

[54] **QUICK-OPEN FLEXIBLE PACKAGE**

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[21] Appl. No.: **43,717**

**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 852,553, Aug. 25, 1969, abandoned.

[52] U.S. Cl. .... **222/107, 222/498, 272/541, 206/56**

[51] Int. Cl. .... **B65d 35/08**

[58] Field of Search .... **222/495-497, 92, 222/107, 212, 541, 544, 556, 559, 498, 499; 206/54 AA; 150/10; 251/4, 331; 229/55, 7, 43, 51**

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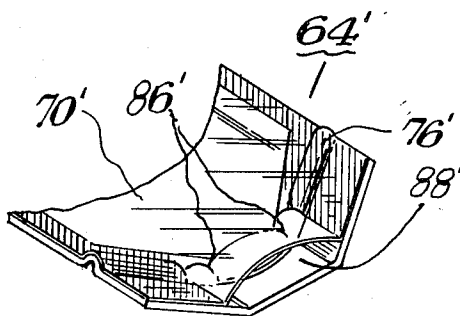
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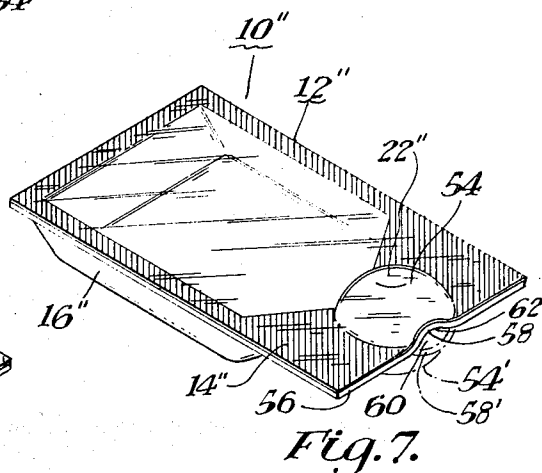
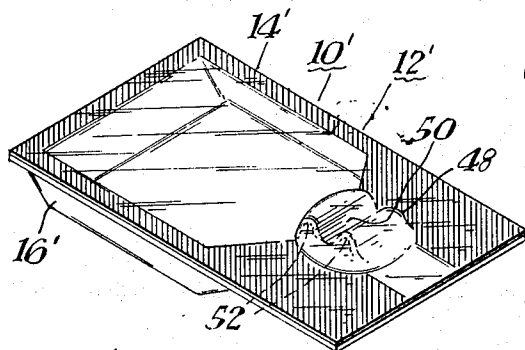
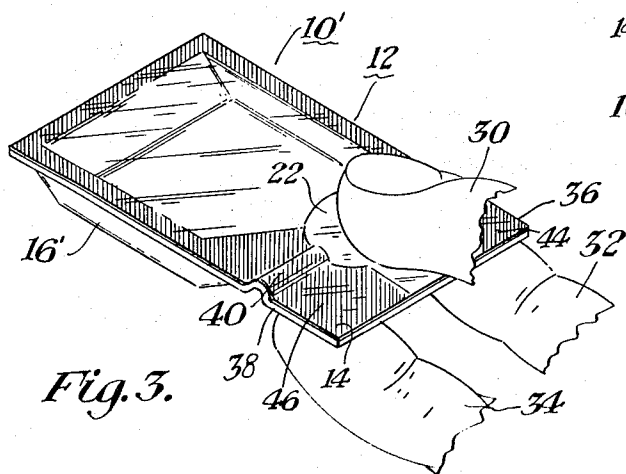
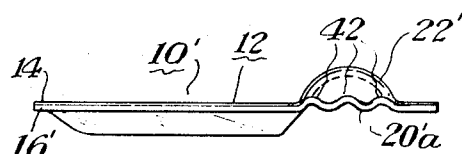
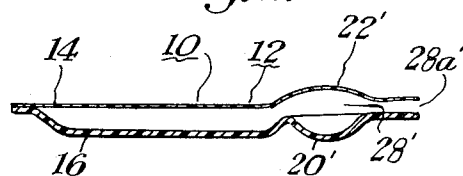
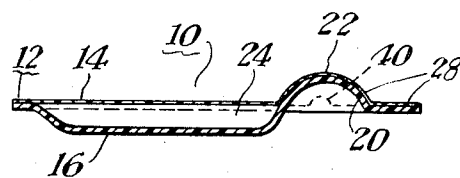
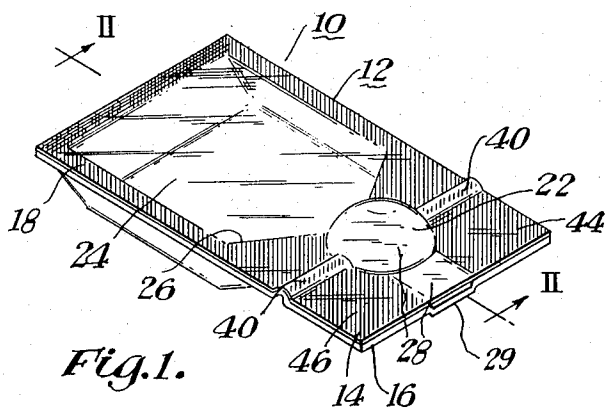
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[57] **ABSTRACT**

I disclose a quick-open container structure comprising a pair of sheet members, means for peripherally sealing said sheet members to define a containment section therebetween, said peripheral sealing means being interrupted to define a relatively narrowed dispensing channel, extending from said containment section to an edge of said structure, at least one of said sheet members being sufficiently flexible to permit deformation at said containment section to extrude the contents thereof through said dispensing channel, a deformable member mounted on one of said members and disposed to block said dispensing channel in the undeformed condition of said deformable member, means for stretching said one flexible member over said deformable member in its nondeformed condition to seal said containment section, said deformable member being shaped to loosen said one flexible member in the deformed condition of said deformable member.

