Aug. 11, 1953 H. A. BENDFELT 2,648,274

BEVERAGE VENDING MACHINE

Filed Aug. 9, 1947 5 Sheets-Sheet 1

Fig. 1.

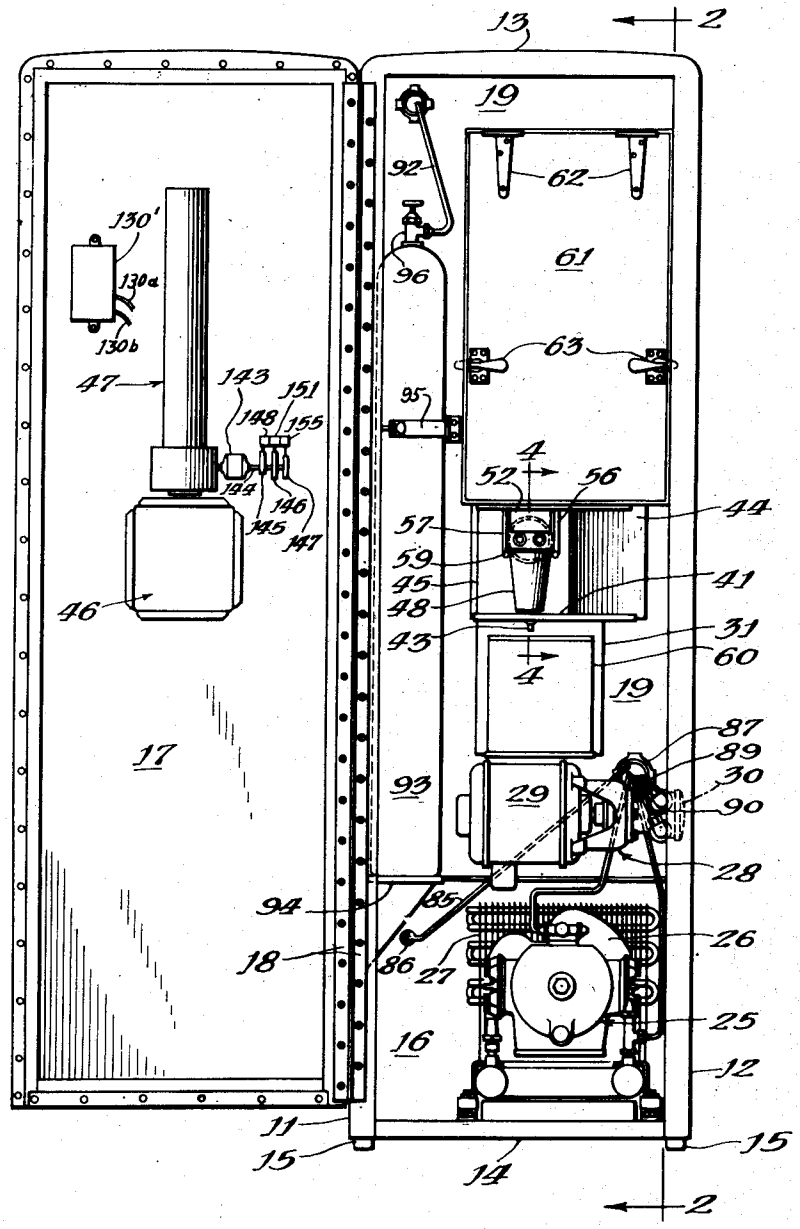

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Fig. 2.

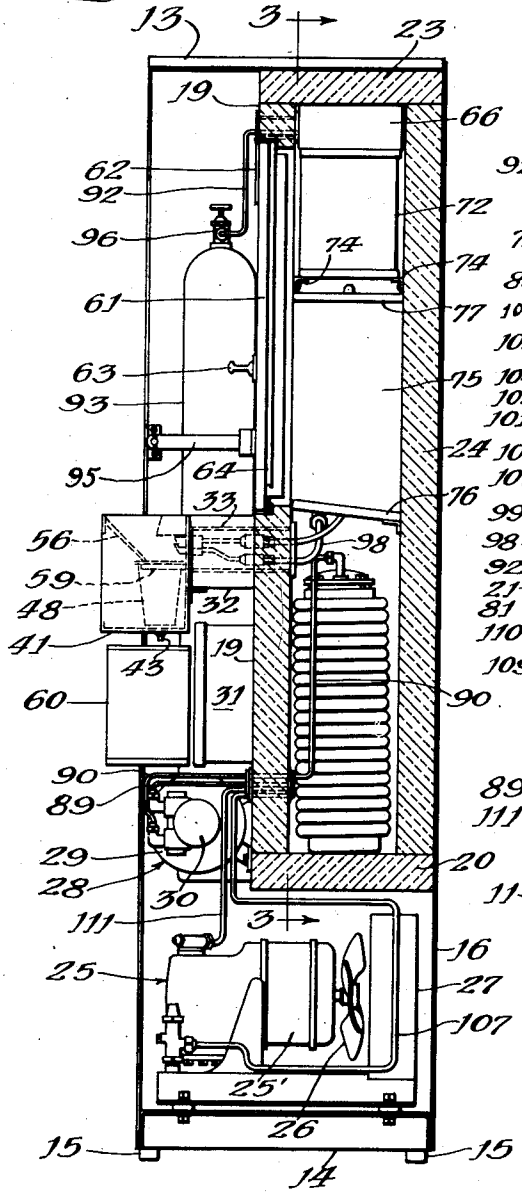
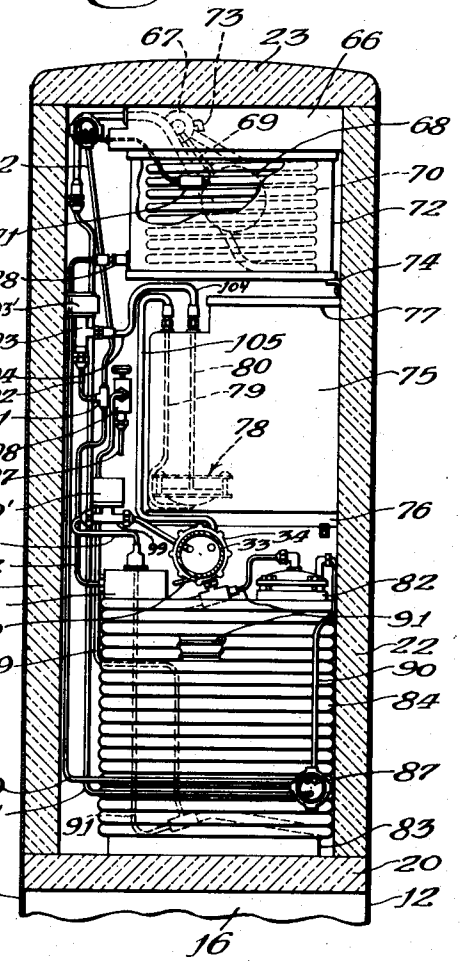


Fig. 3.



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BEVERAGE VENDING MACHINE

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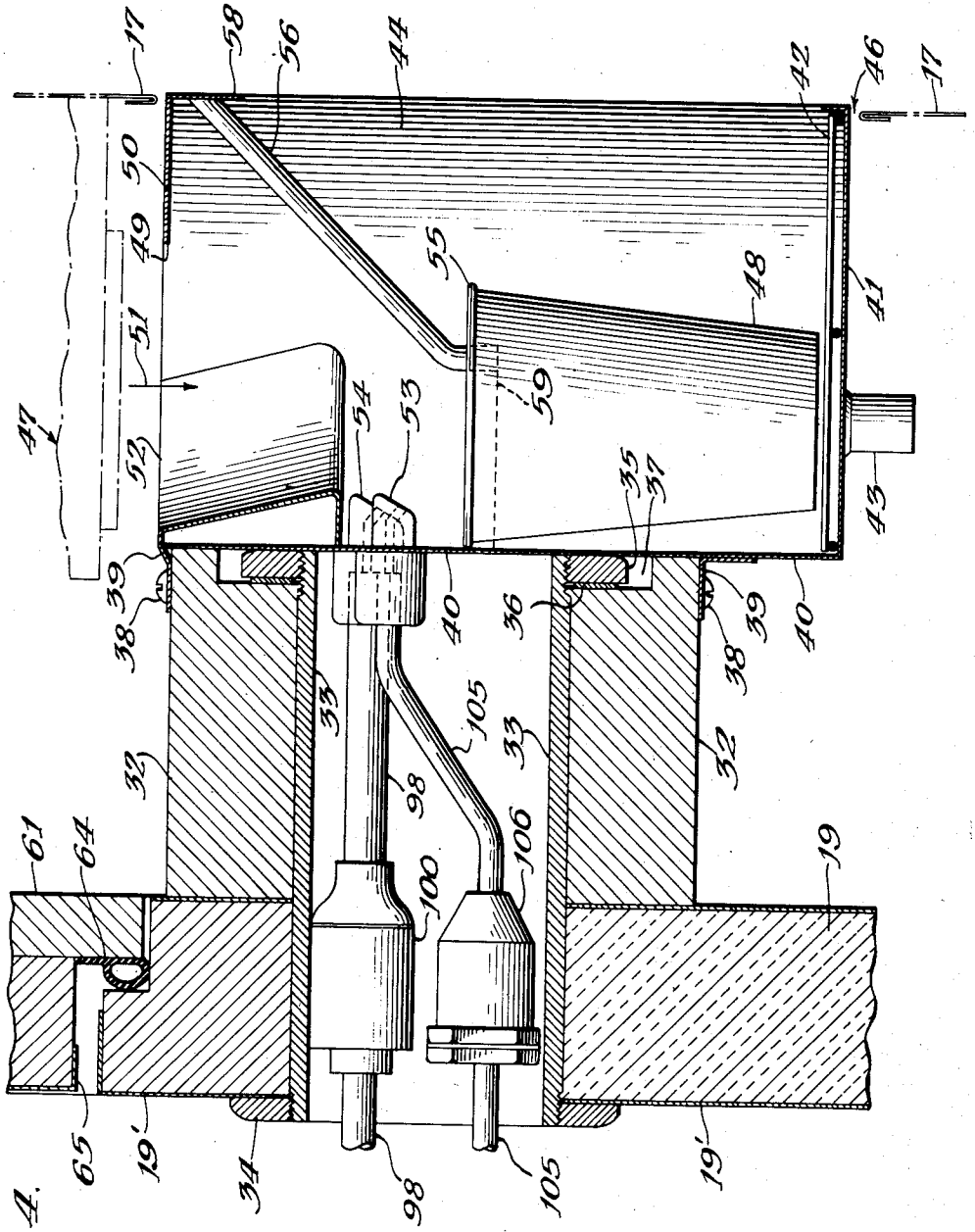

Fig. 4.

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BEVERAGE VENDING MACHINE

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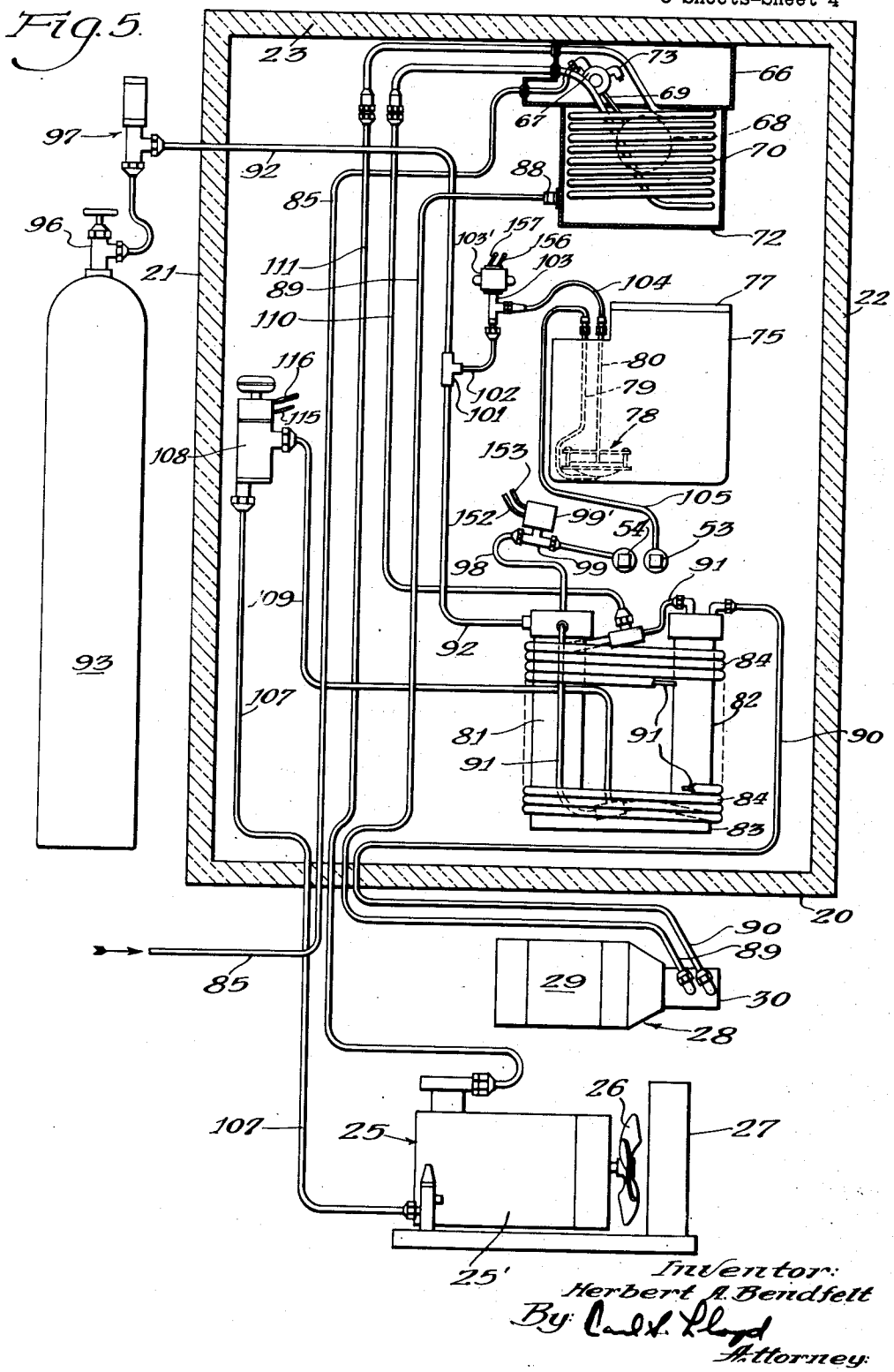
Fig. 5.



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BEVERAGE VENDING MACHINE

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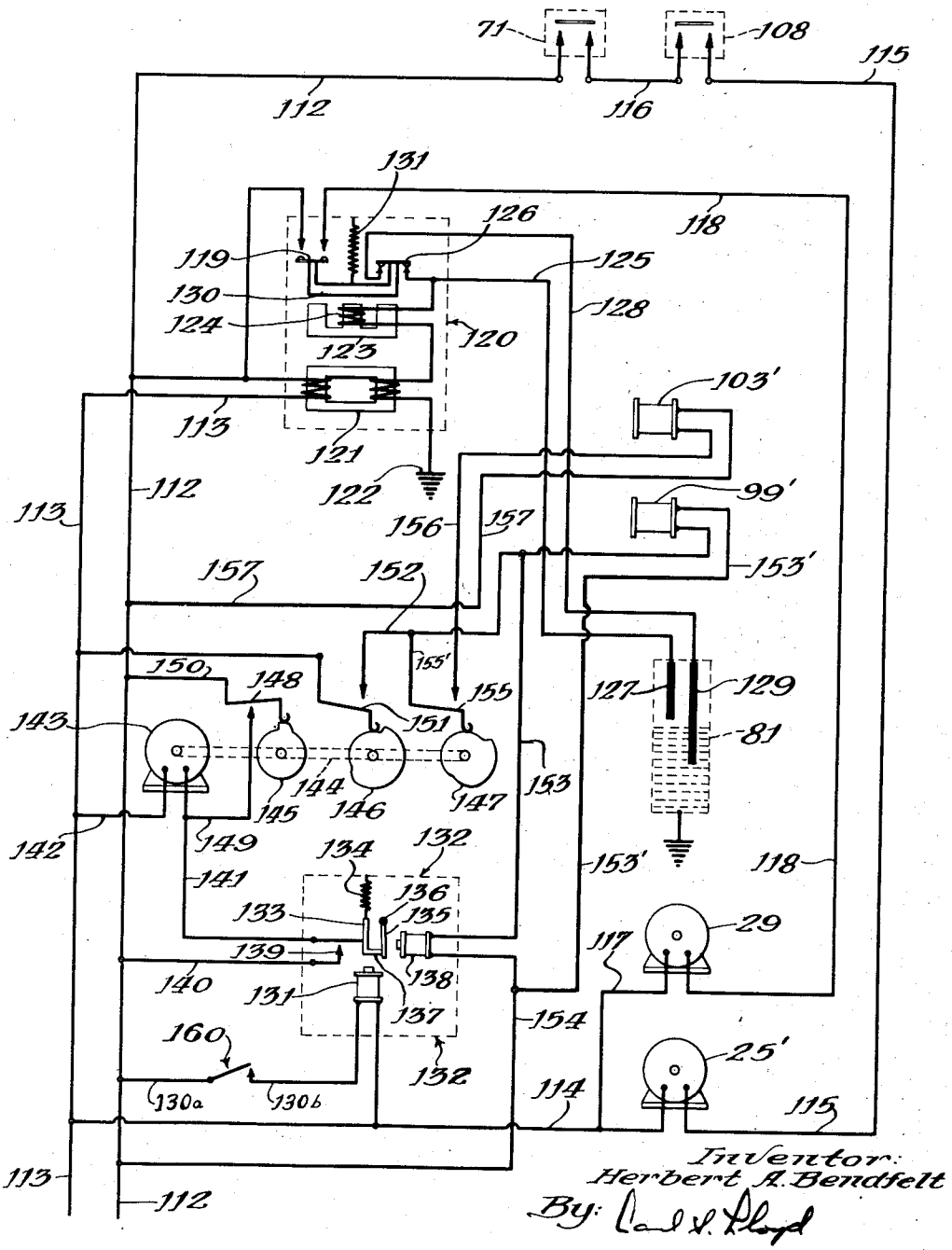
Fig. 6.



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Patented Aug. 11, 1953 2,648,274

UNITED STATES PATENT OFFICE

2,648,274

BEVERAGE VENDING MACHINE

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Application August 9, 1947, Serial No. 767,779

12 Claims. (Cl. 99—275)

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This invention relates to beverage vending machines and more particularly to a coin operated beverage vending machine for automatically vending the ingredients of a cold drink into a positioned cup.

In general the machine of my invention comprises a cabinet having therein two compartments, one of which is refrigerated and contains separate readily removable containers, one for a supply of a beverage liquid, such as water, and the other for a supply of a second ingredient of the beverage, such as a flavored syrup. The refrigerated compartment is arranged to also contain a filter and a carbonating unit in which the beverage liquid may be conditioned to improve the palatability of the drink. Substantially all of the lines and valves through which the beverage liquid and the syrup are caused to flow are housed within the refrigerated space of this compartment and said liquid and syrup are thus maintained in a cold condition until the moment they are discharged into said cup. The second compartment above mentioned is unrefrigerated and contains mechanism and parts not requiring refrigeration, as well as a gas cylinder from which carbon dioxide gas may be supplied to the carbonating unit and the syrup pump hereinafter mentioned.

An important object of my invention is to provide an inexpensive, small and light weight automatic beverage vending machine having a capacity for storing and refrigerating a sizeable supply of beverage ingredients whereby a large number of cold drinks may be dispensed from the machine during a very short period of time.

Another important object of my invention is to provide a beverage vending machine of this character having means for replenishing the supply of refrigerated beverage liquid therein whereby cold drinks may be rapidly dispensed from the machine over an extended period of time.

A further object of my invention is to provide in such a beverage vending machine an arrangement of cooling coils whereby said coils will occupy a minimum of space and efficiently cool the beverage ingredients regardless of whether said beverage is dispensed from the machine at a rapid or at a slow rate.

Still another object of the invention is to provide means for maintaining the beverage ingredients in said machine in a refrigerated condition until they are discharged into a positioned cup.

Another object of my invention is to provide in said machine readily removable containers for

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the beverage ingredients whereby said containers may be easily inspected, cleaned and serviced.

Other objects and advantages of the invention will be apparent from the following description of a preferred embodiment thereof, taken in connection with the accompanying drawings, in which:

Fig. 1 is a front elevational view of a beverage vending machine incoporating my invention, a door on the front of a cabinet for housing the machine being shown in an open position;

Fig. 2 is a sectional view taken on line 2—2 in Fig. 1 to illustrate the arrangement of compartments within the cabinet;

Fig. 3 is a similar view taken on the line 3—3 in Fig. 2 to show the arrangement of parts in the refrigerated compartment;

Fig. 4 is another sectional view taken substantially on the line 4—4 in Fig. 1 and illustrates the manner in which portions of the beverage discharge lines are refrigerated and the beverage ingredients therein kept cold until the latter are discharged into a positioned cup;

Fig. 5 is a schematic illustration of the refrigeration circuit and the arrangement of the various pipes and valves within the machine; and

Fig. 6 is a diagrammatic illustration of the electric circuits in the machine.

As thus illustrated the beverage vending machine is embodied in an open front metal cabinet having sides 11 and 12, a top 13, and a bottom 14, to the latter of which may be attached castors 15. The back of the cabinet is enclosed by a back plate 16, and upon the front of the cabinet a full length door, shown generally at 17, is mounted as by a piano hinge 18.

The interior of the cabinet is divided, by a vertical insulated wall 19, into two compartments. The rearmost compartment is completely insulated, and is defined by the wall 19, a floor 20, sides 21 and 22, and by a top 23 and a back 24. Said compartment may be lined with sheet metal 19' (Fig. 4) and the outer surface of the wall 19 may be similarly covered with metal.

The forward compartment is uninsulated.

Attached to the cabinet floor 14 in the forward compartment is a refrigerant compressor 25 of a suitable commercial construction provided with a fan 26 and a refrigerant condenser unit 27. Above the condenser and attached in a suitable manner to the lower portion of the wall 19 is a water pump unit 28 comprising an electric motor 29 and a small water pump 30 driven by said motor. Above the unit 28, and also fixed to the

outer surface of the wall 19, is a control box 31 which may contain certain electric relays and controls which are hereinafter more fully described.

Immediately above the control box 31 a block 32, of wood or other material having insulatory properties, is fixed to the wall 19, as best shown in Fig. 4. A hollow cylinder 33 of insulatory material, such as processed paper, is disposed horizontally through the block and arranged to extend through the wall 19 into the insulated compartment. Said cylinder may be threaded on each end to receive retaining spanner nuts 34 and 35, and a rubber washer 36 may be placed beneath the nut 35 at the outer end of the block 32, the latter of which may be countersunk as at 37 (Fig. 4) to receive the nut 35.

A vending stage is attached to the outer end of the block 32 by means of screws 38 and brackets 39. (See Fig. 4.) Said vending stage comprises a back plate 40 adapted to fit flush with the outer end of the block 32 to cover an open end of the cylinder 33, and a vending stage floor 41 is formed on the lower end of the back plate 40 and provided with a removable grate 42 and a drain spout 43. Side walls 44 and 45 of the vending stage (Fig. 1) may be attached to the back plate 40 and the floor 41 as by soldering. The surfaces on the back plate, floor and walls, may be chrome plated and the walls may be curved in a modern design to improve the appearance of the vending stage.

The door 17 is provided with an opening, shown generally at 46, through which the vending stage is accessible when the door is in its normally closed position. A drinking cup vending mechanism 47 is mounted on the inside of the door in a position so that when the door is closed the mechanism will be positioned directly above the vending stage. Said cup vending mechanism may be of any suitable construction and is shown in the drawings, by way of example, as an apparatus for vending a single column of paper cups. A cup 48 discharged from the cup vending mechanism when the door 17 is in a closed position will fall through a hole 49 in a top 50 of the vending stage in the direction shown by the arrow 51 in Fig. 4. The cup will strike an arc shaped deflector 52 and be deflected to prevent its coming into contact with two beverage discharge nozzles 53 and 54 which protrude from the back plate 40 into the vending stage. The upper rim 55 of the cup will come into contact, on opposite sides of said cup, with two parallel rails 56 and 57 which extend diagonally downwardly from a flange 58 on the top 50 of the vending stage. The cup will then slide down the rails into a ring 59 which will support said cup in a beverage receiving position below the discharge nozzles as shown in Figs. 1, 2 and 4. From this position the cup may be removed by a customer after it has been filled in a manner to be hereinafter described.

An overflow tank 60 may be suspended in any suitable manner below the drain spout 43 to receive therefrom any of the beverage which may be spilled in the vending stage.

Above the vending stage an insulating door 61 is provided in the wall 19 and is attached thereto as by hinges 62 and fasteners 63. The edges of said door may be made substantially air-tight by a rubber bead 64, and the back side of the door may be covered with a sheet of protective metal 65 as illustrated in Fig. 4.

Within the insulated compartment a hollow open-bottomed mounting member 66 is mounted to the lower side of the insulated top 23. Mounted to said member is a water inlet valve 67 operated by a float 68 on a stem 69, a cooling coil 70 and a temperature sensitive switch 71. Immediately below the member 66 is a readily removable beverage liquid storage tank 72 suitable for receiving water from an outlet 73 of the float operated valve 67. Said tank may be supported by quickly attachable fasteners 74 mounted upon the insulated wall 22, the back 24, and the wall 19. When the tank is in its operative position, as shown in Figs. 2 and 3, the coil 70 and the float 68 extend downwardly into the interior of said tank for which the member 66 serves as a cover.

Below the tank 72 is a removable container 75 supported by a sloping platform 76 attached to the insulated side 22 and to the back 24. Said container is provided with a removable cap 77 and is adapted to hold a supply of flavored syrup or the like. Suspended within said container is a gas operated diaphram pump shown generally at 78. Said pump may be one of a well known construction adapted to discharge a measured quantity of syrup from said tank through an internal line 79 each time compressed gas is introduced into the pump through another line 80.

A water carbonating unit 81 and a water filter assembly 82 are mounted upon a base 83 supported on the insulated bottom 20. Both the carbonating unit and the filter assembly may be of suitable commercial construction and a cooling coil 84 may be disposed about both as illustrated in Figs. 3 and 5.

A water inlet pipe 85, which may be connected to a city water supply or other water source, enters the cabinet through a hole 86 in the back plate 16, extends through a hole 87 in the insulated wall 19, and thence passes upwardly in the insulated compartment to the cover member 66. Said inlet water pipe penetrates the cover member and is attached to the water intake valve 67. Water discharged from the outlet 73 of said valve falls downwardly into the storage tank 72, the liquid level in which is maintained substantially constant by the controlling action of the float 68 on the valve 67.

From said tank water flows through a commercial attaching fitting 88 into a pipe 89 which leads downwardly through the insulated compartment to the hole 87, through said hole and into the inlet side of the pump 30. From the pump 30 said water under pressure enters a pipe 90 which extends through the hole 87 and into the insulated compartment to the intake side of the filter 82.

After passing through said filter, said water is conducted to the carbonating unit 81 through a pipe 91 which traverses the interior of the cooling coil 84 (Figs. 3 and 5). Carbon dioxide gas may be furnished to the carbonating unit through a pipe 92 which is connected to a standard gas cylinder 93 located within the uninsulated forward compartment. Said gas cylinder may be supported upon a base 94 attached to the side 11 of the cabinet and by a detachable bracket 95 having one of its ends fastened to the forward face of the wall 19 and the other to the side 11 (Fig. 1). The gas cylinder may also have associated therewith a shut-off valve 96, a safety valve 97 (Fig. 5), a pressure gauge (not shown), and a pressure sensitive switch (also not shown) for making the machine inoperative when the pressure in said cylinder has been reduced below a predetermined minimum.

From the carbonating unit said water in a carbonated condition is conducted through a pipe 98 to the beverage discharge nozzle 54, a discharge

control valve 99 operated by a solenoid 99' (Figs. 5 and 6), and a pressure reducing valve 100 (Fig. 4) of the well known capillary type being incorporated in the pipe 98. The solenoid 99' may be automatically energized by means hereinafter described to open the valve 99 for a time sufficient to allow a proper amount of the carbonated water to be discharged into the cup 48 each time a drink is to be dispensed. The pressure reducing valve 100 serves to reduce the pressure of the carbonated water passing therethrough to approximately atmospheric pressure.

A T-fitting 101 is provided in the carbon dioxide pipe 92. From said T-fitting a pipe 102 extends to a valve 103 operated by a solenoid 103'. Energization of said solenoid causes said valve to open and allow compressed gas to enter a flexible rubber tube 104 and pass thence into the pipe 80 extending downwardly within the syrup container 75 to operate the diaphragm pump 78. Operation of said pump causes a measured quantity of said syrup to be discharged through the pipe 79 and through a connecting flexible rubber tube 105, the latter of which extends, with the pipe 98, through the cylinder 33 and is fastened to the discharge nozzle 53. In this manner a measured quantity of syrup will be discharged from said nozzle 53 each time the valve 103 is operated. A ball check valve 106 (Fig. 4) is provided in the tube 105, the purpose of this valve being to prevent dripping of syrup from the nozzle 53.

After the solenoid controlled valve 103 has been operated to cause a discharge of syrup in the manner above described, the valve will return to its normal position when the solenoid is de-energized and an escape of gas therefrom will release the gas pressure in the pump 78. A diaphragm (not shown) in the pump will then resume its normal position and in so doing will collect in the pump another measured quantity of the syrup which will be discharged upon the next operation.

Liquid refrigerant, such as Freon, passes from the compressor 25 and condensor 27 into a pipe 107 which extends into the insulated compartment through the hole 87 in the wall 19 and thence to a constant pressure control valve 108 of a well known suitable type. From the valve the refrigerant is conducted into the bottom of the cooling coil 84 through a pipe 109. The refrigerant passes upwardly through the coil 84 in a direction opposite to the direction of the flow of water in the pipe 91 which traverses the interior of said coil as hereinbefore explained. At the top of the coil 84 the refrigerant enters a pipe 110 and flows upwardly therethrough to the cooling coil 70 within the water storage tank 72. After passing through the latter coil the refrigerant enters a pipe 111 and is returned thereby to the compressor 25 to be recompressed and thereafter cooled in the condensor 27 in a manner well known in the art. (See Fig. 5.)

It will be readily understood that as the refrigerant passes into the coil 84 said refrigerant may expand and vaporize therein to absorb heat from the air in the insulated compartment and from the carbonating unit, filter assembly and from the water flowing therein through the pipe 91. Further expansion and vaporization of the refrigerant when the same passes through the coil 70 will likewise cool the supply of water in the tank 72. In practice the valve 108 may be set at a pressure to maintain the temperature of the coil 84 at slightly above 32 degrees Fahrenheit, and the temperature sensitive switch 71 located within the water in the tank 72 may be set to open a circuit to the compressor and thus stop the flow of refrigerant when the temperature of the water within the tank drops below 40 degrees Fahrenheit.

Because the refrigerant first enters the coils 84, refrigeration is always first available therein at the point at which the refrigerant is introduced into the coil. If drinks are not dispensed from the machine at a rapid rate, the water in the pipe 91 within the coil, and the water within the carbonating unit and filter assembly will be quickly cooled. So long as cold water remains in the pipe 91, a minimum amount of vaporization of the refrigerant and resultant refrigeration will take place in said coil. During such periods the refrigerant will pass upwardly to the coil 70 in a liquid or nearly liquid condition and vaporize therein to refrigerate all of the water in the tank 72. In this way a large supply of refrigerated ingredients for the beverage will be prepared for rapid discharge should the rate at which drinks are vended from the machine be suddenly increased. If said drinks are vended from the machine at a high rate over an extended period of time the supply of pre-refrigerated water in the tank 72 may become substantially exhausted. During such periods the water passing through the pipe 91 within the coil 84 will be warmer than desired and consequently the rate at which the refrigerant vaporizes and expands within the coil 84 will be automatically increased by the present of heat in the water to bring the temperature of said water in the pipe 91 down to the desired temperature. During extended periods when drinks are vended rapidly from the machine substantially all of the refrigeration of the water will thus take place in the coil 84.

It will be understood that no valves, solenoids or other apparatus are required to shift the point of maximum refrigeration from one coil to the other and that the rate at which cold drinks may be vended from the machine is materially increased by this arrangement. In the machine which I have constructed, for example, sufficient water for 100 drinks may be pre-refrigerated and contained within the tank 72, the carbonating unit, the filter assembly and the various connecting pipes. The compressor, for example, may have a capacity for cooling sufficient water each hour for 80 drinks. Thus if the machine is suddenly required to dispense drinks at a rapid rate, a total of 180 drinks may be dispensed during the first hour, and 80 drinks may be dispensed during each hour thereafter for an indefinite period, the supply of syrup in the tank 75 being replenished when necessary.

A typical arrangement of electrical circuits for controlling the operation of my machine is illustrated in the Figure 6. Electric current may be introduced into the machine by leads 112 and 113 which may be connected to an electric power source (not shown). From the lead 113 a line 114 extends to one side of a motor 25' adapted to drive the compressor 25. From the other side of the motor 25' a line 115 extends to one side of the constant pressure switch 108. The other side of the switch 108 is connected by a line 116 to the temperature sensitive switch 71 to which the lead 112 is also connected. It will thus be observed that the compressor 25 will be driven by the motor 25' to circulate refrigerant through the coils 84 and 70 only at times when both the switch 108 and the switch 71 are closed.

Electric current may be directed to the water pump motor 29 by means of a lead 117 attached to the line 114 and from thence by a lead 118 to one side of a switch 119 which may be a part of a magnetic switch control assembly indicated generally by the numeral 120. The other side of the switch 119 is connected to the lead 112 to complete the circuit through said motor 29 when said switch 119 is closed. Said switch assembly 120 may be contained within the electric control box 31 and may comprise a transformer 121 having one of its sides electrically disposed between the leads 112 and 113. The other side of said transformer may have one end grounded to the machine, as at 122, and another end extended about a magnet 123, as in a coil 124, and thence to a line 125 which may connect one side of a switch 126 with a short electrode 127 suspended in the carbonating unit 81. The other side of the switch 126 may be connected by means of a line 128 to a longer electrode 129 also suspended within the carbonating unit 81. The contact bars of the switches 119 and 126 in the arrangement shown are mounted upon a bar 130 which is spring-loaded by means of a spring 131 to draw said bar away from the magnet 123 and, in so doing, to close the switch 119 and open the switch 126. When the water level in the carbonating unit 81 is high enough to contact both of the electrodes 127 and 129, the magnet 123 will be energized to keep the switch 119 open and thus prevent the operation of the water pump motor 29 and prevent the pump 30 from introducing water into the carbonating unit. In this manner the level of water in said carbonating unit may be maintained substantially constant regardless of the rate at which drinks are vended from the machine.

A switch 160 electrically disposed between leads 130*a* and 130*b* (Fig. 1) may be associated with a coin receiving apparatus 130' which may be mounted upon the back side of the door 17 and arranged to receive coins through an appropriate slot (not shown) in the front face of said door. Said switch is adapted to be momentarily closed when a coin is inserted through the slot into said coin receiver. The closing of the switch causes the energization of a solenoid 131 in an interlocking relay assembly shown generally at 132. Said relay assembly may be housed within the control box 31 and may comprise a lever 133 loaded by a spring 134, a link 135 pivoted as at 136 and adapted to engage a catch 137 on said lever when the latter is attracted toward the solenoid 131, and another solenoid 138 adapted to attract the link and cause the same to disengage the catch 137.

When the switch 130 is momentarily closed by an inserted coin and the solenoid 131 is energized, as explained above, the latter attracts the lever 137 in a manner which causes the link 135 to engage the catch 137 and causes the closing of a switch 139 which completes a circuit, through leads 140, 141 and 142, to an electric motor 143 which may, for example, be mounted upon the rear side of the door 17 and may be utilized to cause the discharge of cups from the cup vending mechanism 47. Said motor drives a shaft 144 upon which is mounted three cams 145, 146 and 147. As said motor turns the shaft, a switch 148 is closed by the cam 145 to complete another circuit through said motor through lines 149 and 150. This latter circuit will remain closed and the motor will continue to run (regardless of whether the switch 139 remains in a closed position) until the cam 145 has made a complete revolution and again opens the switch 148.

As the cam 146 turns, a switch 151 will be closed thereby to complete a circuit through wires 152, 153', 153 and 154 to simultaneously energize the carbonated water discharge solenoid 99' and the solenoid 138. The former of said solenoids will open the water discharge valve 99 for a time sufficient for a proper amount of water for one drink to be discharged from the nozzle 54 into the cup 48. The solenoid 138 will attract the link 135 to cause the same to disengage the catch 137 of the lever 133 and allow the latter to return to its normal position and thus open the switch 139.

The cam 147 will close a switch 155 to complete a circuit through wires 155', 156 and 157 and through the closed switch 151 to energize a solenoid 103'. This latter solenoid will open the valve 103 and admit compressed gas to the diaphragm pump 78 to cause the discharge of a measured amount of syrup from the nozzle 53 into the cup in the manner hereinbefore described. It will be understood that, because the circuit to the solenoid 103' is completed through the switch 151, the valve 103 will not be opened to cause the discharge of syrup unless the switch 151 has first been closed and water consequently discharged into the cup.

The discharge of the water and syrup into said cup will cause the same to be intermixed therein, and the cup containing the finished cold drink may then be withdrawn from the cup support ring by the customer. Another coin may then be inserted into the coin receiver and the above described dispensing operation will be repeated to vend still another drink.

It will be seen that because of the arrangement of the compartments and the disposition of the storage and refrigeration facilities for the ingredients for the beverage, the vending machine of my invention is very compact and will occupy a minimum of floor and wall space. Because the machine is smaller than machines of prior construction having a capacity for discharging drinks at an equally rapid rate, it is also much lighter in weight and much less expensive.

Another of the important advantages of my machine over those of earlier construction is the ease with which the containers for the beverage ingredients may be inspected, cleaned and serviced. With the door 17 and the inner door 61 in open positions, the container 75 may be pulled forward on the sloping platform 76 to a position in which the cap 77 may be easily removed and the supply of syrup in the container replenished. The flexibility of the rubber tubes 104 and 105 makes it unnecessary to detach the same from the container except when the latter is removed completely from the machine for purposes of cleaning and the like. If said container is removed for this purpose it may be quickly replaced by an identical spare clean container and the machine therefore need not be out of service during the cleaning operation.

When the container 75 has been pulled to a forward position, the pipe fitting 88 on the tank 72 may be detached from the latter and the supporting fasteners 74 may be released to allow said tank to drop downwardly to clear the lower end of the coil 70 and then be brought forward to be removed from the machine. In this manner the coil as well as the temperature sensitive switch 71 and the float and valve 67 may be made

quickly accessible for cleaning and inspection. The tank may of course also be quickly cleaned and inspected while it is out of the machine.

The foregoing detailed description has been given for clearness of understanding only and no unnecessary limitations should be understood therefrom, but the appending claims should be construed as broadly as permissible in view of the prior art.

I claim:

1. A beverage vending machine comprising: a cabinet having therein an insulated compartment; a storage tank for a beverage liquid; a container for a second ingredient of the beverage, said tank and said container being disposed within said insulated compartment; means for refrigerating said beverage liquid and said second ingredients including first and second cooling coils within said compartment, and a refrigerant compressor, said first coil being arranged to receive said refrigerant from said compressor and said second coil being arranged within said storage tank to receive said refrigerant from said first coil thereby causing first refrigeration at said first coil, and thereafter pre-refrigeration of the beverage liquid to substantially dispensing temperature in said storage tank during periods of infrequent use of the machine and consequent slow transfer of such liquid from said storage tank ; and means for measuring and conducting quantities of said beverage liquid and said second ingredient from said tank and said container to an accessible point of discharge at the front of the machine.

2. A beverage vending mechine comprising: a cabinet having therein an insulated compartment; a source of compressed gas; a storage tank for a beverage liquid; a container for a second ingredient of the beverage; a carbonating unit in which said beverage liquid may be charged with said gas, said tank, container, and carbonating unit being disposed within said insulated compartment; means for refrigerating said beverage liquid and said insulated compartment including first and second cooling coils within the latter, and a refrigerant compressor, said first coil being arranged to receive said refrigerant from said compressor and said second coil being arranged within said storage tank to receive said refrigerant from said first coil thereby causing first refrigeration at said first coil, and thereafter pre-refrigeration of the beverage liquid to substantially dispensing temperature in said storage tank during periods of infrequent use of the machine and consequent slow transfer of such liquid from said storage tank; a conduit for conveying said beverage liquid from said storage tank to said carbonating unit; and means for measuring and conducting quantities of said beverage liquid and said second ingredient from said carbonating unit and said container to an accessible point of discharge at the front of the machine.

3. A beverage vending machine comprising: a cabinet having therein an insulated compartment; a source of compressed gas; a storage tank for a beverage liquid; a container for a second ingredient of the beverage; a carbonating unit in which said beverage liquid may be charged with said gas, said tank, container, and carbonating unit being disposed within said compartment; means for refrigerating said liquid beverage and said compartment including first and second cooling coils within the latter, and a refrigerant compressor, said first coil being disposed about said carbonating unit and said second coil being disposed within said tank to conserve space, and said first coil being arranged to receive said refrigerant from said compressor and said second coil being arranged to receive said refrigerant from said first coil thereby causing first refrigeration at said first coil, and thereafter pre-refrigeration of the beverage liquid to substantially dispensing temperature in said storage tank during periods of infrequent use of the machine and consequent slow transfer of such liquid from said storage tank; a conduit for conveying said beverage liquid from said storage tank to said carbonating unit; and means for measuring and conducting quantities of said beverage liquid and said second ingredient from said carbonating unit and said container to an accessible point of discharge at the front of the machine.

4. A beverage vending machine comprising: a cabinet having therein an insulated compartment; a storage tank for a beverage liquid; a container for a second ingredient of the beverage, said tank and said container being disposed within said insulated compartment; means for refrigerating said beverage liquid and said second ingredient including first and second cooling coils within said compartment, and a refrigerant compressor, said first coil being arranged to receive said refrigerant from said compressor and said second coil being arranged within said storage tank to receive said refrigerant from said first coil thereby causing first refrigeration at said first coil, and thereafter pre-refrigeration of the beverage liquid to substantially dispensing temperature in said storage tank during periods of infrequent use of the machine and consequent slow transfer of such liquid from said storage tank; a conduit for conveying said beverage liquid from said storage tank, said conduit traversing the interior of said first coil, thereby causing principal refrigeration of such beverage liquid in said first coil during periods of very frequent use of the machine and consequent rapid transfer of such liquid from said storage tank; and means for measuring and conducting quantities of said beverage liquid and said second ingredient to an accessible point of discharge at the front of the machine.

5. A beverage vending machine comprising: a cabinet having therein an insulated compartment; a source of compressed gas; a storage tank for a beverage liquid; a container for a second ingredient of the beverage; a carbonating unit in which said beverage liquid may be charged with said gas, said tank, container and carbonating unit being disposed within said insulated compartment; means for refrigerating said beverage liquid and said insulated compartment including first and second cooling coils within the latter, and a refrigerant compressor, said first coil being arranged to receive said refrigerant from said compressor and said second coil being arranged within said storage tank to receive said refrigerant from said first coil thereby causing first refrigeration at said first coil, and thereafter pre-refrigeration of the beverage liquid to substantially dispensing temperature in said storage tank during periods of infrequent use of the machine and consequent slow transfer of such liquid from said storage tank; a conduit for conveying said beverage liquid from said storage tank to said carbonating unit, said conduit traversing the interior of said first coil, thereby causing principal refrigeration of such beverage liquid in said first coil during periods of very frequent

use of the machine and consequent rapid transfer of such liquid from said storage tank; and means for measuring and conducting quantities of said beverage liquid and said second ingredient from said carbonating unit and said container to an accessible point of discharge at the front of the machine.

6. A beverage vending machine comprising: a cabinet having therein an insulated compartment; a storage tank for a beverage liquid; a container for a second ingredient of the beverage, said tank and said container being disposed within said insulated compartment; means for refrigerating said beverage liquid and said second ingredient including first and second coils within said compartment, and a refrigerant compressor, said first coil being arranged to receive said refrigerant from said compressor and said second coil being arranged within said storage tank to receive said refrigerant from said first coil thereby causing first refrigeration at said first coil; and thereafter pre-refrigeration of the beverage liquid to substantially dispensing temperature in said storage tank during periods of infrequent use of the machine and consequent slow transfer of such liquid from said storage tank; a conduit for conveying said beverage liquid from said storage tank, said conduit traversing the interior of said first coil in a manner whereby the direction of the flow of said liquid in said conduit within said first coil will be opposite the direction of flow of said refrigerant therein, thereby causing principal refrigeration of such beverage liquid in said first coil during periods of very frequent use of the machine and consequent rapid transfer of such liquid from said storage tank; and means for measuring and conducting quantities of said beverage liquid and said second ingredient to an accessible point of discharge at the front of the machine.

7. A beverage vending machine comprising: a cabinet; a dividing wall in said cabinet adapted to form compartments, one of said compartments being insulated; a storage tank for a beverage liquid and a container for a second ingredient of the beverage, both being removably mounted in said insulated compartment; a door in said dividing wall to provide an opening through which said tank and container may be removed for cleaning and servicing; means for refrigerating said beverage liquid and said insulated compartment including first and second cooling coils within the latter, and a refrigerant compressor, said first coil arranged to receive said refrigerant from said compressor and said second coil being arrangeable within said storage tank and adapted to receive said refrigerant from said first coil thereby causing first refrigeration at said first coil, and thereafter pre-refrigeration of the beverage liquid to substantially dispensing temperature in said storage tank during periods of infrequent use of the machine and consequent slow transfer of such liquid from said storage tank; and means for measuring and conducting quantities of said beverage liquid and said second ingredient from said tank and said container to an accessible point of discharge at the front of the machine.

8. A beverage vending machine comprising: a cabinet; a dividing wall in said cabinet adapted to form compartments, one of said compartments being insulated; a storage tank for a beverage liquid and a container for a second ingredient of the beverage, both being removably mounted in said insulated compartment; a door in said dividing wall to provide an opening through which said tank and container may be removed for cleaning and servicing; means for refrigerating said beverage liquid and said insulated compartment including first and second cooling coils within the latter, and a refrigerant compressor, said first coil arranged to receive said refrigerant from said compressor and said second coil being arrangeable within said storage tank and adapted to receive said refrigerant from said first coil thereby causing first refrigeration at said first coil, and thereafter pre-refrigeration of the beverage liquid to substantially dispensing temperature in said storage tank during periods of infrequent use of the machine and consequent slow transfer of such liquid from said storage tank; a conduit for conveying said beverage liquid from said storage tank, said conduit traversing the interior of said first coil in a manner whereby the direction of the flow of said liquid in said conduit within said first coil will be opposite the direction of flow of said refrigerant therein, thereby causing principal refrigeration of such beverage liquid in said first coil during periods of very frequent use of the machine and consequent rapid transfer of such liquid from said storage tank; and means for measuring and conducting quantities of said beverage liquid and said second ingredient to an accessible point of discharge at the front of the machine.

9. A beverage vending machine comprising: a cabinet having therein an insulated compartment; a source of compressed gas; a storage tank for a beverage liquid; a container for a second ingredient of the beverage; a carbonating unit in which said beverage liquid may be charged with said gas; said tank, container, and carbonating unit being disposed within said insulated compartment; means for refrigerating said beverage liquid and said insulated compartment including a plurality of cooling coils within the latter, and a refrigerant compressor, a first of said coils being disposed about said carbonating unit and adapted to receive said refrigerant from said compressor and a second of said coils being disposed within said storage tank and arranged to receive said refrigerant from said first coil thereby causing first refrigeration at said first coil, and thereafter pre-refrigeration of the beverage liquid to substantially dispensing temperature in said storage tank during periods of infrequent use of the machine and consequent slow transfer of such liquid from said storage tank; a conduit for conveying said beverage liquid from said storage tank to said carbonating unit; a beverage liquid discharge line extending from said carbonating unit to an accessible point of discharge at the front of the machine; a valve in said line; a second discharge line extending from said container to a similar point; a gas operated pump arranged to eject a measured quantity of said second ingredient from the machine at said point upon each operation of said pump, said pump being in communication with said source of compressed gas; a valve in the line of communication between said gas operated pump and said source of compressed gas; actuating means including solenoids for operating said valves; and means including cam operated switches for energizing said solenoids for momentarily opening said valves to cause the operation of said pump and to cause the discharge of said beverage liquid and said second ingredient from the machine at said accessible point of discharge at the front thereof.

10. In a beverage vending machine: a storage tank for a beverage liquid; refrigeration apparatus including a source of fluid refrigerant and a compressor therefor; a cooling coil arranged to receive said refrigerant from said source; a second cooling coil in communication with said first coil and arranged within said tank for cooling said beverage liquid therein; a conduit through which said beverage liquid may flow from said tank, a part of said conduit traversing the interior of said first coil; means for circulating said refrigerant first through said first coil and then through said second coil whereby said beverage liquid, if not sufficiently cooled in said tank by the latter coil, will be further cooled by said first coil and whereby when the beverage liquid traversing said first coil is sufficiently cold for dispensing the refrigerant fluid will pass to said second coil in said storage tank in substantially liquid state and have its principal refrigerating effect there until the beverage liquid in said tank is substantially cold enough for dispensing; and thermostatically controlled means for thereupon rendering said compressor inoperative until the temperature of the liquid in said tank rises to the point that further refrigeration is required.

11. In a beverage vending machine: a storage tank for a beverage liquid; refrigeration apparatus including a source of fluid refrigerant and a compressor therefor; a cooling coil arranged to receive said refrigerant from said source; a second cooling coil in communication with said first coil and arranged within said tank for cooling said beverage liquid therein; a conduit through which said beverage liquid may flow from said tank, a part of said conduit traversing the interior of said first coil; means for circulating said refrigerant first through said first coil, in a direction opposite to the direction of flow of said beverage liquid in said conduit, and then through said second coil whereby said beverage liquid, if not sufficiently cooled in said tank by the latter coil, will be further cooled within said first coil and whereby when the beverage liquid traversing said first coil is sufficiently cold for dispensing the refrigerant fluid will pass to said second coil in said storage tank in substantially liquid state and have its principal refrigerating effect there until the beverage liquid in said tank is substantially cold enough for dispensing; and thermostatically controlled means for thereupon rendering said compressor inoperative until the temperature of the liquid in said tank rises to the point that further refrigeration is required.

12. In a beverage vending machine: a storage tank for a beverage liquid; a supply of compressed gas; a carbonating unit in which said beverage liquid may be charged with said gas; a refrigeration apparatus including a source of liquid refrigerant and a compressor therefor; a cooling coil disposed about said carbonating unit and arranged to receive said refrigerant from said source; a second cooling coil in communication with said first coil and arranged within said tank for cooling said beverage liquid therein; a conduit through which said beverage liquid may flow from said tank into said carbonating unit, a part of said conduit traversing the interior of said first coil; means for circulating said refrigerant first through said first coil and then through said second coil whereby said beverage liquid, if not sufficiently cooled in said tank by the latter coil, will be further cooled by said first coil and whereby when the beverage liquid traversing said first coil is sufficiently cold for dispensing the refrigerant fluid will pass to said second coil in said storage tank in substantially liquid state and have its principal refrigerating effect there until the beverage liquid in said tank is substantially cold enough for dispensing; and thermostatically controlled means for thereupon rendering said compressor inoperative until the temperature of the liquid in said tank rises to the point that further refrigeration is required.

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