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(71)(72) Applicants and Inventors: SCHRAMM, William, L., Jr. [US/US]; 5984 Steubenville Pike, McKees Rocks, PA 15136 (US). SCHRAMM, Ronald, A. [US/US]; 5803 Steubenville Pike, McKees Rocks, PA 15136 (US).

(74) Agent: RADACK, David, V.; Eckert Seamans Cherin & Mellott, 600 Grant Street, 42nd Floor, Pittsburgh, PA 15219 (US).

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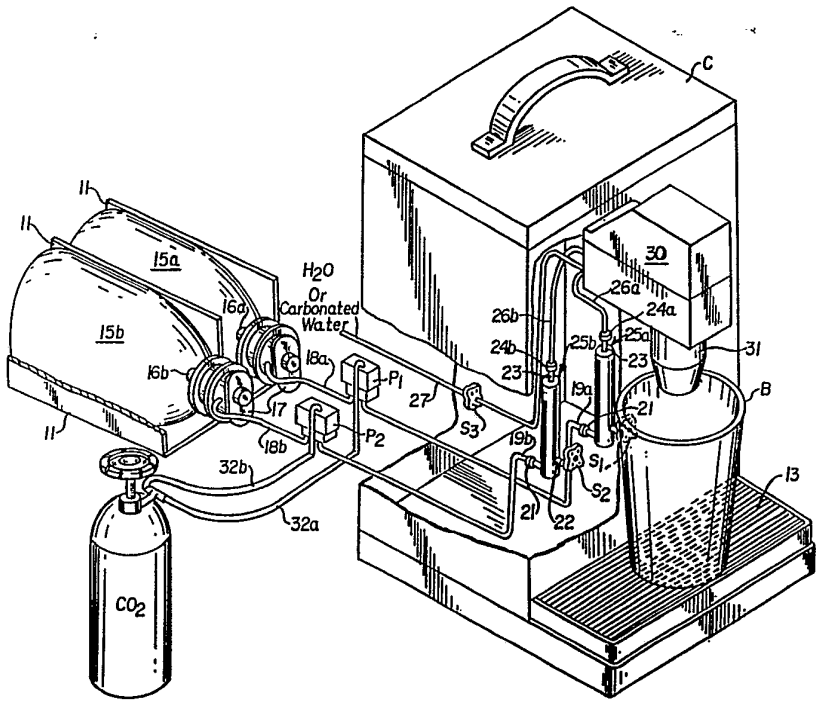

(57) Abstract

An automatic control system for accurately dispensing beverages containing multiple components. The system comprises tubes (18a, 18b) for separately delivering each liquid ingredient to a dispensing outlet (30), a pressure switch (51, 52) associated with each tube and a valve (V_1, V_2) associated with each tube for controlling the flow of the liquid ingredients to the dispensing outlet. The invention also includes a device to retrofit existing one-component systems to become two-component systems. Associated methods are also disclosed. A pacifier device (25a, 25b) is also disclosed which controls the flow of the components through the tubes (18a, 18b). Finally, a dispensing system for use with tanks (401 and 402) or a split tank having separate compartments (700) which contain liquid ingredients is also disclosed.

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AUTOMATIC CONTROL SYSTEM FOR ACCURATELY DISPENSING MIXED DRINKS

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of United States Patent Application Serial No. 07/593,698 filed October 5, 1990, which in turn was a continuation-in-part of United States Patent Application Serial No. 07/534,467 filed June 6, 1990.

BACKGROUND OF THE INVENTION

1. Field Of The Invention

This invention relates to an apparatus for dispensing liquid drinks and the like, wherein a base liquid such as water or carbonated water is to be mixed with numerous liquid-like substances for adding flavor and color thereto and thus providing a suitable beverage.

2. Background Of The Invention

There have been numerous and varied types of liquid dispensing systems for filling beverage containers which, for the most part, employ relatively complex operating arrangements and control elements, but to my knowledge, none of them meet the need for a relatively simple, positive acting and highly efficient system for meeting a long standing problem in the art. This problem has arisen in connection with a so-called bag supplied ingredient system wherein water, as such, carbonated water or salt free water is supplied by a pressurized line to a dispensing station, and liquid ingredients are separately supplied from individual, chemically inert container bags. Each bag usually has a capacity of about two or five gallons of liquid. At the dispensing station, the water and the other two liquid ingredients are mixed by adjustable regulators in proportioned amounts in accordance with a desired formula, and then the mixture is

fed into a drinking cup or container for the customer's use.

In addition to bag-type systems, the liquid ingredients (such as syrup and a sweetener such as asparatame) may be stored in reusable tanks. Asparatame must be kept separate from the syrup. The asparatame will break down if stored with the syrup, thus causing an unacceptable dispensed beverage. Separate tanks of asparatame and syrup or a single tank with separate compartments for holding the syrup and asparatame must be provided.

After a period of use, although the owner of the dispensing unit may try to provide a content of each of the liquid ingredient containing bags or tanks or compartments of one tank roughly corresponding to the proportions of the desired mix, one bag or tank or compartment of a tank may become exhausted before another with the result that one or more ingredients will be lost from the dispensing content. There is, thus, an important need for, in some way, immediately fully stopping the mixing and dispensing operation to enable a replacement bag or tank to be installed or a compartment to be filled before any further dispensing occurs. In other words, the entire operation should positively and immediately be stopped in order that the customer will not be disappointed with a deficient drink content and thus become a candidate for a competitor's product.

The need has also been to accomplish such a type of operational control in such a manner as to avoid an increase in dispensing unit apparatus size or space requirements, and also, in such a manner as to avoid the need for and the expense of replacing presently available

or installed dispensing equipment or its operating elements.

Heretofore, the approach has been to, in some way, redesign the apparatus elements, thereby necessitating discarding and replacing or enlarging a present equipment set-up in such a manner as to not only become highly complex and expensive, but also as to contravene installation limited space requirements.

In this connection, one approach was to provide extra bag or container units and then when one bag is emptied, to switch connections from the empty unit to a full unit. This not only takes up additional space, but requires a more complex system of operating elements, and especially when two or more types of liquids are required for the mixing operation. See the Hansen United States Patent No. 3,140,012 and the Johnson United States Patent No. 3,055,551. Also, there has been single ingredient or premixing mixed drink dispensing equipment that shuts off when, for example, there is not a sufficient, full cup or serving, See the Gust, et al. United States Patent No. 3,981,414. The problem solved by my invention is represented by the space wasting equipment devised for only independently controlling each of a series of liquid dispensing units, See United States Patent of Diebel, et al. No. 3,537,616. The Harde United States Patent No. 3,465,915 is also representative of a system involving the same problem.

SUMMARY OF THE INVENTION

The automatic control system for accurately dispensing beverages containing multiple components has solved the problems in the art. The beverage system for mixing at least two liquid ingredients with a base liquid such as water to assure a desired proportioning of the

same comprises tubes for separately delivering each liquid ingredient and the base liquid to a dispensing outlet, a pressure switch associated with each tube and a valve associated with each tube for controlling the flow of the liquid ingredients and the base liquid to the dispensing outlet. The pressure switches are activated when fluid pressure in the respective tubes falls below a predetermined level and the pressure switches are all electrically connected in series. The valves shut off the respective liquid ingredient and base liquid fluid flows when any of the pressure switches are activated. An associated method is also disclosed.

The invention also includes a device for easily converting a present "one bag" system to a "two bag" system. In this device, the two liquid ingredients from each separate respective bag are dispensed into a blending cup remote from the dispensing head. After this, the blended component is mixed with water and then is dispensed to the user. An alternative involves premixing all of the fluid ingredients with water into the blending cup for subsequent dispensing to the user. An associated method is also disclosed.

The invention also includes a unique pacifier device which controls the flow of the liquid ingredients through the tubes.

Finally, the invention also includes providing separate tanks or one tank with separate compartments for holding separate liquid ingredients. A liquid level control indicates when liquid ingredient is exhausted in the tanks. The liquid level control is electrically connected in series with valves to dispense the liquid ingredients so that the valves shut off liquid ingredient flow when the liquid level control is activated.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, Figure 1 is a perspective view in elevation illustrating a unitized, compact dispensing station of a relatively simple apparatus arrangement of my invention that may be employed for supplying, proportioning and mixing two or more ingredients with water, which includes, salt-free water or carbonated water at a drink dispensing station.

Figure 2 is a schematic of an operating system layout of my invention which is shown as employing electrical energy for its main functioning parts and gas pressure for operating its fluid pressure pumps.

Figure 3 is a slightly enlarged side view in elevation showing equipment units in an operating layout employed in accordance with my invention.

Figure 3A is a further enlarged vertical side view and Figure 3B is a top plan view on the same scale, particularly illustrating a solenoid valve assembly and switches mounted in the dispensing assembly instead of elsewhere in the system as illustrated in Figures 3 and 4.

Figure 4 is a top plan view on the scale of and showing the same representative equipment units as Figure 3 that may be adapted for use in my system.

Figure 5 is a slightly enlarged view in vertical elevation of the pacifying unit of the invention.

Figure 6 is a partially schematic, partially broken away side elevation of another embodiment of the invention which can be retrofitted onto existing one bag dispensing systems.

Figure 6A is a schematic diagram of the system of Figure 7.

Figure 7 is an exploded side elevational view of the blending unit of the invention.

Figure 8 is a top plan view of the blending unit shown in Figure 7 with one of the adjustment means removed.

Figure 9 is a partially exploded rear elevation view of the blending unit at Figure 7.

Figure 10 is a partially schematic view of yet another "retrofit" embodiment of the invention.

Figure 10A is a schematic diagram of the system of Figure 10.

Figure 11 is a perspective view of another embodiment of invention showing the use of tanks of liquid ingredients.

Figure 12 is a schematic diagram of the system of Figure 11.

Figure 13 is a perspective view of a single tank having two separate compartments.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In carrying out my invention, I have been able to make use of on-the-market units, for example, "Shurflo" fluid-operated pumps P_1 and P_2 in the system of Figures 1-4 for separately supplying fluid ingredients to a unitized dispensing assembly 30 (Figure 1) that employs regulators R_1, R_2 and R_3 (Figure 2) for adjusting the proportioning of each liquid, and individual valves V_1, V_2 and V_3 that are respectively operated by their individual solenoids SO_1, SO_2 and SO_3 for supplying proportioned liquids to a suitable mixing and dispensing nozzle 31. Each valve is spring-biased to close and is opened by its own electric solenoid. As indicated, I have been able to adapt commercially available apparatus in such a manner as to carry out my invention, see for example, a so-called dispensing valve, manufactured and sold by the Cornelius Company of One Cornelius Place, Anoka, Minnesota 55303-

1592, as its "Gemini" unit. I have also been able to make use of "Shurflo" so-called "sold-out" switches S_1, S_2 and S_3 (Figure 2). "Shurflo" equipment is manufactured by Shurflo, 1400 Cerritos Avenue East, Anaheim, California 92805. The ingredient containers are strengthened, plastic bags 15a, 15b that are used with any conventional quick-connect and disconnect, joint sealing coupling 16a, 16b for ready replacement of each bag when its respective contents have been used-up or exhausted. Such bags are commercially available and may be of an inert, flexible plastic material of suitable size, for example, 2 to 5 or 10 gallons of ingredient content.

In carrying out my invention, I determined that in a compacted unit such as shown in Figure 1, where tubing from fluid pumps, P_1 and P_2 are employed to move liquid ingredients from bags such as 15a and 15b along relatively short length (as in a compact unit), that there is a tendency to cause a jerky, hammer type of operation. This ripple or wave-like fluid pressure action becomes more acute the shorter the fluid supply lines are. I have been able to assure a smooth and positive operation of regulators R_1, R_2 by devising and installing a pacifying units 25a and 25b in the fluid pressure lines 19a and 19b, respectively, between each fluid supplying pump P_1 and P_2 and an associated pressure-operated electric switch S_1 and S_2. Although I have not shown the use of such a unit in water supply line 27, one may be used if conditions so warrant.

The pacifying or stabilizing units 25a and 25b are similar so only unit 25a will be shown in Figure 5. Pacifying unit 25a has an upright positioned, enclosed hollow cylinder whose upper chamber portion is filled with a cushioning fluid, such as air "A", and whose lower

chamber portion is filled with the liquid ingredient "S" that is being supplied. A lowermost inlet fitting 21 is connected to introduce liquid from an associated bag, such a 15a or 15b, and a slightly upwardly offset outlet fitting 22 is adapted to apply the liquid to a pressure switch S_1 and S_2 that, if utilized, is connected to it (Figures 1 and 3). A vertically, centrally extending outlet pipe 23 is shown extending centrally along the inner chamber of the cylindrical-shaped unit 25a and out through its upper end. Pipe 23 has a threaded fitting 24 connecting it through line 26a to an associated regulator R_1 of a dispensing assembly (Figures 1, 2, 3, 4 and 3B). The stabilizing unit 25a assures a smoothed-out, positive application of positive to negative fluid pressure transition of actuating force as applied to an associated negative pressure-sensitive and opened switch S_1 and S_2.

In Figure 1, I have shown a complete drink dispensing unit or assembly a which is fully compact and requires electrical power supply and an outside line 27 for receiving water, salt free or carbonated water under normal pressures of, for example, a minimum of about 30 pounds per square inch to a maximum of about 100 pounds per square inch or any industry standard pressure. In this assembly, 15a and 15b represent filled conventional liquid ingredient source bags ("bags"), for example, one bag 15a may contain a drink syrup and the other bag 15b a mixture of a drink syrup and a liquid sweetener. These ingredients are separately contained because they do not mix properly when contained in one bag. Pumps P_1 and P_2 are connected to draw liquids from the bags 15a and 15b when they are in dispensing positions, with their mouth ends 16a and 16b connected through quick-change, thumb pressure release, seal-mounted, couplings 17 to hose or

piping lines 18a and 18b. The respective liquids are moved under negative pressure by pumps P_1 and P_2 from their containers 15a and 15b and then under positive fluid pressure to pacifying units 25a and 25b (See also Figure 2). Next, they are moved under positive fluid pressure through lines 26a and 26b to a dispensing unit assembly 30, wherein the mixing liquids supplied by the lines 26a and 26b and water supplied by line 27 are each proportioned or regulated by regulators R_1, R_2 and R_3, and moved through their individual valves V_1, V_2 and V_3 which are controlled by their respective solenoids SO_1, SO_2 and SO_3 (Figure 2). Finally, the proportioned ingredients are fed into a mixing chamber and dispensing spout assembly 31 for discharge into a cup or container "B". As noted, the cup "B" may be placed on shelf 13 in alignment to receive the mixed drink as it emerges.

I have thus been able to incorporate all the operating elements of my system in a compact operating dispensing assembly unit illustrated in Figure 1, by, for the most part, using conventional equipment parts. However, the parts are employed, for the first time, in such a manner in my system, that the problem heretofore outlined has been solved, and in a connected operating relation as to assure a positive, instantaneous stoppage of all liquid ingredient supply to mixing chambers of the dispensing unit assembly 30 when one of the liquid ingredient sources is exhausted or disrupted in any manner. This assures that there will be no "bad" or one or more ingredient missing drink mixed and dispensed.

With reference to the schematic of Figure 2, electric direct current is shown applied from a suitable source to lines 10 and 11 at a voltage suitable for energizing solenoids SO_1, SO_2 and SO_3. The line 11 is

connected in series as shown through the terminals of fluid pressure sensitive switches S_1, S_2 and S_3. The pumps P_1 and P_2 that control the supply of liquids from container bags 15a and 15b are connected through piping or hose 19a, 19b to the switches S_1 and S_2. The pumps P_1 and P_2, as shown, are preferably gas-operated through lines 32a and 32b from a suitable pressurized tank, such as of carbon dioxide (CO_2) gas or a compressed air source, and are employed to normally draw the liquid contents of bags 15a and 15b along lines 18a and 18b, and advance the liquids under pressure along lines 26a and 26b, through regulators R_1 and R_2 and valves V_1 and V_2 into the mixing and dispensing spout 31 (Figure 1).

Water, as plain water, salt-free or carbonated water may be supplied from a suitable source through line 27 to a fluid pressure-sensitive switch S_3 and regulator R_3 and valve V_3 to the head for mixing with the liquid ingredients supplied by the bags 15a and 15b.

In operation, when one bag 15a or 15b becomes exhausted or if, for some reason, the water being supplied is shut off, this will cause fluid pressure to decrease as applied to such a switch as S_1 (for the bag 15a), or S_2 (for the bag 15b), or as S_3 (for the water supply) and thus to open. Since the switches, as shown, are all connected in series in one electric supply line 11, this will automatically cause all the switch-controlled, valve operating solenoids SO_1, SO_2 and SO_3 to be immediately and simultaneously de-energized, to thus cause their respective valves V_1, V_2 and V_3 to close under spring pressure. The entire electrical system is thus de-energized by the opening of any one of the pressure-sensitive switches S_1, S_2 or S_3.

Further, in carrying out the invention and referring particularly to Figure 2 of the drawings, it will be noted that bags 15a and 15b may be of much larger size for supplying the mixing ingredients and can thus be located in a separately positioned somewhat remote location, for example, in a cupboard or rack in a separate room with, as shown in Figures 3 and 4, their out-supplying lines 18a and 18b. The pumps P_1 and P_2 should be located in close proximity to the containers 15a and 15b for best results. Typical bags 15a and 15b are made of a suitable inert material and tend to collapse as they are emptied. I utilize the tendency for negative pressure build-up when a bag is emptied to cause the associated pressure-sensitive switch S_1, S_2 to open. The same result follows if the water pressure drops due to its shut-off, thus causing pressure-sensitive switch S_3 to open.

Again referring to Figure 2, the liquid content of each bag 15a, 15b is drawn out through hose or piping 18a, 18b by pressure pumps P_1 and P_2 which are shown as gas-operated through pipe or hose 32a and 32b that is connected to a suitable source of pressurized gas such as a carbon dioxide, CO_2 tank. There are also electric pumps on the market may serve the same purpose. The liquid content supplied to the pumps P_1 and P_2 is then shown as passed along lines 19a, 19b through its associated stabilizing unit or cylinder 25a or 25b to an associated pressure-sensitive electric switch S_1 or S_2. The liquid ingredients enter each stabilizing unit 25a, 25b, for example unit 25a (Figure 5) through its inlet connection 21 and out through centrally extending "down" pipe or hose member 23 and outlet connection 24, and through piping 26a and 26b (Figure 2) to an associated regulator R_1 and R_2 which has means for adjusting the proportioning of each

ingredient. Each ingredient is then supplied to the mixing chamber of the dispensing unit 30 through individual solenoid-controlled ingredient valves V_1 and V_2 while water or carbonated water is supplied from a suitable conventional source, such as a municipal system, as regulated by a conventional flow meter, and as shown in Figure 2, is passed through line 27, regulator R_3 solenoid-controlled dispensing valve V3 to the same mixing chamber. The regulators R_1, R_2 and R_3, the dispensing valves V_1, V_2 and V_3 as controlled by electric solenoids SO_1, SO_2 and SO_3, the mixing chamber, etc. are all available in a typical commercial unit 30, 31, such as a Cornelius Gemini unit. I have found it preferable to provide a smaller pass-through hole in a conventional regulator in order to enable a suitable "down" adjustment of the percentage of each liquid ingredient as individually supplied to a regulator as a blended liquid ingredient. I am now able to, in accordance with my invention, provide a better mixed drink product, since we can blend whatever ratio is required by the manufacturer by changing the regulator pass through hole diameter. This will be explained further hereinbelow with respect to Figures 7-9.

The pressure switches S_1 and S_2 are set to remain closed when fluid pressure is normal during the withdrawing of liquid from each bag 15a and 15b, but are opened when vacuum or negative pressure increases due to a failure or exhaustion of the liquid content of a given bag. The switch S_3 is set to remain closed when water is being supplied at normal pressure and to open when, for example, its supply is shut off. If desired, the switch S_3 may be eliminated, since the exhaustion of the bags 15a and 15b is a more normal occurrence. It will be noted that if any one of the switches S_1, S_2 or S_3 is thus

opened (Figure 2), then the in-series electrical lines 11 and 14 are opened and all the solenoids SO_1, SO_2 and SO_3 are simultaneously de-energized to thus simultaneously close their associated liquid supply valves V_1, V_2 and V_3, such that no liquid at all will be fed into the mixing chamber of unit 31 and thus, none will thereafter be fed to the container "B". I have found that in addition to their pressure sensitive switches, "Shurflo" so-called high performance gas operated demand pumps work satisfactorily in my system.

In Figures 3A and 3B, I have shown the switches S1 and S_2 as directly connected by fluid lines 35a and 35b to the inlet side of regulators R_1 and R_2, as may occur if the fluid lines 26a and 26b, that are connected to the switches, are of an extended length, such that the stabilizing units 25a and 25b may be omitted. Switches will be used even if the stabilizers are not. Also, the switches, as an alternative, can be mounted in the dispensing unit assembly or head 30 for providing further compactness.

Figure 6 shows another embodiment of my invention which can be retrofitted to many existing beverage dispensing systems with very little expense or effort. Many currently existing beverage dispensing systems can only handle one bag of syrup in combination with a base liquid such as water. In order to accommodate a two or more bag system (as disclosed in Figures 1-4) it would be necessary to run another delivery line tube from the second bag to the dispensing outlet. This would involve not only running the line itself but would also involve modifying the cold plate arrangement if such a system is used. Another problem would arise if there were only two valves in the dispensing head. This two valve

head would have to be replaced by a three valve head necessitating extra equipment and installation charges.

Figure 6 discloses a retrofit system for converting a one bag system into a two or more bag system. The two bags 98 and 99 are shown as component "A" and component "B". A tube 100 having quick disconnect 102 is attached to the connect head 104 of bag 98 (similar arrangement in Figure 1). As above, component "A" is delivered to the tube 100 by applying negative pressure from a pump 106 that is powered by CO_2 from tank 109 delivered through tube 107. Similarly, tube 110 having a quick disconnect 112 is attached to the connect head 114 of bag 99. Component "B" is delivered to the tube 110 by applying negative pressure from a pump 116 that is powered by CO_2 from tank 109 delivered through tube 117.

Each separate component is than transported through respective pacifier means 120 and 122 as was disclosed above. Pacifier means 120 and 122 have associated pressure switches 124 and 126. Component "A" is then transported through tube 127 and component "B" is transported through tube 128 to a mounting block 129 to which blending unit 130 is connected. The blending unit 130 is a modified dispensing head such as one made by the Cornelius Company which receives component "A" and component "B" and dispenses the mixed component "A" and component "B" into a blending cup 132. The blending unit 130 will be discussed in detail below with reference to Figures 7-9.

The blended component "A" and component "B" is then transported in tube 140 past pressure switch 142 by pump 144. Pump 144 increases pressure in tube 146. Pump 144 is powered by CO_2 gas from tank 109. A pacifying unit, such as that disclosed in Figure 5 above, can be

placed on tube 140 between blending cup 132 and pump 144, if desired. The blended component "A" and component "B" is then transported by tube 146 to one of several dispensing heads such as dispensing head 147 where it is mixed with water from tube 148 (either carbonated or non-carbonated) for dispensing into a container 149. This dispensing head is a standard solenoid controlled valve model such as Model No. SF 1 manufactured by the Cornelius Company.

Figure 6A shows a schematic diagram of the system of Figure 6. Electric current is shown applied from a suitable source at lines L_1 and L_2. Pressure switch 142 is connected onto line L_1. Line L_2 from the source is connected to pressure switch 124 and pressure switch 126. The line L_3 then is connected to the solenoid operated valves SO_5 and V_5 and SO_6 and V_6 in the blending unit 130. Line L_4 leads out from the solenoid valve regulators. It will be appreciated that the solenoid valves have associated regulators R_5 and R_6. (These will be described with different reference characters and in more detail hereinbelow with respect to Figures 7-9.) The pressure switches 142 and 124 and 126 are thus electrically connected in series. The operation of the system will be explained below after description of the blending unit and cup shown in Figures 7-9.

Referring more particularly to Figures 7-9, the blending unit 130 and associated blending cup 132 will be described. This blending unit 130 is a modified version of the Gemini unit manufactured by the Cornelius Company.

The blending unit 130 is capable of receiving three different components. For purposes of the system of Figure 6, the blending unit 132 will only receive two components, components "A" and "B". As will be explained

below, a third component can be received by the blending unit 132. This component can be another fluid ingredient or can be water. For purposes of explanation of Figure 6, only a two component mixture will be described.

As is best seen in Figure 9, there are provided three component receiving inlets 150, 151 and 152. Component "A" will be received from mounting block 129 (Figure 6) into inlet 150 and component "B" will be received from mounting block 129 into inlet 151. A third component, such as water, can be received by inlet 152. This will be explained hereinbelow with respect to the embodiment of Figure 10. Inlets 150 and 151 have a closed end wall 154 and 155 having a smaller diameter opening 156 and 157 opening through which the components flow. Prong 158 is used to mount blending unit 130 onto mounting block 129.

Once the components flow through the openings 156 and 157, the flow is then regulated by separate regulator means 160 and 161. Regulator 162 is also provided to receive a third component. Regulator 160 controls component "A" flow; regulator 161 controls component "B" flow; and regulator 162 controls the third component flow if a third component is introduced into blending unit 130. These regulators are similar in design so only one will be described.

Regulator 161 is shown on Figure 7 in exploded and partially cross-sectional form. The regulator 161 consists of a regulator housing 170, a regulator sleeve 171 which surrounds a regulator piston 172 and an adjustment means 173. The adjustment means 173 consists of a spring 174 which fits inside the piston 172 and which is biased against the bottom portion 175 of the adjustment screw 178. The top portion 175 has a base section 176 and

a cap section 177. The cap section 177 and base section 176 receives the adjustment screw 178. The base section 176 has an associated O-ring 179.

The piston 172 is bevelled at its lower section 180 and also has an orifice 181 in its lower base wall 182. The piston 172 also has an annular groove 183. The sleeve 171 has a series of holes 184 around its upper section 185. The bottom section 186 of the housing 170 includes an O-ring 187 (Figure 8).

It will be appreciated that the flow of liquid ingredient through the regulator 161 will be as follows. Liquid ingredient flows through inlet 151 and through opening 157 into housing 170 and up through orifice 181 of piston 172 and then through holes 184 of sleeve 171. The liquid ingredient then flows out of the regulator 161 through passage 197.

The regulator means 161 controls the flow of component "B" by two separate methods. The first method is by the size of orifice 181. The larger the orifice 181, the more component "B" flowing through the blending cup 132. The second method is by adjusting the adjustment screw 178 to force the spring 174 against the piston 172. This adjusts the position of the piston 172 within the sleeve 171, so as to also control flow of component "B". Thus, it will be appreciated that by controlling the flow of the components, any mixture of component "A"/component "B"/water can be achieved.

The flow of component "B" through the entire blending unit 130 is as follows. The component "B" flows through tube 27 to the inlet 151 and then through opening 157. It flows through section 196 of the housing 171. Depending on the size of the orifice 181 and the position of the piston, a desired amount of component "B" is

allowed to flow past the regulator 161 into passage 197 of the blending unit 130.

Once the components flow past the regulators, they then flow to the solenoid-controlled valves 200, 201 and 202. These valves are the same as were described above. The valves 200, 201 and 202 are either opened or closed to allow fluid flow or to stop fluid flow, respectively. Once the components are past the valves 200, 201 and 202, they are directed through section 211 for valve 201 (Figure 7) and into a baffle and check valve means 220. Referring particularly to Figure 9, this baffle and check valve means 220 is adapted to fit inside the blending cup 132. The baffle and check valve means 220 has two prongs 221 and 222 which receive the respective components "A" and "B" and which are adapted to fit into holes 221a and 221b in the lower section of the frame 224 of the blending unit 130. The prongs 221 and 222 have associated O-rings 225 and 226. The prongs 221 and 222 connect to dispensing fittings 230 and 231 respectively. These fittings have contained therein duck bill check valves 232 and 233. If desired, the duck bill check valves can be replaced with ball type check valves. It will be further appreciated that the duck bill or ball type check valves can be built into the baffle and check valve means 220.

The components then flow from tubes 230 and 231 into the blending cup 132. The blending cup 132 has an associated fitting 240 which connects the blending cup 132 with tube 140.

Referring more particularly to Figure 6, in operation, component "A" and component "B" are drawn from bags 98 and 99 into the blending unit 130. The regulators 160 and 161 control the amount of the two components. It

will be appreciated that any mixture ratio can be obtained by varying the size of the orifices in the pistons and/or adjusting the adjustment means as was discussed above. The blended component "A" and component "B" emerge from the blending unit 130, blending cup 132, into tube 140 through pressure switch 142. The blended component flows through tube 140 through pump 144 and then to tube 146 and dispensing head 147 to be mixed with water from hose 148 to provide a suitable beverage into container 149.

When a container 149 is placed under the dispensing head 147 for receiving product, the user presses against a dispense lever (not shown). This will drop pressure in line 146 which will turn on pump 144 which will decrease pressure in switch 142. As can be seen in Figure 6A, this switch 142 is designed so that it is normally open and closes only when there is a demand for a drink at the dispensing head 147. The closing of switch 142 provides power to switches 124 and 126. This in turn energizes the solenoids 200 and 201 in the blending unit 130 which opens the valves allowing component "A" and component "B" to flow into and through blending unit 130.

In operation, as with the system in Figures 1-4, it may be that one component becomes exhausted. If, for example, component "A" is exhausted, switch 124 will open. This in turn will de-energize both solenoids 200 and 201 in blending unit 130, thus closing the valves and preventing the flow of component "A" and component "B" into the blending cup 132. In this way, all flow is stopped once any of component "A" or "B" is exhausted. This will prevent the dispensing of a beverage that is missing any one or more of the particular components used to make a suitable beverage.

It will be appreciated that a pressure switch can also be used on the water line 148 which, when the water is shut off, will open thus de-energizing the solenoid-controlled valves for the blended component "A" and "B" and the water in dispensing head 147 to prevent beverages from being dispensed through dispensing head 147 when the water is shut off.

Dotted line 195 indicates the part of the existing one bag beverage system that would have to be modified in order to retrofit the two bag beverage system of the invention. A board or other cabinet can be used to mount the two pumps 106 and 116 pacifier/switch assembly and blending unit/switch assembly. The existing system would already have pump 144. Thus, all that would be necessary would be to provide those items in a back room in order to blend component "A" and "B" before reaching the dispensing head. This would save the problems mentioned with a total conversion system and could be done quickly and economically.

Figure 10 shows a further embodiment of the invention where the like parts to those of the embodiment shown in Figure 6 are given like reference characters. In the embodiment of Figure 10 components "A" and "B" as well as water are premixed in the blending unit. This system can be used when non-carbonated water is used as it is not recommended to flow carbonated water through the pump 144.

In this embodiment, the water enters the blending unit through tube 300 from a suitable source (not shown). The tube 300 will connect to mounting block 129 to inlet 152 (Figure 9) and will pass through regulator 162 and valve 202 to the blending cup 132. Tube 300 has an associated pressure switch 302, whose operation will be explained below. The fitting 220 must be modified to

contain three, as opposed to two prongs to receive not only component "A" and component "B", but also water. In addition, an extra tube, in addition to tube 230 and 231, having a duck bill or ball type check valves like check valves 232 and 233 must be provided. The three components are then deposited in the blending cup 132.

Referring to Figure 10A, a schematic diagram of the system is shown. As with the embodiment in Figure 6A, a suitable electric current is applied through lines L_1 and L_2. Line L_2 leads to pressure switches 124, 126 and 302, which are connected in series with the solenoid activated (SO_7, SO_8, SO_9) valves (V_7, V_8, V_9) with their associated regulators R_7, R_8 and R_9 by line L_3. Line L_1 is connected to pressure switch 142. Thus, all of the pressure switches are in series with all of the solenoid controlled valves.

As with the embodiment in Figure 6, when a container 149 is placed under the dispensing head 147 for receiving product, the user presses against a dispense lever. This will drop pressure in line 146 which will turn on pump 144 which will decrease pressure in switch 142. As can be seen in Figure 6A, this switch 142 is designed so that it is normally open and closes only when there is a demand for a drink at the dispensing head 147. The closing of switch 142 provides power to switches 124, 126 and 302. This in turn energizes the solenoids 200, 201 and 202 in the blending unit 130 which opens the valves allowing component "A", component "B" and water to flow into and through blending unit 130.

The operation of the embodiment in Figure 10 is similar to that of the embodiment in Figure 6. If, for example, component "A" is exhausted, switch 124 will open. This in turn will de-energize solenoids 200, 201

and thus closing the valves and preventing the flow of component "A", component "B" and water into the blending cup 132. In this way, all flow is stopped once any of component "A", component "B" or water is exhausted. This will prevent the dispensing of a beverage that is missing any one or more of the particular components used to make a suitable beverage.

Referring now to Figures 11-13, another embodiment of the invention will be described. In this embodiment, the liquid ingredients are supplied from reusable and refillable tanks, as opposed to the disposable bags used in the embodiments discussed above. This embodiment, as does the embodiment illustrated in Figures 6 and 6A describes how to convert an existing one liquid ingredient system into an at least two liquid ingredient system.

Referring particularly to Figure 11, two tanks 401 and 402 are shown as containing liquid ingredients component "A" and component "B", respectively. Component "A" can be a syrup and component "B" can be a sweetener, such as asparatame.

A CO_2 tank 404 delivers carbon dioxide pressure to the tanks 401 and 402 through lines 405 and 406, via inlet disconnects 407 and 408, respectively. The tanks 401 and 402 also have removable caps 409 and 410 which allow for refilling thereof.

Each tank 401 and 402 has a siphon tube 419 and 420. The siphon tubes 419 and 420 have openings 423 and 424 positioned on their lower ends through which the liquid ingredients are conveyed out of the tanks 401 and 402. Check valves 425 and 426 are provided at the lower end of the tube to resist flow of the liquid ingredients from the siphon tubes 419 and 420 back into the tanks 401

and 402. The bottom of the siphon tubes 419 and 420 are positioned about 1/8 to 1/2 inches from the bottom of the tanks 401 and 402 with about 1/4 inch being preferred.

The siphon tubes 419 and 420 are connected to component quick disconnects 429 and 430. An insulator 431 and 432 is positioned between the disconnects 429 and 430 and the top of the tanks 401 and 402. The purpose of these insulators 431 and 432 will be discussed below with respect to Figure 12. Connected to the disconnects 429 and 430 are tubes 435 and 436. Check valves 437 and 438 are placed in the tubes 435 and 436 to prevent flow of liquid ingredient back into tanks 401 and 402. These tubes convey the liquid ingredients into the blending unit 530. Blending unit 530 is similar in all respects to blending unit 130 described in Figures 6-9 above. The blended product flows into blending cup 532 and is delivered through line 540 past pressure switch 542 and to the dispensing head 547. The blended product is then mixed with a base liquid such as water (carbonated or non-carbonated) from a water source (not shown) transported through line 548 from the source to the dispensing head 547. Both components are then mixed in the proper ratio and dispensed into container 549.

Referring to Figure 12, the electrical schematic diagram of the system of Figure 11 is shown. Power at a desired voltage from an electrical power source is carried through lines 601 and 602 into a liquid level control 603. A liquid level control 603 is a standard item which senses the level of liquid in a tank. Such a liquid level control is made by SSAC Inc. of Baldwinsville, New York and is sold under the trade designation LLC1 Series.

Lead lines 605 and 606 are connected between terminals on the liquid level control 603 and the tank

401. Similarly, lead lines 607 and 608 are connected between terminals on the liquid level control 603 and tank 402. Lead line 605 is connected to quick disconnect 429 on tank 401 and lead line 606 can be connected to any other part of the tank 401. Lead line 607 is connected to quick disconnect 430 on tank 402 and lead line 608 can be connected to any part of the tank 402.

The liquid level control 603 operates as follows. As long as liquid remains in contact with the siphon tubes 419 and 420, an electrical circuit is completed which closes the relay of the liquid level control. The electrical circuit is completed by current flowing through the lead lines 605 and 607, through siphon tubes 419 and 420 and out into the liquid ingredient in the tank. Because lead lines 606 and 608 are in contact with the tanks, 401 and 402 respectively, the current will flow into the tank walls of tanks 401 and 402 and eventually to lead line 606 and 608 and back to the liquid level control 603 to complete the circuit. The quick disconnects 429 and 430 are insulated from the tank by insulators 431 and 432 so that a circuit can only be completed by flowing through the siphon tubes 419 and 420 and the liquid ingredient in the tank and then through lead lines 606 and 608, respectively.

As will be appreciated, if the liquid ingredient level in either tank 401 or 402 drops below the opening 423 or 424 in the siphon tubes 419 or 420, current can no longer flow through the liquid ingredient in the tank 401, thus breaking the completed circuit. At this point, the relay on the liquid level control 603 is energized and the circuit will be opened so that no power can flow from the power source to the solenoids SO_6 and SO_5 which control valves V_5 and V_6. This will close the valves V_5 and V_6

and thus no liquid ingredients will be dispensed from these valves V_5 and V_6.

Thus, the system operates as follows. When it is desired to dispense a beverage, a user activates a dispense lever (not shown) in dispensing head 547. This will drop pressure in line 540 which will decrease pressure in switch 542. The pressure switch 542 is designed so that it is normally open and closes only when there is a demand for a drink at the dispensing head 547. The closing of switch 542 provides power to the solenoids through line L_4 which opens the valves V_5 and V_6 thus allowing liquid ingredients from tanks 401 and 402 to flow into and through the blending unit 530 and eventually into container 549.

If the liquid ingredient in one or both of the tanks falls below the siphon tube opening, the relay on the liquid level control 603 will break the circuit supplying current to the solenoids SO_5 and SO_6. Solenoids SO_5 and SO_6 are connected in series so that both solenoids are de-energized when current is stopped. Thus, both valves V_5 and V_6 are closed so that the liquid ingredients from the tanks 401 and 402 are unable to flow to the blending unit 530 and thus to the container 549. This will prevent dispensing a beverage having one or both liquid ingredients missing therefrom.

Referring to Figure 13, instead of having two tanks 401 and 402, a split tank 700 having a divider wall 701 can be used. This tank 700 has two separate siphon tubes 702 and 703 with associated quick disconnects 704 and 705 which sandwich insulators 706 and 707. The tank 700 has two separate removable fill caps 710 and 711 as well as two CO_2 disconnects 712 and 713. If desired, instead of providing two separate CO_2 lines to service

disconnects 712 and 713, a manifold can be provided having dual connections for connecting both disconnects 712 and 713 yet having only one inlet for a CO_2 line.

The siphon tubes 702 and 703 have associated respective check valves 714 and 715. It will be appreciated that in this embodiment, lead lines from the liquid level control 603 are connected to disconnects 704 and 705 and only one other return lead line is needed (as opposed to a return lead line for each tank in the embodiment of Figure 11) as only one tank is used.

If desired, only one CO_2 disconnect can be provided. In this embodiment, a check valve is positioned at the top of the tank 700 between the two compartments formed by the divider wall 701. The check valve can be a duck bill or ball type check valve. The check valve will equalize pressure between the two compartments.

The liquid level control system for use with tanks of liquid ingredients can also be used with "premix" type system as was disclosed in Figures 10 and 10A. In the premix type system, the only modification would be to have the water line 548 go right into the blending unit 530 as opposed to being dispensed at the dispensing head.

In addition, the liquid level control system can be used independent of the blending cup 530. That is, the liquid ingredients can be directly transported from the tanks to a dispensing head including a dispensing valve therein, as was shown in Figures 1-5.

Whereas a particular embodiment of the invention has been described above, for purposes of illustration, it

will be evident to those skilled in the art that numerous variations of the details may be made without departing from the invention as defined in the appended claims.

WHAT IS CLAIMED IS:

1. A beverage dispensing system for mixing at least two liquid ingredients with a base liquid such as water in such a manner to assure a desired proportioning of said liquid ingredients and said base liquid in said beverage when dispensed, said system comprising:

means for separately delivering each said liquid ingredient and said base liquid to a dispensing outlet;

a pressure switch operatively associated with at least each said liquid ingredient delivering means;

said pressure switches being activated when fluid pressure in said respective liquid ingredient delivering means falls below a predetermined level;

said pressure switches all being electrically connected in series;

a valve connected to each delivering means for controlling the flow of said liquid ingredients and said base liquid to said dispensing outlet; and

all of said valves shutting off said respective liquid ingredient and base liquid fluid flows when any one of said pressure switches is activated.

2. The system of Claim 1, including

regulator means operatively associated with each valve for controlling the amount of fluid ingredients and base liquid flowing past said valve for dispensing through said dispensing outlet, whereby different mixtures of fluid ingredients and base liquid can be achieved for a desired beverage.

3. The system of Claim 2, wherein

said regulator means include: (i) a sleeve having a series of openings; (ii) a piston surrounded by said sleeve, said piston having an end wall defining an orifice; and (iii) adjustment means connected to said piston, whereby the amount of fluid ingredient or base fluid can be adjusted by varying said orifice size or adjusting said adjustment means or both.

4. The system of Claim 3, including

pacifying means connected to each fluid ingredient delivering means.

5. The system of Claim 4, wherein

said pacifying means include: (i) means defining a chamber for receiving said fluid ingredients; (ii) inlet portion means for introducing said fluid ingredients into said chamber; and (iii) pipe means disposed within said housing, said pipe means having a first portion defining at least one opening adapted to receive said fluid ingredients in said chamber and a second portion adapted to be connected to a liquid outlet into said delivering means.

6. The system of Claim 5, wherein

said pressure switch means is operatively associated with said pacifying means.

7. The system of Claim 6, including

liquid ingredient source means to supply liquid ingredient to each liquid ingredient delivering means and

base liquid source means to supply base liquid to each base liquid delivering means.

8. The system of Claim 7, including

solenoids operatively associated with each valve for electronically controlling each valve, said solenoids being energized by electrical current from a suitable source.

9. The system of Claim 8, including

pump means operatively associated with each liquid ingredient delivering means to draw said liquid ingredients from said liquid ingredient source means.

10. The system of Claim 9, wherein

said pump means are carbon dioxide gas or compressed air operated.

11. The system of Claim 9, wherein

said pump means are electrically operated.

12. The system of Claim 9, including

means for connecting said liquid ingredient source means to said liquid ingredient delivering means.

13. The system of Claim 1, including

a base liquid pressure switch operatively associated with said base liquid delivering means;

said base liquid pressure switch being activated when fluid pressure in said base liquid delivering means falls below a certain predetermined level; and

said base liquid pressure switch being electrically connected in series with all other said pressure switches such that when said base liquid pressure switch is activated, all of said valves shut off said respective liquid ingredient and base liquid fluid flows.

14. A method of dispensing a single beverage which is a mixture of at least two liquid ingredients and a base liquid such as water, in such a manner to assure a desired

proportioning of said liquid ingredients and said base liquid, said method comprising:

providing means for separately delivering each said liquid ingredient and said base liquid to a dispensing outlet;

providing a pressure switch operatively associated with at least each said liquid ingredient delivering means, said pressure switches all being electrically connected in series;

providing a valve connected to each delivering means; and

causing the supply of all of the liquid ingredients and the base liquid to be immediately and simultaneously stopped by said valves when the fluid pressure in said respective liquid ingredient delivering means falls below a predetermined level as sensed by said pressure switches.

15. The method of Claim 14, including

providing regulator means operatively associated with each valve means, said regulator means including: (i) a sleeve having a series of openings; (ii) a piston surrounded by said sleeve, said piston having an end wall defining an orifice; and (iii) adjustment means connected to said piston;

regulating the amount of fluid ingredients and base liquid flowing past said valve for dispensing through said dispensing outlet by varying the size of said orifice or adjusting said adjustment means or both.

16. The method of Claim 15, including

smoothing the fluid flow of said fluid ingredients by providing pacifying means.

17. The method of Claim 16, including

providing a pressure switch operatively associated with said base liquid delivering means.

18. A device for insuring a smooth and even flow of a liquid from a liquid source to a liquid outlet, said device comprising:

housing means defining a chamber for receiving said liquid;

inlet portion means for introducing said liquid into said chamber; and

pipe means disposed within said housing, said pipe means having a first portion defining at least one opening to receive said liquid in said chamber and a second portion connected to said liquid outlet, whereby any air in said liquid source would not enter said pipe means but would instead occupy the portion of the chamber not filled by said liquid thus insuring a smooth and even flow of said liquid from said liquid source to said liquid outlet.

19. The device of Claim 18, including

pressure switch means connected to said housing for determining whether said fluid is present in said chamber.

20. The device of Claim 18, wherein

said housing means is a generally vertically oriented cylinder and said pipe means first portion is disposed near the lower end of said housing and said pipe means second portion is disposed near the upper end of said housing.

21. The device of Claim 20, wherein

said inlet portion means is disposed on the lower end of said housing.

22. The device of Claim 21, wherein

said liquid outlet includes a fitting which receives a tube through which said liquid is transported away from said device.

23. A device for converting an existing one liquid ingredient beverage system to an at least two liquid ingredient beverage system, said existing system including a dispensing head which dispenses said liquid ingredient and a base liquid, such as water, said dispensing head having a first valve controlling the fluid flow of said liquid ingredient and a second valve controlling the fluid flow of said base liquid, said device comprising:

means for separately delivering each liquid ingredient from at least two separate liquid ingredient sources;

a pressure switch operatively associated with each liquid ingredient delivering means;

said pressure switches being activated when said fluid pressure in said respective liquid ingredient delivering means falls below a predetermined level;

a blending unit for receiving said liquid ingredients from said separate liquid ingredient delivering means to form a single blended liquid ingredient;

said blending unit including a separate valve connected to each liquid ingredient delivering means for controlling the fluid flow of said separate liquid ingredients;

a controller pressure switch connected between said blending unit and said dispensing head which receives electric current from an outside source;

said controller pressure switch being activated when it is desired to dispense a beverage from said dispensing head;

said controller pressure switch being electrically connected in series with said liquid ingredient delivering means pressure switches so that when said controller pressure switch is activated, electric current can flow to said liquid ingredient delivering means pressure switches;

all of said valves shutting off said respective liquid ingredient fluid flows when any of said liquid ingredient delivering means pressure switches is activated; and

an outlet tube connected to said blending unit through which said single blended liquid ingredient is transported away from said blending unit to said dispensing head.

24. The device of Claim 23, including

regulator means operatively associated with each blending unit valve for controlling the amount of fluid ingredients flowing into said outlet line, whereby different mixtures of fluid ingredients can be achieved in said single blended liquid ingredient.

25. The device of Claim 24, wherein

said regulator means include: (i) a sleeve having a series of openings; (ii) a piston surrounded by said sleeve, said piston having an end wall defining an orifice; and (iii) adjustment means connected to said piston, whereby the amount of fluid ingredients flowing into said outlet line is regulated by varying the size of said orifice or adjusting the adjustment means or both.

26. The system of Claim 25, including pacifying means connected to each fluid ingredient delivering means.

27. The system of Claim 26, wherein said pacifying means include: (i) means defining a chamber for receiving said fluid ingredients; (ii) inlet portion means for introducing said fluid ingredients into said chamber; and (iii) pipe means disposed within said housing, said pipe means having a first portion defining at least one opening adapted to receive said fluid ingredients in said chamber and a second portion adapted to be connected to a liquid outlet into said delivering means.

28. The system of Claim 27, wherein said liquid ingredient delivering means pressure switch is operatively associated with said pacifying means.

29. The device of Claim 28, including solenoids operatively associated with each valve for electronically controlling each valve.

30. The system of Claim 29, including pump means operatively associated with each liquid ingredient delivering means to draw said liquid ingredients from said liquid ingredient source means.

31. The system of Claim 30, wherein said pump means are carbon dioxide or compressed gas operated.

32. The system of Claim 30, wherein said pump means are electrically operated.

33. The system of Claim 23, including means for delivering said base liquid to said dispensing head;

a base liquid pressure switch operatively associated with said base liquid delivering means;

said base liquid pressure switch being activated when fluid pressure in said base liquid delivering means falls below a certain predetermined level; and

said base liquid pressure switch being electrically connected in series with said controller pressure switch and all other said liquid ingredient delivering means pressure switches such that when said base liquid pressure switch is activated; said first and second valves shut off said respective fluid ingredient and base liquid fluid flows.

34. A device for converting an existing one liquid ingredient beverage system to an at least two liquid ingredient beverage system, said existing system including a dispensing head which dispenses said liquid ingredient and a base liquid, such as water, said dispensing head having a valve controlling the fluid flow of said liquid ingredient and said base liquid, said device comprising:

means for separately delivering each liquid ingredient from at least two separate liquid ingredient sources;

means for separately delivering said base liquid from a base liquid source;

a pressure switch operatively associated with each liquid ingredient delivering means;

said pressure switches being activated when said fluid pressure in said respective liquid ingredient delivering means falls below a predetermined level;

a blending unit for receiving said liquid ingredients from said separate liquid ingredient

delivering means and from said base delivering means to form said beverage;

said blending unit including a separate valve connected to each liquid ingredient delivering means and said base liquid delivering means for controlling the fluid flow of said beverage liquid ingredients to said blending unit;

a controller pressure switch connected between said blending unit and said dispensing head which receives electric current from an outside source;

said controller pressure switch being activated when it is desired to dispense a beverage from said dispensing head;

said controller pressure switch being electrically connected in series with said liquid ingredient delivering means pressure switches so that when said controller pressure switch is activated, electric current can flow to said liquid ingredient delivering means pressure switches;

all of said valves shutting off said respective liquid ingredient fluid flows when any of said pressure switches is activated; and

an outlet tube connected to said blending unit through which said beverage is transported away from said blending unit to said dispensing head.

35. The device of Claim 34, including

regulator means operatively associated with each blending unit valve for controlling the amount of fluid ingredients and base liquid flowing into said outlet line, whereby different mixtures of beverages can be achieved.

36. The device of Claim 35, wherein said regulator means include: (i) a sleeve having a series of openings; (ii) a piston surrounded by said sleeve, said piston having an end wall defining an orifice; and (iii) adjustment means connected to said piston, whereby the amount of fluid ingredients flowing into said outlet line is regulated by varying the size of said orifice or adjusting the adjustment means or both.

37. The system of Claim 36, including pacifying means connected to each fluid ingredient delivering means.

38. The system of Claim 37, wherein said pacifying means include: (i) means defining a chamber for receiving said fluid ingredients; (ii) inlet portion means for introducing said fluid ingredients into said chamber; and (iii) pipe means disposed within said housing, said pipe means having a first portion defining at least one opening adapted to receive said fluid ingredients in said chamber and a second portion adapted to be connected to a liquid outlet into said delivering means.

39. The system of Claim 38, wherein said liquid ingredient delivering means pressure switch is operatively associated with said pacifying means.

40. The device of Claim 39, including solenoids operatively associated with each valve for electronically controlling each valve.

41. The system of Claim 40, including pump means operatively associated with each liquid ingredient delivering means to draw said liquid ingredients from said liquid ingredient source means.

42. The system of Claim 41, wherein

said pump means are carbon dioxide or compressed gas operated.

43. The system of Claim 41, wherein

said pump means are electrically operated.

44. The system of Claim 34, including

a base liquid pressure switch operatively associated with said base liquid delivering means;

said base liquid pressure switch being activated when fluid pressure in said base liquid delivering means falls below a certain predetermined level; and

said base liquid pressure switch being electrically connected in series with said controller pressure switch and all other said liquid ingredient delivering means pressure switches such that when said base liquid pressure switch is activated, said first and second valves shut off said respective fluid ingredient and base liquid fluid flows.

45. A beverage dispensing system for mixing at least two liquid ingredients from liquid ingredient sources with a base liquid, such as water, from a base liquid source in such a manner to assure a desired proportioning of said liquid ingredients and said base liquid in said beverage when dispensed, said system comprising:

means for separately delivering each said liquid ingredient from said liquid ingredient sources and said base liquid from said base liquid source to a dispensing outlet;

liquid level control means connected to each said liquid ingredient source for determining the amount of liquid ingredient in each said liquid ingredient

source, said liquid level control means being activated when said liquid ingredient in any liquid ingredient sources falls below a predetermined level;

a solenoid-controlled valve connected to each delivering means for controlling the flow of said liquid ingredients and said base liquid to said dispensing outlet;

said liquid level control means being electrically connected in series to each said solenoid-controlled valve; and

all of said valves shutting off said respective liquid ingredient and base liquid fluid flows when said liquid level control means is activated.

46. The system of Claim 45, including

regulator means operatively associated with each valve for controlling the amount of fluid ingredients and base liquid flowing past said valve for dispensing through said dispensing outlet, whereby different mixtures of fluid ingredients and base liquid can be achieved for a desired beverage.

47. The system of Claim 46, wherein

said regulator means include: (i) a sleeve having a series of openings; (ii) a piston surrounded by said sleeve, said piston having an end wall defining an orifice; and (iii) adjustment means connected to said piston, whereby the amount of fluid ingredient or base fluid can adjusted by varying said orifice size or adjusting said adjustment means or both.

48. The system of Claim 47, wherein

said liquid ingredient sources are at least two separate tanks which each contain said separate liquid ingredients.

49. The system of Claim 47, wherein

said liquid ingredient sources are one tank including a divider which defines separate compartments, said separate compartments each containing said separate liquid ingredients.

50. A device for converting an existing one liquid beverage system to an at least two liquid ingredient beverage system, said existing system including a dispensing head which dispenses said liquid ingredient from a single liquid ingredient source and a base liquid, such as water, from a base liquid source, said dispensing head having a first valve controlling the fluid flow of said liquid ingredient and a second valve controlling the fluid flow of said base liquid, said device comprising:

means for separately delivering each liquid ingredient from at least two liquid ingredient sources;

liquid level control means connected to each said liquid ingredient source for determining the amount of liquid ingredient in each liquid ingredient source, said liquid level control means being activated when said liquid ingredient in any of said liquid ingredient sources falls below a predetermined level;

a blending unit for receiving said liquid ingredients from said separate liquid ingredient delivering means to form a single blended liquid ingredient;

said blending unit including a separate valve connected to each liquid ingredient delivering means for controlling the fluid flow of said separate liquid ingredients;

a controller pressure switch connected between said blending unit and said dispensing head which receives electric current from an outside source;

said controller pressure switch being activated when it is desired to dispense a beverage from said dispensing head;

said controller pressure switch being electrically connected in series with said liquid level control means so that when said controller pressure switch is activated, electric current can flow to said liquid level control means;

all of said valves shutting off said respective liquid ingredient fluid flows when said liquid level control means is activated; and

an outlet tube connected to said blending unit through which said single blended liquid ingredient is transported away from said blending unit to said dispensing head.

51. The device of Claim 50, including

regulator means operatively associated with each blending unit valve for controlling the amount of fluid ingredients flowing into said outlet line, whereby different mixtures of fluid ingredients can be achieved in said single blended liquid ingredient.

52. The device of Claim 51, wherein

said regulator means include: (i) a sleeve having a series of openings; (ii) a piston surrounded by said sleeve, said piston having an end wall defining an orifice; and (iii) adjustment means connected to said piston, whereby the amount of fluid ingredients flowing into said outlet line is regulated by varying the size of said orifice or adjusting the adjustment means or both.

53. The system of Claim 50, wherein

said liquid ingredient sources are at least two separate tanks which each contain said separate liquid ingredients.

54. The system of Claim 50, wherein said liquid ingredient sources are one tank including a divider which defines separate compartments, said separate compartments each containing said separate liquid ingredients.

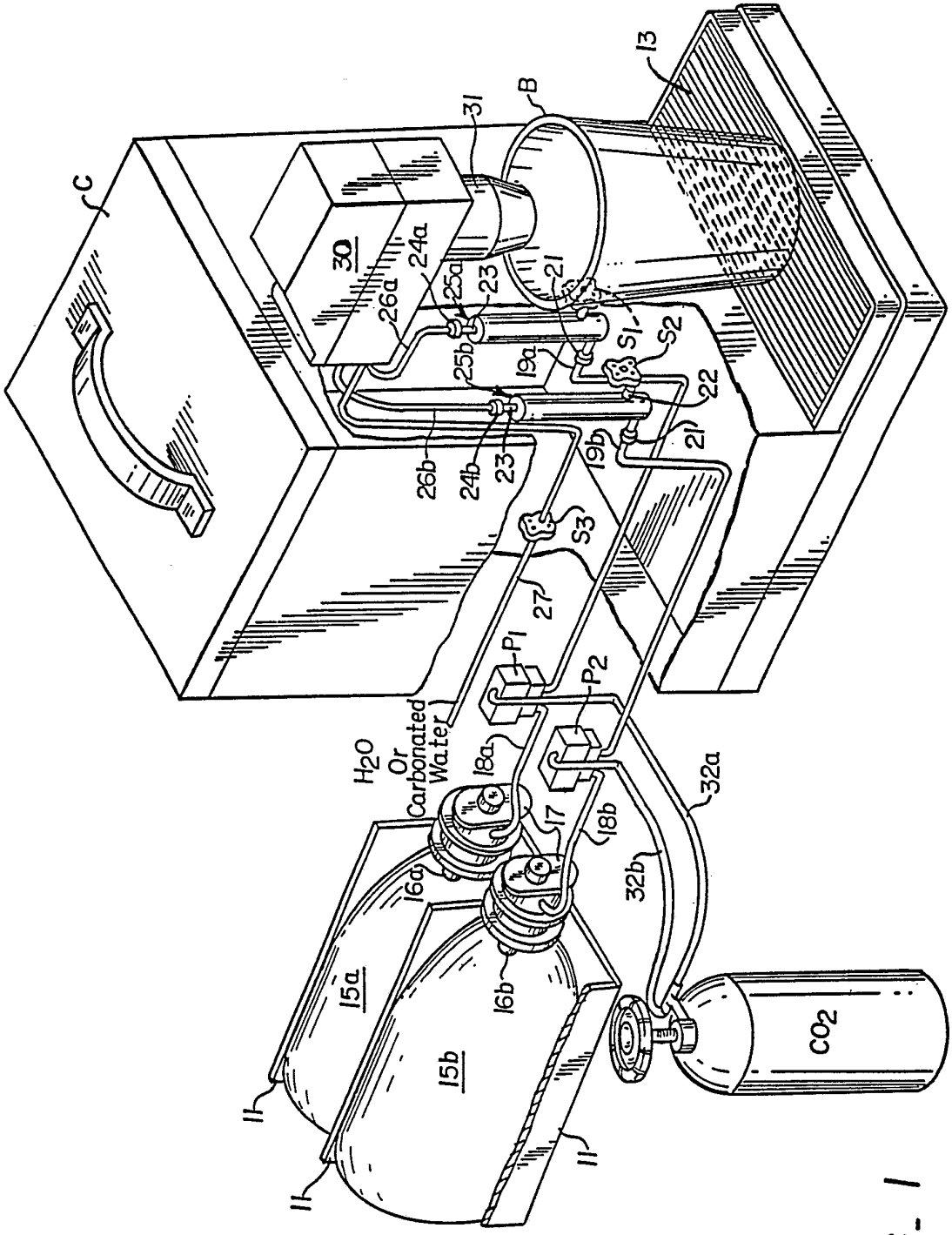
C
13
B
31
30
24a
25a
23
21
26a
S1
S2
25b
19a
22
19b
21
26b
24b
23
S3
27
P1
P2
H2O
Or
Carbonated
Water
18a
17
18b
32a
32b
16a
16b
15a
15b
11
11
11
CO2

FIG. 1

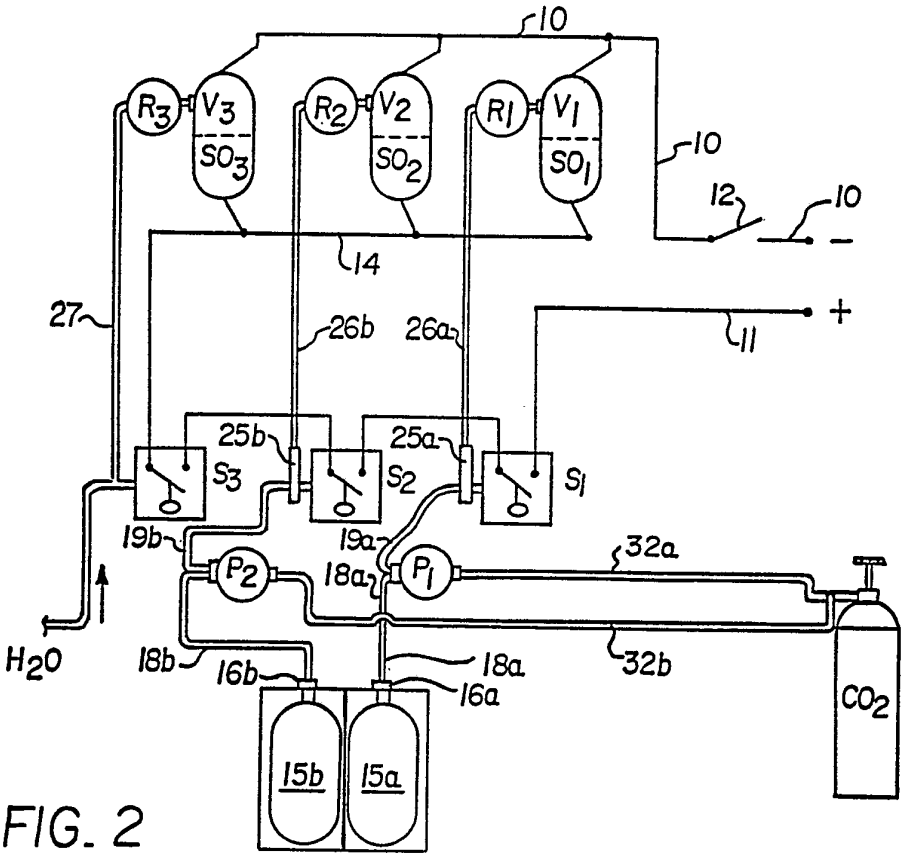
10
R3
V3
SO3
R2
V2
SO2
R1
V1
SO1
10
12
10
14
27
26b
26a
11
+
25b
25a
S3
S2
S1
19b
19a
P2
18a
P1
32a
H2O
18b
16b
18a
16a
32b
CO2
15b
15a

FIG. 2

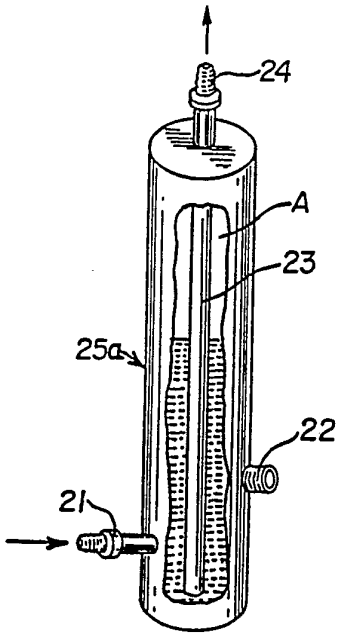
24
A
23
25a
22
21

FIG. 5

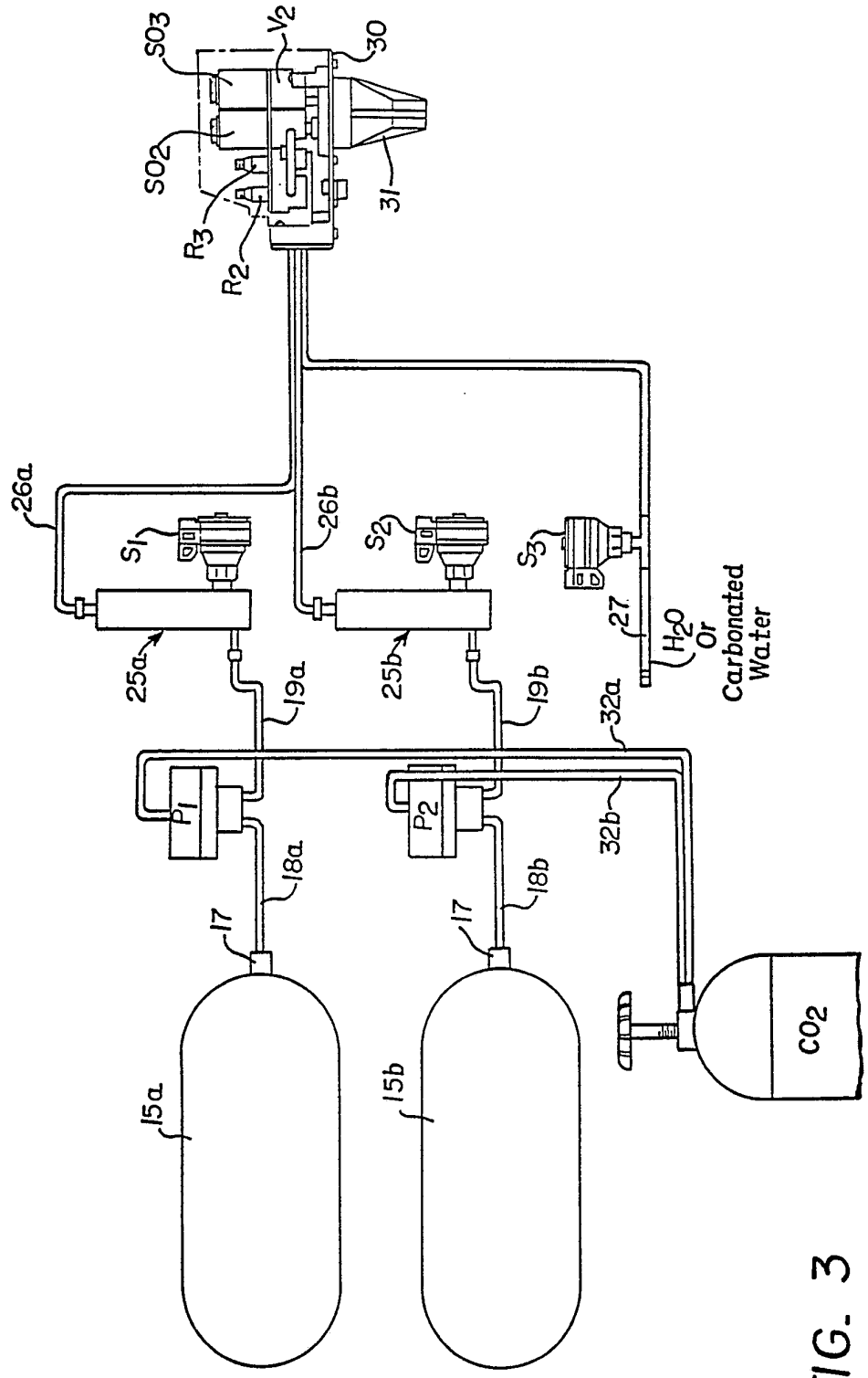
S03
V2
30
S02
31
R3
R2
26a
26b
S1
S2
S3
27
H2O
Or
Carbonated
Water
25a
19a
25b
19b
32a
P1
P2
32b
18a
18b
17
17
15a
15b
CO2

FIG. 3

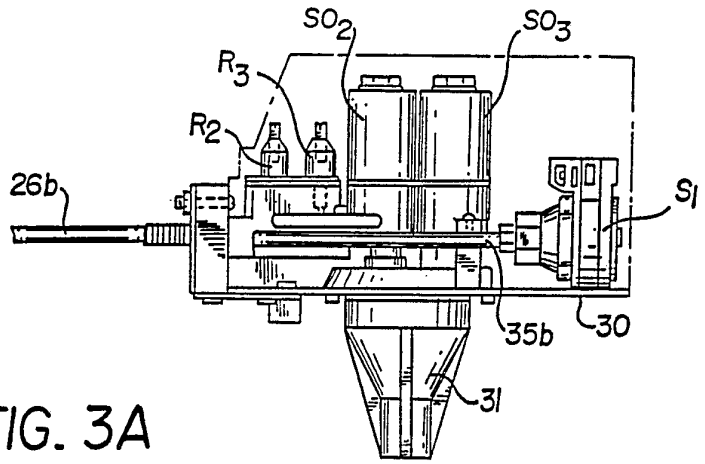
SO2
SO3
R3
R2
26b
S1
35b
30
31

FIG. 3A

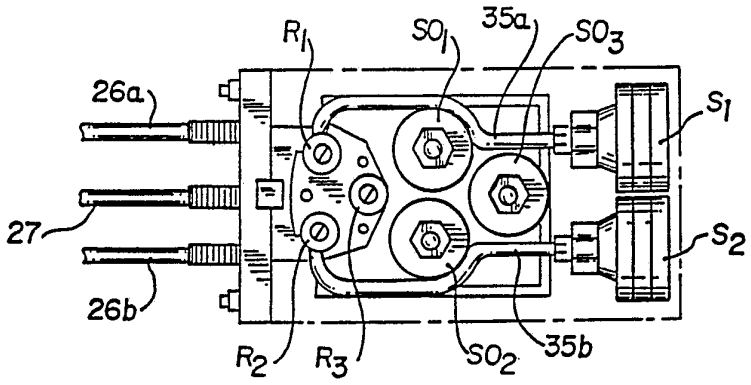
R1
SO1
35a
SO3
26a
S1
27
S2
26b
R2
R3
SO2
35b

FIG. 3B

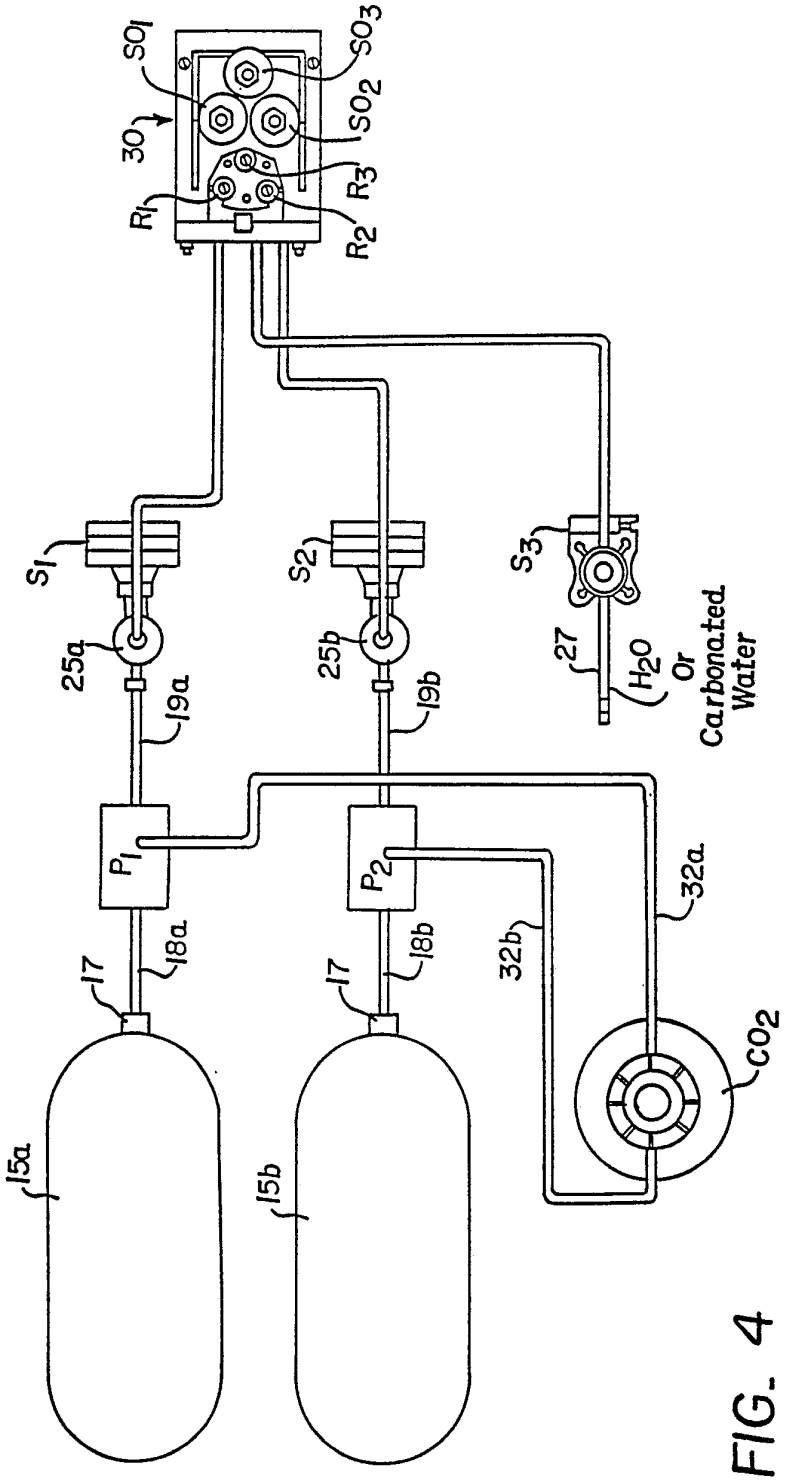
SO1
SO3
SO2
30
R1
R3
R2
S1
S2
S3
25a
25b
19a
19b
27
H2O
Or
Carbonated
Water
P1
P2
32a
17
18a
18b
32b
CO2
15a
15b

FIG. 4

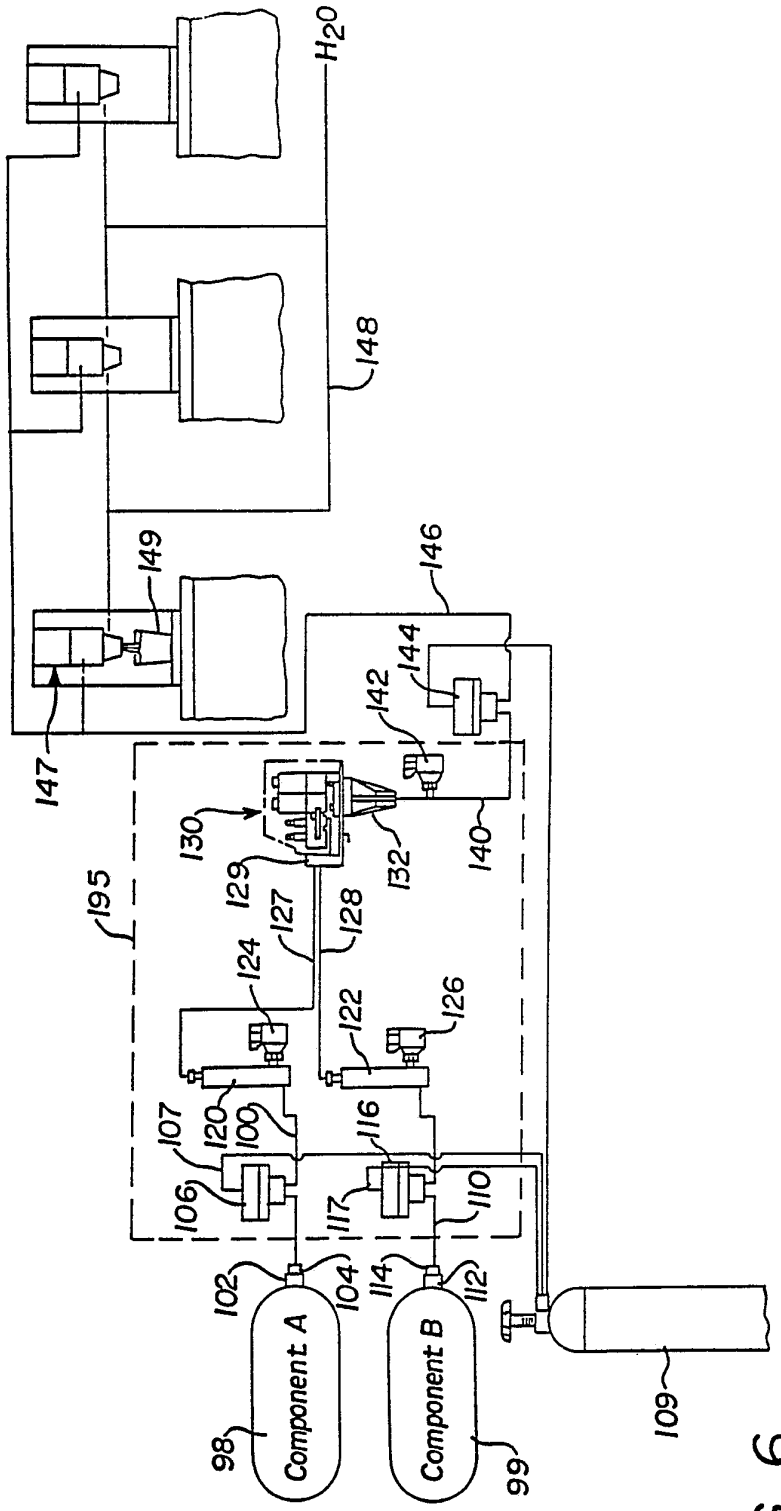
H20
148
149
146
147
144
142
130
132
140
129
128
127
195
124
122
126
107
120
100
116
106
117
110
102
104
114
112
Component A
Component B
98
99
109

FIG. 6

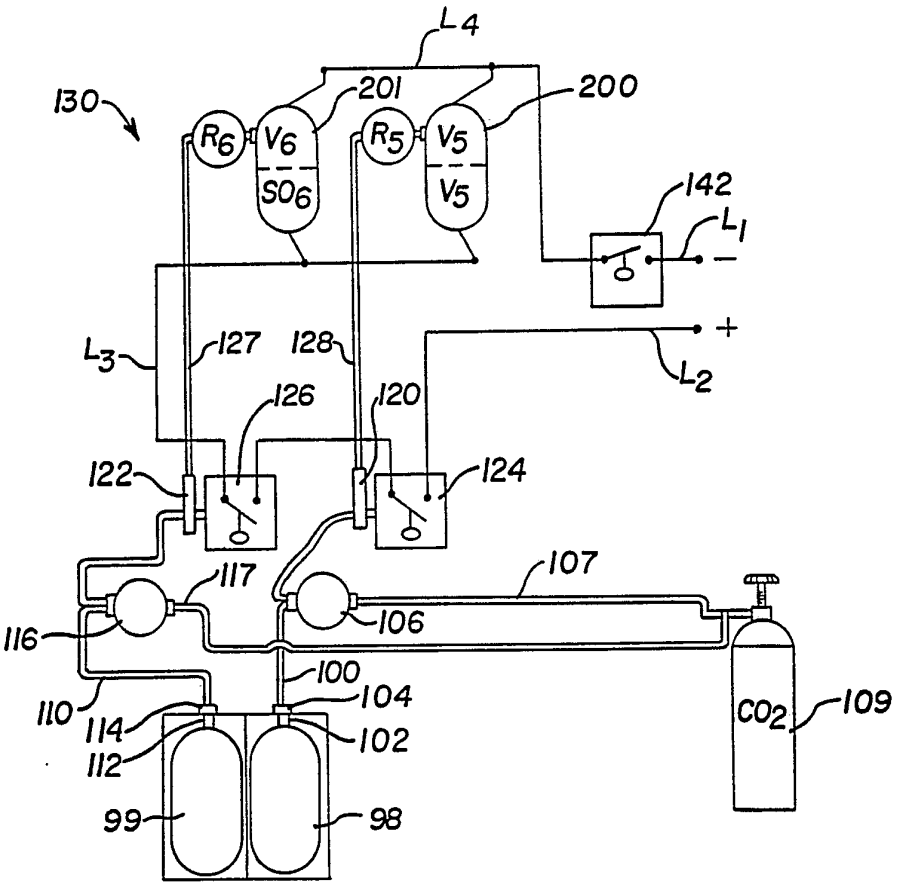
L4
130
201
200
R6
V6
SO6
R5
V5
V5
142
L1
−
+
L3
127
128
L2
126
120
122
124
107
117
106
116
100
104
110
114
102
112
99
98
CO2
109

FIG. 6A

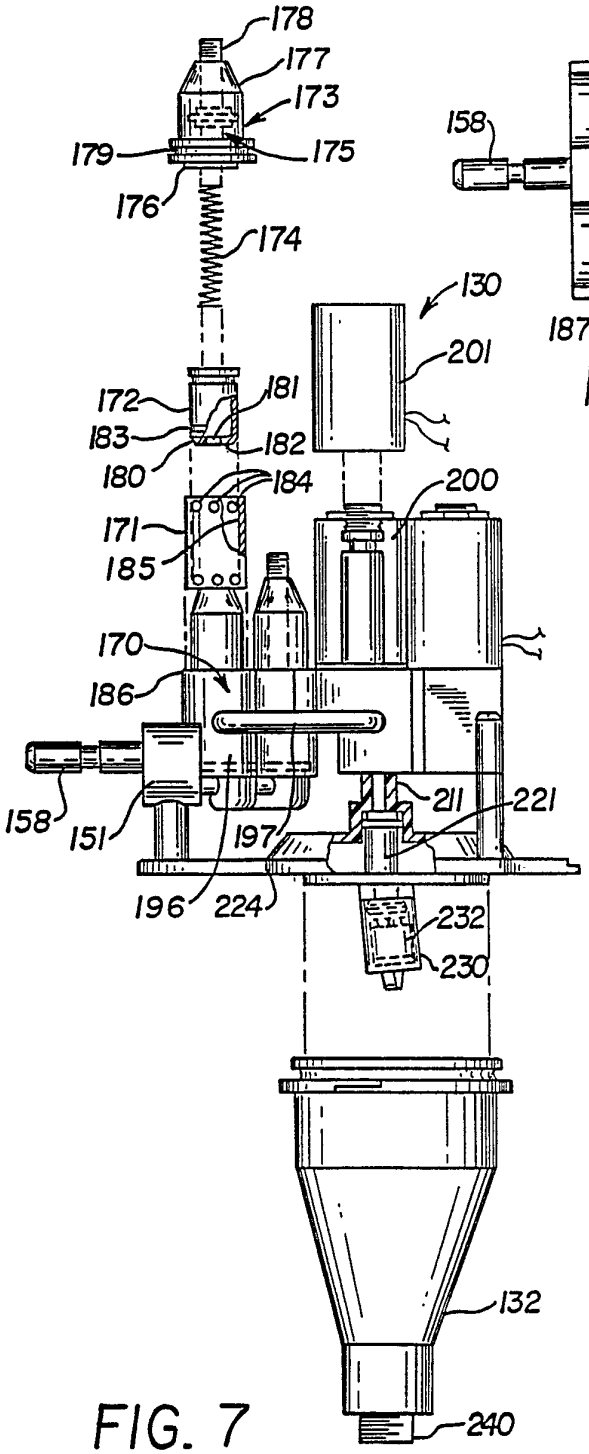

FIG. 7

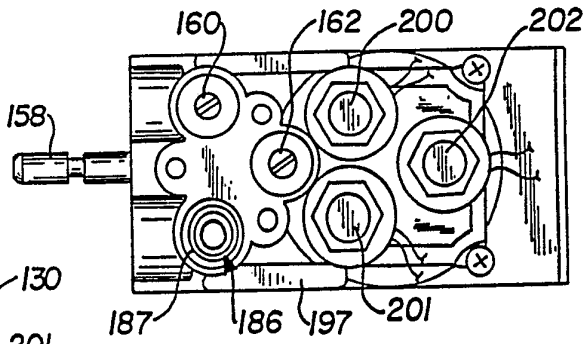

FIG. 8

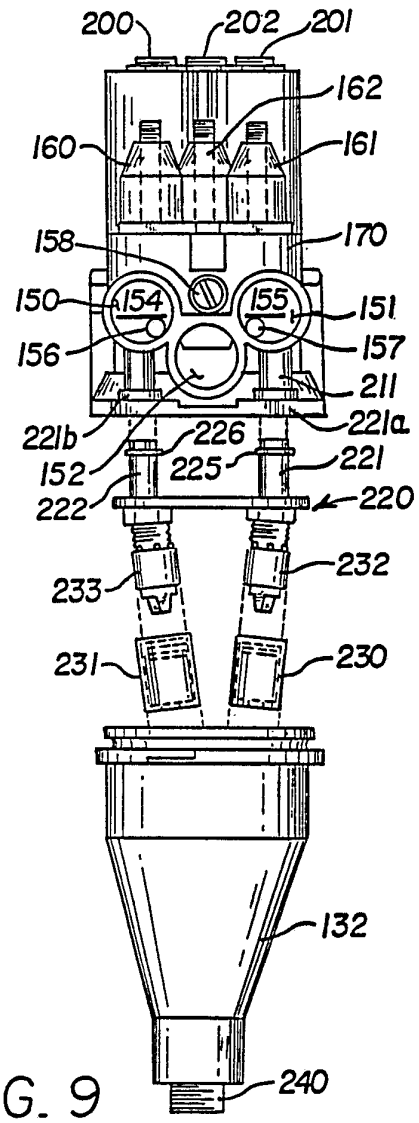

FIG. 9

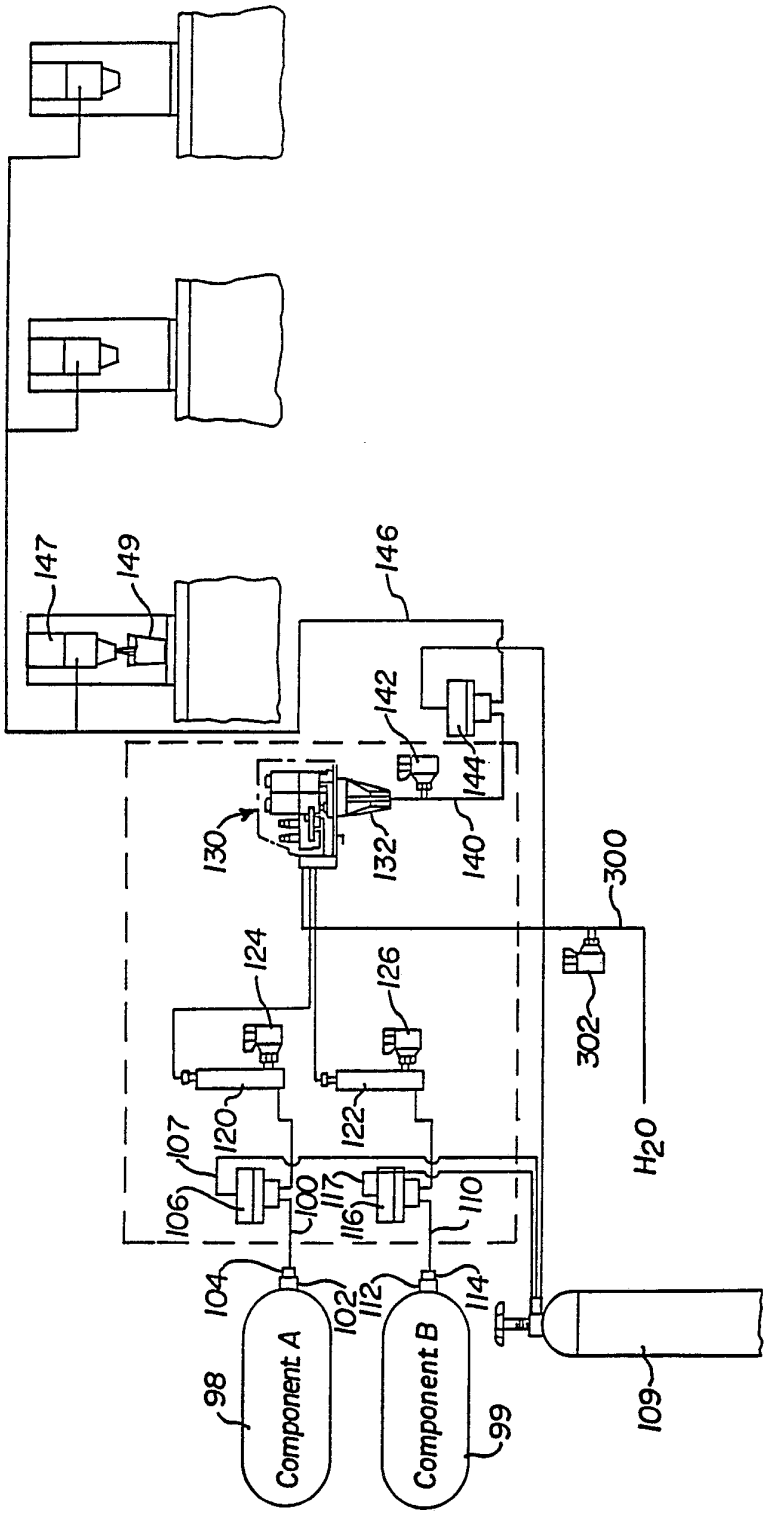
147
149
146
142
144
130
132
140
300
124
126
302
120
122
107
106
100
117
116
110
104
102
112
114
98
Component A
Component B
99
109
H2O

FIG. 10

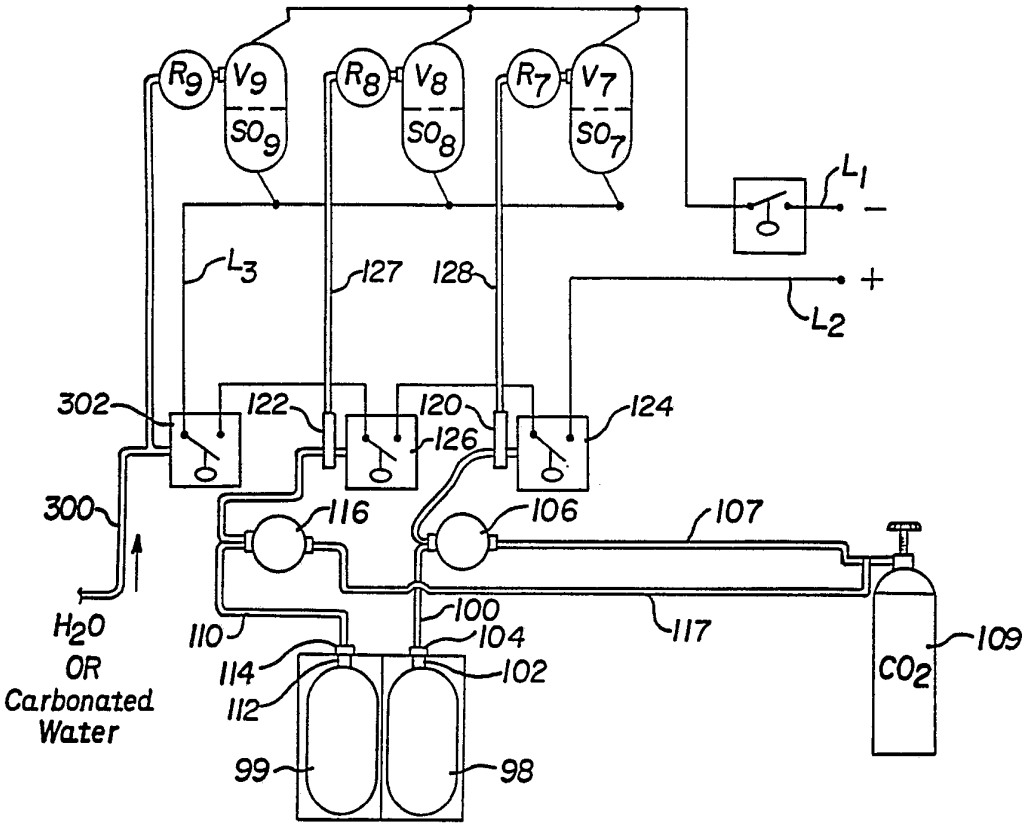
R9
V9
SO9
R8
V8
SO8
R7
V7
SO7
L1
−
+
L2
L3
127
128
302
122
120
126
124
300
116
106
107
H2O
OR
Carbonated
Water
110
100
104
117
109
CO2
114
102
112
99
98

FIG. 10A

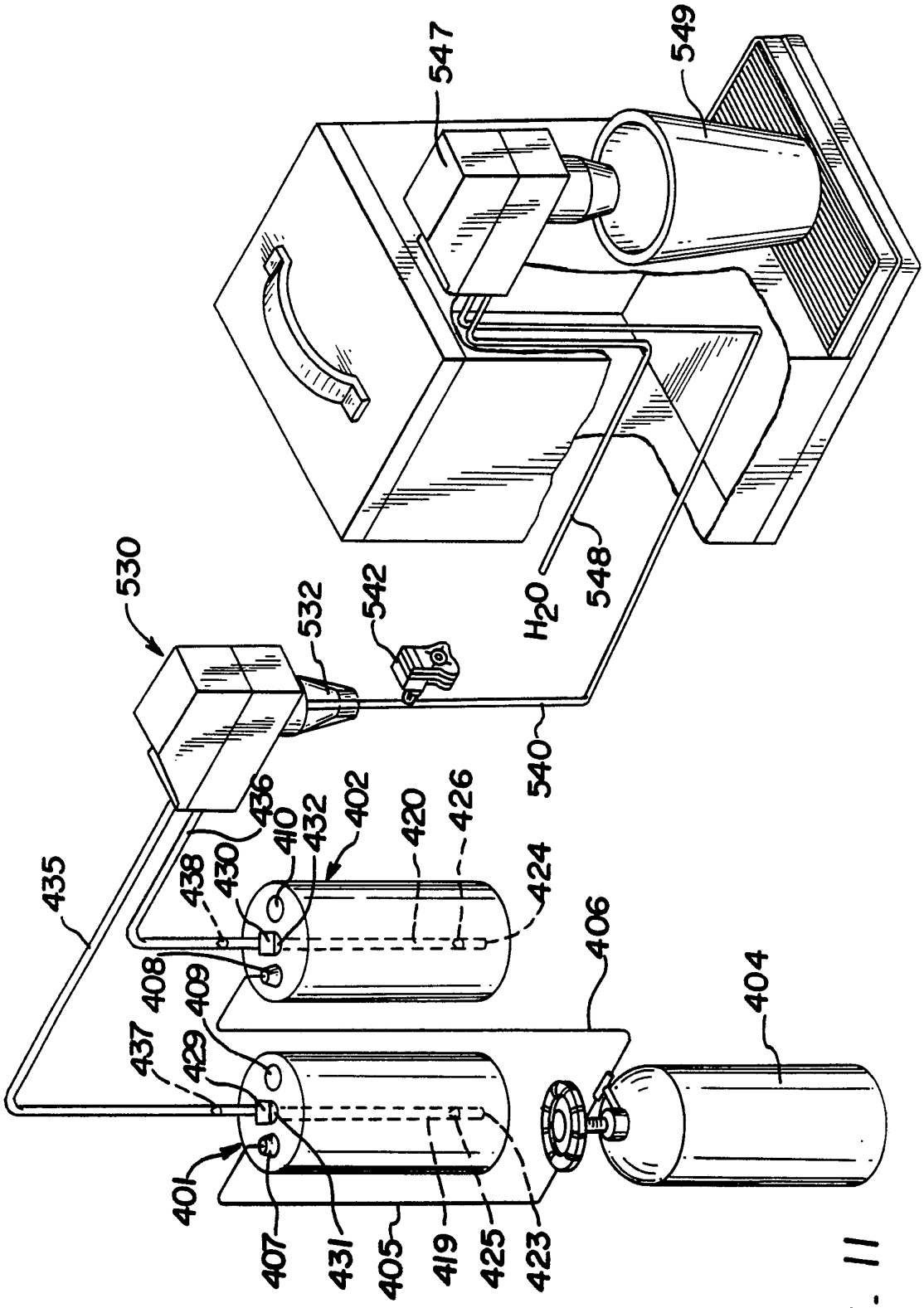
547
549
530
532
542
548
H_2O
540
436
410
432
402
420
426
438
430
424
435
406
404
408
409
437
429
401
407
431
405
419
425
423

FIG. 11

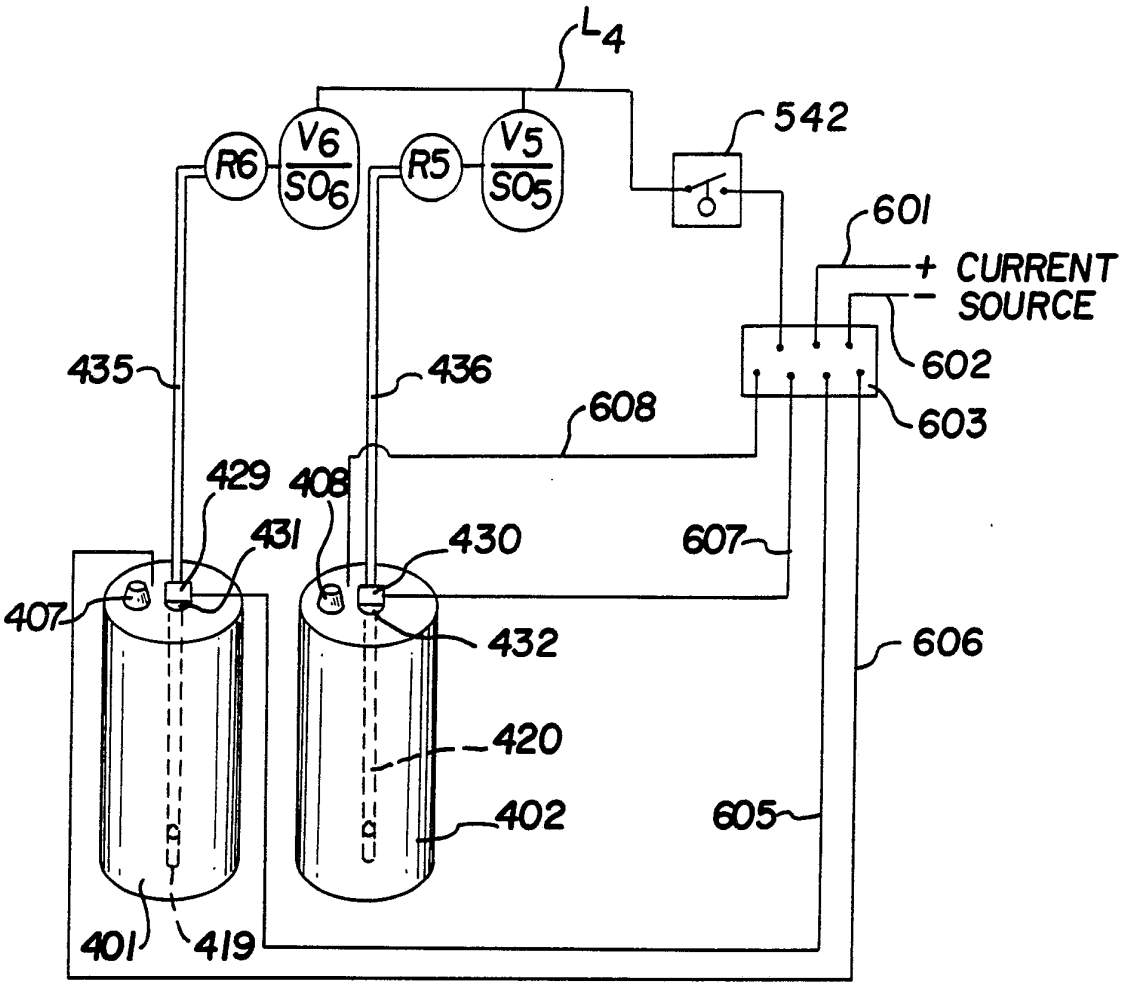
L4
542
R6
V6
SO6
R5
V5
SO5
601
+ CURRENT
- SOURCE
602
603
435
436
608
429
408
431
430
607
407
432
606
420
402
605
401
419

FIG. 12

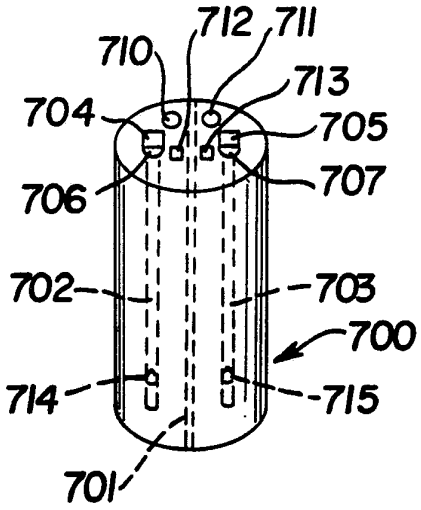
712
711
710
713
704
705
706
707
702
703
700
714
715
701

FIG. 13

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 91/03959

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 G07F13/06 ; B67D1/12

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	G07F ; B67D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
Y A	US,A,4 795 061 (B.M. PECKJIAN) January 3, 1989 see the whole document	1,7-9 12,14,45 11,13, 46,48

Y A	US,A,3 428 218 (F.V. COJA) February 18, 1969 see column 6, line 47 - column 7, line 67 see column 11, line 51 - column 12, line 17; figures 3-7	1,7-9 12,14,45 2,10,46, 48

A	US,A,3 583 601 (W.D. AYERS) June 8, 1971 see column 4, line 8 - column 6, line 25; figure 1	1,2,7-13

A	US,A,3 756 464 (N.L. FUQUA) September 4, 1973	

	-/--	

° Special categories of cited documents :[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
02 OCTOBER 1991	22. 10. 91
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	DAVID J.Y.H.

1

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	EP,A,0 105 526 (THE COCA-COLA COMPANY) April 18, 1984 ---	
A	US,A,4 433 795 (R.R. MAIEFSKI) February 28, 1984 ---	

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

US 9103959
SA 48457

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02/10/91

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-4795061	03-01-89	None		
US-A-3428218	18-02-69	None		
US-A-3583601	08-06-71	None		
US-A-3756464	04-09-73	CA-A-	968758	03-06-75
EP-A-0105526	18-04-84	US-A-	4544328	01-10-85
		AU-B-	574047	30-06-88
		AU-A-	1928083	12-04-84
		CA-A-	1216556	13-01-87
		DE-A-	3377488	01-09-88
		JP-A-	59084800	16-05-84
		SU-A-	1403988	15-06-88
US-A-4433795	28-02-84	None		