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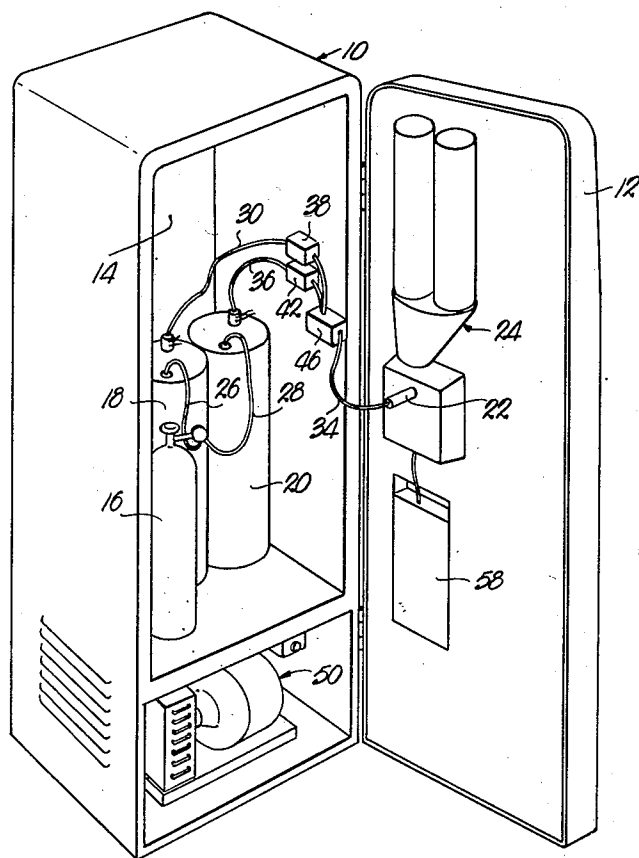
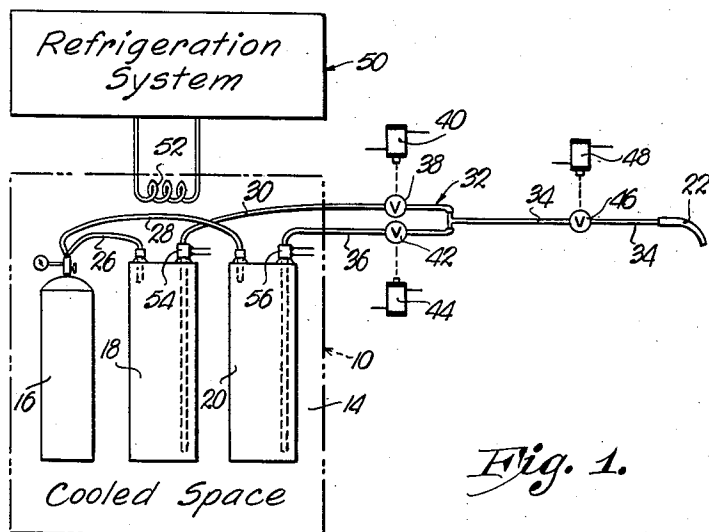
B. A. ANDREWS ET AL

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DISPENSING MACHINE FOR REFRIGERATED PRE-MIXED DRINKS

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BY

INVENTORS.
Boley A. Andrews
Theodore L. Hanson
Boley A. Andrews
ATTORNEY.

