June 15, 1948. J. HOHL ET AL 2,443,506

RECEPTACLE AND CLOSURE

Filed Aug. 17, 1944

Fig. 1.

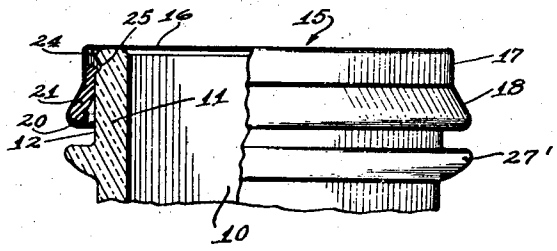


Fig. 2.

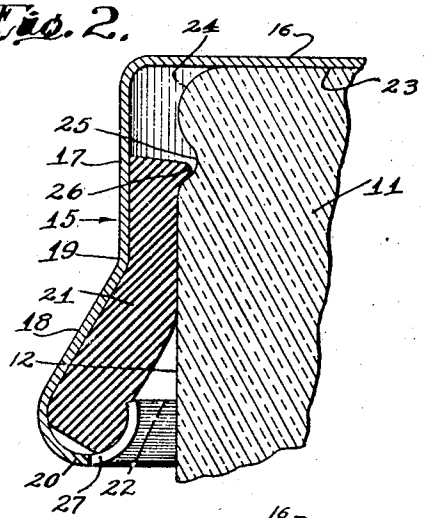
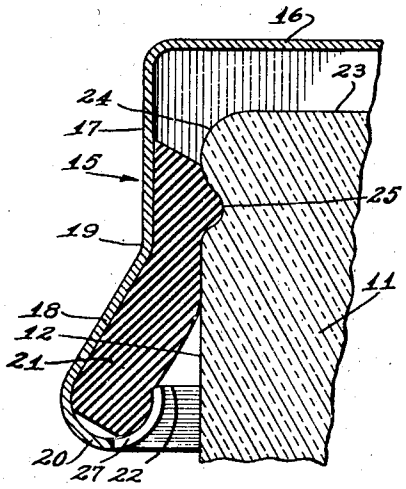


Fig. 3.



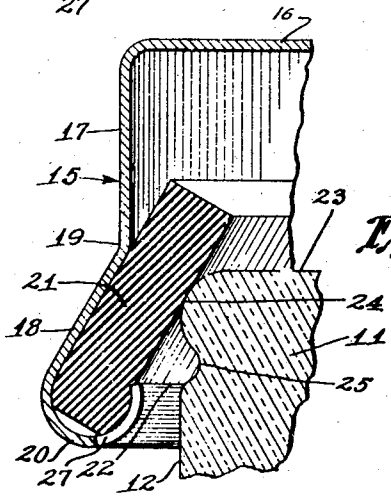


Fig. 4.

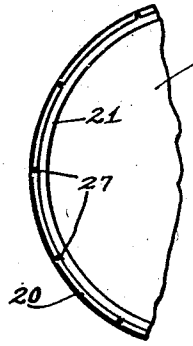


Fig. 5.

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RECEPTACLE AND CLOSURE

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8 Claims. (Cl. 215—40)

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Our invention relates to receptacles such as bottles, jars, and like containers, and closure caps designed to seal the containers. The invention is embodied in a structure of the side seal type in which an annular sealing gasket is mounted in the skirt or depending flange portion of the cap and is held in sealing engagement with the side walls of the container. A construction of this general type is disclosed in the patent to White, No. 2,339,827, January 25, 1944, and the present invention embodies certain modifications and improvements over the disclosure in said patent.

An object of our invention is to provide a combination of novel container and sealing cap therefor adapted to withstand a high internal pressure without liability of the cap being forced thereby off the container or the seal broken by such pressure.

A further object of the invention is to provide a combination of the type indicated in which the cap may be removed easily and also may be replaced with ease for resealing the container.

A still further object of the invention is to provide a novel form of container and sealing cap therefor, in which the container is sealed by a ring gasket of the side sealing type when the cap is placed on the container and forced downward to seat thereon, and which permits the cap to be moved upward a limited distance under pneumatic pressure within the container without breaking the seal, the cap then being held in such position until it is desired to open the container.

Our invention provides a packaging unit comprising a container and a gasketed cap, adapted for packaging and storing fruits, vegetables, and various other commodities which are to be packaged or stored in hermetically-sealed containers. The invention is well adapted for such uses where the container is partially vacuumized and also where an internal pressure is maintained or developed within the container. Certain features of the invention adapt it for use in packaging and sealing materials in containers wherein at one time there may be an internal pressure and at another time, subatmospheric pressure. The invention is well adapted for example, for the packaging of coffee by conventional methods in which the container when filled with coffee, is vacuumized before being sealed so that there is a partial vacuum within the sealed container. After the coffee is thus sealed, it undergoes certain chemical action in which gases are produced and thereby gradually increase the internal pressure to a point above the external pressure of the atmosphere.

