June 2, 1942. R. A. NICHOLSON 2,284,880

DRINK VENDING MACHINE

Filed Dec. 28, 1938 8 Sheets-Sheet 1

Fig. 5.

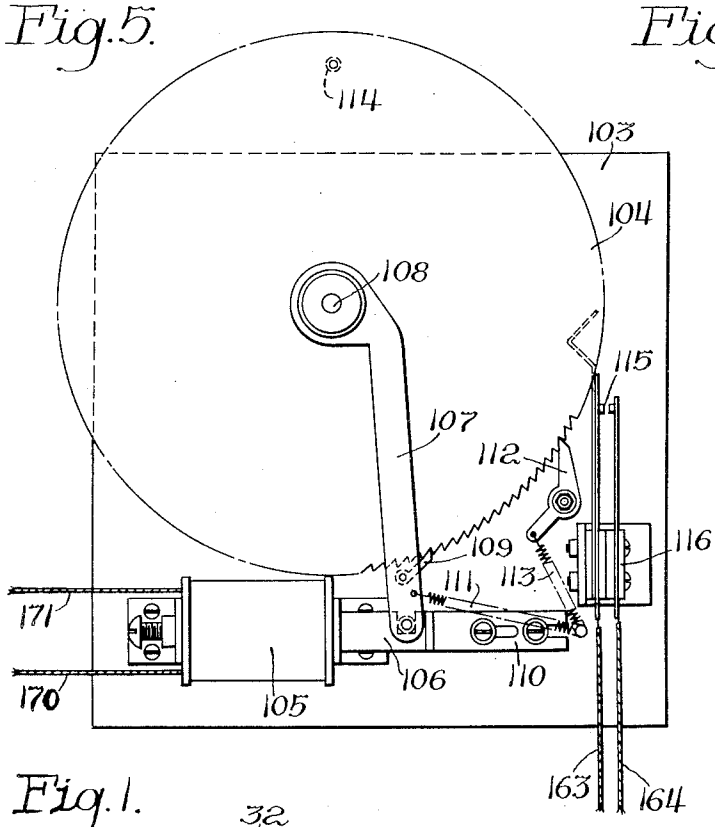


Fig. 6

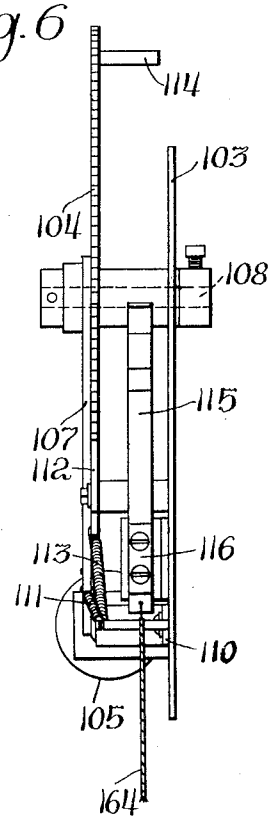
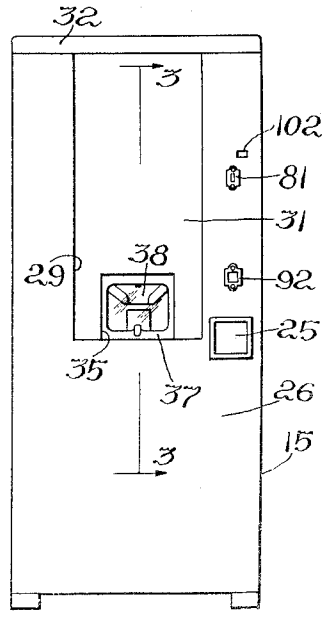


Fig. 1.



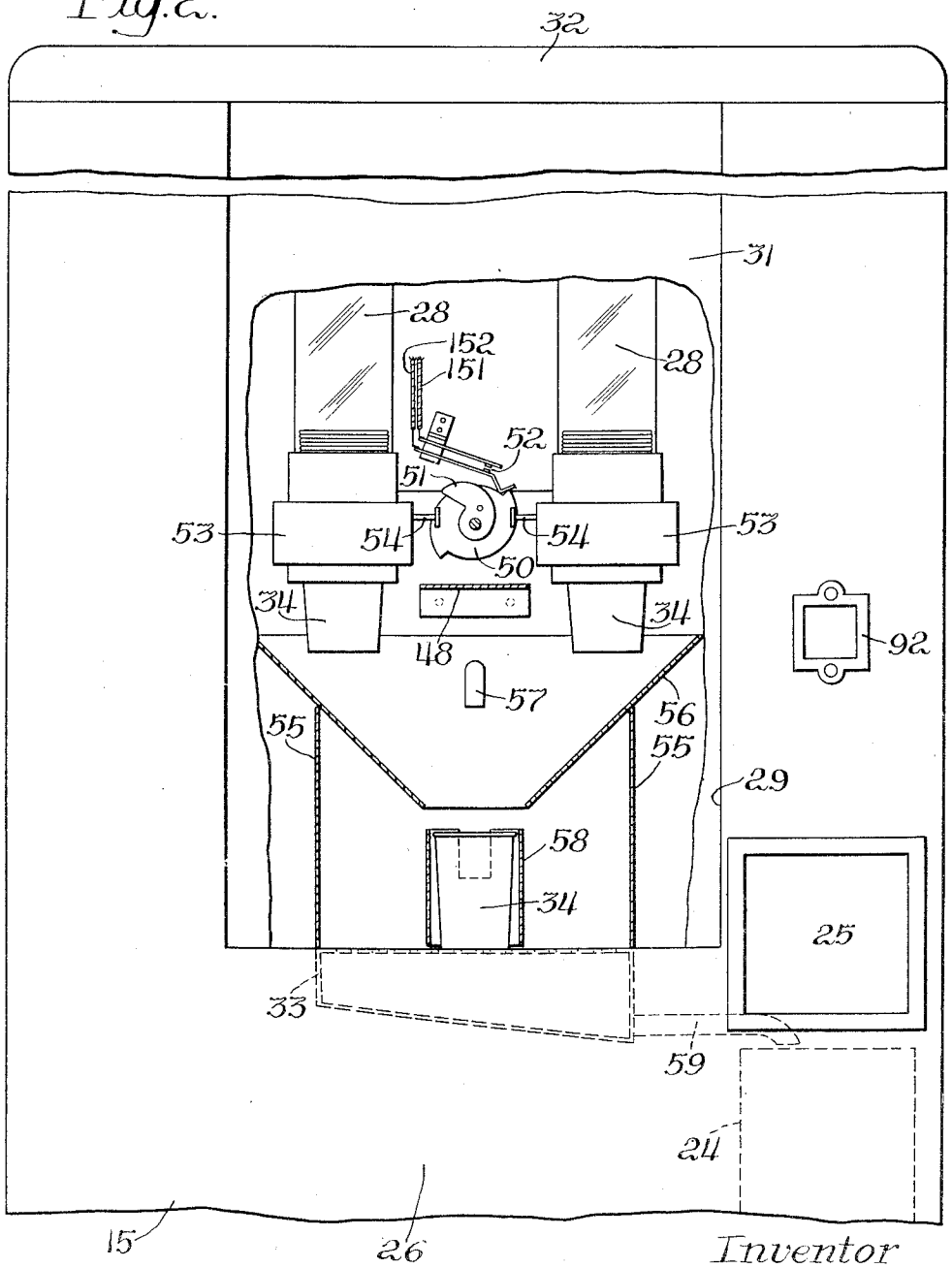
Inventor
Ralph A. Nicholson
By Paul O. Pippel
Atty.

June 2, 1942. R. A. NICHOLSON 2,284,880

DRINK VENDING MACHINE

Filed Dec. 28, 1938 8 Sheets-Sheet 2

Fig. 2.



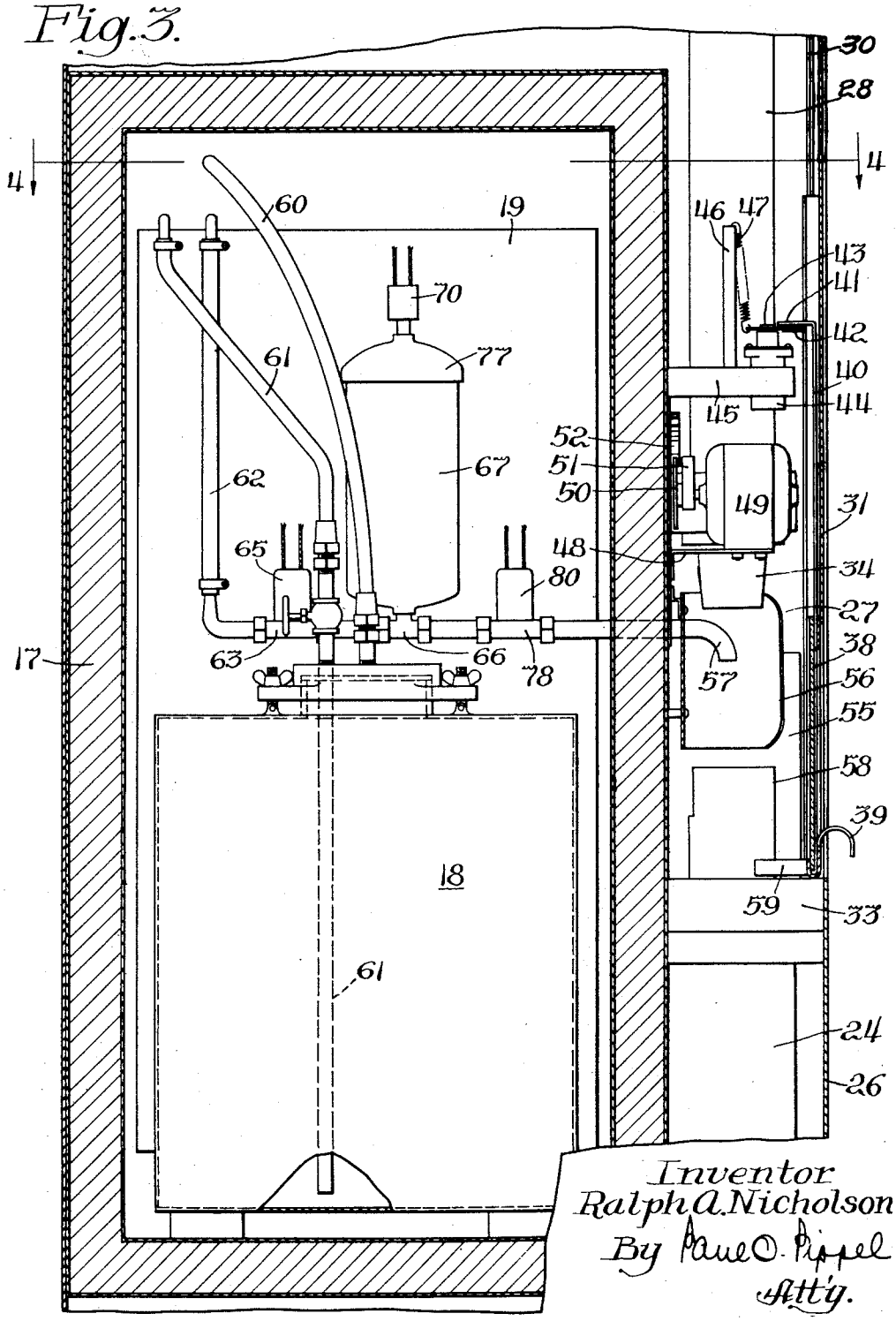
Inventor
Ralph A. Nicholson
By Paul O. Pippel
Atty.

June 2, 1942. R. A. NICHOLSON 2,284,880

DRINK VENDING MACHINE

Filed Dec. 28, 1938 8 Sheets-Sheet 3

Fig. 3.



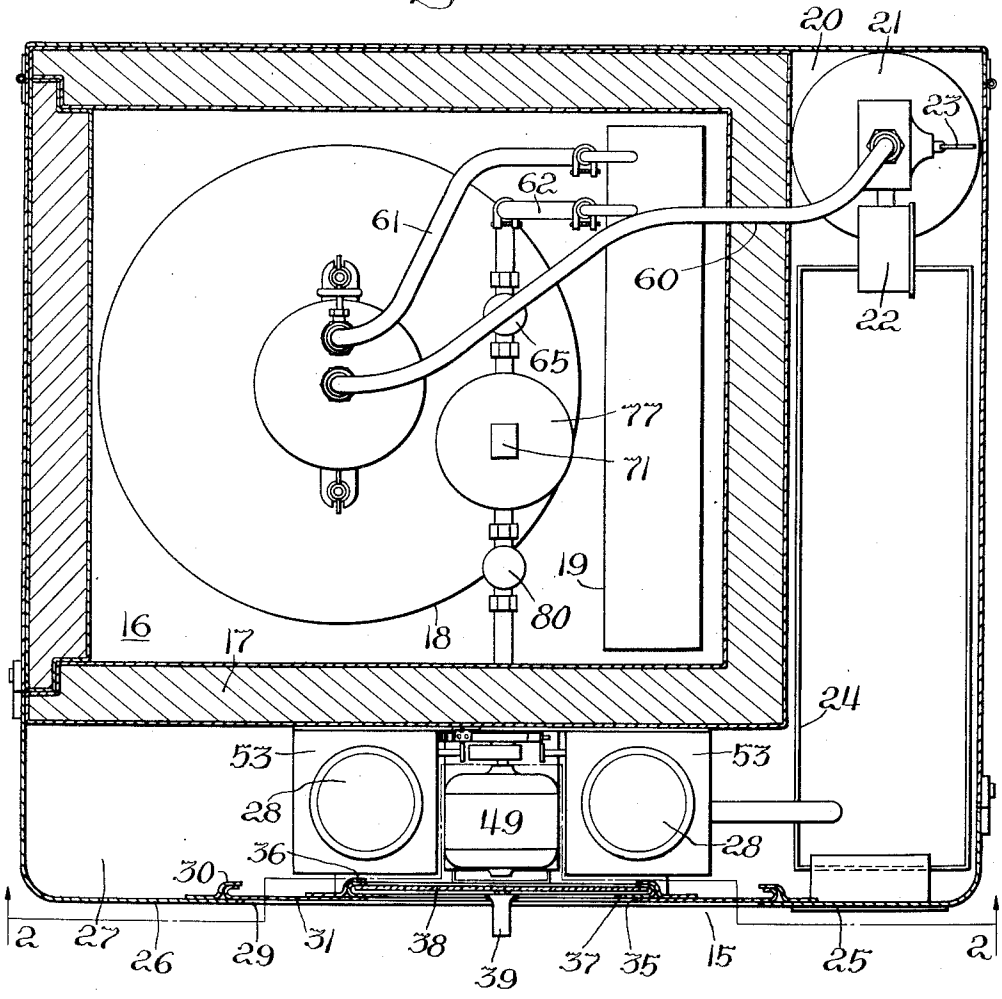
Inventor
Ralph A. Nicholson
By Paul O. Pippel
Att'y.

June 2, 1942. R. A. NICHOLSON 2,284,880

DRINK VENDING MACHINE

Filed Dec. 28, 1938 8 Sheets-Sheet 4

Fig. 4.



Inventor
Ralph A. Nicholson
By Paul O. Pippel
Atty.

June 2, 1942. R. A. NICHOLSON 2,284,880

DRINK VENDING MACHINE

Filed Dec. 28, 1938 8 Sheets-Sheet 5

Fig. 7.

