

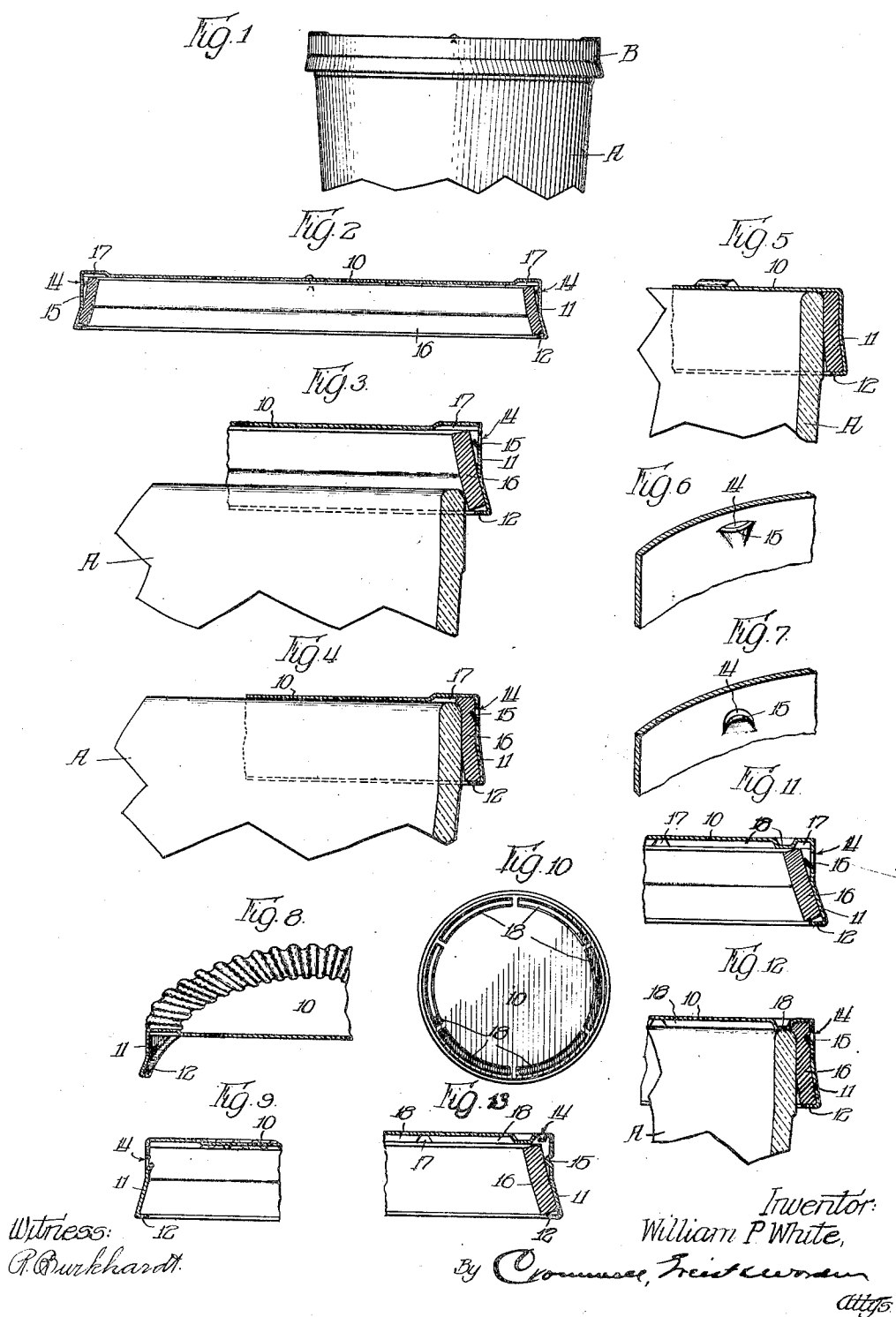
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CLOSURE CAP

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UNITED STATES PATENT OFFICE.

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CLOSURE CAP.

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This invention relates generally to packages and containers for foodstuffs and the like, and particularly to improvements in the closures or caps designed for cooperation with suitable bottles, jars, or cans to form packages or containers in which such materials may be packed and from which they may be dispensed.

Because of the very extensive and increasing use of merchandising packages for the packing of goods, particularly of foodstuffs, small items in the reduction of cost in the manufacture of each container, or in its handling in the packing operations, or in its transportation, amount to very large savings in the aggregate, and are determining factors in the practicability and utility of containers of different sorts. Among the factors which go to determine the cost of a finished package in the hands of a retailer or consumer must be figured not only the actual cost of production of the receptacle and the closure, but also the facility with which they may be manipulated in the packing operations; the certainty with which they will perform their intended functions under varying conditions and thereby eliminate loss through waste of receptacles and closures or spoiling of the material packed; adaptability of uniform receptacles and closures to different conditions of packing, such as hot packing, cold packing, vacuumizing, sterilizing, carbonating, etc.; elimination of special machinery or special fittings for the closing of different sized packages; and adaptability of the finished package to compact assembly in cartons or boxes for the purpose of shipment. In addition to these, other conditions gauge the utility of the container, such as the readiness with which it may be opened by the user, its capacity for re-sealing so as to be continued in use as a protection for the contents, the certainty and facility with which the packages may be stacked, as for display on the shelves of a retailer, freedom from parts which might injure the hands in handling or opening, and its neatness or attractiveness in appearance and capacity for retaining the same.

It is the general purpose of my invention to provide a closure cap which will possess in the highest degree all of the features of utility of such an article. More specifically

stated, my invention has for its purpose the provision of a closure cap which may be manufactured economically; which will maintain its proper shape and assembly of parts incident to packaging and handling; which may be packed in quantities in small space so as to minimize cost in transportation to the packer who uses it; which is quickly and easily assembled with the receptacle on which it is to be used and will form a closure therefor preliminary to the actual sealing operation, so that the package may be freely handled without danger of spilling the contents incident to the sealing operation; which will form an hermetic closure; which will form a very secure closure under different conditions, such as where the goods are sealed in vacuo or sealed under pressure, and will not be displaced by internal pressures which may be generated incident to cooking or heat sterilizing of the sealed packages or be displaced incident to handling or transportation; which does not require special machinery for the sealing operation or different fittings for the sealing of different sizes of closures; which is particularly effective as a closure for plain sided receptacles, such as ordinary tumblers having the walls about their mouths of cylindrical or conical form; which will accommodate the permissible variations in size or roundness encountered in commercial receptacles such as tumblers, bottles, and jars; which conforms closely to the receptacle on which it is sealed, so that the finished packages may be assembled in minimum space in boxes or cartons, thereby keeping down the cost of the boxes and transportation; which will adequately protect the mouth of the glass from being chipped or broken; which will facilitate the stacking of the packages; which may be easily opened without requiring the use of an implement; which, after its original detachment, may be used repeatedly to reseal the receptacle in such fashion as to prevent spilling of the contents; which forms a neat and attractive appearance; and in which all raw edges or margins of metal are effectively concealed so that they will not show rust and will not injure the hands of the user.

Further and particular objects of the invention, and the manner in which they are

obtained, will be pointed out hereinafter, indicated in the appended claims or obvious to one skilled in the art upon an understanding of the present disclosure. For the purpose of this application I have shown in the accompanying drawings forming a part of this specification, certain forms in which the invention may be embodied, but it is to be understood that the invention may be embodied in other and divers forms without departing from which I purport to secure by Letters Patent; and hence that the illustrative disclosures herein are not to be interpreted in any fashion such as to limit my invention short of its true and most comprehensive scope in the art.

In the said drawings:—

Fig. 1 is a part elevational view of a package or container illustrating the appearance of a structure embodying my invention;

Fig. 2 is a sectional elevation of a closure cap in association with a partial representation of a glass tumbler of a sort with which it may be used;

Fig. 3 is a part sectional elevation illustrating the association and cooperation between a receptacle and a form of my improved closure cap as assembled prior to the sealing operation;

Fig. 4 is a similar view of the same elements showing the relationship after the sealing operation;

Fig. 5 is a view similar to Fig. 4, but taken on a different diameter of the closure, illustrating the relationship of parts after the sealing operation;

Fig. 6 is a detail in the nature of a perspective of a fragmentary portion of a closure cap, illustrating one form of vent;

Fig. 7 is a detail similar to Fig. 6 illustrating another form of vent;

Fig. 8 is a detail in the nature of a perspective view of a fragment of a closure cap differing in particulars from that illustrated in Figs. 1 and 2; the corrugations illustrated being in exaggerated proportion;

Fig. 9 is a detail in the nature of a fragmentary sectional elevation through a portion of the closure cap illustrated in Fig. 8;

Fig. 10 is a top view of a second modified form of the invention;

Fig. 11 is a fragmentary sectional elevation of the form illustrated in Fig. 10 illustrating the relationship of parts before the closure is applied to a vessel;

Fig. 12 is a similar fragmentary sectional elevation illustrating the relationship of parts after the form illustrated in Fig. 11 is applied to a vessel; and

Fig. 13 is a similar fragmentary sectional elevation showing a further modification of the form illustrated in Fig. 10.

The nature of the invention will be most readily understood by reference to these il-

lustrative forms in detail. My invention contemplates the use of a suitable receptacle, which is designated by the character A and a suitable closure which is designated by the character B. The latter is preferably shaped out of suitable ductile sheet material, such as light sheet metal, pressed or spun into the form of a cap or cover having the usually circular top portion 10 with the integral side portion 11 depending from the periphery thereof in the form of an annular skirt or flange. This skirt has an upper part shaped to form a gripping portion, same being here shown as of generally cylindrical form, while the lower part of the skirt is of downwardly flaring or conical form, with its marginal portion turned inwardly in suitable fashion such as to form a flange 12 or other suitable edge finishing bead. The depth of the side portion 11 is sufficient to overlap a substantial area of the receptacle A when the top portion 10 is seated against the rim thereof, and the diameters of the top portion and side portion are greater than the diameter of the receptacle or vessel with which the closure is intended for use.

Referring now to the forms illustrated in Figs. 1 to 5, inclusive, it will be observed that adjacent the upper limit of the side portion 11 there is formed a vent opening 14. Preferably there is a plurality of these, spaced circumferentially about the cap. They may be formed by striking in small portions of the material, as illustrated in Figs. 6 and 7, to provide spacing members 15 projecting inwardly from the side portion. An elastic compressible gasket 16, of firm texture, such as of good rubber, is disposed within the cap in contact with the inner surface of the side portion. This gasket is preferably of the sleeve or tubular form and of such diameter that it will fit closely the flaring part of the side portion, its upper part being somewhat compressed within the cylindrical part thereof. The result is that the gasket hugs the inner surface of the side portion closely, excepting where it is held apart therefrom by the inwardly projecting spacing members 15. The width of the gasket is such that when thus assembled with its upper margin abutting the inner surface of the top 10, its lower margin will lie above the inwardly turned bead or flange 12, which will be effective to prevent its downward displacement from the cap, its upward displacement being limited by the top portion. At different localities, preferably in association with the vent openings, limited areas in the marginal portion of the top 10 are bent out of the normal plane to afford venting channels 17 extending across the upper margin of the gasket. The thickness of the gasket is such that it will exceed the clearance between the outer

surface of the receptacle and the inner surface of the gripping portion so that a substantial proportion of the thickness of the gasket, when assembled within the cap before application to the vessel, lies within the area circumscribed by the outer surface of the receptacle. Due to the flaring lower part of the side portion 11, however, the lower part of the gasket takes the form of an inwardly contracting sleeve which, in its lower portion, circumscribes an area sufficient to receive the mouth of the receptacle in such relationship that when the closure is placed thereon in substantially the position illustrated in Fig. 3, it will fit sufficiently tightly to retain the closure fairly securely in place, and prevent spilling or slopping out of the contents of the receptacle incident to the expected movement to which it normally is subjected after filling and before sealing. Due to the obtuse angle at which the flaring part of the side 11 diverges from the cylindrical part, the gasket takes a gradual inward taper, so that downward pressure exerted against the top of the cap, such as to move the latter on to the container, will gradually increase the compression of the gasket between the wall of the receptacle and the side portion 11, which latter exercises a constraining effect. It is preferable that the material in the side portion 11 have a certain amount of resiliency so that it may be slightly sprung outwardly incident to the seating of the cap, so as to assume a position somewhat as illustrated in Figs. 4 and 5. The result is that the farther the closure is forced on the vessel, the greater becomes the compression of the gasket and the tighter the seal upon the wall of the vessel. Through the cooperation of these factors a wide and very tight sealing zone between the vessel and the gasket is secured.

Incident to the upward movement of the vessel in contact with the gasket, the tendency upon the latter will be to wedge it outwardly and displace it upwardly, but its upward movement is definitely limited by the top portion 10, against which it will be pressed tightly so as to be highly compacted or compressed in the corner portion between the side 11 and top 10 and the outer wall of the vessel when the top portion comes into contact with the rim of the vessel. The tight packing of this particular area has particular importance, as will be pointed out presently. When the cap is first applied to the vessel with the edge of the latter in contact with the flaring portion of the gasket there remains a considerable volume between the top portion and what would normally be the surface of the material in the receptacle, which space or volume will be completely or nearly all eliminated in the seating of the cap, depending upon whether the vessel is filled full or nearly

full. If, for example, the vessel is being sealed at atmospheric pressure, such as ordinarily is done with commodities which are self-preserving or contain preserving materials, or with some commodities which it is intended to sterilize after sealing, this volume between the surface of the material and the top of the closure will be occupied by air, which would have to be compressed to half its volume or less if retained in the package during the complete seating of the closure. The vents 14 are provided to afford outlet for this contained air incident to the seating of the cap, and they may function also as channels through which the amount of vacuum within the package may be increased incident to the seating of the cap. It is desirable that the vents 14 be placed high up on the side portion, so that they will be closed only after the cap has completed substantially all of its movement, as thereby the trapping and compression of air in the container is reduced to a minimum. The positioning of the vent openings near the top of the cap is made feasible by the circumstance that the gasket is free to be compressed against the top of the cap and the part of the side portion immediately contiguous thereto, thus insuring the adequate closing of the vent openings when the cap is forced home.

The desirability of having the portion of the gasket within the angle of the cap highly compressed has been mentioned above. In instances in which packages are sealed while their contents are hot, or under vacuum, the external air pressure, upon the cooling of the heated contents after sealing or the removal of the vacuumized package from the vacuumizing apparatus, tends to depress or force inwardly the top portion of the closure. This exercises an inward tension upon the material adjacent the junction of the top and side portions, with the likelihood particularly in instances where very light material is used, of causing a wrinkling or slight buckling thereof and possible injury to the seal of such nature as to result in leakage. Consequently it is important that the material in the angular portions of the closure about the rim of the container be quite solidly supported by the compressed gasket material, and this is accomplished by the use of a free gasket which admits of being crowded and compacted about the mouth of the vessel in the angle between the top and side portions of the cap, as illustrated in Fig. 5. This also forms a tight seal immediately at the mouth of the vessel and prevents the contents overrunning its side. The vent channels 16 afford passages over the gasket through which the air may reach the vents 14 while the gasket is being compressed against the top incident to the seating of the cap. The portion of the

gasket over the vent being held apart from the vent opening by the spacing member 15, the air is free to escape therethrough, until, just as the cap reaches seated position, the upper margin of the vessel passes the vent opening and crowds the gasket material into it, incidentally urging the spacing member 15 outwardly. This compression of the gasket material upon the vent opening hermetically seals the latter, the relationship of parts being illustrated in Fig. 4. When sealing in vacuo, the sub-atmospheric pressure about the container will be effective as suction to draw air out through the vent openings incident to the seating of the cap, thereby aiding in increasing the vacuum in the package.

A distinct advantage of the invention resides in the fact that it does not require any special chucks or implements for re-forming portions of the cap or constricting the gasket, incident to the sealing operation. The container is sealed simply by the application of mechanical pressure against the top of the cap adequate to force it to seated position. Nor does the package have to be sealed in vacuo in order that the closure be retained securely in place and an hermetic seal preserved. The area of contact between the gasket and the receptacle and the degree of compression induced in the gasket by the seating of the closure, together with the resilient tension induced in the side portion of the cap and the compacting of the gasket material in the top angle, cooperate to retain the closure so firmly and securely seated that excessively high internal pressures, exceeding those generated by the customary heat sterilizing practices, would be required to displace it. It is to be observed, furthermore, that the closure affords a seal thus secure upon ordinary straight sided tumblers. As is well known in the art, straight sided tumblers are much more in demand than special forms having shoulders or beads, or other features or characteristics designed particularly with reference to the closure. The economy in the use of straight sided vessels resides not only in their low original cost, but also in their economy in space required to pack them in shipping cases. The economy in the use of straight sided receptacles is so great and the demand because of their reuse value so exceptional that workers in the art have gone to great lengths in the devising of special and costly sealing machinery in efforts to supply the trade with means for effecting hermetic sealing upon vessels of that type.

It will be observed that in Figs. 2 and 3 the vent channels are formed at relatively distant points by striking a limited portion of the metal of the top 10 upwardly out of the normal plane thereof. These vent channels may be formed in a variety of ways, one

modified arrangement being illustrated in Figs. 8 and 9. In this construction the metal adjacent the periphery of the top portion is pressed into a knurled or corrugated form, parts being slightly depressed out of the normal plane of the metal, and alternate portions slightly raised out of that plane. The number of vent openings may vary with the size of the package, and the spacing members 15 may be provided in various forms. It is desirable, however, that they be so disposed that compression of the gasket upon them will have the tendency to bend them outwardly into the vent openings.

Referring now to the modification illustrated in Figs. 10, 11 and 12 it will be observed that the top 10 is provided with a series of circumferentially extending depressions 18 which are located in such position that their bottoms will contact the rim of the vessel when the cap is seated thereon. Before application of the cap to the vessel, the upper margin of the gasket contacts the bottoms of these depressions, retaining the gasket against upward movement and out of contact with the portions of the top intermediate the ends of the depressions. The portions of the top between the depressions and the side portion of the cap remain in the normal plane of the top, so that an internal groove is afforded around the depressions, which groove is of suitable width to receive the upper portion of the gasket when it is displaced outwardly from the depressions and compressed against the side portion of the cap, incident to the seating of the cap on the vessel. Incident to the seating of the cap the confined air has a path of egress through the venting channels thus afforded between the ends of the depressions 18 and through the vent apertures. As the cap reaches its seated position, however, the upper portion of the gasket is crowded outwardly off of the depressions and compressed into the groove between the latter and the side portion of the cap, thus sealing the vent apertures. The depressions afford a resilient area adapted to be pressed firmly into contact with the margin of the vessel without subjecting the latter to dangerous pressures, and the construction has the further advantage of reducing the possibility of any portion of the gasket being pinched between the rim of the vessel and the portions of the top arranged for contact therewith, as the coaction of the depressions and the rim of the vessel tends to wedge the gasket material toward the side portion of the cap. The form illustrated in Fig. 13 contains the features of the form illustrated in Figs. 10, 11 and 12, modified to the extent that the vent aperture 14 is formed in the top portion of the cap adjacent the side portion and in position where the gasket material will be compressed against it when the cap is seated on

the vessel. In this form the spacing member 15 is not severed from the material of the side portion, but it is formed as an inward indentation, preferably as a continuous inwardly struck bead arranged to engage the upper portion of the gasket so as to restrain its upper margin in engagement with the bottoms of the depressions 18 until it is crowded outwardly off of the same when the cap is seated on the vessel.

When the closure cap is in place on a receptacle, the side portion projects slightly from the periphery of the vessel, affording a protecting girth which is of particular advantage on glass receptacles. However, while necessarily greater than the area of the receptacle, the side portions are so close to the wall of the latter as not to materially increase the area necessary for the packing of the sealed package.

A particular advantage resides in the ease with which a package conforming to my invention may be opened. All that is necessary to accomplish this is to deform the side portion 11 either by rolling the package upon a hard surface with pressure applied over the portion 11, or tapping the latter in such fashion as to tend to straighten the angle between the cylindrical and conical portions. This expands the gripping portion of the cap so that the seal between the gasket and the side of the vessel is loosened and the friction there reduced, permitting the cap to be lifted off. The cap may be forced back on the receptacle to provide a fairly tight re-seal, sufficient to prevent spilling or rapid evaporation of the contents. The form of the cap does not in any fashion interfere with the stacking of the packages, and in instances in which the bottom of the receptacle is smaller than its mouth, as in ordinary tumblers, the portions of up-struck metal in the top, in the forms illustrated, in Figs. 1 to 9, inclusive, exercise the function of stops or guides effective to assist in the positioning and retention of one package upon another.

What I claim is:—

1. A closure cap formed of sheet material and having a top portion and an annular side portion, the latter having a substantially cylindrical upper part and an outwardly flaring lower part, a gasket of compressible elastic material seated against the inner wall of the side portion for contact with the top portion, the cap being provided with a vent opening adjacent the upper margin of the gasket, and a vent channel being provided across the top of the gasket.

2. A closure cap of sheet material having a top portion and an annular side portion, the latter having its lower part flaring outwardly from its upper part, an annular gasket seated against the inner surface of the side portion with its lower part conforming

to the flare of the side portion and its upper part constrained by the smaller upper part of the side portion, the cap being provided with a vent opening arranged to be closed by the gasket, and a vent channel being provided across the top of the gasket.

3. A closure cap of sheet material having a top portion and an annular side portion, a gasket of elastic compressible material arranged in contact with the inner surface of the side portion and limited against upward movement by the top portion, the cap being provided with a vent opening and being shaped to afford a vent channel across the upper edge of the gasket.

4. A closure cap having a top portion and an annular side portion, a gasket of compressible elastic material retained in the cap against the inner surface of the side portion, the cap being provided with a vent opening in position to be closed by the gasket, and a spacing member in association with the vent opening for holding the gasket away from the same.

5. A closure cap of ductile sheet material having a top portion and an annular side portion, the latter having a substantially cylindrical upper part and an outwardly flaring lower part, a gasket of compressible elastic material seated against the inner surface of the side portion and constrained thereby so as to substantially conform to the contour of the cylindrical and flaring parts, the gasket being free for upward movement on the side portion so that it may be compressed upon the top portion, and the cap being provided with a vent opening in position to be closed by the gasket.

6. A closure cap of ductile sheet material having a top portion and an annular side portion, the latter having a substantially cylindrical upper part and an outwardly flaring lower part, a gasket of compressible elastic material seated against the inner surface of the side portion and constrained thereby so as to substantially conform to the contour of the cylindrical and flaring parts, the gasket being free for upward movement on the side portion so that it may be compressed upon the top portion, and the cap being provided with a vent opening in position to be closed by the gasket, and a spacing member associated with the vent opening and effective to hold the gasket away therefrom until it is forcibly compressed.

7. A closure cap having a top portion and an annular side portion, a gasket seated in the latter, the cap being provided with a vent opening, and a flexible spacing member arranged to space a portion of the gasket away from the vent opening.

8. A closure cap having a top portion and an annular resilient side portion, the latter having a substantially cylindrical upper part

and an outwardly flaring lower part terminating in an inwardly extending member, a gasket of compressible elastic material assembled freely within the side portion, upward movement of said gasket being limited by the top portion and downward movement being limited by said inwardly extending member, and said gasket being of adequate thickness to retain all parts of the side portion out of contact with a receptacle encompassed thereby and the gasket flaring at the bottom, to permit the closure's being wedged on to a substantially cylindrical sealing surface of a vessel.

9. A closure cap of sheet material having a top portion and an annular side portion, a gasket of compressible elastic material seated against the side portion for contact with the top portion, said top portion having depressed parts associated with the upper margin of the gasket, and the cap being provided with a vent opening in position to be closed by the upper portion of the gasket when the latter is compressed by the seating of the closure upon a vessel.

10. The combination with a vessel, of a closure cap adapted to cover the mouth of the same, said closure cap having a top portion and an annular side portion, said top portion having circumferentially extending depressed parts adapted to engage the rim of the vessel, a gasket seated against the side portion for contact with the top portion, and the cap being provided with a vent aperture in position to be closed by the gasket when the latter is compressed between said depressed parts and the side portion.

11. A closure cap of flexible material having a top portion and an annular side portion, said top portion having a circumferentially extending embossment pressed in the top adjacent the side portion, a flexible elastic gasket fitted within the annular side portion with its upper margin arranged for contact with said embossment, and the cap being provided with a vent opening in position to be closed by the gasket when its upper portion is displaced outwardly from the embossment.

12. A container cap having a top and a resilient annular side portion, a sleeve gasket of flexible elastic material retained by the side portion, a vent opening being provided in the side portion adjacent its upper limit in position to be closed by the gasket when compressed on a container.

13. A closure cap comprising a top and an annular side portion flaring at its bottom and having a vent opening at its upper portion, a sleeve gasket of flexible elastic material against the inside of the side portion and conforming to its flare, and a spacing member for holding the gasket apart from the vent opening.

14. The combination with a vessel having

a substantially cylindrical peripheral sealing surface, of a closure comprising a top and a resilient downwardly flaring side portion, the latter provided with a vent opening adjacent its upper limit, and a sleeve gasket of flexible elastic material retained within the side portion and conforming to the flare thereof for sealing engagement with the peripheral surface of the vessel, said gasket having a portion effective to close the vent opening.

15. A closure cap for a substantially cylindrical mouthed vessel, having a top portion and a resilient side portion depending at substantially a right angle thereto and having a flaring lower part, and a gasket of compressible elastic material confined against outward movement by the side portion and free for upward movement on the same into abutment with the top portion, said gasket covering the side portion at its smallest diameter and flaring at its lower part, whereby a substantial portion of the gasket may be compressed against the top and side portions when the cap is forcibly seated on the vessel.

16. A closure cap having a top portion and an annular resilient side portion, a lower part of the side portion being flaring and a part thereabove being of smaller diameter to form a gripping portion, and a sleeve gasket of compressible elastic material retained in the cap and covering the gripping portion, said gasket flaring at the bottom and arranged for contact with the top portion of the cap, whereby the gasket may be compressed about the mouth of a vessel between the outer surface of the same and the gripping portion and top of the cap when the cap is forced onto the vessel.

17. A closure cap comprising a top portion and an annular side portion, an upper part of the latter shaped to form a gripping portion and the lower part flaring out at an angle from said gripping portion and terminating at an inturned edge, a sleeve gasket of compressible elastic material covering the inner wall of the side portion and free at its lower edge but limited against upward movement by the top portion and against downward movement by said inturned edge, said gasket flaring at its bottom to permit the closures being wedged onto the substantially cylindrical mouth of a vessel to seat the top portion against the rim of the mouth.

18. A closure cap comprising a top portion and annular side portion flaring at its lower part, the top portion being formed with a downwardly extending embossment arranged for contact with the rim of a vessel when the cap is seated thereon, and a sleeve gasket of compressible elastic material overlying the inner wall of the side portion with its upper edge arranged to con-

tact the embossment, said embossment co-
operating with the marginal portion of the
vessel to wedge the gasket outwardly against
the side portion as the cap is forced to seated
position on the vessel.

19. A closure cap comprising a resilient
top portion and annular side portion flar-
ing at its bottom, a sleeve gasket of com-
pressible elastic material overlying the inner
wall of the side portion, the cap being
formed with a downwardly extending em-
bossment in the top for cushioning contact
with the rim of a vessel when the cap is
seated thereon and having a groove adja-
cent the junction of the top and side por-
tions into which the edge of the gasket is
adapted to be compressed when the latter

is wedged outwardly incident to the seating
of the cap on the vessel.

20. A closure cap comprising a top por- 20
tion and annular side portion having a flar-
ing lower part, a sleeve gasket of compres-
sible elastic material overlying the inner wall
of the side portion and flaring at its lower
part in the flare of the side portion, the cap 25
being formed with a circumferentially ex-
tending groove near the upper part of the
gasket for reception of a part thereof when
the gasket is compressed between the side
portion and the wall of a vessel incident to 30
the forcible application of the cap thereto.

In testimony whereof I have hereunto sub-
scribed my name.

WILLIAM P. WHITE.