Nov. 28, 1933. A. L. MEROLLE 1,937,492

BOTTLE CAP AND LINER THEREIN AND METHOD OF ASSEMBLY

Filed Sept. 22, 1931

Fig. 1.

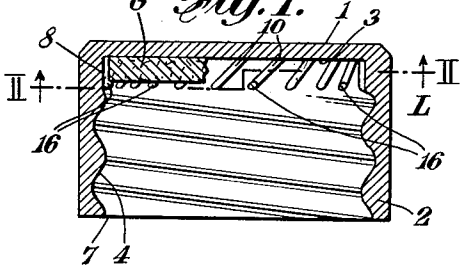


Fig. 2.

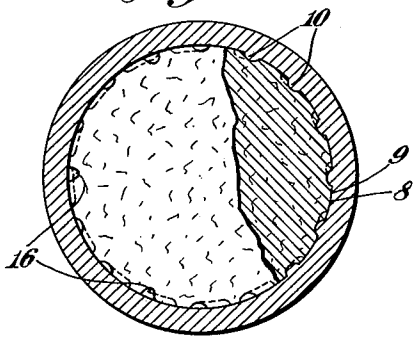


Fig. 3.

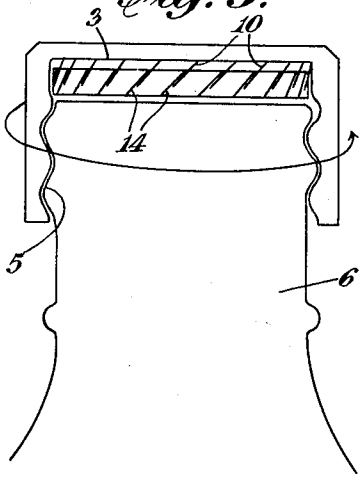


Fig. 4.

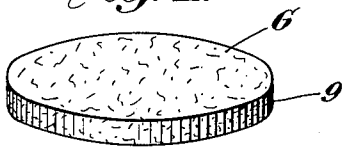


Fig. 5.



Fig. 7.

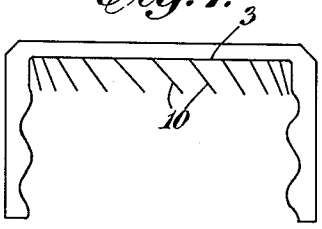


Fig. 6.

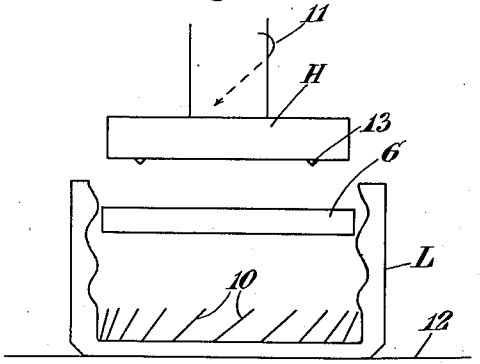
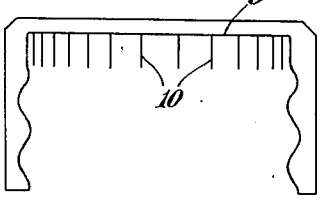


Fig. 8.



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BOTTLE CAP AND LINER THEREIN AND METHOD OF ASSEMBLY

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Serial No. 564,365

4 Claims. (Cl. 215—43)

This invention relates to a bottle cap and liner therein and method of assembly, and has particular reference to bottle caps and the like made of molded material such as bakelite, hard rubber or other similar material.

In the manufacture of caps of this type it has been found that the separately formed liner and disc used therein as a gasket for sealing the receptacle have a tendency to follow the receptacle, rather than the cap, when the cap is being unscrewed from the receptacle, the result being that upon removal of the cap the liner is found adhering to the upper end of the receptacle instead of remaining nested within the cap.

An object of the present invention therefore is to provide means for insuring removal of the liner with the cap at all times.

A further object is to so construct the cap that it will comprise integrally molded parts capable of retaining the liner against following the receptacle out of the cap at any time.

A further object is to provide the cap with means which will tend to urge the liner into closer nested relation within the cap incident to removal of the cap from a receptacle.

A further object is to provide a liner which will properly co-operate with the features of the cap to insure retention of the liner within the cap at all times.

A further object is to provide an improved method of assembly of the cap and liner such as will be conducive to the production of an efficient grip between the cap and the liner against removal of the liner with the receptacle.

Other objects and aims of the invention, more or less specific than those referred to above, will be in part obvious and in part pointed out in the course of the following description of the elements, combinations, arrangements of parts and applications of principles constituting the invention; and the scope of protection contemplated will be indicated in the appended claims.

