

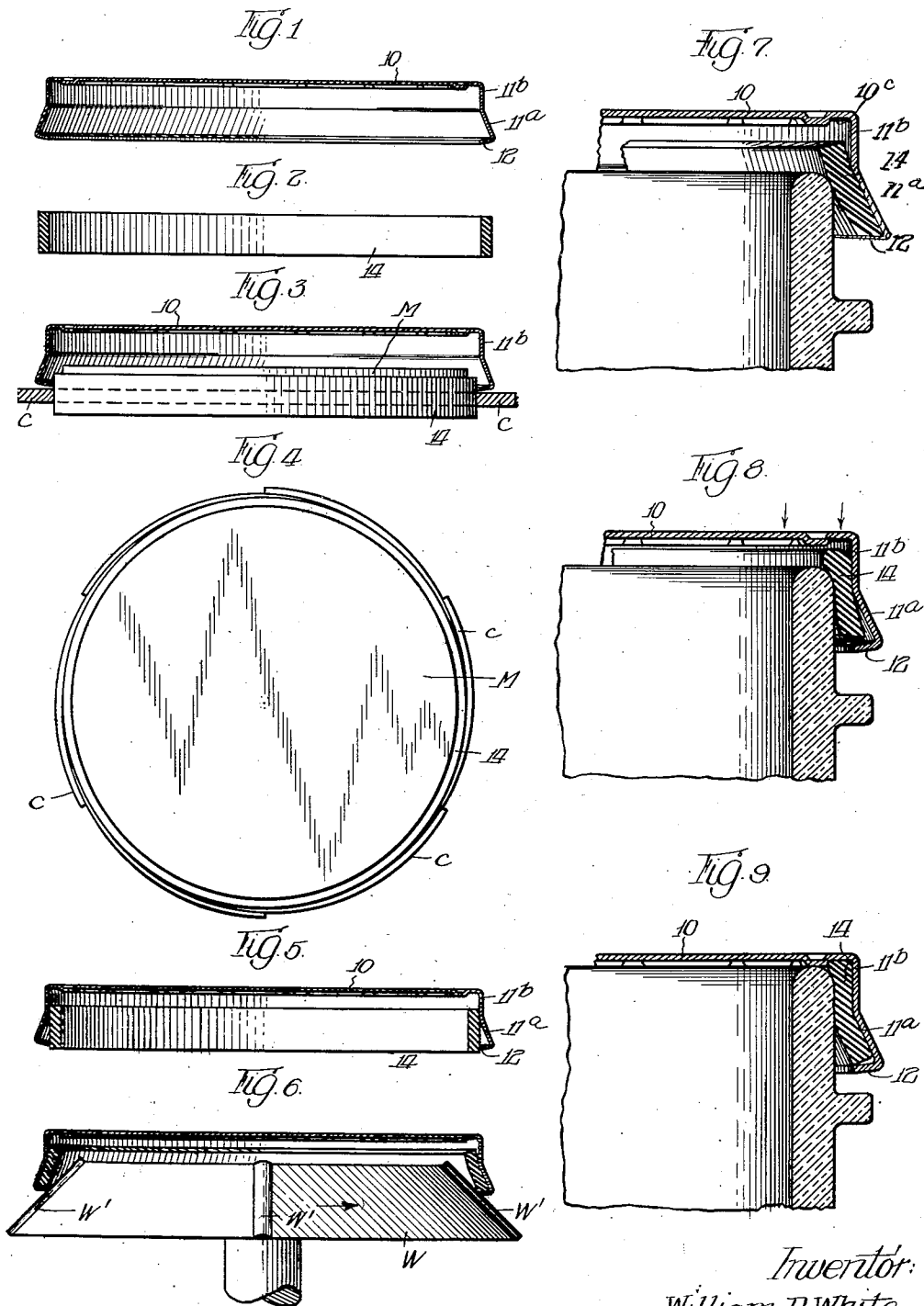
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METHOD OF MAKING CLOSURE CAPS

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UNITED STATES PATENT OFFICE

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METHOD OF MAKING CLOSURE CAPS

Application filed May 21, 1928. Serial No. 279,390.

This invention relates to manufacture of closure caps of the type employed for closing vessels or receptacles, such as jars, cans, tumblers, bottles, and the like, for the retention and preservation of their contents.

In my copending application Serial No. 340,414 filed on February 16, 1929, as a division of this application, I describe and claim an improved closure cap possessing certain features by virtue of which it may be applied with facility to the vessel, will form a secure air-tight seal effective to retain the contents of the vessel, prevent pollution thereof and hold a vacuum in the vessel, may be removed easily without destruction or mutilation of either the vessel or the closure itself, is susceptible of repeated reuse to form an effective closure and seal for a vessel, and has various other advantages from the standpoint of manufacture, use by the packer, and use by the consumer.

One object of the present invention is the provision of an improved method whereby a closure cap having the characteristics and advantages above specified may be manufactured rapidly and in large quantities at minimum expense and with uniformity in the construction and design of the caps produced.

Another object is the provision of an improved method for forming closure caps with elastic sleeve gaskets.

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

In the accompanying drawings forming a part of this specification are illustrated certain steps in the practicing of the method and certain structural features of a cap embodying the invention, but it is to be understood that these may be departed from in certain details in the practice of the invention.

In said drawings:

Fig. 1 is a diametrical sectional elevation of a cap portion of a closure for a packing vessel;

Fig. 2 is a diametrical section of a gasket forming a part of such closure;

Fig. 3 is illustrative of an operation performed in assembling the gasket in the cap portion;

Fig. 4 is a diagrammatic plan view of certain elements of apparatus which may be employed for constricting or circumferentially compressing the gasket for positioning it in the cap portion;

Fig. 5 is a diametrical sectional elevation showing the cap portion with the gasket inserted therein;

Fig. 6 illustrates a similar diametrical sectional elevation of the closure and an operation in the method for positioning the inserted gasket in the cap portion;

Fig. 7 is a part sectional elevation of a receptacle and a closure cap illustrating the relative position of same at one stage in the operation of placing the closure on the vessel;

Fig. 8 is a similar part sectional elevation illustrating relative positions of the closure portions and the vessel at a later stage in the sealing operation, and

Fig. 9 is a similar part sectional elevation illustrating the relationship of the closure parts and the vessel in the sealed package.

In the packing of various materials such as food stuffs, which it is desired to seal airtight, and which it may be desired to pack in vacuo and to subject to a sterilizing heat after sealing, certain features of the package and of the closures therefor are of prime importance. For example, it is of importance that the closure be easily applied, so that the packing may be carried on rapidly and without necessitating the employment of heavy mechanical pressures which might distort or fracture the closure itself or the vessel to which it is applied. Likewise, it is of importance that the closure form a close airtight seal on the vessel so that the contents of the package may be properly preserved, incident to which it is necessary that the connection of the closure and the vessel be such that the former is securely retained in place incident to handling and shipping of the package. Moreover, it is quite desirable that the closure be susceptible of removal.

al with facility by the consumer without injury to it or the vessel, so that it may be continued in use as an effective closure in the event it is desired to keep some of the contents in the vessel after it has been originally opened. The closeness of the seal and the secure retention of the closure on the vessel are of particular importance also in connection with the processing or sterilizing of the sealed package by heat, due to the fact that the heat generates pressures within the package which tend to displace the closure or render the seal leaky, and thus offer opportunity for pollution of the contents. A closure which meets these requirements in a very effective manner is disclosed in my copending application referred to above, and the method of manufacture herein described may be utilized to advantage in the manufacture of closures of that and similar types.

As a first operation in the method of manufacture, a suitably shaped blank of ductile and resilient sheet material, such as sheet metal, is formed, as by punching, drawing and spinning operations, into a cap having the top portion 10, customarily of circular form, with the depending skirt having a holding portion 11^b, preferably cylindrical, and a flaring portion 11^a which terminates at an turned flange 12. A sleeve gasket 14, is formed of a compressible elastic material, such as a firm rubber composition, as by cutting off sections of rubber tubing. The outside circumference of this gasket is substantially in excess of the inner circumference of the holding part 11^b of the cap, and may be in excess even of the maximum internal circumference of the flaring part 11^a. The cap and the gasket are formed with reference to each other in such respect that the width of the flange 12 will be sufficient to cover the end of the gasket. The gasket being so formed and being suitably glycerized or similarly treated to give it the proper surface finish, is then subjected to a constricting deformation or circumferential compression while in a substantially cylindrical or annular form. This step is illustrated in Fig. 3, and may be accomplished by positioning the gasket about a cylindrical mandrel M which is of a circumference substantially smaller than the inner circumference of the gasket and also substantially less than the inner circumference of the holding part 11^b of the cap. Constricting pressure is then applied to the outer circumferential side of the gasket as by means of movable constricting members C operated in such fashion as to compress the gasket radially and circumferentially and press it against the circumferential surface of the mandrel. These constricting members may be associated with one another in such fashion as to completely encompass the gasket, as illustrated in Fig. 4, and manipulated with an involute move-

ment so that they exert pressures both circumferentially and radially inward on the gasket and compress it against the mandrel. An apparatus for thus compressing the gasket is disclosed in my co-pending application Serial No. 278,958. Thus, the gasket is elastically deformed by compression in a substantially cylindrical shape to such an extent that its size, while it is in the compressed condition, is somewhat less than the inner circumference of the holding part 11^b. Although thus compressed and constricted to a size which is substantially less in circumference than that of its original size, the gasket retains its elasticity. While the gasket is held in this constricted size and substantially cylindrically form, the cap is brought into coaxial relationship with it, as illustrated in Fig. 3, whereupon the constricting pressure is suddenly released while at the same time the cap is instantly pressed down in enveloping relationship to it, so that when the gasket reacts elastically from the compression, it will be caught within the circumscribing skirt portion of the cap. Thereupon, the gasket and the cap will occupy approximately the relationship illustrated in Fig. 5. Now, in order to completely position the gasket in the cap with the lower edge of the gasket entirely seated above the flange 12 and the upper edge properly spaced from the top of the cap, and to give the gasket the desired flare or tapering contour, the lower portion of the gasket is submitted to a rubbing operation so applied as to force the entire lower edge to a position overlying the flange 12. This rubbing pressure is preferably applied to the gasket in both upward and outward directions. It may be applied very conveniently and effectively by a spinning operation, as by means of a conical spinning wheel W which is rotated on its axis and which has some low ribs W', the wheel with the ribs being of such size that it may enter part way within the gasket and contact the lower corner portion thereof. When the cap with the gasket is pressed lightly on the wheel as illustrated in Fig. 6, the spinning wheel will apply rubbing pressures circumferentially, upwardly and outwardly to the gasket, and move the gasket upwardly in the cap and dispose the lower margin portion thereof in a position overlying the flange 12, incidentally giving the gasket the desired flaring or tapering form. A proper spacing of the upper edge of the gasket from the top of the cap is of importance in view of the variations which occur in the circumferential size and form of the receptacles which are available commercially. In the manufacture of packing vessels such as glass tumblers and jars, the vessels cannot be held rigidly to accurate roundness and size. Thus certain variations in those particulars are unavoidable

and expected in any lot of a given commercial size rating. In order for a given closure to be capable of use on any vessel within the expected variations, it is necessary that it be qualified to accommodate such variations, from minimum to maximum, without detriment to its sealing efficiency. Hence, it is necessary that the gasket be of sufficient thickness to form an effective seal on a vessel of minimum size, and at the same time that the closure be able to take a vessel of maximum size, within the range of the expected variations of vessels of a given size rating. One condition which it is important to avoid in the sealing of the vessel is the pinching of a portion of the gasket material between the rim of the vessel and the top of the cap. Such pinching prevents the complete seating of the closure on the vessel, and hence may decrease the area of sealing contact between the outer wall of the vessel and the gasket. Moreover, the pinching of some of the elastic gasket material between the rim of the vessel and the top of the cap tends to force the cap off after the pressure of the sealing mechanism has been removed from the cap. Thus, the security of the seal is rendered uncertain if there is pinching of the gasket as just pointed out. In order for a closure to be thoroughly reliable, therefore, it must be proof against this pinching of the gasket. By employing a gasket of such length and positioning it in the cap in such relationship that there is a substantial space between the top of the gasket and the top of the cap, I am enabled to use a cap of sufficient size and a gasket of sufficient thickness to accommodate all variations within the commercial tolerances of a rated vessel size without sacrifice of security or certainty of the seal. The method above described permits the closures to be turned out rapidly with the proper spacing of the gasket from the top of the cap.

It will be observed that the gasket is still retained in a circumferentially compressed condition, and thereby will retain its desired position in the cap, although it is in no manner bound thereto. Hence the closure is ready to be applied to a vessel. The complete closures may be packed conveniently in cartons, one resting partly within another.

