April 3, 1951 E. S. WEGMAN ET AL 2,547,423

DISPENSING APPARATUS FOR CARBONATED BEVERAGES

Filed Feb. 10, 1945 2 Sheets-Sheet 1

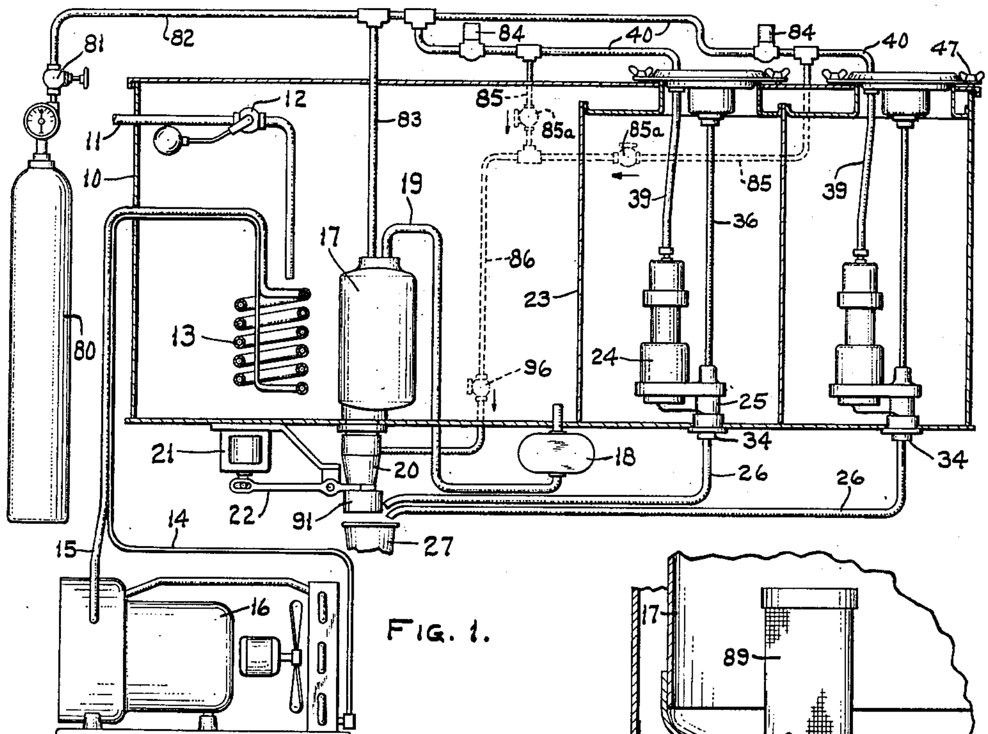

FIG. 1.

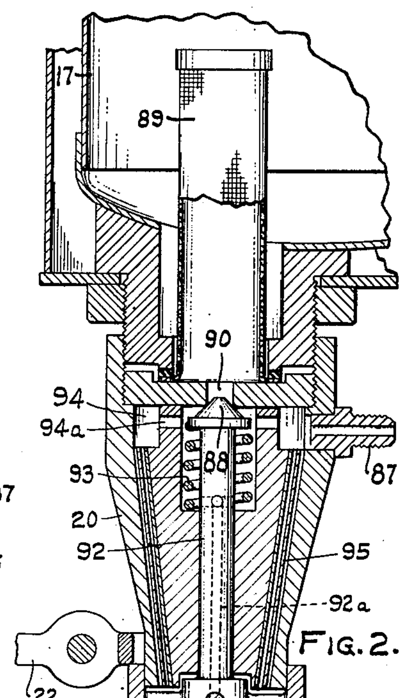

FIG. 2.

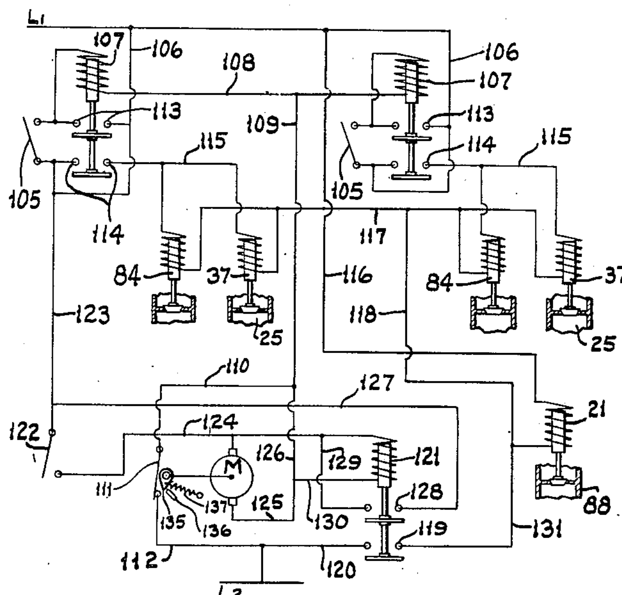

FIG. 3.

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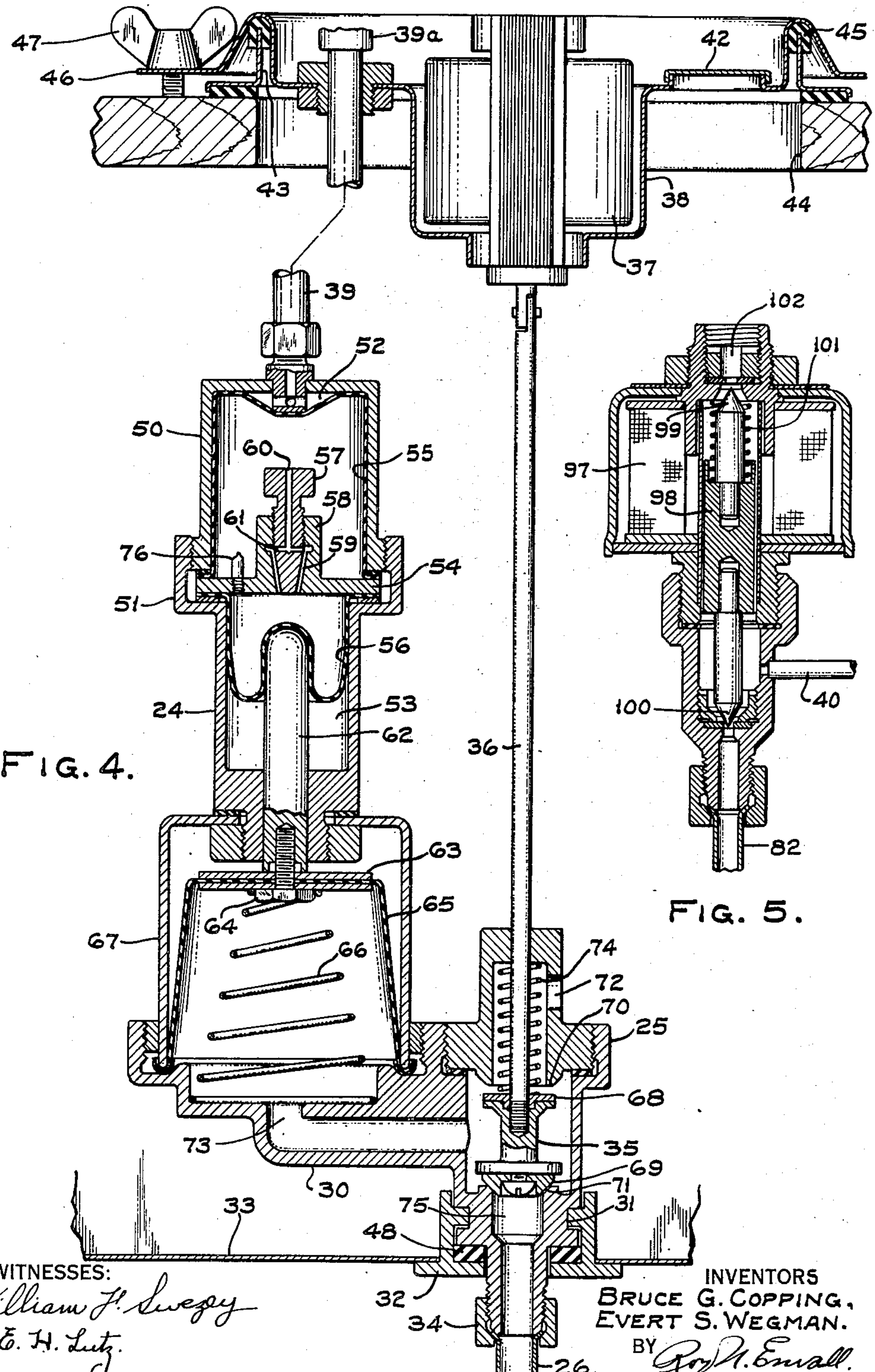

FIG. 4.

FIG. 5.

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Patented Apr. 3, 1951 2,547,423

UNITED STATES PATENT OFFICE

2,547,423

DISPENSING APPARATUS FOR CARBONATED BEVERAGES

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Application February 10, 1945, Serial No. 577,203

7 Claims. (Cl. 225—21)

1

This invention relates to beverage dispensing apparatus, and particularly to apparatus of the type wherein measured quantities of syrup and carbonated water are discharged into and mixed in a common container.

In certain aspects the invention is particularly applicable to that type of dispensing apparatus in which a carbonator is supplied as part of the apparatus for mixing carbon dioxide from a suitable container under pressure with water to be dispensed.

In the copending application of Bruce G. Copping, Serial No. 480,108, filed March 22, 1943, now Patent No. 2,495,201, January 24, 1950, for Automatic Valve for Dispensing and Proportioning Syrup and Carbonated Water, there is disclosed a dispensing apparatus in which the pressure of the carbonated water being dispensed is used to operate a syrup pump through the intermediary of a hydraulic metering device, so that syrup and water are dispensed in constant proportion to produce a uniform beverage at all times. The present invention is directed to the operation of a similar system of metered syrup pumping, but using as the energy source for the syrup pump the pressure, properly controlled, of the carbon dioxide supply for the carbonator. This has the advantage over the prior system in that the considerable waste of cold, carbonated water is eliminated. Such waste is particularly apparent when the dispensing apparatus is designed to selectively dispense one of several syrups, as the prior system discloses the operation of all the pumps when the carbonated water valve is opened even though only one syrup is actually dispensed.

The present invention provides for the selective operation of any one syrup pump in a multiple flavor system by the use of the available carbon dioxide although the invention is equally applicable to a single flavor system.

The invention further provides for the ready removal of the syrup pump and its associated parts from the syrup tank when cleaning, repair or adjustment are necessary.

These and other objects are effected by our invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a schematic representation of a beverage dispensing system embodying the invention;

Fig. 2 is a vertical section through the carbonated water dispensing nozzle;

Fig. 3 is a representative wiring diagram for a

2

multiple syrup dispensing system embodying the invention;

Fig. 4 is a vertical elevation largely in section showing details of the syrup pump construction and the manner of its removal from the syrup tank; and

Fig. 5 is a vertical section through a solenoid valve for controlling the flow of carbon dioxide to the syrup pump.

Referring to Fig. 1, a tank 10, preferably insulated, is provided to hold water to be refrigerated and carbonated. The tank may be filled manually, or from a source under pressure through a conduit 11 and a float-controlled valve 12. The water is cooled by a refrigerating coil 13 immersed therein and connected by conduits 14, 15, to a refrigerant condensing unit 16. The refrigerating system is merely illustrative of the many ways of cooling the water and in itself forms no part of the invention. A carbonator 17 is preferably immersed in the water in tank 10. The carbonator is supplied with water under pressure from tank 10 through a pump 18 and conduit 19. Cold carbonated water is discharged from the carbonator 17 through a valve-controlled nozzle 20 when the solenoid 21 is energized to unseat the valve by means of pivoted lever 22.

Syrup tanks 23, of which two are shown, are also substantially immersed in the water in tank 10. Each of these tanks is provided with a syrup pump 24 and a syrup flow-controlling valve 25. Syrup discharged from each tank passes through a small conduit 26 which terminates near the water nozzle 20 so that both syrup and water are discharged simultaneously into the container or cup 27.

The syrup pumping mechanism is shown in detail in Fig. 4. A body 30, which may be a casting, contains the syrup valve 25 and supports the syrup pump 24. This body is detachably supported, as by a pin and cammed slot connection 31, in a fitting 32 secured as by brazing or welding to the bottom wall 33 of the syrup tank 23. A flared coupling 34 detachably secures the syrup tube 26 to the depending portion of body 30 which projects through the fitting 32. A two-way valve 35 for controlling the flow of syrup from the tank to the pump and from the pump to the syrup tube 26 is provided with an elongated stem 36. This stem or operating rod extends from the valve proper at the bottom of the syrup tank to a solenoid 37 supported in a recess formed in the detachable cover 38 of the syrup tank.

The syrup pump 24, which is offset in the body 30 from the valve 25, is provided with a conduit

39 extending from its upper end through the cover 38 where it is attached by a separable coupling 39a to a carbon dioxide supply line. The filling opening 41 for the syrup tank, which is normally closed by a cap 42, permits the supplying of syrup to the tank without removing the cover 38. This cover engages an upstanding flange 43 provided around the edge of the main opening 44 in the top of the tank and which flange is provided with a compressible sealing gasket 45. The cover 38 is provided with a suitably shaped flange 46 which, when engaged by thumbscrews 47 securely holds the cover in sealing engagement with the top of the tank.

When it is desired to remove the syrup pump and valve assembly from its tank, the thumbscrews are removed, conduits 26 and 39 are separated at the couplings 34 and 39a, respectively, and the whole assembly including cover 38 is rotated sufficiently to release the pin and slot connection 31 whereupon the assembly is removed vertically from the tank through opening 44. It should be here noted that a compressible resilient gasket 48 is provided between the fixed fitting 32 and the lower end of the detachable valve member 25 below the connection 31 to prevent syrup leakage at this point. This gasket is compressed by the weight of the assembly and by the camming action of the connection 31 when the assembly is in its normal operating position shown in Fig. 4.

The syrup dispensing assembly

The syrup pump and valve mechanism per se form no part of the present invention and will only be sufficiently described to explain their operation by the use of carbon dioxide. The pump 24 comprises a pair of threaded castings 50, 51 which form a pair of chambers 52, 53 separated by a rigid dividing wall 54. A rubber sac or cell 55 having its upper end closed is located in the chamber 52 and a similar cell 56 is disposed in chamber 53. The open ends of these cells are clamped by suitable flanges between opposite sides of the dividing wall 54 and the castings 50, 51, thus sealing the insides of the cells from communication with the outside.

The two cells are in controlled communication with each other, however, through an adjustable tapered plug 57 mounted in a boss 58 formed in partition wall 54, and which boss is provided with a tapered orifice 59 into which plug 57 extends. A central orifice 60 and transverse orifices 61 in the plug 57 afford communication between the interior of cell 55 through orifices 60, 61 and 59, and the interior of cell 56. The cells 55 and 56 are completely filled with water or other substantially noncompressible liquid.

The cell 56 bears against a slidable stem 62 which is clamped through plates 63 and bolt 64 to the closed end of a flexible cup-shaped diaphragm 65 which serves as the syrup pump proper. The diaphragm 65 is normally distended by a spring 66. The open end of the diaphragm is clamped tightly between the body 30 and a protective casing 67 surrounding the pump diaphragm.

Flow of syrup to and from the pump is controlled by the valve assembly 25. The valve proper 35, operated by the stem 36, has an upper flexible face 68 and a lower flexible face 69. The upper face cooperates with a seat 70 and the lower face with a seat 71. A port 72 provides communication through valve body 25, and passage 73 to the interior of pump diaphragm 65. The port 72 also is open constantly to the syrup tank 23.

When the parts are in the position shown in Fig. 4, the solenoid 37 is deenergized, and communication between the interior of the syrup pump and the syrup tube 26 is closed because valve face 69 is engaging seat 71 under the influence of the weight of the parts and the influence of spring 74. However, when solenoid 37 is energized in response to predetermined conditions such as the insertion of a coin in suitable mechanism, valve 35 moves upwardly to engage seat 70, and, carbon dioxide under pressure being applied to the interior of chamber 52 and the exterior of cell 55 from conduit 39 in a manner to be hereafter described, that cell is compressed, forcing liquid through orifices 60, 61 and 59 to the interior of cell 56. Thereupon the latter cell expands and through stem 62 forces syrup from the interior of pump diaphragm 65 through passage 73 and past valve seat 71 to orifice 75 and syrup tube 26. When the solenoid 37 is deenergized and the flow of carbon dioxide is simultaneously shut off, the parts return to the position of Fig. 4 and a fresh supply of syrup is drawn into the pump through port 72 and passage 73. A check valve 76 may be provided in the dividing wall 54 to insure quick return of the liquid from cell 56 to cell 55.

The carbon dioxide system

Carbon dioxide is supplied to the system from a suitable container 80 through a pressure reducing valve 81 which may be either manual or automatic. The system herein described has been successfully operated with a controlled pressure of approximately sixty pounds per square inch. After leaving the valve 81 the gas enters a conduit 82 from which a branch conduit 83 leads to the carbonator 17. Other branches 40 lead from conduit 82 to the conduits 39 which, in turn, lead to the syrup pumps 24. These branch conduits 40 are normally closed by solenoid controlled valves 84 and are open to gas flow only when these valves are energized.

Only one such valve is energized when a drink is to be dispensed, and the control circuit is so arranged that the solenoid-operated gas control valve 84 and the syrup valve solenoid 37 of a single syrup tank are simultaneously energized to permit the flow of syrup only from that selected tank. These solenoids are energized simultaneously with solenoid 21 of the carbonated water control valve 88 in nozzle 20 and the circuit is so arranged that the carbonated water valve and one syrup pump and valve operate and are open for a predetermined time to produce a mixed drink of a given volume, whereupon all the solenoids are deenergized. When this occurs, it becomes necessary to relieve the pressure on cell 55 to permit the pump to draw in a fresh charge of syrup. This may be done by interposing conduits 85 in each branch conduit 40 between the solenoid valve 84 and the conduit 39 of each pumping system and connecting them to a conduit 86 which communicates with the carbonated water discharge nozzle through a coupling 87 below the carbonated water valve 88 (Fig. 2). These conduits 85 are provided with check valves 85a to permit fluid flow only in the directions of the arrows (Fig. 1).

The nozzle 20 is constructed on the principle of the nozzle described in the aforesaid application of Bruce G. Copping, that is, it is so designed that the rate of flow of carbonated water through it to the cup is hydraulically proportioned to the rate of flow of water from cell 55 to cell 56 through the controlled passage 59, and consequently to the rate of flow of syrup from its pump 65 to the cup, thus ensuring a constant proportioning of the syrup and water components of the beverage regardless of variations in the temperature of the beverage components or the applied CO_2 pressure.

As here shown, the nozzle comprises a valve 88 normally closing a port 90 leading from the carbonator 17 to a chamber 94 provided in the nozzle 20. The valve 88 is provided with a stem 92 attached at its lower end by an open web to a sliding collar 91. The valve is normally seated by a spring 93 and is unseated when solenoid 21 is energized and rocks lever 22. The forked outer end of lever 22 engages collar 91 to depress the collar and unseat the valve. When the valve is thus unseated, carbonated water under pressure flows from the carbonator 17 past screen 89, through port 90 to chamber 94 and then through restricted capillary passages 95 to the cup. A check valve 96 is provided in conduit 86 to prevent the flow of carbonated water into the carbon dioxide conduits, but to permit the flow of carbon dioxide gas to the fitting 87, chamber 94 and out through capillary passages 95 to the atmosphere when the flow of carbonated water has ceased.

To assist in the quick release of carbon dioxide and restore the syrup system promptly to its normal position ready for the succeeding dispensing operation, an elongated gas venting port *92a* may be provided in valve stem 92, as shown in dotted lines in Fig. 2. The upper end of this port passes laterally through the valve stem and communicates with chamber 94 through ports *94a* when the valve 88 is seated, thus venting conduit 86 to the atmosphere. On the other hand, when the valve stem is depressed for the dispensing of a beverage, the upper end of the port is sealed by the valve body in which stem 92 slides, so that carbonated water can flow to the cup only through the capillary passages 95.

The capillary passages 95 are here shown as a plurality of nested cones of calculated length and spacing so that the rate of flow of water between them is accurately controlled and, as before stated, the rate of flow is hydraulically proportioned to the rate of flow of water from cell 55 to cell 56 through orifice or passage 59 so that syrup and water are dispensed to the cup in constant proportions.

When the valve 88 is opened and carbonated water under pressure is flowing through the nozzle, its pressure is substantially equal to that of the carbon dioxide in the syrup pumping system as the carbonator and the pumping system derive their pressure from the same source, and consequently there will be no material flow of fluid either way through conduit 86 and branches 85. However, when the system is deenergized, the water valve 88 and the solenoid valve 84 close and the pressure in chamber 94 of nozzle 20 drops to atmospheric, whereupon the pressure of carbon dioxide trapped between valve 84 and cell 55 is instantly relieved through branch conduit 85, conduit 86, past check valve 96 and into chamber 94 to the atmosphere. This puff of gas tends to sweep out any residual water which may be clinging to the capillary passages 95 and thus eliminates "after-drip."

Instead of the pressure relieving system just described, the residual pressure may also be relieved by making the solenoid gas controlling valve 84 in the form of a two-way valve as shown in Fig. 5. Here the assembly is shown with the solenoid 97 deenergized and the core 98, which carries valves 99, 100 at opposite ends, in its lowermost position with the valve 100 seated and closing communication between the conduit 82 and the conduit 40. When the solenoid is energized the core 98 moves upwardly against spring 101 to seat valve 99, closing port 102, which opens to the atmosphere, and unseating valve 100 to permit the flow of gas from conduit 82 to conduit 40. Then, when the solenoid is deenergized, valve 100 reseats and valve 99 is unseated so that residual carbon dioxide is discharged from conduit 40 past the loosely fitting core 98 and valve 99 to the atmosphere.

An electrical control circuit for the described system is shown in Fig. 3. As the system is primarily intended for operation as an automatic coin controlled apparatus, the circuit will be so described, although it is apparent that its operation could as well be initiated manually. The circuit and system are also described as selectively dispensing one of two syrups although, of course, they can be arranged to dispense one of any number of syrups by the proper provision of tanks, pumps and valves.

As shown, the insertion of a coin in a selected slot closes either of momentary contact switches 105, thereby establishing a circuit from line conductor L_1 through conductor 106, solenoid 107, conductors 108, 109 and 110, normally closed timer switch 111 and conductor 112 to line conductor L_2. Momentary contact switch 105 is of the type which establishes a circuit in response to a slight pressure and instantly opens when the pressure is removed. When solenoid 107 is initially energized, a holding circuit is established from L_1 through conductor 106, contacts 113, solenoid 107 and conductors 108, 109, 110, switch 111 and conductor 112 to L_2. The energization of relay 107 also sets up, but does not close, a circuit to the selected carbon dioxide flow control valve 84 and the corresponding syrup valve solenoid 37. This circuit runs from L_1 through conductor 106, contacts 114, conductor 115, through the valve solenoids 84 and 37 in parallel, conductors 117, 118 and 131, to the contacts 119 of timer relay solenoid 121, which is not as yet closed, and then through conductor 120 to L_2.

After the coin passes switch 105, which is disposed in the usual chute, it passes through a slug rejector (not shown) and then, in the case of an automatic dispensing machine, causes the dropping of a cup beneath the dispensing nozzle of the apparatus by the actuation of a second momentary contact switch (not shown). The apparatus is now ready for the dispensing of the beverage, and the coin continues its passage down the chute, finally tripping momentary contact switch 122. The closing of this switch starts the timer motor M rotating and also energizes timer relay solenoid 121, a circuit being established from L_1 through conductors 106, 123, switch 122, conductor 124, motor M, conductors 125, 126 and 110, closed switch 111 and conductor 112 to L_2. Current also flows from conductor 124 through timer relay solenoid 121, and conductors 130, 126, 110, switch 111 and conductor 112 to L_2.

As the switch 122 is only momentarily closed, it is necessary that a holding circuit be established for relay 121 and motor M until the motor has completed its cycle. Such a circuit is made from L_1 through conductors 106, 123, 127, contacts 128, conductor 129, solenoid 121, conductors 130, 126, 110, switch 111 and conductor 112 to L_2. Current also flows in parallel from conductor 129 through conductor 124, motor M, conductors 125 and 126 to conductor 110 and thence through switch 111 and conductor 112 to L_2.

The energization of relay 121 also closes contacts 119 completing the circuit through the syrup valve solenoid 37 and gas valve solenoid 84, opening the respective valves and causing the flow of syrup to the cup. Simultaneously with the establishment of the aforesaid circuit a circuit is established for the carbonated water valve solenoid 21 from L_1 through conductor 116, solenoid 21, conductor 131, contacts 119 and conductor 120 to L_2. It should be noted that the carbonated water valve 88 is opened every time the machine is operated but that only one set of syrup and gas valves is operated by the insertion of a coin in a selected slot, and it should be further noted that all the main circuits are controlled by the timer switch 111. As before stated, this switch is normally closed. Its opening is controlled by a finger 135 mounted on and rotating with the shaft of motor M. The finger 135 is normally held against an adjustable stop 136 by a light spring 137. When the motor is energized, its shaft, which is driven through suitable reduction gearing, rotates the finger 135 against the pull of spring 137 until the finger engages and opens switch 111. Thereupon all circuits including that of motor M are opened and the finger is drawn back against stop 136 by spring 137 so that switch 111 recloses and the apparatus is restored for the next dispensing operation. The position of stop 136 may be varied to control the length of the dispensing cycle.

It is apparent from the foregoing description that the invention provides a compact beverage dispensing apparatus in which the syrup dispensing portions are readily accessible for servicing and replacement, and that it also provides a simple and direct system, using the available carbon dioxide, for accurately dispensing predetermined quantities of the beverage components.

While we have shown our invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What we claim is:

1. In apparatus for dispensing a mixed, carbonated beverage through a dispensing nozzle, and in which the beverage components are dispensed by controlled pressure derived from a container of carbon dioxide, the combination of a container for carbonated water adapted to be constantly subjected to carbon dioxide pressure, a syrup container adapted to be maintained at atmospheric pressure, pump means for discharging syrup from the container to the nozzle, means for admitting carbon dioxide under pressure at selected intervals to said pump means, means for controlling the flow of carbonated water from its container to the nozzle, timer means for operating said flow-controlling means in timed relation to the means for admitting carbon dioxide pressure to the pump, and means for instantly relieving carbon dioxide pressure on said pump means when sufficient syrup has been dispensed, said means including a conduit opening into said nozzle and having an operating connection between said pump means and the means for admitting carbon dioxide to said pump.

2. In apparatus for dispensing a mixed, carbonated beverage through a dispensing nozzle, and in which the beverage components are dispensed by controlled pressure derived from a container of carbon dioxide, the combination of a container for carbonated water adapted to be constantly subjected to carbon dioxide pressure, a syrup container adapted to be maintained at atmospheric pressure, pump means for discharging syrup from the container to the nozzle, electrically-operated valve means for admitting carbon dioxide under pressure at selected intervals to said pump means, electrically-operated means for controlling the flow of carbonated water from its container to the nozzle, timer means for operating said flow-controlling means in timed relation to said electrically-operated valve means, and means including said electrically-operated valve means for instantly relieving the carbon dioxide pressure on said pump means at the end of a dispensing cycle.

3. In apparatus for dispensing a mixed, carbonated beverage through a dispensing nozzle, and in which the beverage components are dispensed by controlled pressure derived from a container of carbon dioxide, the combination of a container for carbonated water adapted to be constantly subjected to carbon dioxide pressure, a syrup container adapted to be maintained at atmospheric pressure, pump means for discharging syrup from the container to the nozzle, electrically-operated valve means for admitting carbon dioxide under pressure at selected intervals to said pump means, electrically-operated means for controlling the flow of carbonated water from its container to the nozzle, timer means for operating said flow-controlling means in timed relation to said electrically-operated valve means, and means for instantly relieving the carbon dioxide pressure on said pump means at the end of a dispensing cycle, said pressure relieving means including a conduit opening into said nozzle and operatively connected between said pump means and the electrically-controlled valve means.

4. In apparatus for dispensing a mixed, carbonated beverage through a dispensing nozzle, and in which the motive power for the beverage components to be dispensed is derived from carbon dioxide pressure, the combination of a relatively deep syrup tank, a syrup pump disposed in the lower part of said tank, a separable connection between the syrup pump and the lower tank wall, said connection including a gasket member deformable under the weight of the pump to seal the tank against leakage around said separable connection, a conduit for supplying fluid pressure to said pump, and a separable connection for said conduit adjacent the top wall of the syrup tank, all of said separable connections constituting means whereby said pump may be removed from said tank through the top wall thereof.

5. In apparatus for dispensing a mixed, carbonated beverage, the combination of a dispensing nozzle, a conduit adapted to contain carbon dioxide gas under pressure, a carbonator for containing carbonated water and communicating with said conduit, a container for syrup, gas motivated pumping means for discharging syrup from its container to the nozzle, means for conveying gaseous carbon dioxide under pressure from said conduit to the pumping means at selected intervals for motivating said pumping means to discharge syrup to the nozzle, and means operated in timed relation to the motiva-

tion of said pumping means for effecting communication between said carbonator and the nozzle to discharge carbonated water from the former to the latter.

6. In apparatus for dispensing a mixed, carbonated beverage, the combination of a dispensing nozzle, a conduit adapted to contain carbon dioxide gas under pressure, a carbonator for containing carbonated water and gaseous carbon dioxide under pressure, said carbonator communicating with said conduit at all times, a container for syrup subjected interiorly to the pressure of the ambient atmosphere, gas motivated pumping means for discharging syrup from the container to the nozzle, electrically operated means for delivering gaseous carbon dioxide from said conduit to said pumping means at selected intervals for motivating the pumping means, electrically operated means for controlling the flow of carbonated water from the carbonator directly to said nozzle, and timing means for controlling energization of both of said electrically operated means in timed relation.

7. In apparatus for dispensing a mixed carbonated beverage, the combination of a dispensing nozzle, a conduit adapted to contain carbon dioxide gas under pressure, a carbonator for containing carbonated water and communicating with said conduit, a container for syrup, gas motivated pumping means for discharging syrup from its container to the nozzle, means for conveying gaseous carbon dioxide under pressure from said conduit to the pumping means for motivating the latter, means for controlling the flow of carbonated water from its container directly to the nozzle, timing means actuated at intervals for operating said flow controlling means and said carbon dioxide conveying means for a predetermined period of time and means rendered effective at the conclusion of said period of time for relieving the carbon dioxide pressure acting on said pumping means.

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