April 4, 1950 E. S. WEGMAN 2,502,610

APPARATUS FOR COOLING AND DISPENSING BEVERAGES

Filed Dec. 27, 1943 2 Sheets-Sheet 1

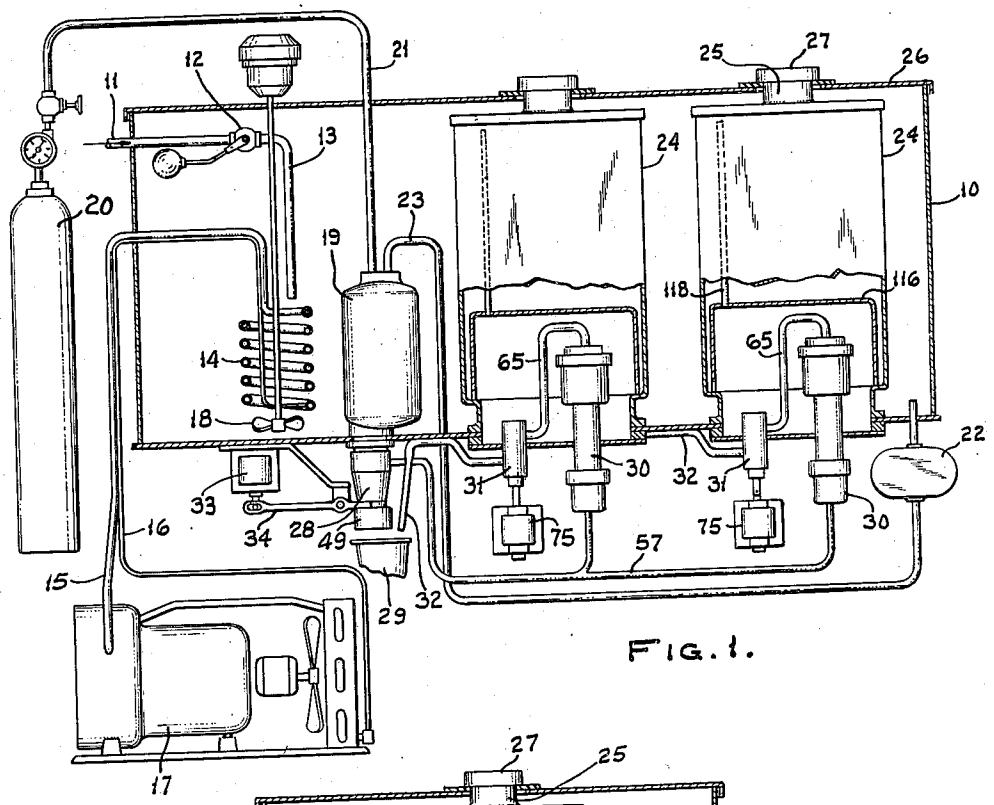


FIG. 1.

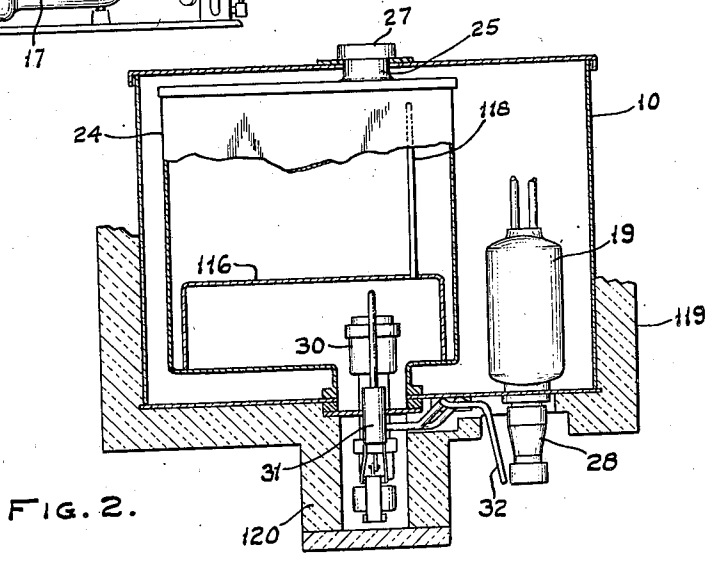


FIG. 2.

WITNESSES:
William J. Swezey
E. H. Lutz

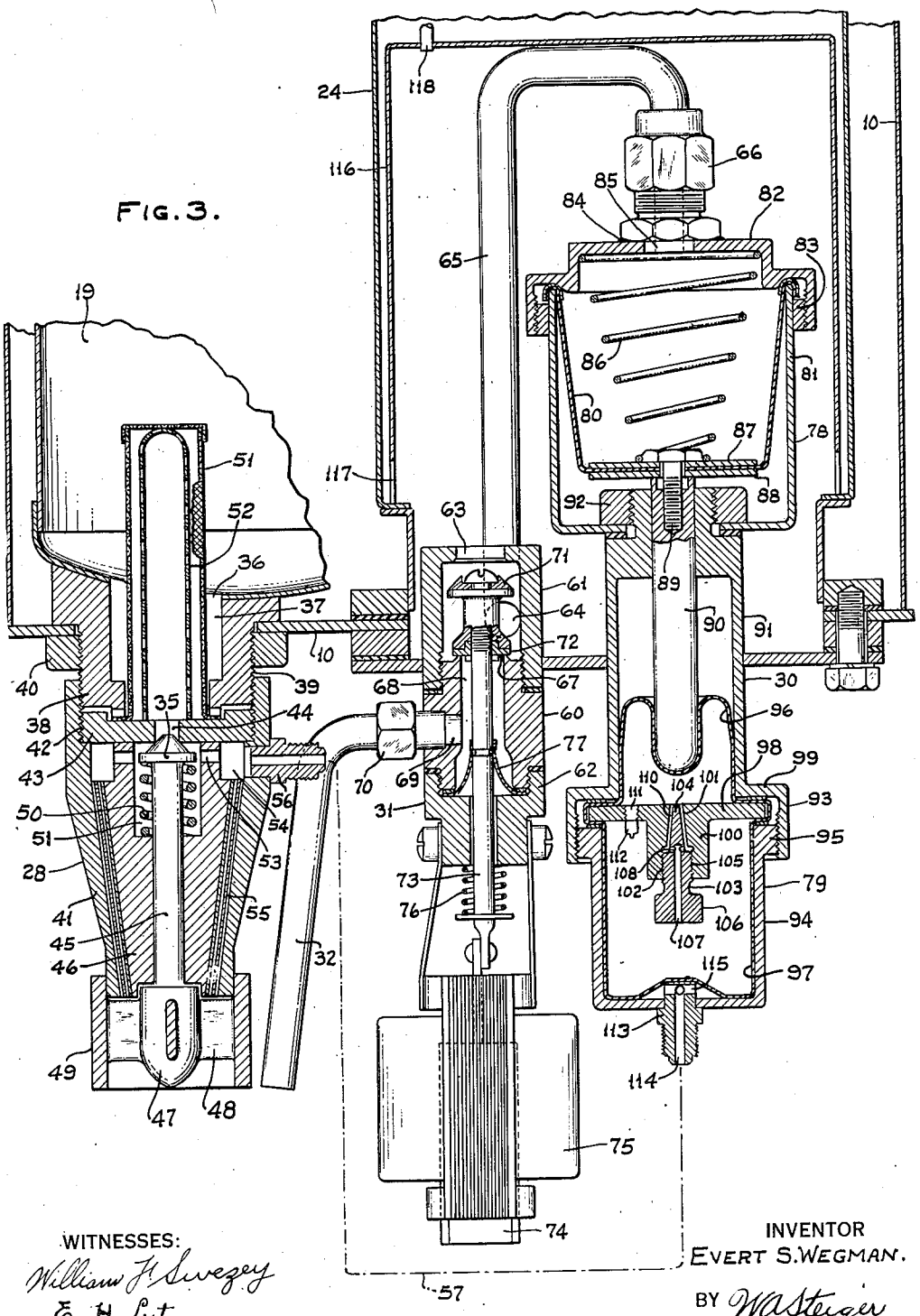
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FIG. 3.



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2,502,610

APPARATUS FOR COOLING AND DISPENSING BEVERAGES

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Application December 27, 1943, Serial No. 515,661

4 Claims. (Cl. 225—21)

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This invention relates to beverage dispensing apparatus and particularly to that type of dispensing apparatus in which a mixed beverage comprising syrup and water components is dispensed into a cup or other receptacle.

