

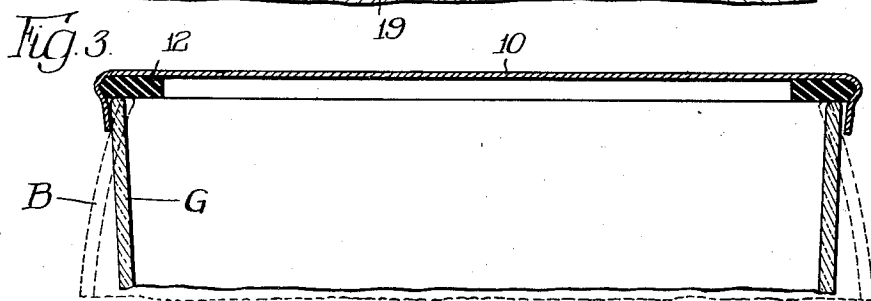
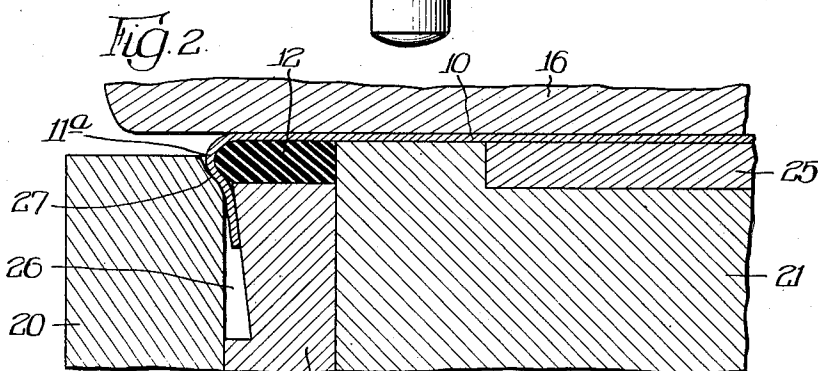
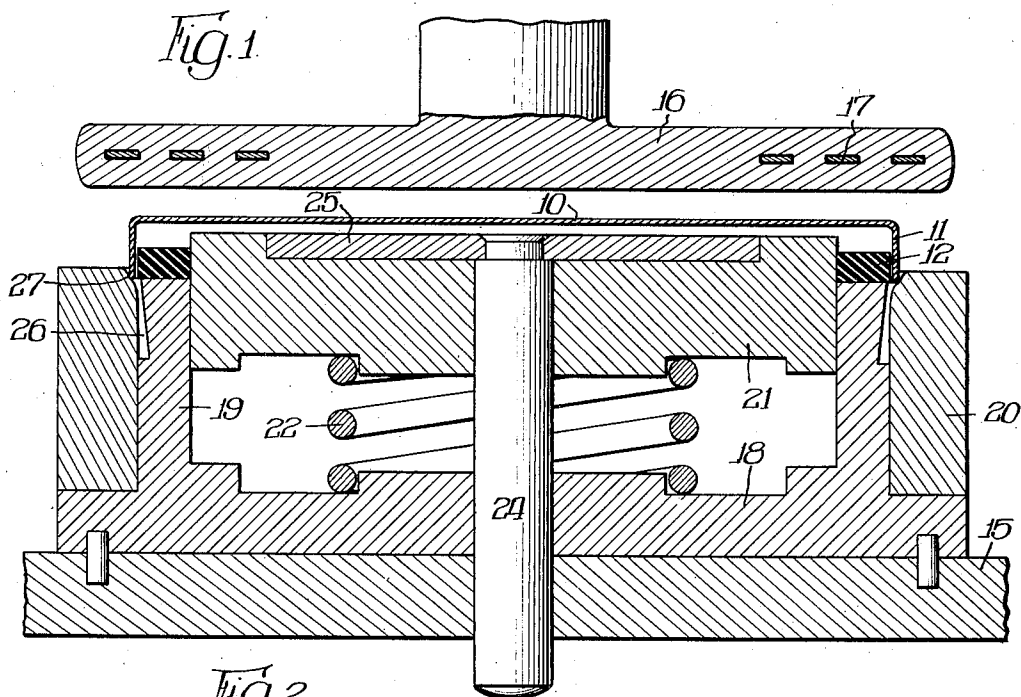
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METHOD OF MAKING CLOSURE CAPS

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METHOD OF MAKING CLOSURE CAPS

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15 Claims. (Cl. 113—80)

This invention relates to closures for packing vessels, such as jars, cans, tumblers, bottles, and the like.

With the steadily increasing popularity of glass vessels for the packaging of various food commodities, there has arisen a desire for the use of vessels which are thin.

The use of thin glassware for such packages has presented various problems, one of which has been the difficulty of providing an economical and easily applied closure for such ware.

A general object of the present invention is the provision of a method which may be employed for the manufacture at low cost of closure caps susceptible of being easily applied in commercial packing practice to thin glass vessels to form an hermetically sealed closure therefor.

Other and further objects will be pointed out or indicated hereinafter, or will be apparent to one skilled in the art upon an understanding of the invention or its employment in practice.

For the purpose of aiding in a disclosure and explanation of the invention, I show in the accompanying drawing forming a part of this specification, and hereinafter describe certain instrumentalities and a certain procedure which may be employed for the practicing of the method constituting my invention. While these serve to exemplify the invention, it is to be understood that they are presented entirely by way of illustration, as the invention may be practiced in various other fashions and by use of various other instrumentalities. Accordingly, the particular exemplifications herein shown and described are not to be accorded any interpretation calculated to limit the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawing,
Fig. 1 is a sectional elevation of apparatus which may be employed for the carrying on of the method constituting the present invention, same showing a cap shell and gasket in course of assembly;

Fig. 2 is a detail of a portion of the same apparatus, shown on a larger scale, and serving to illustrate certain operations in the cap manufacturing procedure; and

Fig. 3 is a sectional elevation of a completed cap, illustrating the same in assembled relationship with a vessel, as incident to or preliminary to the hermetic sealing of the closure on the vessel; the figure also illustrating, in dotted lines, an alternative form of vessel.

The present invention provides for the making

of a form of closure cap in which a suitable sealing gasket is securely retained in proper position in a suitable shell, such that the gasket will provide an effective hermetic seal between the shell and the mouth rim of the appropriate vessel when the closure is seated thereon. The shell has a depending annular skirt or flange which is adapted to encompass the vessel, and the gasket, which preferably is of a flat ring type, is of substantial width in the radial directions of the cap, extending a substantial distance outwardly beyond the minimum internal circumference or compass of the skirt, and extending also to a greater distance inwardly therefrom. A closure of this description may be made in accordance with the present invention, by providing a cap shell with an annular depending flange, placing a pre-formed annular gasket of more or less plastic material within the shell, pressing the gasket against the top of the shell adjacent the flange, and contracting the lower portion of the flange circumferentially to a size somewhat less than the circumferential size of the gasket. Incident to the compression of the gasket, its circumferential extent may be somewhat increased, and it also may be caused to adhere to the shell.

The nature of the invention may be ascertained in more detail by consideration of the illustrated devices and procedure, which will now be described.

In the production of the closure cap as illustrated in the drawing, a suitable shell having a top portion 10 and an annular skirt portion 11 is formed of sheet metal having suitable ductility and resiliency, such as tinned steel plate, the internal diameter of the flange being somewhat greater than the external diameter across the mouth of the vessel for which the closure is designed. Preferably, the skirt depends at an angle approximately 90° from the top of the shell, and it is comparatively short or shallow. A pre-formed annular gasket 12 is provided, same being formed of a soft or yieldable material, such as a rubber composition, and, depending on the intended use of the closure, it may be either a rubber composition which is free of vulcanizing ingredients, or one which is partly vulcanized or contains a proportion of vulcanizing material less than that requisite for complete vulcanization of the rubber content. The gasket composition also properly includes a suitable filler or pigment (e. g., whiting) in proper proportion. The gasket is of a circumference such as to permit its being readily inserted within the compass of the skirt, and its original thickness is somewhat greater

than its intended ultimate thickness in the finished closure.

The shell and gasket of appropriate form and character being thus supplied, they are assembled by inserting the gasket within the shell, the compression of the inserted gasket against the top of the shell, and the contracting or re-forming of the lower portion of the skirt to a form and position inwardly from the outer margin of the gasket. This may be accomplished in the manner illustrated in Figs. 1 and 2, wherein a certain form of apparatus for effecting the operations is shown. This apparatus includes a table arranged to rotate in a horizontal plane and carry a number of chucks angularly spaced about its axis of rotation and at equal distance radially therefrom, so that they will travel in an orbit incident to rotation of the table. Over the orbit of the chucks is a vertically reciprocable presser head 16 which may be heated, as by means of an electrical resistance element 17. Each chuck includes a cup-like member having a base portion 18 which rests upon the table and an annular upstanding rigid flange 19 which is closely encompassed by a rigid ring 20. Fitting within and guided for vertical movement upon the annular flange 19 is a piston-like mandrel 21 which is normally held by a spring 22 with its upper portions above the top of the flange 19, but which may be depressed against the tension of the spring, the spring acting to return it when the pressing force is removed. A plunger 24 passes axially through the mandrel 21 and base 18, and through the table 15, being slidable vertically therein, and said plunger carries at its upper end a lifter plate 25 which is countersunk in the upper portion of the mandrel. The width at the top of the flange 19 is approximately the width of the gasket 12 in its initial size, and the diameter of the mandrel 21 is approximately the same as that of the orifice of the gasket. From its upper end the flange 19 is slightly undercut at its outer side, as indicated at 26. The internal diameter of the ring 20 is somewhat less than the diameter of the cap skirt, and at its upper end the ring is beveled inwardly, as indicated at 27. Consequently, when the gasket is placed on the flange 19 in encompassing relationship to the projecting end of mandrel 21, and the shell is placed in encompassing relationship to the gasket, the lower margin of the shell skirt will rest on the beveled portion 27, in a relation approximately as illustrated in Fig. 1. The chuck with the gasket and shell thus associated thereon is then positioned under the pressing head 16, and the latter is then lowered a predetermined distance such as to press the shell downwardly to an extent such that its top portion is brought into engagement with the upper surface of the gasket and the gasket compressed between the same and the top surface of the flange 19, the mandrel 21 being depressed at the same time to accommodate the downward movement of the cap and compression of the gasket. As a consequence of the downward movement of the shell, the lower portion of its skirt is contracted or swaged inwardly by the wedging action of the beveled portion 27 of ring 20, with the result that the shell skirt is given a shape approximately as illustrated in Fig. 2. Since inward displacement of the gasket material is prevented by the mandrel 21, the compression of the gasket between the top of the shell and the flange 19 moulds some of the gasket material outwardly so that the circumferential size of the gasket is increased. The

re-forming of the shell skirt may be such as to produce a bead affording an internal groove, as indicated at 11^a in Fig. 2, and the moulding of the gasket may be such as to fill such groove.

Such re-forming of the shell and gasket may be adequate to retain them in proper assembled relationship, but for additional certainty and security, the gasket may be caused to adhere to the shell in their areas of contact. This may be accomplished by application of heat to the shell over the area in contact with the gasket, and such heat may be applied through the medium of the pressing head 16 by heating the latter, as by electrical resistance element 17. With the pressing head thus heated, heat is applied to the shell and gasket incident to compressing and re-forming of the latter, with the result that the surface portion of the gasket in contact with the shell top will be rendered adhesive and will stick to the latter.

After the shell and gasket have been re-formed and connected as above described, the pressing head is lifted and the chuck moved from under it, whereupon the plunger 24 and lifter plate 25 are moved upwardly to elevate the gasket and closure skirt clear of the mandrel 21. Although, in the shaping operation, the lower margin of the skirt may have been contracted to a size less than that of the periphery of the top of the flange 19, necessitating some enlargement of the lower portion of the skirt in order to remove it upwardly from the chuck flange, the set given to the metal of the skirt in the re-forming operation is such that the lower portion of the skirt will spring back to approximately its reduced size after it has been lifted clear of the chuck flange. Consequently, the ultimate form of the closure is such that the circumference of the lower portion of the closure skirt is substantially less than that of the gasket.

The closure in its completed form is illustrated in Fig. 3. It is applied to a vessel by inserting the mouth of the latter into the skirt and into contact with the gasket, and it may be sealed upon the vessel by exhaustion of air from within the latter, followed by the application of light pressure to the top of the cap such as to cause slight penetration of the upper margin of the vessel into the plastic gasket material to form an air-tight joint, and then the restoration of atmospheric pressure to the exterior of the closed package, the closure being thereafter held in place by the external atmospheric pressure. The contracted lower marginal portion of the skirt forms a gauge or stop which, through its cooperation with the vessel, necessitates the rim of the latter making contact with the gasket at an appreciable distance from the outer margin of the latter and prevents displacement of the closure laterally with respect to the vessel to an extent such that the rim of the latter might be intruded between the skirt and the outer margin of the gasket. At the same time, due to the width of the gasket, very liberal contact area is afforded for accommodation of variations in the contour and size of the vessels, the gasket width being such that the portion of the gasket material in contact with the vessel rim is well supported by that located inwardly therefrom, so that a firm sealing contact between the gasket and vessel may be effected by light pressure on the cap.

While I have referred above to the use of gaskets which are of more or less plastic character, such as unvulcanized rubber compositions or semi-vulcanized rubber compositions, it will be

appreciated that vulcanized or elastic rubber gaskets may be employed. For example, the preformed gasket may be made of a rubber composition containing the appropriate vulcanizing and accelerator ingredients, but left uncured, and assembled with the shell in a manner as above described. Then, after being thus assembled, the gasket may be vulcanized in the shell by appropriate curing or heat treatment. When a pre-vulcanized gasket is used, it may be assembled with the shell as above described, the reforming of the skirt being such as to retain the gasket against dropping out. The re-forming of the skirt may be such as to effect a slight pinching of the marginal portion of the gasket between the inwardly formed portion of the skirt below it and the top portion of the cap above it.

The invention residing in the closure cap construction herein illustrated and described constitutes the subject matter of my divisional application for Closure for packing vessels, Serial No. 720,365, filed April 13, 1934.

What I claim is:

1. A method for making a closure cap for packing vessels which comprises providing a shell having a top portion and a peripheral skirt depending therefrom, providing a gasket which is made of plastic sealing material and is smaller in diameter than the internal diameter of the skirt, inserting the gasket within the compass of the skirt, squeezing the plastic gasket against the top of the shell and thereby increasing the circumferential size of the gasket, and contracting a portion of the skirt below the gasket to a size less than the circumferential size of the gasket.

2. A method for making a closure cap for packing vessels which comprises providing a shell having a top portion and a peripheral flange depending therefrom, providing a gasket of plastic sealing material, inserting the gasket within the compass of the flange and into contact with the top portion of the shell, shaping the upper portion of the flange opposite the periphery of the gasket to form a circumferential channel, and squeezing the plastic gasket against the top of the shell and thereby displacing peripheral portions of the gasket outwardly into said channel.

3. A method for making a closure cap for packing vessels which comprises providing a shell having a top portion and a peripheral flange depending therefrom, providing a gasket of plastic sealing material, inserting the gasket within the compass of the flange, reducing the circumferential size of the flange below the gasket and increasing the circumferential size of the gasket.

4. A method for making a closure cap for packing vessels which comprises providing a shell having a top portion and a peripheral flange depending therefrom, providing a gasket of sealing material, inserting the gasket within the compass of the flange, displacing portions of the gasket outwardly to increase its peripheral size, and displacing the lower margin of the flange inwardly beyond the periphery of the gasket.

5. A method for making a closure cap for packing vessels which comprises providing a shell having a top portion and a cylindrical peripheral flange depending therefrom, providing a sealing gasket which is smaller in circumference than the internal compass of said flange, inserting the gasket within the compass of the flange, forcing peripheral portions of the gasket outwardly against the flange and reducing the peripheral size of the flange to displace its margin inwardly below the gasket.

6. A method for making a closure cap for packing vessels which comprises forming a shell with a top portion and a depending peripheral flange having an internal circumferentially extending channel in the upper portion thereof, providing a preformed continuous annular gasket of plastic sealing material, inserting the gasket within the compass of the flange, and plastically displacing marginal portions of the gasket outwardly into the channel of the flange.

7. A method for making a closure cap which comprises providing a shell with a top portion and depending annular flange, providing a preformed plastic annular gasket having a circumference smaller than the internal circumference of the flange and which contains unvulcanized rubber, inserting the gasket within the compass of the flange, retaining the gasket against inward displacement, compressing the gasket against the top of the shell until its thickness is decreased and its peripheral size increased, and heating the top portion of the shell and the gasket while the latter is compressed against the former.

8. A method for making a closure cap for packing vessels which comprises forming a shell with a top portion and depending peripheral flange having an inwardly opening channel extending circumferentially thereof, providing a plastic gasket containing rubber and uncombined vulcanizing material, inserting the gasket within the compass of the flange, pressing portions of the gasket radially outward into the channel of the flange, and subjecting the gasket to vulcanizing heat.

9. A method for making a closure cap for packing vessels which comprises providing a metallic shell with a top portion and a peripheral flange depending therefrom, providing an annular gasket of plastic rubber composition, inserting the gasket within the compass of the flange, retaining the gasket against inward displacement, compressing the gasket against the top portion of the cap in such fashion as to crowd some of the plastic gasket material outwardly against the flange, applying heat to the top portion of the cap while the gasket is held under compression, whereby to effect adhesion of the gasket to the shell, and re-forming portions of the flange inwardly to a position below the area of the gasket.

10. A method for making a closure cap for packing vessels which comprises providing a metallic shell with a top portion and a peripheral flange depending therefrom, providing a preformed annular gasket of elastic sealing material, inserting the gasket within the compass of the flange and into contact with the top portion of the cap, maintaining the gasket against inward displacement, compressing the gasket against the top portion of the cap, and re-forming the flange to displace its lower margin inwardly below the area of the gasket.

11. A method of making a closure cap for packing vessels which comprises providing a shell having a top portion with an annular flange depending therefrom, providing a pre-formed annular gasket of sealing material, inserting the gasket within the compass of the flange to a position in which the lower surface of the gasket is spaced a substantial distance above the lower margin of the flange, and contracting the lower margin of the flange inwardly to an internal compass smaller than the circumference of the gasket.

12. A method of making a closure cap for packing vessels which comprises providing a shell having a top portion with an approximately cylindri-

cal flange depending therefrom, providing a pre-formed annular gasket of sealing material of a circumferential size slightly less than the internal compass of the flange, inserting the gasket within the compass of the flange to a position in which the lower surface of the gasket is spaced a substantial distance above the lower margin of the flange, and contracting the lower margin of the flange inwardly to an internal compass smaller than the circumference of the gasket.

13. A method of making a closure cap for packing vessels which comprises providing a shell having a top portion with an approximately cylindrical flange depending therefrom, providing a pre-formed annular gasket of sealing material of smaller circumferential size than the internal compass of the flange, inserting the gasket within the compass of the flange to a position spaced above the lower margin of the flange, and re-forming the portion of the flange below the gasket to a conic form converging downwardly from the periphery of the gasket to a diameter less than that of the gasket.

14. A method of making a closure cap for packing vessels which comprises providing a sheet

metal shell having a top portion with an approximately cylindrical flange depending therefrom, providing a pre-formed annular gasket of a sealing material susceptible of being rendered tacky by heat, inserting the gasket within the compass of the flange, heating the top portion of the shell and compressing the gasket thereagainst, and re-forming the portion of the flange below the gasket to a conic form converging inwardly from the periphery of the gasket.

15. A method of making a closure cap for packing vessels which comprises providing a shell having a top portion with an approximately cylindrical flange depending therefrom, providing a pre-formed annular gasket of plastic sealing material, inserting the gasket within the compass of the flange to a position spaced above the lower margin of the flange, and contracting a portion of the flange below the gasket to a size such that its internal circumference is less than the circumference of the gasket, and applying retaining support to the inner side of the gasket to limit inward displacement thereof during the contracting of the flange.

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