United States Patent

[11] 3,557,985

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[54] **TAMPER-PROOF PLASTIC CLOSURE CAP AND METHOD OF MAKING SAME**
5 Claims, 6 Drawing Figs.

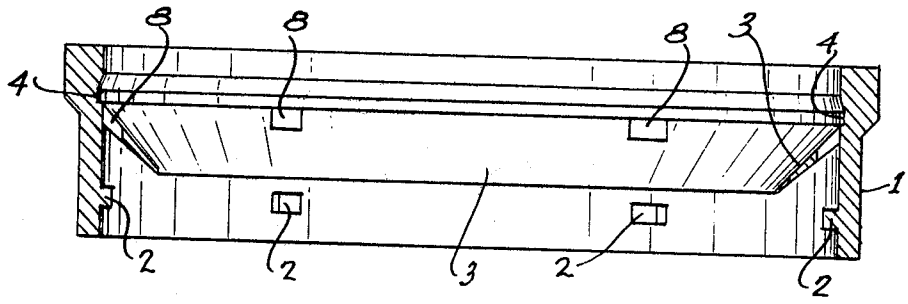
[52] **U.S. Cl.** **215/9,** 215/44
[51] **Int. Cl.** **A61j 1/00,** B65d 55/02
[50] **Field of Search** 215/9, 44

[56] **References Cited**
UNITED STATES PATENTS

3,072,276	1/1963	Nichols	215/9
3,344,942	10/1967	Hedgewick	215/9
3,435,975	4/1969	Weigand	215/44X

Primary Examiner—George T. Hall
Attorney—Peter Kirby and Charles P. Curphey

ABSTRACT: A two-piece closure cap for self-locking tamper-proof containers consisting of (*a*) a resilient molded plastic cylindrical part having an integrally formed resilient ring member extending inwardly from the interior cylindrical surface and a plurality of integrally formed radially inwardly extending lugs spaced around the interior cylinder surface below the ring member and (*b*) a separate top closure for the cap consisting of a disc which fits into an annular recess in the interior cylindrical surface of the cylindrical part.



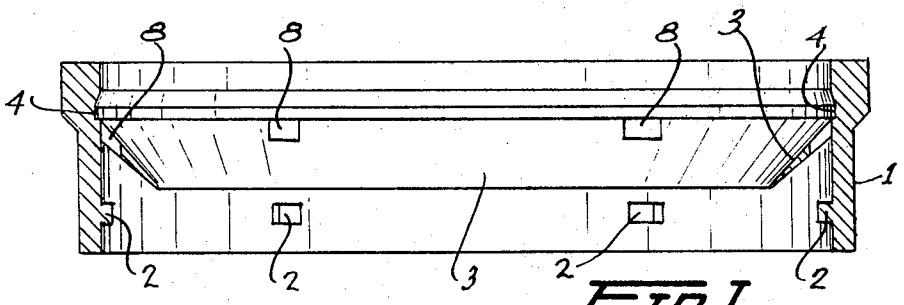


Fig. 1.

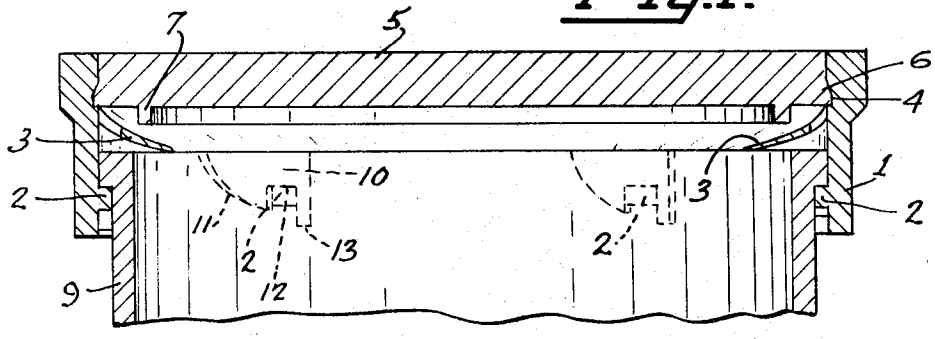


Fig. 3.

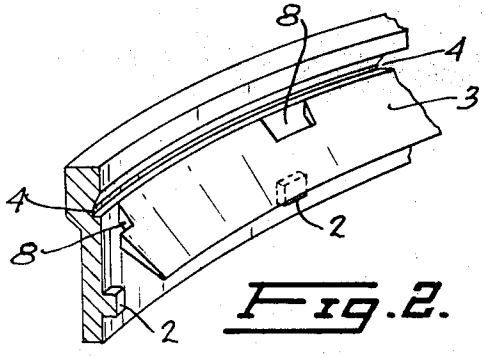


Fig. 2.

