United States Patent [19]

Ward

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[54] **APPARATUS FOR DISPENSING AND MIXING LIQUIDS**

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[21] Appl. No.: **177,019**

[52] **U.S. Cl.** **222/129.4**

[51] **Int. Cl.** **B67d 5/56**

[58] **Field of Search** 222/129.4, 105, 529, 183, 185, 222/94, 96, 129.2, 129.1, 129.3, 212, 207, 214, 452; 229/14 B, 17, 7

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Primary Examiner—Stanley H. Tollberg

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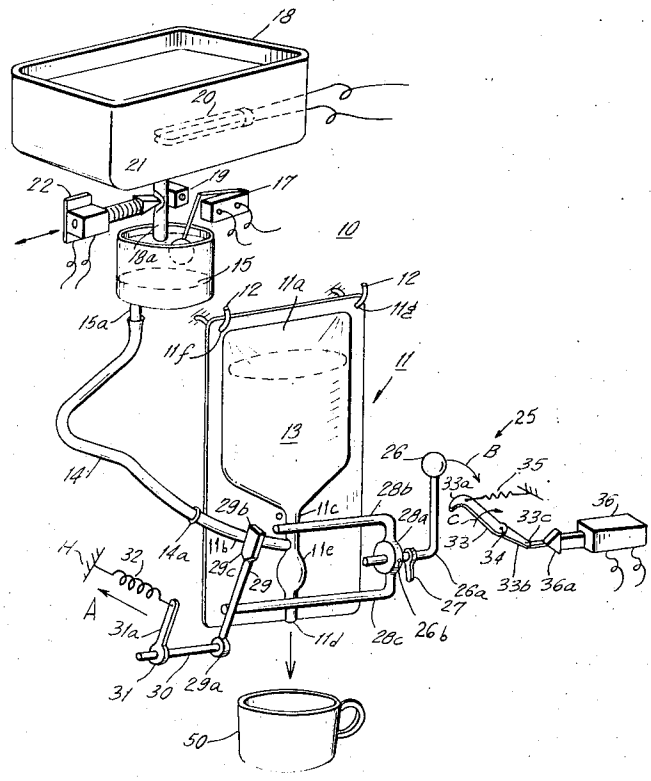
[57] **ABSTRACT**

A bag having cavities and conduits is provided for the storage, selective passage and mixing of liquids. The sealed cavities contain liquids and the conduits are so connected as to cause the liquids to enter a mixing and metering pod from which the thus mixed liquids are dispensed. The arrangement is advantageously adapted for use in dispensing cold or hot drinks.

7 Claims, 15 Drawing Figures



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SHEET 1 OF 7

FIG. 1c.

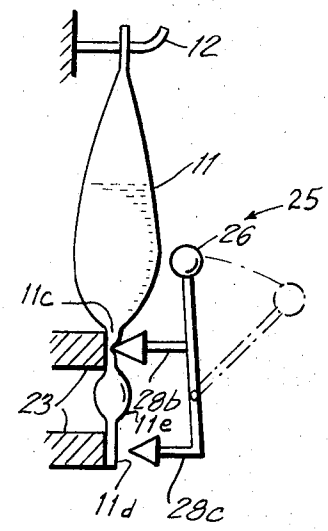

FIG. 1a.

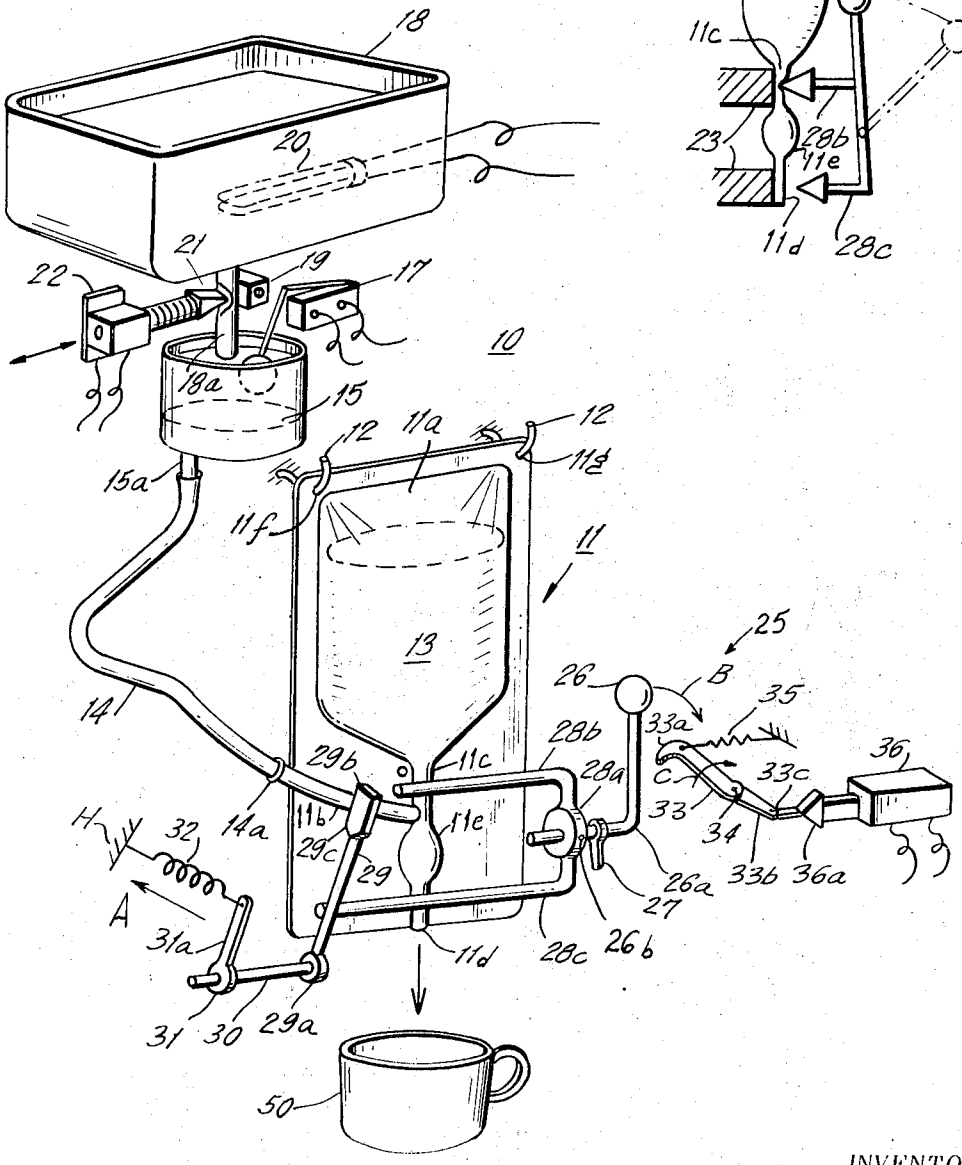

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FIG. 1d.

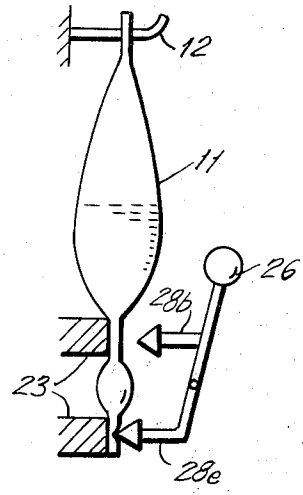

FIG. 1b.

