United States Patent [11] 3,620,400

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[73] Assignee W. Braun Company
Continuation of application Ser. No. 664,490, Aug. 30, 1967, now Patent No. 3,511,403. This application May 6, 1970, Ser. No. 35,063

[54] CLOSURES FOR BOTTLES AND THE LIKE

11 Claims, 8 Drawing Figs.

[52] U.S. Cl. ..... 215/44, 215/1 C, 215/9, 150/.5
[51] Int. Cl. B65d 41/06
[50] Field of Search 215/44, 31, 9, 1; 150/.5

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Primary Examiner—George T. Hall
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ABSTRACT: A container having a neck portion formed of a resilient or flexible material having an uninterrupted external helical thread of constant pitch and a mating screw-type closure cap having internal threads of constant pitch, the continuity of the threads on the cap being interrupted at spaced points to from gaps and abutment shoulders adjacent the gaps. When the cap is screwed tightly on the neck portion the cooperating threads of the container neck are deformed into the gaps in the threads of the cap to cooperate with the abutment shoulders to lock the cap against inadvertent displacement.

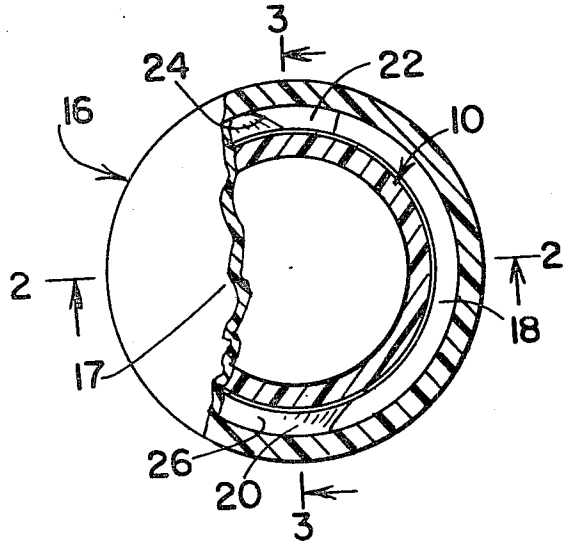


FIG. 1

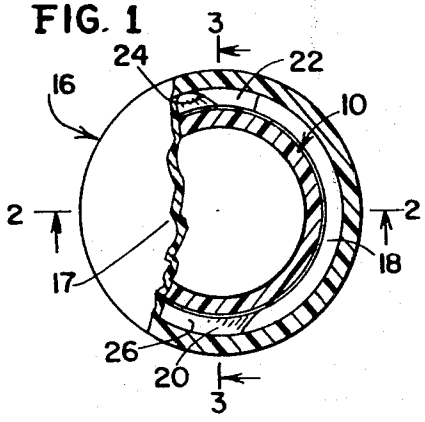


FIG. 2

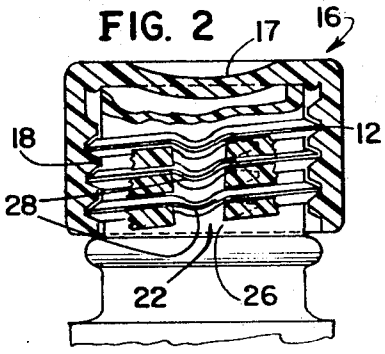


FIG. 3

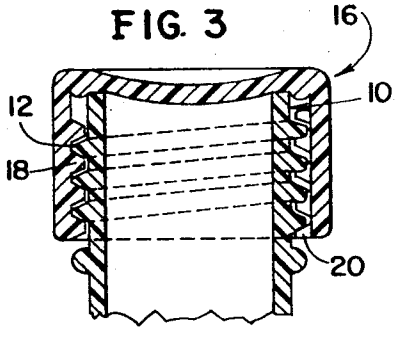


FIG. 4

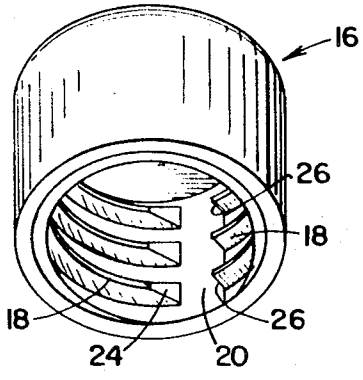


FIG. 5

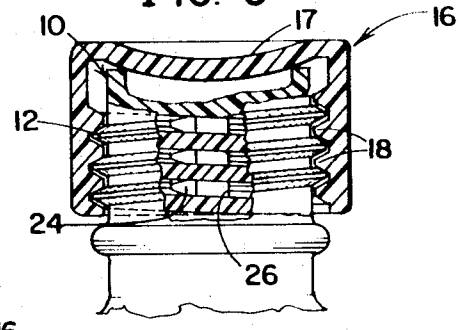


FIG. 6

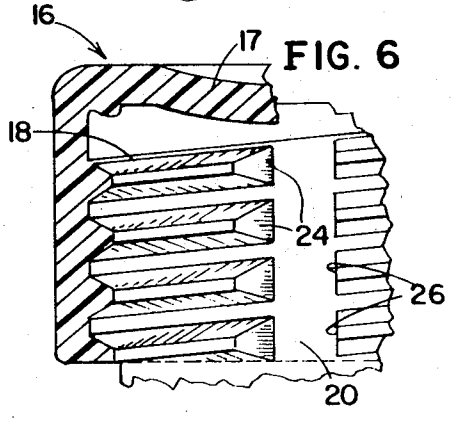


FIG. 7

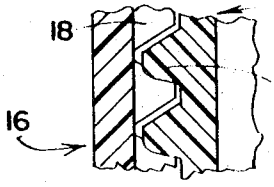
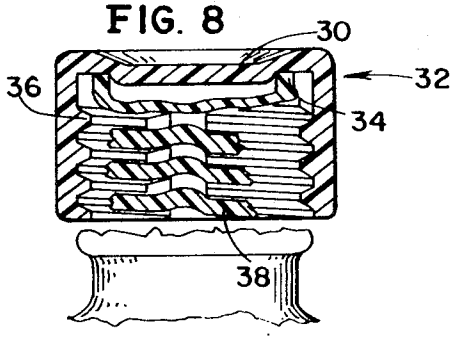


FIG. 8



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CLOSURES FOR BOTTLES AND THE LIKE

This application is a continuation of my copending application Ser. No. 664,490, filed Aug. 30, 1967, now U.S. Pat. No. 3,511,403.

BRIEF SUMMARY OF THE INVENTION

One of the objects of this invention is the provision of a container having a neck portion formed of resilient material with continuous threads of constant pitch and a screw-type cap closure therefor having an internal thread of constant pitch and so arranged that when the cap is screwed tightly on to the neck portion the neck threads are extruded into the gaps in the threads of the cap to lock the cap against inadvertent displacement.

Other and further objects and advantages of this invention will become apparent from the following description when the same is considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a top plan view of the neck portion of a container with a closure cap applied thereto in sealing engagement and with a portion of the cap broken away to show structural details;

FIG. 2 is a cross-sectional view taken substantially on line 2—2 of FIG. 1, showing the cap tightened on the neck with the threads on the neck distorted to occupy the gaps in the threads on the cap;

FIG. 3 is a cross-sectional view taken substantially on line 3—3 of FIG. 1;

FIG. 4 is a perspective view of the cap showing the interrupted threads;

FIG. 5 is a view similar to FIG. 2 but showing the cap applied loosely and not in tight-sealing engagement with the neck portion;

FIG. 6 is an enlarged view showing the interrupted cap threads;

FIG. 7 is a fragmentary cross-sectional view taken substantially on line 7—7 of FIG. 3, and

FIG. 8 is a view similar to FIG. 2 but showing a modified form of closure cap.

Referring to the drawings, the numeral 10 indicates generally a neck portion of a container or bottle which may be formed of resilient or flexible material. The neck portion and also the container may be molded of suitable organic plastic material, such as polyethylene, nylon, polyurethanes, vinyl-type polymers, synthetic rubbers, any polyolefin or other suitable materials which are resilient or flexible. The neck portion is provided on its exterior surface with helical threads 12 generally triangular in cross section. The thread is a continuous thread of constant pitch. The said neck portion is intended to be used with a closure cap having interrupted internal threads, presently to be described.

The cap is made of a substantially rigid material. The cap 16 has a top 17 wherein the inner top surface engages the mouth of the neck portion of the container. The inner top surface is generally convex and constitutes a sector of a spherical shell. In the modified version of the cap, shown in FIG. 8, the top portion is substantially frustoconical in form and the lip of the neck of the container engages against the conical surface. In each embodiment of the closure cap the interrupted helical threads, to be described, are molded on the inner sidewall of the cylindrical shell of the closure cap.

The internal threads of the cap 16 are indicated by the numeral 18. The thread is of constant pitch. Each course of threads 18 is interrupted at two diametrically opposed points providing gaps 20 and 22, which in effect divide each course of threads into two substantially half threads. All of the gaps on one side of the cap are substantially in vertical registration. The leading end 24 of each half thread is tapered substantially in two directions, that is, with respect to width and height. Thus, the terminal portion of each leading end 24 substantially merges into the body of the cap.

The trailing end 26 of each half thread terminates in a full cross section of the thread, as seen clearly in FIG. 6, and affords an abutment shoulder, as will be hereinafter described. Thus, on each side of the cap 16 a leading end 24 is disposed in confronting relation to a trailing end 26 of each course of threads. Preferably, the distance between the leading ends 24 and trailing ends 26 should be approximately 3/32 in., although it will be understood that the distance may vary depending upon the diameter of the cap and the cross-sectional size of the threads.

In order to effect a sealing closure of the container, the cap 16 is applied to the neck portion 10 in the usual manner and FIG. 5 illustrates the relationship of the cap to then neck portion in loose condition, just prior to effecting a sealing engagement between the cap and the neck portion. Referring to FIG. 5, it will be seen that in this condition the threads 18 of the cap are in the form of an interrupted helix and the continuous thread 12 on the neck of the container is not in any way distorted by engagement with the threads 18 of the cap. It will be apparent that because the leading ends of the half threads are tapered, engagement of the cap with the threaded neck portion is facilitated. However, after the cap 16 has been fully engaged on the neck portion and torque is applied to the cap in order to effect a seal between the mouth of the neck and the underside of the cap, as illustrated in FIG. 2, the threads 12 on the neck of the container are caused to be stressed, and since the threads 12 of the neck are resilient these threads are caused to be deformed and will extrude or flow partially into the gaps 20 and 22 in the cap, in the manner illustrated in FIG. 2, thereby forming shoulders 28 which cooperate with the trailing ends 26 of the cap thread 18 to lock the cap 16 on the neck portion 10 and prevent inadvertent reverse displacement of the cap relative to the neck portion.

It will be understood that the sealing engagement between the cap and neck portion will be maintained indefinitely so long as the cap threads are maintained under stress and in the condition illustrated in FIG. 2. This condition, however, may be overridden by the application of a reverse torque to the cap so as to relieve the stresses on the threads and thereby permit the threads to return to normal condition, as illustrated in FIG. 5.

Fig. 8 shows a modified version in which the top portion 30 of the cap 32 is frustoconical in form and the lip 34 of the neck of the container engages against the conical surface when in sealing position. The internal threads 36 of the cap are formed in the same interrupted manner as are the interrupted threads 18 previously described, and function in the same manner with respect to the continuous threads 38 of the neck portion.

It will be apparent from the foregoing that I have provided improved closure means for containers wherein inadvertent reverse displacement of the cap which would result in breaking the seal between the cap and the container mouth is effectively prevented.

What is claimed is:

1. In combination, a container having a neck portion formed of a resilient or flexible material and having an external helical thread with a constant pitch, a closure cap having an internal helical thread of constant pitch having at least one gap therein adapted to cooperate with said external thread so that the cap is screwed into engagement with the neck portion, a portion of said external thread adjacent said gap when said cap is threaded on said neck portion in sealing engagement therewith being deformed into said gap during said threading and preventing inadvertent reverse rotation of said cap relative to said neck portion.

2. In combination, a container having a neck portion formed of a resilient or flexible material and having an external continuous helical thread with a constant pitch, a closure cap formed of a substantially rigid material and having an internal helical thread with a constant pitch having a gap therein and having a leading end and a trailing end on said thread adjacent said gap with the leading end tapered and with the trailing end forming a shoulder and adapted to cooperate with said external thread so that the cap is screwed into engagement

with the neck portion, a portion of said external thread adjacent said shoulder when said cap is threaded on said neck portion in sealing engagement therewith being deformed to abut said shoulder during said threading and preventing inadvertent reverse rotation of said cap relative to said neck portion.

3. In combination, a container having a neck portion formed of a resilient or flexible material having an external helical thread with a constant pitch, a closure cap having an internal helical thread of a constant pitch adapted to cooperate with said external thread so that the cap is screwed into engagement with the neck portion to effect sealing engagement of said cap with said neck portion, the thread on said neck being more resilient or flexible than the thread on the cap, the less resilient of said threads on said cap having a gap therein, a portion of said more resilient thread on said neck when said cap is threaded on said neck portion in sealing engagement being deformed into said gap during said threading to prevent inadvertent reverse rotation of said cap relative to said neck portion.

4. The invention as defined in claim 1 in which the internal thread on the cap has a plurality of gaps arranged in vertical alignment.

5. The invention as defined in claim 2 in which the internal helical thread on the cap is divided into a plurality of segments with each segment having a leading end and a trailing end with each trailing end forming a shoulder.

6. The invention as defined in claim 4 in which the internal thread is triangular in cross section.

7. The invention as defined in claim 4 in which successive gaps are diametrically disposed.

8. The invention as defined in claim 1 in which the resilient or flexible material is a polyolefin.

9. The invention as defined in claim 1 in which the deformation of the thread portion is overridden upon the application of reverse torque to said cap.

10. The invention as defined in claim 1 in which the inner top surface of the cap is generally convex and constitutes a sector of a spherical shell.

11. The invention as defined in claim 1 in which the top portion of the cap is substantially frustoconical.

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