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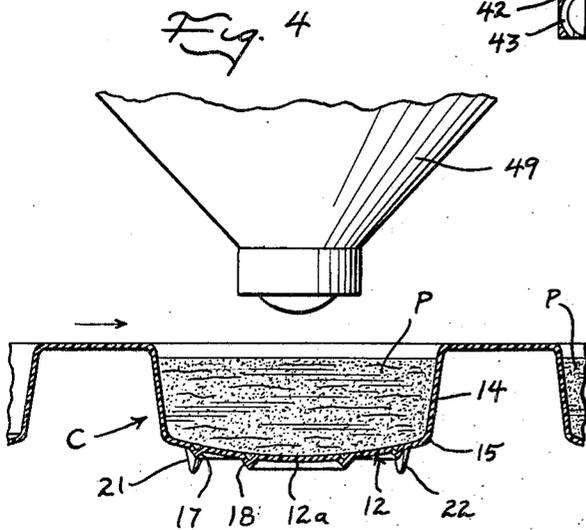
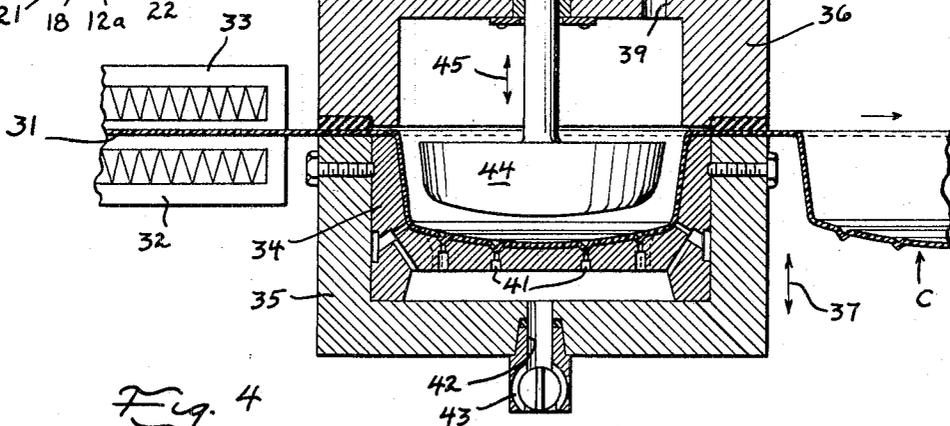
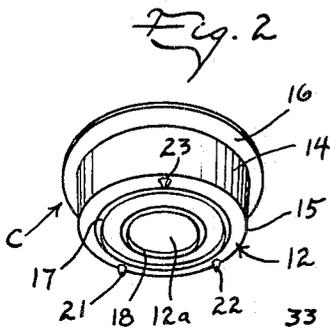
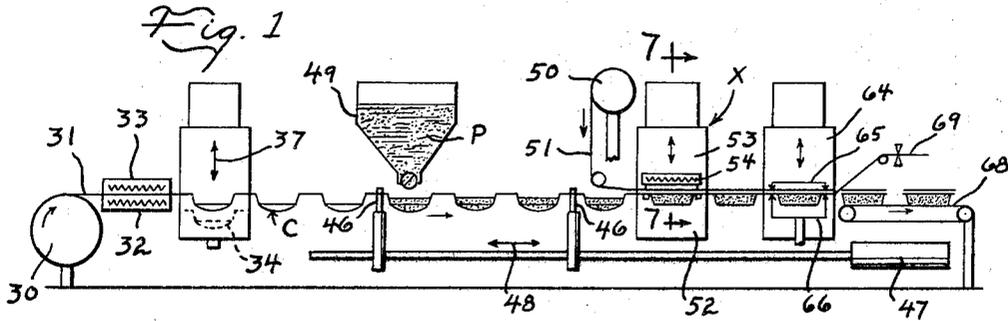
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3,492,773

