

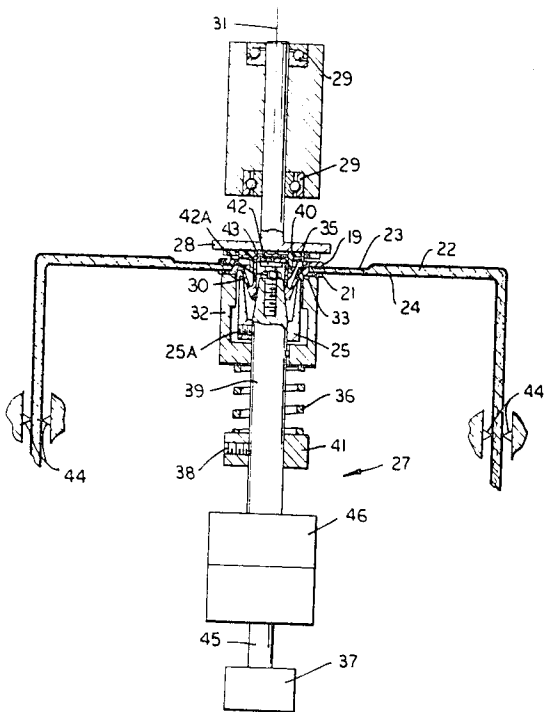
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[54] **METHOD OF MAKING A CONTAINER CLOSURE**
5 Claims, 7 Drawing Figs.
[52] U.S. Cl. **156/69,**
220/67, 285/203, 285/205
[51] Int. Cl. **B29c 27/02,**
B65b 7/18, F16l 37/08
[50] Field of Search..... **156/69;**
220/67; 285/200, 203, 205; 150/0.5

ABSTRACT: A flexible retractable and extensible closure of plastic is secured to a corrugated fiberboard container coated with plastic or a material fusible to the closure, by providing upper, lower, or both upper and lower flanges on a portion of the spout member, the flanges being fused to facing surfaces of the container top around an opening in the top, by spin welding, or other heating means to provide single or double liquid and vaportight seals around the opening.



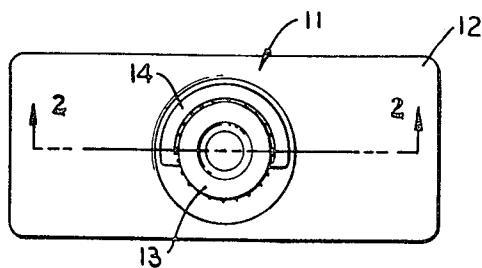


Fig. 1.

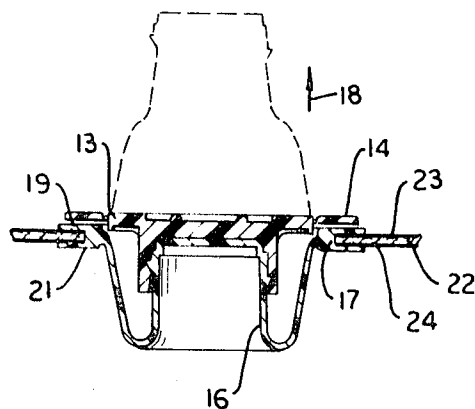


Fig. 2.

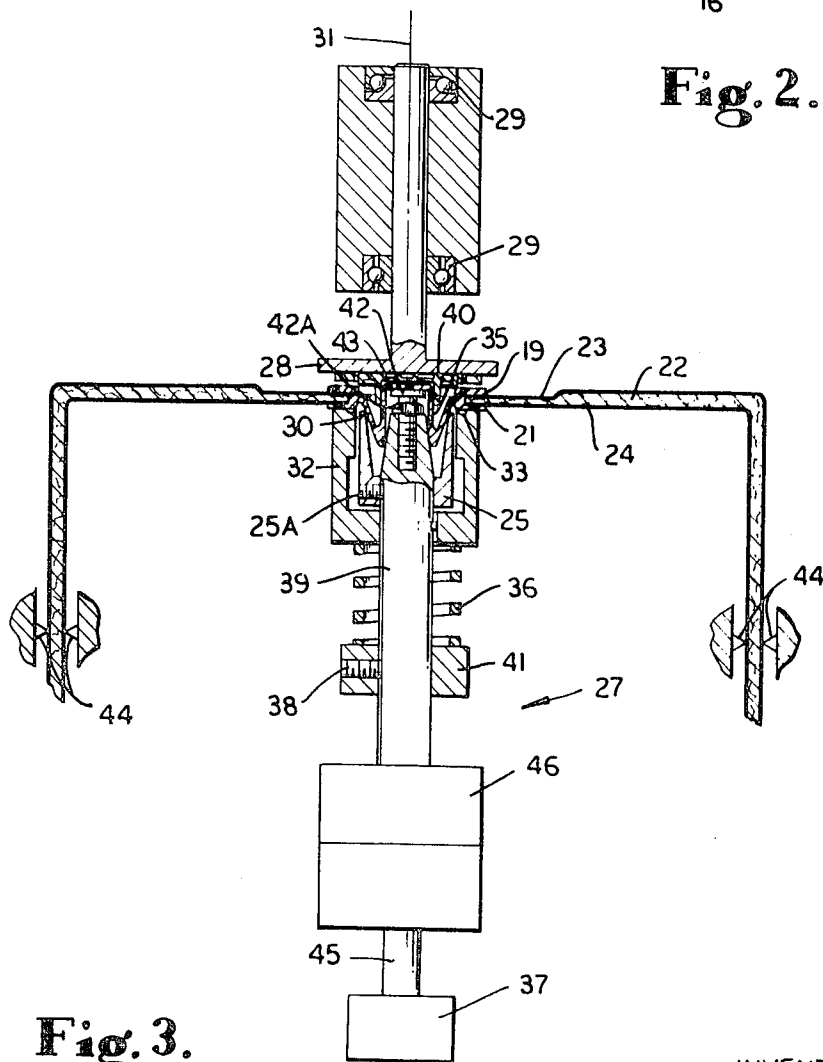


Fig. 3.

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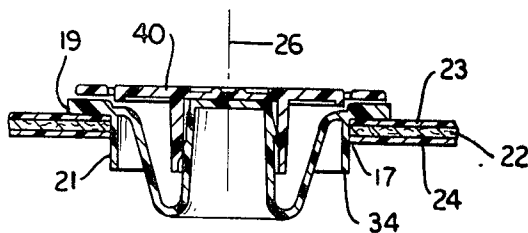


Fig. 4.

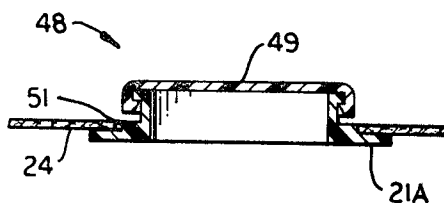


Fig. 5.

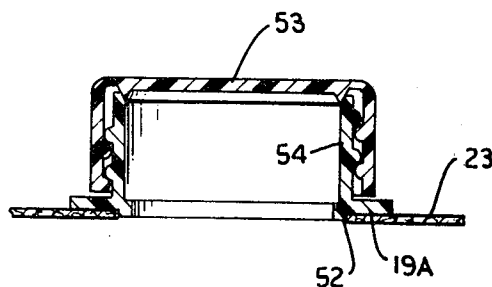


Fig. 6.

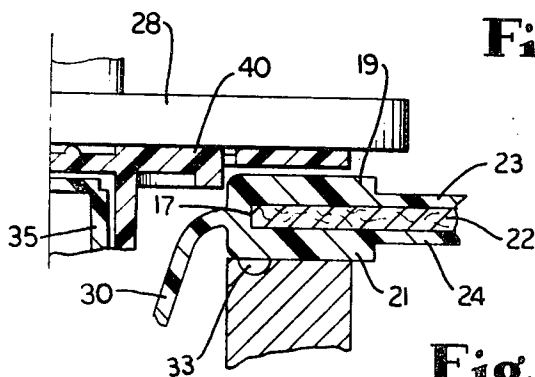


Fig. 7.

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METHOD OF MAKING A CONTAINER CLOSURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to container closures, and more particularly to a closure in a container wherein the closure is sealed both to the exterior and interior surfaces of the container.

2. Description of the Prior Art

Various types of containers made of plastic, or made of other materials coated with plastic, are known in the art. There is a need for such containers with closures on them of type generally shown in U.S. Pat. No. 2,895,654 and No. 3,250,428 issued July 21, 1959 and May 10, 1966, respectively, to Glenn T. Rieke.

There are some types of containers which do not lend themselves readily to attachment of closures of the type shown in the aforementioned patents by the means shown in those patents. An example is a container of corrugated or uncorrugated fiberboard having a polyethylene liner and a polyethylene sheath. It is desirable to be able to mount such closure spouts to such containers and provide a seal on both the liner and the sheath. Such seals should not be damaged and the closure should remain firmly installed in spite of repeated extensions and retractions of the spout for pouring and storage, respectively. The present invention is directed toward the solution of these problems.

SUMMARY OF THE INVENTION

Described briefly, according to a typical embodiment of the present invention a closure is installed in an opening in the container and rested upon a flange having a plastic lower surface engaging an upper surface of the top of the container. A downwardly extending flange is outwardly turned to a condition parallel to the upper flange and having an upper surface engageable with the lower surface of the container top. The container surfaces facing the flange surfaces are heated, together with the flange surfaces engaging them, by one of several means, whereupon they are fused together, to provide a double liquid and vaportight circular seal around the container opening.