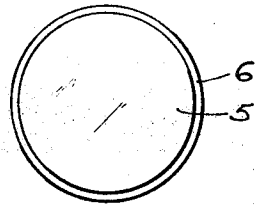


Fig. 4.

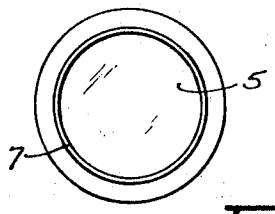


Fig. 5.

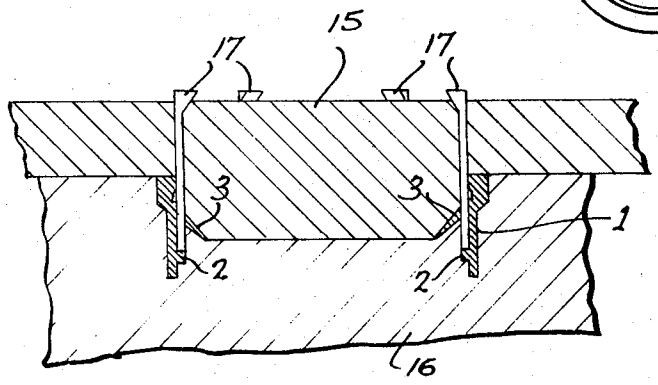


Fig. 6.

TAMPER-PROOF PLASTIC CLOSURE CAP AND METHOD OF MAKING SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a closure for self-locking tamper proof containers.

2. Description of the Prior Art

For many years there has been a great need for some type of tamper proof closure for pill bottles, which is simple to construct and easy for an adult to open, but difficult for a child to open. Many different types of safety caps have been proposed, but these have all been either too expensive or difficult to manufacture, or too difficult to use, or simply not sufficiently safe in the hands of a child.

The type of closure cap for tamper proof containers which has received widest acceptance is provided with a spring member which causes locking elements on the cap to engage retaining slots on the neck of a tubular container in such a manner that the cap cannot be removed by mere rotation. Before the cap can be rotated and removed it is necessary to push the cap down against the tension of the spring member in order to disengage the locking members. After the locking members are disengaged the cap may be freely rotated and removed from the mouth of the container.

The vial described in Nichols, U.S. Pat. No. 3,072,276, issued Jan. 8, 1963, comes close to meeting the requirements for a tamperproof closure. However, the free floating spring member which is snapped in past the locking elements in the skirt of the cap does not provide a uniformly positive spring loading on the locking elements. This means that even when the correct technique is used, difficulties can be encountered in removing the cap and this makes the cap unacceptable to the ordinary consumer.

Attempts have also been made to produce unitary caps in which the spring member is integrally molded with the cap. An example of such a cap is that described in Hedgewick, U.S. Pat. No. 3,344,942 issued Oct. 3, 1967. However, unitary caps of this type present great difficulties in manufacturing particularly in removing the molded cap from the die without damaging the spring member. The Hedgewick patent represents an attempt to overcome this problem by making the spring member in the form of a thin annular web extending downwardly and outwardly from the inner face of the top of the cap. This thin annular web is limited in thickness to permit removal from the die, which means that it is limited thereby in the degree of spring loading it can provide against the locking elements. Moreover, there is a tendency for the thin annular web to tear when being removed from the die, with the result that a rather large number of caps must be rejected. This also means that there is the added manufacturing expense of inspecting the caps for damaged spring members.

It is the object of this invention to overcome the above difficulties and provide a tamperproof cap closure which gives controlled spring loading against the locking elements and is simple and inexpensive to manufacture.

SUMMARY OF THE INVENTION

According to our invention, we have produced a two-part cap meeting the above requirements. One part comprises a molded plastic cylindrical member having an integrally formed resilient ring member extending inwardly from the interior cylindrical surface thereof and also a plurality of integrally formed radially inwardly extending lugs spaced around the interior cylindrical surface below the spring member. The second part comprises a disc member which closes the upper end of the cylindrical member.

This cap is adapted for use with the usual tamperproof type cylindrical container having latching surfaces adapted to engage and hold the lugs against the axial force of the resilient ring member in the cap. The latching surfaces are usually either in the form of grooves recessed into the wall of the container or in the form of surfaces on radially projecting lugs. Preferably, the latching surfaces are provided with an abutment or shoulder at one end which permits the cap to be removed from the bottle by turning in only one direction.

The cylindrical portion of the cap is molded from a resilient plastic, such as polyolefin, e.g. polyethylene or polypropylene, while the disc can be manufactured from practically any rigid material, including plastics, metal, cardboard etc. According to a preferred feature, the upper portion of the cylindrical member is provided with an annual recess into which the disc is pressed. The disc member can also be provided with an annual projection which is adapted to control the axial movement of the spring members.

The cap of our invention has important advantages over the previously known caps.

