United States Patent [19]

Richardson et al.

[11] **3,850,346**

[45] **Nov. 26, 1974**

[54] **HAND SQUEEZABLE, PLURAL CHAMBERED, LIQUID DISPENSER**

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[73] Assignee: **Cambridge Research and Development Group**, Westport, Conn.

[22] Filed: **Apr. 10, 1972**

[21] Appl. No.: **242,323**

[52] **U.S. Cl.** **222/145**, 222/215, 222/492

[51] **Int. Cl.** **B67d 39/00**

[58] **Field of Search** 222/94, 145, 213, 215, 222/494, 492, 493

[56] **References Cited**

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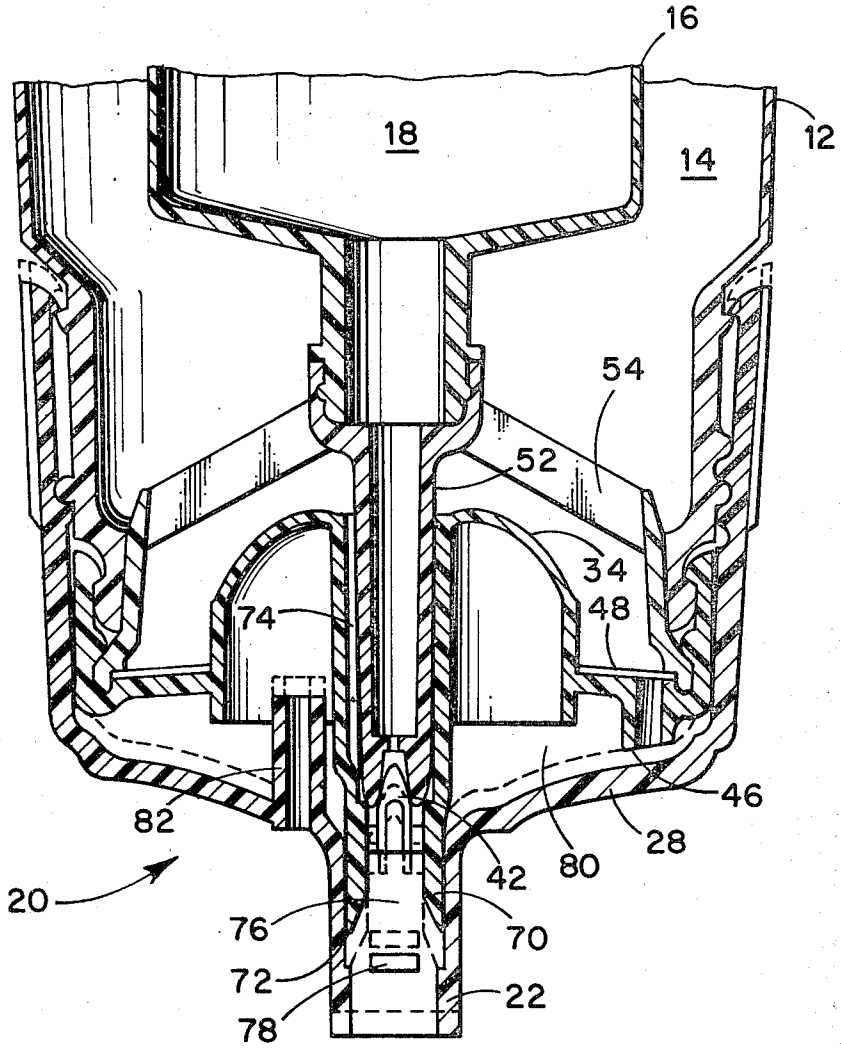
Primary Examiner—Robert B. Reeves
Assistant Examiner—Thomas E. Kocovsky
Attorney, Agent, or Firm—Richard J. Birch

[57] **ABSTRACT**

A plural chambered dispenser for dispensing two liquids. One liquid is contained in an outer, flexible walled chamber. The other liquid is contained in a smaller, compressible chamber which is positioned within the outer chamber. First and second fluid actuated outlet valves are fluidly connected to the outer and inner chambers, respectively. The pressure generated by squeezing the outer flexible walled chamber is transmitted through the liquid in the outer chamber to the inner compressible chamber and to the liquid therein. The outer chamber outlet valve is opened by the action of the fluid, either liquid or gas, in the outer chamber. The inner chamber outlet valve is actuated in response to the actuation of the outer chamber outlet valve. In the preferred embodiment, the inner chamber outlet valve opens after and closes before the opening and closing, respectively, of the outer chamber outlet valve.