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Other objects of the invention than those above specified will appear hereinafter.

Referring to the accompanying drawings:

Fig. 1 is a fragmentary part-sectional elevation of a container and a closure cap thereon, constructed in accordance with the present invention.

Fig. 2 is a fragmentary sectional elevation of the same on a larger scale.

Fig. 3 is a view similar to Fig. 2, but showing the cap lifted a short distance by internal pressure to a normal sealing position.

Fig. 4 is a view similar to Fig. 2 but showing the cap placed on the container before pressure has been applied to force it down into sealing position.

Fig. 5 is a fragmentary bottom view of the cap.

The container 10 comprises a circular neck 11 or upper open end portion having a vertical or approximately vertical exterior cylindrical surface 12 which, if desired, may be slightly flared in an upward direction to facilitate the placing and removal of the gasketed cap without impairing its efficiency as a seal. The closure or cap 15, which may be made of resilient sheet metal, includes a top 16 in the form of a flat or substantially flat circular disk with a depending annular marginal skirt. The latter includes an upper cylindrical flange portion 17 depending vertically from the top 16 and a downwardly flared lower portion 18 integral therewith, the parts 17 and 18 meeting at a circumferential line 19. The lower margin of the skirt is curved or spun inwardly to the form of an open bead 20 which grips the lower edge of a ring gasket 21 mounted within the cap.

The gasket consists of rubber, rubber composition, or other suitable elastic, resilient, impervious material which is compressible and deformable under pressure, and which will resume its normal shape when the pressure is removed. The lower edge of marginal portion of the gasket is seated in and gripped by the bead 20, the inner edge 22 of the bead being adapted to bite into and grip the gasket.

The upper end of the container or neck 11 provides a flat annular top surface 23 on which the top 16 of the cap is adapted to seat when the cap is moved to sealing position on the container. A circumferential bead 24 is formed on the neck 11 at the upper end thereof, completely surrounding the container. The surface of the bead as shown in cross section is preferably in the form

of an arc of a circle which merges into or is tangent to the upper flat surface 23.

Directly beneath the bead 24 is an annular recess 25 extending circumferentially of the container neck and forming a portion of the exterior neck surface. The wall surface of the recess 25 as shown in section defines an arc of a circle of smaller diameter than that formed by the surface of the bead, the surfaces of the bead and recess merging and forming a compound curve. The diameter of the container neck at the bead 24 is preferably equal to or substantially equal to the diameter of the neck at the straight surface 12, so that the width of the space between the skirt portion 17 and the bead 24 is substantially the same as between the surface 12 and the skirt portion 17, the latter being substantially vertical and parallel with the surface 12.

When the gasket is secured in place within the cap, it assumes the shape and position relative to the cap shown in Fig. 4, which represents the cap with its gasket seated on the container before pressure has been applied to move the cap downward into sealing position. The cap may be forced downward on the container from the Fig. 4 position to the Fig. 2 position by any suitable means or conventional capping device. When a cap is thus forced downward, the upper portion of the gasket is compressed between the vertical constricting portion 17 of the cap and the opposite surface 12. The gasket is thus forced into and held in sealing contact with the surface 12 of the container.

As the gasket is compressed through the downward movement of the cap to sealing position, it is also somewhat elongated or stretched in a vertical direction. The gasket is preferably of such length that when the cap is seated on the container, the upper end portion 26 of the gasket is opposite the recess 25 or the lower portion of said recess as shown in Fig. 2, so that such end portion is free to expand laterally and enter the recess.

In packaging coffee, for example, the containers may be filled, and then placed in a vacuum chamber and vacuumized. The caps which may be loosely placed on the containers, as indicated in Figure 4, are then moved downward to the sealing position (Fig. 2) in which the top of the cap seats on the container. When an internal pressure is later developed, it operates to force the cap upwardly a short distance as is shown in Fig. 3. This upward movement of the cap carries the upper end of the gasket past the recess 25 to a position opposite the bead 24, thereby permitting the gasket to expand and fill the recess 25 while the extreme upper end portion of the gasket is held under comparatively great compression between the bead 24 and the constricting flange portion 17.

When the cap has been forced upward thus to the Fig. 3 position, the upper portion of the gasket is wedged between the flange 17 and the upwardly flared surface of the lower half of the bead 24, and the cap is securely held against further upward movement by the locking relation of the gasket and the curved surfaces of the bead 24 and recess 25. The pneumatic pressure applied to the cap also develops a pressure of the gasket against the curved surface of the bead 24, augmenting the pressure due to the inherent resiliency and expansibility of the gasket, thus adding to the security and effectiveness of the seal. The internal pressure applied in an upward direction to the top 16 of the cap causes

the cap to be bowed upwardly more or less to a convex form owing to the resiliency of the metal, and this causes the pressure to be applied at the sealing surface in an inwardly inclined direction and thereby increases the pressure of the gasket against the sealing surfaces. This inward bias further minimizes the possibility of the cap being pulled off the container or the seal being broken by such internal pressure.

The cap may be removed by prying it loose with an implement such as a fork or spoon inserted between the neck of the container and the lower portion of the cap. The prying action forces the gasket past the retaining bead 24, so that the cap is easily removed. This prying action first breaks the seal at one point in the circumference so that any differential pressure between the interior and exterior of the container is neutralized. If there is a partial vacuum within the container, the entrance of air at this point permits the cap to be entirely removed with ease. If there is internal pressure, the blowing out at the point of pry-off dissipates the pressure while the cap is still held throughout the greater part of its circumference by the bead 24 which prevents the cap from being suddenly blown off as it is pried loose.

The bead 20 is formed with slots 27 spaced at short intervals throughout the circumference of the bead. These give flexibility to the cap skirt and particularly the bead 20, thereby greatly facilitating the removal of the cap. It permits the seal to be broken easily at one point during the initial prying action above described, the seal being broken before the gasket has been fully withdrawn from the recess 25 at the pry-off point.

In practice, the caps are applied to the container in the first instance by an automatic press or the like, when the container has been filled with a desired commodity. After the container has been opened for removal of a portion of the contents, the cap may be again used as a reseal and in this instance is placed on the container and forced down into sealing position by hand. The tapered form of the cap skirt permits the cap to be moved downward to sealing position with ease, particularly as the surface of the gasket is usually lubricated, and at the same time subjects the gasket to a compressive force by which an effective reseal is obtained.

The gaskets are ordinarily made of a compound which is impregnated with a wax-like or oily substance or plasticizer which forms a bloom on the surface of the gaskets. This serves as a lubricant which facilitates the sealing of the container and also the removal of the cap and permits the replacing of the cap by hand for resealing the container. The neck of the container may be formed with an annular bead 27' which, when the cap is lowered on the container, is spaced below the cap, thereby providing a pry-off ledge which facilitates the removal of the cap.

Modifications may be resorted to within the spirit and scope of our invention.

We claim:

1. The combination of a container having a neck portion thereof formed with an exterior cylindrical wall surface forming a sealing surface, a cap comprising a top and a depending annular skirt having an interior cylindrical wall surface parallel with, opposite to, and spaced from said sealing surface of the container, thereby forming an annular space between said

wall surfaces, a gasket of elastic compressible sealing material held under compression within and filling said space, said container having its exterior surface formed with an annular recess above and contiguous to the said sealing surface thereof, said gasket being extended upwardly beyond said annular space and having its upper end portion expanded into the lower portion of said annular recess, the upper end of the gasket being spaced below the upper wall surface of said annular recess, the said upper wall surface being extended outwardly into position to overhang the said upper end of the gasket and provide a stop for limiting upward movement of the cap and gasket caused by pressure developed within the container.

2. The combination of a container having a neck portion thereof formed with an exterior cylindrical wall surface forming a sealing surface, a cap comprising a top and a depending annular skirt having an interior cylindrical wall surface parallel with, opposite to, and spaced from said sealing surface of the container, thereby forming an annular space between said wall surfaces, a gasket of elastic compressible sealing material held under compression within and filling said space, said container having its exterior surface formed with an annular recess above and contiguous to the said sealing surface thereof, said gasket being extended upwardly beyond said annular space and having its upper end portion expanded into the lower portion of said annular recess, the upper end of the gasket being spaced below the upper wall surface of said annular recess, the said upper wall surface being extended outwardly into position to overhang the said upper end of the gasket and provide a stop for limiting upward movement of the cap and gasket caused by pressure developed within the container, the cap and gasket being removable from the container as a unit by upward movement relative to the container, and the gasket when released from pressure being of substantially uniform thickness throughout that portion thereof which, when the cap is in sealing position, extends along the sealing surface and recess of the container.

3. The combination of a container having a neck portion thereof formed with an exterior cylindrical wall surface forming a sealing surface, a cap comprising a top and a depending annular skirt having an interior cylindrical wall surface parallel with, opposite to, and spaced from said sealing surface of the container, thereby forming an annular space between said wall surfaces, a gasket of elastic compressible sealing material held under compression within and filling said space, the said container being formed with an upwardly and outwardly inclined annular sealing surface above said cylindrical surface thereof, said gasket having its upper end portion interposed between said cylindrical sealing surface of the container and said inclined sealing surface with the upper end of the gasket spaced below said inclined surface, the cap and gasket being movable upwardly relative to the container into a position in which the upper end surface of the gasket bears against the said inclined sealing surface.

4. The combination of a container having a neck portion thereof formed with an exterior cylindrical wall surface forming a sealing surface, a cap comprising a top and a depending annular skirt having an interior cylindrical wall surface parallel with, opposite to, and spaced from said

sealing surface of the container, thereby forming an annular space between said wall surfaces, a gasket of elastic compressible sealing material held under compression within and filling said space, said container having its exterior surface formed with an annular recess above and contiguous to the said sealing surface thereof, said gasket being extended upwardly beyond said annular space and having its upper end portion expanded into said annular recess, and an annular bead formed on the container immediately above said annular recess, with the lower surface of the bead merging into the upper wall surface of said recess, the upper end of the gasket being spaced below said lower surface of the bead, the cap and gasket being movable upwardly relative to the container to a position in which the gasket is held under compression between the bead and said cylindrical surface of the cap and is expanded laterally into and fills said recess.

5. The combination of a container having a neck portion formed with an exterior cylindrical sealing surface, a cap comprising a circular top and a depending marginal skirt including a vertical cylindrical portion having an interior cylindrical surface of greater diameter than said sealing surface of the container, said skirt having a downwardly and outwardly flared portion below said cylindrical portion, the lower part of said flared portion being curved inwardly to form an open bead, and an annular gasket mounted in said skirt with its lower edge seated within said bead, said gasket being extended upwardly between said cylindrical surfaces of the container and cap, said container being formed with a holding surface spaced above the top surface of the gasket and projecting outwardly over the gasket in position to permit a limited upward movement of the cap and gasket on the container and arrest the gasket at the limit of said upward movement and thereby prevent the cap from being forced off the container by internal pressure applied to the under surface of the cap.

6. The combination of an open top container having a cylindrical external sealing surface, a cap, a gasket, means for securing the gasket in the cap, said cap having a substantially flat top adapted to seat on the top of the container with the gasket surrounding and in sealing contact with said sealing surface, the cap having a depending skirt of larger interior diameter than the diameter of said sealing surface and providing therewith an annular space, said gasket consisting of elastic, compressible material and, when free from external pressure, being of greater thickness than the width of said annular space, whereby the gasket fills said space and is held under compression therein when the cap is seated on the container, said cap and gasket being movable upwardly to a second sealing position on the container in which position the top of the cap is spaced above the container, the neck of the container being formed with an exterior annular recess above and contiguous to said sealing surface and positioned to provide an annular space above the top surface of the gasket while the cap is seated on the container, into which annular space the gasket is expanded when the cap and gasket are moved upwardly to said second sealing position, the said annular recess having its upper wall surface upwardly and outwardly flared, the upper end portion of the gasket being expanded into sealing contact with the said upper wall surface of the annular recess when the gasket is in said second sealing position.

7. The combination of an open top container having an external cylindrical sealing surface, a cap on the container having a depending skirt, an annular gasket of elastic, compressible sealing material, means for securing the gasket within said skirt, said cap and gasket being movable downward on the container to a sealing position in which the gasket is in sealing contact with said cylindrical surface and forms a seal between the cap and container, the container being formed with a circumferential upwardly flared sealing surface positioned above the top surface of the gasket while the latter is in said sealing position, said cap and gasket being movable upwardly from said sealing position to a second sealing position in which the gasket bears against both said sealing surfaces and is wedged between said flared surface and the surrounding surface of the skirt and forms a seal between the cap and container, the sealing surface of the gasket being extended in the direction of said upward movement through a substantially greater distance than the thickness of the gasket.

8. The combination of an open top container having an external cylindrical sealing surface, a cap having a depending skirt, an annular gasket, means for securing the gasket within said skirt, said cap and gasket being movable downward on the container to a sealing position in which the gasket is in sealing contact with said cylindrical surface and forms a seal between the cap and container, said container being formed with a stop

surface spaced above the top surface of the gasket when the latter is in said sealing position, the cap and gasket being movable upwardly under pressure within the container to a second sealing position in which the gasket engages said stop surface and holds the cap against further upward movement while maintaining the seal between the cap and the container, the sealing surface of the gasket being extended in the direction of said upward movement through a substantially greater distance than the thickness of the gasket.

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