

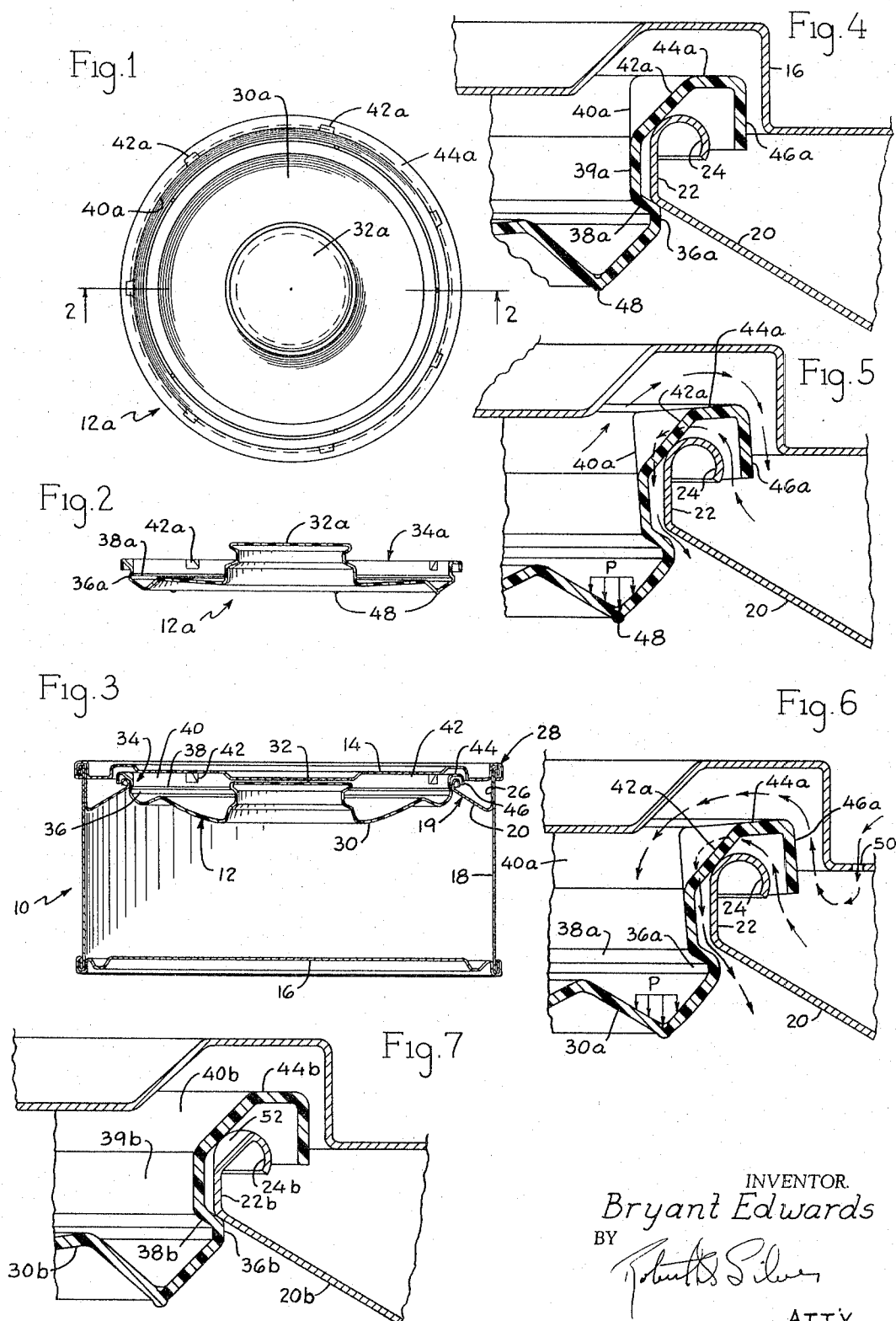
Feb. 7, 1967

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3,302,822

PRESSURE EQUALIZING PACKAGE

Filed Oct. 24, 1962



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3,302,822

PRESSURE EQUALIZING PACKAGE

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Filed Oct. 24, 1962, Ser. No. 232,838

11 Claims. (Cl. 220-44)

This invention relates in general to a package consisting of a container and a closure therefor, and more particularly relates to a container and closure member which sealingly engage each other in a manner to provide a sanitary seal, but at the same time permits the ingress of gas from the exterior to the interior of the container when there is a negative pressure differential interiorly of the container relative to the exterior.

A packaging of foodstuffs in containers of the so-called vacuum variety has long been known. Quite conventionally these cans which are so-called "vacuum packed" are made of metal with a tear strip or other means being available to remove the outer enclosure to break the vacuum and provide access to the interior of the container for removal of the foodstuffs. Since the tear strip approach to vacuum packed foodstuffs led to undesirable sharp edges being exposed for contact with the human hand, different approaches to this problem have been tried. One such approach involves destruction of the outer cover. Since the contents of the vacuum packed containers are often only partially removed after initial opening of the vacuum container, a manually replaceable cover is desired.

This invention is concerned with a one piece manually removable snap-in inner cover and its cooperation with an inner rim of a vacuum packed container, which due to the configuration of either the inner rim and/or the configuration of the cover, provides the functions of a sealing relationship between the cover and the container, and also is easily manually removable due to the pressure equalizing concept involved. It will be appreciated that normally a pressure differential exists between the interior of the container and the exterior caused by the vacuum packing operation. Thus after removal of the outer cover, it becomes greatly desirable to provide a venting operation which will afford a pressure equalization between the interior and the exterior of the container. Otherwise atmospheric pressure will tend to make removal of the so-called manually removable inner lid extremely difficult. A constant venting inner lid, i.e., one which has a hole therethrough will serve this purpose but this has disabilities in that it does not provide the sanitary relationship desired relative to foodstuffs.

There are three essential qualities for any package utilized with foodstuffs, namely, that the package be sanitary, the package material must be economical, and that the package must be designed such that it will do its required job of containing within the parameters of its expected environment.

The general object of this invention is to provide a sanitary, economical, rugged package wherein there are two closure members; the first closure member cooperating with the container with sufficient structural rigidity to withstand large pressure differentials between the interior and the exterior of the container; the second or inner closure member cooperating with the container in a manner to normally seal each other but which will, however, upon being exposed to a pressure differential whereby the pressure is greater on the outside of said second closure member relative to the interior of the container, will permit an equalization of the pressure without causing permanent dislocation of the inner closure member and permit same to reseal after the pressure is substantially equalized.

Since vacuum packed containers having double closure

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members at the top thereof are generally vacuum packed from the bottom end of the container (the end opposite from the double covers), a pressure differential upon the drawing of the vacuum on the interior of the container will occur between the first and second closure members. It is an object of this invention to provide a package construction wherein the inner closure member cooperating with the container may easily vent upon the drawing of the vacuum to permit the withdrawal of air that is normally trapped between the inner and outer closure members whereby a complete vacuum may be drawn on the foodstuffs on the bottom end of the container, said inner closure member returning after the venting thereof to a sealing relationship relative to the container so as to prevent loose foodstuffs and the like interiorly of the container from shifting to the area intermediate the first and second covers during transportation, handling and storage of the units once packed.

It is a further object of this invention to provide a novel closure member to adapt to be an inner closure member for a vacuum packed container, which is made with an integral knob means, is of one-piece, lightweight, economical plastic, is well adapted for mass production techniques, and may be formed from sheet stock material by a sheet forming molding method.

A still further object of this invention is to provide means on a closure member of the type as above set forth which prevents said closure member, when it is free from the container and laid on a flat table surface, from sticking to such table surface upon attempted removal thereof by the housewife.

The novel features that are characteristic of the invention are set forth with particularity in the appended claims. The invention, however, both as to its organization and its method of operation, together with additional objects and advantages thereof will best be understood by the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is a top plan view of one form of closure member;

FIG. 2 is a sectional view of the closure member in FIG. 1 taken along lines 2-2 of FIG. 1;

FIG. 3 is a sectional view through a vacuum pack container showing another embodiment of lid similar to the one shown in FIG. 1 in assembled relationship to the container;

FIG. 4 is an enlarged fragmentary sectional view of one portion of the assembly shown in FIG. 3;

FIG. 5 is a view similar to FIG. 4 showing the venting action affording ingress of gaseous material interiorly of the container when there is a negative pressure differential interiorly of the container relative to the exterior of the inner lid during the drawing of a vacuum from the bottom of a container;

FIG. 6 is a view similar to FIG. 5 showing the pressure equalization taking place after the puncture of the outer lid whereby removal of the inner lid after complete removal of the outer lid is facilitated; and

FIG. 7 is a view of an alternate embodiment of lid and container structure affording substantially similar function of the lids and containers shown in the foregoing figures.

A package 10 shown in FIG. 3 is of the vacuum pack variety and comprises an inner lid 12, an outer lid 14, a bottom wall 16 and interconnecting side walls 18, there being a collar portion means 19 upon which the inner lid 12 is seated. Portions 14 through 19 are preferably made of metal or some other material having sufficient rigidity to withstand the vacuum packing operation.

The collar means 19 comprises an upwardly slanting

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circumferentially continuous member 20 that projects radially inwardly of the container, there being a short vertically extending portion 22 which terminates at its upper end in a reversely rolled portion 24. The portions 20-22-24 form an inner rim or lip portion which is both radially inward and axially inward of the rim 28 of the top or outer lid 14 of the container. The collar means 19 is attached to the side walls 18 by a vertically extending portion 26 which is coextensive with a short portion of the side walls 18 and is sealed to the side walls 18 and top rim 28 by a conventional beading process.

The lid or closure member 12, which adapted to be seated on the inner rim means 19, is preferably made from sheet form plastic material and in accordance with the techniques set forth in my copending application, Serial No. 109,225 filed May 10, 1961. The lid 12 has a diaphragm portion 30 of substantial extent and centrally located integral knob means 32 which is configured so that it is easily manually graspable. The configuration of the knob means and how to obtain same is set forth with more particularity in my aforementioned copending application. The diaphragm portion 30 may be configured in any of a number of ways depending upon the type of container within which it is to be used. In the instant case, the diaphragm portion is configured so that the lowest portion of the lid is immediately adjacent the knob means and the top portions of the knob means is on a level slightly below the outer periphery of the rim means 34 of the lid.

The rim means or lip portion 34 surrounding the diaphragm portion of the lid is formed with a radially outward portion 36 and an upwardly reverse tapered portion 38 which normally provides sealing engagement with portion 20 of the collar adjacent to portion 22. Immediately above portion 38 is a vertically extending portion 39 which has a lesser axial extent than portion 22 of the collar means 19 and which is normally spaced from portion 22 a short distance in the radial direction. Of particular note is that portion of the side walls of the lid 12 immediately above the straight portion 39, namely, portions 40 and 42 which provide a venting means. Portion 40 acts as an extension of and is generally disposed in the same plane as portion 39 although this is not critical as long as it is spaced from the collar means 19. Rim portion 42 is in the form of a plurality of upsets or embossments which serve the twofold function of providing a positive spacing of portion 40 from the rim means 19 and also provides cam surfaces as shall shortly be explained. The transverse portion 44 of the lid 12 extends outwardly from portion 40 and terminates in a reversely extending downturned skirt portion 46 which overlays and surrounds portion 24 of the inner rim.

The lid depicted in FIGS. 1, 2, 4, 5 and 6 is substantially similar to the device depicted in FIG. 3 except for the configuration of the diaphragm portion 30 and the addition of some seal preventing tabs 48 and similar parts will be given similar reference numerals with the suffix *a*. As shown in FIG. 4, portion 38a normally engages portion 20 of the rim to provide a seal at that point. It will be further noted that portions 39a, 40a, 44a and 46a are normally slightly spaced from complementary portions of the inner rim 19 of the container. Portion 42a, being the radially outward portion of the projections or upsets in the lip of the lid, engages the upper portion of the inner rim 19 at a camming angle. Upon the introduction of a vacuum to the bottom of a container (as depicted in FIG. 3) a pressure differential will normally be obtained in the chamber intermediate the outer lid 14 and the lid 12 and the remainder of the container. This creation of the pressure differential causes the diaphragm portion 30 to move inwardly causing portion 42a to move slightly downwardly and with a cam-like action causing the sealing portion 38a to disengage with portion 20, the spacing between the remaining portions of the lid allowing the pressure to equalize as indicated by the arrows in FIG. 5.

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Once the pressure equalizes, portion 42a will again slide on the rim portion 24 adjacent to portion 22 causing the lid to return to the position shown in FIG. 4, i.e., a sealing relationship. When loose foodstuffs, such as coffee or the like, are disposed on the interior of the container, the return to the sealing relationship after the drawing of the vacuum is most important since the loose foodstuffs are then prevented from getting into the immediate area between the inner and outer lid during transportation and handling of the containers.

When the outer container cover 14 is subsequently punctured as at 50 during removal by a can opener or the like, air rushes into the aperture creating a positive pressure on the diaphragm portion 30a causing a pressure equalization to again take place which permits easy removal of the lid 12 via the knob by a housewife after complete removal of lid 14. The pressure equalization after puncture of lid 14 is shown in FIG. 6.

The lid shown in FIGS. 1, 2, and 4 through 6, due to the different configurations of the diaphragm portion, has the greatest downward axial extent thereof substantially near the periphery thereof, such that when the lid is set upon a smooth table surface or the like, a great likelihood of the lid adhering to the smooth surface occurs if special preventative means are not employed. This is particularly true of wet surfaces. To prevent this unwanted adhering from happening, supplementary seal preventing means in the form of small projections 48 are circumferentially spaced around the lid at the lowermost axial extent thereof to prevent a suction cup action.

The embodiment shown in FIG. 7 differs from the foregoing in certain respects and is similar in many respects and similar parts will be identified with the similar reference numerals with the addition of the suffix *b*. More particularly, FIG. 7 is a view similar to FIG. 4 showing a container inner rim and cover configuration wherein portion 40b provides a cam surface on the lid which cooperates with the rim of the container similarly to portion 42a but the projection portion or venting means is formed by grooves 52 upset in the rim portions 24b and 22b. Thus, upon creation of a pressure differential between the interior of the container and the exterior, venting will occur with the configuration shown in FIG. 7. The operation of the package shown in FIG. 7 will be substantially similar to the package shown in the foregoing figures.

Although the specific embodiments have been shown and described, it is with full awareness that many modifications thereof are possible. The invention, therefore, is not to be restricted except in so far as is necessitated by the prior art and by the spirit of the appended claims.

What is claimed as the invention is:

1. A pressure equalizing sanitary package comprising container means having an open end defined by a first circumferential rim and a second circumferential rim radially inwardly of said first rim, one piece snap-on manually removable closure means adapted to be inserted within and retained on said second circumferential rim of said container means, said container means having a portion thereof offset radially outwardly relative to the smallest diameter of said second circumferential rim, said offset portion being adjacent said second circumferential rim, said closure means having an end wall portion for closing off said second circumferential rim and side wall means extending upwardly from said end wall portion, knob means formed in said end wall portion adapted to be grasped by the human hand of manual removal of said closure means from engagement with said second circumferential rim, the side wall means and the second circumferential rim of said closure and container means respectively each being formed with a sealing means portion for normally engaging each other to seal said container means when in assembled relation, and one of said side wall means and said second circumferential rim being formed with an integral venting means

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portion spaced from said offset portion of said container means outwardly from the interior of said container means, said venting means portion being arranged relative to said respective sealing means portions to cause temporary disengagement thereof when the interior of said container is at a lower pressure than the exterior of said container to equalize the pressure therebetween and facilitate removal of said closure means from said second rim of said container means.

2. The package set forth in claim 1 wherein a second closure member is sealingly attached to said first circumferential rim and said package is maintained at a negative pressure differential relative to ambient pressure when said second closure means is assembled to said first circumferential rim.

3. The package set forth in claim 1 wherein the venting means is in the form of projections formed in the side wall of said one piece snap-on manually removable closure means.

4. The package set forth in claim 1 wherein said venting means is in the form of groove means formed in said second circumferential rim.

5. A one piece snap-on manually removable integrally formed flexible closure member adapted to be inserted and retained on a container means having an internal circumferentially continuous radially outwardly offset portion adjacent an open end thereof, said offset portion being radially outwardly of the smallest diameter of the container adjacent the open end thereof, said closure member comprising a relatively large diaphragm portion having integral knob means therein for closing off the open end of the container means, said closure member having first, second and third side wall portions extending upwardly from said diaphragm portion, said first portion being adjacent said diaphragm portion and said second portion and radially outwardly of said diaphragm portion and said second portion, said first portion normally providing sealing engagement with said offset portion of said container means upon assembly of the closure member thereto, said second portion having a diameter less than the diameter of said first portion and formed intermediate said first and third portions, said third portion having first and second subportions, said first subportion being in the form of radially outward upsets spaced around the peripheral extent of said second subportion of said third portion of said container side walls, said first and second subportions being adapted to provide pressure equalizing means and cam means affording relative movement of said first portion of said side wall means relative to said container means upon the existence of the negative pressure differential between the interior of said container means and the exterior thereof after assembly of the closure member thereto.

6. The closure member set forth in claim 5 wherein said knob member projects in a first direction from said diaphragm portion and nib means in the form of projection means are formed in that portion of said diaphragm portion of said closure means extending the greatest dimension from said knob means in the opposite direction, said projection means preventing said closure member from sticking to the smooth surface.

7. The closure member set forth in claim 5 wherein said closure member is formed with a skirt portion reversely extending relative to said first, second and third side wall portions to prevent foreign bodies from settling upon and entering into the venting means portion formed by said first and second subportions of said third portion of said side wall means closely adjacent to said skirt portion.

8. A package comprising one piece snap-on manually removable plastic closure means adapted to be retained on a container means, said container means and said closure means having complementary rim portions each of which is formed with a sealing means portion for normally engaging each other when assembled to seal

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the interior of said container means, and one of the rim portions of said closure means and container means being formed with an integral venting means portion causing temporary disengagement of said respective sealing means portions so as to allow movement of gaseous material therepast from the exterior to the interior of the container while the closure and the container are assembled and when the interior of the container is at a lesser pressure than the exterior of the container, said sealing means portions and said venting means portion being in vertically spaced relation when the closure means is disposed at the top of the container means, said sealing means portions being located below said venting means.

9. A package comprising a one-piece snap-on manually removable closure means adapted to be retained on an open mouth container, said container and said closure means having complementary lip portions adapted to be matingly associated with each other, a circumferentially continuous sealing means portion provided on the lip portion of each of said container and closure means for engaging each other to completely seal the interior of said container, and one of the rim portions of said container and closure means being provided with means causing temporary disengagement of said sealing means portions from each other for the entry of air between the lip portions of said container and closure means when the interior of said container is at a lower pressure than the exterior of said container.

10. The package set forth in claim 9 wherein the closure means has knob means located thereon to facilitate manual removal thereof.

11. A package comprising a one-piece snap-on manually removable plastic closure member adapted to be retained by and overlying the open upper end of a container, said closure member and said container having complementary rim portions adapted to be matingly associated with each other, said closure member having a diaphragm portion radially inwardly offset from its rim portion, the rim portion of said closure member having vertically spaced upper and lower wall portions, the lower wall portion being peripherally continuous and having a dimensional extent such that it underlies at least a part of said container rim portion of locking and sealing said closure member on said container, said upper wall portion being in close proximity to and engaging another part of said container rim portion at a camming angle thereto, and one of said closure and container rim portions in the vicinity of the upper wall portion of said closure member being provided with means including an integral venting means portion causing sliding movement of said upper wall portion and displacement of said lower wall portion relative to said container rim portion for the entry of air between said closure member and container when the interior of said container is at a lower pressure than the exterior of said container.

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