In the accompanying drawing which is to be taken as a part of this specification, and in which I have shown merely a preferred form of embodiment of the invention:—

Fig. 1 is a transverse sectional view through a cap constructed in accordance with this invention and showing a portion of a liner in position therein.

Fig. 2 is a horizontal sectional view substantially upon the plane of line II—II of Fig. 1.

Fig. 3 is a diagrammatic sectional view graphically illustrating the relationship of various elements constituting this invention.

Fig. 4 is a perspective view of the liner metal employed.

Fig. 5 is a similar perspective view showing the liner as it appears after having been inserted into the cap by the method herein proposed.

Fig. 6 is a diagrammatic sectional view illustrating the method proposed herein for assembling the cap and the liner, and

Figs. 7 and 8 are diagrammatic sectional views illustrating modifications of the liner holding means shown in Fig. 1.

Referring to the drawing for describing in detail the structure therein illustrated, the reference character L indicates the cap, the reference character G indicates the liner, and the reference character H indicates the tool hereinafter referred to for use in assembling the liner within the cap.

The cap L is made up wholly as a single molded element, of bakelite, hard rubber or other similar material, and consists of a top wall portion 1 and a marginal pendant flange portion 2.

The top wall portion 1 provides a smooth, flat interior surface 3 against which the liner G rests substantially as indicated in Fig. 1.

The marginal flange portion 2 is formed with threads as 4 therein adapted to mate corresponding threads 5 of the bottle or like receptacle as 6 upon which the cap is intended to serve as a sealing closure. The threads 4 extend from the bottom end as 7 of the flange 2 upwardly within the cap but terminate short of the wall 3 so as to leave an annular unthreaded portion 8 within which the liner G is positioned.

The wall of the portion 8 against which the circumferential edge portion as 9 of the liner engages is formed as a smooth annular wall surface except that it is provided with a series of small ribs as 10—10 thereon spaced apart in substantially parallel relation to each other traversing said surface preferably in a diagonal direction, the general direction of incline being preferably left handed, that is opposite to the general direction of incline of the threads 4, after the manner suggested in Figs. 1 and 3.

These ribs are quite shallow but, it will be noted, they constitute in effect a set of steep threads which, when the cap is being rotated in a direction corresponding to that required for its removal from a receptacle, will tend to screw the standing liner relatively upwardly toward the wall 3, this assuming of course that the marginal edge 9 of the liner has a proper screw thread engagement with said ribs.

The liner may be formed of any suitable mate-

rial for instance a wafer of cork or cork composition, and, before insertion into operative position within the cap, its marginal edge is smooth and even, as indicated in Fig. 4, the diameter of the wafer or disc being substantially the same as the interior diameter of the wall portion 8 of the cap. The material of the liner is such that when the liner is thrust into operative position within the cap the marginal edge 9 of the liner will yield where it engages the ribs 10—10 and allow said ribs to indent themselves into the material of the liner thereby producing a frictional and mechanical grip as between the liner and the cap tending to hold the cap and liner against rotation relative to each other.

In order that this grip between the liner and the cap shall have a maximum of efficiency the present invention proposes that during the time while the cap and liner are being assembled these members shall be rotated one with respect to the other, the direction and speed of rotation and the speed of movement of the two members toward each other being dependent upon the angular disposition of the ribs 10 with respect to the straight line of movement of said members toward each other.

In Fig. 6 the method is illustrated by which this result is accomplished, and it consists essentially in providing a plunger H for use in forcing the liner into the cap and of making this plunger to rotate at the same time that it moves for pushing the liner. The speed of rotation and the speed of straight line movement of the plunger is indicated diagrammatically by the arrow 11, and it will be noted that this arrow has the same angular position as have the ribs 10—10 of the cap.

The cap L is of course mounted non-rotatably upon a suitable support as 12, and the liner is free to rotate with the plunger, suitable gripping means as 13 being provided upon the plunger for insuring rotation of the liner therewith if required.

It will be seen that by this arrangement the movement of the liner onto the ribs 10 is effected while the liner is at the same time rotating in exact accordance with the pitch of the ribs, and that thereby the liner will slide down over the ribs, in a direction precisely lengthwise of the ribs so that each rib will indent its own path transversely across the edge of the liner, the material of the liner intermediate the ribs being left substantially wholly undisturbed.

The liner will thus have its marginal portion formed with inclined transverse grooves as 14—14 one for each of the ribs 10 and each groove will be of a shape to fit and hug closely to its respective rib. The portions as 15—15 of the liner intermediate the grooves 14—14 will be sound and substantial and will project relatively between the ribs and will preferably engage against the surface wall 8 of the cap.