BRIEF DESCRIPTION OF THE DRAWINGS

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

FIG. 1 is a top plan view of a portion of a container with a closure incorporated therein according to a typical embodiment of the invention.

FIG. 2 is a section therethrough taken at line 2—2 in FIG. 1 and viewed in the direction of the arrows.

FIG. 3 is a section illustrating a spin welding method of securing the closure of FIGS. 1 and 2 in a container according to the method of the present invention.

FIG. 4 is a section through a type of closure similar to that in FIGS. 1, 2 and 3 and useful according to this invention.

FIG. 5 is another type of closure securable only to the liner of a container according to the present invention.

FIG. 6 is a section through a closure securable to a sheath of a container according to the present invention.

FIG. 7 is an enlarged portion of the section of FIG. 3 showing the upper and lower flanges fused to the container sheath and liner respectively.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawing in detail, a closure 11 is provided in the top of container 12, the closure including a cap 13 with a bail handle 14. As shown in FIG. 2, the cap 13 is threadedly received on a spout 16 retracted within the opening 17 in the container top. By pulling upwardly in the direction of arrow 18 on the bail 14, the spout can be extended from the nested position shown in FIG. 2, to an ex-

tended pouring position shown in the dotted outline in FIG. 2, whereupon the cap can be removed to facilitate pouring the contents out of the container. Such features are more fully described in the aforementioned U.S. Pat. No. 2,895,654.

According to one embodiment of the present invention, this closure is provided with an upper flange 19 and a lower flange 21, the spout and flanges being of a homogeneous unit of plastic. As used in this application, the expression "plastic" is defined as one of many high-polymeric substances including both natural and synthetic products which, at some stage in its manufacture is capable of flowing, under heat and pressure, if necessary, into a desired final shape. The container illustrated is made of a corrugated fiberboard core 22 having a plastic sheath 23 adhered to the top and outer surfaces thereof, and a plastic liner 24 adhered to the bottom and inner surfaces thereof. Although only the top wall of the container is shown in FIG. 2, it should be understood that such lining and sheath of this or other material may be provided throughout the container.

Referring now to FIG. 3, along with FIG. 4, note that in FIG. 4 the flange 21 projects downwardly and is coaxial with the spout, having a common axis 26. The flange 19 is a circular flange centered on the axis 26. As a first step in the installation of a closure of this type, the downwardly extending flange 21 is projected downwardly through the opening 17 in the container, whereupon the closure is centered in the container by this flange 21, and rests on the container top margin around the opening, supported there by the flange 19. This combination is placed in a spin welding jig designated generally by reference numeral 27.

The inner pressure pad 25 is arranged to cooperate with the taper on the upper end portion of shaft 39 to receive and center the body portion 30 and neck portion 35 of the nested spout on the axis 31 of shaft 39. The vertical location of the pad 25 on shaft 39 is established to provide the desired grip of the pad and taper on the spout, and the setscrew 25A is tightened to maintain this location. A screw threadedly received in the upper end of shaft 39 has a head 42 which serves as a stop and support for the underside of the integral seal diaphragm portion 43 of the spout. The desired vertical location of this adjustable screw is secured by the locknut 42A jammed against the upper end of the shaft 39.

The upper pressure pad 28 is then brought down on the cap 40 and locked by any suitable means (not shown) to prevent upward movement thereof. This pad 28 is on a shaft which is not powered, but can spin freely in bearings 29. As it is brought down, the circular groove 33 in the upper face of the outer pressure pad 32 receives the lower edge 34 of the downwardly extending flange 21 and urges it outwardly to the position shown in FIG. 3 where the flange 21 is in parallel, vertically-spaced relationship to the flange 19, and contacts the lower surface of the container. As the flange areas in contact with container surface areas are known, the amount of load on the flanges for a satisfactory weld is known. The vertical location of the chuck 41 on shaft 39, to establish this load through spring 36 and pad 32, is maintained by setscrew 38.

The container is held stationary in the jig by appropriate clamps indicated schematically at 44. Motor 37 has an output shaft 45 providing a constantly rotating input to the electrically operated conventional clutch-brake unit 46. After the upper pad 28 has been brought into position, the unit 46 is operated to release the brake on shaft 39 and couple it through the clutch to motor output shaft 45. The closure and flanges thereof are thereby spun rapidly against the container surfaces contacted thereby until the heat generated thereby renders the engaging surfaces fusible. Unit 46 is then operated to declutch the shaft 39 from the shaft 45 and apply the brake to it to quickly stop the spinning of the closure. Engagement of the fusible surfaces is maintained until fusion has occurred and the surfaces have cooled sufficiently to avoid separation thereof when the upper pad is raised out of the way for removal of the container from the jig. This procedure thereby effects fusion of the lower surface of flange 19 on the upper

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surface 23 of the container, and fusion of the upper surface of flange 21 on the lower surface 24 of the container. Upon cooling of the fused surfaces, a durable liquid and vaportight circular seal has been provided between the flange 21 and the lower surface 24 of the container, and between flange 19 and the upper surface 23 of the container.

