

[54] **TAMPERPROOF CLOSURE DEVICE**

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[52] U.S. Cl. **215/42, 215/46 A, 215/7**

[51] Int. Cl. **B65d 41/32**

[58] Field of Search **215/42, 7, 43, 46 A; 220/54, 220/27**

[56] **References Cited**

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[57]

ABSTRACT

The present invention relates generally to closure members for application to external thread convolutions of a container and more particularly to an improvement in such closure members whereby unauthorized or unintentional unscrewing of the closure may be readily detected. The embodiments of the present invention disclosed herein include an internally threaded closure member or cap and a locking ring fracturably connected with the lower margin of the cap. Ratchet teeth provided along the inner surface of the locking ring are adapted to interlock with complementary external teeth or protuberances on the container to resist forces tending to unscrew the cap after it has been finally tightened in place. If the cap is subjected to sufficient force tending to unscrew the cap while the ratchet teeth abut the external container protuberances, the fracturable connection will rupture, thereby affording a clear indication that the cap may have been tampered with.

8 Claims, 12 Drawing Figures

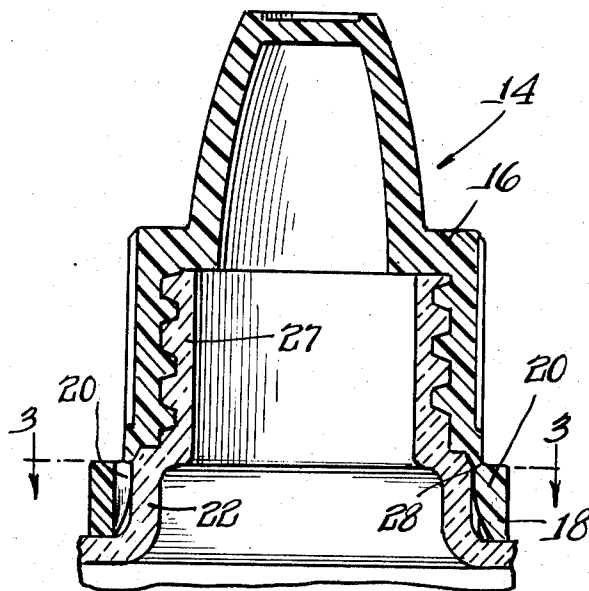


Fig. 1.

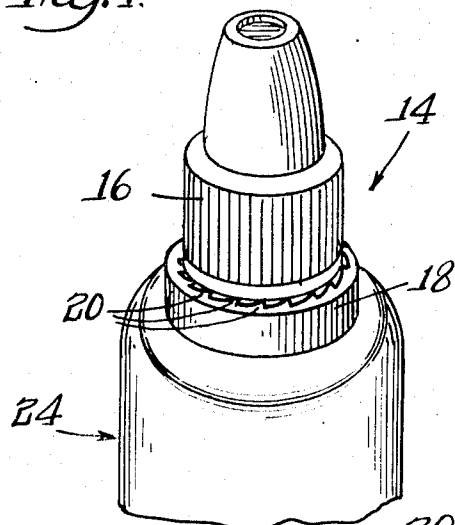


Fig. 2.

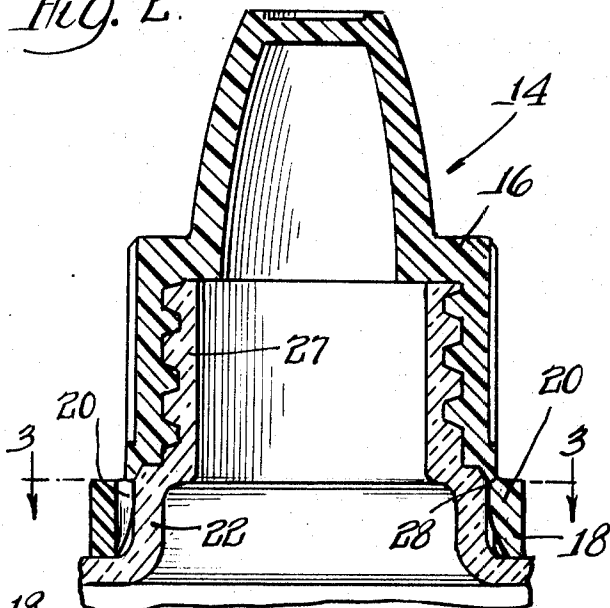


Fig. 4.