**27 Claims, 26 Drawing Figures**





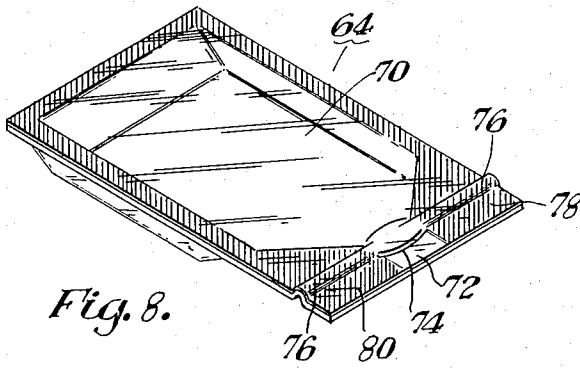


Fig. 8.

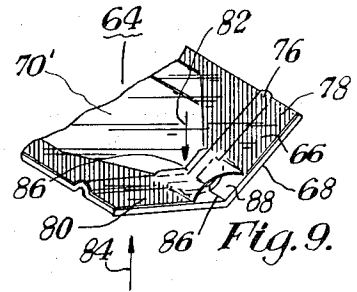


Fig. 9.

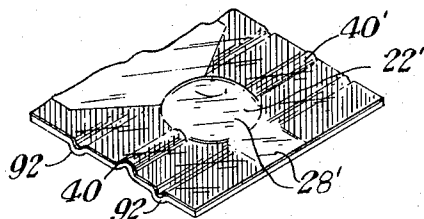


Fig. 11.

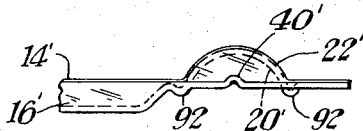


Fig. 12.

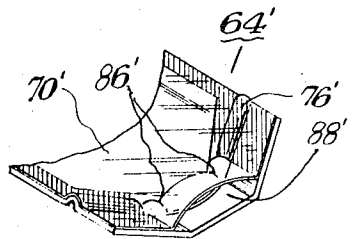


Fig. 10.

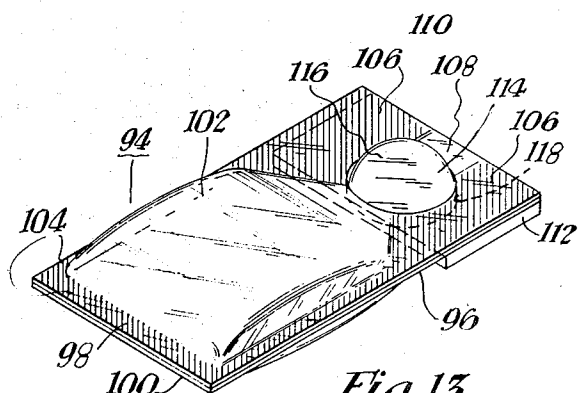


Fig. 13.

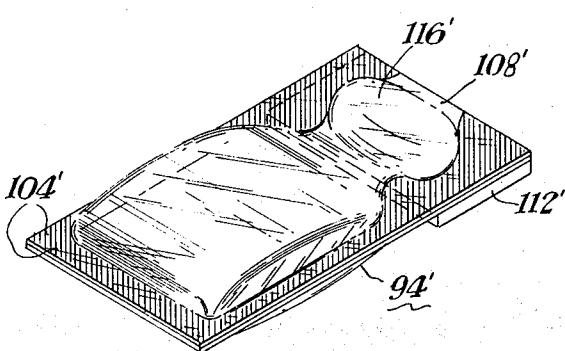


Fig. 15.

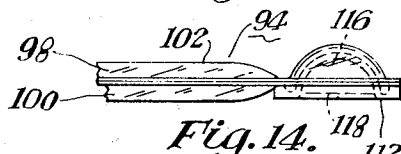


Fig. 14.

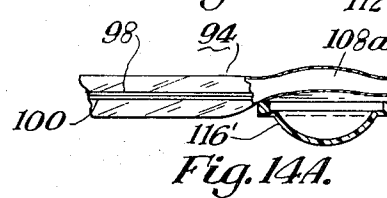


Fig. 14A.

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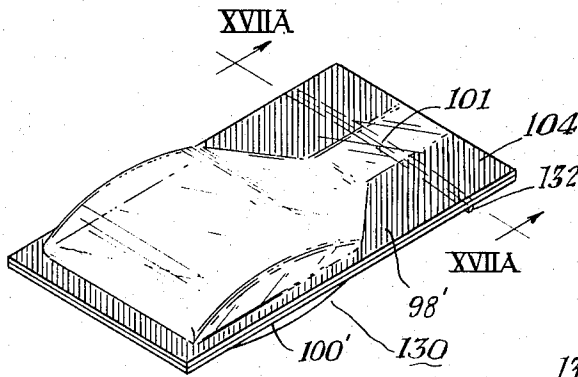


Fig. 17.

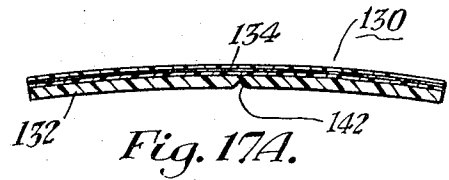


Fig. 17A.

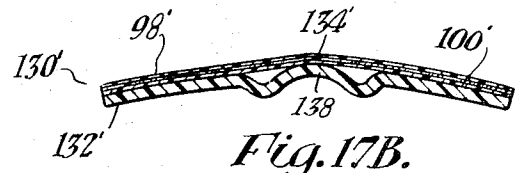


Fig. 17B.

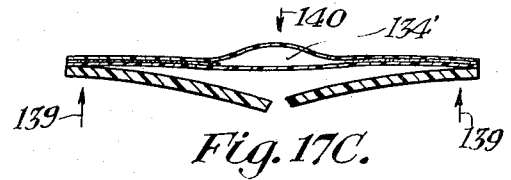


Fig. 17C.

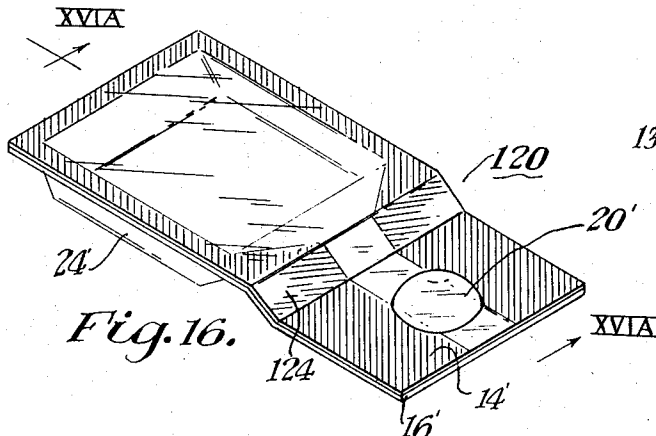


Fig. 16.



