# **United States Patent**

[/2]	inventor	Bernhard Lohrer	
		Kreuzlingen, Switzerland	
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[73]	Assignee	Furstlick Hohensollernsole	
	U U	Huttenverwaltung Laucherti Laucherthal, Germany	nal
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[54]	CLOSURE	CONSTRUCTION	
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Primary Examiner—George T. Hall Attorney—McGlew and Toren

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ABSTRACT: A closure construction includes a container for materials such as bulk materials or liquids such as milk, juice, water, gasoline and the like, having a pouring mouth formed by an inturned flanged top and a neck portion adjacent the mouth which is characterized by the formation of two closely spaced parallel annular protuberances or corrugations. The container mouth is closed by a cover or cap having a depressed central portion which fits into the opening defined by the flanged top and which has an inner portion which is wider than the flange opening to provide a snap fit. The cap also includes a portion extending around the flange and downwardly in the form of a skirt or side portion along the neck of the container. The lowermost portion of the skirt terminates in an apron of annular form having an inwardly extending bead which engages beneath the lowermost protuberance of the exterior of the container. The upper portion of the skirt includes a bead which engages within the groove formed between the two protuberances and the apron is connected to the upper portion by means of a severable tear strip or weakened area. The cap also includes a projection, or ledge, formed around the exterior which may be engaged by the fingers of a person's hand to force the upper portion of the cap off the top of the container while severing the tear strip and leaving the apron intact on the container. When this occurs the apron will drop down further along the exterior wall of the container and when the cap top cover portion is replaced there is a separation between the top cover portion and the apron which shows that the bottle has already been opened.







Fig.2

INVENTOR: BERNHARD LÖHRER Mc glen & Toren By:

ATTOR NEYS

### **CLOSURE CONSTRUCTION**

## SUMMARY OF THE INVENTION

This invention relates in general to the construction of containers and in particular to a new and useful combination closure formed by a cap cover and a container neck portion and to the improved cap cover construction.

The present invention is particularly applicable for containers which are to be used for liquid materials such as juice, water, milk, gasoline or the like and which is closed by a closure cap. The container and the cap are advantageously made of an inexpensive material such as plastic and the main field of application of the invention is for a milk bottle preferably in the form of a thin-walled plastic bottle. It is preferable that the bottles which are employed for milk containers and the like should be used as one way containers in order to get by with a minimum of material. Therefore, the containers must be thin in particular the closure formed by the container and the cap must provide a perfect seal in spite of the fact that the bottle mouth of the known containers made of thin-walled construction cannot absorb great forces. It is also desirable with bottles of this kind that they contain fresh food stuffs and therefore 25 removed. that the closure cover, once it has been removed, should reveal immediately that the bottle has been opened.

In accordance with the invention there is provided a container and a closure cap which forms a closure which is relatively strong but is of thin-walled construction and it includes 30 means for indicating when it has been opened even though the closure cap can be reapplied after the opening has taken place. The container of the invention is characterized by a construction which includes a pouring mouth arranged at the upper end of a neck portion and which terminates in an in- 35 turned flange defining a rim around the pouring opening. The exterior of the container is provided with two spaced parallel annular ribs which bulge outwardly. The cap includes an internal bead which engages between the ribs and a further bead defined at the upper end of a lower apron portion which en-40 gages beneath the lowermost annular rib. The cap also includes a connection between the apron and the upper portion of the side of the cap which is in the form of a tear strip of severable connection. The container is opened by engaging a projecting portion formed on the upper part of the cap and causing a severance of the tear strip area between the upper portion and the apron to leave the apron intact around the container neck. Because the apron contains the inwardly extending bulging portion which is engaged beneath the lowermost corrugation of the exterior of the container, after the upper portion is severed, the apron which otherwise fits loosely around the container will drop downwardly. When the cap is again positioned back on the container it can be readily seen that the apron is separated from the cap showing that the bot- 55 tle has been opened.

By forming the container with the two projecting annular ribs there is achieved not only a rim lip at the pouring opening under which the closure cap can grip but the formation imparts a stiffness to the container mouth permitting the bottle 60 to absorb relatively great forces which are required for a perfect elastic seal.

The application of the closure cap to the container during the closing operation presents no problem because no forces of tension occur during this process along the predetermined 65 separating line, but only forces in compression which do not tend to effect the tearing apart of the container.