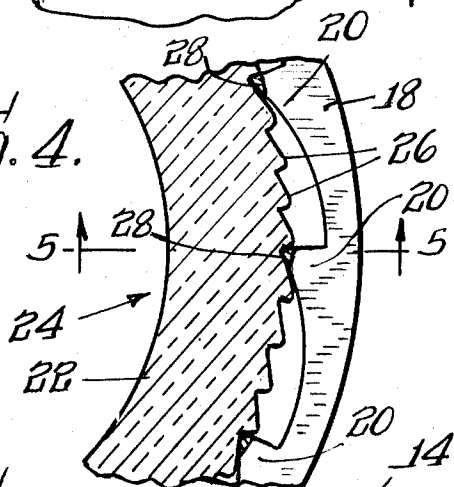


Fig. 3.

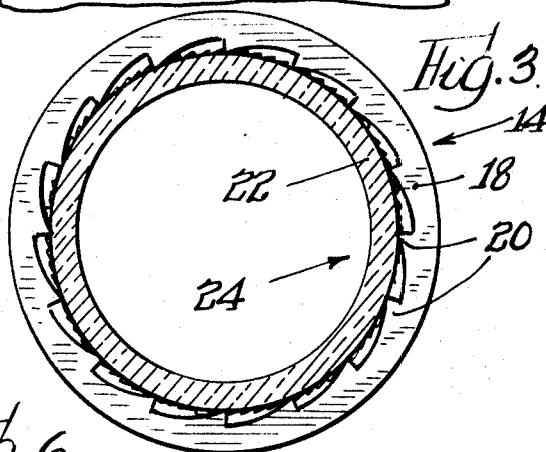


Fig. 5.