Referring now to FIG. 5, the closure 48 thereof, provided with a snap-on cap 49, has but a single annular flange 21A with a shoulder or boss 51 projecting upwardly therefrom. This flange is heat sealable to the liner or other under surface of a container around an opening therein in a manner similar to that employed in FIG. 3. In this instance, however, the end product has but a single circular liquid and vaportight seal of the closure to the container.

The closure of FIG. 6 is sealable to a container in a similar manner, but in this instance the flange 19A is above a boss 52, the latter projecting in an opening such as the opening 17 in the container of FIG. 2. The lower surface of the flange 19A is heat sealed or fused to the upper surface of the container top. Therefore, in this instance again there is but a single annular liquid and vaportight seal to the container, and it is to be the outer surface rather than the inner surface of the container. The cap 53 employed in this embodiment, for example, is threadably received on the neck 54 thereof.

In the forgoing description, heat sealing has been mentioned, particularly with reference to FIGS. 5 and 6. It should be pointed out, however, that ultrasonic sealing, spin welding, heat sealing, or high-frequency sealing can be employed to obtain fusion of the plastics. Also the downwardly extending skirt of the closure of FIGS. 1-4 can be folded over to engagement with the container either prior to the sealing process, or during the sealing process as described above.

For ultrasonic welding, the closure flange or flanges would be held against the container surfaces faced thereby, by the vibration tool of the welding machine. After the application of pressure and vibrations during a predetermined time, the engaging surfaces of the flanges and container are heated and by application of controlled pressure, the areas are fused together. This approach can be used when welding a plastic closure to some other type of material such as metals or papers of a container, at a high production rate.

For heat sealing of the various closures to a container, heat would be applied directly to the plastic to liquefy the contact surface. Once liquefied, pressure is applied to the contact area causing the liquefied surface to impregnate the other contacting surface. The pressure is held until the fused contact areas solidify to form the liquid or vaportight seal. This approach forces the liquid plastic to flow into the contact surface of the metal, other plastic, paper or other material of the container or the closure, as the case may be. Normally, however, the closure is plastic and the container body itself, or the surface materials thereof would receive the liquefied plastic of the respective flange of the closure.

In the high-frequency sealing, a special aluminum foil ring molded into the flange ring is passed under a high-frequency magnetic induction coil. The aluminum foil, interfering with the high-frequency magnetic induction field, causes induction heat to build sufficiently to melt the contact area on the clo-

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sure flange surfaces, and fuse the closure to the container. This procedure can seal any suitable thermoplastic closure to any material which has been impregnated with a suitable material to form the liquid or vaportight seal.

Thus it is seen that by applying one or more methods to closures of the type described above, particularly the flexible, extensible and retractable spout closures can be securely mounted to containers having characteristics not readily lending themselves to mounting of such closures by previously known methods as described in the aforementioned patents.

While the invention has been disclosed and described in some detail in the drawings and foregoing description, they are to be considered as illustrative and not restrictive in character, as other modifications may readily suggest themselves to persons skilled in this art and within the broad scope of the invention, reference being made to the appended claims.

The invention claimed is:

1. A method of securing a closure to a container, comprising the steps of:

projecting a downwardly extending flange of the closure downwardly through an opening in a container;
locating the closure in the opening by abutting an outwardly extending flange of the closure against the topside of the top of the container at the margin of the opening;
turning the downwardly extending flange outwardly below said opening, to engage the underside of said top;
heating the closure;
and keeping said outwardly turned flange engaged with the underside of said container while heating until engaging surfaces become fusible; and
terminating the heating while maintaining the engagement of said outwardly turned flange with the underside of said top, to fuse said outwardly turned flange to the surface of the underside of the said top,
said heating being effected by spinning the closure with respect to said container.

2. The method of claim 1 wherein:

said closure is a flexible retractable and extensible spout unit made of thermoplastic material, and said closure is gripped and spun to generate said heating.

3. The method of claim 1 wherein:

heat is generated in both of said flanges around the entire perimeter of said opening to provide a liquid and vaportight seal between each of said flanges and the respective container surface faced thereby, around the entire perimeter of said opening.

4. The method of claim 1 wherein:

a nested spout portion of said closure is gripped for spinning thereof.

5. The method of claim 1 and further comprising the step of: keeping said outwardly extending flange engaged with the topside of the top of said container while heating until engaging surfaces become fusible; and

terminating the heating and maintaining the engagement of said outwardly extending flange with the topside of said top until the engaging surfaces become fused.

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