15 Claims, 8 Drawing Figures



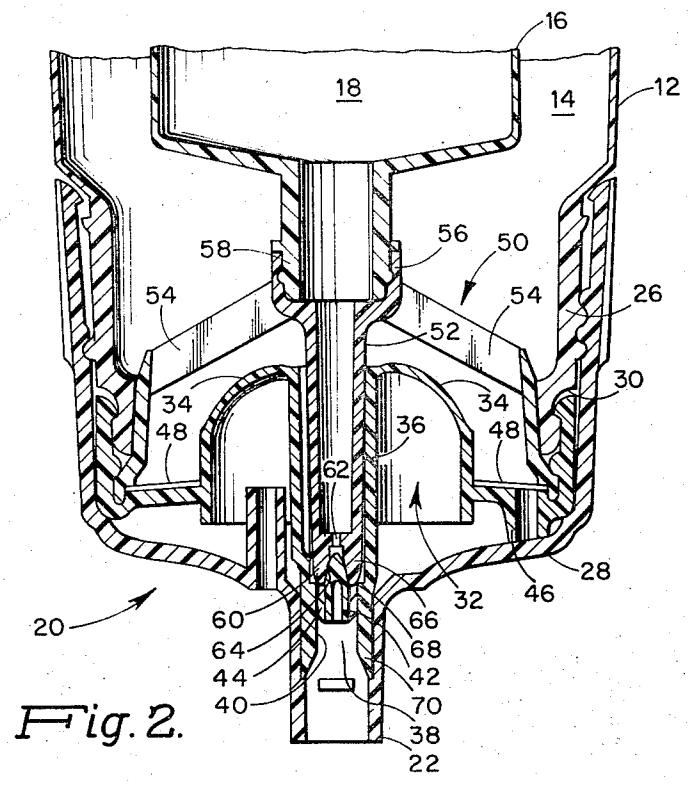


Fig. 2.

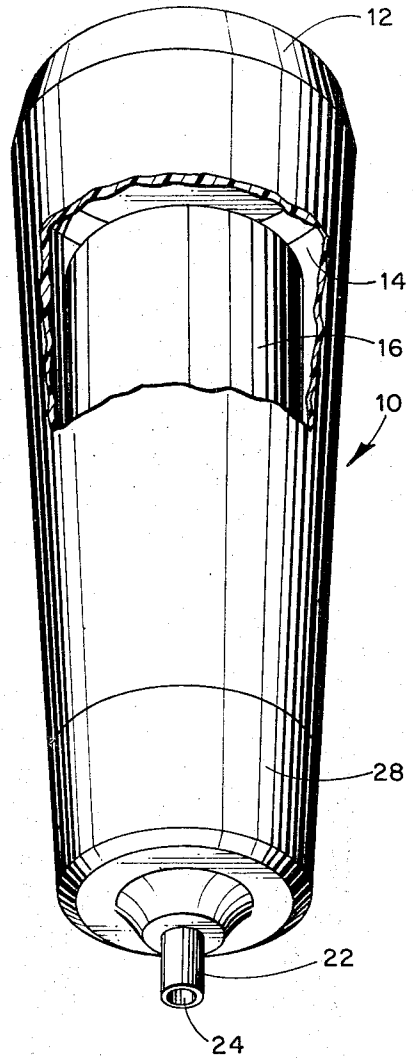


Fig. 1.

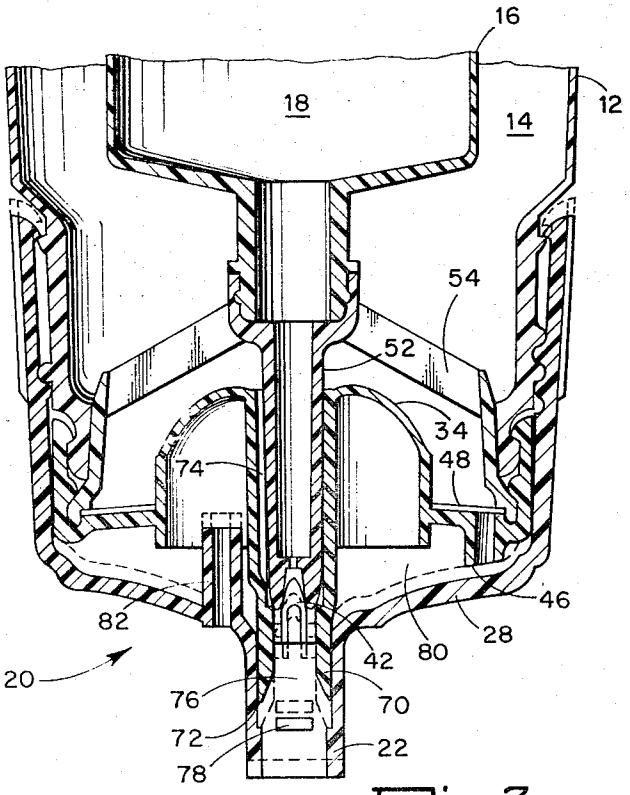


Fig. 3.

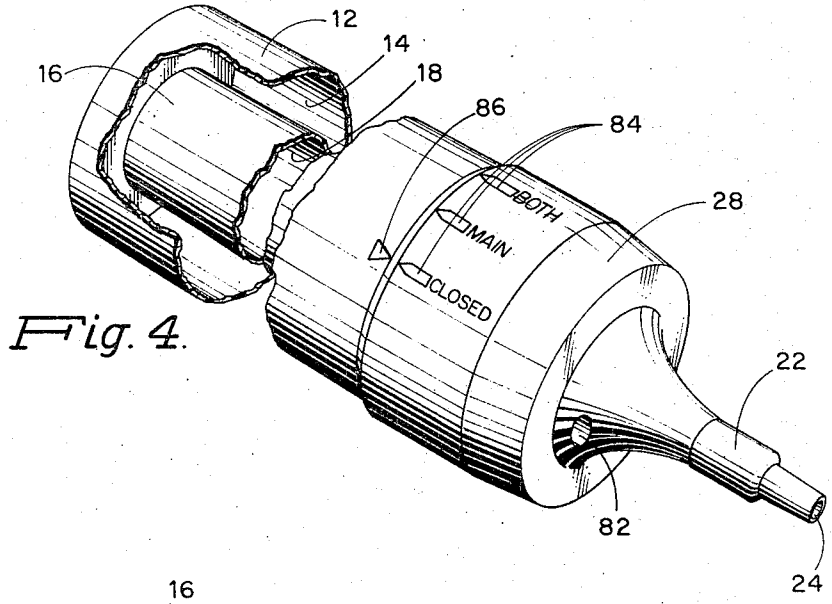

12
14
16
18
86
84
BOTH
MAIN
CLOSED
28
22
82
24

Fig. 4.

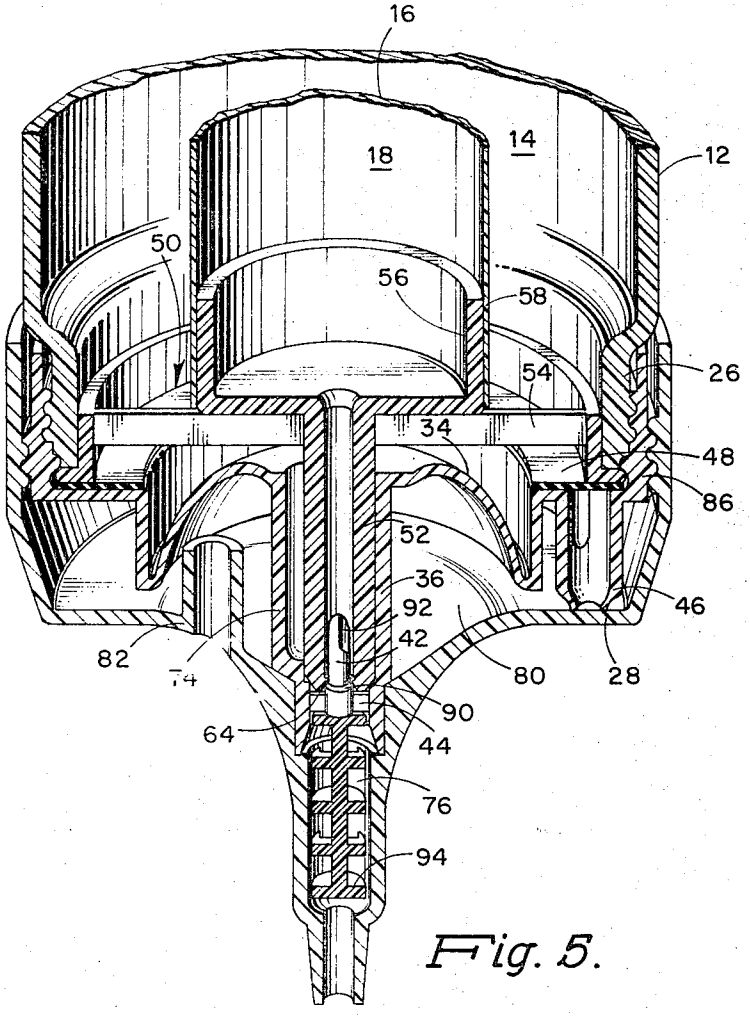

16
18
14
12
50
56
58
54
26
34
48
86
52
36
92
42
46
82
74
80
28
90
64
44
76
94

Fig. 5.

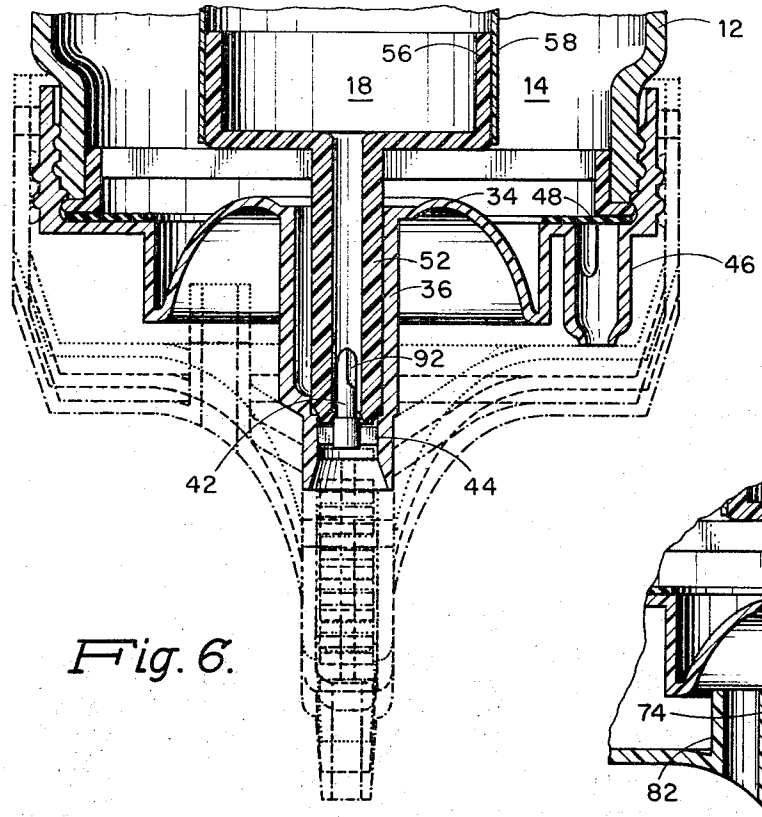


Fig. 6.

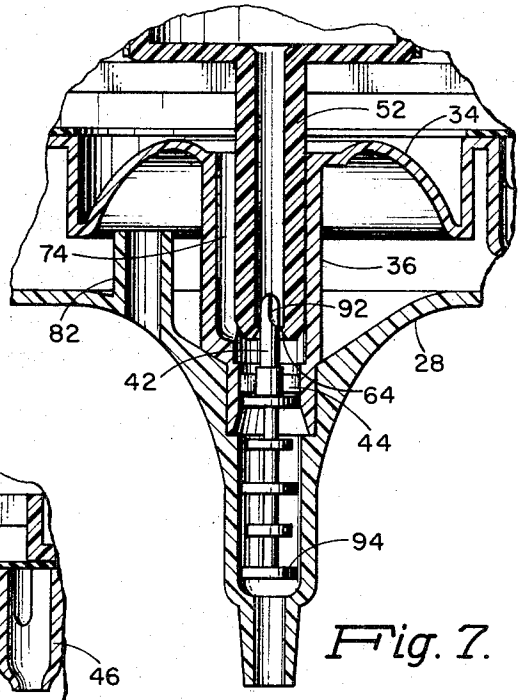


Fig. 7.

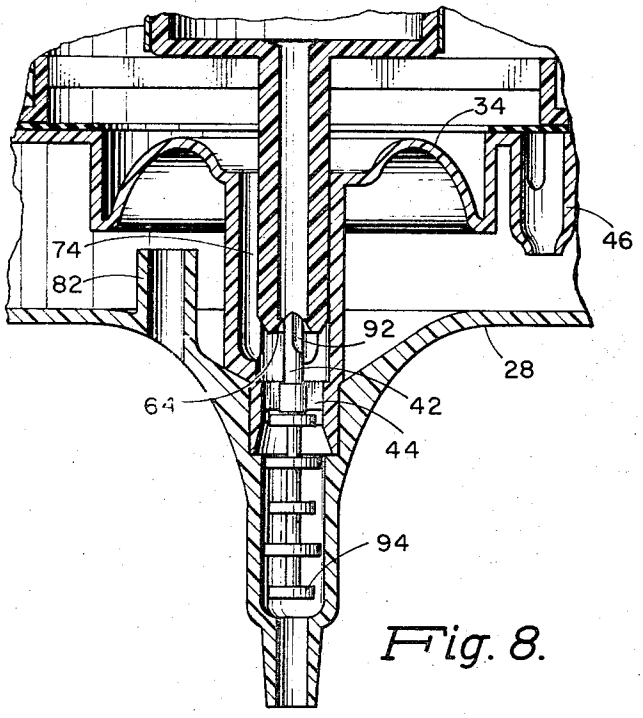


Fig. 8.

HAND SQUEEZABLE, PLURAL CHAMBERED, LIQUID DISPENSER

This invention relates to liquid dispensers in general and, more particularly, to plural chambered liquid dispensers.

The art of plural chambered liquid dispensers is quite extensive and relatively old. Early examples of hand "squeezable" dispensers are found in Hopkins; U.S. Pat. Nos. 1,535,529; 1,639,699; and, 1,699,532, issued Apr. 28, 1925, Aug. 23, 1927, and Jan. 29, 1929, respectively. More recent and also representative examples of such dispensers are shown in Winter, U.S. Pats. No. 2,510,269, issued June 6, 1950; Castelli, et al., No. 2,939,610, issued June 7, 1960; Krister, No. 3,197,071, issued July 27, 1965; Gangwisch, No. 3,200,995, issued Aug. 17, 1965; Farrar, et al. No. 3,217,931, issued Nov. 16, 1965; Modderno, No. 3,318,483, issued May 9, 1967.

The introduction of the ubiquitous aerosol type dispensers has given use to other variations of the plural chambered dispenser. Typical examples of such aerosol dispensers are found in Green, U.S. Pat. No. 3,482,736; Huling, et al., U.S. Pat. No. 3,462,047; Kaplan, U.S. Pat. No. 3,472,423; Prussin, et al. U.S. Pat. No. 3,525,456; and Prussin, U.S. Pat. No. 3,565,290. These patents disclose, in general, various varying systems for proportional co-dispensing of plural fluids. In many instances, accurate metering of the two dispensed fluids is required in order to obtain a safe product mixture for consumer use.

Accurate metering and repeatability are also important in the dispensing of single fluids. Various types of single fluid valving dispensers are shown in liquid "dripper" type art as represented by the following U.S. Pat. Bolin, Nos. 3,020,938; 3,101,751; 3,125,250; and 3,135,302; and Babin, No. 3,550,817.

It is a general object of the invention to provide an improved hand squeezable, plural-chambered liquid dispenser for dispensing accurately metered, predetermined ratios of the fluids contained within the chambers.

It is a specific object of the invention to provide a hand squeezable, plural-chambered, dispenser which permits accurate dispensing of two stored liquids without cross-contamination of the liquids.

It is still another object of the invention to provide a hand squeezable plural-chambered dispenser which allows co-dispensing of the two stored liquids in variable ratios.

It is a further object of the invention to provide for selective dispensing of the two liquids from the dispenser.

It is a still further object of the invention to realize the aforementioned objects at a cost which is economically feasible for a "throw-away" hand dispenser.

It is a feature of the invention that the dispenser can be fabricated from relatively inexpensive moldable materials without sacrificing metering accuracy and repeatability.

It is still another feature of the invention that the ratios of the dispensed liquid are constantly repeatable regardless of the force of the "squeeze," the volume remaining of the two stored liquids, and the position of the dispenser during operation.

These objects and features of the invention will best be understood from a detailed description of a preferred embodiment thereof, selected for purposes of illustration, and shown in the accompanying drawings in which:

FIG. 1 is a view in perspective, partially broken away, showing a hand-squeezable, co-dispensing plural chambered dispenser of the present invention;

FIG. 2 is a view in cross-section showing a portion of the dispenser of FIG. 1 closed for shipping;

FIG. 3 is a similar view in cross-section depicting the relative positions of the components during use;

FIG. 4 is a view in perspective, partially broken away, showing a hand squeezable variable co-dispensing plural chambered dispenser;

FIG. 5 is a view in cross-section of a portion of the dispenser shown in FIG. 4 illustrating the relationship of the components in a closed position for shipping;

FIG. 6 is a similar view to FIG. 5 showing by means of dotted, dashed, and combination lines the relative positions of the dispenser components in the closed position, single liquid dispensing position, and plural liquid dispensing position;

FIG. 7 is another view in cross-section depicting in detail the relationship of the dispenser components when the dispenser is set for dispensing a single liquid; and,

FIG. 8 is a similar view to FIG. 7 showing the relationship of the dispenser components when the dispenser is set to dispense two liquids.

Turning now to the drawings, there is shown in FIGS. 1 through 3, a hand "squeezable," plural chambered dispenser for co-dispensing two liquids constructed in accordance with the present invention and indicated generally by the reference numeral **10.** The dispenser **10** comprises a first, flexible, outer container **12** which defines a corresponding first or outer chamber **14** which is adapted to contain a first liquid. Positioned within the outer container **12** is a second or inner compressible container **16** which defines a corresponding inner chamber **18** (FIGS. 2 and 3) which is adapted to contain a second fluid.

The outer and inner chambers **14** and **18,** respectively, are fluidly coupled through a valve assembly indicated generally by the reference numeral **20** in FIGS. 2 and 3 to a discharge tube having a discharge outlet **24.**

Referring to the detailed views in FIGS. 2 and 3, the outer container **12** terminates in a threaded neck portion **26.** A cap member **28** is threadably mounted on the threaded neck portion **26** of the outer container **12** for rotation about the axis thereof. The cap **28** can be rotated from a closed position as shown in FIGS. 2 and 3 by the solid lines to an open or discharge position as indicated by the dashed lines in FIG. 3. The operating sequence of the dispenser **10** will be explained below in detail. However, for the moment it is sufficient to note that the cap member **28** is rotatably adjustable between a closed and open position. The distal end of the threaded neck portion **26** is indented at **30** to provide a snap-friction lock for a diaphragm assembly, indicated generally by the reference numeral **32.** The diaphragm assembly **32** comprises a flexible fluid pressure actuated diaphragm **34** which under fluid pressure forces diaphragm sleeve **36** in a downwardly direction as viewed in FIGS. 2 and 3. Positioned within the diaphragm sleeve defined bore **38** and secured to the inner wall **40** of the diaphragm sleeve is a generally conical valve plug **42.** The valve plug **42** is secured to the inner

wall 40 of the diaphragm sleeve by means of webs 44.

The diaphragm assembly 32 includes at least one air return element 46 which provides an air communication path between the outer container chamber 14 and the atmosphere. Any directional air flow through the air return element 46 is controlled by a conventional flap valve 48. As viewed in FIGS. 2 and 3, the flap valve 48 is secured between the diaphragm assembly 32 and a metering core assembly indicated generally by the reference numeral 50. The metering core assembly 50 is positioned generally inwardly from the threaded neck portion 26 of the outer container 12 and supports a metering core 52 by means of core supporting webs 54. The inner or upper end 56 as viewed in FIGS. 2 and 3 of the metering core is female threaded to receive in threaded engagement the threaded male portion 58 of the inner container 16. The lower or outer end 60 of the metering core terminates in a metering orifice 62. The inner wall surface 64 of the metering core defines a complementary conical valve seat for the diaphragm assembly valve plug 42. In the closed position as shown in FIG. 2, the flexible valve plug supporting web 44 are distorted to provide a pre-loading force to securely seat the valve plug 42 in a line seal with the metering core valve seat 64. The force for distorting the flexible valve plug supporting webs 44 is obtained by pre-loading the diaphragm 34 in the assembled position. Thus, as viewed in FIGS. 2 and 3, the pre-loaded diaphragm 34 will tend to urge the diaphragm sleeve 36 and hence the valve plug 42 in an upwardly direction. The upward movement of the valve plug 42 is limited by the fixed position of the metering core valve seat 64. However, the diaphragm sleeve 36 is free to continue in an upwardly direction thereby distorting the flexible valve plug supporting webs 44 and pre-loading the valve plug. The upward travel of the diaphragm sleeve 36 is limited by the fixed position of the outer surface of the metering core end 60. The outer surface tapers in a truncated conical form to define a valve seat 66 for the inwardly extending valve portion 68 of the diaphragm sleeve. The valve portion 68 and valve seat 66 provide an annular line seal between the diaphragm sleeve 36 and the metering core 52.

Having described the basic structural element of our hand squeezable, co-dispensing plural chambered dispenser 10, we will now discuss the operation of the dispenser. It has already been mentioned that FIG. 2 depicts the structural relationship of the components of the invention in the closed-for-shipping or factory sealed position. In this position, the inner surface of cap member 28 securely contacts and slightly distorts the outer end of air return element 48 in order to secure seal therebetween. Additionally, in this position the valve plug 42 and valve portion 68 are securely seated against their corresponding valve seats 64 and 66.

Referring now to FIG. 3, the dispenser 10 is prepared for use by rotating the cap member 28 from the factory sealed position shown in FIG. 2 to the user "closed" position shown in FIG. 3. The slight rotation of the cap member 28 required to change the cap position from "factory sealed" to user "closed" causes the cap to move in a downwardly direction as viewed in FIGS. 2 and 3. The inner surface of the cap member is still in contact with the air return element 48, but the distortion of the air return element has been reduced. The relative positions of the dispenser components in the "factory sealed" and user "closed" position can best be seen by comparing the solid positions of the elements in FIGS. 2 and 3. Note in particular the different relationship between the outer end 70 of the diaphragm sleeve and the diaphragm sleeve stop 72 on the cap discharge tube 22.

Assuming that the outer and inner chambers 14 and 18, respectively, are filled with corresponding first and second liquids, co-dispensing of these liquids is achieved by rotating the cap member 28 to the user "open" position as shown by the dotted line in FIG. 3 and then squeezing by hand the outer container 12 of the dispenser. The squeezing pressure forces the first liquid in the outer chamber 14 down into a capillary tube 74 defined by a portion of the inner wall of the diaphragm sleeve 36 and a portion of the outer wall of the fixed metering core 52. In a similar fashion, the force generated by squeezing the outer container 12 is transmitted through the first liquid in chamber 14 to the surface of the compressible inner container 16. The second liquid contained within the chamber 18 is forced downwardly as viewed in FIG. 3 to occupy the space within the metering core 52. If both the inner and outer chambers were not completely filled, it will be appreciated that there will be a slight air bleeding through the first fluid valve defined by valve seet 66 and valve portion 68 and the second fluid valve defined by valve seet 64 and valve plug 42.

With the first fluid fully occupying the capillary tube 74 and the second fluid occupying the metering core 52, pressure on the outer container 12 will be transmitted to the upper surface 34a of the diaphragm 34 thereby causing the diaphragm and its corresponding diaphragm sleeve 36 to move in a downwardly direction as shown in FIG. 3. As the diaphragm sleeve 36 moves downwardly, the first fluid valve defined by valve seat 66 and valve portion 68 opens allowing the first fluid to flow downwardly into a mixing chamber 76. However, the second fluid valve defined by valve seat 64 and valve plug 42 remains closed until the preload on the valve plug supporting webs 44 is removed by further downward travel of the diaphragm sleeve 36. At this point, the second fluid valve opens allowing the second fluid within chamber 18 to flow through the metering orifice 62 and down into the mixing chamber 76. If desired, one or more vanes 78 or other conventional mixing means can be positioned within mixing chamber 76 to insure satisfactory mixing of the first and second liquids without generating an undesirable back pressure.

Given the pre-loading of the first and second fluid valves it will be appreciated that the valves will open only after the pressure on container 12 and hence the first fluid within chamber 14 exceeds a threshold pressure which is sufficient to overcome the pre-loading pressure of the first and second fluid valves. Similarly, when the pressure drops below the pre-load pressure, the first and second fluid valves automatically snap shut while the fluids are being dispensed from the two fluid containing chambers. Looking at FIG. 3, it can be seen that the valve plug 42 closes against the flow of liquid from the inner chamber 18. This arrangement substantially eliminates cross contamination between the two liquids because the second liquid within the chamber 18 is sealed in the metering core 52 and the separate chamber 18. Any residual mixed material in the mixing chamber 76 is thereby sealed off from the metering

core and inner chamber **18.** This is particularly important when the two liquids are chemically interactive and must be maintained in separate containers until immediately before use. In the preceding description of the operational sequence of the dispenser **10,** it has been noted that the first fluid valve opens before and closes after the second fluid valve. This arrangement is desirable in a number of situations. For example, many applications call for the dispensing of a "main solution" and a "concentrate" in a predetermined ratio of volumes. Since the "concentrate" often times can cause injury to the user if dispensed by itself, it is important to insure that the "main solution" will always be present in the mixing chamber **76** when the concentrate in the smaller chamber **18** is dispensed through the second fluid valve. It will be appreciated, however, that the sequential opening and closing of the first and second fluid valves in a first open-last closed sequence is not necessary in the absence of safety requirements with the characteristics of the "concentrate" or second liquid. Accordingly, the physical relationships of the dispenser components shown in FIGS. **2** and **3** can be altered to provide for simultaneous opening of the first and second fluid valves.

In the preferred embodiment of the invention, a conventional self-collapsing tube or pouch is used for the inner container **16.** Since the tube **16** is self-collapsing there is no vacuum build-up and no air return is required. However, with respect to the outer container **12** an air return path is required. The air return path is supplied through the previously mentioned air return element **46** and flap valve **48.** The outer end of the air return element **46** communicates with a first fluid reservoir **80** which is open to the atmosphere through an air return pipe **82.** The pipe **82** extends inwardly, i.e., upwardly, when the dispenser is in the inverted position as shown in FIG. **3** to provide a liquid outlet from reservoir **80** which is operative only when the level of liquid in the reservoir exceeds the height of the air return pipe **82.** This arrangement is desirable to prevent the discharge of any first chamber liquid which may have leaked past the flap valve **48.**

It has already been mentioned that one of the objects of the present invention is to provide a hand squeezable plural chambered dispenser for dispensing either fixed or variable ratios of two liquids. The fixed ratio embodiment of the present invention was described above in connection with FIGS. **1** through **3.** The variable ratio embodiment of the invention is illustrated in FIGS. **4** through **8.** Where possible, the same reference numerals which were used in connection with FIGS. **1** through **3** will be used to identify the same or corresponding components of the invention in FIGS. **4** through **8.**

Referring now to FIGS. **4** through **8,** the rotatable cap member **28** is provided with a plurality of reference marks or indicia **84** which can be aligned with a corresponding index mark **86** located on outer container **12** to indicate the position of the rotatable cap **28** with respect to the outer container.

The differences between the fixed co-dispensing embodiment shown in FIGS. **1** through **3** and the variable co-dispensing embodiment shown in FIGS. **4** through **8,** can best be seen by referring to the detailed cross-sectional view of the variable ratio co-dipsensing embodiment illustrated in FIG. **5.** The neck portion **26** of the outer container **12** is similar to that shown in FIG. **2.** However, the structure of the diaphragm assembly **32** is slightly changed so that the diaphragm assembly is threaded onto the threaded neck portion **26** of the outer container. The cover cap **28** is in turn threaded to the threaded portion **88** of the diaphragm assembly.

A slightly different arrangement is employed for securing the inner container **16** to the inner end **56** of the metering core **52.** Instead of a threaded connection as shown in FIGS. **2** and **3,** the container **16** is directly secured to the core member portion **56** by heat sealing or by other suitable means which will provide a fluid type connection between the two elements.

The structure of the second fluid valve has been altered in the embodiment shown in FIG. **5** to provide variable dispensing of the first and second liquids. Looking at FIG. **5** there can be seen that the valve plug **42** extends upwardly through the metering core orifice **62.** A shoulder **90** is provided on the valve plug to engage the valve seat **64** on the inner surface of the metering core. Collectively, the valve plug shoulder **90** and valve seat **64** constitute the previously mentioned second fluid valve. The diameter of the inwardly extending portion of the valve plug **42** is substantially the same as the diameter of the metering core discharge orifice **62.** Given this relationship, it can be seen that the valve plug **42** can be moved in a downwardly direction as viewed in FIG. **5** without opening the metering core discharge orifice **62.** The upper end of the valve plug is partially cut away at **92** to provide a bypass for the fluid contained within chamber **18** when the dispenser is set before dispensing both liquids. This arrangement can best be seen in FIG. **8** and will be discussed in detail below.

A sequential baffling system **94** is positioned within the mixing chamber **76** to provide a thorough mixing of the dispensed liquids. It will be appreciated that various other types of baffling systems, vanes and mixers can be employed in the mixing chamber to achieve the desired degree of mixing of the two liquids.

Having briefly described the differences between the variable ratio co-dispensing dispenser shown in FIGS. **4** through **8** of the drawings, and the fixed ratio dispenser shown in FIGS. **1** through **3** of the drawings, we will now describe the operation of the variable ratio co-dispensing dispenser. The dispenser is shown in the "factory sealed" or shipping condition in FIG. **5** of the drawings. The cap member **28** is firmly seated against the air return element **36** and distorts the outer end thereof to provide a tight seal. FIG. **6** illustrates by means of dotted, dashed, and combination dotted, dashed lines the positions of the movable elements in the user "closed" position (dotted lines), the single fluid dispensing position (dashed lines) and the dispensing position for dispensing both fluids (the combination dot and dashed lines). The single or "main" fluid dispensing position is shown in detail in FIG. **7.** In this position, the main solution in the outer chamber **14** exists downwardly through the diaphragm sleeve capillary **74** and through the now open first fluid valve defined by the metering core valve seat **66** and the diaphragm sleeve valve portion **68.** Note that the shank portion of the valve plug **42** still blocks the metering core discharge orifice **62.**

Further rotation of the cap member **28** provides for further downward travel of the diaphragm sleeve **36** as viewed in FIG. **8** of the drawings. In this position, it can

be seen that the bypass **92** formed in the valve plug **42** is positioned within the metering core discharge orifice **62** to permit the second or "concentrate" liquid in the inner chamber **18** to flow downwardly through the metering core and valve plug bypass into the mixing chamber **76.**

The ratio of the concentrate to main solution can be varied by intermediate settings of the rotatable cap **28.** At an intermediate setting, it can be seen that the open area defined by the valve plug bypass **92** and the metering orifice **62** is reduced. Further rotation of the cap member **28** will cause the valve plug **42** to move upwardly as viewed in the drawings and gradually reduce the area of the opening through which the second or "concentrate" liquid can flow from the inner chamber **18** into the mixing chamber **76.**

The variable and fixed ratio dispenser shown in the drawings and described above can be fabricated from a variety of materials. However, the particular structural configurations of the two dispensers are especially suitable for conventional plastic molding techniques. Representative methods and materials for constructing the dispensers include injection or blow molded low density polyethylene for the outer container **12**; a polyethylene-aluminum inner container **16** with an injection molded head; a high density polyethylene or styrene for the cap member **28**; a low density polyethylene for the diaphragm assembly **32** and the flap valve **48** and a high density polyethylene or styrene for the metering core assembly **50.**

In order to achieve maximum accuracy and constant ratio metering of the liquids contained within the first and second containers **12** and **16,** it is desirable to have the two containers connected to their corresponding outlet valves through a capillary tube. It has already been mentioned that the outer container **12** is fluidly coupled preferably through a capillary tube **74** to its corresponding outlet valve comprising valve seat **66** and valve portion **68.** The inner or second container **16** is also fluidly coupled preferably through a capillary tube formed by the bore of the metering core **52.** The use of two capillary tubes to connect the plural chambers to their respective valves is desirable because it helps to provide a relatively constant metering ratio despite varying pressures exerted upon the other container **12** and the amounts of the liquid remaining in chambers **14** and **18.** This relationship will hold true as long as the viscosities of the two liquids contained within chambers **14** and **18** are not too widely disparate.

Having described in detail my plural chambered dispenser, what I desire to claim and secure by Letters Patent of the United States is:

1. A plural chambered dispenser for dispensing first and second liquids comprising:

a first, flexible, chamber defining container adapted to contain the first liquid;

a second, compressible, chamber defining container positioned within said first container and adapted to contain the second liquid, said second container having substantially no shape memory and a smaller volume than said first container whereby pressure exerted upon said first container is transmitted through the first liquid to said second container;

a fluid actuated first outlet valve means fluidly coupled to said first container through a capillary tube; and,

a second outlet valve means fluidly coupled to said second container through another capillary tube, said second outlet valve means being actuated in response to the actuation of said first valve means with the opening and closing of the second outlet valve means occurring after and before the opening and closing, respectively, of the first valve means.

2. A hand squeezable, plural chambered dispenser for dispensing first and second liquids comprising:

a first, flexible, chamber defining container adapted to contain the first liquid;

a second, compressible, chamber defining container positioned within said first container and adapted to contain the second liquid, said second container having a smaller volume than said first container whereby pressure exerted upon said first container is transmitted through the first liquid to said second container;

a first, normally closed, outlet valve means fluidly coupled to said first container;

diaphragm means in fluid pressure communication with said first chamber, said diaphragm means being operatively connected to said first outlet valve means whereby said valve means is opened when fluid pressure is exerted upon the diaphragm by squeezing the first container;

a second, normally closed, outlet valve means fluidly coupled to said second container, said second outlet valve means being operatively connected to said diaphragm means to open when fluid pressure is exerted upon the diaphragm; and,

means for varying the ratio of the volumes of the first and second liquids discharged through said first and second outlet valve means.

3. The dispenser of claim **1** wherein said second outlet valve means opens after and closes before the opening and closing, respectively, of said first outlet valve means.

4. The dispenser of claim **1** wherein at least said first outlet valve means is pre-loaded in the closed position.

5. The dispenser of claim **1** wherein both said first and second outlet valve means are preloaded.

6. The dispenser of claim **1** further characterized by said first and second outlet valve means discharging into a mixing chamber having an outlet through which the mixed first and second liquids are dispensed.

7. A hand squeezable, plural chambered dispenser for dispensing first and second liquids comprising:

a first, flexible, chamber defining container adapted to contain the first liquid;

a second, compressible, chamber defining container positioned within said first container and adapted to contain the second liquid, said second container having a smaller volume than said first container whereby pressure exerted upon said first container is transmitted through the first liquid to said second container;

a first, normally closed, outlet valve means fluidly coupled to said first container through a capillary tube;

diaphragm means in fluid pressure communication with said first chamber, said diaphragm means

being operatively connected to said first outlet valve means whereby said valve means is opened when fluid pressure is exerted upon the diaphragm by squeezing the first container;

a second, normally closed, outlet valve means fluidly coupled to said second container through a capillary tube, said second outlet valve means being operatively connected to said diaphragm means to open when fluid pressure is exerted upon the diaphragm; and,

means for selectively preventing the opening of said second outlet valve when said first outlet valve means is actuated.

8. A hand squeezable, plural chambered dispenser for dispensing first and second liquids comprising:

a first, flexible, chamber defining container adapted to contain the first liquid;

a second, compressible, chamber defining container positioned within said first container and adapted to contain the second liquid, said second container having a smaller volume than said first container whereby pressure exerted upon said first container is transmitted through the first liquid to said second container;

a first, normally closed, outlet valve means fluidly coupled to said first container through a capillary tube;

diaphragm means in fluid pressure communication with said first chamber, said diaphragm means being operatively connected to said first outlet valve means whereby said valve means is opened when fluid pressure is exerted upon the diaphragm by squeezing the first container;

a second, normally closed, outlet valve means fluidly coupled to said second container through a capillary tube, said second outlet valve means being operatively connected to said diaphragm means to open when fluid pressure is exerted upon the diaphragm; and,

means for varying the ratio of the volumes of the first and second liquids discharged through said first and second outlet valve means.

9. The dispenser of claim **8** wherein said second container is concentrically positioned within said first container.

10. The dispenser of claim **8** wherein said diaphragm means is preloaded when the first and second outlet valve means are closed.

11. A hand squeezable, plural chambered dispenser for dispensing first and second liquids comprising:

a first, flexible, chamber defining container adapted to contain the first liquid;

a second, compressible, chamber defining container positioned within said first container and adapted to contain the second liquid, said second container having substantially no shape memory and a smaller volume than said first container whereby pressure exerted upon said first container is transmitted through the first liquid to said second container;

a first, normally closed, outlet valve means fluidly coupled to said first container;

diaphragm means in fluid pressure communication with said first chamber, said diaphragm means being operatively connected to said first outlet valve means whereby said valve means is opened when fluid pressure is exerted upon the diaphragm by squeezing the first container;

a second, normally closed, outlet valve means fluidly coupled to said second container, said second outlet valve means being operatively connected to said diaphragm means to open when fluid pressure is exerted upon the diaphragm.

12. The dispenser of claim **11** further characterized by a unidirectional air return valve means fluidly coupled to said first container.

13. The dispenser of claim **12** further characterized by means for varying the ratio of the volumes of the first and second fluid dispensed through said first and second outlet valve means.

14. The dispenser of claim **12** wherein at least said first outlet valve means is preloaded.

15. The dispenser of claim **12** further characterized by means for selectively preventing the opening of said second outlet valve when said first outlet valve means is actuated.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,850,346 Dated November 26, 1974

Inventor(s) James E. Richardson and Harvey H. Groves

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 27, "varying" should be --valving--

Column 8, line 39, "claim 1" should be --claim 2--.

Column 8, line 43, "claim 1" should be --claim 2--.

Column 8, line 46, "claim 1" should be --claim 2--.

Column 8, line 48, "claim 1" should be --claim 2--.

Signed and sealed this 4th day of February 1975.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents