

Dec. 12, 1933.

E. SCHIETZEL

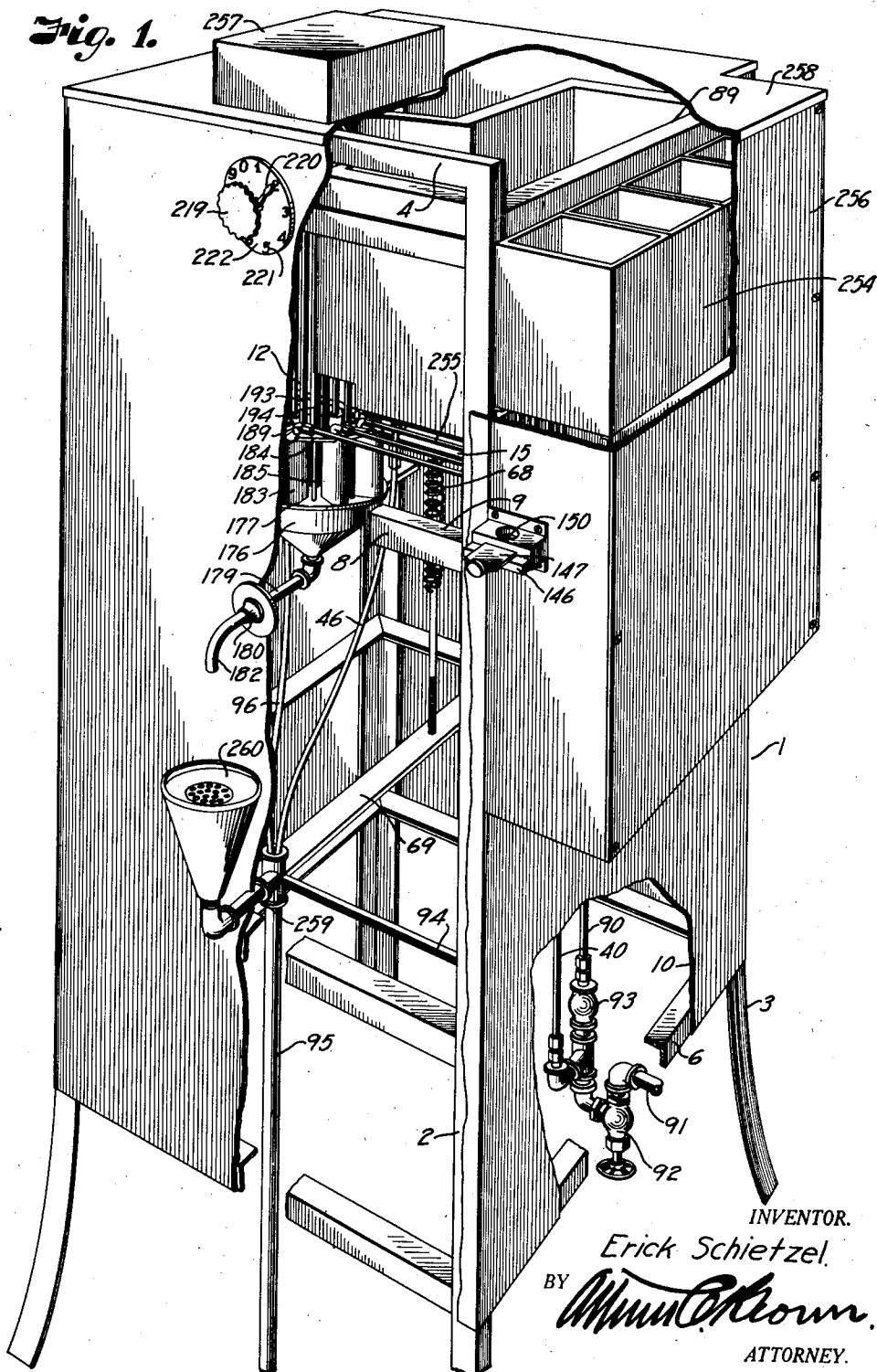
1,939,280

DRINK VENDING MACHINE

Filed Sept. 6, 1932

5 Sheets-Sheet 1

Fig. 1.



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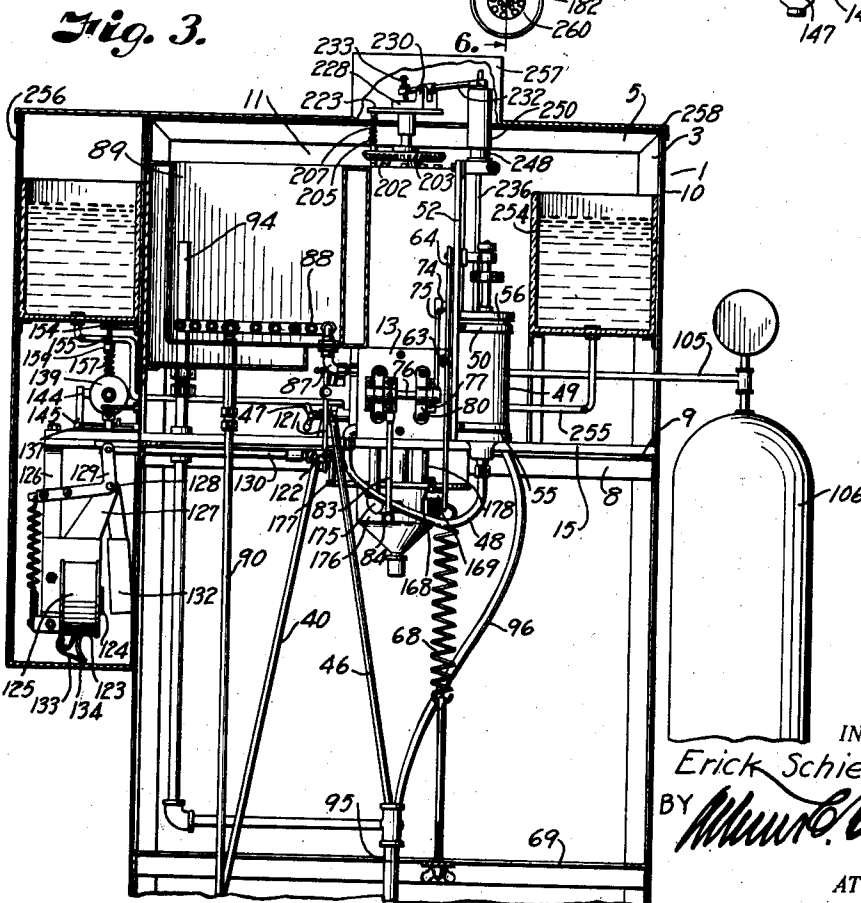
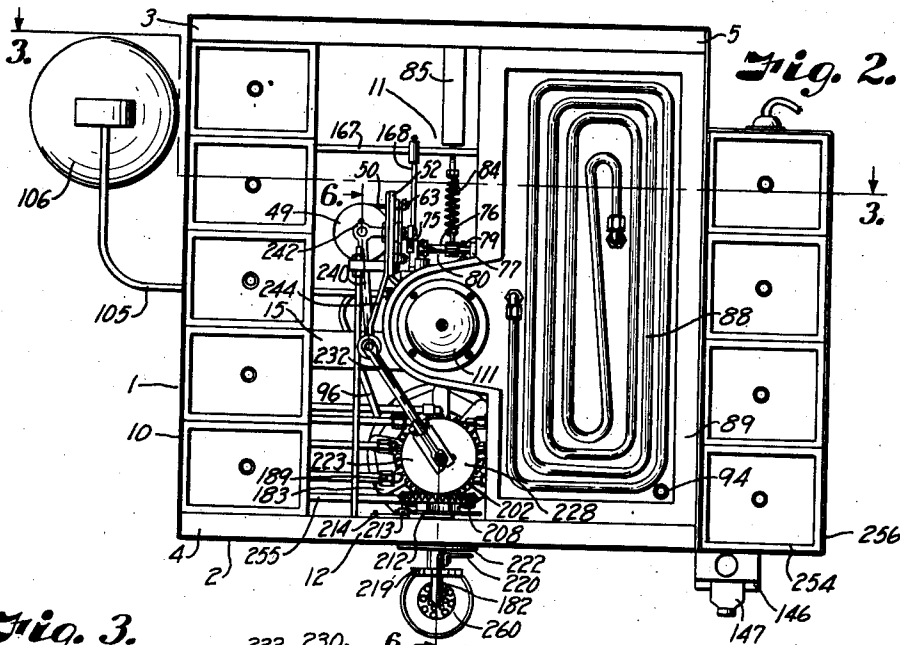
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DRINK VENDING MACHINE

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5 Sheets-Sheet 2



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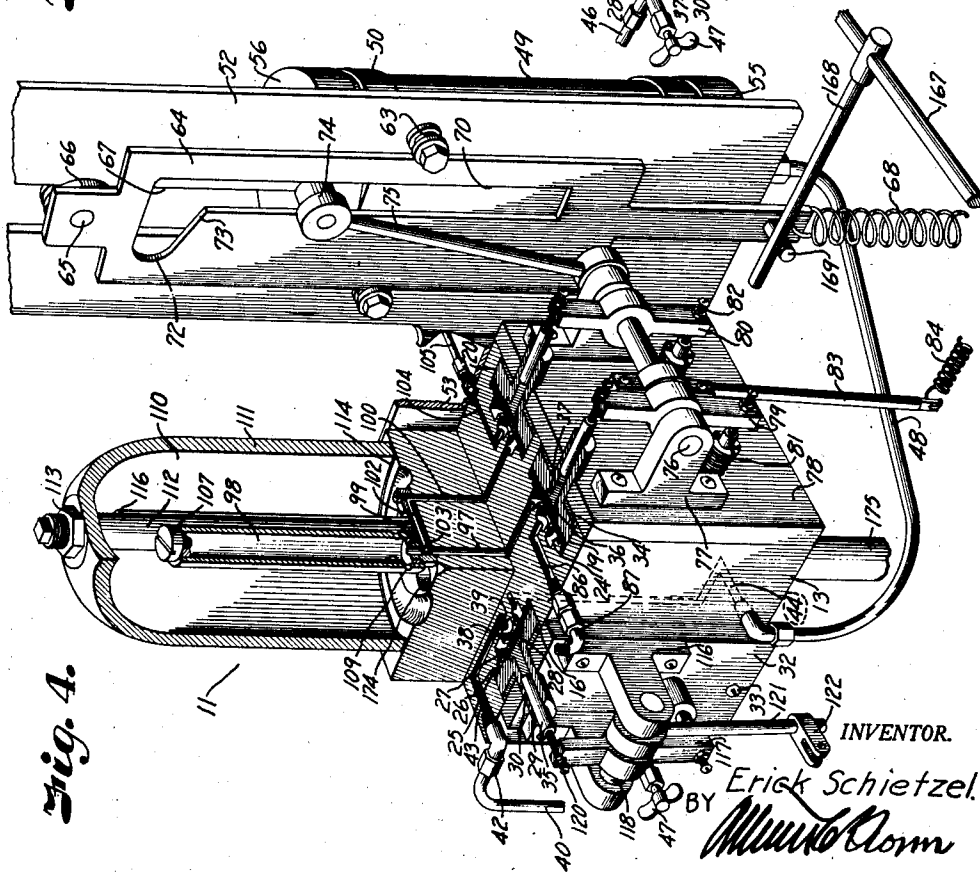
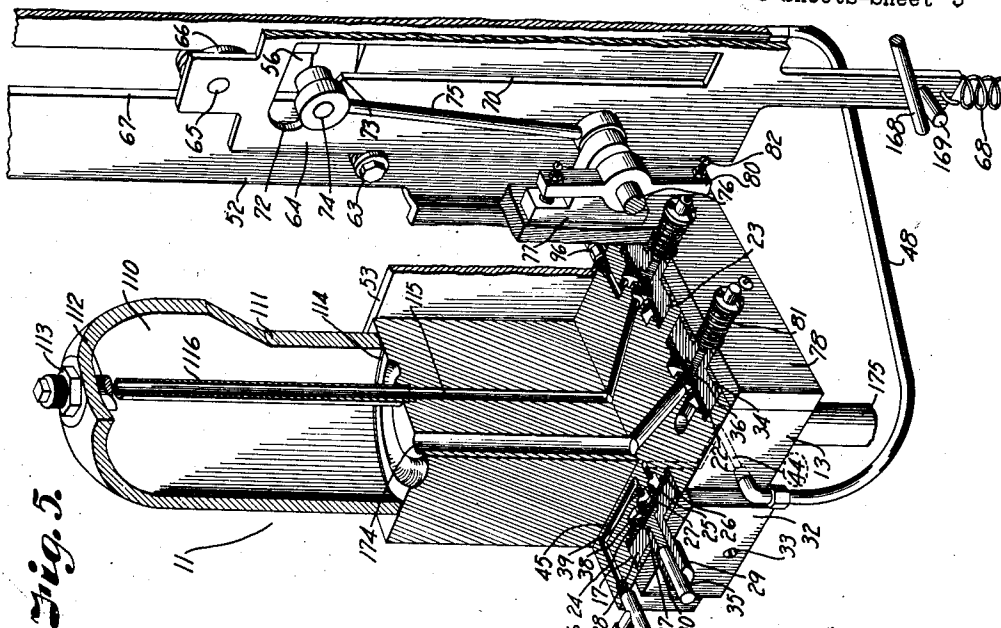
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DRINK VENDING MACHINE

Filed Sept. 6, 1932

5 Sheets-Sheet 3



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DRINK VENDING MACHINE
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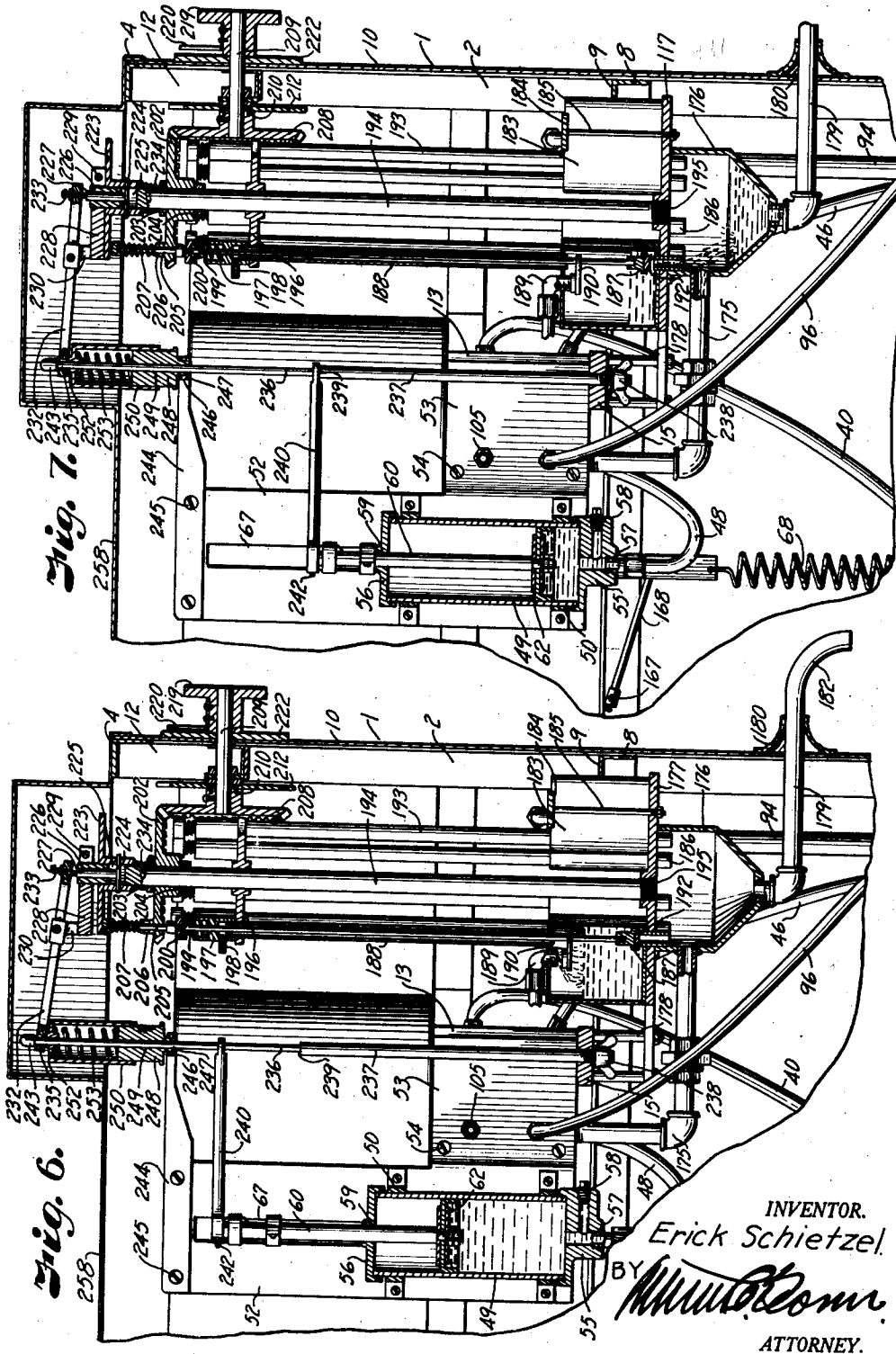


Fig. 6.

Fig. 7.

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DRINK VENDING MACHINE

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5 Sheets-Sheet 5

Fig. 8.

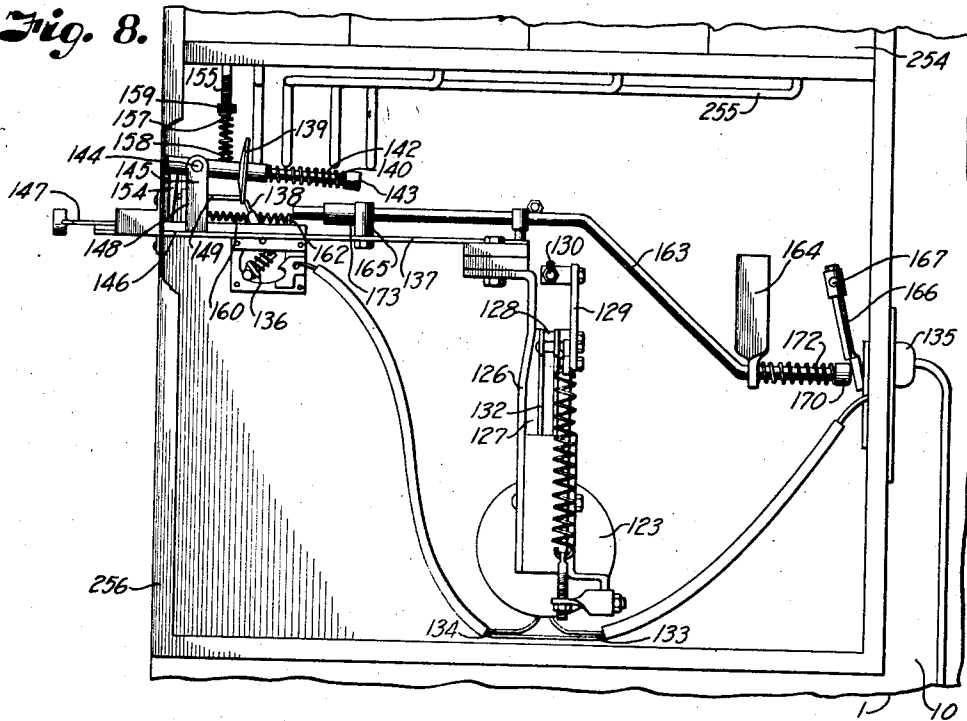


Fig. 9.

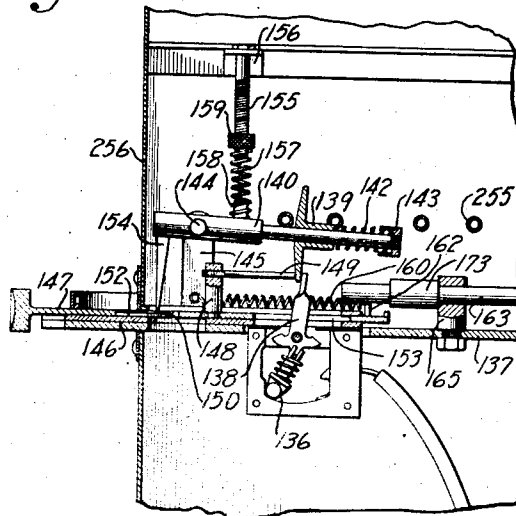
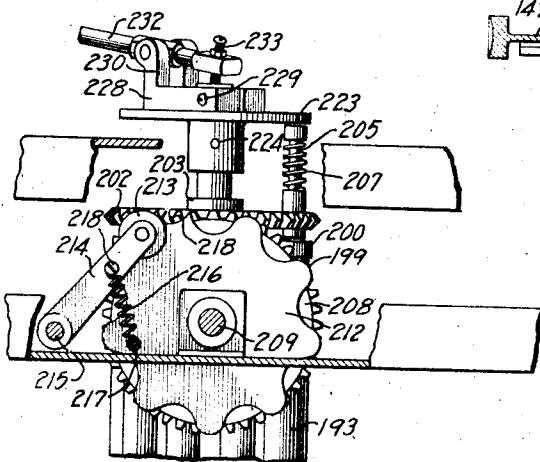


Fig. 10.



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UNITED STATES PATENT OFFICE

1,939,280

DRINK VENDING MACHINE

Erick Schietzel, Girard, Kans.

Application September 6, 1932. Serial No. 631,831

14 Claims. (Cl. 225—21)

My invention relates to apparatus for vending drinks and more particularly to a device of that character adapted for supplying carbonated drinks of various flavors to customers, the principal object of the invention being to provide a compact machine from which a measured quantity of cooled water charged in the machine with carbon dioxide gas and thoroughly commingled with a measured quantity of selected flavoring syrup may be drawn upon insertion of a coin of a required denomination into the machine.

A further object of the invention is to provide a machine of this character that is sanitary and that can be actuated by the normal pressure of a city water main.

In accomplishing these and other objects of my invention I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a drink vending machine constructed in accordance with my invention, portions of the machine walls being broken away for better disclosure of the vending apparatus.

Fig. 2 is a plan view of the machine with its cover removed for disclosing the cooling coil, syrup containers and other vending mechanism.

Fig. 3 is a vertical section on the line 3—3, Fig. 2, particularly illustrating the relation of the syrup containers and valve actuating mechanism to each other.

Fig. 4 is a perspective view of a valve block, charging chamber and associated control cylinder, the upper end of the block being shown in section to disclose the valves controlling flow through the water and gas supply conduits.

Fig. 5 is a similar view with the block cut away near its lower end to disclose the valves controlling drain and vent conduits.

Fig. 6 is an enlarged sectional view on the line 6—6, Fig. 2, illustrating the position of a control piston for effecting discharge of syrup into a syrup chamber.

Fig. 7 is a similar view showing the piston in a position for effecting discharge of the syrup into a mixing chamber.

Fig. 8 is an elevational view of a coin controlled switch-actuating mechanism for operating valves in water supply and drain conduits.

Fig. 9 is an enlarged view showing the relative positions of an operating plunger and a toggle switch when a coin is placed in the coin control.

Fig. 10 is an elevational view of cooperating latch members used for selecting the desired flavor for a drink.

Referring more in detail to the drawings:

1 designates a cabinet preferably comprising front and rear frame members 2 and 3 providing legs for the cabinet and connected at their upper ends by horizontal portions 4 and 5. The legs are connected adjacent their lower ends by angle members 6 and are further braced near their upper ends by similar angle members 8 having inwardly directed flanges 9, the frame being substantially covered with sheet metal 10.

The apparatus comprises two distinct units, the first unit 11 including valve mechanism and necessary equipment for charging and supplying charged or carbonated water to a mixing chamber, and the second unit 12 including the mechanism for measuring and delivering a quantity of selected flavoring material to the mixing chamber.

The first unit includes primarily a valve block 13 preferably rectangular in shape and supported on a cross-bar 15 mounted on the flanges 9 of opposite angle members 8. In one face of the block are provided a pair of aligned upper and lower valve sockets 16 and 17 while in an adjacent face of the block are formed upper and lower pairs of aligned valve sockets 19, 20 and 22, 23, all for purposes presently described.

The valve sockets are identical in construction and each includes a base recess 24 of decreased diameter to produce a lateral valve face 25 provided with an annular boss 26 for engaging a flexible valve disk 27 retained against the boss by the head 28 of a sleeve 29. The sleeve, in turn, is slidably extended through the opening 30 of a closure plate 32 secured to the block by screws 33, and through a filler washer 34 interposed between the head of the sleeve and the plate. A plunger 35, mounted in the bore of the sleeve, and provided with a head portion 36 seated in a counterbore 37 of the sleeve head, is adapted to urge the valve disk to seating engagement with an annular boss 38 formed concentrically in the base of the reduced recess 24.

It will thus be evident that the flexible valve disk prevents leakage of liquid around the head of the sleeve member and also serves to close a valve port 39 opening concentrically through the boss 38.

The valve mounted in the upper socket 16 controls flow of incoming liquid led from a water main through a conduit 40 and elbow nipple 42, as later more fully described, into a duct 43 formed in the valve block and opening through the inlet port, while the valve in the lower socket 17 serves to control drainage of liquid from the 110

block through ducts 44 and 45, and a drain pipe 46 controlled by a valve 47 as shown in Fig. 5.

As will be noted from Figs. 4 and 5, the duct 44 communicates the recesses of both valve sockets 16 and 17 so that water entering through the conduit 40, when the upper valve is opened, can flow downwardly through the duct 44 and through a conduit 48 into a cylinder 49 for actuating various valve mechanisms of the machine as will later be evident. The cylinder is preferably fixed by U-clamps 50 to a bracket 52 having a plate portion 53 in turn fixed to the valve block by screws or the like 54. The ends of the cylinder are closed by plates 55 and 56, the lower plate having a threaded opening 57 for receiving the pipe 48 and being also provided with a drain 58, while the upper plate 56 has a guide opening 59 to slidably receive a piston rod 60 carrying a piston 62 reciprocable in the cylinder.

Thus, by admitting liquid under pressure into the cylinder the piston will be elevated and in order to utilize such movement thereof for actuating the valves in the sockets 19, 20 and 22, 23, a pair of flanged guide studs 63 are fixed in the bracket 52 for guiding a shift plate 64 connected to the piston rod by a link 65 carrying a flanged collar 66 vertically slidable in a guide groove 67 of the bracket. The lower end of the shift plate is resiliently anchored by spring 68 to a cross-member 69 of the cabinet frame to normally return the piston to its lowermost position and an elongated slot 70 formed in the shift plate near one of its side edges terminates at its upper end in an offset portion 72 to produce a cam shoulder 73. A lateral head 74 of an arm 75 fixed to a rock-shaft 76 slidably engages the slot to effect shifting of the arm upon passage of the lateral head over the cam shoulder, and the rock-shaft is journaled in bearings 77 mounted on a plate 78 covering the valve sockets 19, 20 and 22, 23 so that rocker-arms 79 and 80, fixed on the rock-shaft will actuate the valves mounted in these sockets in one direction, the valves in the sockets 22 and 23 being moved in the opposite direction by compression springs 81 anchored on the valve stems 35, these being the only valves in the valve block that are not opened by fluid pressure. The rocker-arms are provided at each end with adjustable set screws 82, the set screws of the arm 79 engaging the valves in the sockets 19 and 22 while the screws of the arm 80 are adapted to bear against the valves in the sockets 20 and 23.

Upon elevation of the shift plate the head of the arm 75 will be moved out of engagement with the lateral portion of the slot 70 to rock the shaft 76 in one direction and in order to urge the rock-shaft in the opposite direction an arm 83 is fixed thereto and its lower end is anchored by a spring 84 to a bracket 85 of the frame.

The inlet of the valve socket 19 is connected through a duct 86 and an elbow coupling 87 to a cooling coil 88 arranged in a cooling chamber 89 adjacent the upper end of the cabinet and adapted for receiving ice to cool the liquid in the coil, the opposite end of the coil being connected to a conduit 90 leading to a source of water supply indicated by the pipe 91 valved at 92, a check valve 93 being further interposed in the conduit 90 to prevent return flow of water from the cooling coil. An overflow or drain pipe 94 extending upwardly into the cooling chamber leads to a common drain 95 receiving also the end of the conduit 46 leading from the valve socket 17 and the discharge end of a conduit 96 communi-

cating with the outlet of the valve socket 23. Cold water from the cooling coil is, therefore, free to flow through the duct 86 into the recess of the valve socket 19 when the valve is open for passage therefrom through a duct 97 into a tube 98 threaded on a neck 99 formed on the upper face of the valve block 13.

The passageway controlled by the valve in the socket 20 comprises a duct 100 having a lateral portion 102 leading into the duct 97 and terminating in a nozzle portion 103 for a purpose presently described. An inlet port 104 is connected by a line 105 to a container or "gas bottle" 106 of the usual commercial type containing a supply of carbon dioxide gas under pressure. By discharging the carbon dioxide gas through the nozzle directly into the flow of cold water adjacent its point of discharge into the tube 98 a mixture of the gas and water or charging of the water with gas is effected. The upper end of the tube 98 is closed as indicated at 107 while spaced ports 109 are provided near the lower end of the tube for escape of the charged fluid into a discharge chamber 110 produced by mounting an inverted cup-shaped member 111 on a stud bolt 112 projecting upwardly from the valve block, the cup being securely retained on the valve block by a nut 113 threaded on the bolt, and a gasket 114 being inserted between the cup and block to prevent leakage of fluid from the chamber.

As clearly illustrated in Fig. 5, the valve closing the socket 23 controls a vent or drain passage 115 leading upwardly through a pipe 116 projecting from the valve block into the chamber 110.

The valves in the sockets 16 and 17 are alternately closed and opened through the medium of a rocker-arm 117 fixed on a rock-shaft 118 journaled in bearings 119 similar to the bearings 77, each end of the rocker-arm being provided with a set screw 120 for engaging the plunger end of a valve seated in the corresponding valve socket. A lever 121 having one end secured to the rock-shaft is provided, at its opposite end, with a clevis 122 operably connected with actuating mechanism now to be described.

While various means may be employed for moving the arm 120 to actuate the valves controlling the flow of liquid to the operating cylinder and drainage of liquid therefrom, I prefer to use a coil-controlled electromagnet or solenoid 123 including the usual core 124 surrounded by a coil or winding 125 mounted on a bracket 126 fixed in any convenient manner to the cabinet frame. The bracket includes a bearing arm 127 journaling a shaft 128 whereon is fixed a bell crank lever 129 having one end resiliently anchored to the solenoid support and having its opposite end connected by a rod 130 to the clevis 122. An arm 132 likewise fixed to the shaft 128 is constructed of suitable iron for attraction by the core of the magnet when energized to rotate the shaft 128 for actuating the connecting rod, thereby moving the rocker-arm 117 to open the valve in the socket 16 for admitting liquid to the control cylinder and to simultaneously close the valve in the socket 17 for preventing escape of liquid from the cylinder. The solenoid winding may obviously be connected to any suitable source of electrical energy and is shown in Fig. 8, as being connected by conductors 133 and 134 to a wall plug 135. Interposed in the conductor 134 is a toggle switch 136 mounted on a bearing plate 137 having one end supported by the cross-

plate 15 and its opposite end carried by the wall of the cabinet. An arm 138 of the toggle switch is adapted to be engaged by a disk 139 slidably mounted on the reduced end of a shaft 140 and yieldingly retained thereon by a spring 142 seated on the shaft between the disk and an end cap 143 of the shaft.

The shaft 140 is pivotally supported by trunnions 144 on spaced bearing posts 145 having their lower ends secured to a grooved guide 146 mounted on the plate 137. The guide projects outwardly from the cabinet for receiving a slide 147 carrying a post 148 wherein is threaded a shaft 149 to engage the disk 139 and move it against tension of its related spring for throwing the switch. The slide is further provided with a coin opening 150 adapted to register with a coin receptacle of the cabinet for receiving a coin 152 of the desired denomination and is also provided with a slot 153 to admit the arm of the toggle switch.

In order to prevent actuation of the toggle switch with coins or slugs of less than regulation thickness a "feeler" 154 is secured to the outer end of the shaft 140, as best shown in Fig. 9 and a resilient adjustment is provided therefor including a bolt 155 anchored to a bracket 156 of the frame, and a spring 157 having one end seated on a boss 158 of the shaft 140 and its opposite end bearing against an adjusting nut 159 threaded on the bolt.

The slide 147, after being pushed inwardly to throw the toggle switch for energizing the solenoid, is returned to its normal position by a spring 160 preferably anchored to one of the bearing posts 145 and to a lug 162 fixed to the slide. Other means must, however, be provided for returning the toggle switch to its former or open position after a drink is dispensed from the machine and for this purpose I have provided a shaft 163 slidably secured to the frame angle 8 and to the plate 137, one end of the shaft being adapted to engage the arm of the toggle switch while its opposite end bears against the outer end of an arm 166 fixed to a rod 167 extending transversely across the cabinet and journaled in the angles 8. A lever 168 is further fixed to the transverse shaft intermediate its ends and is adapted to be engaged by a lateral projection 169 fixed to the shift plate 64 as clearly shown in Fig. 4 to open the toggle switch when the piston has approached its upper limit of travel. Sleeved on the shaft 163 between the bearing bracket 164 and an enlarged end 170 of the shaft is a spring 172 for normally returning a boss portion 173 of the shaft to stop engagement with the bearing bracket 165 to permit free movement of the toggle switch to closed position.

The mechanism thus far described will serve to deliver charged or carbonated water into the chamber 110 and in order to mix the charged water with the desired flavoring material it is conducted from the chamber through an outlet port 174 and conduit 175 to a mixing chamber 176 for admixture of flavoring syrup by the unit 12 now to be described.

The mixing chamber or housing 176 is secured in any suitable manner to a supporting plate 177 suspended by bolts 178 from the cross-bar 15 for supporting the unit 12 and a drain pipe 179 leads from the mixing chamber through the front wall of the cabinet as shown at 180 and terminates in a down-turned nozzle 182. Since it is desired to supply a comparatively wide range of flavors from which a selection may be made for

flavoring a drink a plurality of syrup chambers or housings 183 are arranged in an annular series on the plate 177 and may be secured thereto by clamping plates 184 and bolts 185 if desired, and outlet nipples 186 extending through the plate into the mixing chamber preferably project upwardly into the syrup chambers to produce a valve seat for engagement by an outlet valve 187 mounted on the lower end of a vertical valve rod 188. An inlet nipple 189 fixed in the upper wall of the syrup housing projects downwardly therethrough to serve as a seat for an inlet valve 190 secured to the valve stem in fixed relation to the outlet valve. Each of the inlet and outlet valves may be provided with a resilient cushion 192 to insure against leakage when closed, one of the valves being closed while the other is open as will be apparent from Figs. 6 and 7. The valve stems of the several syrup chambers are extended upwardly through tubular supports 193 arranged in an annular series about a central shaft 194 threaded as indicated at 195 into the plate 177 and provided near its upper end with a spider 196 for retaining the upper ends of the tubular members. Carried on the extreme upper end of the tubes 193 above the spider are socket members 197 having lateral ports 198 for admitting air under atmospheric pressure to the tubes and into the syrup chambers.

Each valve rod is normally urged upwardly, for holding the inlet valve in closed condition, by means of a spring 199 seated in the socket member and bearing against a cap 200 threaded on the valve stem. By depressing the valve rod against the tension of the spring the inlet valve is opened and the outlet valve is closed, thus admitting syrup through the nipple 189 into the syrup chamber.

To effect actuation of a selected valve rod for dispensing syrup from its respective chamber a bevel gear 202 is rotatably mounted on the shaft 194 between collars 203 and 204 keyed to the shaft, and a plunger 205 is extended through an opening 206 provided in the gear adjacent its periphery so that the plunger can be aligned with any of the valve rods by rotating the gear, a spring 207 being mounted on the plunger to normally return the plunger to its uppermost position.

Rotation of the gear 202 is effected by means of a cooperating gear 208 fixed on the inner end of a shaft 209 journaled in the front wall of the cabinet, and fixed to the gear 208 as indicated at 210 is a notched disk 212 yieldingly engaged by a roller 213 carried on the outer end of an arm 214 having its inner end pivoted to the frame by a shaft 215, the roller being urged into the notches of the disk by means such as a spring 216 having opposite ends respectively anchored to the cabinet and to the arm as shown at 217 and 218. As will be evident, the notches of the disk correspond in number to the valve rods or syrup chambers and the position of the disk in relation to the gear 202 is so arranged that when the roller 213 engages a notch of the disk the plunger 205 will be positioned directly over a valve rod.

One of the projecting portions or teeth of the disk is preferably provided with a notch 218' which, if engaged by the roller 213, will locate the plunger centrally between two adjacent valve rods to permit discharge of carbonated water into the mixing chamber without simultaneous discharge of syrup into the chamber as will later be apparent. To facilitate rotation of the shaft 209 for engaging the roller with a selected notch, a

hand wheel 219 is fixed to the outer end of the shaft extending through the cabinet wall and an indicator hand or pointer 220 secured to the hub of the wheel is adapted for registering with indicia 221 provided on an indicator plate 222 which may be secured in any suitable manner to the front wall of the cabinet. If desired, the indicia or numerals may be provided directly on the cabinet wall.

From the foregoing it will be evident that by rotating the gear 202 through the medium of the gear 208 and hand wheel 219 the plunger 205 can be moved to registry with any of the valve rods 188 and upon such registry only a slight pressure on the plunger is required for opening the inlet and closing the outlet valve in a corresponding syrup chamber. Such depression of the plunger is preferably accomplished by means including a disk 223 slidably mounted on the upper end of the central shaft 194, and limited in its sliding movement thereon by a cross-pin 224 extended through the hub of the disk and through an elongated slot 225 provided in the shaft.

Extending concentrically through the extreme upper end of the shaft 194 and intersecting the elongated slot is a bore 226 for slidably receiving a pin 227 adapted to engage the cross-pin for depressing the slide on the shaft. A bracket 228 is clamped on the shaft 194 adjacent its upper end by a screw 229 and is provided with a pair of spaced arms 230 to pivotally mount therebetween a lever 232 having an adjusting screw 233 threaded transversely through one end for engaging the pin 227 so that rocking movement of the lever will depress the pin to actuate the plunger, the disk being returned to its original or inoperative position by a spring 234 seated between the collar 203 and the hub of the disk. The end of the rocking lever opposite the end carrying the adjusting screw is provided with an opening 235 for admitting the reduced upper end 236 of a vertical rod 237 having its lower end slidably extended through the cross-bar 15 and provided with a thumb screw 238 to further adjust the position of the lever 232 relative to the bar. A shoulder 239 formed by reducing the diameter of the upper end of the rod serves as a seat for a cross-bar 240 having one end slidably engaging the smaller portion of the rod and having its opposite end fixed in any suitable manner to the upper end of the piston rod as shown at 242. A head 243 formed on the upper end of the reduced rod portion 236 engages the rocking-lever 232 so that return of the piston to its lowermost position in the cylinder 49 will coincidentally draw the rod 237 downwardly, thereby releasing the adjusting screw from contact with the pin 227.

Resilient means, however, is required for rocking the lever 232 in the opposite direction and for this purpose I have secured an arm 244 to the upper end of the bracket 52 as indicated at 245 and have formed an eyelet opening 246 on the projecting end of the arm for seating the reduced neck 247 of a guide 248 having an opening 249 to receive the smaller portion of the rod 237. Slidably mounted on the guide is a sleeve 250 having an upper closed end 252 likewise mounted for sliding movement on the reduced rod portion, the sleeve confining a spring 253 serving to urge the corresponding end of the rocking lever upwardly to depress the plunger 205 for actuating the valve rod in a downwardly direction.

As will be observed, the syrup chambers are comparatively small and are intended to contain

only a sufficient amount of syrup for adding the desired flavor to a single drink and it is therefore desirable to connect the nipple 189 of each chamber to a syrup reservoir or container 254 by means of suitable conduits 255. The containers are preferably formed of non-metallic material such as glass and may be mounted on a machine at any desired location provided they are elevated sufficiently to deliver syrup from the containers by gravity to the syrup chambers. As shown in Fig. 2 I prefer to arrange some of the containers along the inner face of one of the cabinet walls and to position other of these containers adjacent the outer face of an opposite wall of the cabinet, the containers located exteriorly of the cabinet being enclosed by a housing 256 serving also to enclose the coin control and electro-magnetic mechanism.

Since the rocking lever 243 and parts of the actuating mechanism therefore are located slightly above the upper end of the machine, a hood 257 is provided on a cabinet cover 258 so that substantially the entire operating mechanism is enclosed to provide a sanitary machine of neat appearance.

In order to further enhance sanitation of the machine a refuse pipe 259 connected with the drain pipe 95 is provided with a cone shaped receptacle 260 located exteriorly of the machine and directly beneath the outlet 182 for receiving drippings from the outlet.

Assuming a drink vending machine to be constructed and assembled as described, operation thereof will be as follows:

The customer rotates the hand wheel 219 to register the indicator with the indicia representing his preferred flavor and thereupon inserts a coin in the coin opening of the plunger 147. He next pushes the plunger inwardly and the "feeler" engaging the coin will prevent rocking of the shaft 140 to allow the disk 139 to throw the toggle switch to closed position, thereby causing energization of the solenoid and, consequently, attraction of the arm 132 for moving the connecting rod 130 to rock the arm 117 to the position shown in Fig. 4.

Assuming further, that the valve in the water supply line is open, water under line pressure thereupon forces the valve in the valve socket 16 from its seat to allow flow of the water into the operating cylinder. While the valve in the socket 16 is open the valve in the socket 17 is maintained in closed condition by the lever 117 so that the water is confined in the control cylinder. Consequently, the piston therein is moved upwardly as shown in Fig. 6, releasing the arm 240 from the shoulder of the shaft 237, thereby allowing depression of the valve rod of a selected syrup chamber to admit a measured amount of syrup from the corresponding reservoir into the chamber. Simultaneously therewith, the cam plate 64 is elevated together with the piston to displace the head of the arm 75 from the lateral portion of the slot in the shift plate, thereby opening each of the valves in the sockets 19 and 20 to admit cooled water from the reservoir 89 and carbonic gas from the "bottle" 106 into the charging chamber. Continued elevation of the cam plate and post 169 will cause rocking of the arm 168 to, in turn, rotate the shaft 167 and shift the rod 163 by means of the arm 166 engaging the outer end of the shaft, thus moving the switch arm in the opposite direction for opening the toggle switch and de-energizing the solenoid. Thereupon the arm 132 is with-

drawn from the solenoid core and moves the rocker-arm 117 in opposite direction to close the valve in the socket 16 and to open the valve in the socket 17 for communicating the discharge end of the cylinder with the drain.

The shift plate under tension of the spring 68 is thereafter moved downwardly together with the piston in the cylinder until the head of the arm 75 engages the lateral portion 72 of the shift plate slot. With the arm 75 in this position, or as shown in Fig. 5, the valves in the sockets 19 and 20 are closed while the valves in the sockets 22 and 23 are opened to admit atmospheric pressure through the vent pipe into the chamber 110 to displace the liquid in the chamber through the line 175 into the mixing chamber. Lowering movement of the piston will also cause engagement of the arm 240 with the shoulder on the rod 237 (Fig. 7) thus compressing the spring 253 and releasing the pressure on the plunger 205 to permit closing of the inlet and opening of the outlet valve in the syrup chamber for discharge of the measured amount of syrup into the mixing chamber. From the mixing chamber the charged water, and flavoring material commingled therewith, is delivered through the discharge spout into a cup or suitable receptacle for receiving the drink.

From the foregoing it will be apparent that the operation of the machine is entirely automatic after a coin of the required denomination has been inserted therein and that measured quantities of charged water and flavoring material are simultaneously dispensed to the customer.

What I claim and desire to secure by Letters Patent is:

1. In apparatus of the character described, a mixing chamber, means for delivering measured amounts of liquid to said chamber, an annular series of syrup chambers arranged about a center common with the axis of the mixing chamber and having outlets communicating with the mixing chamber, valve mechanisms controlling flow of syrup from said outlets, an actuator movable to operative relation with any of said mechanisms, and means responsive to operation of said first named means for operating said actuator.

2. In apparatus of the character described, a mixing chamber, means for delivering measured quantities of liquid to said chamber, a syrup chamber having an outlet in communication with the mixing chamber and having an inlet, a valve rod carrying inlet and outlet valves for alternately closing said inlet and outlet, yielding means for actuating said valve rod and means responsive to operation of said first named means for controlling actuation of said yielding means.

3. In apparatus of the character described, a mixing chamber, means for delivering measured quantities of liquid to said chamber, an annular horizontal series of syrup chambers having outlets individually communicating with the mixing chamber, valves controlling flow of syrup from said outlets, an actuator movable for selective operative engagement with any of said valves, and means for moving said actuator to operative alignment with a selected valve.

4. In apparatus of the character described, a mixing chamber, means including a cylinder and a piston reciprocable in the cylinder for delivering measured quantities of liquid to said chamber, a syrup chamber having an outlet in communication with the mixing chamber, a valve for controlling said outlet, yielding means for opening the valve, spring-pressed means for closing the

valve, and means operably connected to said piston for limiting actuation of said spring-pressed means to predetermined positions of the piston for effecting simultaneous discharge of syrup from the syrup chamber and of a measured quantity of liquid into the mixing chamber.

5. In combination with a water main, a mixing chamber, a charging chamber communicating with the mixing chamber, liquid and gas conduits leading to said charging chamber, valves interposed in the conduits, a cylinder, a pipe connecting the cylinder with said main, a piston movable in said cylinder in one direction by the pressure of the water in said main and operably connected with said valves, resilient means for moving the piston in the opposite direction, a syrup chamber in communication with the mixing chamber, and valve means operable in response to reciprocation of said piston for discharging syrup from the syrup chamber into the mixing chamber.

6. In apparatus of the character described, a mixing chamber, a charging chamber communicating with the mixing chamber, liquid and gas conduits leading to said charging chamber, valves interposed in the conduits, a cylinder, a piston reciprocable in the cylinder and operably connected with said valves for coincidentally operating said valves to effect simultaneous discharge of liquid and gas into the charging chamber for charging said liquid with the gas, a plurality of syrup chambers having outlets in communication with the mixing chamber, valves for the outlets, and mechanism selectively engageable with any of said last named valves and operable in response to reciprocation of said piston for discharging syrup from a selected syrup chamber into the mixing chamber.

7. In combination with a water main, a charging chamber, liquid and gas conduits leading to said charging chamber, valves controlling flow through said conduits, a cylinder, a pipe connecting the cylinder to said water main, a valve in the pipe, a piston in the cylinder operably connected with the first named valves and means for actuating said last named valve to admit water from the main under pressure to the cylinder and effect actuation of the first named valves by the piston.

8. In combination with a source of fluid pressure, a charging chamber, liquid and gas conduits leading to said charging chamber, valves controlling flow through said conduits, a cylinder, a pipe connecting the cylinder to said source of fluid pressure and having a drain branch, valves in said pipe and branch, a piston in the cylinder operatively connected with the first named valves, and means for alternately opening and closing the last named valves for respectively admitting and draining fluid from said cylinder.

9. In combination with a source of fluid pressure, a charging chamber, liquid and gas conduits leading to said charging chamber, drain and vent conduits leading from said chamber, valve mechanism for opening and closing the liquid and gas conduits alternately to opening and closing of the drain and vent conduits, a cylinder, a pipe connecting the cylinder to said source of fluid pressure and having a drain branch, valves in said pipe and branch, a piston in the cylinder operatively connected with said first named valve mechanism, and means including an electro-magnet for alternately actuating said last named valves.

10. In apparatus of the character described, a mixing chamber, means for delivering charged liquid to said chamber, an annular series of syrup

- chambers having outlets communicating with the mixing chamber, valves controlling flow of syrup from said outlets, a gear concentric with said annular series of chambers, a plunger slidable in said gear in eccentric relation to the axis of the gear for selective registry with any of said valves upon rotation of the gear, and means for rotating the gear.
11. In combination with a source of fluid pressure, a valve block including a charging chamber, liquid and gas conduits leading to said charging chamber, drain and vent conduits leading from said chamber, valve mechanism including valves in said block for opening and closing the liquid and gas conduits alternately to opening and closing of the drain and vent conduits, a cylinder, a conduit extending through the valve block connecting the cylinder to said source of fluid pressure and having a drain branch, valves in the block for said conduit and branch, a piston in the cylinder operatively connected with said first named valves, and means for alternately actuating said last named valves.
12. In combination with a source of fluid pressure, a charging chamber, liquid and gas conduits leading to said charging chamber, drain and vent conduits leading from said chamber, a valve in each conduit, a rocker arm having opposite ends respectively engaged with the valves in the liquid and drain conduits, a rocker arm having opposite ends respectively engaged with the valves in the gas and vent conduits, a common shaft carrying said arms in fixed relation to each other, a cylinder, a pipe connecting the cylinder to said source of fluid pressure, a valve in said pipe, a piston in the cylinder and operatively connected with said shaft for opening and closing the valves in the liquid and gas conduits alternately to opening and closing of the valves in the drain and vent conduits, and means for actuating the valve in said pipe to admit fluid under pressure to the cylinder to effect actuation of the first named valves by said piston.
13. In apparatus of the character described, a mixing chamber, means for delivering measured amounts of liquid to said chamber, a plate covering the chamber, a shaft mounted perpendicularly on the plate, an annular series of syrup chambers arranged about said shaft in communicating relation with the mixing chamber, a valve for each syrup chamber to control flow of syrup into the mixing chamber, a gear journaled on the shaft above said valves, a plunger slidable in said gear for selective registry with any of said valves upon rotation of the gear, means for rotating the gear, and means responsive to actuation of said first named means for effecting operation of said plunger and discharge of syrup from a syrup chamber into the mixing chamber.
14. In apparatus of the character described, a mixing chamber, means for delivering measured amounts of liquid to said chamber, a plate covering the chamber, a shaft mounted perpendicularly on the plate, an annular series of syrup chambers arranged about said shaft in communicating relation with the mixing chamber, a valve for each syrup chamber to control flow of syrup into the mixing chamber, a gear journaled on the shaft above said valves, a plunger slidable in said gear for selective registry with any of said valves upon rotation of the gear, means for rotating the gear, a disk slidably mounted on the shaft above said gear for engagement with the plunger, an arm pivotally carried by the shaft and operatively connected with the disk, and means responsive to actuation of said first named means for rocking said arm to effect discharge of syrup from a syrup chamber into the mixing chamber.

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