

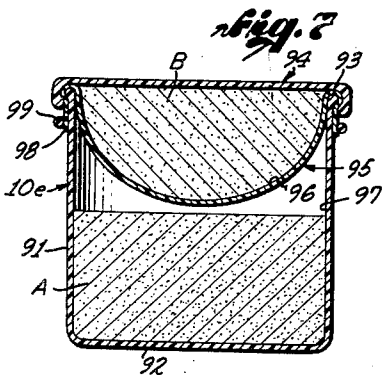
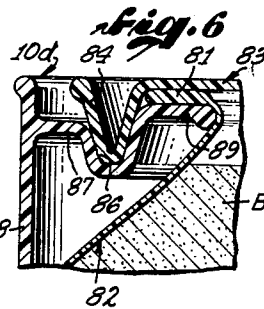
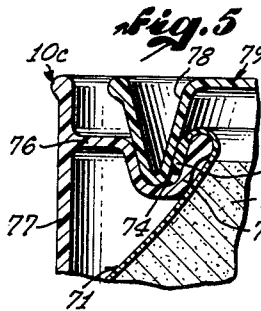
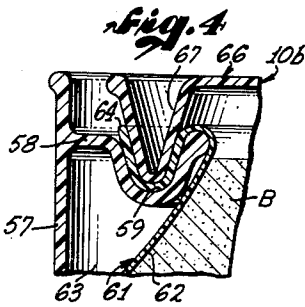
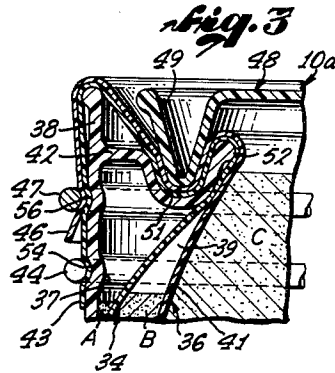
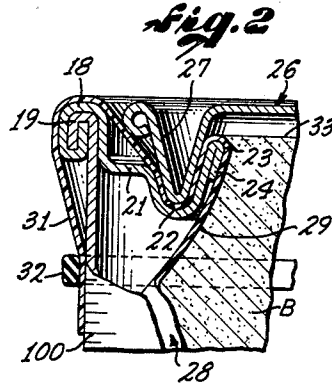
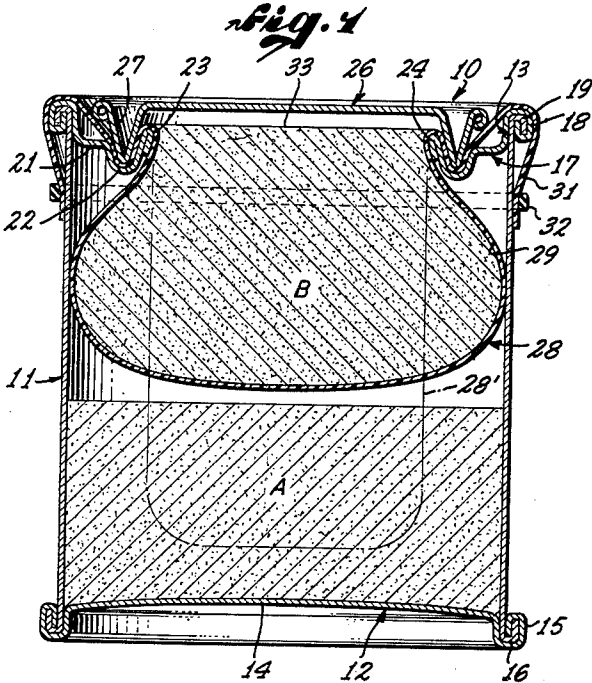
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3,052,371

CONTAINER

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3,052,371 CONTAINER

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This invention relates to a container and more particularly to a plural-chambered container for storing and/or shipping a plurality of chemically reactive, coactive or mixable materials, in liquid or solid form, in separated and inactive or unmixed state.

This invention provides a new and improved container in which a plurality of components may be stored and shipped in separated and inactive state, the components being separated by a pliant, flexible diaphragm which is clamped between a closure means and a lip of the container for sealing and closing all of the chambers so as to seal each component from the other and prevent intermingling of the components until the closure means is removed and the diaphragm rupture, punctured, or removed. Both container and diaphragm are impervious to the components. A predetermined quantity of one component is contained within the interior of the container itself while a predetermined quantity of a second component is contained within a pocket formed by the pliant diaphragm extending into the first container and having its peripheral edge draped over the open end of the container and clamped by the closure means whereby the closure means closes the open end of the container and the pocket formed by the diaphragm in sealed relationship.

The diaphragm is independently supported to facilitate filling with the second component and so as to prevent the diaphragm from being inadvertently forced or dropped into the container during the filling operation. Adjustment of the means by which the diaphragm is supported also serves to more accurately measure the quantity of the second component placed therein.

Further components which are chemically reactive may be stored within the container and separated by the use of additional diaphragm means forming additional chambers, each containing a separate component and stored in an inactive state.

In many instances one component has a greater specific gravity than the other. When filling the chamber formed by the diaphragm with a component having a higher specific gravity than the first component the diaphragm may be caused to drop into the container to displace the first component so that there is an intermingling of the components. By supporting the peripheral edge of the diaphragm during filling thereof and prior to covering thereof by the closure means, the diaphragm pocket and its contents is firmly supported and the components are retained from intermingling until intended to do so.

It is therefore an object of this invention to provide a new and improved plural-chambered container for storing and shipping chemically reactive, coactive or mixable materials in separated and inactive form.

Another object of this invention is to provide a new and improved plural-chambered container in which the materials are separated by a pliable, flexible diaphragm which is self-supported within the container.

Still a further object of this invention is to provide a new and improved plural-chambered container in which the pliant, flexible diaphragm is impervious to each component so as to prevent intermingling of the components until it is intended to do so.

Still another object of this invention is to provide a new and improved plural-chambered container of the character described in which the diaphragm is removable for intended intermingling of the components held in separate

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state and/or is rupturable so as to permit one component to intermingle with another when intended to do so by selective rupturing of the diaphragm.

Yet another object of this invention is to provide a new and improved plural-chambered container of the character described in which the diaphragm self-supporting means is integral therewith or is easily and quickly affixed thereto for supporting the diaphragm independently of the closure means.

Another object of this invention is to provide a new and improved plural-chambered container of the character described which is economical to manufacture and is capable of mass production and which greatly facilitates filling thereof by automatic filling means.

A general object of this invention is to provide a new and improved plural-chambered container which overcomes disadvantages of prior means and methods heretofore intended to accomplish generally similar purposes.

These and other objects of this invention will be more apparent from the following detail description, drawings and appended claims.

In the drawings:

FIGURE 1 is a vertical, cross-sectional view, as taken substantially through the center of a container designed and constructed in accordance with this invention;

FIGURE 2 is an enlarged, fragmentary, cross-sectional view, illustrating a corner thereof in greater detail;

FIGURE 3 is a fragmentary, cross-sectional view similar to FIGURE 2, illustrating another embodiment of this invention;

FIGURE 4 is a fragmentary, cross-sectional view, similar to FIGURE 3, illustrating a third embodiment of this invention;

FIGURE 5 is a similar, fragmentary, cross-sectional view, illustrating a fourth embodiment of this invention;

FIGURE 6 is a similar, fragmentary, vertical, cross-sectional view, illustrating a fifth embodiment of this invention; and

FIGURE 7 is a vertical cross-sectional view of yet another embodiment of this invention.

Referring in detail to the drawings and more particularly to FIGURES 1 and 2, there is shown, by way of illustration but not of limitation, a preferred embodiment of a container, designed and constructed in accordance with this invention and designated generally by the numeral 10.

The container 10 comprises a tubular body 11 having a closed end 12 and an open end 13. The container is herein shown and described as a substantially conventional container known as a "can" of metal or other suitable, relatively rigid material whereby the body 11 is cylindrical or non-cylindrical. The closed end 12 is shown as a conventional end wall 14 having its peripheral edge 15 rolled into sealing and securing engagement with the lower peripheral edge 16 of the body 11. A flange 17 of substantial width is secured to or integrally formed with the body 11 and adjacent to the open end 13, the flange 17 is herein illustrated as having its outer peripheral edge 18 rolled into sealing and securing engagement with the upper peripheral edge 19 of the body 11. A flat portion 21 of the flange 17 is preferably spaced downwardly from the upper edge 19 and is provided with an annular groove 22 of substantially V-shaped cross-section and forming an annular opening 23 appreciably smaller than the open end 13 of the body 11. The flange at the opening 23 is preferably rolled back as at 24 to avoid a sharp edge at the opening.

A closure member 26 is provided to close the open end 13 and includes a peripheral edge 27 having a substantially V-shaped cross-section complementary to the V-shaped cross-section of the annular groove 22 and

interfitting therein in an interference fit so as to seal the opening 23 when nested within the groove 22.

A diaphragm 28 of pliant, flexible material, such as plastic, or the like, is disposed within the container body 11 so as to form a pocket or chamber 29. The peripheral edge 31 of the diaphragm is draped over the flange 17 and is permanently or non-permanently secured to the outer surface of the body 11 adjacent to the open end 13, as by an elastic band indicated at 32. The elastic band 32 serves to support the diaphragm 28 while the chamber 29 is filled by a predetermined amount of material, indicated as component B, and subsequent to filling of the first component, indicated as component A, residing in the interior of the body 11. Subsequent to filling of the chamber 29 with a predetermined quantity of the component B, the closure member 26 is installed so as to sandwich the peripheral edge 31 of the diaphragm 28 between the V-shaped annular peripheral edge 27 of the closure member 26 and the annular groove 22 of the flange 17 to clamp the diaphragm therebetween and seal the compartment 29 from the exterior of the container simultaneously with sealing of the interior of the body 11, that is, closing the open end 13.

By supporting the diaphragm 28 at its peripheral edge 31, it is possible to fill the container 29 with material of the component B which, if having a higher specific gravity than the component A, will not cause the diaphragm to drop into the container resulting in intermingling of the components A and B. The diaphragm 28 is preferably impervious to both components A and B so as to prevent chemical activity therewith or between the components. Additionally, if the material of the components A and B are filled by mechanical means such as automatic filling machines, which generally inject materials with substantial force, the diaphragm 28 will not be forced into the container and the components will be held separate and in an inactive state.

When it is desired to use the contents of the container 10, that is, the intermixed and intermingled compound of the components A and B, the closure member 26 is removed, after which the diaphragm 29 may be removed from the container to spill the contents thereof, the component B, for intermingling with the component A or intermixing thereof. The diaphragm 28 may be optionally ruptured as by a sharp tool (not shown) to permit intermingling of the component B with the component A.

The quantity of component B may be readily predetermined and measured by predetermining the volume of the chamber 29. By the provision of the independent self-supporting means 32, i.e., the elastic band, the peripheral edge 31 may be pulled downwardly over the opened 13 to decrease the volume of the chamber 29 or pulled upwardly to increase the volume by releasing the elastic band 32 and positioning the peripheral edge 31 to a desired position after which the elastic band 32 may be replaced to secure the peripheral edge 31. Thereafter, the upper edge 33 of the diaphragm, determining the opening of the chamber 29, may be used as a guide to determine the quantity of component B. The component B may be filled within the chamber 29 until it reaches the upper level 33.

As indicated by the broken lines 28' of FIGURE 1, the diaphragm may extend substantially inwardly of the container 11 to displace a fluid, crystalline or granular component A. Further, the component A may be a refrigerant to preserve a component B during shipping.

If desired, more than a pair of components may be stored and shipped in the container of this invention by the provision of more than one diaphragm like 28. Referring more particularly to FIGURE 3, a pair of diaphragms 34 and 36, similar to the diaphragm 28, are disposed within the container, designated by the numeral 10a, to form three discrete chambers, a first chamber defined by the interior 37 of the tubular body 38 of the

container 10a, a second chamber 39 defined by the pocket formed by the diaphragm 34 and a third chamber 41 defined by a pocket formed by the second diaphragm 36 and respectively capable of containing material designated as components A, B and C, each being chemically reactive or mixable with each other and held in inactive state by the impervious diaphragms 34 and 36. The body 38 in the instant embodiment, is shown as having its flange 42, similar to the flange 17, integral therewith and die-cast or otherwise molded of metal, plastics or other suitable material which is preferably impervious to the component A.

In the instant embodiment, a predetermined quantity of the component A is the first to be placed within the container prior to positioning of the diaphragm 34, after which the diaphragm 34 is placed therein to form the pocket or chamber 39 with its peripheral edge 43 draped over the flange 42 and the upper region of the exterior of the body. The peripheral edge 43 is secured permanently or non-permanently to the exterior of the body by an annular member, illustrated herein as a metallic snap ring 44. Obviously, the elastic band 32 may be optionally used.

