Feb. 9, 1932. W. F. SCHMALZ 1,844,442

CONTAINER CLOSURE OR BOTTLE CAP

Filed Feb. 7, 1931

Fig. 1

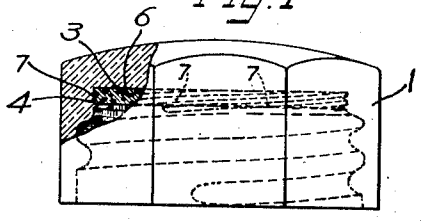


Fig. 2

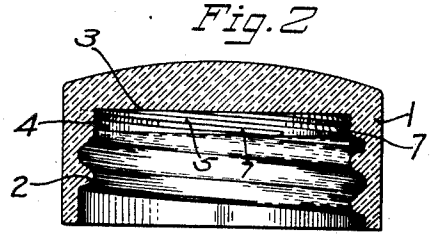
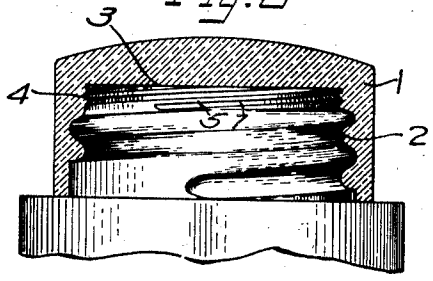


Fig. 3



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UNITED STATES PATENT OFFICE

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CONTAINER CLOSURE OR BOTTLE CAP

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The present invention relates particularly to closures for bottles and other containers, the closures being provided with suitable threads adapted to engage corresponding threads on the containers. Threaded closures of this type are usually provided with gaskets or liners which, when the closures are in place, are pressed against the mouths of the containers to seal them and prevent leakage. The invention is particularly applicable to closures in the form of caps having internal threads for engaging external threads on the bottles or other containers, but the invention is not necessarily so limited.

The liners are ordinarily placed in the caps or closures by the closure manufacturer and it is necessary that the liners be firmly held in place so that none of them will fall out during handling and shipment prior to the time that the closures are placed on the bottles. It will be apparent that the loss of even an occasional liner may cause considerable difficulty, as the closure without a liner may be placed upon a bottle without the absence of the liner being observed. The bottle thus improperly sealed, may be placed in a shipping package with other bottles, with the result that leakage may occur and the entire contents of the package may be damaged.

It is also essential that the liner remain in place in the cap or closure when the bottle or container is opened by the consumer. If the liner is not firmly secured to the closure it may adhere to the bottle rather than to the closure, and in that case the consumer must restore the liner to its proper place in the closure if effective sealing is to be maintained. Frequently the consumer does not restore the liner, but discards it, and this results in leakage and consequent dissatisfaction.

One object of the present invention is to provide simple, inexpensive, but effective means for firmly holding the liners in place in the closures so that none of them can fall out either during handling and shipment prior to the time that the closures are placed on the containers or during subsequent use by the consumers.

A further difficulty with container closures or bottle caps as heretofore constructed is that the liners are at best loosely held in place in the caps, small crevices existing at the edges of the liner and between the top of the liner and the adjacent surface of the body of the cap. If, in shipment or in use, the cap with its liner is not tightly screwed onto the bottle some of the liquid contents may escape into the interior of the cap, from which it will flow by capillary action or otherwise into the said crevices. Small quantities of the liquid are thus retained in the crevices between the lining and the body of the cap and this retained liquid may become sour or rancid, and may cause a disagreeable odor or be otherwise objectionable. When the cap is laid on a table top or other surface some of the retained liquid may escape, thus causing staining or other objectionable action. Furthermore, if the liner is not securely held the lubricating action of the liquid behind the liner may permit it to more readily adhere to the bottle or become otherwise detached from the cap.

An additional object of the invention is not only to firmly hold each liner in place, but also to form an effective seal between the body of the cap and the edge of the liner, so that no liquid can enter between the said body and liner.

In the drawings I have shown the embodiment of the invention which I now deem preferable, but it will be understood that the drawings are intended for illustrative purposes only and are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawings:

Fig. 1 is an enlarged side view of a bottle cap or container closure embodying the invention, a portion of the cap at one side being broken away to show the liner and the holding means therefor.

Fig. 2 is a vertical sectional view of the bottle cap, the liner being omitted in order that the construction of the cap may more clearly appear.

Fig. 3 is a view similar to Fig. 2 but also

showing the core pin on which the bottle cap is molded.

Referring to the drawings, 1 represents a container closure as an entirety, and I have shown a closure of the cap type. The closure whether of the cap type or of some other type may be molded from an artificial resin or other plastic material, but the invention is not necessarily so limited as concerns the broader aspects thereof. The external contour or configuration of the closure or cap 1 is immaterial insofar as the present invention is concerned and I have therefore shown a bottle cap of conventional design.