More specifically, the invention relates to a mixed beverage dispensing apparatus in which the syrup and water components are stored separately and maintained in a refrigerated condition until a few seconds before the dispensing mechanism is actuated, manually or by a coin, whereupon predetermined amounts of the components are mixed and dispensed or are dispensed separately and mixed in the receptacle.

In an apparatus of this character it is highly desirable, indeed almost essential for the production of a satisfactory drink, that the syrup and water components be maintained at a selected low temperature, usually about 40° F., and delivered at that temperature to a receptacle, usually an expendable paper cup.

Some of the factors requiring this condition are (1) the maintenance of proper carbonation in the dispensed drink, (2) the assurance of the delivery of the exact amount of syrup, this being among other things a function of the viscosity and consequently affected by temperature, and (3) the susceptibility of some syrups particularly those with a sugar base to fermentation and mold growth when exposed for a substantial time to the air at room temperature.

In the interests of simplicity and serviceability it is also desirable that the cooling unit of the mechanical refrigerating system usually associated with such a dispensing apparatus be made as a single compact unit rather than an elaborate coil system winding its way into contact with the water receptacle, the carbonator, the syrup tank or tanks, the dispensing valve and the syrup metering devices. Nevertheless, the cooling unit and the entire cooling arrangement must be such that all of those parts are adequately cooled.

A multiple drink dispenser, that is, a dispenser from which any one of several flavors may be selected by the consumer, offers further problems with respect to the cooling of the associated parts because of the necessity of disposing some of the syrup tanks a considerable distance from the dispensing nozzle.

Among the objects of this invention are the provision of an arrangement of the parts of a dispensing apparatus to provide adequate and uniform cooling of the water to be dispensed, the carbonator, one or more syrup tanks, the dispensing valve or nozzle, the syrup metering devices and the conduits leading from the metering device to the nozzle.

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A more specific object is to accomplish the objects of the preceding paragraph by cooling the water to be dispensed by means of a refrigerant heat-absorbing unit disposed in a tank containing the water, immersing the carbonator and syrup tank or tanks in the water to be cooled thereby, and disposing the normally fluid-containing parts of the syrup metering device, herein described as a pump and a valve for each syrup tank, within one of the aforesaid tanks so as to be cooled by the liquid therein.

Specifically, it is an object of the invention to cool the syrup-containing portions of the syrup metering devices by so arranging the syrup dispensing system that the normally syrup-containing portions of these devices are disposed within the syrup tank itself so as to be cooled by the contents thereof. By "normally-syrup-containing portions" is meant those portions of the metering devices which are static or at rest when the apparatus is not dispensing a beverage.

Another object of the invention is to provide the syrup tank with a baffle means so constructed and arranged as to ensure a quantity of cold syrup being in contact with the syrup metering devices at all times.

These and other objects are effected by the 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 diagrammatic representation of a dispensing apparatus embodying my invention;

Fig. 2 is a vertical elevation partly in section, showing a single syrup tank and the metering device therefor, the carbonator and the dispensing nozzle; and

Fig. 3 is a full scale vertical section through a single syrup metering device and carbonated water dispensing nozzle.

A receptacle 10 is provided for containing a body of water to be refrigerated, carbonated and dispensed. The water may be supplied by any suitable means, here indicated as a conduit 11, through which the entry of water is controlled by a float-operated valve 12. A conduit 13 leads from the valve 12 to discharge water in the vicinity of a refrigerant heat-absorbing unit 14. This unit is here shown as a conventional expansion coil operatively connected by a suction conduit 15 and a capillary tube 16 to a motor-driven refrigerant condensing unit 17.

The refrigerating system per se forms no part of the present invention and need not be described in detail as many types of these units are available. For the purpose herein used, it should have adequate capacity to maintain the temperature of the water bath between selected limits, and be controlled by a suitable device responsive to the water temperature. The present practice is to maintain the water temperature between 36° F. and 40° F. in order to produce a palatable beverage in the cup. A motor-driven agitator 18 is provided adjacent the cooling unit 14 to distribute the cooled water and thus assist in maintaining a uniform temperature throughout the water bath and the parts of the apparatus immersed in it.

A suitable carbonator 19 is located in receptacle 10 and is uniformly cooled by the water in the tank. The carbonator receives carbon dioxide gas under controlled pressure from a cylinder 20 through a conduit 21. Water is supplied to the carbonator from the cooled supply in tank 10, by means of a pump 22 and conduit 23. The carbonator I prefer to use is fully described in the copending application of Andrew J. Nicholas, Serial No. 501,947, filed September 11, 1943, now abandoned, and assigned to Westinghouse Electric & Manufacturing Company. The operation of pump 22 is controlled in response to the water level in the carbonator by any of several known devices (not shown).

Syrup tanks 24 are also disposed in the water receptacle. These may be any desired number, here shown as two, and may contain the same or different syrups. The tanks have necks 25 projecting through the cover 26 of receptacle 10, and through which they are filled. Removable caps 27 are provided for the necks.

The beverage dispensing mechanism here shown comprises a carbonated water nozzle 28 leading from the carbonator to the cup 29, and, for each syrup tank, a pump 30 and a flow control valve 31 for directing the flow of syrup from the tank 24 to the pump 30 and from the pump 30 to the syrup outlet 32, from whence it flows to the cup simultaneously with the carbonated water from nozzle 28. 33 indicates a solenoid which, when energized, operates, through pivoted lever 34, a valve 35 in the dispensing nozzle to allow the cold carbonated water to flow into the cup.

The carbonated water-dispensing nozzle and the syrup metering and dispensing system for a single tank are shown in detail in Fig. 3. The apparatus herein disclosed requires only a single carbonated water nozzle, but a separate syrup metering and dispensing system is required for each syrup tank supplied.

The carbonator 19 and the water nozzle 28 leading therefrom are shown at the left side of Fig. 3. The lower end of the carbonator is provided with an opening 36 which leads into an opening 37 provided in a hollow plug 38. This plug is preferably metallically bonded to the carbonator wall to form a fluidtight joint. The lower end of the plug 38 is externally threaded, as at 39. The plug extends through the bottom wall of the water tank 10, and the nut 40, when screwed tight on the external threads 39, serves to clamp the plug 38 and consequently the carbonator 19 to the bottom wall of the tank 10.

The dispensing valve and nozzle proper comprise an externally and internally tapered body 41 which, at its upper end, is internally threaded,

as at 42, for engagement with the lower threads 39 on plug 38. A plate 43 provided with a central orifice 44 is threaded into the upper part of valve body 41. The under side of this plate around the orifice 44 serves as a seat for the valve 35. This valve is attached to a vertically reciprocable stem 45, which passes through a conically-shaped core 46 and terminates in screw-threaded engagement with a nut 47. Webs 48 connect the nut with a sleeve 49, the upper portion of which is mounted in sliding engagement with the lower end of valve body 41. A spring 50, located in a recess 51 in the upper portion of core 46, surrounds the upper part of valve stem 45 and bears against the under side of the valve 35. This spring should be sufficiently strong to maintain the valve seated against the pressure prevailing in the carbonator.

In the embodiment shown, the valve is unseated by the lever 34 which moves the sleeve and valve stem downwardly in response to the energization of solenoid 33. Thus water will flow from the carbonator 19 through the orifice 44 as long as the solenoid 33 is energized. A screen filter 51*a* provided with a ported support 52 may be disposed between the carbonator 19 and the orifice 44.

The cold carbonated water, after passing the orifice 44, passes through ports 53 provided in the upper end of core 46 and then into a chamber 54 disposed between the core 46 and the valve body 41. Here the water follows two paths, one through a flow-restrictive device 55 disposed between the core 46 and the valve body 41 to the cup or other receptacle, and the other through a fitting 56 and a conduit 57 to the several syrup pumps 30, one of which is shown in Fig. 3.

The syrup metering system and the water flow control device herein described form no part of the present invention, but are fully described and claimed in the copending application of Bruce G. Copping for Automatic valve for dispensing and proportioning syrups and carbonated water, Serial No. 480,108, filed March 22, 1943, now Patent 2,495,210, January 24, 1950. The flow control device 55, here shown, comprises a group of nested cones of predetermined length, spaced apart at calculated intervals to permit the flow of water from the carbonator under known pressure to the cup at atmospheric pressure without an excessive loss of carbon dioxide. The design of such a flow control device and the calculations therefor are fully disclosed in the aforesaid Copping application.

The syrup dispensing system herein described is so designed that the volume of syrup dispensed is always in direct proportion to the amount of water dispensed, thus ensuring uniformity of each drink. The main elements of each syrup dispensing unit, one of which is provided for each syrup to be dispensed, comprise a valve mechanism 31, a pump 30 and a syrup conduit 32. The valve mechanism controls the flow of cold syrup from its tank 24 to the pump 30 and from the pump to the conduit 32. This conduit terminates adjacent the water nozzle 28, and discharges the syrup directly into the cup simultaneously with the water so that the ultimate mixing of the two occurs in the cup itself.

The syrup valve mechanism 31, here shown, comprises a body 60 provided with an upper cap 61 and a lower cap 62. The upper cap is provided with a port 63 communicating with the interior of the syrup tank 24 and also with a port 64 communciating with a conduit 65, which con-

duit is attached by a coupling 66 to the upper end of the syrup pump 30. The valve body 60 is provided with a valve seat 67 past which syrup may flow at selected times to the chamber 68 and then through a port 69 and coupling 70 to the syrup conduit 32. The flow of syrup through the ports 63, 64 and 69 is controlled by a double valve comprising an upper member 71 and a lower member 72, both of which are moved simultaneously by a reciprocable stem 73 attached to the movable core 74 of a solenoid 75. In the position shown in Fig. 3, the solenoid is deenergized so that the lower valve member 72 is seated on valve seat 67 and the upper valve member 71 is withdrawn from the port 63, allowing free communication between the tank 24 and the pump 30 through ports 63, 64 and conduit 65. This is the normal position of these parts when the system is static, that is, when a drink is not being dispensed. The weight of the valve members, their stem and the solenoid core tend to maintain them in this position. A spring 76 may be provided around the valve stem 73 to assist in moving the stem downwardly. A flexible sealing member 77 is provided between the valve stem 73 inside the chamber 68 and the valve body to prevent leakage around the valve stem. This member is sealed to the valve stem by known means and may conveniently be clamped at its lower flared end between the body 60 and lower valve cap 62. Suitable gaskets, not specifically enumerated, may be provided at any joint in the entire system herein described, as is well known to those skilled in the art.

The syrup pumping mechanism 30 comprises two distinct parts, one the pumping portion per se, shown generally at 78 in Fig. 3 and disposed in the cold syrup in tank 24, and the other the metering device indicated generally at 79 in Fig. 3 and disposed outside the syrup tank.

The pumping mechanism 78 comprises a flexible cup-shaped diaphragm 80, here shown as having a frusto-conical shape, and which may be conveniently molded from any suitable natural rubber or synthetic rubber. The upper or open end of the diaphragm is firmly clamped between the upper edge of a rigid cup 81, preferably made of stainless steel, and a cap 82 of the same material disposed in screw-threaded engagement with a ring 83 bonded to the upper edge of cup 81. The fitting 66 is bonded to the cup 82, as indicated at 84, and is provided with a port 85 which affords constantly open communciation between the interior of diaphragm 80 and the conduit 65. A light spring 86 may be provided to return diaphragm 80 to its extended position. The lower horizontal portion of the diaphragm is clamped between two metal plates 87, 88 by the bolt and nut assembly 89.

The bolt of assembly 89 extends in screw-threaded engagement with the upper end of a reciprocable stem 90 so that movement of this stem imparts motion to the flexible diaphragm 80. This stem 90 has a smooth sliding fit inside a bore provided in the upper end of a body 91. The rigid cup 81 is clamped to the upper end of body 91 by a nut 92.

Body 91 has an enlarged internally threaded cup-shaped member 93 formed at its lower end. An elongated hollow cap 94 has an externally threaded flange 95 provided on its upper or open end for engagement with the threads on member 93. A pair of flexible cells 96, 97 are disposed one above and one below a separator plate 98, flanges formed at the free ends of these cells being clamped, together with the edge of plate 98, between the flange 95 of cap 94 and the horizontal wall 99 of member 93.

Centrally of the separator plate 98 there is provided a boss 100 having a tapered orifice 101 at one end and a screw-threaded recess 102 at the other end for receiving an adjustable plug 103. This plug has a tapered end 104 cooperating with the orifice 101 to provide an adjustable restriction 110 controlling the flow of fluid between the cells 96, 97 through the plate 98, adjustment being provided by the screw-threaded portion 105 of plug 103 which cooperates with the screw-threaded recess 102 in boss 100 and is manipulated by the head 106 on the plug 103. A port 107 extends axially of the plug 103 and communicates through branch ports 108 with the restriction 110.

In order to ensure quick return of the fluid from cell 96 to cell 97 at the end of the pumping stroke, the plate 98 is provided with a ported plug 111 through which the flow of fluid is permitted in one direction only (downwardly in Fig. 3) by a rubber check valve 112, commonly known as a "Thompson" valve. The carbonated water conduit 57 is connected to the cap 94 by a plug 113 and is provided with an axial port 114 and radial ports 115 through which the carbonated water flows from conduit 57 to the outside of cell 97. The cells 96, 97 are filled with a suitable fluid, and for the purpose described this may be distilled uncarbonated water. The cells themselves are preferably molded with thin walls from natural or synthetic rubber.

Considering the operation of the apparatus when viewed as an automatic mixed beverage dispenser, let it be assumed that the parts are in the positions shown in the drawings and that the carbonator and syrup tanks and their contents are all cooled to dispensing temperature of between 36° F. and 40° F. It should be particularly noted that the syrup-containing portions of valve 31 and pump 30 are immersed in the cold syrup in tank 24 which is in turn immersed in the refrigerated water in receptacle 10. A baffle 116 may be disposed in the lower part of each syrup tank around the immersed parts of the syrup valve and pump, this baffle being provided with ports or openings 117 at its lower end for the passage of syrup. Likewise each baffle should be provided with a vent tube 118 extending from the top wall of the baffle to the space above the normal syrup level in tank 24. This tube serves to release air which may become entrapped under the baffle when syrup is supplied to the tank 24. The purposes of the baffle 116 are (1) to prevent mixing of freshly added syrup with that which has already been cooled to dispensing temperature, or in other words, to provide for the continuous presence of a body of syrup already cooled, and (2) to maintain this cold body of syrup around the immersed portions of the syrup pump and valve, as it is the syrup in those portions which is initially dispensed from the apparatus when a coin is inserted or the device is otherwise actuated.

It will likewise be noted (Fig. 2) that the external water receptacle 10 is insulated completely as indicated in part at 119, and that insulation is provided in the form of a channel 120 around the depending parts of the syrup pump and valve not otherwise disposed in the syrup tank, and further that the major part of the syrup conduits 32 and water conduit 57 pass through this insulated channel where they are

uniformly cooled by being in proximity to the uninsulated portions of the syrup tanks and water receptacle immediately above the channel.

To revert to the mechanical operation, the various electrical circuits not being shown, the flexible diaphragm 80, conduit 66 and the portion of syrup valve 31 above the valve seat 72 are filled with cold syrup. A coin being inserted and a cup having been thereupon deposited below the nozzle 28, one of the solenoids 75 is energized, as determined by the flavor selection made, and its core 74 is drawn upwardly, seating valve member 71 against port 63 and moving valve member 72 away from seat 67.

Solenoid 33 is likewise energized and through lever 34 and sleeve 49 unseats valve 35. Carbonated water under pressure then flows through orifice 44 and ports 53 to chamber 54 from where most of it flows through restrictor 55 to the cup. A small amount, however, passes through fitting 56 and conduit 57 to the interior of the caps 94 of each syrup pump. The pressure of the carbonated water on the exterior of each flexible cell 97 forces water from that cell through the ports 107, 108 and orifice 110 to the interior of cell 96, causing that cell to expand and push the flexible diaphragm 80 upwardly, thus forcing the contained syrup in the diaphragm out through conduit 65. If the solenoid 75 has been energized, as previously explained, the syrup will pass from conduit 65 through port 64 and past seat 67 to chamber 68, and through port 69 and coupling 70 to conduit 32 and the beverage cup. This syrup flow is maintained as long as the valve 35 is unseated in response to the energization of solenoid 33, the result being that the syrup and water are dispensed in selected proportions. If several syrup tanks and their attendant valves and pumps are provided, syrup will flow to the cup only from that tank whose valve solenoid 75 has been energized, for although all the pumps are actuated when the carbonated water flows to the cup, unless the attendant valve solenoid is energized the syrup will flow from the pump chamber back through conduit 65, port 64 and orifice 63 to the tank 24.

A suitable timing mechanism deenergizes the electrical circuits to the various solenoids and stops the liquid flow to the beverage cup. The return stroke of the pump occurs when the pressure on cell 97 is relieved by the closing of valve 35 through spring 59. At the same time, the solenoid 75 being deenergized, valve member 72 seats and member 71 unseats so that syrup is drawn from tank 24 through orifice 63, port 64 and conduit 65 into the pump in readiness for the next dispensing operation. The return of water from cell 96 to cell 97 is accelerated by the provision of the check valve 112.

The objects of the invention and preferred means of attaining them have been fully stated in this specification and it is believed that the objects of obtaining a uniform temperature of the dispensed liquids by a compact, accessible arrangement of uniformly cooled parts has been adequately obtained in a simple, direct manner by the apparatus herein described.

The terms dispensing valve, dispensing nozzle and dispensing valve mechanism as used herein are not to be construed as meaning only a single outlet, but rather as including a composite device discharging a plurality of beverage components into a single cup or receptacle simultaneously or consecutively, so as to produce a mixed beverage in the cup. The terms dispensing valve, dispensing nozzle and dispensing valve mechanism are also to be construed as meaning a device which discharges either a single liquid, a mixed liquid or a plurality of liquids into a cup or receptacle.

While the invention has been shown 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, and it is desired, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In apparatus for dispensing a cold mixed drink through a dispensing nozzle and for maintaining the component parts of the drink in a cold uniformly refrigerated condition prior to the dispensing operation, the combination of a receptacle for the water component of a beverage, a tank disposed in the water receptacle for storing syrup, refrigerant heat-absorbing means disposed in the receptacle for cooling the water therein and through the cooled water cooling the syrup tank and its contents, a syrup pump, valve means for controlling the flow of cooled syrup from the tank to the pump and from the pump to a dispensing nozzle, those portions of the valve means and pump which, when in their static position, contain syrup being disposed within the confines of the syrup tank so as to be constantly immersed in and cooled by the contents thereof.

2. In apparatus for dispensing a cold mixed drink through a dispensing nozzle and for maintaining the component parts of the drink in a cold uniformly refrigerated condition prior to the dispensing operation, the combination of a receptacle for the water component of a beverage, a tank disposed in the water receptacle for storing syrup, refrigerant heat-absorbing means disposed in the receptacle for cooling the water therein and through the cooled water cooling the syrup tank and its contents, syrup metering means associated with the syrup tank, said metering means having its syrup containing portion disposed in the syrup tank so as to be constantly immersed in intimate thermal contact with the contents thereof, a syrup conduit extending adjacent a wall of the receptacle from the metering means to a dispensing nozzle, and walls forming an insulating enclosure for said receptacle and conduits.

3. In apparatus for dispensing a cold mixed drink through a dispensing nozzle and for maintaining the component parts of the drink in a cold uniformly refrigerated condition prior to the dispensing operation, the combination of a receptacle for the water component of the beverage, a tank disposed in the water receptacle for storing the syrup component, refrigerant heat-absorbing means disposed in the receptacle for cooling the water therein and through the cooled water cooling the syrup tank and its contents, a metering device for causing and controlling the flow of cooled syrup from the tank to a dispensing nozzle, those portions of the metering device which contain syrup when the dispensing apparatus is inactive being disposed within the confines of the syrup tank so as to be constantly immersed in and cooled by the contents of said tank, and baffle means disposed in the syrup tank adjacent said portions for constantly maintaining a body of cold syrup in contact with said portions.

4. In apparatus for dispensing a cold mixed drink through a dispensing nozzle and for main-

taining the component parts of the drink in a cold uniformly refrigerated condition prior to the dispensing operation, the combination of a receptacle for the water component of the beverage, a tank disposed in the water receptacle for storing the syrup component, refrigerant heat-absorbing means disposed in the receptacle for cooling the water therein and through the cooled water cooling the syrup tank and its contents, a metering device for causing and controlling the flow of cooled syrup from the tank to a dispensing nozzle, those portions of the metering device which contain syrup when the dispensing apparatus is inactive being disposed within the confines of the syrup tank so as to be constantly immersed in and cooled by the contents of said tank, baffle means disposed in the syrup tank adjacent said

portions for constantly maintaining a body of cold syrup in contact with said portions, and vent means associated with the baffle means and extending above the normal liquid level in the syrup tank for purging entrapped air to the atmosphere.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,316,528	Wooten et al.	Sept. 16, 1919
1,776,539	Calleson	Sept. 23, 1930
2,328,110	Thompson et al.	Aug. 31, 1943
2,391,003	Bowman	Dec. 18, 1945