The cap or neck of the pouring mouth are deformed primarily during the application and removal of the cap and in dependence on the design and the choice of the wall thickness of the container. It is preferred to form the caps of a harder material than would be expedient normally when there is a likelihood that deformation will primarily affect the cap. Preferably both the cap and the container can comprise a thermoplastic synthetic material such as a polyvinyl chloride 75 or polyethylene. However, the container may also be of another material such as glass duroplastic synthetic or metal.

Accordingly, it is an object of the invention to provide an improved closure formed by a container having a neck portion with an annular inturned flange forming a rim around a central opening which is closed by a cap having an inwardly extending central portion which snap-fits into the opening and engages behind the rim and which also includes an internally beaded portion of the cap which engages between a bulging portion of 10 the container defined at the rim and also at a spaced location from the rim along the side thereof, the bottom of the cap including an apron portion which is severable from the upper portion of the cap for removal of the cap and which will drop downwardly from the connected position in order to indicate when the container has been initially opened.

A further object of the invention is to provide a container of simple lightweight plastic construction which is reinforced by a plurality of annular protuberances and which is engaged by walled. Nevertheless they must have the required strength and 20 the interfitting of an internally beaded portion of a cap between the protuberances and below the lowermost protuberance and which also includes an apron formation which is severable from the upper portion of the cap and which slips downwardly on the container after the cap is initially

A further object of the invention is to provide a closure construction, a container construction, and a cap construction which are simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial transverse sectional view of a closure construction formed by the neck of a container and a cap constructed in accordance with the invention; and

FIG. 2 is a partial elevational and partial sectional view of 45 the closure indicated in FIG. 1.

### GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in particular the invention em-50 bodied therein comprises a container such as a milk bottle 1 having a relatively short top portion or neck which terminates in a pouring opening which is bounded by an inturned end of a top flange or rim 6. The complete closure is formed by the container 1 and a closure cap 4 which has an inversion or inwardly extending central portion 5 which fits into the opening within the rim 6. The inverted portion 5 includes a widened lower end or bead so that the inwardly extending portion snaps into the opening of the container.

In accordance with a feature of the invention, the exterior wall of the neck of the container directly adjacent the rim 6 is provided with a protuberance or bulge 2 at the upper end and a second protuberance or bulge 3 which is closely spaced downwardly therefrom. Each of the protuberances are of annular form and the space between the two protuberance define a groove into which a beaded interior portion 9 of a side part or skirt 8 of the closure cap 4 is engaged.

The closure cap 4 includes an upwardly extending annular rib 7 which reinforces the cap and provides a symmetrical cap 70 structure for facilitating the application thereof to the container. The side edge or skirt 8 of the cap 4 includes a lowermost portion or apron 11 which is separated from the upper portion by means of a severable area or tear strip 12. In addition, the upper portion of the apron 11 is provided with an inwardly extending bead 12a which is advantageously of an an-

nular form and which engages below the bulging portion of the protuberance 3. The cap also rests at its top against the curved transition portion between the rim 6 and the protuberance 3.

At one point on the exterior periphery of the cap side portion 8 there is defined an outwardly extending pushoff tab 10 5 which may be engaged for example, by the thumb of a person's hand to facilitate the upward pushing and removal of the upper portion of the cap 4 from the lower apron 11 by tearing the cap along the tear strip 12. Once the tearing is completed the interior bulging portion 12*a* will no longer be urged upwardly against the protuberance 3 so that the apron 11 which loosely fits around the container will drop downwardly. This means that when the closure cap 4 is replaced over the container there will be a marked separation between the upper portion and the apron 11 showing that the container has been 15 previously opened.

The container 1 advantageously has the shape of an ordinary bottle and the wall thickness of the container will of course fluctuate in accordance with its capacity. Wall thicknesses which are from between 0.2 and 0.4 millimeters and which 20 may increase to approximately 0.4 and 0.6 millimeters in the mouth area as a result of its being formed by hollow blow molding in which the mouth will have a small diameter than the rest of the bottle, are suited for smaller plastic bottles perhaps in the range of from 0.25 to 1 liter. If the bottles are sub- 25stantially bigger, the correspondingly greater wall thickness will naturally have to be chosen. The wall thickness is determined decisively by the strength requirements which the bottle will have to meet so that the figures mentioned above represent only preferred dimensions which may be exceeded or be less than that indicated for individual cases. In thinwalled containers the annular ribs at the pouring opening are preferably designed as concave corrugations which are part of the interior of the pouring neck.