The closure 1 is preferably provided with suitable threads 2 which are adapted to engage corresponding threads on the container with which the closure is to be used. When the closure is in the form of a cap the threads 2 are internal threads. The threads are preferably of substantially uniform pitch diameter throughout. At the upper end of the closure 1 and beyond or above the threads 2 provision is made for receiving and holding a gasket or liner such as indicated at 6. The liner 6 may be formed of cork or other material suitable to engage the end of the container to effect sealing. Preferably there is a flat top surface or wall 3 and a cylindrical or partly cylindrical surface or wall 4, which together define or form a recess 5 adapted to receive and hold the said gasket or liner 6. When the closure has internal threads, the diameter of the recess 5 is preferably at least as small as the minimum diameter between the tops of the threads 2. The diameter of the recess must however be large enough to permit the use of a liner of sufficient size to properly cover and engage with the end of the container. Inasmuch as the diameter of the recess 6 is as small as, or smaller than, the minimum diameter of the threads, there is thus provided a thickened wall portion surrounding the recess which tends to greatly reduce breakage of the caps.

The liner 6 is of such diameter as to fill or substantially fill the recess 5 and the closure 1 is provided along a circumferential wall of the recess with integral liner engaging ribs or projections 7, 7 which project into the recess and are adapted to engage the edge portions of the liner 6 to firmly hold it. As shown the ribs or projections 7 extend radially inward from the peripheral wall 4 of the recess. Preferably the projections 7, 7 are tangent to a cylinder of smaller diameter than the minimum diameter between the tops of the threads 2. This makes it possible for the liner to have a diameter no greater than the minimum diameter of the bottle engaging threads, but to be nevertheless engaged and firmly held by the projections 7, 7.

Preferably the projections 7, 7 comprise one or more threads. The formation of the circumferential ribs in the form of threads may not be essential as concerns the broader aspect of the invention, but the threads have important advantages.

The threads 7, 7 are discontinuous from the container engaging threads 2 and are preferably of considerably finer pitch. The container engaging threads necessarily have a relatively coarse pitch and the liner engaging threads must have a much finer pitch in order to properly engage the thin edge portions of the liner. When the closure is provided with a distinct liner receiving recess such as 5 the depth of the recess is preferably less than the pitch of the container engaging threads and the pitch of the liner engaging threads is less than the depth of the recess. By reason of the shallow recess as described, the cap is adapted for use with a relatively thin and correspondingly inexpensive liner; and by reason of the fine pitch threads as described, the thin liner may be engaged throughout its entire periphery, and not merely at separated points as would be the case with coarse pitch threads.

Preferably the threads 7, 7 are multiple, having two or more circumferentially spaced starts. Preferably the threads have at least three starts, but under some circumstances a smaller number of starts may suffice, although less effectively. However, for even greater efficiency I have shown in the drawings threads having four starts. With multiple threads the liner is held at a plurality of circumferentially separated places. The bottle engaging threads 2 preferably have a single start and the multiple start liner engaging threads preferably have the same lead as the single start container engaging threads. As already stated the container engaging threads have a smaller pitch, this smaller pitch necessarily resulting from the multiple starts.

Inasmuch as the threads 7, 7 have the same lead as the threads 2 it is possible for a molded closure to be readily removed from the mold without injury to any of the threads. As indicated in Fig. 3 the cap may be molded around a threaded core pin such as shown at A. Because of the uniformity of lead the finished cap can be readily unscrewed from the core pin without any tendency to distort or strip any of the threads. It will be obvious that, if the projections 7, 7 were not in the form of threads or if they were in the form of threads with a different lead from that of the threads 2, it would be difficult, if not in fact impossible, to remove the cap from the core pin without destroying the projections.

The construction of the ribs 7, 7 in the form of threads has the further advantage that the liner 6 can be more firmly engaged. When the liner is put in place it may be rotated with respect to the cap with the result that it is caught by the threads 7, 7, which

embed themselves in the soft material of the liner and force it into its proper final position in the recess 5. Container or bottle caps having their liners held in place as herein described may be handled and shipped without there being any possibility of any of the liners becoming loosened and detached. Furthermore the action of placing the cap on the container or bottle tends to relatively turn the liner in the cap and to thus force it even more firmly into the liner recess.

With liners held in place according to prior practice, considerable difficulty has been experienced as the result of variations in the diameters of the liners. Liners of the correct specified size might be held in place reasonably well, but liners running slightly undersize would fall out and cause trouble. With the present construction, wherein the threads are embedded into the peripheral surface of the liner, it will be obvious that there may be a considerable variation in liner diameter without any such loss of engagement as would permit the liner to actually become loosened. There is sometimes a tendency for the liner to shrink after being put in place, and it will be obvious that the construction herein disclosed permits a considerable amount of shrinkage without allowing the liner to become loose.

The projections 7, 7, whether constructed in the form of threads or otherwise, extend circumferentially throughout the entire circumference of the liner recess. When there are multiple threads they overlap each other, with the result that at every position around the periphery of the liner there is at least one thread, and in most places two threads, which are pressed into the yieldable material at the periphery or edge of the liner to form an effective seal. This seal prevents any liquid from finding its way around the edge of the liner and into any space between the liner and the top of the closure body. The disadvantages of any such entry of liquid have been pointed out.

What I claim is:

1. A container closure of the cap type molded from plastic material and having internal container engaging threads of substantially uniform pitch diameter and having above and immediately adjacent the said threads a shallow interior liner recess with a flat top and with a diameter at least as small as the minimum diameter between the tops of the threads, the said recess being provided immediately adjacent the container engaging threads and along its entire periphery with a plurality of separate circumferentially extending overlapping inward projecting liner engaging ribs, the said ribs being discontinuous from the said threads and being positioned to engage the liner at circumferentially spaced portions of the periphery thereof and to thereby hold the liner in place and prevent the passage of liquid around the edges of the liner.

2. A container closure, comprising in combination threads having a relatively coarse pitch and adapted to engage similar threads on a container, and additional threads adjacent the upper end of the closure having a relatively fine pitch and adapted to engage the edge portions of a liner to hold it in place.

3. A container closure of the cap type, comprising in combination internal threads having a relatively coarse pitch and adapted to engage similar external threads on a container, and additional internal threads adjacent the closed end of the cap having a relatively fine pitch and adapted to engage the edge portions of a liner to hold it in place.

4. A container closure and liner assembly comprising in combination, a closure of the cap type having internal container engaging threads with a relatively coarse pitch and having beyond the said container engaging threads an interior circular liner recess with a flat top and with a depth less than the pitch of the said threads, the said recess being provided at its periphery with internal threads having a relatively fine pitch less than the depth of the recess, and a liner seated in the said liner recess and having its edge portions engaged with the last said threads.

5. In a container closure, the combination of walls forming a shallow liner recess adjacent the upper end of the closure, and multiple start threads projecting into the recess from a circumferential wall thereof and having a lead greater than the depth of the recess, the said threads being adapted to engage the corresponding edge of a liner to thereby hold it in place in the recess.

6. In a container closure of the cap type, the combination of walls forming a shallow liner recess adjacent the upper end of the cap, and multiple start fine pitch internal threads projecting inward into the recess of the periphery thereof, the said threads overlapping within the recess and being adapted to engage the peripheral edge of a liner to thereby hold it in place in the recess.

7. In a container closure of the cap type, the combination of internal threads adapted to engage external threads on a container, walls on the cap separate from the said threads and forming a liner recess beyond the threads and adjacent the closed end of the cap, and multiple start circumferentially spaced internal threads additional to and discontinuous from the container engaging threads and projecting inward into the recess from the periphery thereof, the said threads being adapted to engage the liner along its peripheral edge to thereby hold the liner in place in the recess.

8. The combination in a bottle cap, of single start internal threads adapted to engage similar external threads on a bottle, and mul-

tiple start circumferentially spaced internal threads adjacent the closed end of the cap and adapted to engage the edge portions of a liner to hold it in place.

9. The combination in a bottle cap, of single start internal threads adapted to engage similar external threads on a bottle, interior walls separate from the said internal threads and forming a circular recess adjacent the closed end of the cap and having a diameter at least as small as the minimum diameter between the tops of the said threads, and multiple start circumferentially spaced internal threads at the periphery of the recess and adapted to engage the edge portions of a liner to hold it in place in the recess.

10. The combination in a bottle cap, of single start internal threads having a relatively coarse pitch and adapted to engage similar external threads on a bottle, and multiple start internal threads adjacent the upper end of the cap and having a relatively fine pitch, the last said threads being adapted to engage the edge portions of a liner to hold it in place and prevent the passage of liquid around the edges of the liner.

11. A container closure comprising in combination, single start coarse pitch threads adjacent the lower end of the closure and adapted to engage similar threads on a container, and multiple start fine pitch threads adjacent the upper end of the closure and adapted to engage a liner to hold it in place, the said fine pitch multiple threads having the same lead as the coarse pitch single threads.

12. A container closure of the cap type comprising in combination, single start coarse pitch internal threads adjacent the lower end of the cap and adapted to engage similar external threads on a container, and multiple start fine pitch internal threads adjacent the upper end of the closure and adapted to engage the edge portions of a liner to hold it in place, the said fine pitch multiple threads being of smaller diameter than the coarse pitch single threads and having the same lead.

13. A container closure and liner assembly comprising in combination, a closure of the cap type molded from plastic material and having adjacent the lower end single start coarse pitch internal container engaging threads and having above the threads an interior liner recess provided throughout the entire periphery thereof with multiple start fine pitch overlapping internal threads, and a liner seated in the said liner recess and having its entire periphery engaged with the said overlapping multiple threads so as to thereby hold the liner in place and prevent the passage of liquid around the edges thereof.

In testimony whereof I have hereunto set my hand this 5th day of February, 1931.

WM. F. SCHMALZ.