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PRESSURIZED DISPENSING DEVICE

Filed May 22, 1957

Fig. 1.

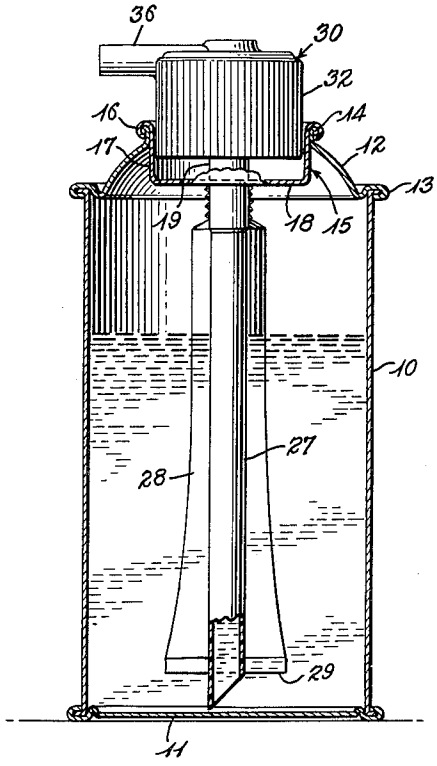


Fig. 2.

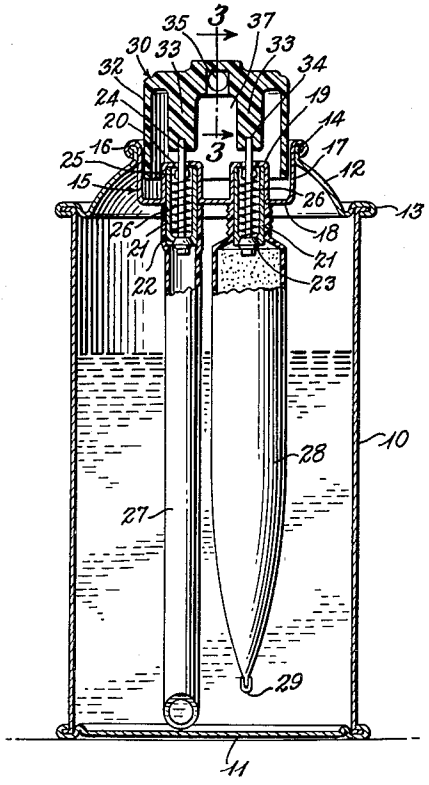
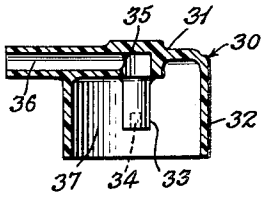


Fig. 3.



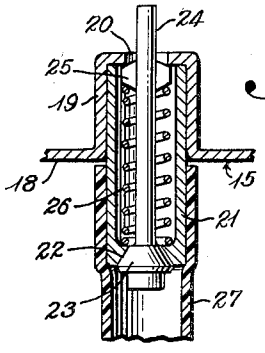


Fig. 4.

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PRESSURIZED DISPENSING DEVICE

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6 Claims. (Cl. 222—94)

The present invention relates to a compartmental, pressurized dispensing device for keeping two or more materials separated from each other until time of use. More particularly, this invention relates to a pressurized container in which two or more materials are kept separated from each other and, prior to use, are released together under pressure to be combined in a mixing chamber before dispensing from the pressurized device.

It will be appreciated that there are various compositions which cannot be marketed in premixed form. Such compositions as creamy whipped foods, paints, lacquers, sprays, insecticides containing ingredients, two or more component systems and the like, in the final composition which cannot be mixed until use because the mixing of these ingredients would cause corrosion to the container or degradation of the product due to continuous contact or standing. Materials of this type require a special packaging and dispensing device in order to maintain the portions distinct in storage condition during shipment and in storage prior to sale, and yet to allow them to be brought together in a convenient manner when their use is desired.

The present invention is directed broadly to the dispensing of all types of compositions of the above-mentioned character and it has found utility for foods, insecticides, lacquers and paint compositions, and the like, which, to be effective as usable products, must be mixed in situ when use is desired. It is essential in the commercialization of such products that their ingredients be held in the proper proportions, each in a state of inactivity for an indefinite period of time to account for shipping and storage periods, to provide an effective product when needed. It is also highly desirable that the dispensing device be capable of mixing and dispensing only a part of the composition if the user does not require the full amount at one time, and that the remainder can be stored unmixed until more of the composition is required. It is of economic importance that one use of the contents of the container should not preclude further use of the contents therein.

The dispensing container of this invention meets these needs and allows for repeated use of the material when desired by providing a combination of separating means and means for simultaneous discharge into a chamber for mixing the contents of the compartments, utilizing the pressure in one compartment to discharge the material in the other compartment and thus allow a measured or metered amount of each ingredient to be mixed prior to dispelling for the intended use. Thus, the contents of the container can be reused repeatedly and utilized for home or commercial consumption in a manner heretofore unknown to the art. Although pressurized containers, such as fire extinguishers, aerosol devices, and the like, are known in the art, there is not known in the prior art a pressurized container which is uniquely adaptable as a package for compositions above-described to allow compartmentalizing of ingredients to be brought together in a mixing chamber under

a pressure within the container when desired for immediate use.

It is the object of this invention to provide a compartmentalized dispensing device suited for packaging compositions, the ingredients of which must be kept separate until use, which meters the desired amounts of the ingredients into a mixing chamber prior to discharge from the device.

It is a further object of the invention to provide a compartmentalized pressure dispensing device in which the pressure in one compartment containing ingredient for forming a composition can be utilized to dispel from other compartment or compartments in the container ingredient or ingredients in measured amounts to form the desired composition.

It is still a further object of this invention to provide for a multiple valve mixing chamber in which a discharge cap effects simultaneous operation of the valves, thereby allowing metered amounts of ingredients from each compartment to mix to form the desired composition before dispelling it from the device.

It is still another object of the invention to provide a compartmentalized container in which the discharge head can be removed in order to clean the mixing chamber in which two or more ingredients in metered amounts are mixed to form the desired composition prior to dispelling it from the device.

Additional objects of the invention will become apparent from examination of the drawings, specification, and appended claims.

The invention will be described further in connection with the accompanying drawings, which are to be considered as exemplification of the invention and do not constitute limitation thereof.

In the drawings,

Figure 1 is a cross-sectional view in elevation of the compartmental pressurized dispensing device of the present invention showing a dual valve arrangement,

Figure 2 is a side view in elevation of Figure 1,

Figure 3 is a cross-sectional view along the line 3—3 of Figure 1 showing the details of valve depressing bosses and the discharge nozzle, and

Figure 4 is a fragmentary cross-sectional view of one of the valves shown in Figure 2 for discharging an ingredient under pressure into the mixing chamber.

Referring now to the drawings, Figure 1 illustrates the pressurized dispensing device of the present invention in which a container **10** has a bottom portion **11** and a cup-shaped cover **12** fitting onto the open top of container **10** and clinched by a rolling flange **13** to provide an hermetic seal between cover **12** and the container **10**. The top of cover **12** defines a central aperture, the portion of cover **12** forming the boundary of the aperture being in the form of a rolled flange or bead **14**. Seated into the aperture is an annular insert **15** and a flange **16** which embraces the bead **14** and is clinched or rolled thereto to form therewith an hermetic seal. Annular insert **15** has a concave portion **17** which depends downwardly into cover **12** and terminates in a bottom wall **18** parallel with the bottom of container **10**. Symmetrically spaced in the bottom wall **18** of annular insert **15** are two upwardly extending circular bosses **19**, each defining therein a circular opening. The circular openings in the flat face portion of the bosses provide an annular flange **20**.

Each upwardly extending boss defines a cylindrical opening concentric with the hole provided in the face of the boss. Extending into the cylindrical opening of each boss is a short tube **21**, the axis of which coincides with the center of the hole in the flat face of boss **19**, the tube extending downwardly into container **10**. In the bottom portion of the short tube **21** is an annular seat ring **22** on

the inner surface thereof adapted to receive a valve 23 in seating relation therewith. Valve 23 is provided with a valve stem 24 which extends upwardly through short tube 21 and projects a short distance out of the hole defined by the face of boss 19 (see Fig. 4). On the top portion of the valve stem 24, before it passes through the hole in the flat face of boss 19, is a pair of lugs 25. Disposed around valve stem 24 is a compression spring 26, one end of which rests against the top of annular valve seat ring 22 and the other end rests against lugs 25, thereby biasing valve 23 against valve seat 22. Attached to the short tube of one of the valve arrangements is a discharge tube 27 through which the material under pressure in the container passes when valve stem 24 is depressed.

Attached to the other valve arrangement and mounted on short tube 21a is a pliable tube 28 depending downwardly into the container and sealed at its bottom end 29 to form a rigidly mounted closed tubular container capable of having its walls collapse against each other when the valve arrangement is opened to discharge the contents of the tube by the external pressure thereabout.

Slidably mounted in the annular insert 15 is a discharge cap 30 (see Figure 3) having top portion 31 and an annular skirt 32 so proportioned as to form a sliding fit with the inner walls of annular insert 15. Depending from the underside of top portion 31 are two valve activating lugs 33 having a circular depression 34 centrally located therein and adapted to fit over the extended portion of valve stem 24 when the cap is inserted in annular insert 15. In top portion 31 is an opening 35 leading into a discharge nozzle 36. Opening 35 allows for communication through nozzle 36 with a discharge chamber 37 formed by the annular skirt 32 and the inner surface of annular insert 15 when the cap 30 is engaging the side walls of the annular insert.

It is understood that the cap 30 can be a screw cap arrangement capable of being threaded in an annular insert provided with an internal thread, or any other suitable arrangement where the cap can be removed so that the contents within the annular insert can be cleaned therefrom after mixing of the separate ingredients discharged through the separate valves and discharge of the resulting composition.

In operation, collapsible tube 28 is filled with one desired ingredient for forming a composition, the ingredients of which must be kept separate until use, and is hermetically sealed in its discharge end to short tube 21a located in annular insert 15 forming a part of cover 12. On short tube 21 is mounted dispensing tube 27. In the container 10 is placed the other ingredient or compatible ingredients which, when brought together with the ingredient in tube 28, forms the desired composition. The cover 12 is then hermetically sealed by rolling flange 13 and is sealed position places the collapsible tube 28 and discharge tube 27 is a depending position extending downwardly into the container 10 which holds the other ingredient or compatible ingredients to be mixed with the ingredient in tube 28. The can is then charged to a desired pressure (around 40 pounds) by a propellant gas, which in the case of food products can be an argon gas. Annular skirt 32 or cap 30 is then inserted in annular insert 15 so that the circular depression 34 of each dependent lug 33 fits over the extended portion of each valve stem 24 of each valve to finish the assembly of the pressurized dispensing device.

The ingredients in the container can then be stored for a period and can be mixed for use by merely depressing the top of cap 30 so that the bosses 33 depress valve stems 24 of each valve, thereby unseating the valve seat 23 so that the material under pressure in the container will pass through tube 27 into mixing chamber 37 and the pressure surrounding tube 28 will cause its collapse, thereby forcing the ingredients from tube 28 into the mixing chamber where the composition is mixed prior to dispensing through nozzle 36. In this manner, a metered amount of each ingredient can be provided in the mixing chamber by the arrangement of the size of the valve openings so that when the dispensing cap is pressed downward, the proper proportions of the ingredients escape from each compartment into the mixing chamber.

As this container is useful for materials which are normally not compatible over a period of time or which form hardened mixtures, the removal of the cap allows for cleaning of the residual composition from within the annular insert. For example, in the case of water-soluble materials, the annular insert with the cap removed may be placed under a stream of water and the mixing chamber can be cleaned of all residue of composition, thereby readying the container for instant and efficient use for mixing another portion of the composition as desired.

When a product having a heavy, creamy consistency is desired, it has been found that argon gas provides an excellent propellent and dispensing agent for the device of this invention. It has been found that argon provides an aerosol propellent which will dispense a product with the minimum of foaming. Control of foaming is important where the composition desired must have a creamy consistency with a minimum amount of bubbles therein, such as molding of dental impressions. An excessive amount of bubbles would produce undesirable porosity, which would not allow the mold to present a continuous film surface having all the detailed impressions of the oral cavity that are necessary for making a usable denture. It has also been found that the degree of solubility can be controlled by providing a propellent gas which will give the desired results by mixing an insoluble gas, such as argon, with a more soluble gas, such as nitrous oxide. Mixtures of gases prepared in this manner can be used to give the desired results depending upon the amount of foaming that is acceptable and the nature of the ingredients forming the dispensed product.

It has been found that pressures between 30 and 50 p.s.i. give very good results, but other pressures can be used. When using high pressures, the thickness and bursting strength of the container must be taken into consideration. It has also been found that the range of pressure is somewhat dependent upon the physical conditions of the material to be dispensed and whether it is to be dispensed as an aerosol or a plastic mass.

The collapsible tube can be made of any type of film material in which the walls are strong enough to resist any pushing of the material in an upward direction, which would obstruct the valve opening. It has been found that these tubes may be made of a "Mylar" film, which is a trade name for a highly durable transparent, water repellant film of polyethylene terephthalate resin characterized by outstanding strength and chemical inertness. Many other materials may be used to form the tube, e.g., polyethylene, nylon, rubber, and the like. The thickness of the material will depend, of course, upon the condition under which the pressurized container is to operate, and the type of tube will in like manner depend on the nature of the ingredients and to some extent on the product to be dispensed from the container.

It is to be understood that this invention is not limited to a two-compartment dispensing device but a plurality of collapsible tubes can be provided with a corresponding valve for each tube so that more than two incompatible components of a composition can be brought together in a mixing chamber, as heretofore described, and such a plurality of collapsible tubes comes within the breadth and scope of this invention.

Although the present invention has been shown and described in terms of preferred embodiments, nevertheless various changes and modifications such as are obvious to one skilled in the art are deemed to be within the purview of the invention.

What is claimed is:

1. A pressurized dispensing device for discharging a composition formed from a plurality of ingredients main-

tained in separate compartments comprising a pressure container having compartments therein separated by a movable wall operable by a differential in pressure between adjacent compartments when said composition is discharged from the container; a discharge head located on the said container having a discharge nozzle therein, said discharge head forming a mixing chamber intermediate the interior of said container and said discharge head; a plurality of valve means located between said mixing chamber and the interior of said container, each valve means communicating the interior of one of said comportments in said container with said mixing chamber, and means associated with said discharge head for operating said plurality of valve means in unison to release simultaneously the contents of each compartment into said mixing chamber to effect formation of said composition prior to discharge from said nozzle.

2. The pressurized dispensing device as claimed in claim 1 in which each of said valve means has a discharge opening therein capable of proportioning a measured amount of material to said mixing chamber.

3. The pressurized dispensing device as claimed in claim 1 in which the discharge head forming the mixing chamber therewith, is removable for cleaning said chamber, whereby the dispensing device is readied for repeated use.

4. A pressurized dispensing device for discharging a composition formed from a plurality of ingredients maintained in separate compartments comprising a pressure container having a portion of the wall thereof concave to define a recess therein; a plurality of valve means positioned between said recess and the interior of said con-

tainer, each said valve means communicating the interior of said container with said recess; at least one of said valve means having connected thereto a dependent discharge tube for discharging the contents from said container into said recess; at least one of said valve means having connected thereto a collapsible ingredient-retaining compartment positioned within said container operable by a differential in pressure between the compartment and the container; a discharge head having a material dispensing nozzle therein positioned in said recess to form a mixing chamber intermediate said container and said discharge head, the discharge head adapted to slidably operate in said recess and to actuate said valve means to discharge the contents of the container and the ingredient-retaining compartment into said mixing chamber to form a mixture of ingredients therein before discharge through the dispensing nozzle.

5. The pressurized dispensing device as claimed in claim 4 in which said discharge head has depending therefrom a plurality of bosses, each boss in line with one of said valve means.

6. The pressurized dispensing device, as claimed in claim 4, in which the collapsible ingredient-retaining compartment is rigid in the vertical direction but collapsible in the lateral direction.

References Cited in the file of this patent

UNITED STATES PATENTS

1,094,761	Thousand	Apr. 28, 1914
1,981,446	Apfelbaum	Nov. 20, 1934
2,748,985	Seymour	June 5, 1956