Fig. 18A.

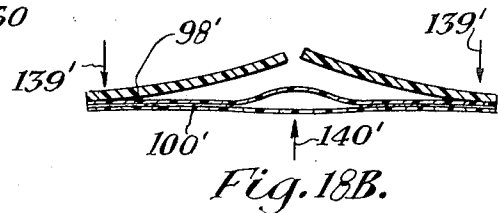


Fig. 18B.

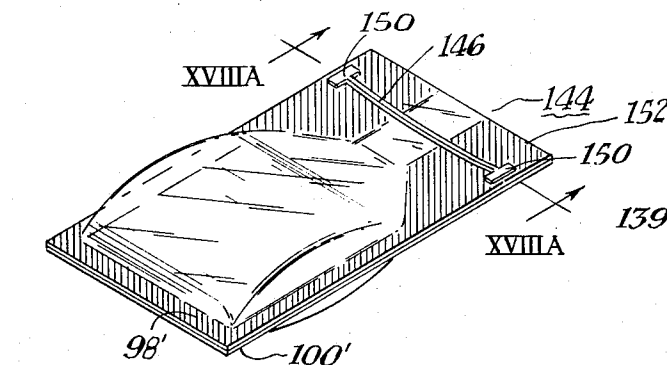


Fig. 18.

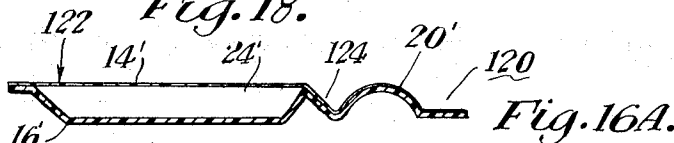


Fig. 16A.

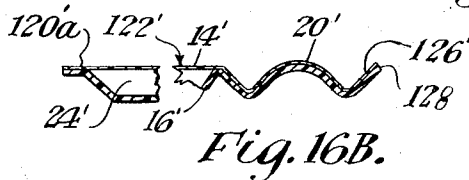


Fig. 16B.

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**QUICK-OPEN FLEXIBLE PACKAGE**

This application is a continuation-in-part of my copending application entitled **QUICK-OPEN FLEXIBLE PACKAGE** filed Aug. 25, 1969, Ser. No. 852,553 now abandoned.

My present invention relates to quick-open or snap-open packages and more particularly to packages of the character described adapted for containing fluid or semifluid materials. In certain aspects of my invention, the packages further are provided with quick-close or snap-close means.

The desirability of a quick-opening sealable container structure has been elaborated upon in my copending applications entitled "Sealed Dispensing container," Ser. No. 716,438, filed Mar. 27, 1968, now abandoned; and "Quick-open Container Structure," Ser. No. 812,234, filed Apr. 1, 1969.

As there stated, there are many applications where it is desirable to afford containers of the character described for pharmaceuticals, foodstuffs, and other fluids or relatively free flowing solids. In many cases these materials because of their nature or end use are dispensed in relatively small, usually individualized, quantities. For convenience in handling, and in appropriate situations to prevent contamination of the contents, it is desirable to provide a package or container which can be readily and effectively sealed but which can be opened quickly, desirably with the use of one hand in the case of the smaller sizes, leaving the other hand free for other administrations.

Previously proposed container structures of this general nature either have been overly large and inappropriate for individualized portions, have been incapable of proper and effective sealing throughout the useful life of the container, have been complicated in construction, have required complicated structure for making or breaking the seal or otherwise for opening the package, or have not been furnished with suitable pouring means upon opening. In amplification of certain of these shortcomings, the opening, pouring of dispensing means of known packages are large or bulky or otherwise difficult to manipulate and to use. For example, such pouring means may get in the way of the patient's or user's nose. In other conventional packages the dispensing means render the fluid difficult to extract from the package or will not remain in the intended dispensing configuration, when opened. Known packages, particularly those for individualized portions, almost uniformly fail to provide quick-opening sealing means in addition to pouring means. No prior art is known which exhibits a snap-open feature or a snap-close feature or both. As a final comment on the prior art, before citing specific examples, known containers of this character frequently are too complex for mass production techniques or do not provide the user with sufficient indication of an operational approach to their opening procedures.

I am aware of the U.S. Pat. to Antonious No. 3,110,335; Carter No. 2,740,573; Kersh et al. No. 3,315,866; Stephens No. 2,696,943; Collie No. 3,321,123; Miller No. 3,302,858; O'Neal et al., No. 2,330,840; Gardner No. 3,301,459; and O'Neal No. 2,839,234. Although, perhaps, useful for their intended purposes, these patents, in general utilize complex structures for opening purposes which are difficult to manufacture in quantity and difficult to seal where required. None of these known structures, therefore, is readily adaptable for use as quick-opening, individualized containers for fluids and semifluid foodstuffs or pharmaceuticals or the like. Carter No. 2,740,573, as an example, requires two hands for opening and is otherwise unduly complex in construction for individualized dispensing. Although Antonious No. 3,110,335 is of greater interest than others of the cited patents in that a package which apparently can be opened with one hand is disclosed, the Antonious container is not suitable for fluids or semifluids, cannot be adequately sealed, and is overly complicated for individualized dispensing. Relative to certain modifications of my invention, none of these references affords both quick-opening and quick-closing dispensing means for liquid containers.

Also relevant to this discussion are the U.S. Pat. to Forney No. 988,453; Miner No. 1,190,935; Russell No. 2,008,314;

Alter No. 2,084,757; Lieber No. 2,150,627; and Wolfe No. 2,215,989. Although these containers may be useful for their intended purposes, the last-mentioned group of patents suffer from the same disadvantages as pointed out in connection with the Antonious structure, insofar as packaging and dispensing small or individualized fluid portions are concerned. These references also fail to disclose a suitable quick-open or quick-close seal.