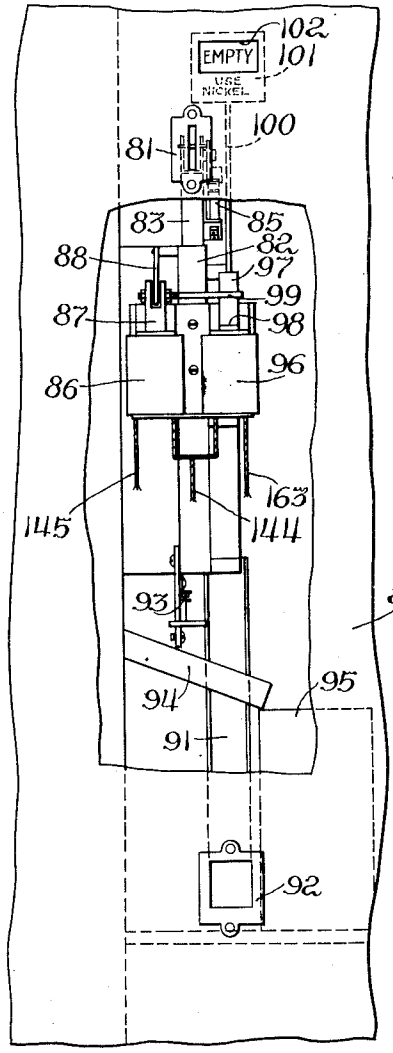
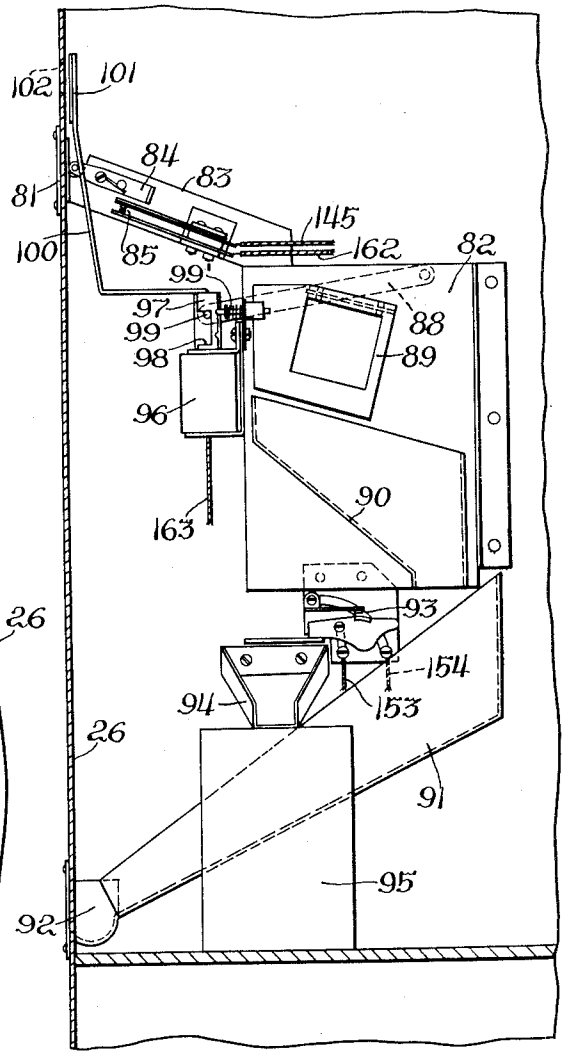


Fig. 8.



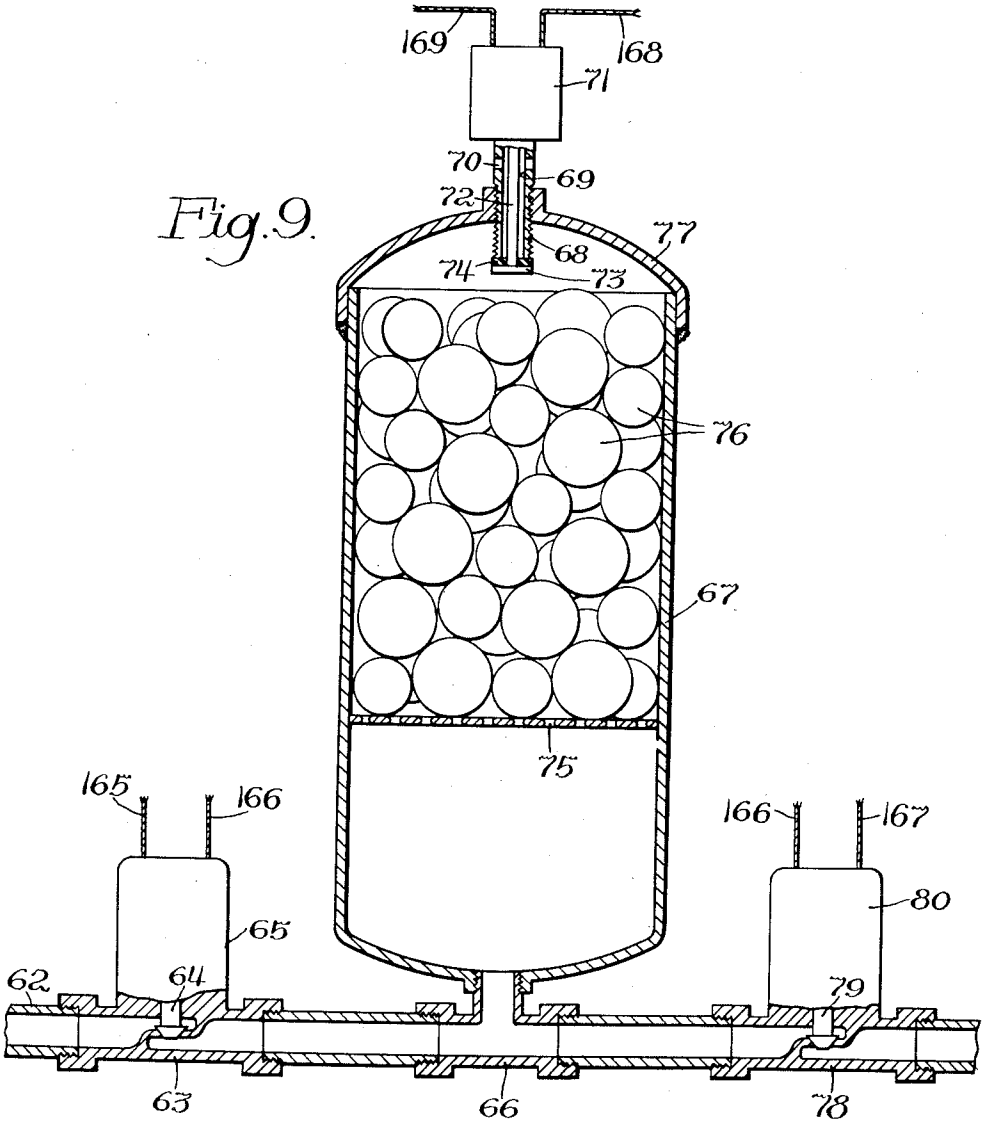
Inventor
Ralph A. Nicholson
By Paul O. Pippel
Atty.

June 2, 1942. R. A. NICHOLSON 2,284,880

DRINK VENDING MACHINE

Filed Dec. 28, 1938 8 Sheets-Sheet 6

Fig. 9.



Inventor
Ralph A. Nicholson
By Paul O. Pippel
Atty.

June 2, 1942. R. A. NICHOLSON 2,284,880

DRINK VENDING MACHINE

Filed Dec. 28, 1938 8 Sheets-Sheet 7

Fig. 10.

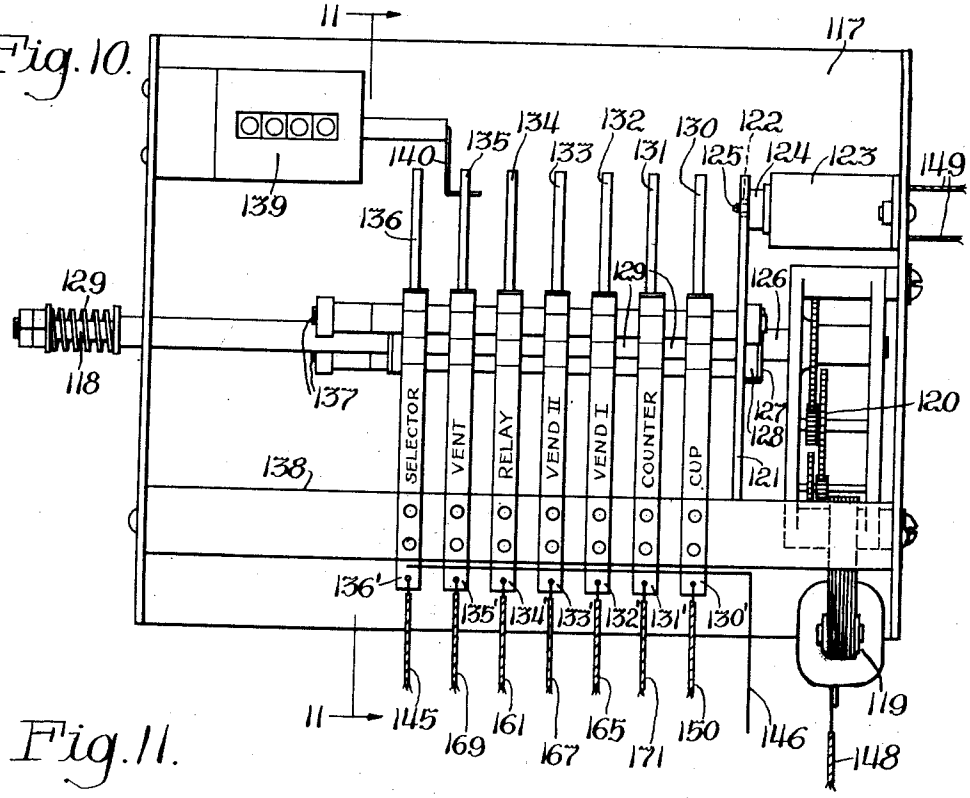
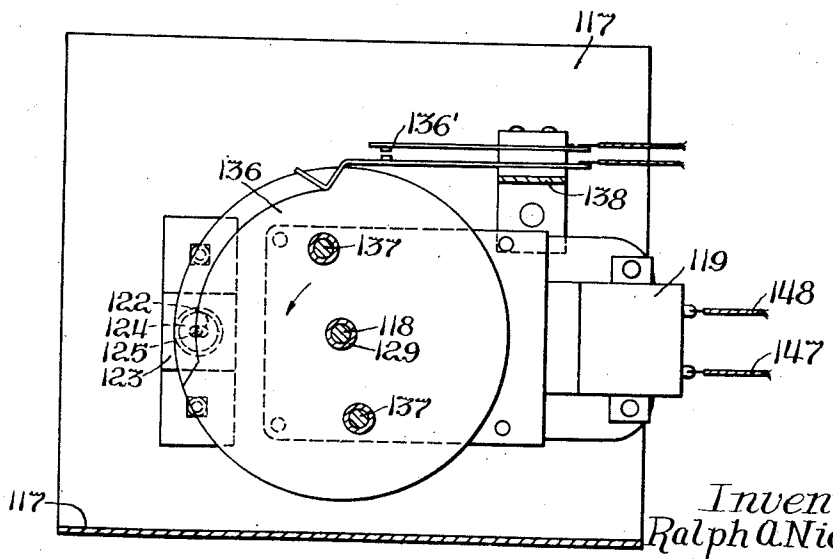