METHOD OF VACUUM PACKAGING

Filed Jan. 25, 1967

2 Sheets-Sheet 1



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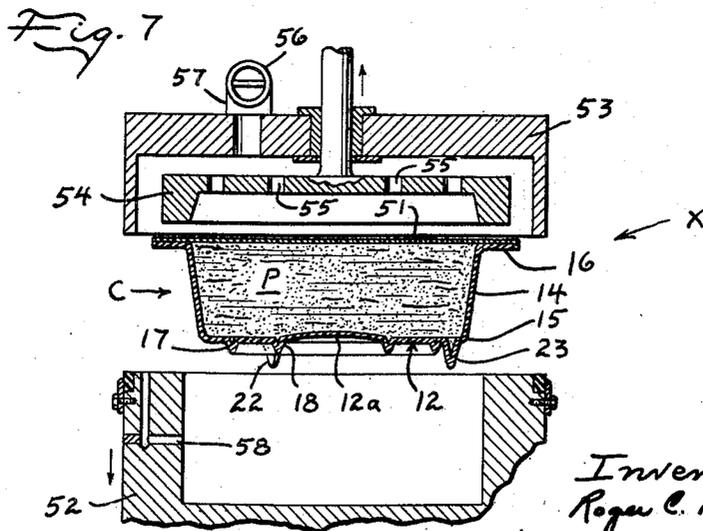
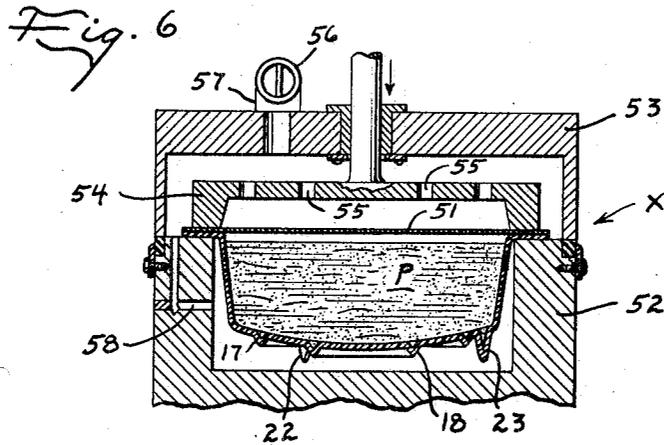
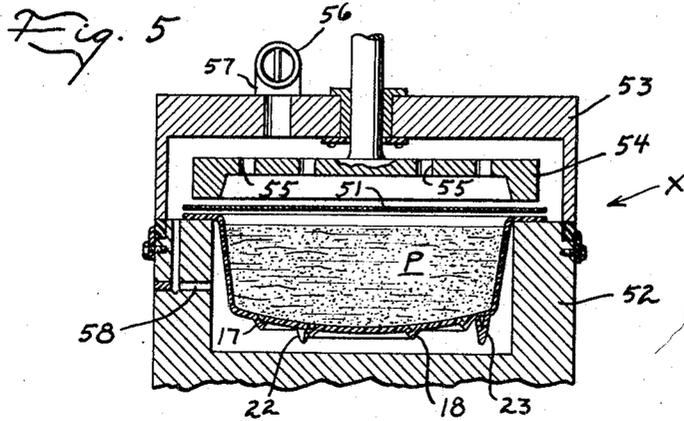
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METHOD OF VACUUM PACKAGING

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2 Sheets-Sheet 2



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3,492,773

METHOD OF VACUUM PACKAGING

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Int. Cl. B65b 9/04, 31/02, 47/02
U.S. Cl. 53—22

2 Claims

ABSTRACT OF THE DISCLOSURE

Vacuum packaging by: forming a container with a V-shaped groove in its bottom wall, placing material in the container to less than its full volume, enclosing the container in an evacuable chamber and evacuating the air therefrom, sealing a cover on the container, and releasing the evacuation to re-form the container at the grooves as the bottom wall moves toward the cover to reduce the container volume.

BACKGROUND OF THE INVENTION

The present invention pertains to packaging.

It is desirable that the package appear full of whatever material is being packaged. Additionally, with some food products, air enclosed in the package can cause decoloration or deterioration, and it is desirable that the air be removed or at least minimized. Both of the foregoing desirable features can be accomplished by filling the container to the top; however, the material may then interfere with sealing a cover on the container since the product may extend into the area of the seal.

SUMMARY

The present invention relates to a new and useful method of vacuum packaging.

It is an object of the present invention to provide a method of vacuum packaging to alleviate the above noted problems and provide a resultant package having a volume approximating the volume of material therein.

Another object is to provide a method of vacuum packaging wherein the bottom is caused to move inward after sealing to reduce the volume of the package.

Still another object is to provide a method of vacuum packaging wherein the container is initially formed with a weakened area along which the container will re-form after the vacuum is removed.

These, and other objects and advantages of the present invention, will become apparent as the same becomes better understood from the following detailed description when taken in conjunction with the drawings.

DRAWINGS

FIGURE 1 is a diagrammatic illustration of an apparatus capable of performing the method of the present invention;

FIG. 2 is a perspective view of a completed package;

FIGS. 3 and 4 are fragmentary longitudinal sectional views showing steps of the method; and

FIGS. 5-7 are fragmentary cross-sectional views through a typical evacuable chamber and showing successive steps of the method.