There are many applications wherein it is desired to dispense a viscous liquid or other fluid rather slowly and in a controlled manner. The simplest construction for accomplishing this involves a flexible package which is compressed or "milked-down" with the fingers to extrude the contents through a restricted passage. Considerable difficulty has been experienced in the past in constructing a package of this nature so that it can be opened quickly and easily. Although numerous attempts have been made in the past to develop a suitable construction for this purpose, the packages have been difficult to open, to seal in the first instance, to extrude the contents therefrom in a controllable manner, and to reseal the packages in the event of incomplete usage of their contents. Of more particular interest to the invention are the U.S. Pat. to Salfisberg No. 2,103,389; Campbell No. 3,173,580; Kaplan No. 2,707,581 and Mason No. 2,705,579. The Kaplan and Salfisberg patents show flexible packages wherein removal of a tear strip is prerequisite to opening, which requires the use of two hands and, of course, prevents resealing. The Campbell reference likewise shows a flexible packet one edge of which is preferentially weakened to open upon application of pressure to the fluid contents of the container. In addition to the aforementioned disadvantages the Campbell arrangement is subject to uncontrolled dispensing upon opening. The Mason patent is similar to the Kaplan and Salfisberg containers and is opened by tearing off a weakened portion of the seal.

Of generalized interest to the subject of individualized dispensing, both liquid and solid, are the U.S. Pat. to Hartman, Jr., No. 3,054,503; Gronemeyer No. 3,029,987; Sparks No. 3,207,299; Sorenson No. 2,317,860; Rieke No. 2,565,699; Johnson No. 3,118,573; Allen No. 3,248,017 and Wallis No. 3,214,063.

Hartman, Jr. and Sorenson apply manual (finger) pressures to a solid contained article to push the article through a package wall, with considerable potentiality of damage to the article. If these prior packages were adapted to contain a fluid or semifluid material the dispensing characteristic would, of course, be largely uncontrolled. Gronemeyer, Johnson and Allen apply pressure to fluid contents to dispense the contents through a frangible or porous member. Here again, there is considerable likelihood of premature breakage of the package and uncontrolled dispensing. Wallis employs an auxiliary puncturing device for rupturing a frangible seal and requires additional hardware. Sparks and Rieke likewise relate to containers of solid materials and suffer from the foregoing disadvantages.

My novel package, on the other hand, can be quick-opened (or quick-closed) utilizing the fingers of one hand and without the application of pressure to the contents, prior to opening or unsealing the package. Moreover, my package requires the use of only two components and can be readily manufactured on form, fill and seal machines, which are in vogue throughout the packaging industry.

In brief, the prior art has failed to formulate a flexible package having an adequate closure seal which can be manipulated to an unsealed position by bending, twisting or otherwise deforming the seal in a single, quickly but accurately performed, dispensing operation. Further, the prior art does not disclose a package, made in accordance with another feature of my invention, which can be quickly and easily resealed.

I accomplish these desirable results by providing a quick-open container structure comprising a pair of sheet members, means for peripherally sealing said sheet members to define a containment section therebetween, said peripheral sealing means being interrupted to define a relatively narrowed

dispensing channel extending from said containment section to an edge of said structure, at least one of said sheet members being sufficiently flexible to permit deformation at said containment section to extrude the contents thereof through said dispensing channel, a deformable member mounted on one of said members and disposed to block said dispensing channel in the undeformed condition of said deformable member, means for stretching said one flexible member over said deformable member in its nondeformed condition to seal said containment section, said deformable members being shaped to loosen said one flexible member in the deformed condition of said deformable member.

I also desirably provide a similar quick-open container structure wherein only one of said sheet members is flexible, the other of said sheet members is resilient, and said deformable member is formed integrally with said resilient member.

I also desirably provide a similar quick-open container structure wherein said deformable member is shaped to exhibit a bistable characteristic and an overcenter effect as the deformable member is moved between a stable closed position thereof whereat said flexible layer is stretched thereover to block said channel and a stable open position thereof displaced from said one flexible member to open said channel.

I also desirably provide a similar quick-open container structure wherein said deformable member is positioned on a separate stiffening element secured to one of said sheet members.

I also desirably provide a similar quick-open container structure wherein said deformable member is hemispheroidal in contour and is thereby shaped to exhibit an overcenter bistable characteristic.

I also desirably provide a similar quick-open container structure wherein means are provided on said container structure and disposed on each side of said deformable member and said dispensing channel for stiffening said structure in the areas thereof adjacent said deformable member to facilitate deformation of said deformable member.

I also desirably provide a similar quick-open container structure wherein said stiffening means adjoin said deformable member so that said deformable member is deformed to its channel-open position upon angulation of said stiffening means and the adjacent areas of said container construction.

I also desirably provide a sealing and/or valving construction comprising a pair of flexible members, means for partially adjoining said members to define a flow channel therebetween, a deformable element mounted on one of said members and disposed to block said flow channel in an undeformed condition of said deformable element, at least one of said members being sufficiently flexible for stretching over said deformable element in its undeformed condition to block said channel, means for so stretching said flexible member, and said deformable element being shaped to loosen said flexible member in the deformed condition of said deformable element to unblock said channel.

During the foregoing discussion, various objects, features and advantages of the invention have been set forth. These and other objects, features and advantages of the invention together with structural details thereof will be elaborated upon during the forthcoming description of certain presently preferred embodiments of the invention and presently preferred methods of practicing the same.

In the accompanying drawings, wherein similar reference characters with primed accents denote components which are similar to those in preceding figures, I have shown certain presently preferred embodiments of the invention and have illustrated certain presently preferred methods of practicing the same, wherein:

FIG. 1 is an isometric view of one form of quick-open or snap-open flexible package arranged in accordance with my invention;

FIG. 2 is a longitudinally sectioned view of the package shown in FIG. 1 and taken along reference line II—II thereof;

FIG. 3 is an isometric view illustrating a step in the opening of my package;

FIG. 4 is a view similar to FIG. 2 but showing the package of the preceding figures in its opened condition;

FIG. 5 is a side elevational view of a package similar to that of the preceding figures but showing another embodiment of stiffening means therefor;

FIG. 6 is an isometric view of a modified form of the package shown in FIG. 1 and incorporating alternative snap-open sealing means;

FIG. 7 is a similar view of a package having still another form of the sealing means;

FIG. 8 is an isometric view of another form of my quick-open flexible package which can be quick-opened by angulation;

FIG. 9 is a partial, end isometric view of the package of FIG. 8 in its opened condition;

FIG. 10 is a similar view of a modified form of the package shown in FIG. 9;

FIG. 11 is an isometric view of still another form of my novel quick-open package, similar to that shown in FIG. 5 but illustrating another form of lateral stiffening means;

FIG. 12 is a side elevational view of the package as shown in FIG. 11;

FIG. 13 is an isometric view of another modification of my novel quick-open package illustrating another form of sealing means therefor, which means in addition allow an increased flexibility of the package;

FIG. 14 is a partial, side elevational view of the package as shown in FIG. 13;

FIG. 14A is a similar view of the package as shown in FIG. 14 but in its opened condition;

FIG. 15 is an isometric view of still another form of sealing means for use with any of the preceding package constructions, and incorporating a flow-compensating device;

FIG. 16 is an isometric view of a further modification of my quick-open flexible package;

FIG. 16A is a longitudinally sectioned view of the package as shown in FIG. 16 and taken along reference line XVIA—XVIA thereof;

FIG. 16B is a similar view showing another form of the dispensing end portion of the package shown in FIGS. 16, 16A;

FIG. 17 is an isometric view of still another modification of my quick-open flexible package;

FIG. 17A is a cross-sectional view of the package as shown in FIG. 17 and taken along reference line XVIIA—XVIIA thereof;

FIG. 17B is a similar view but showing a modified form of the sealing means;

FIG. 17C is a similar view showing the package of FIGS. 17, 17A in its open condition;

FIG. 18 is an isometric view of still another form of my novel quick-open flexible package;

FIG. 18A is a cross-sectional view of the package of FIG. 18 and taken along reference line XVIII A—XVIII A thereof;

FIG. 18B is a similar view showing the package of FIGS. 18, 18A in its open condition.

Referring now more particularly to FIGS. 1-4 of the drawings, the exemplary form of my novel package 10 shown therein comprises a bipartite container structure 12 having an upper layer 14 and a lower layer 16, each of which is generally in the form of a sheetlike member. As better shown in FIG. 1 the upper and lower layers 14, 16 are peripherally sealed to one another, as denoted by shaded areas 18. Desirably, the upper layer 14 is fabricated from a known, relatively thin flexible plastic sheet material which is capable of good moisture retention. The lower layer 16 likewise is fabricated from a known plastic material of good moisture retention, but is of a relatively thicker, formable material or is otherwise provided with lesser flexibility. In this connection, the lower layer 16 may be termed "resilient" instead of "flexible," for purposes of descriptive differentiation. The two layers or members 14,

16 can be joined or sealed by conventional techniques such as heat sealing, solvent welding, gluing or cementing.

For sealing purposes the resilient or bottom layer 16 is formed with a protruding deformable member or bubble 20 (FIG. 2) over which the flexible or upper layer 14 is stretched as denoted by reference character 22. This stretching is accomplished at the sealing step and the contiguous contact between the layers 14, 16 in the area of the bubble 20, is thereafter maintained by the resiliency and relative stiffness of the bottom layer 16. Such resiliency maintains the shape of the bubble 20 until it is desired to open the package 10.

The deformable member, such as the member 20, can take a variety of shapes. It need not be formed integrally with one of the package layers but can be provided as a discrete member as shown in FIGS. 13-15 or in FIGS. 17-18B. Likewise, it is not necessary for the deformable member to have an overcenter action; rather it can merely crumple or break to free the dispensing channel 28 (FIGS. 1-4) or similar dispensing channel of the remaining figures. By use of the term "deformable," I denote also a frangible sealing member, forms of which are shown in FIGS. 17-18B, by which the associated dispensing channel is freed by breaking of the deformable sealing member.

From FIGS. 1 and 2 it will be seen that the lower or resilient layer 16 is formed into a trough shape so as to define a fluid containment section 24. The section 24 is enclosed and sealed by the upper flexible layer 14 which is stretched thereover by the peripheral seal 18. The end of the containment section 24 adjacent the sealing bubble 20 is constricted at 26 so as to open into a dispensing passage 28, formed in this instance by a discontinuity in the peripheral sealing or joining 18. As better shown in FIG. 1, flow of fluid through the dispensing channel 28 can be facilitated by lightly troughing the adjacent otherwise flat surfaces 29 of the lower layer 16. Depending on the flexibility and elasticity of the upper layer 14, the dispensing trough 29 in many cases is unnecessary and has not been shown in the remaining figures.

When the container structure 12 is in its closed condition (FIGS. 1 and 2) the sealing bubble 20, which extends across at least the inner end portion of the dispensing channel 28, completely blocks the channel and hence the containment section 24, by pressure-sealing the upper and lower layers 14, 16 at the channel 28. Alternatively the sealing bubble (e.g., the bubble 54 in FIG. 7) can coextend with the entire length and width of the dispensing channel. In any event, the aforementioned sealing is effected at least to the adjacent baseline portions of the sealing bubble.

The stretched, contiguous contact between the sealing bubble 20 and the juxtaposed area 22 of the upper layer 14 is such that a considerable pressure can be exerted upon the fluid contents 24 without disrupting the pressure seal between the deformable member 20 and the stretched portion 22 of the upper layer 14.

Of course, the height and other physical dimensions of the bubble 20 can be varied depending upon the size and contents of the package, flexibility of the top layer 14, resiliency of the lower layer 16, the desired character of sealing contact between the bubble 20 and the area 22, etc.

With reference to FIGS. 3 and 4, means including the sealing bubble 20 are provided by my invention for opening (and reclosing, if desired) the package 10 without the application of any pressure whatsoever directly upon the fluid contents of the containment section 24. Thus, any inadvertent or uncontrolled dispensing of the contents is avoided. My novel package 10 is so arranged that it can be opened with the fingers of one hand (FIG. 3), if desired. It will be understood, of course, that the same desirable principles can be applied to larger packages or to other packages, wherein the user may wish to employ two hands in the opening procedure otherwise outlined below. The use of one or two hands in the opening procedure will depend on the size of the package or of the sealing member, stiffness of the materials employed in its manufacture, manual strength and dexterity of the individual user, etc.

In the illustrated package, however, the latter is grasped as shown in FIG. 3 and the thumb 30 is urged downwardly against the top of the sealing bubble or deformable member 20, while the index finger 32 and middle finger 34 support the undersides of the adjacently lateral areas 44, 46, near the outer edges 36, 38 of the container structure 12 to apply opposing forces thereto. In smaller packages the stiffness of the lower or resilient layer 16 is such that the general contour of this area of the package 10 is maintained while the thumb 30 pushes the sealing bubble 20 to its downward and open position 20' (FIG. 4). In larger packages or with a more flexible bottom layer 16, a number of transversely extending stiffener members or ribs 40 (FIG. 1) or 42 (FIG. 5) minimize bending of the adjacent flat areas 44, 46 of the lower layer 16 when the sealing bubble 20' or 20'a is depressed. The stiffeners 40 can be discrete, adhered elements or they can be formed integrally with the lower layer 16.

The illustrated sealing bubble 20, therefore, has a bistable or overcenter characteristic, as represented by FIGS. 2 and 4 respectively. In furtherance of this function, the sealing bubble or deformable member 20 can be substantially hemispherical, although a particular shape is not essential to my invention. In the event that it is desired not to dispense the contents of the package 10 at one time, the sealing bubble 20 can be restored to its initial or closed position by inverting the package 10 (from the position shown in FIG. 3) and using the thumb or other means to restore the sealing bubble 20' of FIG. 4 to its closed position 20 (FIG. 2). The package construction 12, then, exhibits a valving action by structure which is simplified by an astounding degree.

The bistable characteristic of the sealing bubble 20' is not essential, however, to this feature of my invention, and may be more or less, depending on materials employed in a specific package construction. With certain known plastic materials, the bubble 20', when deformed, will merely collapse or crumple to free the dispensing channel 28 (as denoted at 28a' in FIG. 4) in an essentially similar manner, rather than passing through an overcenter stage to a second bistable position.

It is contemplated, of course, that the aforementioned sealing construction, with its valving action, can be used with other package constructions or with other applications divorced from the packaging art, for valving or sealing purposes.

In my novel package 10' according to FIG. 6 a sealing bubble or deformable member 48 is utilized in place of the sealing bubble 20 of the preceding figures and is provided with a transverse dimple or crease 50. When assembling the package construction 12' the upper layer 14' is stretched not only over the humps 52 of the bubble 48 but also into and along the transverse dimple 50 to provide, in effect a double sealing arrangement for the dispensing channel 28' of the package 10'.

In FIG. 7 the sealing bubble or deformable member 54 of package 10'' is disposed at the end of the package construction 12'' so that the outer end portion of the dispensing channel of the preceding figures is eliminated. Instead, the end edge 56 of the package construction 12'' intersects the sealing bubble 54 at 58. Thus, when the bubble 54 is depressed to its other bistable or dispensing position as denoted by chain outline 54' or is otherwise deformed away from the overlying portion 22'' of the upper layer 14'', a dispensing opening 60 appears between the released package edge 62 and the chain-outlined edge 58'' of the bubble 54'.

In FIGS. 8-10 another exemplary embodiment 64 of my novel container structure is illustrated. The package 64 likewise is of bipartite construction including upper and lower layers 66, 68. The layers 66, 68 are peripherally joined together as described in the preceding figures to enclose a containment space 70 therebetween. The peripheral junction is likewise interrupted to form a dispensing channel 72 which is blocked, in the closed condition of the package 64, by a widened rib portion 74 forming part of transverse strengthening rib 76. The upper layer or membrane 66 is sealed to the adjacent flattened areas 78, 80 of the lower layer 68 and also to the rib structure 76 formed therein with the exception of its

central area 74, and with the further exception of the dispensing channel 72, which can be further defined by troughing the lower layer 68.

The package 64 is opened by grasping it after the manner of FIG. 3, or with two hands, depending on package size or the opening forces involved. In this example, a downward force (arrow 82) and upward forces (arrows 84) are applied to the package which causes the flattened areas 78, 80 to angulate as shown in FIG. 9. The widened areas 74 of the strengthening rib 76 serves to weaken the rib 76 adjacent its midpoint so that it buckles as denoted by reference character 86. When this occurs, the upper layer 66 is no longer stretched over the buckled portion 86, and a dispensing opening 88 forms.

The material of the lower layer 68 can be selected such that the buckling 86 becomes more or less permanent so that the opening 88 remains after the flattened areas or wings 78, 80 of the package are released. Alternatively, and different material can be selected having more of a "memory" so that upon release of the flattened areas 78, 80 the package 64 springs back into the original closed disposition of its wings or angulatable portions 78, 80 to reseal the package. As an additional alternative in this connection, the strengthening rib 76 need not be widened in the area 74, over which the upper layer 66 is stretched but not sealed, and other means can be provided for preferentially weakening the midpoint or channel area of the strengthening rib 76. For example, the rib structure 76 can be thinned or scored adjacent its midpoint to promote the buckling 86. As better shown in FIG. 10, additional lines or areas of weakening 86' can be similarly provided adjacent the midpoint of the strengthening rib 76 to provide a correspondingly larger dispensing opening 88' when the package 64' is angulated as aforesaid.

My novel package 90 of FIGS. 11 and 12 is generally similar to that shown in FIG. 5 but employs a differing arrangement of multiple transverse stiffeners 40' and 92. These stiffeners are embossed or otherwise formed integrally with the bottom layer 16'. The ribs 92, however, project downwardly to facilitate extending them substantially across the width of the package 90. Desirably, the ribs 92 are spaced closely adjacent the opposite sides respectively of the sealing bubble 20'. The ribs 92, therefore, provide a considerable reinforcement for the area of the package 90 adjacent the sealing bubble 20', when the latter is depressed to open or close the package 90. The ribs 92 can be more or less rounded, as shown, for the comfort of the user's fingers in opening the package.

A similar package 94 of either bipartite or tripartite construction 96 is illustrated in FIGS. 13-14A. In this arrangement the container portion of the package construction 96 includes a pair of flexible sheet or membrane members 98, 100 which are peripherally sealed about the containment section 102 enclosed therebetween, as denoted by reference characters 104 and 106. The membrane members 98, 100 can, of course, be respective halves of a single, larger sheet which is shaped and folded to the desired package configuration. However, the upper and lower membranes 98, 100 are not sealed in an area defining a dispensing channel 108, which is further defined by a depression or trough 110 in backing or stiffening member 112.

The flexible members 98, 100 also are not sealed in an area 114 juxtaposed to sealing bubble or deformable member 116 which is carried on the backing member 112. In this example, the backing member coextends substantially with the combined length of the channel 108 and bubble 116. In this arrangement the backing member 112 can be made relatively thick and of sufficient stiffness to eliminate the necessity or desirability of auxiliary stiffening means such as the aforementioned transverse ribbing. This results from the termination of the backing member 112 short of the containment section 102 such that the rigidity of the backing member 112 cannot interfere with compression, squeezing, or flexure of the wall surfaces of the package 94 adjacent its containment section 102 to expel the contents when the package is opened.

The outer surface of the lower layer 100 also is flushly sealed to the backing member 112 with the exception of the channel configuration 110 recessed therein and with the further exception of the sealing bubble recess 118 described below.

The sealing bubble 116 likewise is carried on the backing member 112 with which it is desirably formed integrally. Desirably also, the sealing bubble 116 in its closed disposition rises from the floor of a recess 188 formed in the backing member 112 to provide a thinner and more resilient wall structure for the sealing bubble 116 and to ensure that the sealing bubble 116 does not block the dispensing channel 108 in its opened condition 108a (FIG. 14A) when the sealing is displaced therefrom. The package 94 is opened and closed as described in connection with FIG. 3.

As shown in FIG. 15, the bubble recess 118 can be eliminated and the lateral limits of the dispensing channel 108' of the package 94' can be widened to engage the sealing bubble 116' adjacent the ends thereof to compensate for whatever obstruction the bubble 116' may offer in its snapped-open condition to the flow of fluid through the channel 108'. It will be understood that the arrangement of FIG. 15 can also be applied for this purpose to any of the preceding package constructions.

It will also be understood that a thinner backing member 112 of FIGS. 13-14A can be utilized and provided with any of the transverse ribbing constructions described above or with equivalent reinforcing means.

For certain applications, and for manufacturing convenience, it is desirable to place the deformable member or bubble 20' within the dimensional confines of the containment section of the package, such as package 120 of FIGS. 16, 16A. In this case, the top of the deformable member 20' rises no higher than the top level 122 of the package 120, as evident from FIG. 16A. In furtherance of this purpose, area 124 lying between containment section 24' and the deformable member 20' is depressed below top surface 122 of the package 120. The depression of the area 124 still permits the deformable member or sealing bubble 20' to rise above the immediately surrounding area of the package 120 to apply compressive forces to the adjacent portion of the upper layer 14', which is stretched over the deformable member of bubble, as described previously in connection with FIGS. 1-5 and other figures, to seal the dispensing channel.

Area 126 adjacent the dispensing end of the package 120 can remain substantially flat as shown in FIGS. 16, 16A. Alternatively, for certain manufacturing sequences, package area 126' can be sloped upwardly as shown in FIG. 16B such that the end 128 of the package 120' terminates on substantially the same level as the top surface 122' of an adjacent package 120'a. This facilitates manufacture of the packages 120' from strip or continuous materials. Further, by elevating the package end 128 (FIG. 16B) there is less likelihood of pressure being applied inadvertently to the deformable member 20', which would otherwise open the package prematurely.

Referring now to FIGS. 17-17C the deformable sealing member can be provided in shapes other than as shown in FIGS. 13-15 and in preceding figures. As better shown in FIGS. 17, 17A a quick-open flexible package 130 is provided with a sealing bar or strut 132. The strut 132 is suitably curved or otherwise shaped (FIG. 17A) to apply sealing pressures to flexible layers 98', 100' along the length of the strut 132 and particularly in the area of dispensing channel 134. The end portions of the strut 132 are adhered, as by heat or solvent welding, gluing, or application of cement to shaded areas 136 (FIG. 17) of the strut 132. When applying the strut 132 in this manner, to the package 130, the adjacent portions of the layers 98', 100' desirably are stretched lightly and longitudinally of the strut 132. The curvature or bow of the strut 132 applies closing and sealing forces to the dispensing channel 134.

As better shown in FIG. 17B, the strut 132' of package 130' can be provided with a protuberance 138. By disposing the

strut 132' with its protuberance 138 immediately adjacent the dispensing channel 134' of the package 130', the forces occasioned by stretching the package layers 98', 100' longitudinally of the strut 132' are applied preferentially by the protuberance 138 to the dispensing channel 134'. A tighter seal is thus afforded.

To facilitate opening the package 130 or 130' the strut 132 or 132' desirably is fabricated from a frangible material, which can be a relatively thin plastic or other suitable structural material. The package 130 or 130' is opened by the application of forces to the ends (arrows 138) and adjacent the mid-section (arrow 140) of the strut, to break the strut. Breakage of the strut 132 or 132' releases, of course, the forces which have been applied to the dispensing end portion of the package 130 or 130' and particularly to the dispensing channel 134 or 134', respectively. The contents of the package can then be removed from the dispensing channel in the manner described previously. Breakage of the strut 132 or 132' can be facilitated by means of a notch 142 (FIG. 17A) or 142' (FIG. 17B) or other preferentially weakening means adjacent the midpoint of the strut.

A similar package 144 is illustrated in FIGS. 18-18B of the drawings. The package 144 is provided with a deformable sealing member or strut 146 which is configured to apply somewhat greater sealing forces to dispensing channel 148 of the package 144. The sealing strut 146, which can be configured after the manner of FIG. 17A (as shown in FIG. 18A) or after the manner of FIG. 17B (not shown in FIGS. 18, 18A) is likewise arranged to apply sealing forces to the dispensing channel 148 when the adjacent portions of the package members 98', 100' are stretched along the length of the strut 146. To facilitate anchoring the strut 146 at its ends to the sealed-together portions of the package layers 98', 100', the strut 146 in this example terminates in widened sealing or end portions 150. The adjacent surfaces of the upper package layer 98', for example, can be adhered to the widened portions 150 in the manner described above with reference to the shaded areas 136 of FIG. 17. As the widened strut sections 150 are thus being adhered, the dispensing end portion 152 of the package 144 desirably is stretched a predetermined amount along the length of the strut 146, depending upon the amount of sealing force desired. The sealing strut or deformable member 146, which is bowed downwardly in this example, can be reinforced by a longitudinally extending rib 154.

The package 144 is opened after the manner described above in connection with FIG. 17C, as illustrated in FIG. 18B. The strut 146, however, can be made more or less difficult to break by proper selection of the frangible material and of a suitable cross-sectional configuration thereof.

From the foregoing it will be apparent that novel and efficient forms of quick-open flexible packages have been described herein. While I have shown and described certain presently preferred embodiments of the invention and have illustrated presently preferred methods of practicing the same, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the spirit and scope of the invention.

I claim:

1. A quick-open container structure comprising a pair of sheet members, means for peripherally sealing said sheet members to define a containment section therebetween, said peripheral sealing means being interrupted to define a relatively narrowed dispensing channel extending from said containment section to an edge of said structure, at least one of said sheet members being sufficiently flexible to permit deformation at said containment section to extrude the contents thereof through said dispensing channel, a deformable member mounted on one of said members and disposed to block said dispensing channel in the undeformed condition of said deformable member, means for stretching said one flexible member over said deformable member in its nondeformed condition to seal said containment section, said deformable member being shaped to loosen said one flexible member in the deformed condition of said deformable member.

2. The combination according to claim 1 wherein only one of said sheet members is flexible, the other of said sheet members is resilient, and said deformable member is formed integrally with said resilient member.

3. The combination according to claim 1 wherein said deformable member is shaped to exhibit a bistable characteristic and an overcenter effect as the deformable member is moved between a stable closed position thereof whereat said flexible layer is stretched thereover to block said channel and a stable open position thereof displaced from said one flexible member to open said channel.

4. The combination according to claim 1 wherein said dispensing channel is coterminous with an outer edge of said deformable member.

5. The combination according to claim 1 wherein means are provided on said container structure and disposed on each side of said deformable member and said dispensing channel for stiffening said structure in the areas thereof adjacent said deformable member to facilitate deformation of said deformable member.

6. The combination according to claim 5 wherein said stiffening means include at least one transverse rib structure extending from each lateral edge of said container structure to the adjacent side of said deformable member.

7. The combination according to claim 6 wherein said deformable member is an intermediate continuation of said rib structure and is joined at its ends thereto.

8. The combination according to claim 7 wherein means are coupled to said intermediate continuation for preferentially weakening the same so that said intermediate continuation is deformed to its channel-open position upon angulation of said rib structure and the adjacent portions of said container structure.

9. The combination according to claim 5 wherein said stiffening means include a plurality of rib structures extending from each lateral edge of said container structure to the adjacent edge of said deformable member.

10. The combination according to claim 9 wherein at least some of said rib structures are located on said container structure on the side thereof opposite from said deformable member in its closed position and extend continuously and transversely across said container structure.

11. The combination according to claim 1 wherein said deformable member is positioned on a separate stiffening element secured to one of said sheet members.

12. The combination according to claim 11 wherein the length of said stiffening element is substantially coextensive with that of said dispensing channel.

13. The combination according to claim 11 wherein said deformable member in its closed position rises from the floor of a recess which is formed in said stiffening element and which substantially surrounds said deformable member.

14. The combination according to claim 1 wherein said dispensing channel is widened in the area of said deformable member.

15. The combination according to claim 1 wherein said deformable member is hemispheroidal in contour and is thereby shaped to exhibit an overcenter bistable characteristic.

16. The combination according to claim 15 wherein said hemispheroidal member is creased transversely of said container structure, and said flexible member is stretched into said crease to increase the sealing effect of said hemispheroidal member.

17. The combination according to claim 5 wherein said stiffening means adjoin said deformable member so that said deformable member is deformed to its channel-open position upon angulation of said stiffening means and the adjacent areas of said container construction.

18. A sealing and/or valving construction comprising a pair of flexible members, means for partially adjoining said members to define a flow channel therebetween, a deformable element mounted on one of said members and disposed to block said flow channel in an undeformed condition of said

deformable element, at least one of said members being sufficiently flexible for stretching over said deformable element in its undeformed condition to block said channel; means for so stretching said flexible member, and said deformable element being shaped to loosen said flexible member in the deformed condition of said deformable element to unblock said channel.

19. The combination according to claim 18 wherein said deformable element is constructed to exhibit a bistable characteristic and an overcenter effect when the deformable element is moved between a stable closed position thereof wherein said flexible member is stretched thereof and a stable open position thereof displaced from said flexible member.

20. The combination according to claim 18 wherein means are provided on at least one of said members and disposed on each side of said deformable elements and said channel for stiffening said one member in the areas thereof adjacent said deformable element to facilitate deformation thereof.

21. The combination according to claim 1 wherein said deformable member is frangible and is positioned to unblock said dispensing channel upon breakage thereof.

22. The combination according to claim 21 wherein said deformable member is elongated and extends transversely of said dispensing channel, said deformable member being secured adjacent its ends to said container structure and being

shaped to apply closing forces to said dispensing channel.

23. The combination according to claim 21 wherein said deformable member is elongated and extends transversely of said dispensing channel, said deformable member being curved along its length towards said dispensing channel.

24. The combination according to claim 21 wherein said deformable member extends transversely of said dispensing channel and is provided with a protuberance extending toward said channel, said protuberance being shaped to apply sealing forces thereto.

25. The combination according to claim 21 wherein said deformable member is elongated and extends transversely along said dispensing channel, said deformable member terminating at each of its ends in a widened section for adhering to said container structure.

26. The combination according to claim 21 wherein said deformable member is provided with preferential weakening means adjacent said dispensing channel.

27. The combination according to claim 1 wherein an area of said container structure adjacent said deformable member and removed from said containment section is depressed such that said deformable member lies within a transverse dimension of said containment section.

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