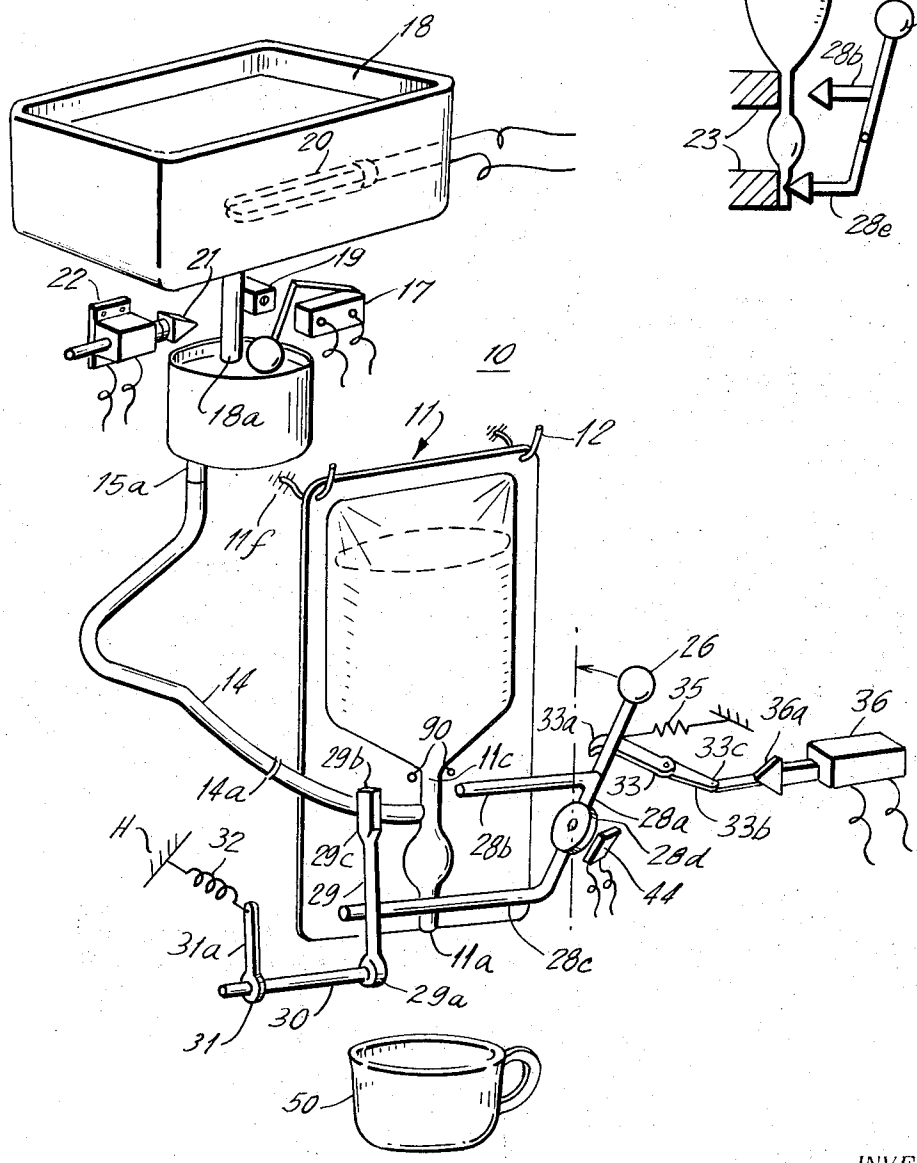

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FIG. 3.

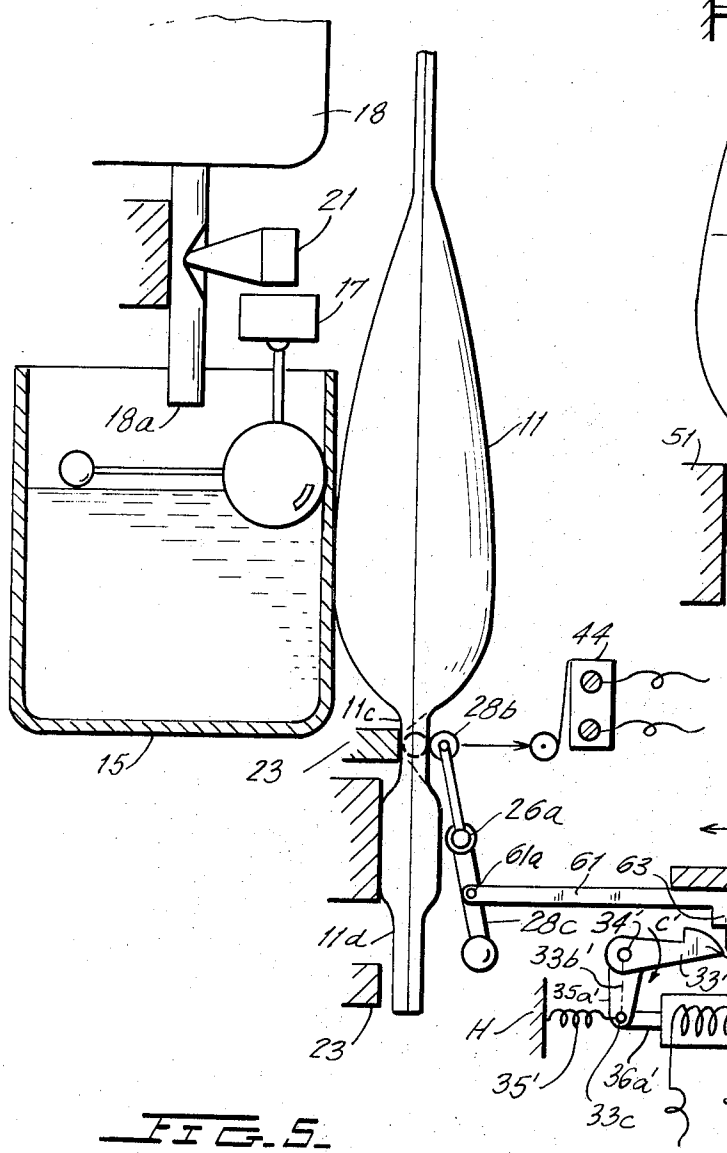


FIG. 2.

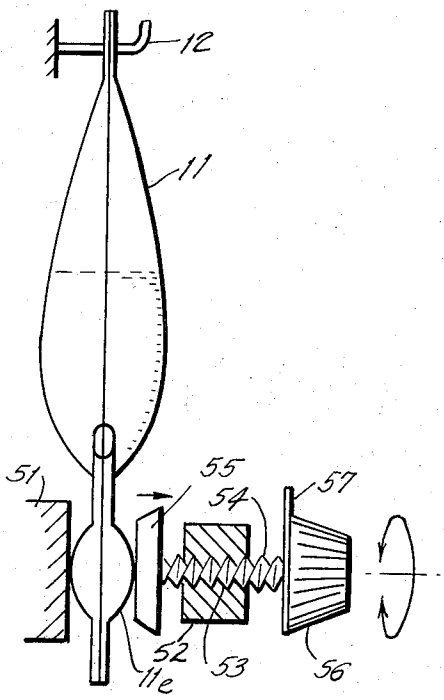


FIG. 5.

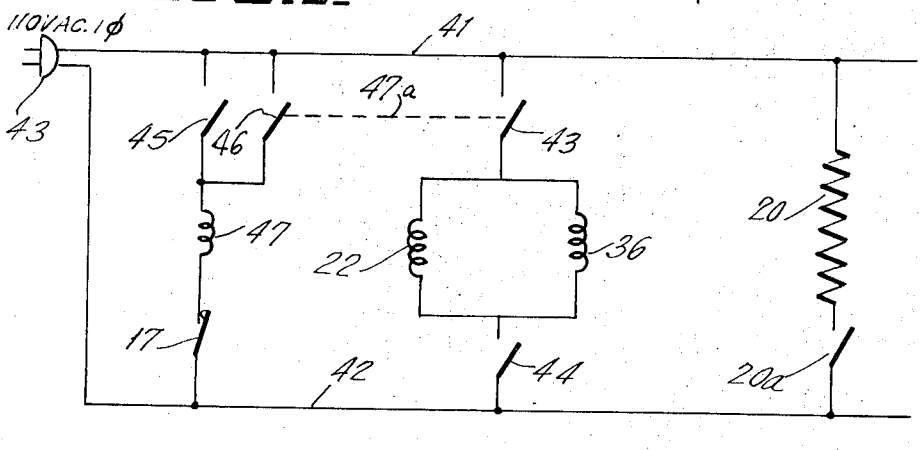
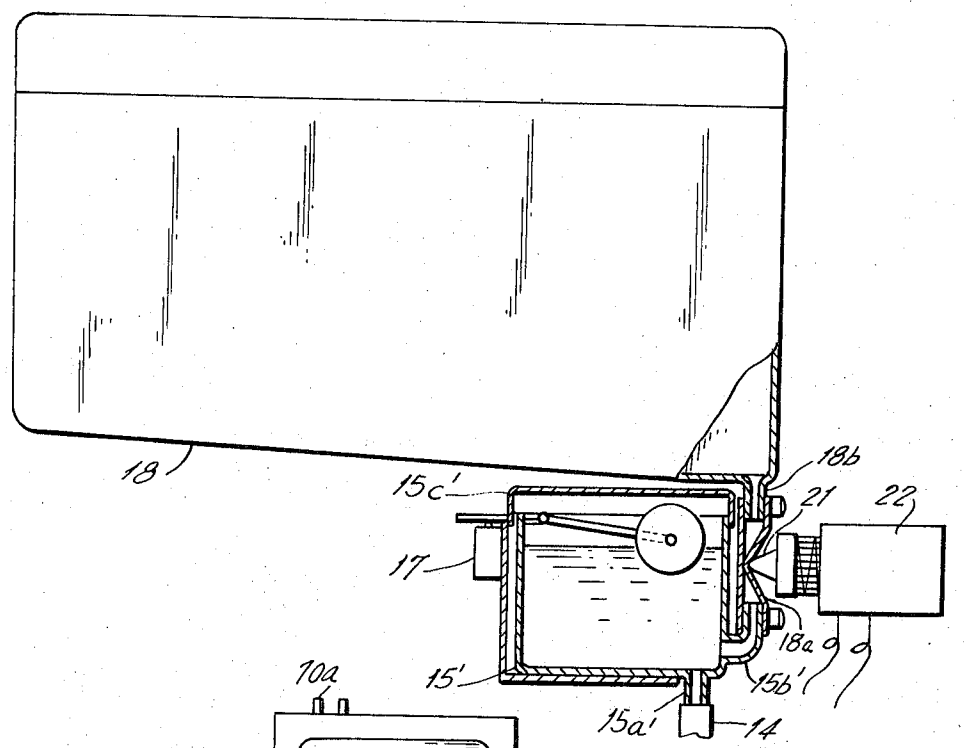


FIG. 3a.



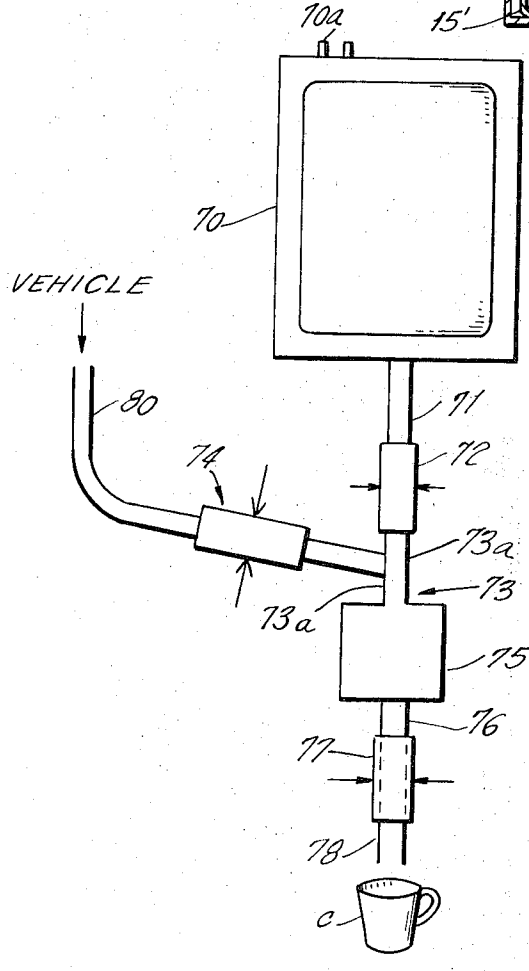


FIG. 4.

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FIG. 3b

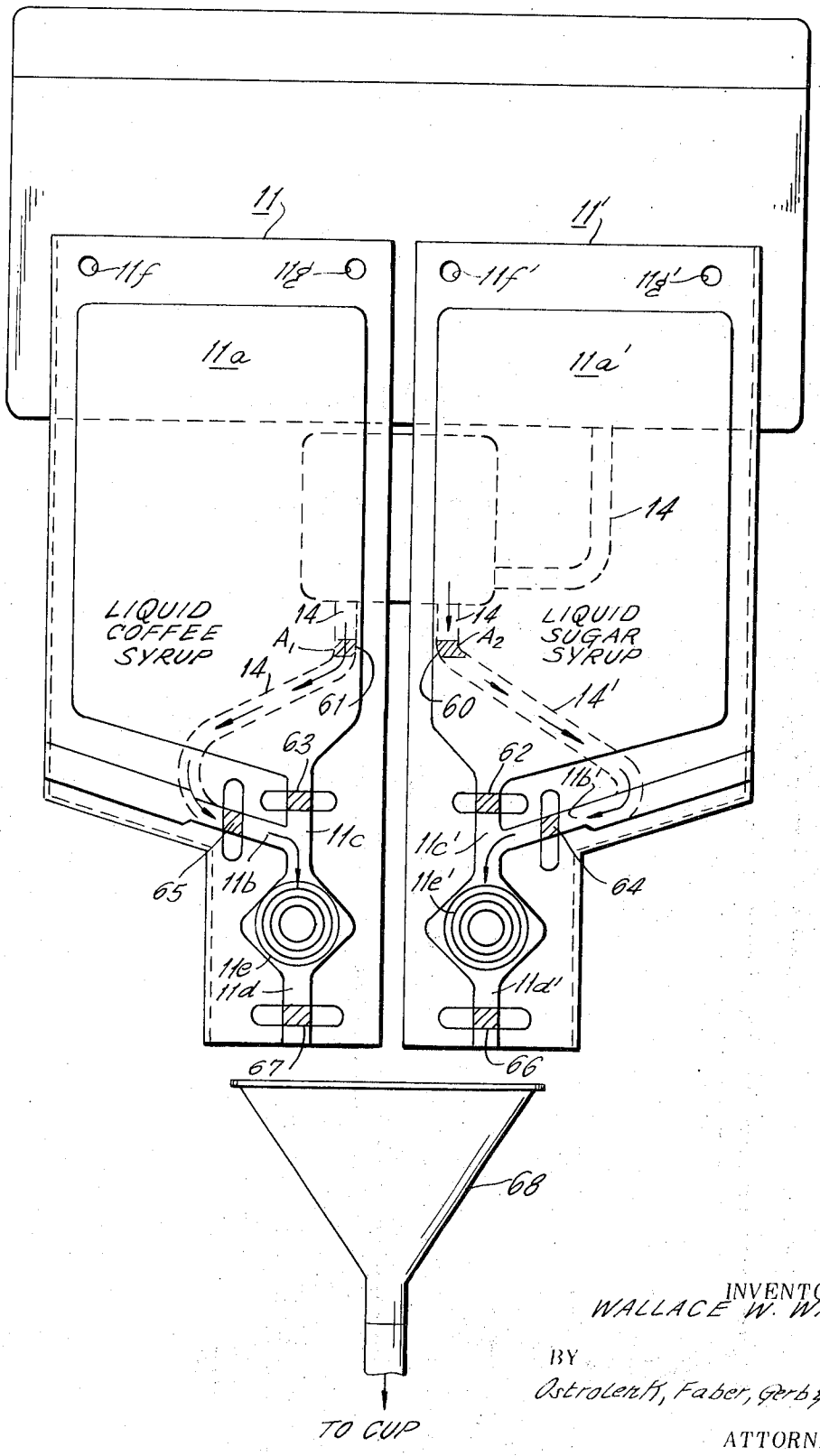

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FIG. 6a.

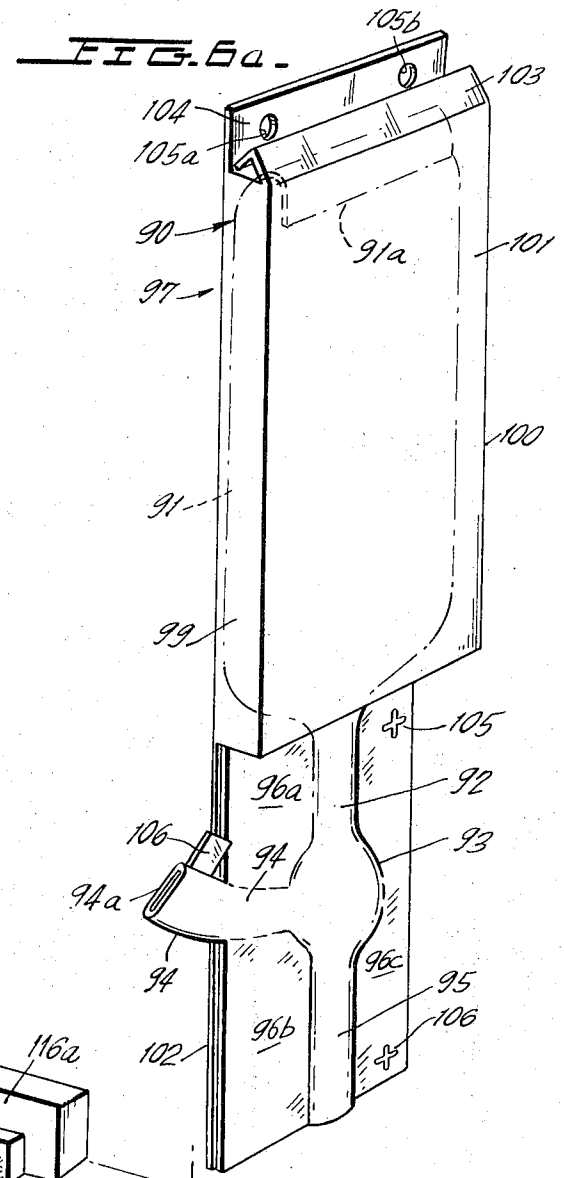

105b
103
104
105a
90
91a
101
97
100
91
99
105
96a
92
106
94
93
94a
96c
94
95
96b
102
106

FIG. 7a.

110
112b
112a
105b
105a
COFFEE
CASSETTE
111
91
133
113
113a
135
92
113d
113b
113f
113h
116a
118a
114
134
113c
116
118
115
117
93
113j
124
94
119b
116b
115
122
120
113g
113e
95
102
114
113k
C

FIG. 7c.

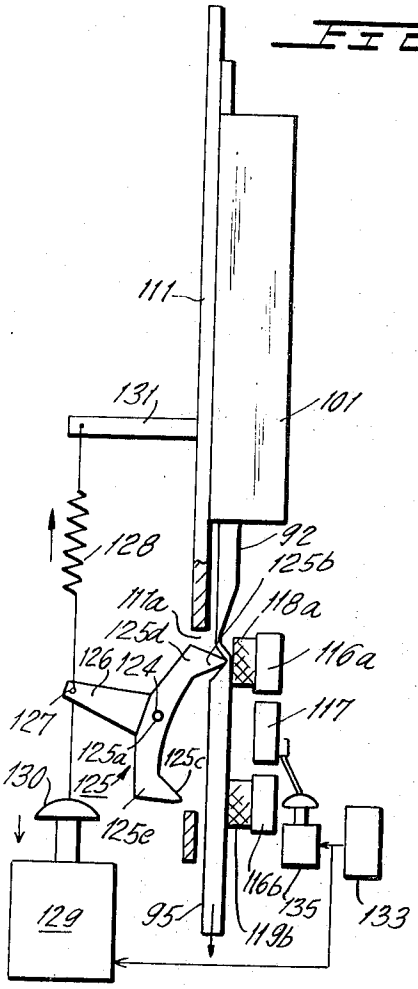


FIG. 7b.

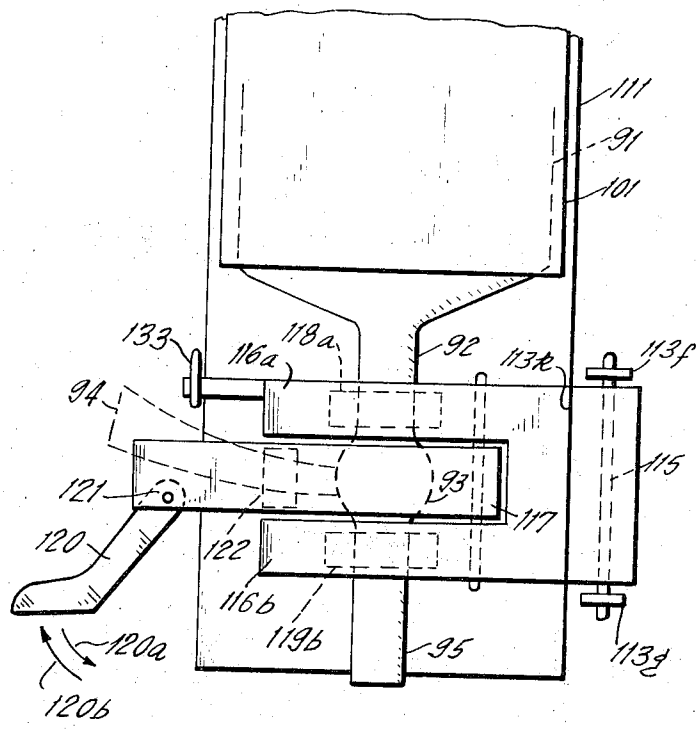


FIG. 6b.

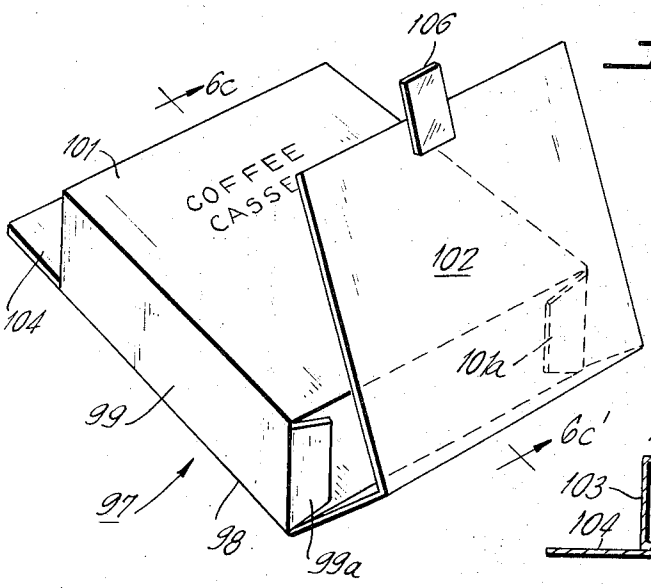
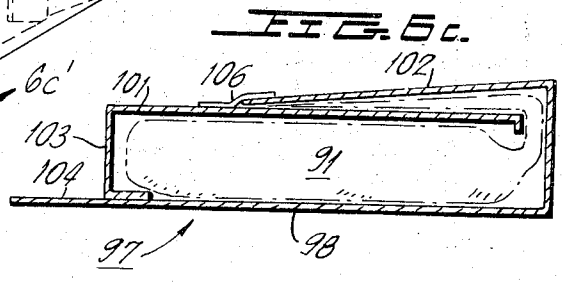


FIG. 6c.



APPARATUS FOR DISPENSING AND MIXING LIQUIDS

The present invention relates to mixing means and more particularly to a novel bag structure and associated apparatus for mixing of at least two liquids and the dispensing thereof.

BACKGROUND OF THE INVENTION

A wide variety of applications exist wherein it is desirable to independently store liquids which are to be subsequently admixed. For example, in vending machines, it is typical to provide independent means for storing water, sugar, coffee and cream, until such time as a vending operation is called for. Separate containers are typically provided for storage of each of the above ingredients. An arrangement of interconnected conduits and associated valves are provided for the selective ejection of controlled amounts of the above ingredients in order, for example, to dispense a cup of coffee. After long, continued periods of use these conduits and their associated control valves require maintenance and cleaning. Periodic maintenance is typically warranted in vending machines provided at locations having a high storage capacity and which are used quite frequently. However, marginal locations in which very few cups per day may be dispensed do not warrant such an expense, making their widespread use rather prohibitive.

The present invention is characterized by providing combined storage, mixing and dispensing means within lightweight inexpensive disposable bag structures thus completely eliminating the maintenance problems referred to hereinabove.

BRIEF DESCRIPTION OF THE INVENTION

The present invention is comprised of a bag structure which may preferably be comprised of a pair of flexible plastic sheets heat-sealed or otherwise joined together so as to form a network of cavities and connecting conduits. The cavities are provided for storage of one or more liquids preparatory to their being dispensed. The conduits couple the cavities as well as exterior liquid sources to a mixing and discharge pod wherein the selected ingredients are admixed and discharged. Valve means typically employed in conventional apparatus are eliminated and replaced by means which serve to pinch off the conduits during respective phases of the operating cycle so as to control the accurate dispensing of the ingredients. The bags are easy to install and/or replace, they may be utilized to indefinitely package, i.e., store the ingredients and be shipped in that manner and are simple and inexpensive to manufacture, as well as totally eliminating the need for conventional rigid conduit means such as tubes, pipes and the like.

It is, therefore, one object of the present invention to provide a novel apparatus for the packaging, storage, mixing and dispensing of liquids which utilizes bag means of a novel design to carry out the above mentioned functions.

Another object of the present invention is to provide a novel bag structure for use in the storage, mixing and dispensing of liquids and the like and including cooperating mechanical control means for carrying out the dispensing and mixing operations.

BRIEF DESCRIPTION OF THE FIGURES

The above as well as other objects of the present invention will become apparent when reading the accompanying description and drawings in which:

FIGS. **1***a* and **1***b* are perspective views showing one preferred embodiment of the present invention in the idle and charging positions, respectively.

FIG. **1***c* shows an elevational end view of a portion of the structure of the FIG. **1***a*.

FIG. **1***d* shows an elevational end view of a portion of FIG. **1***b*.

FIGS. **2** and **3** and FIGS. **4***a* and **4***b* show views of still other alternative embodiments of the present invention.

FIG. **5** shows an electrical wiring diagram employed to operate the mechanism such as, for example, as shown in FIGS. **1***a*–**1***d*.

FIG. **6***a* is a perspective view showing another preferred embodiment of the bag structure of the present invention.

FIG. **6***b* shows a perspective view of the bag structure of FIG. **6***a* in the partially closed position.

FIG. **6***c* shows a sectional view of the bag structure of FIGS. **6***a* and **6***b* in the fully closed (i.e. shipping) position.

FIG. **7***a* is a perspective view of another preferred dispensing mechanism for use with the bag structure of FIG. **6***a*.

FIGS. **7***b* and **7***c* are front and side views respectively, of the dispensing mechanism of FIG. **7***a*.

BRIEF DESCRIPTION OF THE FIGURES

Considering initially the embodiment of FIGS. **1***a*–**1***d*, the storage mixing and dispensing apparatus **10** shown therein is comprised of a bag or pouch **11** which, while not shown in detail, may preferably be formed of a pair of flexible plastic sheets which are heat-sealed or otherwise glued together at selected regions of the sheets so as to form a large storage cavity **11***a*, conduits **11***b*, **11***c* and **11***d*, and a small cavity **11***e* which functions as a discharge pod. The bag may be provided with small openings **11***f* and **11***g* which enable the bag to be hung upon hooks **12, 12,** which in turn may be suitably secured within a housing (not shown) for enclosing the storage mixing and dispensing apparatus. The cavity **11***a* may be utilized to store a coffee liquid **13** which may, for example, be a highly concentrated coffee in liquid or syrup form.

The plastic sheets may be formed of any suitable plastic material and may preferably be transparent in nature to easily determine the amount of stored liquid at any given instant.

Conduit **11***b* is provided with an outlet opening along the left-hand vertical edge of the bag for receiving the lower end **14***a* of a piece of flexible and preferably transparent plastic tubing **14** whose upper end is force-fitted upon a tubular projection **15***a* provided at the bottom of tank **15.** Tank **15** is adapted to receive water or any other liquid to be dispensed and is fitted with a float valve **16** for operating a switch **17** which functions to close an electrical circuit to be more fully described in connection with FIG. **5** when the liquid within the container **15** reaches a predetermined level.

The open end of container **15** is positioned beneath a tubular projection **18***a* which extends downwardly from a tank **18** which may be filled from the top by any

suitable liquid such as, for example, water. A heating coil and thermocouple assembly **20** extends into tank **18** so as to be immersed in the liquid. The heating coil is provided with thermocouple means (not shown) to maintain the liquid in tank **18** at a predetermined temperature level.

Outlet opening **18***a* is preferably a piece of flexible tubing to one side of which is positioned a stationary block **19** which acts as a backing plate for a ram **21** operated by solenoid **22** to selectively open and pinch off the tube **18***a*. Ram **21** is normally biased (by means not shown for purposes of simplicity) into position to "pinch" tube **18***a*.

Bag **11**, as shown best in FIG. **1***c*,is positioned within a suitable housing (not shown for purposes of simplicity) so as to have the conduit sections **11***b*, **11***c* and **11***d* positioned immediately adjacent stationary projections **23** which are secured to the housing in any suitable fashion. The backing projections cooperate with a mechanism **25** to selectively control and sequence the vending operation in a manner to be more fully described.

The control apparatus **25** is comprised of a hand-operated lever **26** which is supported for rotation about its portion **26***a* by means of a collar **27** which may be secured to the housing in any suitable manner. Shaft portion **26***a* is rigidly secured to a collar **28***a* provided with a suitable opening for receiving shaft portion **26***a* and which may further be provided with a set screw **26***b* for locking collar **28***a* to shaft portion **26***a*. Collar **28***a* is provided with bifurcated arms **28***b* and **28***c* which are operated by movement of the operating lever **26** in a manner to be more fully described.

Arm **28***c* extends toward the left to an amount sufficient to control the operation of arm **29** as will be more fully described. The lower end of arm **29** is provided with a collar **29***a* which is rigidly secured to shaft **30**, which shaft may be journalled within suitable bearings provided within the vending apparatus housing frame. A second collar **31** is also rigidly secured to shaft **30** and is provided with an integrally formed arm **31***a* whose free end is coupled to the vending machine housing H by means of a biasing spring **32** which normally urges arm **31***a*, shaft **30** and arm **29** in a direction shown by arrow A. The free end of arm **29** is provided with an enlarged projection **29***b* having a flat face **29***c* and cooperating with one of the projections **23** so as to pinch off the conduit **11***b* of bag **11** when the vending apparatus is in the charging position, as will be more fully described. Operation of the vending lever **26** in the direction shown by arrow B causes arm **28***c* to urge arm **29** in a direction opposite that shown by arrow A. The end of latch arm **33** is provided with a projection **33***a* for embracing the vending lever **26** in a manner to be more fully described. Spring biasing means **35** couples the end of latch arm **33** to the machine housing H and normally biases latch arm **33** in a direction shown by arrow C. The opposite end **33***b* of latch arm **33** is pivotally coupled at **33***c* to the reciprocating arm **36***a* of solenoid **36** which functions to rotate latch arm **33** in the direction opposite that shown by arrow C to indefinitely hold the vending lever **26** in the charging position, as will be more fully described.

FIG. **5** shows the electrical wiring diagram for the apparatus of FIGS. **1***a*–**1***d* in which a pair of buses **41** and **42** are coupled through a plug **43** adapted to be connected to a 110 volt, single phase, A.C. source. A first branch circuit coupled between buses **41** and **42** is comprised of heater element **20** and its associated thermostat switch **20***a* which operates to open-circuit this branch circuit when the temperature of the liquid in tank **18** reaches a desired level. Conversely, the thermostat switch **20***a* returns to the closed position if the temperature level of the liquid in tank **18** falls below the predetermined level.

A second branch circuit, coupled across buses **41** and **42**, is comprised of normally open contact **43**, normally open contact **44** and parallel connected solenoid coils of solenoids **22** and **36**.

A third branch circuit, coupled across buses **41** and **42**, is comprised of normally open contact switches **45** and **46**, which are connected in parallel with each other and in series with solenoid coil **47** and the contact of float switch **17**. Contacts **46** and **43** are mechanically coupled to one another, as shown in schematic fashion by dotted line **47***a* and are controlled by solenoid coil **47**. Although not shown in the figures for the purpose of brevity, switch contact **45** represents the contacts of a coin-operated mechanism which is preferably of the type conventionally used in present day vending machines.

The operation of the embodiment of FIGS. **1***a*–**1***d* (taken into consideration with the electrical diagram of FIG. **5**) is as follows.

Before the initiation of a dispensing operation, the apparatus is in the rest position as shown in FIG. **1***a*, wherein conduit **11***b* is open, conduit **11***c* is pinched closed, conduit **11***d* is open and tube **18***a* is pinched closed. Switch **17** is normally closed when the liquid in metering cup **15** falls below a predetermined level and opens when the aforesaid predetermined liquid level is reached.

Deposit of a coin in the coin mechanism causes momentary closure of contact **45**. With the contact of switch **17** closed, relay coil **47** is energized which serves to simultaneously actuate contacts **46** and **43**. Contact **46** "locks" relay coil **47** into the energized state.

The switch **44** whose switch contact **44** is shown in FIG. **5** is also shown in FIG. **1***b* and is positioned adjacent collar **28***a* which is preferably provided with a cam-shaped projection **28***d* so that when the vending handle **26** is moved from the position of FIG. **1***a* to the position of FIG. **1***b*, switch contact **44** is closed. With switch contact **43** having been closed previous thereto, the solenoid coils for solenoids **22** and **36** are energized causing the projection **33***a* to latch the operating handle **26** in the manner shown best in FIG. **1***b* and causing solenoid **22** to move from the position shown in FIG. **1***a* to the position shown in FIG. **1***b* so as to dispense the heated liquid into tank **15**. With the bifurcated arms **28***b* and **28***c* being moved from the position shown in FIG. **1***a* to the position shown in FIG. **1***b*, head **29***b* of arm **29** pinches off conduit **11***b*, arm **28***b* opens conduit **11***c* enabling the liquid or syrup **13** to pass therethrough into mixing pod **11***e* and conduit **11***d* is pinched off by arm **28***c* so as to prevent the release of the syrup **13**.

The energization of solenoid **22** moves ram **21** away from tube **18***a* causing metering cup **15** to fill. After the liquid supplied to tank **15** reaches a predetermined level, switch **17** has its contacts moved to the open position so as to deenergize relay coil **47** which causes the opening of its associated contacts **46** and **43**, thereby deenergizing solenoids **22** and **36**. The solenoid **32**

thereby operates to pinch off tube 18*a*, while solenoid 36 operates to move latch arm 33 out of engagement with the vending lever 26 to cause it to be moved from the position shown in FIG. 1*b* to the position shown in FIG. 1*a*. This causes conduit 11*b* to open, conduit 11*c* to be pinched closed, and conduit 11*d* to open so as to dispense the admixed liquids (i.e. hot water and syrup 13) into a cup 50.

FIG. 2 shows a mechanism for adjusting the volume of the mixing pod and is comprised of a projection 51 which is in position behind pod 11*e*. An upwardly extending projection 52 is provided with a tapped aperture 53 for receiving a threaded member 54. The left-hand end of threaded member 54 is provided with a circular-shaped disc 55 which bears against the adjacent surface of mixing pod 11*e*. Threaded member 54 is provided at its right-hand end with a control knob 56 having an indicating arm 57 extending thereform. The control knob may be positioned along the exterior face of the housing (not shown) which may be further provided with indicia along the front surface of the housing which cooperates with indicating arm 57 to regulate the amount of liquid to be mixed within mixing pod 11*e*. By rotation of control knob 56 in a first direction, the volume of mixing pod 11*e* may be reduced while rotation in the reverse direction enables the volume of mixing pod 11*e* to be increased. This structure enables a varied amount of admixed liquids to be dispensed. For example, this enables the structure to be employed with containers of varying capacity such as 4 oz. cups, 6 oz. cups and 8 oz. cups, thereby greatly increasing the flexibility of the structure. If desired, the control knob 56 may be positioned within the machine and in operations in which the cups are automatically dispensed from the vending apparatus. The volume control apparatus of FIG. 2 may be adjusted according to capacity, depending upon the particular machine.

Whereas a manual operation has been described herein, it should be understood that mechanical, electrical or other means may be employed to further automate the mixing and dispensing operations.

FIG. 3 shows an alternative embodiment to that described in connection with FIGS. 1*a*–2 in which the actuating arm is replaced by a pushbutton mechanism. As shown therein, a pushbutton 60 is provided and is preferably positioned so as to extend outwardly from the front face of the vending machine having an inclined portion 62 and a projection 63 positioned immediately adjacent thereto. The left-hand end of rod 61 is pivotally coupled by pin means 61*a* to arm 28*c* which is pivoted about shaft 26*a*. The remaining portion of the shaft, namely, the vending handle 26 is omitted herein since it is replaced by the pushbutton mechanism.

FIG. 3 shown the position of the pushbutton switch when the mechanism is in the idle state with conduit 11*c* being shown as being pinched off and conduit 11*d* shown as being open. By depressing pushbutton 60 as as to move rod 61 in the direction of arrow D, projection 63 moves to the left of latch 33′ which is pivoted about pin 34′. Latch arm portion 33*b* ′ is positioned at right angles to latch arm 33′ and is pivotally connected at 33*c* ′ to spring biasing means 35′, as well as being coupled to the actuating arm 36*a* ′ of solenoid 36. Spring means 35′ normally biases latch arm 33′ in the direction shown by arrow C′. The energization of solenoid 36′ in the same manner as described hereinabove in connection with solenoid 36 of FIGS. 1*a* and 1*b* causes rotation of latch arm 33′ in the direction opposite to that shown by arrow C′ to lock rod 61 in the position whereby conduit 11*c* is opened and conduit 11*d* is pinched off by virtue of the fact that arm 28*c* presses conduit 11*d* closed against projection 23. A torsion spring 35*a* ′ coupled between arms 33′ and 33*b* ′ serves to normally bias arm 33′ counterclockwise relative to arm 33*b* ′. However, spring 35*a* ′ enables arm 33′ to move clockwise relative to arm 33*b* ′ to permit projection 63 to slide past notch 33*a* ′ and thereby allow notch 33*a* ′ to "snap" into the latching position.

With arm 28*c* in the position whereby it pinches off conduit 11*d*, arm 28*d* is moved into engagement with switch 44 to close the contacts thereof so as to operate the mechanism in the same manner as was described hereinabove in connection with FIGS. 1*a* –1*d* and 5.

FIGS. 3*a* and 3*b* show another preferred embodiment of the present invention in which tank 18 is shown as being provided with a rigid hollow outlet projection 18*b* which is coupled to flexible tubing portion 18*a*. The bottom end of tubing 18*a* is coupled to a hollow tubular inlet opening 15*b* ′ of tank 15′ which, in turn, is provided with a pair of hollow tubular outlet openings 15*a* ′ and 15*c* ′ (note especially FIG. 3*b*) which, in turn, are coupled through hoses 14 and 14′ to a pair of bag structures 11 and 11′.

Each of the bag structures are provided with cavities 11*a* and 11*a* ′ for receiving liquid coffee syrup and liquid sugar syrup, respectively. The conduits 11*b* and 11*b* ′ couple the closed metering container 15′ which is provided with a covering lid 15*c* ′ (note FIG. 3*a*) to the vehicle inlet conduits 11*b* and 11*b* ′, respectively. The bags 11 and 11′ are each provided with mixing pods 11*e* and 11*e* ′. The apparatus of FIGS. 3*a* and 3*b* differs from that described in connection with FIGS. 1*a* –1*d* in that the liquid provided in metering tank 15′ is shared by both bag structures 11 and 11′ in order to provide admixture of the liquid coffee syrup with water vehicle, as well as providing admixture of the liquid sugar syrup with the vehicle. The control apparatus for dispensing and admixing is, however, substantially the same as that shown in FIGS. 1*a*–1*d* with the darkened areas representing the pinched-off positions. Pinch-off position 60 represents a mechanism similar to that shown in FIGS. 1*a*–1*d* wherein the liquid is dispensed through flexible tube 14 only when coffee with sugar is ordered. Position 61 is opened at the appropriate phase in the operation when coffee (with or without sugar is ordered). Positions 62 and 63 are normally pinched off in the idle position and are opened to enable the dispensing of coffee syrup or sugar syrup during the charging state. Positions 64 and 65 are normally open during the idle position and are closed during the charging position, while positions 66 and 67 are normally open in the idle position and closed in the charge position to be subsequently reopened after admixture of the ingredients within their respective mixing pods 11*e* ′ and 11*e* .

Conduits 11*d* and 11*d* ′ are positioned above a funnel 68 which receives the dispensed liquids, admixes them within the funnel and transfers the contents thereof to a suitable container (not shown for purposes of simplicity).

Whereas FIG. 3*b* shows the bag structures 11 and 11′ as being separate bag structures, it should be understood that a single bag structure can be employed if desired. As an additional modification, the funnel structure 68 may be eliminated by providing (in a single bag

structure) a Y-shaped conduit means coupling the outlet ends of conduits 11*d* and 11*d* ' shown in FIG. 3*b* to a single common conduit which may, in turn, be positioned immediately above the cup into which the admixed ingredients may be dispensed.

FIG. 4 shows still another alternative embodiment of the present invention in which the bag structures of FIGS. 1*a*–3*a* may be replaced by a rigid container **70** having a breather opening **70***a* . The bottom end of rigid container **70** which may be formed of a suitable light weight plastic is provided with an outlet conduit **71** coupled through a pinch-off apparatus **72** into a T-coupler conduit **73** having a first tubular portion **73***a* coupled to pinch off apparatus **72,** a second tubular portion **73***b* coupled to pinch off mechanism **74** and a third tubular section **73***c* coupled to a mixing pod **75.** The bottom end of mixing pod **75** is coupled to a conduit **76** whose outlet end is coupled through a pinch off mechanism **77** which, in turn, has its outlet end coupled to a conduit **78** to dispense the admixed ingredients into a cup **79.** The mixing pod **75** may be formed of a suitable flexible plastic material so as to facilitate its use with the volume control mechanism shown in FIG. **2.** The inlet opening of pinch off apparatus **74** is coupled to the outlet end of a conduit **80** whose inlet opening is coupled to a tank which, while not shown, may be of the type shown in FIGS. 1*a*, 1*b* or 3*a*.

Control apparatus of the type shown, for example, in FIGS. 1*a* and 1*b* may be employed to operate the pinch off apparatus **72, 74** and **77** in the same manner as was described hereinabove.

FIGS. 6*a*–6*c* show another preferred embodiment **90** of the present invention which is comprised of a bag having a storage portion **91** which narrows at its bottom end so as to be joined with a conduit **92** which selectively feeds the contents of the storage portion **91** to a mixing pod **93.** A flared conduit **94** having an opening **94***a* is provided for coupling to a conduit from the water supply means (for example, the water supply means **18** in FIG. 1*a*) and communicates at its opposite end with a mixing pod **93.** The bottom of mixing pod **93** is provided with an opening which communicates with a final outlet conduit **95.**

The bag may preferably be formed from first and second sheets of a suitable heat-sealable plastic material which is sealed along the periphery of the bag structure so as to assume the shape as shown, for example, in FIG. 6*a*. The flat sheets may be heat-sealed substantially completely around the region occupied by the conduits **92, 94** and **95** and the mixing pod **93** with the sealed areas being designated by the numerals **96***a*,**96***b* and **96***c*. The storage portion **91** of the bag structure is housed within a box member **97** having a flat rear surface **98,** side surfaces **99** and **100,** a front surface **101,** a downwardly extending cover portion **102** , an upper cover flap **103** and an upwardly extending marginal portion **104** which may preferably form part of the flat back **98.** The upwardly extending marginal projection **104** is provided with openings **105***a* and **105***b* for being received by a pair of projecting pins provided as part of the dispensing device (to be more fully described)-substantially in the same manner as the bag structure shown, for example, in FIG. 1*a*. The upper end of bag storage portion **91** is provided with a flap **91***a* which may preferably be comprised of both of the heat-sealed sheets which are folded over in the manner shown and stapled, glued or otherwise affixed to the front face or side **101** of the box structure **97.** Obviously, if desired, the flap **91***a* may be bent in the reverse direction and affixed to the rear side or surface **99** of the storage box.

In a like manner, the heat-sealed portion **96***c* is affixed such as, for example, by stapling at **105** and **106** to the lower cover portion **102** of the box. Stapling is provided for at only one side thereof so as to allow for free expansion of the conduits **92, 94** and **95,** as well as the mixing pod **93** when fluids are caused to flow therethrough.

The bag and storage box may be folded in the manner shown best in FIGS. 6*b* and 6*c* which respectively show the structure partially and completely folded to facilitate storage, handling and shipping of the structure. Cover **102** may be provided with a pressure-sensitive strip **106** for maintaining the cover **102** in the closed position. Sides **99** and **101** may be provided with inwardly bent flaps **99***a* and **101***a* respectively, to more completely seal the bag housed within the storage box. As can best be seen in FIG. 6*c*, the storage portion **91** is retained within the hollow interior of the box while the conduit and mixing pod portion of the bag are located between the front side **101** and flap **102** of the box when in the sealed position. The open end **94***a* of conduit **94** may be folded over upon itself so as to be retained within the confines of the storage box when it is in the closed position. A pressure-sensitive strip **107** may be employed to retain the outwardly projecting portion of the conduit **94** in the folded over position.

Conduit **94** is preferably flared in the manner shown so as to facilitate the insertion of the down stream end of a conduit, such as, for example, a piece of flexible plastic tubing into the flared opening. The flexible tubing may be pressed into the flared conduit **94** until a substantially force-fitted engagement is established between the flexible tubing and the flared conduit. The pressure-sensitive strip **106** may then be tightly wrapped around the free end of the flared conduit **94** so as to further facilitate the retention of the down stream or outlet end of the flexible plastic tubing. The flexible plastic tubing has been omitted from FIGS. 6*a*–6*c* for purposes of simplicity, it being understood that the flexible tubing may be similar to that shown and designated by the numeral **14** of FIG. 1*a*.

The storage portion **91** of the bag structure **90** may be utilized to store a liquid coffee concentrate as has been described hereinabove.

FIGS. 7*a*–7*c* show an alternative vending apparatus which may be employed with the bag structure **90** of FIGS. 6*a*–6*c*. The apparatus **110** (referring to FIGS. 7*a*–7*c*) is comprised of a vertically aligned support member **111** provided with a pair of projecting pins **112***a* and **112***b* for being received by the openings **105***a* and **105***b*, respectively, of the box structure in the manner shown best in FIG. 7*a* with the rear side **98** and cover flap **102** of the box being positioned against the vertical support **111.**

Vertical support **111** has secured thereto a channel shaped mounting bracket **113** having a pair of marginal flanges **113***a* and **113***b* each of which receives suitable fastening members **114** (some of which have been omitted for purposes of simplicity) for securing the channel shaped member **113** to vertical support **111.**

The central portion **113***c* of the channel shaped member is provided with a pair of rectangular openings **113***d* and **113***e* to permit a pair of closure members to

selectively project therethrough in a manner to be more fully described.

The right-hand flange 113*b* of channel shaped member 113 is provided with a pair of outwardly directed mounting members 113*f* and 113*g*, each being provided with openings 113*h* and 113*j* respectively, for receiving an elongated pin 115 which pivotally mounts a bifurcated member 116 and a member 117 each provided with suitable openings for receiving elongated pin 115 therethrough. Bifurcated member 116 may be moved in the first direction as shown by arrow 118 so as to occupy the closed position or may be moved in the direction opposite that of arrow 118 for purposes of removing a bag structure and replacing the removed bag structure with a new bag structure, for example. Member 117 may be pivotally moved in a similar manner. The arms 116*a* and 116*b* of bifurcated member 116 are each provided with resilient pads 119*a* and 119*b*, respectively, which are affixed to the arms of the bifurcated member by any suitable means such as, for example, an adhesive so as to confront openings 113*d* and 113*e* in the central portion 113*c* of channel shaped member 113. The arrangement of the pads can best be seen in FIG. 7*c* when the dispensing apparatus is in the operating position.

Member 117 is provided with a pivotally mounted handle member 120 arranged to pivot about a pin 121 mounted to member 117. The upper end of arm 120 has a resilient pad 122 affixed thereto which moves with the rotation of arm 120 in a manner to be more fully described so as to selectively seal or open the flared conduit 94.

The vertical support 111, as can best be seen in FIG. 7*c*, is provided with suitable openings 111*a* and 111*b* substantially aligned with the openings 113*d* and 113*e* of channel shaped member 113.

Channel member 113 is further provided with a pair of outwardly directed portions 113*k* and 113*l* (note FIG. 7*b*) which are each provided with suitable openings for receiving elongated rod 124 which can be seen to be arranged in a horizontal fashion. Rod 124 receives a bifurcated member 125 having a centrally located opening 125*a* and a pair of tapered portions at 125*b* and 125*c* at the free ends of its arms 125*d* and 125*e*, respectively. The rear surface of bifurcated member 125 is provided with an outwardly extending projection 126 which, in turn, is provided with a pivot pin 127 connected in common with a bias spring 128 and the armature 130 of a relay 129. The opposite end of bias spring 128 is secured to a bracket 131 mounted upon vertical support 111.

As can best be seen from FIG. 7*a*, the lower portion of the assembly is arranged relative to the dispensing apparatus with conduit 92 overlying aperture 113*d* and conduit 95 overlying aperture 113*e*. Flared conduit 94 extends to the left as shown. In the operating position pivoted bifurcated member 116 and pivoted member 117 are moved in the direction shown by arrow 118 so as to occupy the position shown best in FIG. 7*c*. A latch 133 pivoted to leg 113*k* of channel shaped member 13 by pin 134 is moved in the direction of arrow 135 so as to rest upon arm 116*a* and pivoted member 117 and be clamped around rod 124 to retain members 116 and 117 in the operating position.

The operation of the dispensing apparatus is as follows.

With the machine in the off position, relay 129 is de-energized placing bifurcated member 125 under the control of biasing spring 128, thereby causing arm 125*b* to be urged against conduit 92 and resilient pad 118*a*, thereby causing conduit 92 to be pinched closed. Pad 122 remains in the vertically aligned position whereby the flared conduit 94 remains in the open position.

At this time a coin is deposited in a coin receiving mechanism 133 which, upon the receipt of the appropriate coin, operates relays 135 and 129 to cause bifurcated member 125 to open conduit 92 and pinch closed conduit 95 and to respectively rotate arm 120 in a direction shown by arrow 120*b* of FIG. 7 to close flared conduit 94.

The selection push button is then depressed. Although not shown in FIGS. 7*a*–7*c*, the selection push button may be of the nature of that described in connection with FIGS. 1*b* and 3, for example, whereupon a relay of the type shown by relay 22 in FIG. 1*a*, for example, is operated to permit the heated water to fall into a dispensing cup 15 as shown in FIG. 1*a*. Simultaneously therewith, the vending button actuates relay 135 to rotate arm 120 in the direction shown by arrow 120*a* and thereby open flared conduit 94. Once the water from the dispensing cup 15 has been depleted the float valve mechanism resets the dispensing apparatus. Operation of the vend button also de-energizes relay 129 causing conduit 92 and conduit 95 to be pinched closed and opened respectively, whereby the admixed hot water and coffee fluid are dispensed from mixing pod 93 into a cup C.

Replacement of the coffee casette upon depletion of the fluid therefrom may be simple and readily performed by releasing latch 133 swinging bifurcated member 116 and pivoted member 117 to the open position, lifting the casette box from the supporting pins 112*a* and 112*b*, and replacing it with a new box and bag. The bifurcated member 116 and pivoted member 117 are then returned to the operating position.

It can be seen from the foregoing description that the present invention provides novel means for mixing and dispensing of separately stored liquids which greatly reduces the mechanisms and conduits required for such apparatus, thereby significantly reducing their cost and substantially eliminating the maintenance normally required for conventional systems. The use of the flexible bag means described hereinabove enables the liquids to be stored in the flexible bags even during handling and shipment thereof prior to insertion within the vending apparatus. To prevent egress of the stored liquid prior to use thereof, a thin wire strip may be inserted through openings such as, for example, the openings 90 shown in FIG. 1*b* to pinch off conduit 11*c* until such time as the bag structure 11 is inserted within a vending apparatus at which time the wire may be untwisted and removed thereby placing the apparatus in condition for repeated use. Whereas the preferred embodiments described herein have pointed out the advantageous use of the invention in conjunction with beverage vending apparatus, it should be noted that the apparatus finds widespread use throughout other applications which require independent storage of liquids preparatory to their dispensing and admixing. For example, the bags may be employed to retain liquids such as, for example, paints which may be mixed at a later time to yield paints of varying colors and gradations of color.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention it to be limited, not by the specific disclosure herein, but only by the appending claims.

What is claimed is:

1. Fluid mixing means for mixing and dispensing at least first and second fluids comprising:
- first, second and third conduits each having inlet and outlet ends;
- a mixing chamber having first and second inlet openings and an outlet opening;
- the inlet ends of said first and second conduits being adapted to respectively receive said first and second fluids and having their outlet ends respectively coupled to the first and second inlet openings of said mixing chamber;
- the inlet end of said third conduit being coupled to the outlet opening of said mixing chamber for passing the admixed fluids out of said third conduit outlet end;
- at least portions of said first, second and third conduits being flexible to facilitate selective opening or closure of said conduits;
- said fluid mixing means comprises at least first and second flexible plastic sheets being joined together to form said first, second and third conduits and said mixing chamber;
- means cooperating with said flexible chamber for adjusting the volume of the chamber;
- said sheets being further joined to form a storage container adapted to store one of said fluids and having an opening in communication with the inlet end of one of said first and second conduits.

2. Fluid mixing means for mixing and dispensing at least first and second fluids comprising:
- first, second and third conduits each having inlet and outlet ends;
- a mixing chamber having first and second inlet openings and an outlet openings;
- the inlet ends of said first and second conduits being adapted to respectively receive said first and second fluids and having their outlet ends respectively coupled to the first and second inlet openings of said mixing chamber;
- the inlet end of said third conduit being coupled to the outlet opening of said mixing chamber for passing the admixed fluids out of said third conduit outlet end;
- at least portions of said first, second and third conduits being flexible to facilitate selective opening or closure of said conduits;
- first, second and third control means for selectively closing and opening said first, second and third conduits, respectively;
- fourth means normally biasing said first control means to close said first conduit;
- fifth means normally biasing said second and third control means to respectively close and open said second and third conduits;
- operating means for moving said first, second and third control means, when actuated, to the closed, open and closed positions, respectively, for enabling the fluid entering said second conduit to pass into said mixing chamber;
- sixth means responsive to the actuation of said operating means for reversing the conditions of said first, second and third conduits to enable said fluids to be admixed and pass through said mixing chamber and out of said third conduit outlet.

3. Fluid mixing means for mixing and dispensing at least first and second fluids comprising:
- first, second and third conduits each having inlet and outlet ends;
- a mixing chamber having first and second inlet openings and an outlet opening;
- the inlet ends of said first and second conduits being adapted to respectively receive said first and second fluids and having their outlet ends respectively coupled to the first and second inlet openings of said mixing chamber;
- the inlet end of said third conduit being coupled to the outlet opening of said mixing chamber for passing the admixed fluids out of said third conduit outlet end;
- at least portions of said first, second and third conduits being flexible to facilitate selective opening or closure of said conduits;
- a metering cup for receiving one of said first and second fluids and having fourth conduit means for transferring the liquid contents thereof to the inlet end of said first conduit;
- a fifth conduit for supplying the liquid to said metering cup;
- means for closing said fifth conduit when the liquid in said metering cup reaches a predetermined level.

4. A bag structure for storing at least a first liquid and mixing said first liquid with a seond liquid comprising:
- first and second flexible plastic sheets, said sheets being sealed to one another to form a first cavity of a first predetermined volume for storing said first liquid, a second cavity of a second predetermined volume less than said first predetermined volume, a conduit joining said first and second cavities, a second conduit having an inlet end adapted to receive a second liquid from a source located external to said bag and an outlet end coupled to the second cavity, and a third conduit having an inlet end coupled to said second cavity and an outlet end adapted to pass any liquid entering said second cavity out of said bag structure whereby the liquids are admixed in said mixing chamber prior to being dispensed.

5. The bag structure of claim **4** further comprising a container for said bag, said container having a pair of front and rear faces maintained in spaced relationship by a pair of side members joined to the ends of said faces; and forming a hollow interior region for housing said first cavity with the remainder of said bag structure extending beyond one end of said container;
- one of said faces having a first bendable flap extending in the direction of the remainder of said bag structure and being bent so as to be against the other of said faces to seal said container and sandwich the reminder of said bag structure between said flap and said other face to facilitate handling, storage and shipment of said container when not in use.

6. The structure of claim **5** further comprising means for securing said bag structure to one of said faces and said first flap.

7. The structure of claim **5** wherein one of said faces is provided with a second flap extending in a direction opposite said first flap, said second flap having a pair of apertures for mounting said structure within a dispensing apparatus.

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