The relative grooves and depressions 14—15 will in effect constitute steep screw threads upon the disc mating the thread-forming ribs 10 and co-operate with said ribs to urge the liner in a direction toward the wall 1 of the cap in the event of any rotary movement of the finished cap with respect to the finished liner such as is likely to occur when the cap is being unscrewed from a receptacle.

It may be stated here that if desired the liner, instead of being formed with a smooth annular edge at the time of its insertion into the cap as indicated in Fig. 4, and as above contemplated, may in some instances be formed with the relative grooves and raised portions 14—15 as the normal form of the liner.

In order to further insure against accidental displacement of the liner after the cap has been removed from the receptacle, or before the cap is first applied to the receptacle, as well as to further insure against the possibility of the liner following the receptacle instead of the cap when the cap is being unscrewed from the receptacle, the present invention proposes that if desired one or more slight inwardly projecting protuberances as 16—16 may be provided in a position to overlie the margin of the outer surface of the liner as a sort of shoulder or stop. These protuberances or shoulder forming parts may be formed in any manner but in the instance illustrated they are shown to consist of slight enlargements of the outer ends of certain of the ribs 10.

While, as hereinabove indicated, it is preferable that the ribs 10 of the cap, and likewise the grooves 14 of the liner, shall be arranged in an inclined screw thread relationship and that they shall be pitched oppositely to the threads 4 of the cap, yet it will be understood that if preferred they may be made to incline in a relatively opposite position as in Fig. 7 or they may be positioned in a direct vertical position with respect to the wall 3 as in Fig. 8.

In the event of arrangement as suggested in Fig. 7 the unscrewing movement of the cap from the receptacle would tend to move the liner away from the wall 3 but the pitch of the ribs being different from the pitch of the threads 4 the liner and receptacle would move at different speeds. The receptacle would move faster than the liner, and would in consequence be separated from the liner and leave the liner to be held substantially in its original position by its frictional engagement with the walls of the cap.

In the event of arrangement as suggested in Fig. 8 the unscrewing movement of the cap from the receptacle would produce no tendency to urge the liner either toward the cap or toward the receptacle. It would however cause the liner to rotate positively with the cap and thereby break the joint between the liner and the receptacle, the liner in this instance again being left held substantially in its original position by its frictional engagement with the walls of the cap.

As many changes could be made in this construction without departing from the scope of the invention as defined in the following claims, it is intended that all matter contained in the above description, or shown in the accompanying drawing, shall be interpreted as illustrative only and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A receptacle closure having a top wall and a marginal flange thereon, said flange being formed interiorly with screw threads adapted to co-operate with the threads of the receptacle to which the closure is to be attached, a liner within the closure, said closure and liner having co-operative thread formations between them, and the threads of the closure co-operative with the liner having protuberances thereon overlying outer surface portions of the liner to retain the liner against displacement.

2. A receptacle closure having a top wall and a marginal flange thereon, said flange being formed interiorly with screw threads adapted to co-operate with the threads of the receptacle to which the closure is to be attached, a liner with-

in the closure, and said closure having a series of ribs therein in a position to extend across the marginal edge of the liner and said ribs being received in mating grooves formed transversely across the marginal edge of the liner to thereby retain the liner against rotary movement with respect to the closure, together with means formed within the closure arranged to overlie portions of the outer surface of the liner to prevent displacement of the liner from said ribs.

3. A receptacle closure having a top wall and a marginal flange thereon, said flange being formed interiorly with screw threads adapted to co-operate with the threads of the receptacle to which the closure is to be attached, a liner within the closure, and said closure and liner having co-operative thread formations between them, the thread formations co-operative between the liner and the closure being of a pitch different from the pitch of the threads of the closure which engage the receptacle, and the threads of the closure co-operative with the liner having protuberances thereon overlying outer surface portions of the liner to retain the liner against displacement.

4. In combination, a receptacle closure formed as a single body of molded material consisting of a top wall and marginal side walls, the inner annular surface of the side walls adjacent to the top wall being formed with a series of inwardly projecting ribs therein for engagement by a liner, the inner annular surface of said side walls below said ribs being formed with a continuous thread adapted to co-operate with the thread of a receptacle to which the closure is to be attached, and a separately formed liner disc inserted into said closure in engagement with said top wall and having its marginal wall engaging said ribs, said ribs protruding into the material of the marginal edge portion of the liner, said ribs extending longitudinally at substantially a 45° inclination with respect to the top wall of the closure and being thereby greatly more inclined than said continuous thread to thus serve in retaining the liner against rotary movement in one direction within the closure.

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