Fig. 11.



Inventor
Ralph A Nicholson
By Paul O. Pippel
Atty.

June 2, 1942. R. A. NICHOLSON 2,284,880

DRINK VENDING MACHINE

Filed Dec. 28, 1938 8 Sheets-Sheet 8

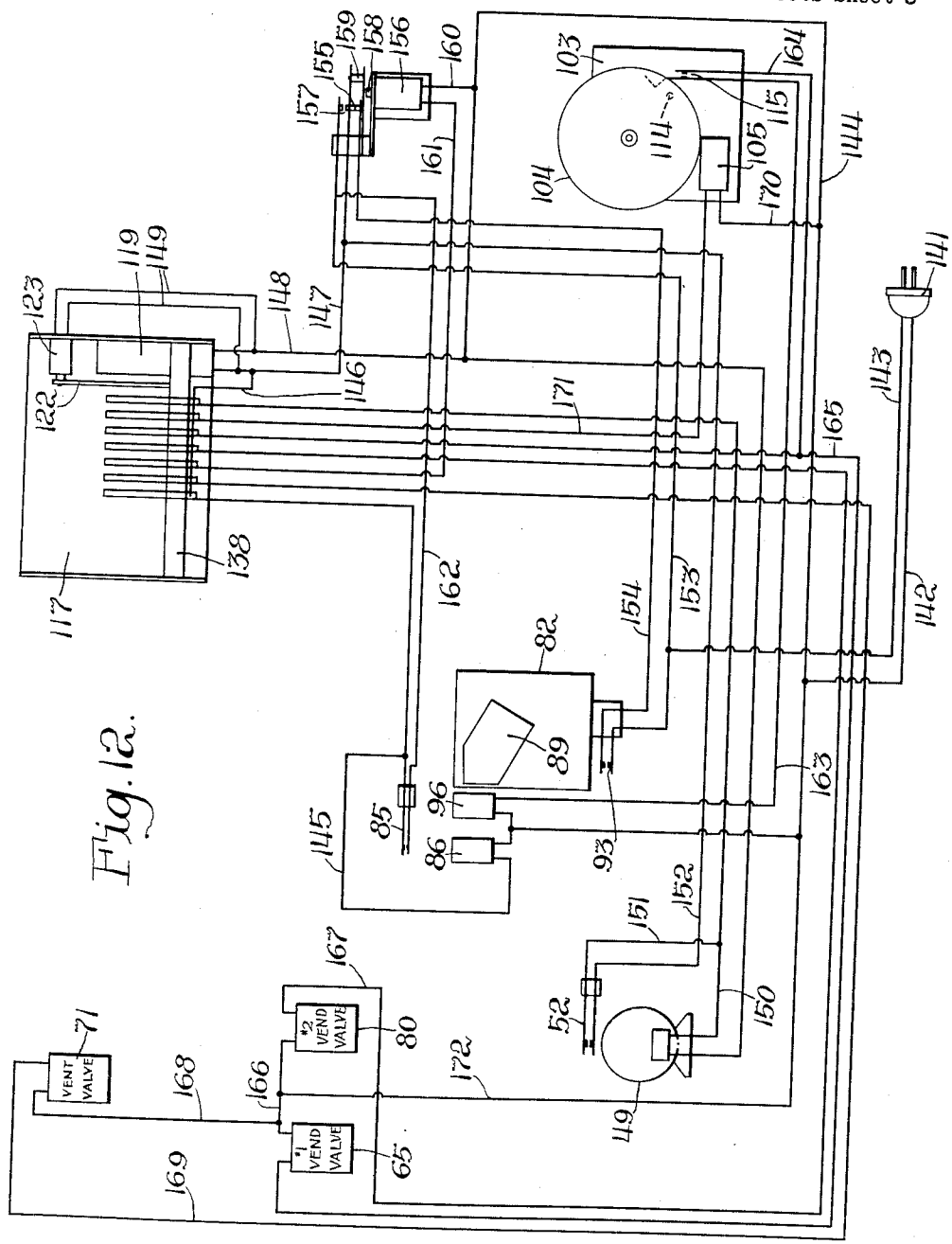


Fig. 12.

Inventor
Ralph A. Nicholson
By Paul O. Pippel
Atty.

Patented June 2, 1942

2,284,880

UNITED STATES PATENT OFFICE

2,284,880

DRINK VENDING MACHINE

Ralph A. Nicholson, Chicago, Ill., assignor to Raymond T. Moloney, Chicago, Ill.

Application December 28, 1938, Serial No. 248,114

20 Claims. (Cl. 225—21)

The invention relates to a drink or beverage vending machine of the automatic, coin operated type.

These machines usually embody a refrigerated cabinet and vend a carbonated drink into a cup which is first vended in timed relation to the vending of the drink.

Many problems have been encountered in the use and operation of machines of this type since it is difficult, for example, to handle a carbonated beverage. Timing of the various operations in proper sequence also entails problems as does the matter of making the machine inoperative when no more of the beverage remains to be vended.

The main object of the invention is to provide an improved coin operated, drink vending machine.

Another object is to provide an organization of operative parts for such a machine, which will work in the desired, properly timed sequence.

Another object is to provide an improved cup vending mechanism for such a machine.

Still another important object is to provide an improved drink vending mechanism.

Another purpose is to provide an improved means for vending a carbonated beverage, so that in the handling thereof its gaseous content will not be dissipated.

Another object is to provide an improved drink measuring means for the vender.

Another object is to provide a counting mechanism to count the number of drinks vended and additionally to provide means to indicate when the machine is empty and to return the user's coin when it is inserted into an empty machine.

A further object is the provision of a method and apparatus for automatically dispensing a pre-mixed, carbonated beverage in a manner to preserve as much of the gas content as possible, and with a minimum amount of foam, especially where the beverage contains a flavoring syrup or other substance likely to increase its foam-forming tendencies in conjunction with handling under relatively high carbonating pressures.

A more general object is to provide an improved organization and relative disposition of the parts within the cabinet housing the machine.

Still another object is to provide an improved venting means associated with the drink measuring means.

Also an object is to include in the combination of parts, an improved electro-mechanical motor operated timing device to insure foolproof, proper sequential functioning of all operating parts.

Other important objects will, no doubt, appear to those skilled in this art as the disclosure is more fully made.

Generally, the improved machine comprises a refrigerated cabinet containing a cold unit and a mixed drink, bulk container, for a refreshment drink such as a carbonated beverage.

A cup vending mechanism is provided to vend and place a cup in a drink receiving position on a suitable support under a pouring nozzle from which the measured drink flows into said cup by gravity so as not to release gas from the drink in handling same. A drink measuring and defoaming device receives a measured quantity of liquid from the bulk container. Electromagnetically controlled valves are present to govern the charging of the measuring vessel, venting of same, and draining of same, to vend the drink into the cup. Electro-mechanical timing means is coin operated to govern the various operations. Counting mechanism is operative to count each drink, or cup full measure of liquid vended, and when the entire quantity of liquid in the bulk container has been vended, an indicator means is operative to designate this fact to a prospective user. At the same time the coin slide or release mechanism is made ineffective by causing it to return the coin to the user without operating the machine. The cabinet construction housing the machine is so compartmented that various units of the machine are in ideal relative positioning with respect to each other to achieve compactness and accessibility. The cup vending mechanism and the foam controlled measuring means also present novel features.

An illustrative example of the invention is shown in the accompanying sheets of drawings, wherein:

Figure 1 is a general front elevational view of the drink vender;

Figure 2 is an enlarged front view of the cup vender mechanism, partly in elevation and section, taken along the line 2—2 of Figure 4 and looking in the direction of the arrows;

Figure 3 is an enlarged, side view in section through the machine, taken along the line 3—3 of Figure 1, and looking in the indicated direction;

Figure 4 is a horizontal sectional view through the machine, taken along the line 4—4 of Figure 3 and looking in the indicated direction;

Figure 5 is an elevational, enlarged detail view of the drink counting pawl and ratchet means and a control circuit associated therewith;

Figure 6 is an end view of the structure shown in Figure 5;

Figure 7 is a front elevational, detail view of the coin handling mechanism used with the drink vender;

Figure 8 is a side elevational view of the structure shown in Figure 7;

Figure 9 is a detail view, partly in section, of the drink measuring device and the foam control means and valves associated therewith;

Figure 10 is an enlarged plan view of the electro-mechanical timing mechanism used to control the proper sequence of operation of the various parts of the vender;

Figure 11 is an end view, partly in section, of said timer taken along the line 11—11 of Figure 10, looking in the indicated direction; and,

Figure 12 is a typical wiring diagram for the electro-mechanical means employed in the drink vender.

The improved drink vender is enclosed by an appropriate housing 15, the same as shown in Figures 3 and 4, having a compartment 16 delineated by an insulated partition structure 17. Resting on the floor of the compartment 16 is a rather large drum 18 constituting the bulk, mixed drink or beverage container. The present container is of a size to hold one hundred sixty five cup fulls or drinks. This is mentioned now because it is of significance when the drink counting and a certain control is later to be described. In this compartment 16 is also located a suitable refrigerator unit 19, which cools the contents of the drum 18, as well as certain measuring means later to be described and also situated in compartment 16.

The partition 17 delineates within the cabinet, a side space 20, which is occupied by an upright drum 21 of CO_2 gas having a pressure indicator 22 thereon, and a control valve 23. The remainder of the space 20 is occupied by a waste receptacle 24 standing on the floor of the housing. A door 25 is formed in the front wall 26 of the housing to permit waste, or used cups, to be disposed of by passing same through the door 25 into said receptacle 24.

The partition 17 also forms a front compartment or space 27 in which is carried, from the proximate partition part 17, a pair of cup containing magazines 28 and a cup vending mechanism later to be described. The front wall 26 of the housing, as indicated in Figures 1, 2 and 4, is formed with a large opening 29, the vertical side edges of which are delineated by grooved guides 30, slidingly to receive a front closure panel 31 which can be slid upwardly out of the cabinet to expose interior parts, when a removably mounted top 32 for the cabinet is first removed.

On a level with the bottom of the opening 29 the partition 17 and front wall 26 carry a suitable, grated, horizontal support 33 on which a vended cup 34, to be filled rests as will subsequently be made known. The front panel 31 is formed with an opening 35 the side edges of which are formed with vertical guide grooves 36 slidably to receive a vertically slidable door 37, having a transparent window 38 therein to make visible to the user, a cup standing on the support 33. This door has a finger grip or handle portion 39 to enable the user to raise said door to make a vended drink filled cup 34 accessible.

This door 37 carries an upstanding arm 40 having a rearwardly bent shoulder 41 at its upper end, which shoulder cooperates with a cushion pad 42 carried on the piston 43 of a dash pot 44 supported in a frame 45 mounted on the front partition part 17, see Figure 3. An upright arm 46 is rigidly carried on the frame 45 and a spring 47 connects between the arm 46 and piston 43. When the door 37 is raised the shoulder 41 raises off the pad 42 so that the spring 47 pulls the piston 43 upwardly out of the dash pot 44, the pad 42 of course rising with the piston since it is carried by it. When the door is released after having been raised, the shoulder 41 abuts the pad 42 and the dash pot is effective slowly and gently to cause closing of the door without being noisy and creating a shock.

Looking at Figures 2, 3 and 4 it will be seen that the cup containing magazines 28 are vertically disposed in the space 27 in parallel spaced apart relation. Between the lower ends of said magazines, the wall 17 carries a bracket 48 on which is supported an electric motor 49, having a shaft for driving a cam wheel 50 and a cam 51. The wheel 50 has oppositely disposed notches for controlling closing of a spring blade switch 52 supported on the wall 17. Each magazine has a conventional cup releaser mechanism 53 at its lower end, including respective plungers 54 positioned to be alternately operated by the cam 51, alternately to dispense cups one at a time from said magazines.

The grate support 33 carries an upstanding support 55 on which is supported a trough or chute structure 56 shaped as shown, to deflect a vended cup under a pouring spout 57 in a centralized position below and between the magazines to fall upright into an upright guide cylinder 58 connected by a bracket 59 to the back side of the door 37. The lower edge of said cylinder 58 when the door is down in its closed position, is substantially flush with the support 33 on which the vended cup 34 is positioned. When said door 37 is raised, the cylinder 58 of course raises with it to leave the drink filled cup standing free and clear under the pouring spout 57. It will be clear that the pouring spout 57 vends the drink into the vended cup standing on the support 33 and since the latter is a grate, any liquid spilled will be drained off by a pipe 59 into the waste receptacle 24.

A conduit 60 leads from the gas drum 21 into the head of the drink container 18 to keep the liquid under pressure. A conduit 61 takes the liquid from near the bottom of the tank 18 and leads it into the refrigerator 19, the cooled liquid emerging therefrom by means of a conduit 62. Looking now to Figures 3, 4 and 9 it will be seen that conduit 62 has coupled to it a valve unit 63, including a valve 64 operated by an electromagnet 65. Beyond the valve unit 63 a T-coupling 66 is disposed in the line 62, said coupling carrying and having communication with a closed drink measuring vessel or receptacle 67 which is disposed as a vertical cylinder above drum 18 and in the same cooling compartment 16 therewith, so that both the drum 18 and cylinder 67 are refrigerated by unit 19.

The upper end of said vessel, as seen best in Figure 9, has a fitting 68 threaded thereinto, the same having a central bore 69 with radial openings 70 positioned outside the vessel 67. Outside the vessel, the fitting 68 carries a solenoid 71 having a movable core 72 extending through the bore 69, said core at its lower end being formed with a valve head 73 with a compressible valve seat 74 cooperating with the lower end of the fitting 68 to close off the bore 69 from the inside of the vessel 67 under normal conditions, as when the solenoid 71 is deenergized.

Disposed rigidly in the lower middle section of vessel 67 is a grated or screened support 75 on which is disposed a quantity of spherically shaped pieces, such for example, as marbles 76, which may be of various sizes. The space in the vessel 67 above the support 75 is substantially occupied by these marbles. The marbles are insertable into the vessel upon removal of a cap piece 77 for the vessel 67. These objects 76 are preferably spherical or substantially so in practice to precent rounded surfaces which contact each other at points to leave interstices between which the beverage entering the vessel 67 will flow. The balls 76 of course displace liquid, so obviously by inserting more or less of the balls into the vessel the capacity thereof to hold liquid can be varied as to volume. Thus the size or volume of the drink to be vended can be controlled. As the liquid from tank 18 enters the vessel 67 the same passes up between the balls 76 and since they present smooth or rounded surfaces to the liquid it is found that the gas in the liquid is not released or separated therefrom. Consequently, no foaming takes place and this is highly desirable and advantageous.

Beyond the T-coupling 66 the line 62 has placed therein another valve unit 78 including a valve stem 79 which is the armature of an electromagnet 80, as shown.

As seen in Figure 1 a slot 81 is provided in the front wall 26 to receive a coin for releasing and causing operation of the drink vender. For this purpose a coin handling mechanism is provided as seen in Figures 7 and 8. Behind the slot 81 a wall part carries a coin chute bracket 82 for a well known type of coin selector unit. A chute 83 leads an inserted coin over a lever 84 that closes a switch 85 in a circuit later to be described, to energize an electromagnet 86, which operates a core 87 to a pull down on a lever 88, which moves means to flap a hinged gate 89 side-wise to reject false coins passing from the chute 83 past said gate 89, said coins dropping out side-wise by gravity into a chute 90, then a chute 91 and finally to a return trough 92. This slug rejector per se forms no part of the invention and is illustrated and described only to such extent as is necessary to disclose other features connected with the coin handling mechanism that happen to cooperate with the drink vender.

An authentic or good coin will pass through the selector mechanism of this coin handler and close a switch 93, the coin then passing to a chute 94 to be directed into a suitably provided cash box 95.

The bracket which carries the device 86 also carries an electromagnet 96, having a core 97 formed with an elongated cut out 98, a cross pin 99 extending from the core 87 as shown and playing up and down in the notch 98. This must be so since the device 86 is operated while the device 96 remains deenergized. Associated with the core 97 which has two spaced indentations is a spring pressed detent 99'. The core 97 carries a forwardly and upwardly bent arm 100 the upper end of which carries a target or sign 101 the lower half of which carries the legend "Use Nickel" while the upper half reads "Empty." This sign is disposed behind a window 102 formed in the wall 26, it being understood that only one legend on the sign is visible at one time through the window. Normally the sign is up when the magnet 96 is deenergized to display the "Use Nickel" legend, but when the tank 18 is empty a condition arises where the magnet 96 becomes energized to lower the sign 101 so that the "Empty" legend is displayed at the window 102.

A drink counting and indexing mechanism is provided as shown in Figures 5 and 6. On some suitable support such as the wall 17 in the space 20 may be mounted a carrier plate 103 on which is rotatably carried a ratchet wheel 104 having 165 teeth, one for each drink contained in the tank 18, when it is full. The plate 103 carries an electromagnet 105 having a core 106 which is pivotally but loosely connected to an arm 107 also pivoted on the pin 108 serving as the axis of the wheel 104. The arm 107 carries a pawl 109 to engage the ratchet teeth. An adjustable bracket 110 on the plate 103 serves to limit the stroke of the arm 107 and pawl 109 so that the latter will act to move the wheel 104 one step at a time only. It can be seen that when the device 105 is energized the core 106 is moved to the left as viewed in Figure 5 and thereafter a spring 111 connected as shown, pulls the arm with the pawl 109 back as far as the stop 110 to cause the ratchet wheel 104 to move one step. A pivoted dog 112 on the plate 103 is pulled by a spring 113 to hold the gain of the wheel 104 in an obvious manner. The wheel 104 carries a pin 114 near its periphery which pin extends normal to one face of the wheel to extend into the plane in which is positioned a normally open, spring blade contact switch 115 carried by an insulated pack 116 supported on the wall 103.

A timing mechanism of the type covered in Nicolaus' Patent No. 2,138,243 of November 29, 1938, is also used with this machine, so much of said mechanism as is thought necessary to show its use, herein being generally shown in Figures 10 and 11.

This timer unit may be positioned in any convenient place in the machine, but preferably in the space 20 at one side of the cabinet. The unit comprises a support bracket 117, end walls of which carry a cross shaft 118 constantly rotated when an electric motor 119 is turning to operate reduction gears 120 driven by the motor and connected to the shaft. The shaft 118 carries loose thereon a disk 121 having a perforation 122 therein around its marginal edge. The bracket 117 adjacent said disk 121 carries an electromagnet 123 having a spring pressed movable core 124 formed at its ends with a detent 125 to enter said perforation 122 to lock the disk 121 against turning. As shown in Figure 12 the motor 119 and device 123 are energized together and also deenergized together.

Between a spacer sleeve 126 having a head 127 and the disk 121 is a friction disk driver 128 held pressed against the disk 121 by the pulling action of a spring 129. A series of variously notched fibre cam wheels 130, 131, 132, 133, 134, 135 and 136 are provided loosely on the shaft 118 and held by the spacers shown in the desired spaced relation. By means of bolts 137 these wheels are bolted together to turn as a unit with the lock wheel 121. Each cam wheel has a step off notch on its periphery as shown to cooperate with corresponding spring blade switches 130', 131', 132', 133', 134', 135', and 136', said switches being carried on a cross plate 138.

The switch 130' is timed in its operation by the turning of the cam wheel 130 to control vending of a cup from a cup magazine and is therefore labelled "cup" in Figure 10; the wheel 131 and switch 131' control the counter control coil 105 and is designated "counter"; the wheel 132 and switch 132' control the first drink vending valve

unit 65 and is accordingly labelled "Vend I"; the wheel 133 and switch 133' control the second valve unit 80 used in vending the drink and is designated "Vend II"; the wheel 134 and switch 134' control a relay not yet described and is designated "relay"; the wheel 135 and its switch 135' control the vent valve 71 and is therefore labelled "Vent"; and the last wheel 136 and its switch 136' control the selector electromagnet 86.

A visual, drink dispenser, register is shown at 139 carried by the bracket 117, said device having an operating crank 140 positioned to ride the periphery of the wheel 135 and when it drops into the notch of said wheel actuates the register 139. Thus, every time a measured drink is vented in the vessel 67 by valve control 71 the register 139 operates.

The wiring and circuits for the various electrically actuated parts will now be described with reference primarily to Figure 12.

A source of electrical energy is illustrated by the plug 141, from which runs a main wire 142 and a return wire 143. The wire 142 is connected to a wire 144 having respective branches connected to the coils 86 and 96. From the coil 86 a wire 145 runs to one side of the switch 85 and the selector control switch 136'. A wire 146 cross connects one side of all of the timing switches 136', 135', 134', 133', 132', 131', and 130'. This wire 146 cuts into a wire 147 that goes to one side of the timer drive motor 119. The lead out wire from said motor 119 is shown at 148 and a series circuit 149 leads from these wires 146, 147 to operate the coil 123 conjointly with the motor.

The wire 148 goes to one side of the cup vending motor 49 and a wire 150 runs from said motor to the cup vend control switch 130'. A wire 151 leads from wire 150 to one side of the switch 52 and a wire 152 leads from the other side of said switch to the wire 147, as shown. The main wire 143 goes to one side of the timer motor switch 93 by connecting with a wire 153, a return wire 154 going from the other side of said switch 93 to one side of a spring blade switch 155 disposed in the circuit. The wire 147 constitutes the other circuit side for said switch 155. This switch is closed when a relay solenoid 156 is deenergized and another switch 157 is open but closed when the relay 156 is energized, by the action of the core 158 pushing on the blade extension 159. In such case the switch 155 is open. Thus when switch 155 is closed, switch 157 is open, and vice versa. The other side of switch 157 is connected with the wire 153, as shown.

One side of the relay 156, by means of a wire 160, is connected with the wire 144 and a wire 161 goes from the other side thereof to the timer relay switch 134'. The wire 152 connects to wire 147, and the wire 144 connects to wire 148. A wire 162 goes from one side of the switch 85 to the wire 153.

A wire 163 goes from one side of the coil 96 to one side of the counter switch 115, a return lead 164 going from the other side of said switch to a wire 165. The latter wire is connected to one side of the "Vend I" switch 132' and the other end of said wire leads into one side of the coil 65 for the "Vend I" valve, which coil 65 is connected by a wire 166 to coil 80 for the "Vend I" valve. A wire 167 leads from coil 80 to the "Vend I" timer switch 133' and a wire 168 leads to the coil 71 for the vent valve. From said coil 71 is lead a wire 169 that goes to the timer vent switch 135'.

A wire 170 is connected with wire 144 and goes into one side of the counter electromagnet coil 105, a wire 171 leading from the other side thereof to the counter control switch 131'. A wire 172 connects between wire 166 and wire 144. This completes the details of description of the parts and the operation thereof will now be summarized.

The tank 18 will be filled with not less than 165 cup fulls of the previously mixed, carbonated, or other beverage, which the machine is to dispense. In initial position the pin 114 is on the side of switch 115 as shown in Figure 12 so that as the wheel 104 is turned clockwise all teeth thereof, to the extent of one hundred sixty-five of them, can be used in one turn of the wheel 104. All switches except 155 are open. The plug 141 is plugged into a socket to receive electrical energy through wires 142 and 143. The timer of Figure 10 is held releasably locked by the cooperation of detent 125 with the lock wheel 121 and all the cam wheels 130 to 136 are positioned in the starting position with associated switches held open, a cycle of operation of this timer unit being complete in one turn thereof to time the operation of all parts in successive order to perform the cup and drink vending functions and then set itself in a position to start all over again to vend the next drink.

The machine, of course, is coin operated or released. The coin is inserted into slot 81, it being understood that the sign 101 is raised to show "Use nickel" as the standard give cent piece is desired to be used in releasing and causing operation of the machine. As the coin enters the slot 102 it operates levers 84 (Figure 8) to close the switch 85. In the starting position the timer cam wheel 136 for the coin selector operation holds switch 136' closed and current flows from the source of energy 141 through switch 85, and coil 86 to energize the latter, the circuit being through wires 142, 144, 145, 162, 153 and 143 back to 141. Through linkage 88 and core 87 the flap door 89 is hinged outwardly so that a coin held in jamming position in the coin selector mechanism 82 can fall out and be released, a good or authentic coin, however, following a rectangular passage to be guided onto and close the switch 93, before passing over the chute 94 into the cash box 95.

When the switch 93 closes, current flows from source 141 through wires 143, 153, 154, switch 155, wire 147 into motor 119 and magnet 123, back by way of wire 148 wire 144 and wire 142 to source 141. As a consequence, the motor 119 operates the timer unit of Figures 10 and 11 to turn all cam wheels, the selector switch 136' remaining closed by the cam wheel 136 because at this instant the relay 156 is energized because relay timer switch 134' is closed. This moves the core 158 causing switch 155 to open and switch 157 to close. The cam wheel 134 through its full turn now will hold switch 134' closed until the vender operation is complete, as the switch 157 must be kept closed. The cam wheels of Figure 10 are all turning as a unit, but very slowly because of the reduction gearing 120.

At this instant in the order of operation, the cup vend motor 49 begins to turn becasue cam 130 holds switch 130' closed, and cam 50 then instantly closes the switch 52 to keep the motor 49 in operation through a 180° turn of the cam 50 until the wiper 51 can push one or the other

of the plunger cup release members 54 (see Figure 2) to release a cup 34 to drop by gravity onto chute or trough 56 to be guided into the cylinder 58 and come to rest in a standing position on the support 33 beneath the pouring spout 57. By the time this has happened the cam 50 has turned far enough to cause switch 52 to open and stop the motor 49.

In the meanwhile, the cam wheel 132 closes switch 132' and current flows from source 142, wire 144, wire 172, 166, coil 65, wire 165, switch 132', wire 146, 147, switch 157, and wires 153, 143 back to the source 141. As a result the "Vend I" valve 64 is opened so that the beverage under pressure of gas from tank 21 flows into the measuring vessel 67. The length of time switch 132' remains open under control of turning cam wheel 132 governs the amount of liquid that enters the vessel to some extent, but a more accurate measure results from the balancing of back pressure from within the closed vessel 67 and the pressure of the gas from tank 21. The balls 76 also serve to control the measure in that they displace liquid. As the coil 65 is deenergized by opening of switch 132' the valve 64 closes.

The cam wheel 135 has now turned enough to actuate crank 140 and register on the counter 139 (Figure 10); at the same time closing the switch 135' so that current flows from source 141 through wire 142, 144, 172, 168 into coil 71, wire 169, switch 135', wire 146, 147, switch 157, wire 153, 143 and back to the source 141. As a result the vent valve 73 is operated by the solenoid 71 to release the head or gas pressure in the dome of the vessel 67 and let in atmosphere.

In the next sequence the cam wheel 133 closes switch 133' whereupon current flows from source 141, wires 142, 144, 172, 166 into coil 80, wire 167, switch 133', wires 146, 147, switch 157, wires 153 and 143 back to the source 141. Thus, coil 80 is energized to open the valve 79, while vent valve coil 71 is still energized, whereupon the measured beverage from the vessel 67 flows by gravity through pipe 62 to the spout 57 and into the cup 34 standing on the support 33. Since the drink is not vended under pressure into the cup it is found that none of its gas content is released and foaming therefore does not take place. The user raises the door 37 to get the drink. By this time the cam wheel 135 will have turned enough to cause the switch 135' to open and the coil 71 is deenergized to cause the valve 73 once more to close.

In the next step of the timer of Figure 10, the cam wheel 131 closes switch 131' so that a circuit can run from the source 141, wires 142, 144, 170 to coil 105, wire 171, switch 131', wires 146, 147, switch 157, wires 153, 143 and back to the source. It follows that the magnet 105 of Figure 5 now works to operate the means shown to step up the ratchet wheel 104 one step in an obvious manner.

By this time the operations are complete and the relay control cam wheel 134 has completed one turn, whereupon the switch 134' drops into its notch to open and break the relay circuit heretofore described. It follows now that the circuits for the motor 119 and coil 123 are opened so that the timer stops its rotation and the detent 125 locks same through lock wheel 121. Thus, the relay switch 134' deenergizes the relay 156 to reverse the positions of switches 155 and 157, the latter now assuming their starting positions ready for a repeat operation of the vender when another coin is dropped onto switch 93.

After the counter wheel 104 has stepped up one hundred and sixty-five times, or as many times as there are drinks in the tank 18, the pin 114 acts to close the switch 115. When this occurs the relay 156 is still energized so that current flows as follows: from source 141 through wires 142, 144, coil 96, wire 163, switch 115, wires 164, 165, switch 132', wires 146, 147, switch 157 and wires 153, 143 back to the source 141. As a result the magnet 96 operates to pull down the flag 101 to display the legend "Empty" at the window 102. At the same time (see Figures 7 and 8) the cross rod 99 lowers core 87 into the coil 86 to operate the linkage that will swing the coin return gate 89 of the coin device 82 to its open position, so that any coins thereafter entering the machine will be returned by way of the chutes 90 and 91 to the return pocket 92 where the user can readily get back his coin. The spring detent lock 99' is now effective to hold the cores 97 and 87 in the position shown in Figures 7 and 8. After this when the tank 18 is again filled, the service man will raise the sign 101 and reset the detent 99' as well as the flap 89.

It will now be seen that an improved drink dispensing machine has been provided to achieve the desirable objects of the invention as heretofore recited.

The intention is to cover herein all changes and modifications which do not constitute departures from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. A drink vender comprising a bulk container for carbonated beverage, a measuring vessel, a pouring spout, an input conduit connected between the container and vessel, an output conduit between the vessel and spout, a control valve in the input conduit, a control valve in the output conduit, a vent valve in the vessel, and means for causing the latter valve to open at a time when the other two valves are closed.

2. A drink vender comprising a bulk container adapted to contain the quantity of beverage under pressure, a normally closed measuring vessel adapted to receive beverage under pressure from said container, a pouring spout, an input conduit between the container and vessel, an output conduit between the vessel and spout, a control valve in the input conduit a vent valve in the vessel, a control valve in the output conduit, and automatically acting means for successively operating said valves in the order named, said vent valve being opened at a time when the other two valves are closed, and being held open at least until the contents of said measuring chamber is drained to vend a drink admitted thereto by previous operation of said control valve.

3. In a carbonated drink vender, a bulk container, a measuring vessel, a pouring spout, means for supplying the drink under pressure from the container to the vessel, means to vent the vessel, and means to drain the drink by gravity from the vessel to the spout, said vessel having rounded objects therein leaving interstices therebetween to prevent foaming of the drink when it enters the vessel.

4. In a carbonated drink vender, a bulk container, a measuring vessel, a pouring spout, means for supplying the drink under pressure from the container to the vessel, means to vent the vessel, and means to drain the drink by

gravity from the vessel to the spout, said vessel having substantially spherical members supported therein to displace the liquid and prevent foaming thereof as it enters the vessel.

5. In a drink vender, a refrigerated cabinet, a bulk container therein for a beverage, a measuring vessel, a pouring spout, a pair of cup magazines, a cup support, electrically operated means to vend cups alternately from the magazines one at a time to the support in a position below the spout, electrical means to control vending of a measured drink under pressure from the container to the vessel, electrical means to vent the vessel, electrical means to cause the drink to be vended by gravity from the vessel to the spout and into a cup on the support, an electric circuit for the electrical means, and an electro-mechanical timer means to regulate automatically the order of operation of all operative means.

6. In a drink vender, a refrigerated cabinet, a bulk container therein, a measuring vessel, a pouring spout, a cup magazine, a cup support, means to vend a cup from the magazine to the support in a position below the spout, means to direct liquid from the container into the vessel, means to direct liquid from the vessel to the spout and into the cup on the support, an electrical control system operative in response to coin released means to regulate the functioning of operative parts, and a counting unit included in the system to make the same inoperative after a predetermined number of drinks have been vended.

7. In a drink vender, a container, a measuring vessel, a pouring spout, means to vend a cup to a supported position below the spout, means to vend a drink from the container to the vessel, means to vend a drink from the vessel to the spout and into the cup, a counting mechanism to count the drinks vended, and means to make the vender inoperative when a predetermined number of drinks have been vended.

8. In a drink vender, a container, a measuring vessel, a pouring spout, means to vend a cup to a supported position below the spout, means to vend a drink from the container to the vessel, means to vend a drink from the vessel to the spout and into the cup, a counting mechanism to count the drinks vended, coin operated means to set operative parts of the vender into operation, means to make the vender inoperative when a predetermined number of drinks have been vended, and means to return to the user a coin inserted into the machine when it is so made inoperative.

9. In a drink vender, a container, a measuring vessel, a pouring spout, means to vend a cup to a supported position below the spout, means to vend a drink from the container to the vessel, means to vend a drink from the vessel to the spout and into the cup, a counting mechanism to count the drinks vended, coin operated means to set operative parts of the vender into operation, means to make the vender inoperative when a predetermined number of drinks have been vended, and means to give a visual indication to the user when the machine is so made inoperative.

10. In a pre-mixed drink vender, a cabinet having a refrigerator compartment containing a bulk beverage container, an L-shaped compartment in the cabinet exterior of the first compartment, a gas tank in one leg of the latter compartment having a conduit entering the first compartment and container to put pressure on the pre-mixed beverage therein, cup vending mechanism in the other leg of the latter compartment to vend a cup to a supported position therein, a rigidly positioned measuring vessel in the refrigerator compartment to receive the liquid from the container under pressure, a pouring spout communicating with the vessel and disposed to drain into a supporting cup, and means to vend liquid from the vessel by gravity through the spout into the cup.

11. In a beverage vender, the combination with a container adapted to hold a pre-mixed beverage under gas pressure, said beverage including as a constituent a flavoring syrup of dispensing means including a closed measuring chamber, means including a normally closed inlet valve connecting said chamber with said container, a normally closed outlet valve for said chamber, a normally closed gas relief valve situated in the top of said chamber, and control means for effecting coordinated cyclic operation of said valves so that the inlet valve is first opened and closed, then the relief valve is opened, and finally the outlet valve is opened and then the relief and outlet valve are closed.

12. In a device of the class described including a container adapted to hold a pre-mixed beverage, dispensing means including a source of gas pressure connected with said container to maintain the beverage under pressure, a measuring chamber having connection with said container and with a dispensing outlet, said chamber also having a top wall portion with a gas relief opening therein, together with valve means operatively associated with said connections of the chamber to said container, said dispensing outlet and said relief opening, and means including electro magnetic valve operating means and timing switch means cooperating therewith for controlling said valve means to first admit a quantity of beverage to the chamber and close off the chamber with respect to the relief opening and dispensing outlet, then close off the chamber with respect to the container, and thereafter open the relief opening and then said dispensing outlet said relief opening remaining open at least until said quantity of beverage has been dispensed as aforesaid.

13. The method of dispensing a pre-mixed carbonated beverage which comprises confining the beverage under pressure of carbon dioxide gas, transferring a quantity of the beverage into a closed measuring chamber in amount and with a back pressure at all times sufficient to displace a desired volume of gas in said chamber and force said volume of gas back into the body of transferred beverage in said chamber to positively collapse a substantial portion of foam resulting from the transfer, and thereafter relieving substantially all of the pressure in the head space of said measuring chamber and flowing the beverage therefrom by gravity substantially free of back pressure.

14. The method of dispensing a carbonated beverage from a source of supply under carbonating pressure which comprises transferring a quantity of the beverage from said source of supply to a closed chamber in a volume and at a pressure sufficient to collapse foam therein by compression of gas back into the body of said transferred quantity, then opening said chamber at a level entirely above the upper level of said quantity for a period sufficient to permit substantially all of the free gas therein to escape from above said body of the transferred quan-

tity, and thereafter flowing said transferred quantity from the chamber by gravity substantially free of back pressure whereby the beverage is dispensed with a minimum of foam but with a substantial volume of carbonating gas therein.

15. The method of dispensing a carbonated beverage with a relatively minimum amount of foam and an optimum volume of gas in the body of the beverage at the time of dispensation, which method includes forcing the beverage by gas pressure from a supply chamber into a closed measuring chamber to compress gas in the head space above the beverage in the measuring chamber until amounts of foam therein are collapsed back into the body of the beverage and to force gas in said head space into said body of the beverage, thereafter discharging substantially all of the residual gas from said head space and flowing the beverage by gravity from the measuring chamber substantially free of back gas pressure.

16. The method of dispensing a pre-mixed carbonated beverage which comprises the confinement of a supply of the beverage in a supply chamber, subjecting the contents of said chamber to a constantly acting pressure of carbon dioxide gas, effecting transfer of portions of beverage from the supply chamber to a closed measuring chamber by gas pressure existing in the supply chamber and maintaining said pressure at a valve which is always sufficient to force a certain quantity of the transferred beverage into the measuring chamber and to compress portions of the foam in the head space thereabove to a point of collapse so that substantial amounts of the foam are forced back into and down onto the transferred body of beverage; thereafter relieving the gas from said head space and causing said transferred beverage to flow from the measuring chamber by gravity.

17. In a carbonated drink vender, in combination, a bulk container, a normally closed measuring vessel, a pouring spout, means including a normally closed inlet valve to direct liquid under pressure from the container to the vessel, a normally closed vent valve for the vessel, a normally closed discharge valve between the vessel and spout to drain liquid by gravity from the vessel to the spout, an electrical control system including electro-magnetic means for operating said valves, and coin controlled electro-mechanical timing means for automatically energizing the electro-magnetic means to open and close the inlet valve, then open the vent valve before the discharge valve is opened, then open the discharge valve and retain the vent valve open while the liquid is being drained through the discharge valve.

18. A carbonated beverage vender including in combination with means for maintaining a supply of pre-mixed beverage under pressure, a measuring chamber, inlet valve means connecting said chamber with said supply means, vent valve means communicating through the upper part of said chamber to the atmosphere, dispensing valve means communicating from a lower part of the chamber to a dispensing outlet, and actuating means cooperating with said valve means to actuate the same in dispensing cycles in an order in which the inlet valve means is opened long enough to permit filling of said measuring chamber to the capacity permitted by existing temperature and back pressure conditions therein, and said inlet valve means is thereafter closed, said vent valve means being opened after said measuring chamber is filled to capacity as aforesaid, and said dispensing valve means is opened following opening of said vent valve means but not until substantially all head pressure from gas in said chamber has had time to be dissipated by said vent valve means, the latter being retained open while the liquid is being discharged by gravity through said dispensing valve means.

19. In a pre-mixed carbonated beverage dispenser, in combination, a container adapted to hold a supply of beverage, of the type including syrup and water, under pressure of carbon dioxide gas, means for transferring measured quantities of the beverage from said container to a dispensing receptacle with a substantial amount of said gas in the transferred quantity and with little foam therein, said means including a normally closed measuring chamber having electrically controlled and normally closed valve means interconnecting the same with said container and with a dispensing outlet, together with electrically controlled valve means for venting said chamber upwardly through the top thereof from a point above the level of liquid therein, and control mechanism for actuating the several valve means in a certain relationship to admit a quantity of beverage from said container to the measuring chamber then close off communication between the chamber and container, then open and hold open the venting valve means, and thereafter open communication between said chamber and dispensing outlet while the venting valve means remains open.

20. In a beverage dispenser including a beverage supply container and means maintaining the contents thereof under gas pressure, the combination of a measuring and defoaming chamber connected by an inlet valve with said supply container, a relief valve communicating through the head portion of said measuring and defoaming chamber, and an outlet valve leading from said chamber to a gravity discharge spout, together with actuating means for operating said valves in a sequence in which the relief and outlet valves remain closed while the inlet valve remains open a period of time which is a function of the pressure and temperature of the beverage, until gas in said head space is compressed to force a portion thereof into the beverage in said chamber and to collapse foam in the chamber back into the beverage, said actuating means then opening said relief valve to discharge gas from said head space and thereafter also opening said discharge valve while retaining the relief valve open so long as any of the measured quantity of beverage remains in the chamber, whereby to permit the beverage to gravitate from the measuring chamber substantially free of head gas pressure.

RALPH A. NICHOLSON.