United States Patent

Ritzenhoff

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[54] **CONTAINER AND CLOSURE CAP ASSEMBLY**

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[73] Assignee: **Gebruder Seidel KG**

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[30] **Foreign Application Priority Data**

Nov. 11, 1969 Germany.....P 19 56 586.7

[52] **U.S. Cl.**.....**215/42**, 215/44

[51] **Int. Cl.**.....**B65d 41/20**

[58] **Field of Search**.....215/42, 44

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[57] **ABSTRACT**

Container and closure cap assembly comprises container with open top portion and closure cap for sealing top portion of container. Closure cap has lower portion secured to top portion of container and upper portion separated from lower portion by weakened line of connection. Upper portion of closure cap after separation from lower portion thereof serves as removable closure for container top. Projections on upper portion of closure cap and exterior of container top cooperate with each other to seal container top after upper portion of closure cap is separated from lower portion. Prior to separation projections on closure cap are positioned adjacent to but out of direct contact with projections on container top.

2 Claims, 6 Drawing Figures

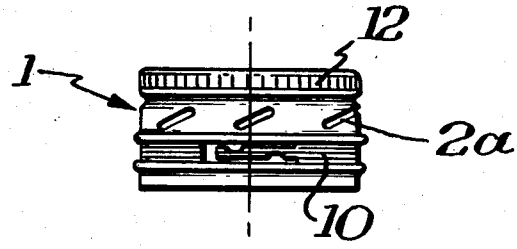


Fig. 1.

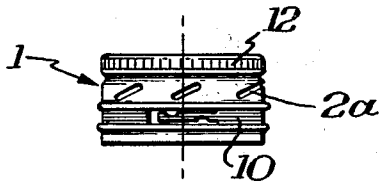


Fig. 2.

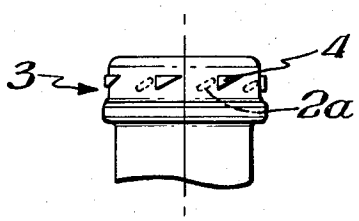


Fig. 3.

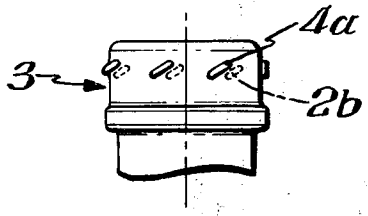


Fig. 4.

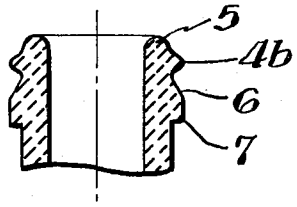


Fig. 5.

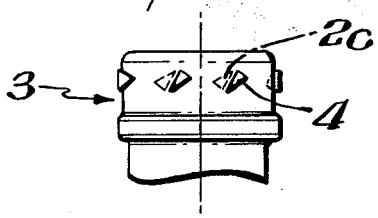
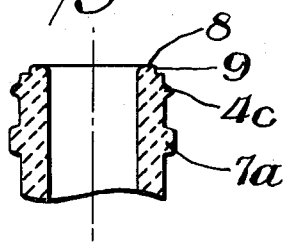


Fig. 6.



CONTAINER AND CLOSURE CAP ASSEMBLY

BACKGROUND OF THE INVENTION

The present invention relates to a container having an open top portion sealed by a metal closure cap, the closure cap being of the kind comprising a lower part secured to the top of the container and an upper part separable from the lower part for example by tearing along a weakened line. The upper part, when detached, serves as a removable closure or cap for the container top.

One of the purposes of this closure cap is to provide means to indicate whether or not a container has been opened, and if the upper part is still attached to the lower part it guarantees to the purchaser that the container has not been opened and its original contents tampered with.

Closure caps of this kind have been proposed wherein a single thread is impressed on the cap after it has been fitted over the top or neck of a container such as a bottle, for example. In this case a heading die forming part of a cap sealing machine presses the closure cap onto the neck of the bottle, and at the same time as steel rollers apply pressure to form the single thread, the lower edge of the lower part of the cap is secured to the bottle by means of a flanging or similar metal deforming operation.

The above described arrangement has the following disadvantages. When the rotating steel rollers of such a cap sealing machine form the thread and carry out the flanging operation while the heading die is at the same time pressing the closure means onto the edge of the bottle, the action of impressing the thread causes resilience in the material which has an adverse effect with regard to the sealing action. The steel rollers press into helical recesses in the container which act as an inner former and when the steel rollers are withdrawn, the material of the cap tends to spring back so that loss of tension occurs both in the direction of the sealing portion of the closure cap and the flange. The effectiveness of the seal provided by the closure cap thereby suffers since the compressed sealing insert is correspondingly relaxed. Since relaxation likewise occurs in the downward direction towards the flange, the flange no longer grips as firmly as it would if there were no impressed screw thread.

In order to achieve a good sealing action, it was therefore necessary to use a higher pressure in the heading die. In many closure operations this is a considerable disadvantage because of the statics involved in the containers. The single thread also has an unfavorable effect when opening the bottle. Because of the small pitch of the single thread, it is necessary to exert considerable pressure to overcome the considerable frictional resistance resulting from the compressed seal. It is for this reason that lubricant materials are added to the plastics sealing compositions often inserted so as to reduce the frictional resistance. These lubricant materials are, however, undesirable as they may have an undesirable effect on the contents of the bottle or container.

These and other disadvantages can be avoided with the help of the closure caps of the invention.

SUMMARY OF THE INVENTION

The present invention provides a container having an open top sealed by a metal closure cap of the kind comprising a lower part secured to the top of the container and an upper part separable from the lower part by a tearing action. The upper part after separation serves as a removable closure for the container top. The upper part of the cap is formed with a plurality of circumferentially spaced projections defining a multiple thread for cooperative mating engagement with a corresponding number of projections on the outer surface of the top of the container that also define a multiple thread. When the entire closure cap seals the container the threads or projections on the closure cap are positioned adjacent to but out of direct contact with the threads or projections on the container. This relationship exists before the upper part of the closure is separated from the lower part.

The closure caps are made of metal, preferably aluminum.

The container may comprise a bottle, glass, canister and other receptacles having a round opening or mouth which is to be sealed. Any material that can be shaped hot or cold, such as glass, plastics material, ceramic material, metal and the like, can be employed as the material for the containers.

BRIEF DESCRIPTION OF THE DRAWING

Novel features and advantages of the present invention in addition to those mentioned above will become apparent to those skilled in the art from a reading of the following detailed description in conjunction with the accompanying drawings wherein:

FIG. **1** is a side elevational view of a closure cap according to the present invention;

FIG. **2** is a side elevational view of the neck of a container to which the closure cap is to be secured;

FIG. **3** is a side elevational view of the neck of a modified container;

FIG. **4** is a sectional side view of the neck of a further modified container;

FIG. **5** is a side elevational view of the top of a still further modified container; and

FIG. **6** is a side elevational view of the top of yet another modified container.

DETAILED DESCRIPTION OF THE DRAWING

With regard to the closure cap **1** illustrated in FIG. **1** and the associated bottle type container top **3** shown in FIG. **2**, the container top **3** has thread portions **4** of triangular shape to facilitate the fitting of the closure cap in the correct position. If desired, the triangular form can be varied by sloping the upper horizontal side of the triangle so as further to facilitate fitting of the cap. The upper part of the cap has "thread" elements **2***a* formed by pressing during manufacture of the cap. The cap is fitted on the top of the container and rotated through a small arc so that the thread elements **2***a* are positioned between adjacent thread portions **4** on the container. The position of the thread elements **2***a* after the cap is rotated is indicated in FIG. **2**.

If desired, the thread elements on the cap may also be of triangular form as shown by **2***c* in FIG. **5**, the triangles being so disposed relative to each other that

each triangle 2*c* forms a parallelogram with an associated triangle 4 on the container when the threads are abutting one another.

During the first closure operation, the sealing of the closure cap on the container is achieved exclusively by flanging the lower edge of the lower part of the cap while the die is pressing the cap firmly onto the container. The thread elements on the cap are required only for resealing after the first opening of the container. The flange does not tend to spring back but receives to a large extent the sealing pressure produced by the heading die during the closure operation. Thread pressures and the associated disadvantageous resilience in the material do not occur. The strength of the flange can be further increased by a Z-shaped formation on the flanged edge. The same also applied to a crimping within the body of the cap instead of a flanging of the edge of the cap. No pull is exercised on the crimp from the end of the cap and by means of an appropriate shape of container and pressure rollers, unrestricted return flow of the material below the crimp is promoted. This measure provides a tighter seal. A further advantage is obtained when opening the container. When the seal strip **10** which may consist of the tearing tab and the pull ring is pulled off, the upper part of the closure cap can be lifted in the axial direction. No frictional resistance occurs as with a single thread. Resealing and opening are, however, also facilitated since a steep multiple thread results in easier opening than the hitherto normal single thread, quite apart from the fact the the operation is more rapid with a multiple thread.

Furthermore, it is well known that the flanks of a plurality of thread elements of a multiple thread bear more firmly than the thread flank of a single thread. Thus, a better sealing action is obtained when resealing the container. Advantages of an economical kind are also obtained since a shorter cap can be used as the result of the long-pitched multiple thread. In view of the large quantities of closure caps of this kind that are required, the smallest saving in material constitutes a considerable saving in cost.

Whereas in the above described embodiments the thread elements on the cap are disposed between the complementarily shaped thread portions of the multiple thread on the container during the first closing operation after filling of the container, FIG. **3** shows an example in which the thread elements 2*b* are disposed below the corresponding thread portions 4*a* of the multiple thread of the container. For the sake of simplicity the position of the thread elements 2*b* after flanging is shown in broken lines. This last embodiment differs from the previous one in that, before reaching the sealing machine, the cap is rotated to position the thread elements 2*b* just below the thread portions 4*a*. When the heading die of the sealing machine presses the closure onto the upper edge of the bottle, the thread elements are simultaneously pressed away from the corresponding flanks of the portions of the multiple thread portions 4*a*. The sealing action of the closure cup is again achieved exclusively by means of the lower flange of the cap. The thread elements are only required for the purpose of resealing.

When the container is opened by detaching the upper part of the cap by the help of a tear-off strip, the pressure of the seal is reduced to an extent corresponding to the distance the thread elements 2*b* are spaced below the thread portions 4*a* of the multiple thread on the container. This greatly facilitates opening of the container quite apart from the fact that, here again, the short and steeper multiple thread makes further opening easier than with previously known sealing means. An arrangement of this kind is recommended for containers adapted to be filled with fluids that generate an internal pressure, since the remaining upper part of the sealing means is prevented from being pushed off in an undesirable manner by the pressure generated within the bottle.

It is also possible for the thread elements in the two above described embodiments to be produced in the form of portions stamped out of the body of the cap.

To render it easier to form the various thread elements during manufacture of the caps, the knurled gripping portion **12** usually present on the upper part of the body of the cap, is recessed over a width corresponding at least to the width of the thread elements.

A further embodiment will now be described by reference to the sectional illustration of the top of a container as seen in FIG. **4**. In this case, the thread elements are impressed by the sealing machine prior to flanging during the first sealing operation in such manner that, during the flanging that follows immediately, they can be eased away from the position in which they bear on the portions of the multiple thread portions of the container.

In FIG. **4** numeral **5** designates the upper edge of the container, **6** an inclined surface, 4*b* a multiple thread portion and **7** the edge about which the closure cap is flanged. When the closure cap is pressed on to the container, the thread elements acquire a similar shape as can be seen from the cross-section of the container at 4*b* and **6**. The inclined surface **6** on the top of the container and in the closure cap renders it possible to prevent the spring-back occurring when the thread elements are formed. Instead, the inclined surface enables the thread elements to relax their bearing pressure on the portions 4*b* of the multiple thread portions. Thus, the flanging operation is so carried out that the material is not held fast in the narrow threads and that relaxation of loosening cannot therefore occur after flanging. Here again, after the first unsealing operation, there occurs relaxation which, as in the case of the previously described embodiments, leads to greater ease of opening.

A further modification for use with roll-on closure caps is shown in FIG. **6** wherein the container top for a roll-on closure cap is provided with multiple thread portions. In this figure the numeral **8** designates the upper horizontal edge of the top, **9** an additional cylindrical sealing edge, 4*c* a thread portion, and 7*a* the flanging edge.

For this type of container top, the associated closure means are preferably supplied with the thread elements already formed therein by pressure. In this case, the heading die of the sealing machine not only presses the caps firmly onto the top of the container but draws down the outer edge of the top surface so that it becomes a cylindrical stepped portion together with the sealing composition located on the inside, is pressed firmly onto the additional cylindrical sealing

face 9. Squeezing or crimping is thus applied to the closure cap parallel to the surface 9 and below this it undergoes a stepwise widening up to the original diameter. After this, flanging of the lower edge is carried out.

In a further arrangement, the inwardly disposed thread elements on the closure cap may be combined with a thickened portion located at the same level, which portion is provided with small knurled areas. This thickened portion, provided with knurled gripping areas, facilitates the handling of the closure cap and provides protection for the fingers against the tearoff edge of the closure cap located immediately below.

What is claimed is:

1. A container and closure cap assembly adapted to be filled with fluids that generate an internal pressure comprising a container having an open top portion and a closure cap for sealing the open top portion of the container, the closure cap including a lower portion sealingly secured to the top portion of the container and an upper portion separated from the lower portion by a weakened line of connection including a tear strip, a plurality of spaced apart inwardly depressed inclined projections on the upper portion of the closure cap, and an equal number of spaced apart outwardly extending inclined projections on the exterior of the top portion of the container, the projections on the upper portion of the closure cap and the top portion of the container cooperating with each other in such a manner that when the entire closure cap seals the container in a first sealing operation the projections on the upper portion of the closure cap are positioned between but out of direct contact with the projections on the top portion of the container whereby removal of the upper portion of the closure cap from the container is achieved solely through axial movement of the upper cap portion and when the upper portion of the closure cap seals the container in further sealing operations the projections on the upper portion of the closure cap are in direct contact with the projections on the top portion of the container.

2. A container and closure cap assembly as in claim 1 wherein the projections on the upper portion of the closure cap and the top portion of the container each have a triangular configuration.

3. A container and closure cap assembly as in claim 2 wherein the projections on the upper portion of the closure cap and the top portion of the container are constructed and arranged to form a parallelogram when one of the projections on the upper portion of the closure cap is adjacent an associated projection on the top portion of the container.

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