1. By making the cylindrical member separately, a two-piece mold die can be used. This means that the spring member can be molded in the exact shape and thickness that is desired for the final product and the two die pieces are removed from above and below the spring member without disturbing the spring member in any way. The result is that every cylindrical member is perfectly formed so that there are no production losses from damaged spring members and no inspection is required.

2. The separate formation of the disc also had advantages in that it can be formed from a very inexpensive material. Moreover the discs can be customized to the desires of individual distributions. In other words, they can be made in different colors and can be made with the name of the distributor embossed thereon. Because of their extremely low cost, they can be made in very large numbers and when a customer order is received the cylindrical members and discs can be assembled in an automatic capping device.

BRIEF DESCRIPTION OF THE DRAWINGS

Our invention is illustrated by the preferred embodiments shown in the accompanying drawings, in which:

FIG. 1 is a sectional view of the cylindrical member;

FIG. 2 is a fragmentary sectional perspective view of the cylindrical member;

FIG. 3 is an elevation view of a container, partly in section, showing the cap locked on the container;

FIG. 4 is a top plan view of the disc member;

FIG. 5 is a bottom plan view of the disc member, and

FIG. 6 is a transverse sectional view of a mold, showing the manner in which the cap of the invention is made.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIGS. 1—3, the cap of the invention comprises an open ended cylindrical skirt 1 having a plurality of radially inwardly projecting lugs 2 adjacent the lower end thereof. An integral resilient annular member 3 extends generally radially inwardly from the skirt 1.

The disc 5, as shown in FIGS. 4 and 5, is of a size which can be press fitted into the annular recess 4 adjacent the upper end of the skirt 1. Preferably the disc is provided with a peripheral projection 6 which fits snugly into the annular recess 4 and is also provided with an integral annual rib 7 which extends axially from the surface thereof and is adapted to generally overlie the free end of the resilient annular member 3.

The container 9 is generally cylindrical and is provided at the upper end with a plurality of outwardly extending radial projections 10. As shown in FIG. 3, each radial projection 10 has a smoothly curved portion 11, a notch or recess 12 and an abutment 13.

When the cap is to be attached to the container, it is placed over the open end of the container and turned until the lugs 2 engage the curved portions 11, and the turning motion is continued until the lugs 2 slip into the notches 12 where they are firmly held against the axial spring force of the resilient ring member 3.

In order to remove the cap, an axial force must be applied to the top of the cap sufficient to depress the lugs **2** from engagement with the notches **12** and then turned in a direction away from the abutments **13**. The annular rib **7** is adapted to engage the resilient ring member **3** when the cap is depressed and prevent the lugs **2** from being depressed below the lower faces of the abutments **13**.

The caps of this invention can be provided with a very strong springing action in the resilient ring member **3**. Since the cap can only be removed by a uniformly applied strong downward push to free all of the lugs **2** from the engaging notches **12**, combined with a turn in the proper direction, it will be evident that it would be most unlikely that a child could ever accidentally remove the cap.

FIG. **6** shows the appearance of the molded cylindrical member as it is formed in a mold having an upper element **15** and a lower element **16**. A plurality of pin members **17** are provided having their lower ends extending downwardly into the cavity that defines the cylindrical wall. The lower ends of the pin members **17** define the upper surfaces of the lugs **2**. The openings **8** in the ring member **3** are caused by the pin members **17** passing through the portion of the mold cavity forming the ring member.

In operation, plastic is introduced under pressure into the mold cavity. Then, the mold elements are drawn apart leaving the molded article. Since the mold elements **15** and **16** part in the region of the resilient ring member **3**, it will be seen that the entire cylindrical member can be removed from the mold elements without deformation. This means that the thickness of the resilient ring member **3** can be varied as desired without any difficulties in removing the molded product from the mold.

We claim:

1. A closure cap comprising a molded plastic cylindrical member having an integrally formed resilient ring member extending inwardly from the interior cylindrical surface thereof, said ring member being adapted to engage the mouth of a container, and a plurality of integrally formed radially inwardly extending lugs spaced around the interior cylindrical surface below the ring member, said lugs being adapted to engage notches on the upper end of the container, and a disc member which closes the upper end of the cylindrical member.

2. A closure cap according to claim **1** wherein the disc member fits into an annular recess in the interior cylindrical surface of the cylindrical member.

3. A closure cap according to claim **1** wherein the disc member is made from plastic, metal or cardboard.

4. A closure cap according to claim **1**, wherein the cylindrical member is molded from a polyolefin.

5. A method of manufacturing a closure cap which comprises molding from a resilient plastic a cylindrical member having an integrally formed resilient ring member extending inwardly from the interior cylindrical surface thereof and a plurality of integrally formed radially inwardly extending lugs spaced around the interior cylindrical surface below the ring member, separately forming a disc member from a rigid material and pressing the disc member into the top of the cylindrical member.