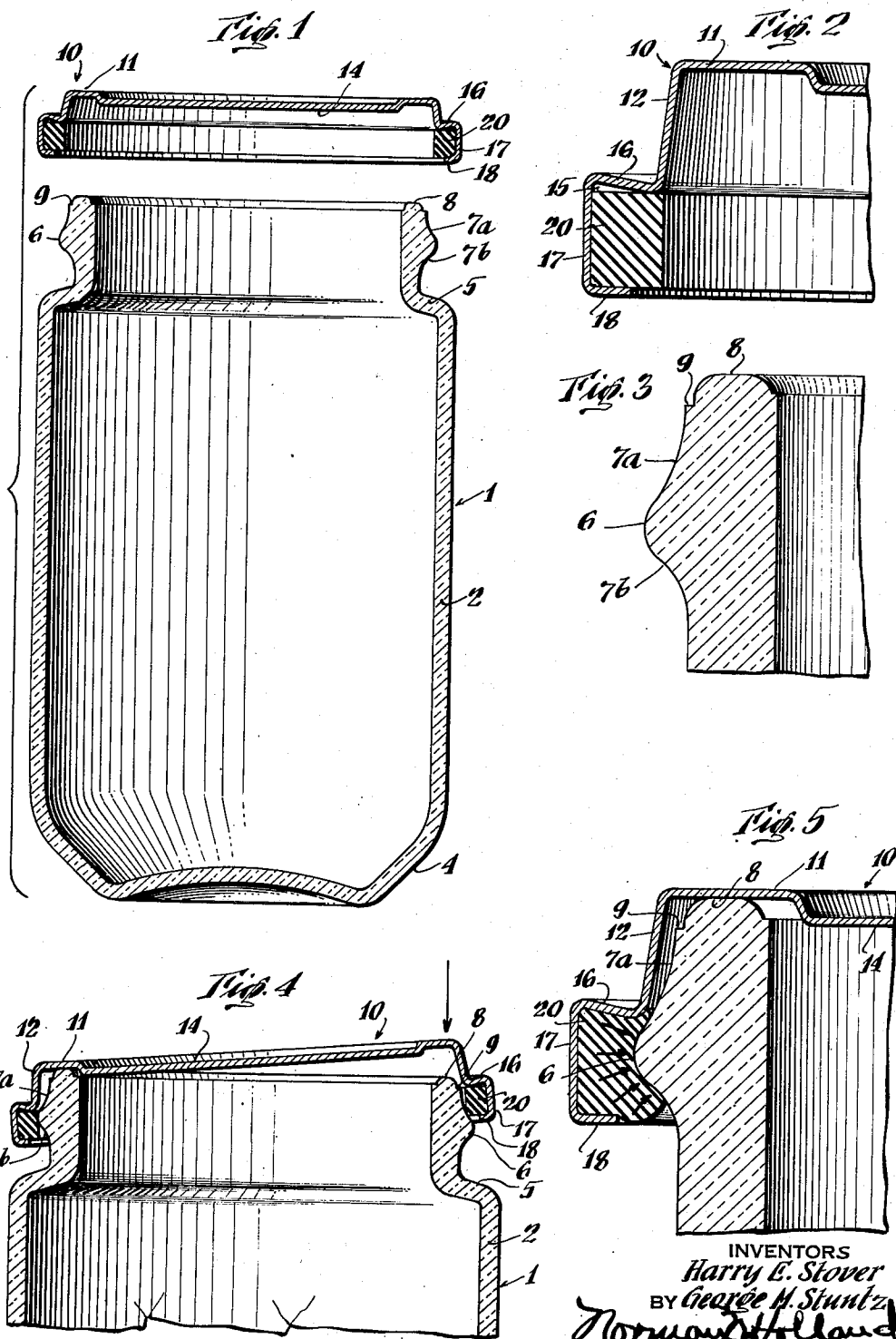


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SEALED GLASS CONTAINER

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SEALED GLASS CONTAINER

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1 Claim. (Cl. 215—31)

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The present invention relates generally to a sealed package and the component parts thereof, and more particularly to an improved glass container, metal closure cap, and the package formed thereby.

Various foods and other products are packed in glass containers and sealed with closure caps. Most of such products require a hermetic seal, and many require a partial vacuum within the package. In view of the quantity sold and their mass production, the sealing must be at a rapid rate. The assignee of the present application has developed machines which will hermetically seal with a high vacuum therein as many as 250 normal size containers a minute (about four each second) and as many as 500 small size containers a minute. Imperfect seals must be kept at an absolute minimum.

Under these severe conditions of mass production, the requirements as to closures, containers and the seals formed are extremely exacting. The problems involved are different than exist with closures that have their skirts reformed after being placed over a container mouth. In addition, due to limitations in the manufacture, glass containers vary considerably both in size and out-of-roundness from a true standard. Likewise closures vary in size from a true standard, but to a lesser extent. It is not practicable to gauge each container or closure. Permissible tolerances are substantial and must be permitted. In many cases the containers vary more than the prescribed tolerances, and yet perfect seals have to be made readily on them by closures that are merely pushed down over the container sealing surfaces, without any reforming of the closure skirts.

Under such conditions, perfection in seals and their component parts is necessary. Slight differences in construction change failure into commercial success.

Removal of the closure from the container by the housewife is another serious problem. The housewife is not a mechanic, and she usually attempts to pry the closure off with any implement she can find. Hence it is very desirable to have a closure which may be pried off with ease and without breaking the container. Heretofore in prying the closure from the container the implement used would frequently break the container due to the sharp overhangs on the container utilized for holding the closure in place. In such cases particles of glass may fall into the food and the contents are not edible. In some cases, the chipped particles of glass are not noted, and serious injury is occasioned by persons eating the product with the glass chips in it.

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The finish and closure herein overcome these difficulties.

The housewife also desires a closure and container which may be re-sealed after the contents have been partially consumed so that the remainder may be kept in the refrigerator or elsewhere without spoiling. This objective is also achieved by the present invention.

The present invention aims to provide an improved package and improved component parts therefor which may be effectively sealed by high speed machinery with a minimum of imperfect seals. More particularly, the present invention is an improvement upon Patent No. 1,909,406 and aims to overcome difficulties encountered with said package, both in high speed sealing and in the removal and re-sealing of closures.

An object of the present invention is to provide an improved container, an improved closure, and an improved package formed thereby.

Another object of the invention is to provide an improved closure and container which may be readily sealed by high speed machinery.

Another object of the invention is to provide an improved container which facilitates closure application.

Another object of the invention is to minimize "leakers" and other imperfect seals.

Another object of the invention is to provide a package which may be readily opened without breaking the container or chipping glass into the product.

Another object of the invention is to provide an improved package which may be easily re-sealed by a housewife and which forms a better re-seal for preserving unconsumed contents of the package.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claim, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein:

Fig. 1 is a sectional view of the present container and closure spaced from each other;

Fig. 2 is a fragmentary enlarged sectional view showing features of the closure;

Fig. 3 is a fragmentary enlarged sectional view showing features of the container;

Fig. 4 is an enlarged fragmentary sectional view showing the position of the container and

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closure as the closure is about to be forced down onto the container; and

Fig. 5 is an enlarged fragmentary sectional view illustrating the relation of the closure and container in sealed position.

Referring again to the drawings illustrating a preferred embodiment of the invention, and more particularly to Fig. 1 thereof, there is shown a container 1 having a cylindrical side wall 2 and a reduced lower end 4. The upper end of the container has an abrupt shoulder 5 which may be formed by the outward flare of the wall of the container. An annular enlargement 6 spaced above the shoulder 5 is adapted to cooperate with a closure cap gasket in forming a seal and holding the cap on the container.

The annular enlargement 6, shown more clearly in Figs. 3 and 5, when viewed in section, has a convex surface leading at its upper side to an annular upper concave surface 7a that extends along a gentle curve to a location adjacent the rim of the container. An annular lower surface 7b curves inwardly toward the wall of the container more abruptly than the upper concave surface and merges into the side wall of the container. The annular convex portion of the enlargement is adapted to be enveloped by the closure gasket, when a closure is forced on the container, to form a hermetic seal and to retain the closure on the container, as shown more particularly in Fig. 5.

The gently curved upper surface 7a facilitates application of a closure cap to the container and allows the closure to ride lower on the container when a preliminary seal is formed, as will be later more fully described. The lower, more abrupt surface 7b securely holds the closure on the container. In addition, the rounded under-surface causes a cap removing tool or other instrument inserted under the bottom of the closure to slide along without chipping or breaking the glass. This latter feature is important in order to avoid breakage and to guard against chipped glass getting into a packaged product.

A slight offset 9 is provided on the outer side wall slightly below the rim, which serves as the parting line between the split neck ring forming the finish and the solid annular ring forming the rim in the manufacture of the container. This eliminates fins at this point and avoids particles of glass which might form and later find their way into the contents of the package.

The closure comprises a cover portion 11 and a depending skirt 12. The cover portion has a depressed panel 14 which is sufficiently large to receive the reduced lower end 4 of the container whereby the sealed packages may be readily stacked without fear of their "creeping" sideways, when subjected to vibrations and shock, and toppling off.

The skirt of the closure has an annular channel therein spaced down substantially from the cover of the closure and formed by an upper wall 16, an outer side wall 17 and a lower wall or ledge 18. The upper wall 16 of the channel is shown inclined upwardly and outwardly (Fig. 2) and the outer side wall 17 may be substantially perpendicular with respect to the cover part of the closure. The lower wall 18 may be formed by bending the free edge of the closure inwardly sufficiently far to support the underside of a gasket 20 after the closure is sealed on the container.

It will be noted in Fig. 2 that the inclined wall 16 of the annular channel forms a space 15 into which the upper side of the gasket may move.

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In other words, as pressure is applied which tends to force the upper inner corner of the gasket between the glass finish and the corner of the cap, relief is given by the gasket moving outwardly and upwardly into the increased space given by the raised portion. The width of the gasket is substantially equal to the width of the inner side of the upper wall 16 of the channel, thus further decreasing the tendency of the gasket to wedge between the closure and the glass finish. A gasket having a thickness of about .090 inch and a height of about .111 inch affords excellent results. Preferably the middle of the gasket is slightly below the middle of the convex band 21, as this relationship affords greater holding power.

The most desirable action in sealing a closure to a container would be to have the closure forced downwardly while retained in a plane perpendicular to the axis of the container; that is, to force the closure of Fig. 1 straight down on the container. This is not feasible in all sealing machines. In many instances as illustrated in Patent No. 2,525,199, the container moves along a path and pulls a closure out of a chute, steam being injected between the container rim and underside of the closure. The closure then moves down over the upper curved surface to the relationship shown in Fig. 4. In this relationship the gasket should be in contact with portions of the annular enlargement throughout its circumference to form a preliminary seal. Usually a stationary member "wipes" over a portion of the closure as it moves along with the container in order to insure that the closure gasket 20 and a portion of the annular container enlargement are firmly in contact throughout their circumferences, so that when steam condenses in the headspace of the container a partial vacuum will be formed in the package. The formation of this secure preliminary seal is of utmost importance as it determines whether the final sealed package will have a suitable vacuum therein. When it is recalled that the seals may be made at a rate as high as 250 a minute it is readily appreciated that the seal must be quickly and easily formed.

With the present gently curving upper surface 7a, a closure and its gasket may readily move down along the upper part of the curve until it rests against an appropriate diameter portion of the upper curved surface. The closure is not held up relatively high on any straight taper where it is subject to being objectionably jarred or shifted; instead the closure rides relatively low so that it is not likely to fall off the container or to lose a partial vacuum formed by the condensing injected steam.

The relatively small diameter afforded by the upper portions of the curved surface 7a facilitates reception of closures which may be undersize even though the container may be oversize.

The upper curved surface 7a, when viewed in section, may be formed along an arc of a circle having a radius of about two tenths of an inch, thus providing a smoothly curved concave surface over which the gasket slides in the sealing operation. The enlargement adjacent its maximum diameter is a smoothly curved concave surface when viewed in section.

Subsequent to formation of the preliminary seal, shown in Fig. 4, the final seal may be formed by forcing the closure fully down by means of a pressure belt, as shown in Patent No. 2,529,199, to make the gasket slide over the annular enlargement 6 and grip it firmly throughout its circumference.

An important feature of the present invention is the hardness of the gasket. A gasket having a Shore durometer hardness of from 70 to 85 (this terminology being well-known in the art) has been found to give unexpected results. A gasket of this hardness is sufficiently soft to accommodate a wide range of variations in the containers and form a seal on a minimum size and yield sufficiently to go on the maximum size container. In addition, the gasket is sufficiently hard so that when it is sealed over the enlargement on the container, the co-action between the gasket and the enlargement is such as to hold the closure securely in place even when a substantial pressure is developed in the container, as a result of processing or sterilizing the product after it is sealed. It is common for pressures to be built up as high as eight, ten or twelve pounds per square inch during sterilization. The heat of sterilization also softens the gasket to some extent but in spite of this the co-action of the gasket and the enlargement of the present invention will hold the closure securely in place.

As shown the gasket envelopes the enlargement 6 at its maximum diameter with a greater portion of the gasket engaging below the middle of the enlargement than above it. The portion above the mid area of the enlargement tends to force the cap off the container, whereas the portion below it secures the cap on the container. The inwardly extending edge 18 of the closure engages the gasket sufficiently far inwardly so that it holds the underside of the gasket securely in place under the enlargement on the finish.

The outwardly and upwardly inclined side 16 forms a space 13 over the upper side of the gasket allowing the gasket to yield more by moving into the space. This prevents or minimizes the possibility of the inner upper corner of the gasket being forced upwardly or concentrated between the glass finish and the inside of the skirt of the cap at and directly above the upper side of the channel. The wedging of the gasket in this space tends to impair the seal by an excessive upward pressure tending to raise the closure.

The thick wall of the finish adjacent the rim of the container is a distinct advantage. When the glass leaves the mold, it is soft due to its high temperature, and any thin portions tend to deform. The finish of the present invention provides a thick wall which supports the glass of the finish and maintains it closer to the prescribed standard size.

It will be seen that the present invention provides an improved closure, an improved container, and an improved seal formed thereby. The closure and the glass finish are particularly adapted for high speed sealing with a minimum number of "leakers" or otherwise defective seals. The closure readily moves down over the gently curving upper surface of the sealing zone to form a preliminary seal; in this relationship the closure is positioned relatively low on the container so that it is not easily dislodged. When pushed fully "home" to form the final seal the closure is securely held in position by the co-operation of the enlargement with the gasket and may be readily removed without chipping glass from the container into the contents. The inclined upper side of the closure channel and the inwardly extending lower edge co-operate to prevent or minimize the tendency of the gasket to "roll" and the tendency of the upper edge of the gasket to wedge between the closure and the finish. This further facilitates the sealing operation at high

speeds and minimizes "leakers" and imperfect seals.

This application is a continuation of application Serial No. 39,418 filed in the United States Patent Office on July 19, 1948 and now abandoned.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described our invention, we claim:

In a sealed package of the forced-on closure type, the combination of a glass container having an annular enlargement on the side thereof comprising in vertical cross section a maximum diameter portion spaced from the rim of the container and presenting an outward convexly rounded surface, an annular gasket-guiding and initial sealing surface thereabove of gradually diminishing diameter and outwardly facing, continuously smooth, gradually curving, concave shape merging smoothly into a vertically disposed generally cylindrical wall portion adjacent the rim, an annular closure retaining surface of diminishing diameter and outwardly facing, continuously smooth, more abruptly curving, concave shape forming the lower surface of said enlargement and merging into a vertically disposed generally cylindrical container wall below said enlargement, and a closure cap of the type adapted to form a hermetic seal by being forced over said enlargement without reformation of the closure skirt, said closure cap having a cover part and a depending skirt, an annular channel at the lower part of said skirt with the bottom of the skirt flanged inwardly to form the bottom of the channel and a support for the underside of a sealing gasket, a relatively thick narrow annular gasket in said channel supported by said flange and pressed into firm sealing engagement with the convexly rounded portion of said annular enlargement, said gasket engaging under said abruptly curved closure retaining surface to hold the closure firmly on the container and to exert sufficient holding force to overbalance substantially the upward pressure occasioned by that portion of the gasket compressed against the upper surface of said enlargement.

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