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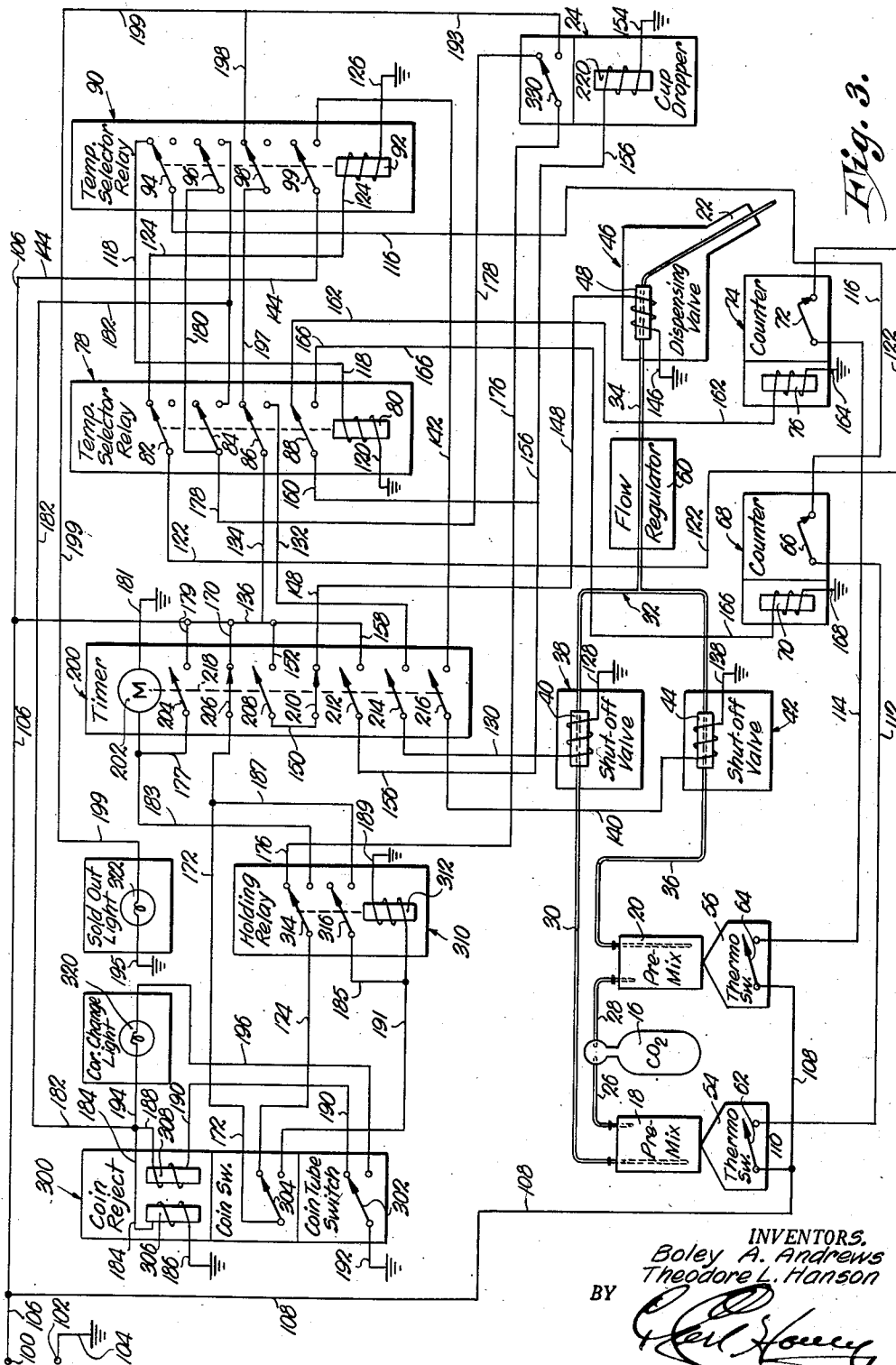


Fig. 3.

INVENTORS.
Boley A. Andrews
Theodore L. Hanson
BY 

ATTORNEY.

1

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DISPENSING MACHINE FOR REFRIGERATED
PRE-MIXED DRINKS

Boley A. Andrews, Mission, Kans., and Theodore L. Hanson, Kansas City, Mo., assignors to The Vendo Company, Kansas City, Mo., a corporation of Missouri

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7 Claims. (Cl. 62-7)

This invention relates generally to the field of vending machines, and, more particularly, to improved apparatus for the vending of pre-mixed, carbonated beverages.

The objects of this invention are to provide improved apparatus for the vending of pre-mixed, carbonated beverages from at least a pair of containers introduced into the apparatus with the beverage material at ambient temperatures with the apparatus remaining inoperative until the beverage material in at least one of the containers has been cooled to a predetermined temperature level and with automatic switch over from one container to the other after the first has been substantially exhausted of beverage material and the other has had the material therein cooled to the mentioned predetermined temperature level.

Other important objects of the invention, including certain significant details of construction, will be made clear or become apparent as the following description of the invention progresses.

It should be pointed out that the invention also contemplates as among its objectives the applicability of certain of its principles to apparatus other than vending machines in which the temperature level of fluid material within one or more containers must be altered to a predetermined, desired level and the fluid material then delivered to a point of utilization thereof.

In the accompanying drawings:

Fig. 1 is a diagrammatic representation of certain of the primary elements of the thermal hydraulic and electrical combination contemplated by the invention;

Fig. 2 is a perspective view of a vending machine cabinet with the access door thereof open showing the contemplated arrangement therein of certain of the elements of the combination involved in the invention; and

Fig. 3 is a schematic diagram showing the entire electrical and hydraulic system contemplated as constituting a preferred form of the invention.

Referring first to Figs. 1 and 2, the numeral 10 generally designates a vending machine cabinet having an access door 12 thereon by which access may be had to an internal, thermally insulated compartment 14. Compartment 14 is adapted to receive therewithin a carbon dioxide containing tank 16 and at least a pair of containers 18 and 20 each having therein a quantity of pre-mixed carbonated beverage material. A dispensing spigot 22 is provided on the door 12 for dispensing material into cups not shown from a cup storing and dispensing device generally designated 24 also mounted on door 12.

The carbon dioxide tank 16 is replaceable and is releasably coupled with the product container 18 by a line 26 and with the product container 20 by a line 28. The product container 18 is in turn coupled by a releasably connected branch section line 30 of conduit means 32 having a common section 34 with the spigot 22, product container 20 being in like manner coupled through a branch section line 36 and the common section 34 with the spigot 22. Interposed in branch section 30 is an electrically responsive control valve 38 provided with an

2

operating solenoid 40, while a control valve 42 having an operating solenoid 44 is interposed in branch section 36. Interposed in the common section 34 is a dispensing valve 46 having an operating solenoid 48.

It will be understood that the beverage containing product containers 18 and 20 are replaceable within the compartment 14 by virtue of the releasable connections between same and the lines 26 and 28 and the branch conduit sections 30 and 36 associated therewith.

A refrigeration system generally designated by the numeral 50 is also provided within cabinet 10 and includes a cooling coil or element 52 disposed in heat exchanging relationship with the air contained within compartment 14. Refrigeration system 50 thus functions to maintain the interior of compartment 14 at a temperature substantially below the normal ambient temperature of beverage material within the product containers 18 and 20 at the time that same are introduced into the compartment 14. By virtue of the heat conductive nature of the product containers 18 and 20, it will be clear that the temperature of beverage material therewithin will be cooled to and maintained at a predetermined level normally below the mentioned ambient temperature thereof at the time of introduction of such containers 18 and 20 into the compartment 14.

Operably associated with each of the product containers 18 and 20 respectively are thermally responsive electrical switching assemblies 54 and 56, it being understood that such devices 54 and 56 are releasably mountable on the containers 18 and 20 and are adapted for operating the electrical switches forming a part thereof and more particularly hereinafter described, responsive to cooling of the liquid beverage material within the corresponding container 18 or 20 to a predetermined, desired level. Other conventional vending machine components, including a waste tank 58 and certain coin handling and related mechanisms (not shown in Figs. 1 and 2) will normally be provided.

Referring now to the comprehensive schematic diagram of Fig. 3, the various parts and their operable interconnections will first be described, then the manner of their cooperative operation discussed.

From the hydraulic point of view, it will be seen that the connections are as above-described in connection with Figs. 1 and 2, except that a flow regulator 60 will normally be interposed in the common section 34 of conduit 32 between the branches 30 and 36 and the dispensing valve 46.

A pair of terminals 100 and 102 adapted for connection with a source of electrical power are shown, terminal 102 being grounded as at 104. Terminal 100 is coupled through a conductor 106, a conductor 108, and a conductor 110 with one side of a normally open, thermostatically controlled single pole, single throw, electrical switch 62 forming a part of the thermally responsive device 54 and through conductors 106 and 108 with one side of a similar switch 64 forming a part of the thermally responsive device 56. The opposite side of the switch 62 is coupled through a conductor 112 with one side of a normally closed, single pole, single throw electrical switch 66 forming a part of a counter switch mechanism 68 having an operating solenoid 70. The opposite side of switch 64 is similarly coupled through a conductor 114 with one side of a normally closed, single pole, single throw switch 72 forming a part of a counter switching mechanism 74 having an operating solenoid 76.

There is provided a first control or temperature selector relay 78 having an operating solenoid 80, a normally closed, single pole, single throw switch 82, a normally open, single pole, single throw switch 84, and a pair of single pole, double throw switches 86 and 88. In like manner there is provided a control or temperature se-

lector relay 90 having an operating coil 92, a normally closed, single pole, single throw switch 94, a normally open single pole, single throw switch 96, a normally closed single pole, single throw switch 98, and a normally open single pole, single throw switch 99.

The side of counter switch 66 opposite conductor 112 is coupled through a conductor 116, normally closed relay switch 94 of relay 90 and a conductor 118 with one side of the operating coil 80 of relay 78 whose opposite side is grounded as at 120. The side of counter switch 72 opposite conductor 114 is coupled through a conductor 122, normally closed switch 82 of relay 78, and a conductor 124 with one side of operating coil 92 of relay 90, the other side of which is grounded as at 126.

It will be understood that the thermally responsive switching means 54, the counter switching means 68, and the control relay 78, all correspond to or are functionally associated with the product container 18, while the thermally responsive switching device 56, the counter switching device 74 and the relay 90 are similarly associated with the product container 20. Obviously, the valve 38 is likewise associated with the product container 18, while the valve 42 is associated with the product container 20.

The apparatus further includes a timer switching mechanism generally designated 200 including an operating motor 202 and (regarding as normal that condition thereof existing when the timer 200 is in stand-by condition between operative cycles thereof) a normally open, single pole, single throw switch 204, a normally closed single pole, single throw switch 206, a normally open single pole, single throw switch 208, a normally closed single pole, single throw switch 210, a normally open single pole, single throw switch 212, a normally open single pole, single throw switch 214, and a normally open single pole, single throw switch 216, which switches it will be understood are operated in predetermined sequence by cam means associated with the motor 202 and indicated generally by the dotted line 218, as hereinafter more particularly described.

One side of the valve operating solenoid 40 is grounded as at 128 and oppositely connected through a conductor 130, normally open switch 214 of timer 200, a conductor 132, the normally open portion of switch 86 of relay 78, a conductor 134, a conductor 136, and the conductor 106 with the power terminal 100. Similarly, one side of the operating solenoid 44 for valve 42 is grounded as at 138 and oppositely connected through a conductor 140, the normally open switch 216 of timer 200, a conductor 142, the normally open switch 99 of relay 90, a conductor 144, and the conductor 106 with power terminal 100.

The operating coil 48 of dispensing valve 46 has one side thereof grounded as at 146 and the opposite side thereof coupled through a conductor 148, normally closed switch 210 of timer 200, a conductor 150, normally open switch 208 of timer 200, a conductor 152, and the conductors 136 and 106 with power terminal 100.

A cup dropping solenoid 220 forming a part of the cup handling assembly 24 is grounded at one side thereof as at 154 and oppositely connected through a conductor 156, the normally open switch 212 of timer 200, a conductor 158, and conductors 136 and 106 with the power terminal 100. Conductor 156 coupled with the ungrounded side of the cup dropping solenoid 220 is also connected through a conductor 160 with the movable pole piece of double throw switch 88 of relay 78 by which it is normally (that is, when the relay operating coil 80 is energized) coupled through a conductor 162 with one side of the operating coil 76 of counter switching device 74, the opposite side of operating coil 76 being grounded as at 164. When the operating coil 80 of relay 78 is energized, the pole piece of switch 88 shifts to effect a connection between the mentioned conductor 160 and a conductor 166 (instead of the conductor 162),

which conductor 166 is coupled with one side of the operating coil 70 of the counter switching device 68 whose opposite side is grounded as at 168.

The coin mechanism provided as a part of the apparatus is generally designated by the numeral 300 and includes a single pole, double throw coin tube switch 302 whose position is reversible when a supply of coins maintained for change making purposes is exhausted, a coin operable, single pole, double throw switch 304 which is responsive to a deposited coin to momentarily shift its position, and a pair of coin rejecting solenoid actuated assemblies 306 and 308 associated with the coin receiving chutes (not shown) conventionally forming a part of the coin handling apparatus 300.

Other components of the apparatus include a holding relay generally designated 310 having an operating coil 312, a single pole, double throw switch 314, and a normally open, single pole, single throw switch 316; an indicating lamp 320 for advising potential customers that correct change only must be used in operating the apparatus; and an indicating lamp 322 for advising potential customers that the apparatus is sold out and inoperative. It is also noted that a single pole, double throw switch 330 is normally associated with the cup handling assembly 24 as a part thereof and has a normal position when cups (not shown) are available within the assembly 24 and a different position when the supply of cups has been exhausted.

A power circuit is provided from power terminal 100 through conductors 106 and 136, a conductor 170, normally closed switch 206 of timer 200, a conductor 172 normally closed aspect of coin switch 304, a conductor 174, the normally closed aspect of switch 314 of holding relay 310, a conductor 176, the normally closed aspect of cup assembly switch 330, a conductor 178, either switch 84 of relay 78 when closed or a conductor 180 and switch 96 of relay 90 when closed, a conductor 182 and a conductor 184 to one side of the coin reject operating solenoid 306, the opposite side of which is grounded as at 186. It will be understood that the solenoid 306 rejects coins when deenergized and clears the coin chute for reception of deposited coins when energized. The mentioned circuit also is adapted to energize the coin rejecting solenoid 308 through a conductor 188 coupling one side thereof with the conductor 182 and a conductor 190 coupling the opposite side thereof with ground as at 192 through the normally closed phase of the coin tube switch 302. Assuming that the apparatus is adapted for vending a single drink of beverage for five cents and that the coin handling mechanism 300 is adapted for accepting either the correct change of one nickel or accepting a dime and returning a nickel of change when the supply of change making nickels in the coin tube is not exhausted, the solenoid 306 would be associated with the nickel receiving coin chute and the solenoid 308 associated with the dime receiving coin chute. It will be noted that when the change making nickels within the coin tube are exhausted, the switch 302 moves to its opposite position breaking the energizing circuit for coin rejecting solenoid 308 to deenergize the latter and blocking the dime receiving chute; simultaneously, a shifting of the coin tube switch 302 closes an energizing circuit for the correct change indicating lamp 320 leading from the above-mentioned conductor 182 through a conductor 194, the lamp 320, a conductor 196 and the then closed coin tube 302 to ground as at 192.

The normally closed phase of relay switch 86 of relay 78 continues oppositely from the conductor 134 through switch 86, a conductor 197, the normally closed switch 98 of relay 90, a conductor 198 and a conductor 199 to the sold-out indicating lamp 322, which is oppositely grounded as at 195.

The normally open phase of the cup dropper switch 330 opposite the conductor 176 is coupled by a conduc-

5

tor 193 with the conductor 199 for also operating the sold-out indicating lamp 322 when the supply of cups within assembly 24 has been exhausted, it being observed that, as will hereinafter become more apparent, the previously mentioned energizing circuit for the sold-out lamp 322 becomes operative when the beverage material within neither of the product containers 18 and 20 has cooled to the predetermined temperature level necessary for closing of the corresponding thermostatic switch 62 or 64.

The circuitry is completed by an energizing circuit for the timer motor 202 traceable from the power terminal 100 through conductors 106 and 170, normally closed timer switch 206, conductor 172 and the operated phase of coin switch 304 (which prevails momentarily upon deposit of a coin) and a conductor 191 connected with one side of the holding relay operating coil 312 which is oppositely grounded as at 189. A holding circuit for the holding relay operating coil 312 is provided by a conductor 187 coupled with the mentioned conductor 172 and thence through the holding relay switch 316 (which is closed when coil 312 is momentarily energized), and a conductor 185 coupled with the conductor 191 and the ungrounded side of operating coil 312.

The normally open phase of holding relay switch 314 is coupled oppositely to the conductor 174 through a conductor 183 with one side of the timer motor 202, which is oppositely grounded as at 181. A holding circuit for the timer motor 202 is established from the power terminal 100 through the conductor 106, a conductor 179, the then closed timer switch 204, a conductor 177, and the conductor 183 to the oppositely grounded timer motor 202.

In operation, assuming that the product containers 18 and 20 have just been inserted into the compartment 14 and that the beverage material within each of same is above the required low temperature level necessary for operation of the corresponding thermostatic switches 62 and 64, the operating coils 80 and 92 of control relays 78 and 90 respectively will remain deenergized and the switches of such control switches 78 and 90 in the normal positions thereof above-described. In such condition of the apparatus, neither of the control relay switches 84 or 96 will be closed to complete the energizing circuit for the coin reject solenoids 306 and 308, and all coin receiving chutes of the apparatus will, therefore, be blocked. Also, the sold-out indicating lamp 322 will be energized through a circuit traceable from power terminal 100 through conductor 106, conductor 136, conductor 134, relay switch 86, conductor 197, relay switch 98, and conductors 198 and 199 to the oppositely grounded lamp 322. Should the supply of cups in the cup dispensing assembly 24 be exhausted, the sold-out lamp 322 would similarly be energized and the energizing circuits for the relay solenoids 306 and 308 to block the coin chutes through the circuits above alluded to.

Next presume that one of the product containers 18 (although it could obviously be either of same) reaches the low, desired level of refrigeration necessary to close the associated thermostatic switch 62. Closing of switch 62 will energize the operating coil 80 of the control relay 78 through a circuit traceable from power terminal 100 through conductor 108, conductor 110, switch 62, conductor 112, counter switch 66, conductor 116, relay switch 94 of control relay 90, and conductor 118 to oppositely grounded relay coil 80. Energization of coil 80 opens its associated relay switch 82 thereby preventing energization of the operating coil 92 of relay 90 through its corresponding circuit, even though the thermostatic switch 64 may subsequently close, until such time as the control relay 78 has been deenergized by opening of the counter switch 66 as hereinafter mentioned.

With the control relay 78 thus energized, the apparatus is in condition for vending beverage from the product container 18. Upon deposit of a coin within the

6

mechanism 300, the coin switch 304 will momentarily shift to energize the operating coil 312 of the holding relay 310 through a circuit traceable from the power terminal 100 through conductor 106, conductor 170, then closed timer switch 206, conductor 172, coin switch 304 and conductor 191 to oppositely grounded holding relay operating coil 312. The above-mentioned holding circuit for coil 312 through relay switch 316 immediately takes over to maintain the operating coil 312 energized so long as the timer switch 206 remains closed.

Energization of coil 312 shifts its associated relay switch 314 so that, upon return of the coin switch 304 to its normal condition, the timer motor 202 is energized through a circuit traceable from the power terminal 100, through conductor 106, conductor 136, conductor 170, then closed timer switch 206, conductor 172, coin switch 304, conductor 174, then shifted holding relay switch 314 and conductor 183 to oppositely grounded timer motor 202.

Upon energization of the timer motor 202 the switch 204 first closes establishing a holding circuit for the energization of the timer motor 202. Then, timer switch 206 opens, breaking the holding circuit for the holding relay 310 and deenergizing the coil 312 thereof. Then, timer switch 212 closes momentarily long enough to energize the cup dropping solenoid 220 and immediately reopens. Next, the timer switches 214 and 216 close substantially simultaneously to energize the operating solenoids 40 and 44 of valves 38 and 42 respectively to open the latter. Then, timer switch 208 closes for a predetermined length of time to energize the operating solenoid 48 of the dispensing valve 47 for that interval necessary to dispense a predetermined quantity of beverage material from the spigot 22, the pertinent energizing circuit being from power terminal 100 through conductor 106, conductor 136, conductor 152, then closed timer switch 208, conductor 150, still closed timer switch 210, and conductor 148 to the oppositely grounded dispensing solenoid 48. After the predetermined dispensing interval, switch 208 opens, then timer switch 210 closes and timer switches 214 and 216 open, then timer switch 206 closes and timer switch 204 opens, at which time the timer 200 has completed its cycle and all of its switches 204-216 have returned to their normal stand-by condition.

It will be noted that at the same time that the cup dropper solenoid 220 was energized by a pulse resulting from the momentary closing of timer switch 212, the operating solenoid 70 of the counter device 68 was pulsed or actuated to record the dispensing of one portion of beverage from the product container 18 through a circuit traceable from conductor 156, through conductor 160, then closed relay switch 88, and conductor 166 to oppositely grounded counter operating solenoid 70. After the counter operating solenoid 70 has been actuated or pulsed a predetermined number of times it opens its associated counter switch 66. Opening the counter switch 66 deenergizes the operating coil 80 of the control relay 78 by breaking the energizing circuit above traced for coil 88, thereby preventing further energization of the valve solenoid 40 or opening of the valve 38 associated with the delivery line section 30 coupled with the product container 18.

At this time, if the material within product container 20 has not been cooled sufficiently to close thermostatic switch 64, the apparatus will return to its sold-out condition above-described. If, however, the thermostatic switch 64 has been closed by the material within the product container 20 being cooled to the desired low level, then the control relay 90 will be operated and further dispensing will occur from the product container 20 in exactly the same manner as described for the product container 18 through the corresponding electrical circuits functionally associated with the product container 20 and whose identity will be obvious from their analogy

to the corresponding circuits above traced in connection with the product container 18.

It will now be apparent that this invention is ideally adapted for accomplishing all of the above-mentioned and other objects thereof. It will be understood by those skilled in the art, however, that certain minor modifications and changes could be made from the exact structure disclosed as preferred for illustrative purposes without departing from the true spirit or intention of the invention. Accordingly, the invention shall be understood as limited only by the scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In apparatus for bringing the temperature of fluid material within a bulk container therefor from an ambient level normally characterizing the material prior to introduction thereof into the apparatus to a different, desired level and for delivering the material from the container only when the temperature thereof has been brought to said desired level, the combination of: means presenting a compartment having a fluid medium therewithin, said compartment being adapted to receive therewithin in heat exchanging relationship with the medium a thermally conductive container with a quantity of said material therein whose temperature when initially introduced into the compartment will normally be at said ambient level; means, including an element in heat exchanging relationship with the medium, for maintaining the temperature of the medium at a predetermined level at least as far removed from said ambient level as said desired level is and in the same direction; fluid handling means adapted for effecting delivery of a quantity of said material to a location where same may be utilized; conduit means coupled with the fluid handling means and adapted for coupling with the container for carrying said material from the container to the fluid handling means; electrically responsive valve means interposed in the conduit means; thermally responsive means adapted for operable association with the container and for responding to the temperature of material within the container, said thermally responsive means including a thermostatically operable electrical switch adapted for automatic actuation whenever the temperature of the material within the container is within a predetermined range including said desired level and excluding said ambient level; and coupling means including an electrical control circuit operably coupling said switch of the thermally responsive means with the valve means for controlling operation of the valve means responsive to actuation of the thermally responsive means.

2. In apparatus for bringing the temperature of fluid material within at least a pair of bulk containers therefor from an ambient level normally characterizing the material prior to introduction thereof into the apparatus to a different, desired level and for delivering the material from said containers successively but only when the temperature thereof has been brought to said desired level, the combination of: means presenting a compartment having a fluid medium therewithin, said compartment being adapted to receive therewithin in heat exchanging relationship with the medium at least a pair of thermally conductive containers each with a quantity of said material therein whose temperature when initially introduced into the compartment will normally be at said ambient level; means, including an element in heat exchanging relationship with the medium, for maintaining the temperature of the medium at a predetermined level at least as far removed from said ambient level as said desired level is and in the same direction; fluid handling

means adapted for effecting delivery of a quantity of said material to a location where same may be utilized; conduit means, including a common section coupled with the fluid handling means and a branch section for each container respectively coupled with the common section and adapted for coupling with the corresponding container, for carrying said material from the containers to the fluid handling means; electrically responsive control valve means for each branch section respectively interposed in the latter; thermally responsive means for each container respectively adapted for operable association with the latter and for responding to the temperature of material within the corresponding container, said thermally responsive means each including a thermostatically operable electrical switch adapted for automatic actuation whenever the temperature of the material within the corresponding container is within a predetermined range including said desired level and excluding said ambient level; an electrically responsive switching unit for each container respectively, each unit including an electrically responsive device and a number of control switches operably coupled with the device for operation when the latter is actuated; first electrical circuit means for each thermostatic switch respectively coupling the same with the device of the corresponding unit for controlling actuation of the latter, each of said first circuit means having coupled therein one of the control switches of each of the units other than said corresponding unit, whereby the device of any given unit can be actuated only when the devices of all other units are unactuated; and second electrical circuit means for each control valve means respectively coupling the same with another of the control switches of the corresponding unit for operation of any given control valve means only when the device of the corresponding unit is actuated.

3. In apparatus as set forth in claim 2, wherein is provided an electrical empty switch for each first circuit means respectively and coupled therein; and cut-off means for each container respectively responsive to substantial exhaustion of said material from the latter and operably coupled with a corresponding empty switch for operating the latter.

4. In apparatus as set forth in claim 3, wherein is provided electrically responsive dispensing valve means interposed in said common section; and third electrical circuit means coupled with the dispensing valve means for controllably operating the latter.

5. In apparatus as set forth in claim 4, wherein each of said cut-off means includes an electrically responsive counter; and fourth electrical circuit means for actuation of any given counter whenever the dispensing valve means is operated and the device of the corresponding unit is actuated.

6. In apparatus as set forth in claim 4, wherein is provided electrically actuatable time switching means coupled with said third circuit means for controlling energization of the latter.

7. In apparatus as set forth in claim 6, wherein is provided coin operable switching mechanism coupled with the time switching means for controlling actuation of the latter.

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