After the component B is placed in the chamber 39, the second pliant diaphragm 36 is placed within the body forming a pocket defining the chamber 41 and has its peripheral edge 46 draped over the peripheral edge 43. The peripheral edge 46 is similarly secured by a metallic or other snap ring 47 to support the diaphragm 36, after which a predetermined quantity of component C is inserted into the chamber 41. A closure member 48, having a peripheral edge 49 of substantially V-shaped cross-section and complementary to an annular groove 51 of V-shaped cross-section, is installed to close the opening 52 of the chamber 41 and thereby close all chambers 37, 39 and 41 with the diaphragms 34 and 36 being sandwiched between the V-shaped cross-sections of the annular peripheral edge 49 and the annular groove 51.

If desired, the retaining effect of the snap rings 44 and 47 may be increased by providing a pair of spaced annular grooves spaced from the upper edge 53 of the container body 38 and designated at 54 and 56, respectively, in which the snap rings 44 and 47 reside, to clamp the peripheral edges 43 and 46, respectively.

The peripheral edge of the diaphragm in each embodiment may, in place of, or in addition to the clamping elastic band 32, or snap rings 44 and 47, be treated with an adhesive or a pressure-sensitive adhesive to secure the edge to the exterior of the body wall.

A metallic diaphragm may be used, such as a relatively thin foil which is pliant and flexible and capable of clamping of its peripheral edge by the closure means.

Referring more particularly to FIGURE 4, a third embodiment of this invention is illustrated wherein a container 10b includes a tubular body 57 similar in construction to the embodiment 10a. The body 57 includes an integral flange 58 in which an annular groove 59 is formed having a substantially V-shaped cross-section. A diaphragm 61 forms a second chamber 62, secondary to the chamber formed by the interior 63 of the body 57, for supporting therein a component separated from the component contained within the chamber 63, as in the embodiment of FIGURE 1. The diaphragm of the instant embodiment, however, includes a peripheral edge 64 of relatively rigid material. The edge 64 is illustrated as being substantially thickened in a V-shaped cross-section and substantially complementary to the groove 59 so that the peripheral edge 64 rests therein for independently supporting the diaphragm 61 prior to installation of a closure means 66. A washer (not shown) of V-shaped cross-section may be optionally secured as by cementing or the like to afford rigidity. The closure means 66 includes an annular peripheral edge 67 having a substantially V-shaped cross-section complementary to the groove 59 for clamping engagement therewith, whereby

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the peripheral edge 64 is clamped between the edge 67 and the groove 59 for sealing the interior of the chamber 62.

In FIGURE 5, a fourth embodiment of this invention is illustrated, wherein a diaphragm 71 is provided with a relatively-rigid, annular, peripheral edge 72 which is compressible between one wall 73 of a groove 74 formed in a flange 76 integral with or secured to a wall 77 of the container 10c and an adjacent wall of a V-shaped annular peripheral edge 78 of a closure means 79. The annular peripheral edge 72 is preferably formed by thickening the edge of the diaphragm 71 but may be optionally secured thereto as by cementing, thermal-treating, or the like, and serves to support the diaphragm 71 while it is being filled with a component and prior to the installation of the closure means 79, similar to the other embodiments.

In the fifth embodiment, illustrated in FIGURE 6, an annular edge 81 of a diaphragm 82 is illustrated as being substantially thickened so as to be relatively-rigid for independently supporting the diaphragm 82 for filling of a chamber defined thereby prior to installation of a closure means 83. The closure means 83 includes a V-shaped annular peripheral edge 84 nested in a groove 86 of a flange 87 formed integrally with or secured to the body 88 of a container generally designated by the numeral 10d. In the instant embodiment, the peripheral edge 81 is capable of supporting the diaphragm 82 for filling thereof and independently of the closure means 83 and is responsive to the installation of the closure member 83 so as to compress and form a sealing gasket between the closure member 83 and a substantially flat inner annular extension 89 of the flange 87.

If desired, an adhesive, pressure-sensitive or other, may be applied to the thickened edge portions 64, 72, 81 to assist in supporting the respective diaphragms prior to clamping by their respective closure means.

Referring to FIGURE 7, another embodiment of this invention is illustrated and generally referred to by the numeral 10e. The container 10e of a relatively-rigid material, such as plastic or the like, includes a tubular, cup-shaped body having an annular wall 91, a closed end 92 and an open end 93. The open end is closable as by a closure member 94 having a tight fit therewith. A diaphragm 95 is disposed within the body so as to divide the interior of the body into a pair of chambers 96 and 97. The diaphragm 95 has its peripheral edge 98 draped exteriorly and clamped between the closure member 94 and the annular wall 91 and is further temporarily or permanently independently supported for filling by a securement means 99 in the form of an elastic band. Optionally, it is to be understood that the securement means, in the form of split-rings, like the split-rings 44 and 47, a thickened edge like the edge 72 or adhesive means, may be substituted to independently support the peripheral edge during filling and for adjusting the volume of the chamber formed within the diaphragm to measure the quantity of a subsequent component of material.

Indicia, as indicated at 100, in FIGURE 2, may be provided on the exterior of the container to more accurately predetermine the quantity of component of material placed in the chamber of the diaphragm, like 28, wherein the peripheral edge is drawn down to a predetermined indicia prior to filling.

While the instant invention has been shown and described herein in what is conceived to be the most practical and preferred embodiments, it is recognized that departures may be made therefrom within the scope of the invention which is therefore not to be limited to the details disclosed herein but is to be afforded the full scope of the claims.

What I claim as new and desire to secure by Letters Patent is:

1. A container comprising: a tubular body of relatively rigid material and having a closed bottom rigidly

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fixed to said body and an open upper end; an annular internal flange fixed on said body and substantially adjacent to said open end thereof and forming a circular central opening for introducing material into said body, said flange having an annular groove of substantially V-shaped cross-section, a pliant, imperforate and drapable diaphragm having a closed lower end and open upper end extending into said body and forming a pocket therein in substantial spaced relationship with the inner surface of said body and said bottom and having the portion forming its upper open end draping over the edge of said open end and said annular groove, and covering the outer surface of said annular internal flange and the upper end of said body and extending vertically downwardly a substantial distance over the outer surface of said tubular body with the lower outer end of said diaphragm being in contact with the outer surface of said body to permit the outer end of said diaphragm to be pulled downwardly to decrease the volume of said pocket and to be pulled upwardly to increase the volume of said pocket, and indicia means marked so on the outside surface of said body adjacent its upper end for cooperation with the lower outer end of said diaphragm to predetermine the volume of said pocket, closure means of relatively rigid material for covering said circular opening of said body, said closure means having an annular flange around its periphery, said annular flange being substantially V-shaped in cross-section and complementary to said V-shaped groove of said internal flange of said body so as to nest therein with said diaphragm periphery sandwiched therebetween in clamping, sealing engagement; and a continuous elastic band encircling said outer surface of said body and clamped adjacent the outer end of said diaphragm independently supporting said diaphragm in a fixed sealing relationship with respect to said body prior to clamping thereof by said closure means and said internal flange, said container being adapted to receive one component of material in the lower portion thereof prior to placement of said diaphragm, and a second component of material adapted to be contained in said pocket of said diaphragm prior to clamping of said peripheral edge of said diaphragm by said closure means.

2. A container comprising: a tubular body of relatively rigid material and having a closed bottom rigidly fixed to said body and an open upper end; an annular internal flange fixed on said body and substantially adjacent to said open end thereof and forming a circular central opening for introducing material into said body, said flange having an annular groove of substantially V-shaped cross-section, a pliant, imperforate and drapable diaphragm having a closed lower end and open upper end extending into said body and forming a pocket therein in substantial spaced relationship with the inner surface of said body and said bottom and having the portion forming its upper open end draping over the edge of said open end and said annular groove, and covering the outer surface of said annular internal flange and the upper end of said body and extending vertically downwardly a substantial distance over the outer surface of said tubular body with the lower outer end of said diaphragm being in contact with the outer surface of said body to permit the outer end of said diaphragm to be pulled downwardly to decrease the volume of said pocket and to be pulled upwardly to increase the volume of said pocket, and indicia means marked so on the outside surface of said body adjacent its upper end for cooperation with the lower outer end of said diaphragm to predetermine the volume of said pocket, closure means of relatively rigid material for covering said circular opening of said body, said closure means having an annular flange around its periphery, said annular flange being substantially V-shaped in cross-section and complementary to said V-shaped groove of said internal flange of said body so as to nest therein with said diaphragm periphery sandwiched therebetween in clamping, sealing engagement; and means encircling said outer

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surface of said body and clamped adjacent the outer end of said diaphragm for independently supporting said diaphragm in a fixed sealing relationship with respect to said body prior to clamping thereof by said closure means and said internal flange, said container being adapted to receive one component of material in the lower portion thereof prior to placement of said diaphragm, and a second component of material adapted to be contained in said pocket of said diaphragm prior to clamping of said peripheral edge of said diaphragm to said flange of said open end of said body by said closure means.

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