

Jan. 21, 1969

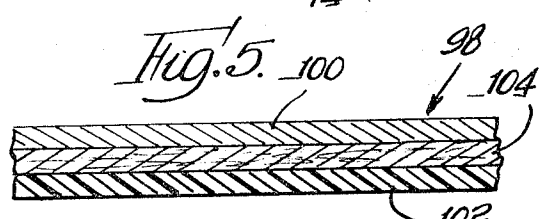
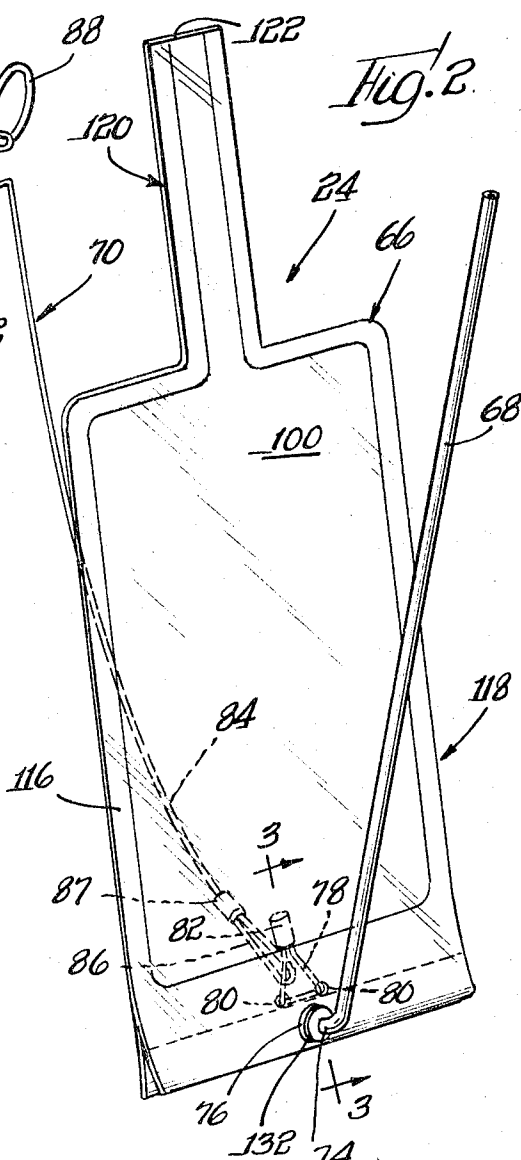
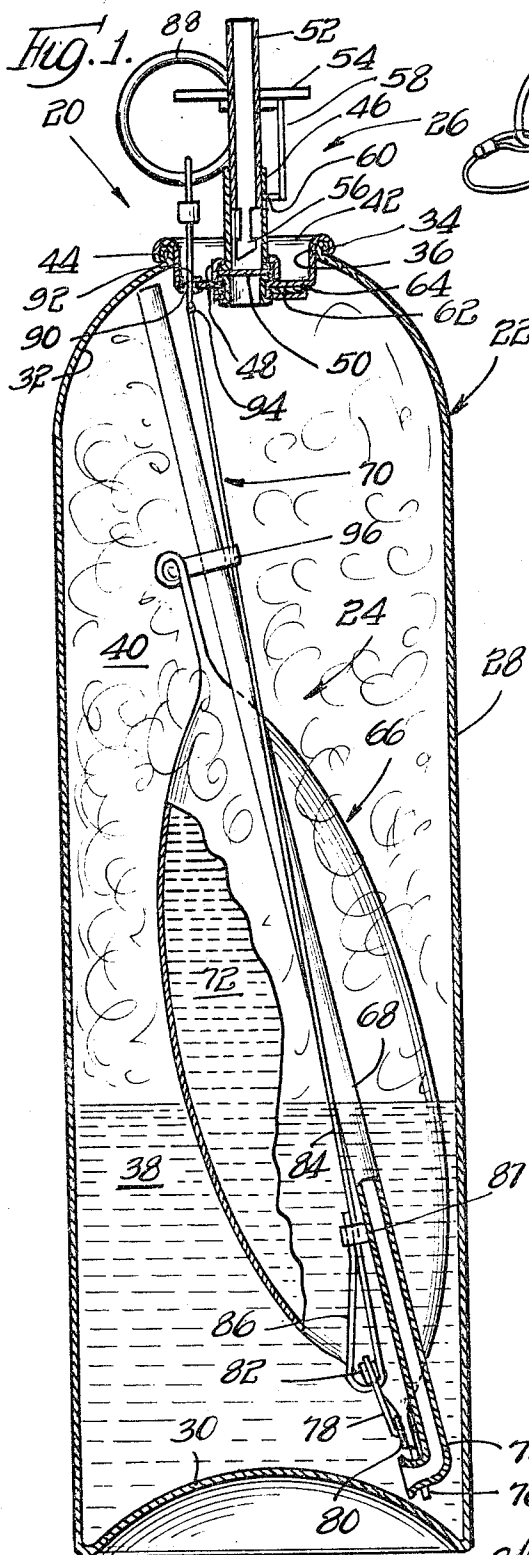
W. R. BROOKS ET AL

3,422,992

DISPENSING CONTAINER

Filed Dec. 14, 1966

Sheet 1 of 2



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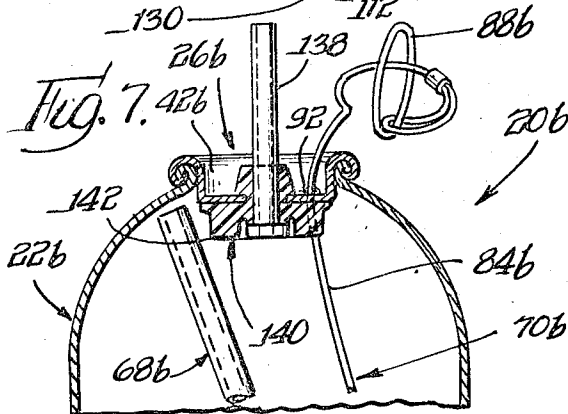
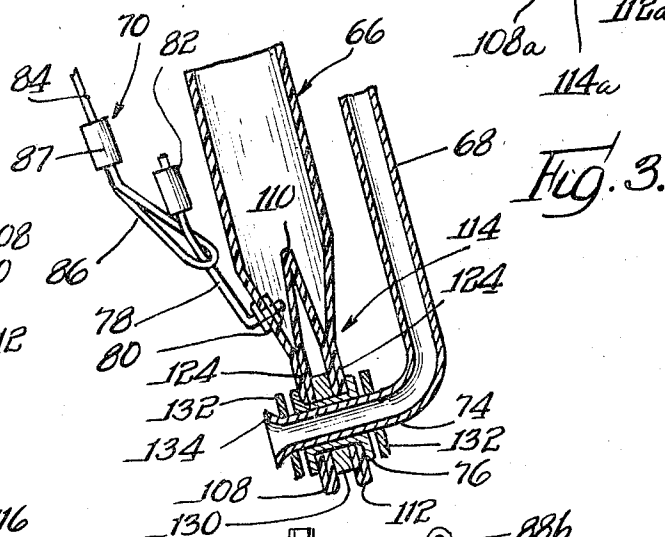
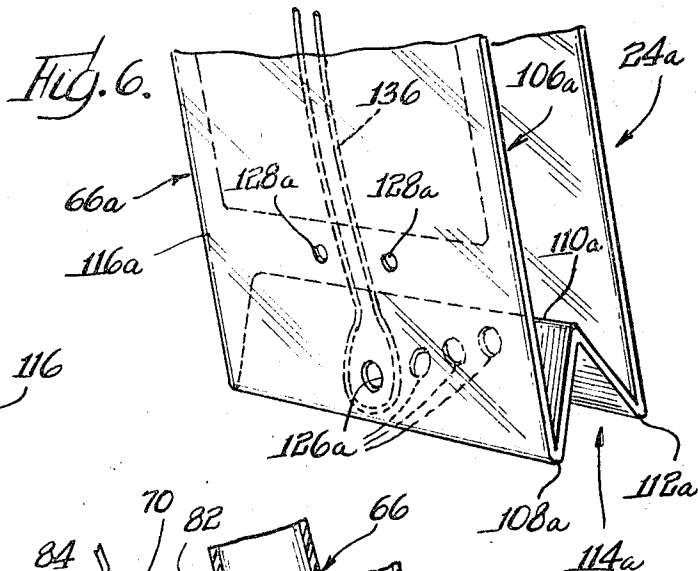
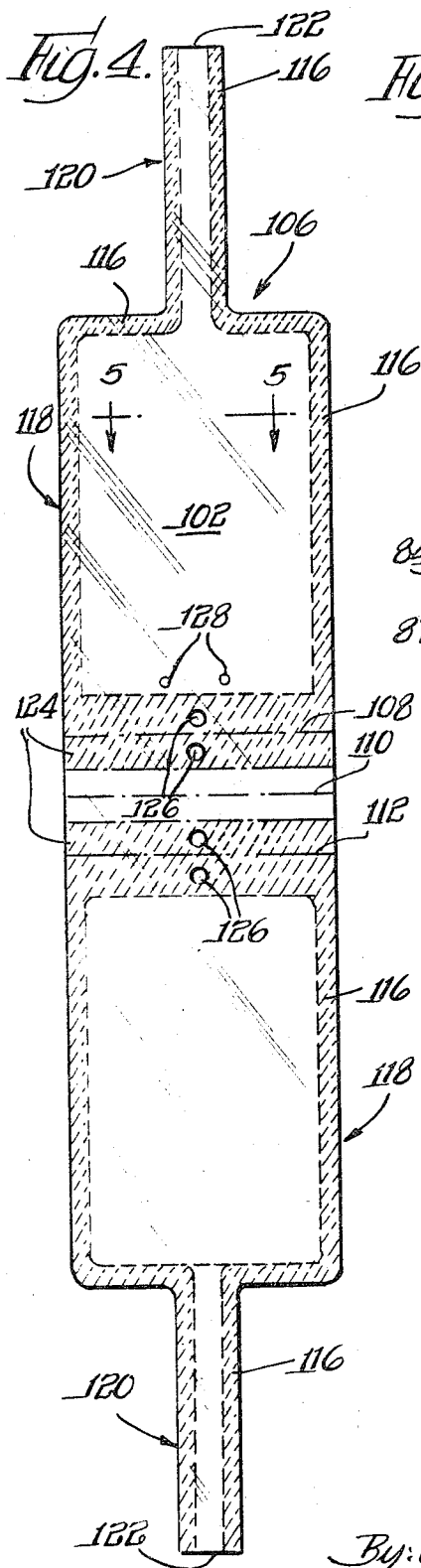
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Sheet 2 of 2



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3,422,992

DISPENSING CONTAINER

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Filed Dec. 14, 1966, Ser. No. 601,528
U.S. Cl. 222-80
Int. Cl. B67b 7/24; B65d 83/14

3 Claims

ABSTRACT OF THE DISCLOSURE

An isolating container device in which a rupturable vessel is attached to a rigid support and to a pull member, the support serving to hold the vessel against a rupturing force applied through the pull member.

This invention relates generally to dispensing apparatus and more particularly to self-contained units for dispensing a multi-component product.

In one specific aspect, the present invention relates to a rupturable vessel for releasably isolating one ingredient of a multi-component product in a self-contained dispensing unit.

There is a recognized need for isolating the ingredients of certain products in order to prolong storage life, and various schemes have been developed in the past for achieving this result. However, the problems are compounded when the product is to be dispensed under pressure; and among the specific problems that arise in the latter situation are the following: (1) partial premature mixing of the ingredients as a result of leakage, oozing or wicking; (2) incomplete release of the isolated component at the time of actual use and resultant destruction of the formulated proportions; and (3) tortuous assembly of the isolating and primary containers.

The present invention takes as its principal object the solution of the aforesaid problems and the provision of a new and improved unit for dispensing a multi-component product.

Another object of the invention is to provide an isolating container for packaging one ingredient of a multi-component product.

A more specific object of the invention is to provide a self-contained unit for packaging and dispensing reactable resins.

These and other objects and features of the invention will become more apparent from a consideration of the following descriptions.

The invention, both as to its construction and mode of operation, will be better understood by reference to the following disclosure and drawings forming a part thereof wherein:

FIG. 1 is a central sectional view of a self-contained dispensing unit constructed in compliance with the present invention;

FIG. 2 is a perspective view, on reduced scale, of the isolating container used in the dispensing unit of FIG. 1;

FIG. 3 is an enlarged sectional view taken substantially along the line 3-3 of FIG. 2;

FIG. 4 is a plan view, on reduced scale, of the blank used in making the rupturable vessel of the isolating container of FIG. 2;

FIG. 5 is an enlarged sectional view taken substantially along the line 5-5 of FIG. 4, showing the construction of the material for the rupturable vessel;

FIG. 6 is an enlarged perspective view showing the bottom end construction of a first modified form of the isolating container; and

FIG. 7 is a fragmentary cross-sectional view similar

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to the top portion of FIG. 1 but illustrating a second modified form of the invention.

One important use of the dispensing unit of the invention is in the packaging of reactable resins, such as the ingredients of polyurethane resins; and hereinafter, such art will be used for purposes of explanation and illustration without intending to limit the applications and uses of the invention in any way. It is recognized that the invention may also be used for packaging other resinous systems, such as epoxy resins, and multiple-component food products of the type wherein deleterious effects obtain upon prolonged contact of the several ingredients.

Referring now in detail to the drawings, specifically to FIG. 1, a self-contained dispensing unit indicated generally by the reference numeral 20 is shown to comprise a rigid external container or vessel 22, an isolating container assembly 24 and a discharge valve assembly 26. The rigid container 22 is advantageously made from metal, for example drawn steel or a suitable aluminum alloy; and when the contents are to be held and dispensed under superatmospheric pressure, the container 22 is fabricated to comprise pressure-resistant surfaces including a cylindrical sidewall 28, a convex bottom 30 and a domed top 32. To provide a mounting site for the discharge valve assembly 26, the domed top 32 is provided with an upstanding collar 34 which surrounds a filling aperture 36. Finally, the rigid container or vessel 22 is sized to receive the isolating container assembly 24, a charge 38 of a first component, such as a polyhydric alcohol, and a charge 40 of a selected gas or gases, such as a mixture of nitrogen and dichloro-difluoromethane, in the headspace over the charge 38.

The discharge valve assembly 26 includes a cup-shaped closure element 42 having a depending annular distal lip 44 which is capable of being crimped onto the collar 34 in securing the valve assembly to the rigid container 22. An upstanding tubular nozzle 46 is mounted on the closure element 42 by the crimped-over lip of an annular collar 48 which also serves to secure a sealing element 50 across the lower end of the nozzle 46. A tubular member 52 is slidably received in the nozzle 46 to act as a seal depressor and nozzle extension, an annular finger-plate 54 being suitably secured to the tubular member 52 for use in urging a lower actuator portion 56 thereof against the sealing element 50. A lock spring 58 cooperates with a notch or groove 60 in the outer surface of nozzle 46 in holding the actuator portion 56 away from the sealing element 50. A fill valve spring 62 and a cooperating gasket 64 are provided to permit gas to be fed into the rigid container 22 through the nozzle 46 and the remainder of the discharge valve assembly 26.

In compliance with the features of the present invention, the isolating container assembly 24 includes a rupturable vessel 66, a rigid support member 68 and a pull member 70. The vessel 66 is sized for releasably containing a charge 72 of an ingredient to be isolated such as for example an isocyanate resin to be reacted with the polyol of charge 38. The support member 68 is intended to act as an anchor for the rupturable vessel 66; and accordingly, the lower end of the support member is attached to the rupturable vessel, desirably, adjacent the lower end thereof. In the embodiment illustrated in FIG. 1, the support member 68 is fabricated from tubing, and the lower end 74 of this tubing is bent at right angles in order to pass through the hollow center of a grommet 76 that is secured in the lower end of vessel 66. The opposite end of support member 68 extends freely away from this situs of attachment to confront the inner surface of domed top 32 and to be engageable therewith in positionally anchoring the support member within the rigid container 22. The length of support member 68 is

selected to allow a minimum amount of play within the rigid container.

The pull member 70 is attached to the rupturable vessel 66 adjacent the grommet 76 which is used in mounting the support member 68 in place. So secured, the pull member is capable of being used in applying a rupturing force to the vessel 66 with the anchor of support member 68 acting to oppose the resistance of the vessel material to the applied rupturing force. Structurally, the illustrated pull member includes a loop element 78 which is preferably formed of steel wire, element 78 being threaded through a pair of laterally spaced tubular grommets 80 and closed or made endless by an inert resinous plug 82. In addition, the pull member 70 includes a pull element 84 which is also preferably formed of steel wire and which includes a loop portion 86 that is interlinked with the loop element 78, loop portion 86 being closed by an inert resinous plug 87. The pull element 84 extends through a punched hole in the closure element 42 to have a manipulating ring 88 fastened onto its outer end; and a double seal is advantageously employed in passing the pull element through the closure element. More specifically, an inner seal 90 of solder or other readily fusible metal is formed about the pull element on the inner surface of the closure element, a fusion joint being formed between the seal, the closure element and the pull element. Moreover, a subsequently placed seal 92 of silicone rubber or other polymeric material is formed about the pull element on the outside surface of the closure element. The seal 92 may be applied from a solvent solution or from a melt. If desired, a seal-breaking enlargement 94 may be formed on the pull element 84 internally of the closure element. In some situations, it may also be desirable to provide a support for the upper end of the rupturable vessel 66; and in the embodiment of FIG. 1, a support ring 96, formed in the shape of a figure eight, is mounted on the member 68 by encircling that member with one of its ring-like portions. The remaining ring-like portion is disposed laterally to receive the curled upper end of the vessel 66 is shown.

The rupturable vessel 66 is intended to provide effective isolation for the product component which it releasably contains; and in compliance with the features of the present invention, the vessel 66 is fabricated from laminated material to provide chemical resistance, mechanical strength and impermeability. More particularly and with reference to FIG. 5, the laminated material for construction of the vessel 66 comprises a layer or sheet 98 having three plies or laminas, an outside ply 100 of metallic foil such as aluminum or steel foil, an inside ply 102 of inert resinous plastic material such as polyethylene or polypropylene and a medial ply 104 of kraft paper or other mechanically strong sheet material. The foil ply 100 provides a high degree of impermeability because of its substantial freedom from pin holes or other imperfections, and the inert resinous plastic ply 102 affords the chemical resistance necessary for contact with a reactive material such as the charge 72 of isocyanate resin. In addition to providing mechanical strength, the medial ply 104 serves as a base to which the foil and resinous plastic plies may be readily adhered. Suitable adhesive may be utilized in connecting the plies 100, 102 and 104; or the inherent adhesive character of one of the plies, such as the ply 102, when activated by heat or solvent may be used in place of separate adhesive.

The impermeability of the rupturable vessel 66 is also promoted by the manner of forming the marginal seams of that container. With reference to FIGS. 3 and 4, the vessel 66 is advantageously formed from a single piece or blank 106 cut from the laminated material. More specifically, the bottom portion of the vessel 66 is developed by forming a double-pleated fold transversely of the blank 106 employing fold lines 108, 110 and 112 as is shown in FIG. 4. With the intended inside surface facing upwardly, the blank 106 is folded upwardly at

the line 110 and downwardly at the lines 108, 112 to develop a pleated construction 114 shown in FIG. 3. By virtue of this folded construction, cut edges are avoided at the lines 108, 110 and 112. Being immersed in the polyol of charge 38, these edges would otherwise be highly susceptible to wicking the polyol into contact with the isocyanate of charge 72, resulting in partial premature reaction of these materials.

Returning to FIG. 4, the confronting margins of the blank 106, when the latter has been folded to bring ply 102 into face contact with itself, are sealed together forming a relatively wide marginal seam 116. When the ply 102 is fabricated from a polyolefin or other thermoplastic resin, simple fusion to form a heat seal is employed to advantage in forming the seam 116. Seam 116 completely surrounds a body portion 118 of the vessel blank, except for the ingress provided by a narrowed portion or neck 120, the seam 116 traversing the lateral sides of the neck 120 but terminating in spaced relation at a filling lip 122.

Sealed marginal seams 124 are also formed in the pleated construction 114 adjacent the fold lines 108 and 112 while regions on either side of the fold line 110 are left free of such seams. This arrangement allows perforated, grommet-receiving holes 126 to be encompassed completely by sealed seams, the holes 126 being adapted to receive the grommet 76 in mounting the support member 68 in four layers of material as is shown in FIG. 3. A strong attachment of the rupturable vessel 66 to the support member 68 results. In further accord with the invention, grommet holes 128 are formed in one side only of the blank 106, according to the showing of FIG. 4, so that the grommets 80 mount the pull member 70 in only a single thickness of material whereby to insure easy tearing of the rupturable vessel when force is applied to the pull member 70. Mounting of the pull member in a single thickness of material is well illustrated in FIG. 3.

Continuing with reference to FIG. 3, suitable mounting and sealing may be achieved at the grommets 80 by fabricating these elements entirely from a chemically inert, deformable, resilient material such as nylon or by fabricating them as metal grommets with suitable rubber seals. Furthermore and with respect to the attachment of the support member 68 to the rupturable vessel 66, a spacer 130 may be disposed between the pleats of construction 114, and outboard washers 132 may be arranged with the grommet 76 to act as locators. In making final attachment of the support member 68 to the grommet 76, the terminus of the bent end 74 may be spun out with a flare 134 or otherwise formed outwardly to define an enlargement that cannot be retracted through the washers 132 and the grommet 136.

It is also desirable to fashion the neck 120 to be of greater width than the diameter of filling aperture 36 in the rigid container 22. Thus, physical interference may be relied on to locate the neck in and extending above the filling aperture while the charge 72 is being placed in the rupturable vessel 66.

Having described one construction of the invention, it will be valuable now to set forth how that embodiment is filled and used.

With the isolating container assembly 24 constructed as described and in the empty condition shown generally in FIG. 2, the pull member 70 will be aligned with the support member 68, and the flexible material of vessel 66 will be smoothed flat to exclude air and then wrapped around these two members to form a narrow cylindrical part for insertion through the filling aperture 36 of the rigid container 22. The support member 68 will be situated entirely within the rigid container; the ring 88 and attendant portion of the pull member will be deposited outside of the filling aperture 36; and the upper end of the neck 120 will be spread to engage the opposite sides of the filling aperture whereby to be positioned therein. A spout, not shown, will then be inserted in the open end

of the neck 120 and the charge 72 of isocyanate resin filled therein, the body of vessel 66 unrolling as it receives the resin. Upon withdrawal of the filling spout, the lip 122 of the neck 120 will be closed by heat sealing or by rolling the neck into the support ring 96 upon partial elevation of the support member 68 through the filling aperture.

It is advantageous to preassemble the discharge valve assembly 26 to the pull member 70 before the ring 88 is attached; and when this latter procedure is followed, the closure element 42 will be seated on the collar 34 and crimped in place after the charge 38 of polyol has been filled into the container 22. At this time, the auxiliary seal 92 will be installed if it has not been done so previously. Finally, a selected gas or mixture of gases will be filled into the headspace 40 through the valve assembly 26, and the lock spring 58 will be snapped into place.

To use the dispensing device 20, the ring 88 is grasped and pulled sharply away from the container 22, breaking the seals 90 and 92 and ripping one sidewall of the vessel 66 from a point beginning at the grommets 80 to a position adjacent the neck 120. This rupturing of the vessel 66 releases the charge 72 of isocyanate resin into contact with the gaseous charge 40 and the charge 38 of polyol. Thorough mixing of the ingredients is brought about by vigorously shaking the container 22 for from about five to about sixty seconds depending on formulation. Upon release of the lock ring 58, the tubular member 52 may be depressed into contact with the seal element 50 using the fingerplate 54, opening the sealing element 50 and allowing the pressurized and reacting contents to exit through the nozzle 46 and the tubular member 52. Upon complete discharge of the contents, the dispensing unit 20, being fabricated of inexpensive components, may be discarded.

The dispensing unit of the invention exhibits a number of important advantages, and among these is its profound ease of handling in use. Only a single package is involved; the respective ingredients are easily mixed by a simple sharp pull on the ring 88 followed by a short period of shaking; and thereafter, dispensing is readily accomplished by simple manipulation of a finger-responsive nozzle. Furthermore, the dispensed product is not subject to contamination by portions of the isolating container, the vessel 66 being ripped rather than shredded and the material of the vessel being generally resistant to the action of the packaged ingredients. Contamination by atmospheric moisture and oxygen is also avoided by filling the isocyanate into a flattened vessel. Full advantage may also be taken of the capabilities of the product in optimum formulations because the isolated ingredient is quickly and completely released as a result of the arrangement of the support and pull members. Moreover, effective isolation is achieved by virtue of the construction and fabrication of the rupturable vessel. Finally, the isolating container assembly, by virtue of the flexibility of vessel 66 and the guiding action provided by the rigid support member 68, is easily inserted in the primary container for filling, filling itself being readily accomplished by virtue of the provision and construction of the neck 120 on the vessel 66.

While a particular embodiment of the invention has been thus far shown and described, it should be understood, of course, that the invention is not limited thereto since many modifications may be made. In order to enhance the understanding of the invention, two such modified forms are shown in this application, illustrated respectively in FIGS. 6 and 7. Since the embodiments of these latter figures include elements similar to those found in the embodiment of FIGS. 1-5, like numerals have been used to designate like parts with the suffix letter *a* being employed to distinguish those elements associated with the embodiment of FIG. 6 and with the suffix letter *b* being utilized to distinguish those elements associated with the embodiment of FIG. 7.

The embodiment of FIG. 6 is characterized by the provision of a long, narrow loop 136 of wire or like strong,

filamentous material, the loop 136 encircling the grommet-passing apertures 126*a* and passing laterally between the grommet-passing apertures 128*a*. So disposed, the loop 136 serves as a guide for the loop element which passes through the holes 128*a* in the manner of loop element 78 in FIGS. 2 and 3. The loop 136 is otherwise disposed freely within the vessel 66*a* and, when fabricated from soft steel wire, may be extended into the neck of the rupturable vessel to cooperate with the material of the vessel in forming a folded, rolled or crimped seal of the neck after filling. On the other hand, fabrication of the loop 136 from a stiffer material such as spring wire or music wire, permits termination of the loop 136 short of the neck portion of the vessel whereby to allow the rupturing loop element to be pulled completely through the material of the isolating vessel. In addition, fashioning of the loop 136 from these latter materials is of advantage in that the loop itself is less likely to kink in fabrication of the isolating container assembly or during its insertion into the primary container. Because of the provision of the guide loop 136, the grommet-passing holes 128*a* may be situated within the margins of heat seal 116*a* rather than outside of such margins as in the case of the embodiment of FIGS. 1-5. Greater sealing assurance is thus provided.

The embodiment of FIG. 7 is characterized by the construction of the discharge valve assembly 26*b*. In particular, the assembly 26*b* comprises a cup-shaped closure element 42*b*, a tubular nozzle 138, and a rubber sealing body 140. In accordance with the present invention, the sealing body 140 includes an annular, depending rim 142 of substantial transverse thickness, this rim receiving the upper portion of pull element 84*b* and sealing the egress of that element through the closure element 42*b*. As will be noted from an inspection of FIG. 7, the rim 142 has an outside diameter which closely approximates the outside diameter of the closure element 42*b* and has an inside diameter which is only sufficiently great to allow proper valving action around the inner end of the nozzle 138. A sealing membrane 92*b* may be formed of silicone rubber on the outside surface of closure element 42*b* surrounding the pull element 84*b*, silicone rubber sealing readily to an enameled surface of the closure element.

In other respects the embodiments of FIGS. 6 and 7 are constructed and operated similar to the embodiment of FIGS. 1-5.

The specific examples herein shown and described are to be considered as being primarily illustrative. Various changes beyond those described will no doubt occur to those skilled in the art; and such changes are to be understood as forming a part of this invention insofar as they fall within the true spirit and scope of the appended claims.

The invention is claimed as follows:

1. A container device comprising: rupturable vessel means for releasably containing an ingredient to be isolated; a rigid vessel containing said rupturable vessel means and including a port, said rigid vessel being sized to contain a second ingredient outside of said rupturable vessel means and having a selected transverse inside dimension; a rigid support member in said rigid vessel attached to said rupturable vessel means and having an end portion away from the site of said attachment and engageable with a wall of said rigid vessel for cooperating therewith in forming an anchorage; discharge valve means fixed in said port and including a closure element and a discharge nozzle; a pull member having an end loop portion engaging said rupturable vessel means adjacent said attachment site for use in applying a rupturing force to said vessel means and including an exit portion penetrating one of said rigid vessel and said closure element, said vessel means and said rigid support member having substantial portions thereof extending between said anchorage-forming portion and said support member attachment site whereby tensile forces applied to said vessel

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means through said pull member are opposed by said support member to effect efficient rupturing of said vessel means, said support member having a length sufficiently greater than said selected dimension so that rotation about the engageable end portion thereof is blocked by the inside sidewall of said rigid vessel whereby tensile forces applied to said pull member produce a rupturing of said vessel means; and a tear guide in said rupturable vessel means and encompassed by said end loop portion, said tear guide extending from a position adjacent said support member attachment side to a position spaced apart therefrom whereby to ensure ripping of a substantial opening in said vessel means for quickly releasing said isolated ingredient into contact with said second ingredient.

2. A container device according to claim 1 wherein said discharge valve means further includes a resilient body selectively sealing said nozzle and wherein the exit portion of said pull member penetrates said closure element and said resilient body to be sealed by said resilient body.

3. A container device according to claim 2 wherein said resilient body includes a thick annular rim receiving and sealing said exit portion.

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U.S. Cl. X.R.

206—47; 222—82, 83, 394