indicate that such leakage is taking place. The foil **16** may, however, be provided with a number of small perforations for the purpose of relieving such pressure.

In the embodiments of the invention illustrated in FIGURES 1 to 3, the cup-shaped member **11** may, as described above, be returned to its upper position, so that the cap may be refitted to the container. In the embodiment shown in FIGURE 4, such possibility is prevented, for the purpose of definitely avoiding any fraudulent replacement of the broken or torn connection between the skirt and cup-shaped member.

In the embodiment of the invention shown in FIGURE 4 the member **11** is provided with a number of projections **21** arranged in spaced relation along a circumferential line around its outer peripheral surface the skirt **6** being provided with a circumferential groove **22** extending unbroken around the inside of the skirt and adapted to be engaged by the projections **21** in such a manner that the member **11** and the skirt **6** are axially locked relatively to each other. The projections **21** are, as shown, each provided with a flat top face **23**, for the purpose of securing a positive engagement with the oblique top surface of the groove **22**, to the effect that a withdrawal of the member **11** is positively prevented. On the other hand, the lower surfaces **25** of the projections **21** are oblique, so that they may slide along the oblique face **26** defining the lower surface of the groove **22**, and the cup-shaped member **11** may be pushed downwardly within the skirt **6**. In order to resist unintentional downward movement of the member **11**, the skirt **6** is provided with a small projecting rim **27** forming a step on which the lower edge **28** of the member **11** may rest when the projections **21** are in engagement with the groove **22**.

Further, the skirt **6** is also, in this embodiment, provided with an additional circumferential groove **32** which may be engaged by the projections **21** on the member **11** when the latter is pushed downwardly to expand the skirt **6** and disengage the surface **8** from the container bead. When the member **21** is pushed to this position the lower edge **28** thereof, as shown on the right-hand side of FIGURE 4, abuts against the surface **8** of the internal projection **7** on the skirt. The engagement of the projections **21**, in the groove **32** positively prevents a withdrawal of the member **11**, and it is not possible to return the projection **8** to a position underneath the container bead. Consequently, when the container is once opened, it is not possible to return it to the condition existing prior to the opening operation.

Whilst the invention has been described with reference to a container from which the contents is dispensed through a spray nozzle, it will be understood that it can be applied to containers having other forms of dispensing devices or having simple outlet orifices.

In FIGURE 4, the projections **21** and the grooves **22** and **32** are shown disposed in a plane at right angles to the axis of the cap, to the effect that the member **11** may be inserted into the skirt in an angular position, but obviously any other disposition of the grooves and projections may be adopted, provided that the plane through the projections coincides with that through either of the grooves in case it is desirable, for any reason, to ensure that the member **11** can only adopt a certain angular position relatively to the skirt.

In the embodiments shown, both the skirt **6** and the member **11** is presumed to be essentially cylindrical, but obviously both members may be made more or less frustoconical, having the smaller bases facing upwardly.

What I claim is:

1. A cap for enclosing an opening of a container, adapted to be held in position thereon by the engagement of an internal circumferential riblike projection on the cap with an annular surface of a bead around the container opening, wherein the cap comprises a skirt made of a flexible material and having the internal circumferential riblike projection formed at its lower edge, and an inverted cup-shaped member located within the skirt in axial slidable engagement with the same, the skirt and cup-shaped member being of such relative formation as to cause expansion of the lower end of the skirt by a movement of the cup-shaped member towards the said lower end of the skirt, means being provided adapted to produce a visible change in the condition of the cap by such movement of the cup-shaped member.

2. A cap according to claim **1**, wherein the skirt and cup-shaped member are interconnected by connecting means adapted to be interrupted by a relative movement of the cup-shaped member and the skirt for the purpose of expanding the lower edge of the skirt.

3. A cap according to claim **1**, wherein the skirt and the cup-shaped member are provided with integral interlocking elements adapted to engage one another by a relative movement of the cup-shaped member and the skirt for the purpose of expanding the lower edge of the skirt, thereby preventing a return movement of the cup-shaped member to its initial position.

4. A cap according to claim **1**, wherein the skirt is formed with an inner diameter which decreases towards its lower edge and the cup-shaped member has an outer diameter which is substantially constant along the whole length of said member.

5. A cap as claimed in claim **1**, wherein the cup-shaped member is more rigid than the skirt.

6. A cap as claimed in claim **1**, wherein the skirt is provided with slits axially extending from the lower edge thereof.

7. A cap as claimed in claim **1**, wherein the skirt and the cup-shaped member are interconnected by connecting means adapted to be interrupted by a relative movement of the cup-shaped member and the skirt for the purpose of expanding the lower edge of the skirt, and arranged along the circumference of the closed top surface of the cup-shaped member.

8. A cap as claimed in claim **1**, wherein the skirt and the cup-shaped member are interconnected by connecting means adapted to be interrupted by a relative movement of the cup-shaped member and the skirt for the purpose of expanding the lower edge of the skirt and arranged along the circumference of the closed top surface of the cup-shaped member, the connecting means comprising a radially extending flange extending along the closed top surface of the cup-shaped member and having its external circumference secured at the top of the skirt.

9. A cap as claimed in claim **1**, wherein the skirt and the cup-shaped member are interconnected by connecting means adapted to be interrupted by a relative movement of the cup-shaped member and the skirt for the purpose of expanding the lower edge of the skirt and arranged along the circumference of the closed top surface of the cup-shaped member, the connecting means comprising a foil-like member, the external circumference of which is secured to the skirt and the central portion of which is secured to the closed top surface of the cup-shaped member.

10. A cap as claimed in claim **1**, wherein the skirt and the cup-shaped member are interconnected by connecting means adapted to be interrupted by a relative movement of the cup-shaped member and the skirt for the purpose of expanding the lower edge of the skirt and arranged along the circumference of the closed top surface of the cup-shaped member, the connecting means comprising a foil-like member, the external circumference of which is secured to the skirt and the central portion of which is engaging the closed top surface of the cup-shaped member.

11. A cap as claimed in claim 1, wherein the skirt and the cup-shaped member are provided with integral interlocking elements adapted to engage one another by a relative movement of the cup-shaped member and the skirt for the purpose of expanding the lower edge of the skirt thereby preventing a return movement of the cup-shaped member to its initial position, the interlocking elements comprising co-operating recess means and projections provided on the skirt and cup-shaped member, respectively, adapted to arrest the two members in at least one relative axial position.

12. A cap as claimed in claim 1, wherein the skirt and the cup-shaped member are provided with integral interlocking elements adapted to engage one another by a relative movement of the cup-shaped member and the skirt for the purpose of expanding the lower edge of the skirt thereby preventing a return movement of the cup-shaped member to its initial position, the interlocking elements comprising co-operating recess means and projections provided on the skirt and cup-shaped member, respectively, adapted to arrest the two members in at least one relative axial position, the projections being arranged in spaced relation along at least one circumferential line on the external surface of the cup-shaped member, while the recess means is in the form of at least one continuous circumferential groove in the internal surface of the skirt, the said projections and the said grooves being adapted to engage one another at the termination of the axial movement of the cap.

13. A cap as claimed in claim 1, wherein the skirt is provided with an inwardly directed projection adapted to support the lower edge of the cup-shaped member in the initial position of the latter.

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