The annular corrugations or protuberances formed on the <sup>35</sup> exterior of the container are advantageously of approximately semicircular profile. The corrugation or protuberance closer to the pouring mouth may be somewhat larger than the annular corrugation which is further away from the mouth because the one closer to the mouth is the only one required for reclos-<sup>40</sup> ing the bottle after it is first opened. The wall thicknesses of glass bottles are conventional.

The free rim of the pouring opening 6 is advantageously drawn inwardly and rests in sealing engagement against an inwardly oriented concentric inversion of the cap central portion. This free rim is advantageously concentrically formed. By using the free rim as a sealing surface the sealing surface is not affected by an ever so small marking of the mold halves which stem from the production of the bottle. To increase the sealing affect the diameter of the inversion may be increased somewhat in the area below the part adjacent to be drawn in rim of the bottle mouth, thus bringing about an additional snap in action when closing and this also increases the sealing effect. However, the seal may be also provided in another location such as the face of the pouring opening. 55

In order to increase the strength the inversion formed in the cap, at the central portion, is reinforced upwardly by an annular rib which protrudes outwardly close to its rim. The pushoff projection which is formed on the exterior side or skirt of the cap may be designed as an external beading running around the entire diameter but it is preferable to design it as a single pushoff tab located at a certain spot around the periphery which may be easily engaged for the purposes of effecting lift off.

What is claimed is:

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1. A closure comprising a container having a neck portion with a top rim formed around a pouring opening, a first annular protuberance defined on the exterior of said container adjacent said top rim, a second protuberance defined around the exterior of said container at a spaced location downwardly from said first protuberance and defining a recess between said first and second protuberances, a cap having a top engaged over said rim and an inverted portion engaged in the opening bounded by said rim and a top side portion connected around the periphery of said cap top and extending downwardly along said container and including a first interior projection engaged in the recess formed between said first and

second protuberances and a side apron connected with said top side portion by a tearable connection and having an interior bead thereon which is resiliently engaged below said second protuberance, and a pushoff projection defined on the exteri-

or of said top side portion for facilitating the pushing off of the top side portion and top of said container cap from said container whereby to sever the tearable connection between said 0 top side portion and said apron, said apron being sized so that it will slip downwardly upon being disconnected from said top side portion along the walls of said container so that when said container cap with said top side portion and said top are replaced on said container there is a spacing between the top 5 side portion and said apron.

2. A container, according to claim 1, wherein said first and second annular protuberances are substantially semicircular in cross section and defined as annular ribs.

3. A closure, according to claim 1, wherein said rim includes an inturned flange portion terminating in an edge bounding the opening, said inverted portion of said cap having a lowermost portion of a dimension greater than the opening defined by the edge of said rim to provide a snap engagement therewith.

4. A closure, according to claim 1, wherein said inverted portion of said cap is reinforced on the exterior by an annular rib which extends upwardly from said top of said cap.

5. A closure, according to claim 1, wherein said pushoff projection comprises an outwardly extending flat portion of 40 said cap top side portion forming a projection engageable by the thumb of a person's hand.

6. A closure, according to claim 1, wherein said container comprises a thin-walled plastic bottle.

7. A closure, according to claim 1, wherein said container comprises a glass bottle.

8. A closure cap for a container having a neck portion with a top rim formed around a pouring opening and including a side wall adjacent the top with a plurality of protuberances thereon adjacent the top, comprising a cap having a top por-50 tion with an annular outer part which is adapted to engage over the container rim and a central inverted portion extending downwardly from said annular part and having a lower end of greater dimension than the opening of the container to permit it to be snapped into said opening, said closure cap also in-55 cluding a side portion having an upper part which includes an inturned interior bead adapted to be engaged below the uppermost protuberance on said container and having an apron portion connected to the top side portion by a tearable connection permitting severance of said apron from said top side

50 portion, said apron portion comprising an annular collar which may move downwardly from the container after it is severed, and a pushoff formation on the top side portion of said cover extending outwardly from the periphery thereof for facilitating the lifting off of this portion of the cover.

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