DESCRIPTION

The method of the present invention relates to vacuum packaging of products in a container. While other shapes

are contemplated, a typical container C is illustrated in FIG. 2. The container is advantageously cup-shaped having a bottom wall, generally designated 12, and a generally frusto-conical side wall 14. Walls 12 and 14 are joined together at a well-defined juncture indicated at 15. The side wall advantageously slopes uniformly upwardly from bottom wall 12, and an outwardly projecting flange 16 extends outwardly around the periphery of the side wall at the upper end thereof. The central portion of the bottom wall 12 is advantageously disposed farther away from the upper end of the container for a purpose which will become apparent. The container may be conveniently formed from a web of material as hereinafter described and the flange formed by trimming the web to the desired size and shape. The container C is preferably arranged so that its bottom wall 12 may move toward the open end of the container after filling and sealing, to thereby reduce the volume of the container to "full" condition. For this purpose, a weakened area is provided in the wall, and along this weakened area the container may be re-formed. In the embodiment illustrated, the weakened area is advantageously in the form of a V-shaped groove 17 adjacent the juncture 15. A second groove 18, of similar shape, is advantageously formed in bottom wall 12 inwardly of groove 17. These grooves form fold lines for the take-up of material as bottom wall 12 moves toward the upper end of the container, as hereinafter described. A plurality of legs 21-23 may be provided on the bottom wall 12, if desired, to provide a stable tripod support.

After the container C is formed, a preselected quantity of a product P is dispensed into the container. In accordance with the present invention, the quantity of product dispensed is less than the formed volume of the container C. The product P may be any type which may be handled and packaged. The product illustrated in FIG. 4 is a liquid with its upper surface below the flange 16. If the product is a particulate or semi-solid material, however, its upper surface probably will not be level. The fact that the volume of material is less than the volume of the formed container is an obvious advantage in this circumstance. If the product is a particulate material, it should be understood that its volume is the effective volume of the material including the voids therebetween.

After the product P has been placed into the container C, the container is placed in an evacuable chamber and the air evacuated therefrom. A cover is thereafter sealed on the container, and the evacuation released. The vacuum, however, remains inside the container. Thus, when the sealed package is exposed to atmosphere, the atmospheric pressure causes the container to reform along the weakened area provided. The bottom 12 moves toward the cover as the container is re-formed and the volume of the container is reduced substantially to that volume of product contained therein.

While other apparatus may be used, one suitable apparatus for performing the steps of the method is diagrammatically illustrated in FIG. 1. A roll 30 of thermoplastic material is supported adjacent one end of the machine. A web 31 is withdrawn from the roll and advanced longitudinally of the machine past successive stations. Heating heads 32 and 33 heat the web 31 so that it may be formed into any desired shape. At the next station, the container, generally designated C, is pressure-formed in web 31 by a mold 34 adjacent one side of the web and pressure adjacent the other side. It is con-

templated that vacuum-forming may also be utilized, and the term "pressure-formed" should be taken as including pressure-forming, vacuum-forming, and the like. As illustrated in FIG. 3, there is at the forming station a lower member 35, which supports mold 34, and an upper member 36. Mold 34 and lower member 35 are moved in the direction of arrows 37 between a forming position generally contiguous to the web (FIG. 3) and a second position (shown in dashed lines in FIG. 1) removed from the web so that the web may be intermittently advanced. At the forming position members 35 and 36 provide a generally airtight chamber. A conduit 38 communicates inlet opening 39 in upper member 36 with a source of gas under pressure (not shown). A valve 40 is conveniently provided in conduit 38 to control the gas introduced through inlet 39. As shown, mold 34 is advantageously complementary to the shape of the formed container C, and is provided with a plurality of outlet openings 41 to allow air on the underside of web 31 to escape during the forming operation. A discharge opening 42 is conveniently provided through lower member 35 and may have a valve 43 to control the escape of air. If desired, a plug 44 may be moved against the web 31 to assist in forming the container C. As shown in FIG. 3, the plug-assist 44 is reciprocated in the direction of arrows 45. Web advancement is conveniently accomplished by grippers 46 which are reciprocated by piston 47 in the direction of arrows 48. One machine of this general type is disclosed in U.S. Patent No. 3,196,590, issued to J. G. H. Ollier et al., and reference is made thereto for a more complete disclosure of the apparatus.

The product P is next deposited into the container C manually, or by a dispenser 49 which may be mounted on the machine or be independent of the machine, as desired. A second roll 50 is supported on the machine and a sheet 51 is withdrawn therefrom to be sealed to flange 16 of container C. Advantageously, compatible thermoplastic materials are selected for web 31 and sheet 51, and the sealing accomplished by heat-sealing. It should be understood, however, that other materials may be utilized and other sealing methods may be used. For example, aluminum foil having a pressure-sensitive or a heat-sensitive coating thereon can be used and the sealing accomplished by the application of heat, or pressure, or both. It is necessary, however, that sheet 51 span the open end of the container C to provide a cover therefor and to be sealed thereto. Sheet or cover member 51 is placed in juxtaposition to the flange 16, and then the container C and cover member 51 are placed in an evacuable chamber, generally designated X. At chamber X, the air is evacuated from the chamber and the container C, and the cover member 51 is sealed to flange 16.

As illustrated, evacuable chamber X includes a lower member 52 and an upper member 53, which may be moved into juxtaposition to form a substantially airtight enclosure. Disposed in the upper member 53 is a sealing head 54 of a shape generally corresponding to flange 16 for sealing the cover member 51 thereto. Sealing head 54 is movable between a position removed from the cover member (FIG. 5) and a sealing position engaged with the cover member (FIG. 6). The sealing head may be heated in any convenient manner; or may be adapted for pressure-sealing if a pressure-sensitive adhesive is utilized. High frequency sealing and other sealing methods may also be utilized, if desired. Sealing head 54 is conveniently provided with openings 55 as an aid in evacuating the chamber and container. The chamber can be placed in communication with the atmosphere or with a vacuum pump (not shown) by means of a valve 56 disposed in a chamber outlet conduit 57. As shown, the lower member 52 is provided with a passage 58 to communicate the upper and lower portions of the chamber and allow the air to escape when the chamber is evacuated. Advantageously, a high vacuum is drawn; for example, around 27-29 inches of mercury. When the desired amount of

air has been evacuated, the sealing is accomplished, and valve 56 is moved to an open position to communicate the chamber with atmosphere.

After the chamber has been evacuated, and the cover 51 sealed onto the container C, as shown in FIG. 6, a partial vacuum results in the space between the product level and the cover member 51. When the sealed package is then exposed to atmosphere, the atmospheric pressure applied to the container will cause it to re-form along the weakened area provided. At this time, then, bottom 12 moves toward the cover as the container re-forms along the weakened area, and the volume of the container is reduced substantially to that volume of product contained therein. As shown, bottom 12 has a central portion 12a which is advantageously initially formed farther away from the top of the container C than is juncture 15. Central portion 12a is shown as that portion of bottom 12 inwardly of weakened area or groove 18; however, it should be understood that it may include that portion inwardly of weakened area or groove 17. It is central portion 12a in which the movement toward the cover 51 or top of the container C is most readily observed. The movement may be such that central portion 12a moves over center, as shown in FIG. 7. During the movement of the bottom 12 toward the cover 51, the outwardly extending flange 16 rigidifies the upper end of the carton while the re-forming takes place. Since a weakened area is provided, the location of the re-forming is controlled, and the result is an attractive package which is substantially filled with the product and without danger of contamination of the upper rim or flange 16 during the packaging process.

The web containing the sealed package is then advanced to another station 64 where the packages are cut from the web by cutters 65 and 66. The completed packages are conveniently deposited on a conveyor 68, and the waste portion of the web is fed out of the machine, as shown at 69.

It is deemed obvious that the containers need not be formed in a web as illustrated, but may be individual containers preformed with a weakened area located at the lower end of the container. Additionally, the filling, evacuating, and sealing may be performed at one station, if desired, and such is entirely within the purview of this invention.

The invention in its broader aspects is not limited to the specific steps shown and described, but departures may be made therefrom without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

1. A method of vacuum packaging a preselected quantity of a material comprising the steps of: thermoforming a one-piece, open-topped plastic container having an original shape with a volume greater than that of said preselected quantity an outturned peripheral flange at the top and a weakened area at the bottom and having a bottom wall with a central portion bowed downwardly, placing said preselected quantity of material in the container to a level below the top of the peripheral flange while maintaining the original shape of the container; thereafter enclosing the container in an evacuable chamber and evacuating the air from the chamber and container while maintaining the original shape of the container; sealing a flat cover onto the container while in the evacuated chamber; and releasing the evacuation of the chamber to atmosphere to reform the container only at said weakened area as the central portion moves toward the top of the container and to reduce the volume to less than the original volume and substantially to the volume of said preselected quantity so that the upper level of the material is at the top of the peripheral flange.

2. A method of vacuum packaging as set forth in claim 1 wherein the step of thermoforming a container includes thermoforming a container having side and bottom walls

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and with the weakened area in the form of at least one fold line adjacent the juncture of the side and bottom walls.

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