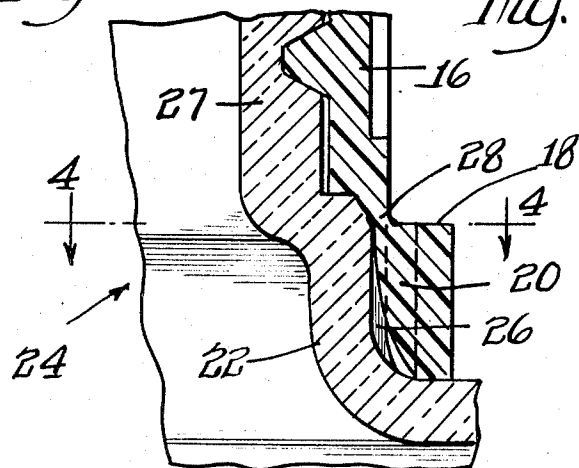
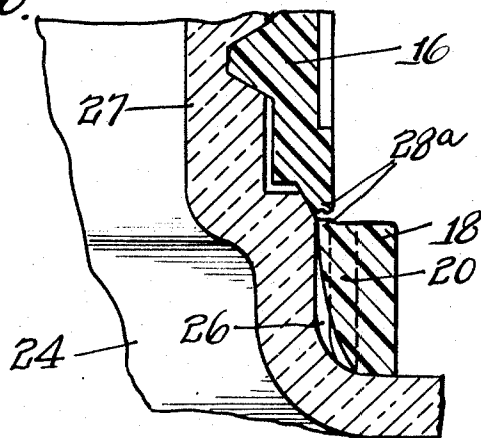
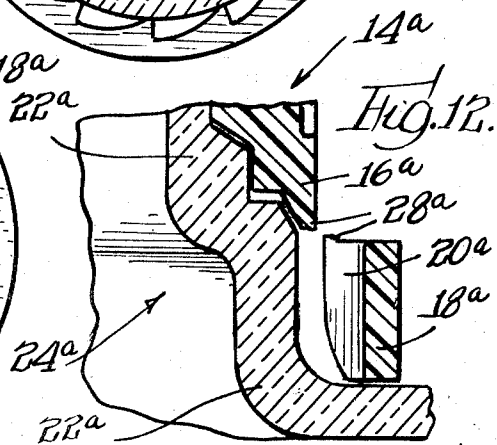
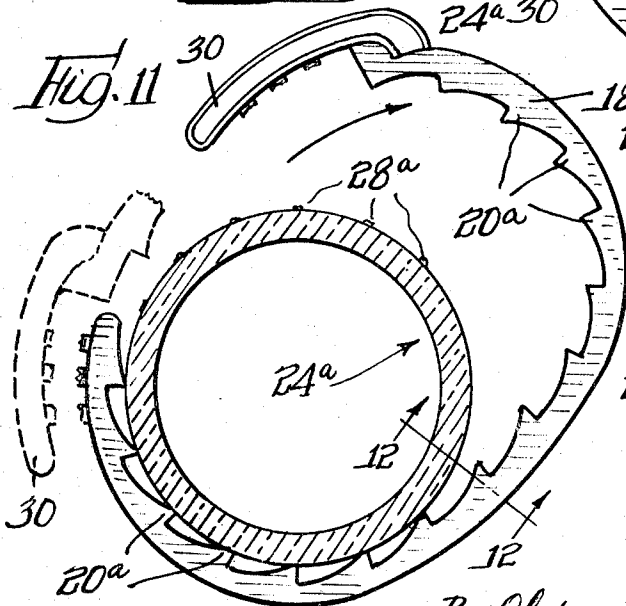
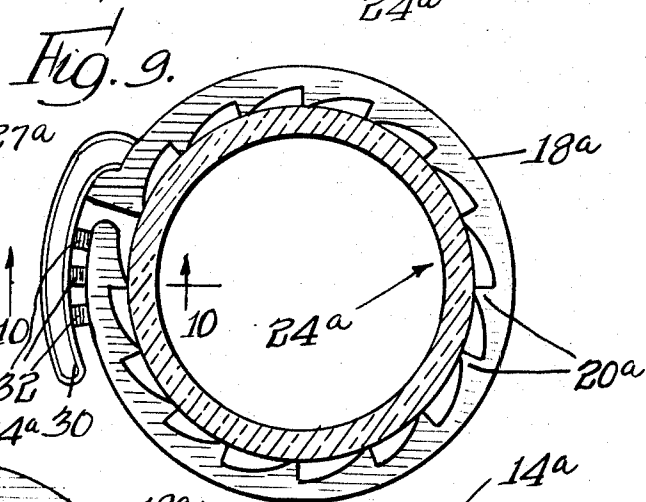
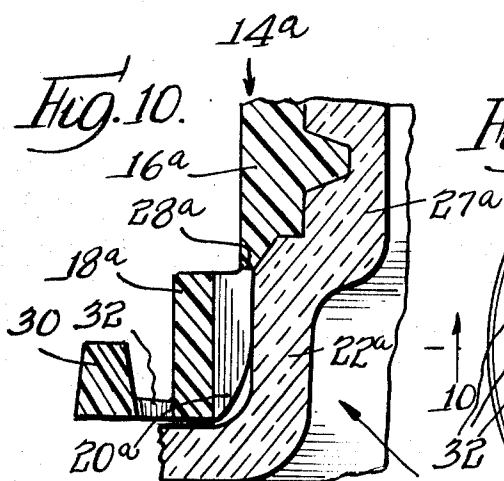
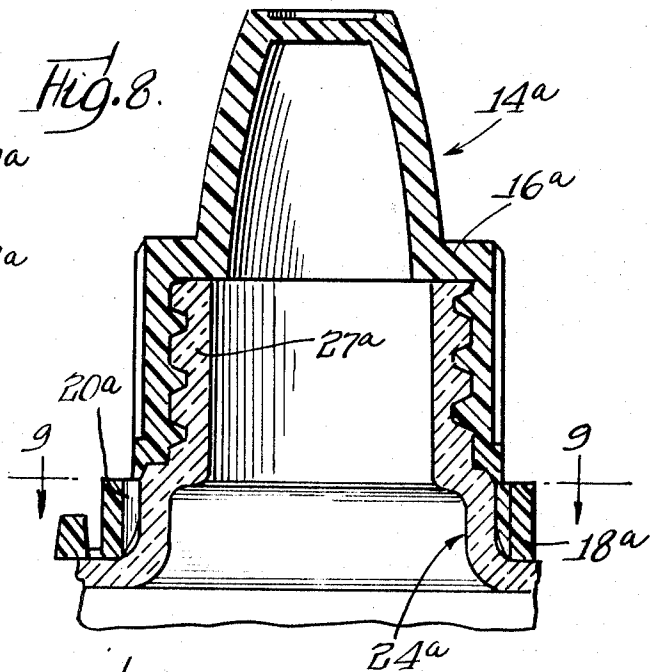
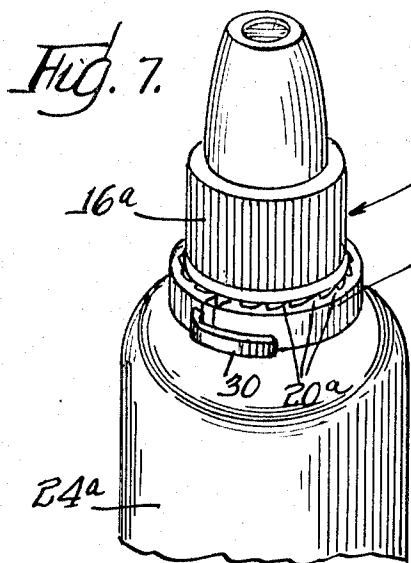


Fig. 6.



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TAMPERPROOF CLOSURE DEVICE

SUMMARY OF THE INVENTION

The present invention is particularly concerned with the provisions of an improved tamperproof closure member or cap of the type adapted for application to the external thread convolutions of a container.

More specifically, it is an object of the present invention to provide a closure member or cap equipped with novel and practical means which will prevent unscrewing of the cap without indicating to a user that the cap may have been previously tampered with.

More specifically, the present invention contemplates an improved closure member or cap which will be self locking against retrograde rotation as the cap approaches its final tightened position thereby requiring actual fracture of a cap section of limited cross section in order to unscrew the cap.

It is a further object of the present invention to provide a one piece closure member or cap of the above-mentioned type which may be produced by practicing conventional molding methods, thereby making it possible to produce the cap at minimum cost.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects and advantages will be more apparent from the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of a closure member or cap device which is representative of one embodiment of the present invention, said cap being shown in operative association with the externally threaded neck of a bottle type container;

FIG. 2 is an enlarged vertical central sectional view of the closure member shown in FIG. 1;

FIG. 3 is a horizontal sectional view taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is an enlarged detail sectional view of the ratchet type ring in locking association with external protuberances on the container, said view being taken substantially along the line 4—4 of FIG. 5;

FIG. 5 is a fragmentary detail sectional view taken substantially along the line 5—5 of FIG. 4 before the integral connection between the cap body and the locking ring has been ruptured;

FIG. 6 is a fragmentary sectional view similar to FIG. 5, showing the rupture or severance which occurs when sufficient retrograde force is applied to the cap;

FIG. 7 is a perspective view similar to FIG. 1, disclosing a modified form of tamperproof cap;

FIG. 8 is an enlarged vertical sectional view of the cap and annular locking section illustrated in FIG. 7;

FIG. 9 is a horizontal sectional view taken substantially along the line 9—9 of FIG. 8;

FIG. 10 is an enlarged fragmentary sectional view taken substantially along the line 10—10 of FIG. 9, before the continuity of the locking ring has been broken;

FIG. 11 is a view similar to FIG. 9 disclosing the internally ratcheted locking ring severed from the lower margin of the cap proper; and,

FIG. 12 is an enlarged fragmentary sectional view taken substantially along the line 12—12 after the locking ring has been severed from the lower margin of the cap body.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings more in detail, wherein like numerals have been employed to designate similar parts throughout the various figures, it will be seen that a closure device representative of one embodiment of the present invention is designated generally by the numeral 14. The closure device 14 includes an internally threaded cap body 16 and an integral annular locking member or ring 18 at the base of the cap body 16.

The internal surface of the locking ring member 18 is formed with a plurality of ratchet teeth 20. The external periphery of a neck portion 22 of a container 24 is provided with a plurality of circumferentially distributed external teeth or protuberances 26. As the cap body 16 is rotatably applied to the externally threaded section 27 of the container 24, the ratchet teeth 26 are ultimately brought into engagement with the external protuberances 26. Thus when the cap body 16 is finally tightened into position as shown in FIG. 2, the ratchet teeth 20 will interlock with the protuberances 26 to counteract forces tending to unscrew the cap body 16.

Attention is directed to the fact that the lower margin of the cap body 16 is integrally connected with the upper margin of the locking ring 18 by an area of limited cross section, indicated by the numeral 28 in FIG. 5. To unscrew the cap body 16 from the container, it is necessary to apply a retrograde force which is sufficient to rupture the connecting area 26. This ruptured condition is indicated clearly in FIG. 6. Thus any tampering with the cap body 16 which would tend to cause the cap to rotate in a retrograde rotation with respect to the container, will be evidenced by the ruptured area between the ring 18 and the lower margin of the cap.

In FIGS. 7 to 12, inclusive, a modified form of a tamperproof closure device is shown. The only distinguishing difference between the device shown in these figures over the closure device illustrated in FIGS. 1—6, inclusive, is in the provision of a structurally modified locking ring 18a. The closure device FIGS. 7—12 inclusive is indicated generally by the numeral 14a and includes an internally threaded cap body 16a. The cap 16a may be applied to the externally threaded neck portion 26a of a container 24a. The locking ring 18a is formed integral with the lower margin of the cap body 16a by a fracturable connecting portion 28a. The inner surface of the strip which forms the locking ring 18a is provided with a plurality of ratchet teeth 20a adapted to interlock with complementary protuberances 26a formed along the exterior of the neck section 22a of the container 24a. The engagement of the ratchet teeth 20a with the complementary circumferentially distributed protuberances 26a counteracts forces tending to unscrew the cap body 16a. Should sufficient retrograde forces be applied to the cap 16a, the connecting area 28a of limited cross section will rupture, thereby freeing the cap for removal. In this manner, any tampering with the cap body is readily detectable.

Attention is directed to the fact that the locking ring 18a is secured as an integral ring when a tab member 30 formed as a part of the ring 18a occupies the position shown in FIG. 9. In this position, the tab member 30 secured to a peripheral portion of the locking ring 18a by fracturable connecting sections 32 of restricted cross section. To release the ring 18a from association with the neck portion 22a, it is only necessary to grip the free extremity of the tab 30 and exert a force which is sufficient to cause the section 32 to be ruptured as clearly indicated in FIG. 12. The ring member 18a may then be unwrapped, thereby rupturing or severing the connecting areas 28a previously referred to. Should the ring be removed without authorization, it will be readily apparent that the closure device has been tampered with. Thus the closure device 14a exhibits the advantage of detecting tampering in two ways. Namely by the severance or rupture of the connecting areas 28a as a result of unauthorized retrograde forces being applied to the cap body 16a or by the removal of the locking ring 18a before unscrewing the cap body.

From the foregoing, it will be apparent that the present invention contemplates a very simple yet practical closure device which is tamperproof. The structural design of the closure devices 14 and 14a are such as to enable the production thereof by practicing conventional plastic molding methods. Hence, the cost of production may be held to a minimum. In both forms, any authorized or unintentional retrograde rotation of the cap body is readily detectable.

I claim:

1. A tamper proof closure device for application to a container having external closure accommodating thread convolutions circumferentially distributed peripheral abutments in the vicinity of said convolutions, and an annular closure engageable shoulder located between said convolutions and said abutments, including an internally threaded cap body, an annularly disposed cap locking section in the vicinity of and below said internal thread convolutions having internal locking teeth adapted, when the cap body is rotatably tightened upon complementary external container threads, to interlock with complementary peripheral container abutments, whereby to counteract retrograde rotary forces to which the cap body may be subjected, a fracturable integral coupling between the cap body and the annular locking section and an annular abutment surface interposed between said cap locking section and the lowermost internal thread convolution for engaging a complemental shoulder of a container.

2. A tamper proof closure device as set forth in claim 1, wherein the internal locking teeth are in the form of ratchet teeth which permit tightening rotation of the closure device, but are adapted to lockingly engage complementary peripheral container abutments to counteract retrograde rotation.

3. A tamper proof closure device as set forth in claim 1, wherein the fracturable integral coupling is located between the lower margin of the cap body and the upper margin of the annularly disposed cap locking section.

4. A tamper proof closure device as set forth in claim 1, wherein the annularly disposed cap locking section comprises a uniformly continuous ring member.

5. A tamper proof closure device as set forth in claim 1,

wherein the annularly disposed locking section comprises a member in the form of a discontinuous ring and a fracturable tab member formed integral with and coupling the opposite extremities of said discontinuous ring member.

6. A tamper proof closure device as set forth in claim 5, wherein the upper margin of the discontinuous ring member is connected to the lower margin of the cap body by fracturable coupling means of limited cross section.

7. The combination including a container having external thread convolutions in the vicinity of an open area thereof, circumferentially distributed peripheral abutments in the vicinity of and below said external thread convolutions, an annular closure engageable shoulder located between said convolutions and said abutments, a closure device for said container including an internally threaded cap body and an annularly disposed cap locking section in the vicinity of and below said internal thread convolutions having locking teeth which are so disposed that when the cap body is rotatably tightened upon said container, said internal teeth will interlock with the above-mentioned circumferentially distributed peripheral abutments to counteract retrograde rotary forces to which the cap body may be subjected, a fracturable integral coupling between the cap body and the annular locking section and an annular abutment surface interposed between said cap locking section and the lowermost thread convolution thereof for engaging the aforesaid container shoulder.

8. The combination as set forth in claim 7, wherein the annularly disposed cap locking section is in the nature of a discontinuous ring member and includes integral tab means adapted to be gripped for rupturing said integral coupling.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,650,428

Dated March 21, 1972

Inventor(s) Christian F. Miller

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 2, line 43, after "cap" insert --body--

Col. 2, line 73, change "authorized" to --unauthorized--

Signed and sealed this 27th day of June 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents