

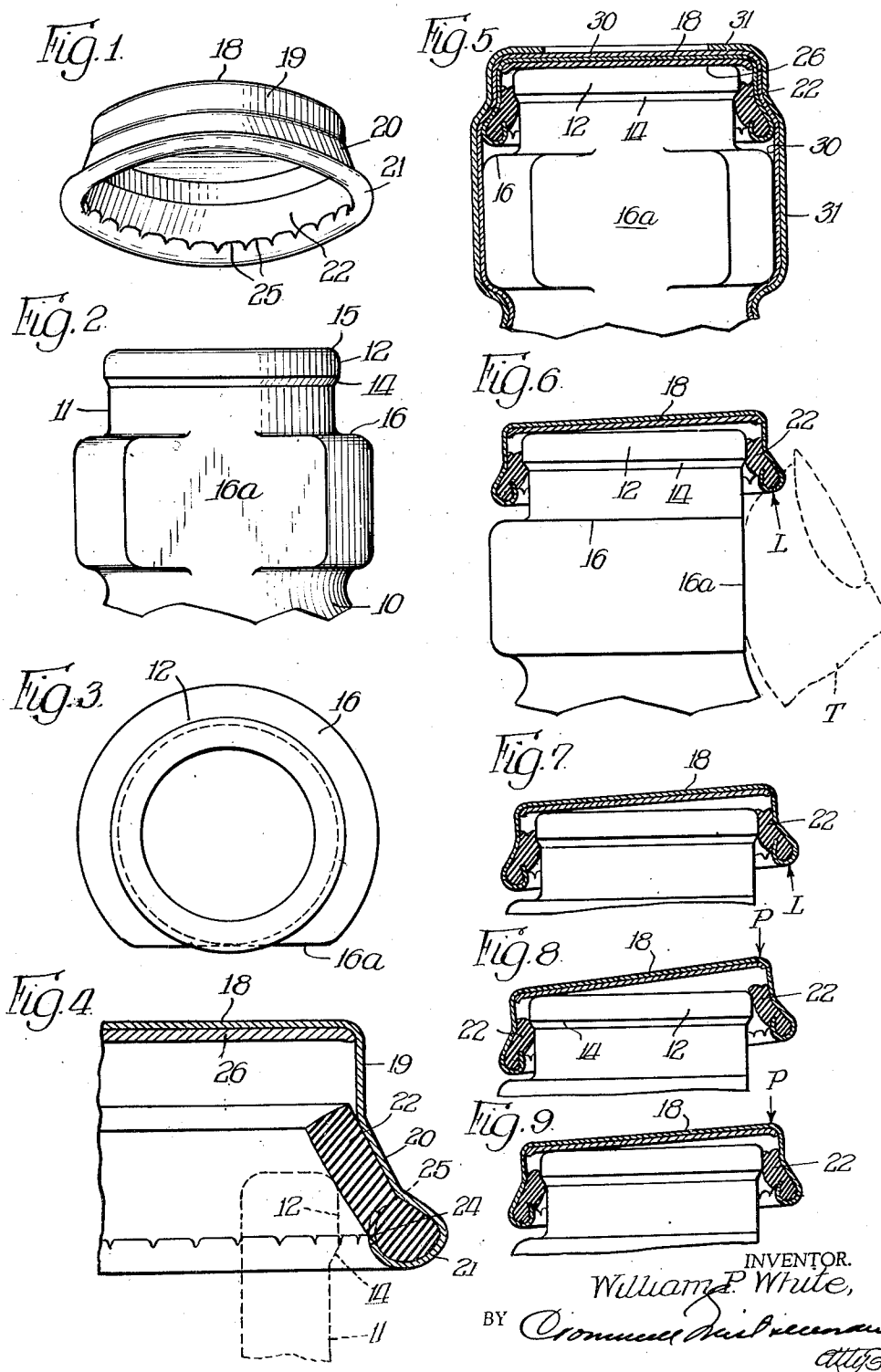
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PACKAGE AND CLOSURE

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PACKAGE AND CLOSURE

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This invention relates to packages and closures for the airtight packaging of various commodities, volatile liquids for example.

A general object of the invention is the provision of a package and closure which can be stoppered and sealed airtight very quickly and very easily incident to or pursuant to the exhaustion or evacuation of air from the receptacle or the charging of it with a pressure fluid, which will remain securely sealed incident to the contemplated handling of the package, yet which may be opened or unstoppered easily by hand when desired and resealed or restoppered by hand easily and quickly in an airtight condition effective to preserve the contents against evaporation.

A particular object of the invention is the provision of a package comprising a receptacle and stopper which are of such character that the latter may be applied and removed very easily and quickly by hand and repeatedly incident to the dispensing of the contents piecemeal, yet when on the receptacle will be retained very securely against internal pressures and impact of the contents, so as to retain the latter against leakage or evaporation.

Other objects of the invention will be pointed out or indicated hereinafter or will be apparent upon an understanding of the invention or its employment in use.

For the purpose of aiding in an explanation of the invention, I show in the accompanying drawing forming a part of this specification, and hereinafter describe, one form in which it may be embodied. It is to be understood that this is presented merely for illustration, however, and is not to be construed in any fashion for limiting the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawing,

Fig. 1 is a perspective view of a cap constituting the closure or stopper portion of the package, same being shown in perspective as viewed from below;

Fig. 2 is a side elevational view of the neck portion of a bottle or other container constituting the receptacle portion of the package, same being shown in elevation;

Fig. 3 is a top view of the bottle neck structure shown in Fig. 2;

Fig. 4 is a detail in the nature of a radial section of the closure illustrated in Fig. 1, showing the construction in detail and on a larger scale;

Fig. 5 is an illustration of the parts shown in Figs. 1 and 2 in their assembled or sealed relationship, the closure being shown in section and

the bottle neck in elevation, and showing also an applied sealing strip or stamp and protective capsule;

Fig. 6 is a detail illustrating the relationship of the closure and neck portion of the receptacle in the course of the removal of the closure;

Fig. 7 is a similar illustration showing the relationship of the parts at a later stage in the removal of the closure;

Fig. 8 is a similar illustration showing the relationship of the parts at an early stage in the operation of reapplying the closure to the receptacle by hand; and

Fig. 9 is a similar illustration showing the relationship of the parts at a later stage in the operation of reapplying the closure by hand. The illustrations in Figs. 5 to 9 inclusive are of diagrammatic character.

There are numerous commodities which it is desirable to seal airtight when they are packaged in order to preserve them against spoilage or evaporation. Many of these are of a sort which are not consumed immediately upon the opening of the package, but are dispensed piecemeal over a considerable period of time. Condiment sauces and vinegar are examples of such commodities in the food class, and lotions, antiseptic solutions, carbonated liquids and spirituous liquors are examples of other commodities.

To meet fully the requirements for use with such commodities, the receptacle and its closure must be of a character such that they may be furnished at low cost to the packer, may be assembled and sealed by him quite rapidly and easily, will retain the closure securely against inadvertent detachment or loosening in the course of the packaging and shipping and handling of the package, and yet that the closure be susceptible of removal quite easily by the user, and finally that the closure be susceptible of being taken off and put back on repeatedly by hand with great ease and in such condition that it will continue to function as an airtight closure.

The present invention fulfills these requirements in most effective fashion. As embodied in the form illustrated in the accompanying drawing, it comprises a suitable receptacle in the nature of a bottle, jar or the like, and a cooperating sealing closure or stopper in the nature of a closure cap. The body portion 10 of the receptacle, only a fragment of which is shown in Fig. 2, may be of conventional form and made of any suitable material such as glass. It has a neck portion 11, which may be of generally cylindrical

form, and which affords a mouth at its upper end. For a distance below the mouth rim, the neck is slightly thickened or enlarged circumferentially so as to afford a peripheral compression surface 12, which may be for the most part cylindrical, and a downwardly converging or conic jutting surface 14 which meets the compression surface 12 and the smaller peripheral surface 11 at angles which are quite obtuse, in the neighborhood of 150°, for example. The mouth rim is relieved at its outer margin to form an upwardly converging surface 15. The surfaces 12, 14 and 15 are quite smooth and unbroken by any projections, the jutting surface 14 merging directly into the surfaces 11 and 12 at its lower and upper ends. At a suitable distance below the jutting surface 14, the neck of the receptacle is formed with a peripherally projecting shoulder or ledge 16, which extends outwardly a substantial distance beyond the compression surface 12 and may be of substantial longitudinal extent so as to present peripheral surfaces of considerable extent in the axial direction. In at least one locality this ledge is interrupted or flattened off approximately as far as the neck surface 11, as illustrated at 16a. It may be likewise flattened off at the opposite side of the neck if desired.

The closure, as best illustrated in Figs. 1 and 4, comprises a shell which preferably is made of sheet metal and is formed with a circular top portion 18 from the margin of which depends an annular skirt. The upper part 19 of this skirt is of approximately cylindrical form and is of constricted size relative to the lower part and its internal diameter is larger than the external diameter of the compression surface 12 of the receptacle. Below the constricted part 19, the skirt is formed with a flaring part 20 which slopes at an angle of appreciably less than 45° from the vertical and terminates in a rolled portion or bead 21. The thickness of this bead radially of the shell is almost as great as the length of the flaring skirt portion 20 and exceeds the radial deflection thereof—viz., the radial distance by which the lower limit of portion 20 exceeds its upper limit, and the bead is offset from and projects outwardly beyond the flaring portion 20 for a substantial distance, at least half the thickness of the bead, and then curves inwardly and upwardly so as to provide the skirt with a smoothly rounded lower margin of substantial width or thickness and of a diameter considerably greater than that of the flaring portion 20. The gasket 22 is made of a fairly soft but highly elastic flexible sealing material, such as a firm rubber composition. This gasket is of sleeve form and before insertion into the shell is of approximately cylindrical shape and of a diameter slightly greater than the internal diameter of the flaring portion 20 at its lower end. This gasket also is fairly plump, that is, of substantial thickness, such that its normal thickness exceeds the difference between the radius of the surface 12 and that of the inner surface of the skirt part 19 by 15% or more. This gasket is constricted or compressed circumferentially enough to permit it to be inserted within the compass of the skirt, where, due to such compression and its elastic character, it lies closely against the inner surface of the skirt and its lower portion takes a downwardly flaring form corresponding to that of the lower portion of the skirt. The skirt material in the bead 21 is curled inwardly around the lower end of the gasket and then upwardly and outwardly into tight gripping engagement with the gasket a short dis-

tance above its lower end, as indicated at 24, thereby fastening its lower end very securely to the skirt and the lower margin of the skirt may be provided with prongs or serrations 25 which are curled upwardly and outwardly and intruded deeply into the gasket as shown. As thus positioned and secured in the shell, the gasket is located with its upper end projecting only slightly above the lower end of the constricted portion 19 of the skirt and spaced from the internal top surface of the shell by a distance exceeding the thickness of the gasket, as seen in Fig. 4. As thus formed and shown in Fig. 4, the bead 21 projects outwardly beyond the lower limit of the flaring portion 20 for a distance almost as great as the total diameter of the bead, in which relationship, although the transverse thickness of the bead is greater than the radial deflection of the flaring portion 20, the bead lies entirely outwardly beyond the inner surface of the constricted portion 19. The diameter of the closure at the periphery of the bead is approximately equal to the diameter of the periphery of the ledge 16. A liner 26 is secured in covering relationship to the top portion 18 as a protection for the latter against abrasion by the mouth of the receptacle, and the proportions of the parts are such that, when so assembled, the upper end of the gasket 22 is spaced from the liner 26 a distance slightly less than the spacing of the jutting surface 14 from the uppermost surface of the mouth rim of the receptacle, and the upper limit of the flaring part 20 of the skirt is spaced from the lower surface of the liner 26 (which will be referred to as the under surface of the top portion) a distance slightly greater than the spacing of the upper limit of the jutting surface 14 from the uppermost surface of the mouth rim of the receptacle.

The package is closed and sealed simply by placing the closure upon the mouth of the receptacle with the mouth rim of the latter against the flaring inner surface of the gasket 22, and then pressing the closure downwardly so as to intrude the compression surface 12 within the gasket. Preliminary to the seating of the closure the air may be displaced or withdrawn from within the cavity of the closure and the unfilled head space of the receptacle. The closure is pressed down until its under surface reaches the mouth rim of the receptacle, at which position the lower margin of the skirt will be spaced a slight distance above the peripheral ledge 16, substantially as illustrated in Fig. 5.

Incident to the forcing down of the closure, the upper portion of the gasket is compressed between the compression surface 12 at its inner side and the constricted portion 19 and upper part of the flaring portion 20 of the skirt against its outer side, and due to this compression, the uppermost portion of the gasket is somewhat elongated or molded upwardly in the space below the under surface of the top. When in seated position, the upper portion of the gasket bears inwardly against the compression surface 12 and a portion of the gasket immediately therebelow is molded inwardly under and in close engagement with the jutting surface 14, approximately as illustrated in Fig. 5. The high compression of the gasket between the receptacle at its inner side and the shell skirt at its outer side is effective to form a very tight hermetic seal between them, as the softness of the gasket permits it to conform closely to all irregularities in the compression surfaces and its inherent elasticity remains continuously effective to maintain the closeness of the

contact. The engagement of the portion of the gasket underneath the jutting surface portion 14 provides a mechanical lock or interengagement which holds the closure securely in place against pressures which may exist or be developed within the sealed package and against percussive forces such as may result from impacts of the contents of the package against the under surface of the closure. As a consequence, the package is very securely stoppered in a fashion which maintains an airtight seal. The ledge 16 which underlies the skirt of the closure throughout almost its entire extent affords a safeguard against accidental removal of the closure, and it also affords a convenient place of attachment for a sealing strip, such as a revenue stamp or the like which is adhesively secured in place so that it extends across the top of the closure and then down opposite sides thereof and down opposite sides of the ledge member, as illustrated at 30 in Fig. 5. Due to the proximity of the ledge 16 to the lower end of the skirt and the fact that they are of approximately the same diameter, they serve to safeguard such a sealing strip against being torn apart. An added protection for the sealing strip may be provided by applying and shrinking into place over and around the closure and ledge 16 a thimble or band 31 of cellulosic material of a kind customarily used for this purpose.

While the closure when seated on the receptacle as above described is held in place very securely, particularly by the elastic reaction of the compressed gasket radially against the surface 12 and by engagement of portions of the gasket under the jutting surface 14, the closure may be removed, when desired, quite quickly and easily by proper manipulation. In the first instance it may be preferable to do this by intruding a suitable prying implement between the ledge 16 and the bead 21 of the closure and prying the closure upwardly. This serves to tilt the closure and slide the gasket at one side upwardly from the oblique jutting surface 14, thus freeing it from the interlocking engagement of that surface and permitting it to be slid upwardly off of the compression surface 12 to such an extent that it may be lifted entirely off of the receptacle by hand. Detachment of the closure by means of a prying implement in this fashion is usually the easiest way to remove it in the first instance if the package was sealed in vacuo and if it has remained in this sealed condition for a sufficient time to permit the gasket material to have taken a certain amount of set in conformation with the surface 14.

After having been initially removed, the closure may be readily re-applied and sealed airtight on the receptacle by hand, as in the fashion illustrated in Figs. 8 and 9. In such re-application, the closure is first applied to the mouth of the receptacle in a tilted position with the gasket engaged below the jutting surface 14 at the lower side of the closure, and then applying downward pressure against the higher side of the top of the closure as indicated by the arrow marked P in Fig. 8. Thereby the elastic gasket is compressed between the compression surface 12 and the skirt of the shell and slid downwardly as the closure is forced down until it is reengaged all the way around under the jutting surface 14. Thus the interlocking between the closure and the receptacle is reestablished and the closure securely fastened in place. Thereafter, it may be readily removed simply by pressing upwardly, as with the tip of the thumb, against the lower margin of 75

the bead 21 at the location 16a where the ledge 16 is recessed or flattened off so as to allow the thumb to engage the bead. Such upward pressure slides the gasket upwardly off of the jutting surface 14 at that locality, whereupon the closure may be lifted off of the receptacle quite freely. The progressive movement of the closure in this operation is illustrated in Figs. 6 and 7, and it will be observed that the flaring lower portion of the shell skirt affords a progressively enlarging space for accommodation of the larger diameter portion of the receptacle represented by the compression surface 12, as the angularity of the closure with respect to the receptacle increases during the tilting of the former. The closure may be thus removed or replaced a great many times without destroying its effectiveness as an airtight seal or its ability to hold its place on the receptacle against internal pressures or impacts against the under surface of the closure. The secure retention of the closure on the receptacle results from the various cooperative features of the two, including the fact that the arrangement of the compression surface 12 and jutting surface 14 affords an interlocking engagement with the gasket completely around the neck of the receptacle. By virtue of the fact that the gasket is constrained circumferentially by the skirt of the shell, it requires quite a high pressure upon the under surface of the shell top to distend the gasket sufficiently to permit it to be moved upwardly from below the jutting surface 14 and blown off of the bottle. Consequently, the closure will be held in place against quite high internal pressures within the package. The ease with which the closure may be removed and replaced by hand likewise results from various cooperative features of the closure and receptacle. Among these are the large diameter or thickness of the bead 21, which gives the skirt a broad and smooth lower margin against which the tip of the thumb may be pressed with convenience and without discomfort, the disposal of the bead so that it projects a substantial distance outwardly beyond the flaring portion 20, thus increasing quite substantially the length of the pry-off leverage, and the angular relationship of the jutting surface 14 to the compression surface 12 whereby the former affords an inclined plane up which the gasket may be slid and gradually compressed by lifting of the cap at one side. The closure goes back on easily due to the fact that the gasket may be hooked under the jutting surface 14 at one side, and then the gasket may be gradually distended by intrusion of the tapering surface portion 15 of the mouth rim within it as the higher side of the closure is pressed downwardly. As the closure is thus moved downwardly on the receptacle, radially compressed portions of the elastic gasket reach the lower limit of the compression surface 12 and then expand under the jutting surface 14, thus causing the interengagement to be accomplished gradually from the low side toward the higher side of the closure, and actually aiding in the seating movement. In none of these operations is any portion of the closure subjected to permanent distortion.

For these reasons, this package is particularly effective and convenient for the packaging of materials which are to be dispensed from it from time to time and which it is desired to preserve against evaporation.

What I claim is:

1. A package for packing liquids and the like, comprising in combination, a receptacle having an annular mouth rim at its upper end and a

cylindrical peripheral compression surface therebelow and an annular peripheral jutting surface extending downwardly and inwardly from said compression surface at an obtuse angle; and a cap-like closure comprising a shell formed with a top portion for covering the receptacle mouth and an annular skirt depending from said top portion and having a flaring lower part and constricted upper part, the depth of said constricted part from said top portion being slightly greater than the spacing of the upper terminus of said jutting surface from the mouth rim, and a sleeve gasket of yieldable elastic sealing material disposed within the skirt and fastened thereto at its lower end with the periphery of the gasket resting against the inner surface of said flaring part and the upper end of the gasket spaced below the top portion but extending within and constrained in circumferentially constricted condition by the constricted part with portions of the gasket compressed radially between the latter and portions of the compression and jutting surfaces of the receptacle entirely around said surfaces; whereby the closure is retained in sealing position on the receptacle whence it may be disengaged by swinging one side of it upwardly by finger pressure to slide portions of the gasket upwardly along the jutting and compression surfaces at one side of the receptacle.

2. In a package having a receptacle with an annular mouth rim at its upper end and an annular peripheral compression surface therebelow and a smooth annular jutting surface sloping inwardly at an obtuse angle from the lower limit of the compression surface; a closure for hermetically sealing such receptacle and comprising a cap-like shell with a top portion for covering the receptacle mouth and an annular skirt depending from said top portion and of greater diameter than the compression surface of the receptacle, said skirt being formed with a flaring lower portion and with a constricted upper portion of greater depth than the compression surface of the receptacle, said closure having a sleeve gasket of yielding elastic sealing material disposed in the shell with its periphery lying against the flaring portion of the skirt and its lower end fastened to the lower end thereof and its upper end spaced below the top portion but extending above the flaring portion and retained in circumferentially constricted condition by the skirt, constricted portions of said gasket being of thickness

sufficient to be compressed radially between the constricted portion of the skirt and portions of the compression and jutting surfaces of the receptacle entirely around the latter when the closure is seated on the receptacle, the skirt having at its lower end a peripheral bead offset from and projecting outwardly beyond the flaring portion and forming therewith a leverage member through which finger pressure may be exerted to tilt the seated closure on the receptacle and slide portions of the gasket at its elevated side upwardly along the jutting and compression surfaces to disengage the closure from the receptacle.

3. A closure for hermetically sealing a receptacle having an annular mouth rim at its upper end and an annular peripheral compression surface therebelow and a smooth annular jutting surface sloping inwardly from the lower limit of the compression surface; said closure comprising a cap-like shell with a top portion for covering the receptacle mouth and an annular skirt depending from said top portion and of greater diameter and depth than the compression surface of the receptacle and being formed with a flaring lower portion and a constricted upper portion, said closure having a sleeve gasket of elastic sealing material disposed with its periphery lying against the flaring portion of the skirt and its lower end fastened to the lower end thereof and its upper end spaced below the top portion but extending above said flaring portion and retained in circumferentially constricted condition by the skirt, constricted portions of said gasket being of thickness sufficient to be compressed radially between the constricted portion of the skirt and portions of the compression and jutting surfaces of the receptacle entirely around their peripheries when the closure is seated on the receptacle, the skirt having at its lower end an inwardly curled peripheral bead in which the gasket is clamped, the transverse thickness of said bead exceeding the radial deflection of the flaring portion and the bead being offset from the flaring portion so that the major part of the bead's thickness projects outwardly beyond the flaring portion and forms therewith a leverage member through which finger pressure may be exerted to tilt the seated closure on the receptacle and slide the gasket upwardly along the jutting and compression surfaces on one side thereof to disengage the closure from the receptacle.

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