By the method above described, the caps may be formed rapidly and in large quantities with strict uniformity in size and design, it being understood, of course, that the method is not limited to the formation of caps of the particular design illustrated in the drawing.

What I claim is:

1. A method of making a closure for vessels comprising forming a cap with an annular skirt portion having a holding part and a flaring part terminating at an in-turned marginal flange, forming a sleeve

gasket of compressible elastic material of greater circumference than said holding part, subjecting the gasket while in substantially cylindrical form to circumferential compression to reduce its size to a circumference less than that of the holding part, inserting the gasket, as thus compressed, within the skirt portion of the cap, releasing the gasket to the constraining retention of the skirt portion, and pressing the lower portion of the gasket upwardly to a position overlying the marginal flange of the cap.

2. A method of manufacturing a closure comprising forming a cap of sheet material with an annular skirt portion having a flaring lower part terminating in an in-turned flange, forming a sleeve gasket of compressible elastic material and of a circumferential size exceeding the inner circumference of said flange, compressing the gasket circumferentially to a size permitting its insertion into the skirt portion, inserting the gasket into the skirt portion while so compressed, permitting the gasket to expand elastically from its compressed size into contact with the skirt portion, and then rubbing the lower portion of the gasket outwardly to a position against the flaring part and above the flange.

3. A method of manufacturing a closure comprising forming a sheet metal cap with an annular skirt portion having a substantially cylindrical upper part and outwardly flaring lower part terminating at an in-turned flange, forming a sleeve gasket of compressible elastic material with a circumferential extent exceeding the inner circumference of said cylindrical part, compressing the gasket circumferentially to an annular form and size permitting its insertion within said cylindrical part, inserting the gasket within the skirt portion while so compressed and permitting it to expand elastically against the skirt portion, and then pressing the gasket into the cap to position its lower margin above the in-turned flange while its upper portion is within the said cylindrical part.

4. A method of manufacturing a closure which comprises forming a sheet metal cap with an annular skirt portion which has a lower part terminating in an in-turned flange and flaring from an upper part of smaller circumferential extent, forming a sleeve gasket of compressible elastic material with a circumferential extent exceeding that of said upper part, elastically deforming the gasket by compressing it circumferentially in substantially annular form to a circumferential size permitting its insertion within the skirt portion, inserting the gasket within the skirt portion while so compressed, permitting the gasket to expand elastically into contact with the skirt portion, and applying spinning pressure to the lower portion of the

gasket to move it to a position overlying the marginal flange of the cap.

5. A method of assembling an elastic sleeve gasket in the skirt of a closure cap, which comprises setting up elastic compression in the gasket by applying to it peripheral constricting pressure and supporting it against collapsing inwardly, disposing the closure cap in coaxial association with the constricted gasket, releasing the constricting pressure and at the same time moving the cap skirt in an axial direction into encompassing association with the gasket, thereby permitting the gasket to expand by its own elasticity into peripheral contact with the inner wall of the skirt.

6. A method of assembling an elastic sleeve gasket in an annularly flanged closure, comprising elastically deforming the gasket to reduce its radial dimensions, inserting it within the compass of the closure flange, and spinning portions of the gasket outwardly into peripheral contact with the inner surface of the flange.

7. A method of making a vessel closure which comprises providing a cap with an annular skirt having portions curved on a common radius and a flared portion of larger radius, providing an elastic sleeve gasket of circumferential extent greater than the inner wall of the skirt, constricting the gasket to a size permitting its insertion into the compass of the skirt, inserting it axially within the compass of the skirt, and spinning portions of the gasket into peripheral contact with the flared portion of the skirt.

8. A method of assembling a closure which comprises providing a closure part in the form of an annular skirt, providing an elastic sleeve gasket of circumferential extent greater than that of the inner surface of said skirt, constricting the gasket to reduce its circumferential extent and supporting it against collapsing inwardly, inserting the constricted gasket within the compass of the skirt, and releasing the gasket to permit it to expand by its own elasticity into peripheral contact with the skirt.

9. A method of assembling an elastic sleeve gasket in an annular closure skirt, which comprises applying inward pressure to peripheral portions of the gasket to reduce its extent and set up elastic compression in it, applying support to inner surface portions of the gasket to limit their inward displacement, inserting the reduced gasket within the compass of the skirt, and releasing the gasket to the constraining support of the skirt.

In testimony whereof I have hereunto subscribed my name.

WILLIAM P. WHITE.