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LEAK-RESISTANT CONTAINER



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FIELD OF THE INVENTION

The present invention is related to containers. In particular, the present
5 invention is related to containers having safety, leak-resistant and measuring
features.

BACKGROUND OF THE INVENTION

Containers with child-resistant features are well known in the art. US patent
4,134,513 describes a safety closure with at least one interlocking member
10 which can only be removed by compressing the distal end of the sidewall
straddling the interlocking member, together with the concurrent retrogressive
movement of the closure. The container is described as having a cylindrical
shape, with a pair of diametrically opposing and axially extending shoulders,
which are adapted to interact with corresponding ribs on the closure. US patent
15 4,138,028 further discloses secondary interlocks for engagement when the
closure is partially removed. In addition, a frictionally slidable, fluid-tight sealing
arrangement is described, which is operative to prevent leakage of the
container's contents. This sealing arrangement uses a continuous annular
sealing head of flexible resilient material formed integrally on the interior surface
20 of the sidewall of the closure. The sealing head slopes convergently, inwardly,
and axially away from the closed endwall of the closure such that it will flex
against and snugly contact the exterior surface of the mouth of the container to
form a fluid-tight seal. The sealing head itself, however, may interfere with the
insertion process when it approaches the mouth of the container. This is
25 because the sealing head is sloping inwards, yet the mouth of the container

needs to be inserted within this seal. As a result, the mouth of the container can easily be jammed onto the sealing head instead of sliding within it.

OBJECT OF THE INVENTION

5 It is an object of the present invention to provide a container with a leak-resistant cap.

It is a further object to provide one embodiment of a container cap according to the present invention with measuring, pouring and/or drinking features.

It is yet another object to provide another embodiment of a container
10 according to the present invention which has a safety locking feature.

SUMMARY OF THE INVENTION

The present invention provides a container having a hollow body for retaining liquid, and a dispensing end for pouring. The dispensing end has an exteriorly threaded cylindrical hollow neck portion extending from a shoulder.

15 The cap is provided with a closed end wall and a cylindrical and internally threaded wall depending from the end wall. The thread on this wall is adapted to cooperate with the thread on the neck of the bottle to allow the cap to turn onto the neck to close the bottle.

According to one feature of the invention, the cap is also provided with a
20 spout which depends from the closed end wall of the cap and adapted for telescopic insertion into the neck of the bottle. This spout may act not only as a measuring and pouring structure, but also as a leak-resistant seal by having a thickened base which pushes the neck radially outwards upon closure of the cap.

In another aspect of the present invention, the bottle is preferably of molded plastic, with a locking member being molded onto the shoulder of the bottle. The cap is also provided with an external wall which depends integrally from the end wall and is adapted to form a sidewall over the neck. This
5 external wall is provided with a ridge which is adapted to engage the locking member when the cap is closed, such that the cap is locked into the closed position. Unlocking can only be effected by squeezing the cap in a manner so as to release the ridge from the locking member. The external wall is made from a material which is deformable under pressure.

10 In a further aspect of the invention, the bottle has a non-cylindrical shape such that it would not roll off a table even if turned on its side.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1A and B are the perspective elevated views of a bottle and a cap
15 respectively according to the present invention.

Figure 1C and D are the top and side views of the same bottle according to the present invention.

Figure 2A to D are the top, front, back and side views respectively of the same cap.

20 Figure 2E is the longitudinal cross-sectional view along line A-A of the same cap.

Figure 3A is the top view of the closed bottle and cap.

Figure 3B is the longitudinal cross-sectional view along line B-B of the closed bottle and cap.

DESCRIPTION OF THE INVENTION

Figure 1A shows a bottle according to the present invention. In this example, the bottle has a non-cylindrical hollow body **20** and a dispensing end **22** having a shoulder **24** and a hollow neck **26**. Neck **26** is provided with a threaded exterior. Optional measurement markings **30** are also provided to indicate the amount of liquid in the bottle and the amounts dispensed. A locking member **32** having the general shape of a saddle is provided on the shoulder. In this example, the bottle is tear drop- or pear-shaped with a rounded side **27** and a pointed side **29** such that the bottle would not roll off even if it is kept on its side.

Figure 1B shows a cap with a closed end wall **34** and an external wall **36** which is shaped to match the shape of the bottle, with a rounded side **37** and pointed side **39**. Markings **38** are also provided to indicate the position in which a person has to squeeze in order to release the locking mechanism.

Figure 1C shows a top view of the same bottle according to the present invention, showing clearly the saddle-shaped locking member **32** with two humps **33** and a valley **35**.

Figure 2 shows the details of the cap, with the external wall **36** shaped into a tear drop having a rounded side **37** and a pointed side **39**. Spout **42** is provided with an arched indentation **50** which matches the opening of the bottle. This indentation facilitates the pouring from the bottle into the spout. For example, medicine may be poured and measured inside the spout by resting the opening of the bottle on the arched indentation. A protruding lip **48** is also provided on the other side of the spout to facilitate the pouring out of liquid

measured inside spout 42. This lip is shaped like the tip of a spoon such that liquid may be poured out conveniently without dripping, and a child may drink directly from it. To this end, the spout may also be provided with markings to indicate volumes. These features on the spout provide a convenient and spoon-free medicine measuring and administering capability to the bottle ideal for use with all ages. A ridge 44 (preferably of solid plastic molded together with the cap) is provided at the end of the rounded side. The position of ridge 44 coincides with the position of the locking member on the bottle, such that when the cap is twisted firmly close, the ridge will be forced over the first hump of the saddle to settle into the valley. No further twisting movement of the cap is then possible under normal usage to prevent inadvertently opening of the bottle. Markings 38 are provided at two positions 90 degrees from ridge 44. From this figure, it can be clearly seen that when pressure is applied to the cap at markings 38 (i.e. sideways), the external wall, which is deformable, would be flattened in a direction normal to ridge 44. This causes the back (rounded side) and front (pointed side) of the cap to stretch outwards, allowing ridge 44 to clear the hump of the locking member. If the squeezing action at the markings is performed together with a twisting action, the cap would be unlocked. A thickened base 52 is provided for spout 42, which is adapted for interaction with the bottle neck as described below.

Figure 3 shows the interaction between the same cap and bottle according to the present invention. The threaded wall 40 has internal threads which are adapted to provide threaded engagement with bottle neck 26. Spout 42 is accurately positioned and provided with a thickened base such that it can slide telescopically within neck 26. As the cap is twisted close, the thickened base 52 forces the opening of the bottle outwards, resulting in a tight and leak-resistant seal.

The bottle and cap may be fabricated from various materials, such as different kinds of plastics. In order for the optional markings on the bottle to easily measure the volume of liquid inside, the bottle is preferably blow molded from polyethylene and the cap molded from polypropylene. For the
5 leak-resistant feature to function well, the diameter at the base of the spout should be slightly larger than the diameter of the opening at the neck of the bottle (e.g. 0.1mm), while the tip of the spout should be smaller than the neck and made of a deformable material. This allows the spout to be easily inserted into the neck, while forcing the neck into tight association with the thickened
10 base when the bottle is tightly closed.

While the present invention has been described particularly with references to Figs 1 to 3 with emphasis on a tear drop shaped medicine bottle, it should be understood that the figures are for illustration only and should not be taken as limitation on the invention. In addition it is clear that the apparatus of the
15 present invention has utility in many applications in leak-proof liquid retention and measurement. It is contemplated that many changes and modifications may be made by one of ordinary skill in the art without departing from the spirit and the scope of the invention described.

Other non-cylindrical shapes may also be used based on the teaching
20 herewith to design a bottle according to the present invention. The tear drop-shaped bottle, however, presents a challenge in the design, as there is an inherent asymmetry along line C-C of Fig. 3A. The front is the pointed end and the back is the rounded end. As a result, only one locking member is used in this embodiment. The molten plastic material used for blow molding the
25 bottle is preferably elliptical in shape. In order to obtain a strong locking member on the shoulder of the bottle, the center line of the air tube for blowing

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may be shifted forward (towards the pointed end) such that the locking saddle at the back (rounded end) is rendered stronger by a thicker layer of plastic.

CLAIMS

1 1. An apparatus for retaining and dispensing liquid comprising :

2 a container having

3 a hollow body with a dispensing end having an exteriorly threaded cylindrical
4 hollow neck with mouth on one end and extending from a shoulder on
5 the opposing end;

6 a cap having

7 a closed end wall;

8 a cylindrical and internally threaded wall depending integrally from said closed
9 end wall and adapted to telescope over said neck a first distance for
10 threaded engagement;

11 a spout with a thickened base depending from said closed end wall and
12 adapted for telescopic insertion a second distance within said neck,
13 said second distance being greater than said first distance; said
14 thickened base having an external diameter larger than the internal
15 diameter of said mouth for liquid-tight engagement with said
16 dispensing end.

1 2. An apparatus according to claim 1 further comprising :

2 at least one locking member provided at the shoulder of said body;

3 an external wall depending integrally from said closed end wall and adapted to
4 form a sidewall over said threaded wall, said external wall further
5 deformable under pressure; and

6 at least one ridge provided on the interior surface of said external wall, said ridge
7 rising radially inwards for locking engagement with said locking member
8 such that closing said cap over said neck causes locking, and deforming
9 said external wall to cause an outward radial movement of said ridge
10 releases said locking.

1 3. An apparatus according to claim 1 or 2 wherein said hollow body has non-
2 cylindrical shape to prevent continuous rolling in one direction when said
3 container is kept sideways.

1 4. An apparatus according to claim 1 or 2 wherein said hollow body has a
2 tear drop-shaped traverse cross-section with a pointed end and an
3 opposing round end; and said locking member being provided at the
4 round end.

1 5. An apparatus according to claim 4 wherein said external wall conforms to
2 the same tear drop-shape as the body of the container, and the ridge on
3 said external wall is provided at the round end.

1 6. An apparatus according to claim 1 or 2 wherein said spout further
2 comprises a pouring end with a protruding lip to facilitate pouring of liquid
3 out of said spout.

1 7. An apparatus according to claim 1 or 2 wherein said spout further
2 comprises a pouring end with an arched indentation to facilitate pouring of
3 liquid into said spout.

1 8. An apparatus according to claim 1 wherein said spout further comprises
2 markings thereon, said markings indicative of predetermined volumes of
3 liquid dispensed in said spout.