

Sept. 16, 1958

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2,852,043

VENDING MACHINES FOR A MULTIPLICITY OF HOT MIXTURES

Filed June 16, 1955

12 Sheets-Sheet 1

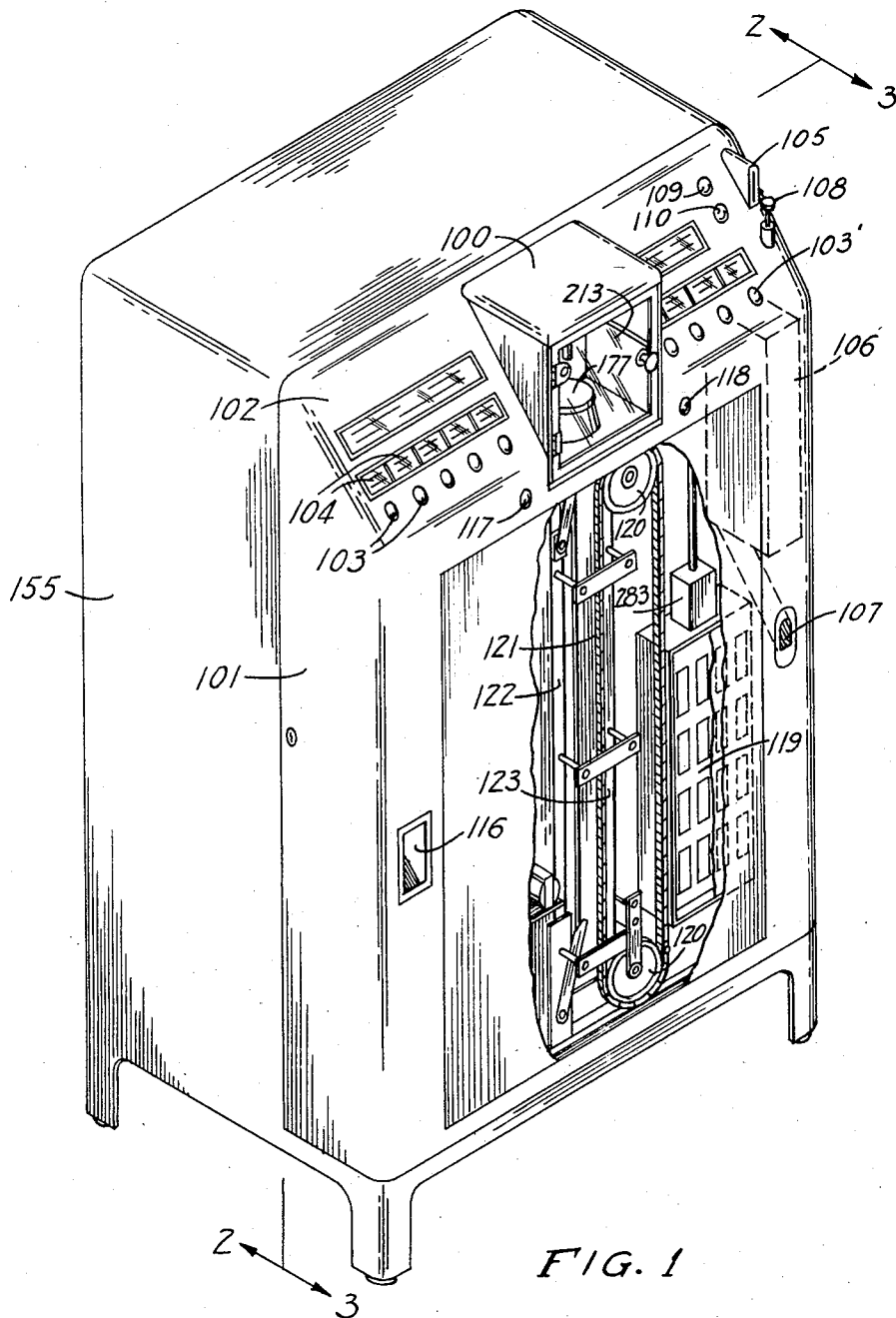


FIG. 1

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12 Sheets-Sheet 2

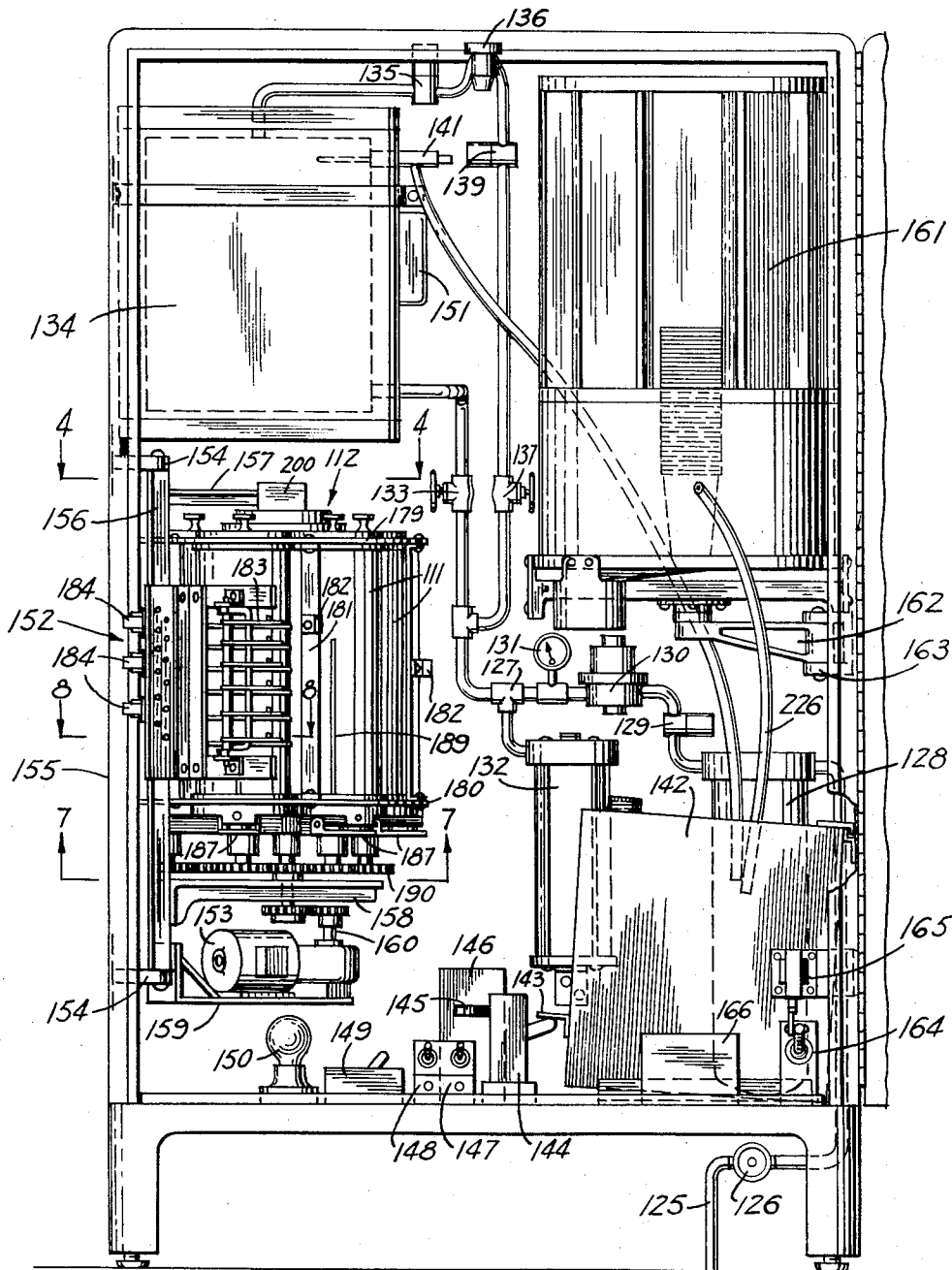


FIG. 2

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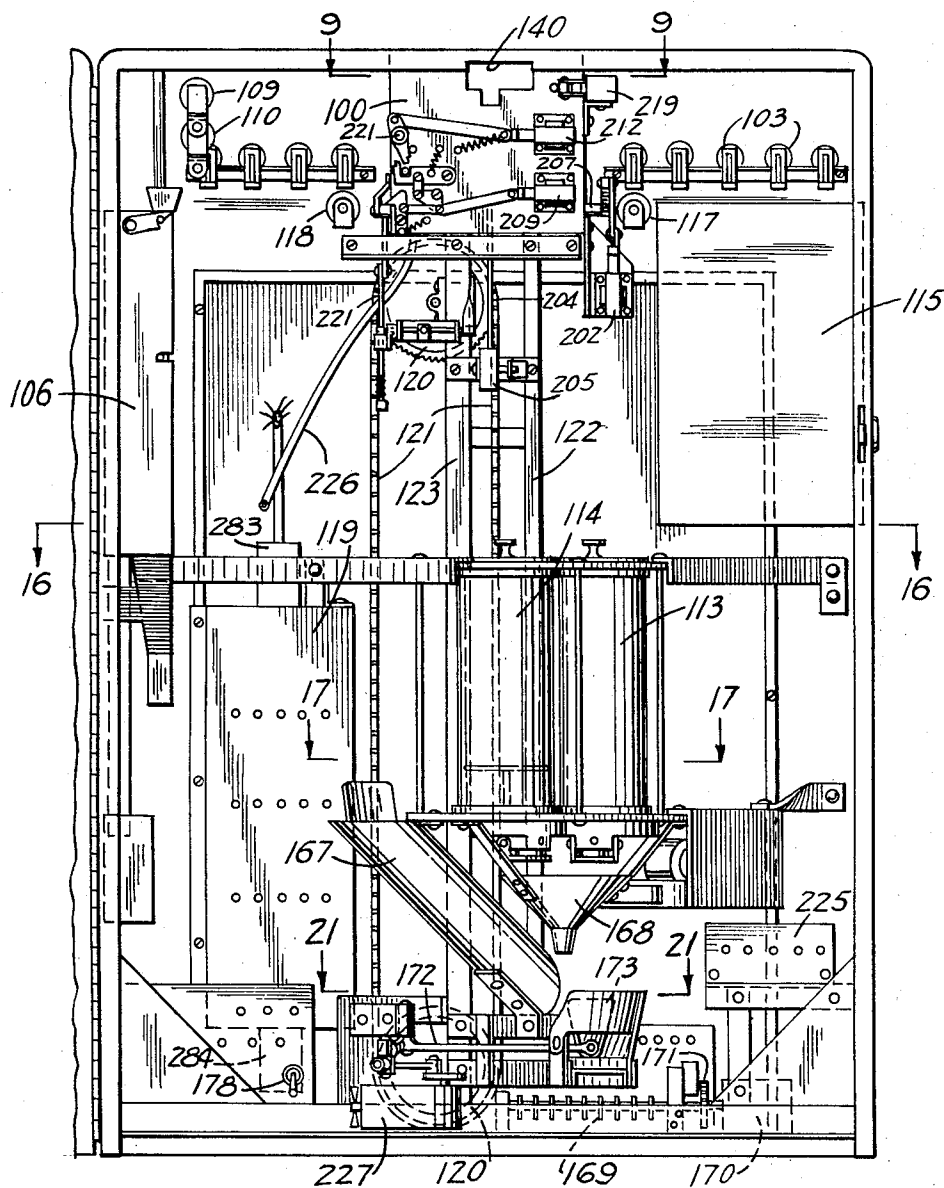


FIG. 3

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12 Sheets-Sheet 4

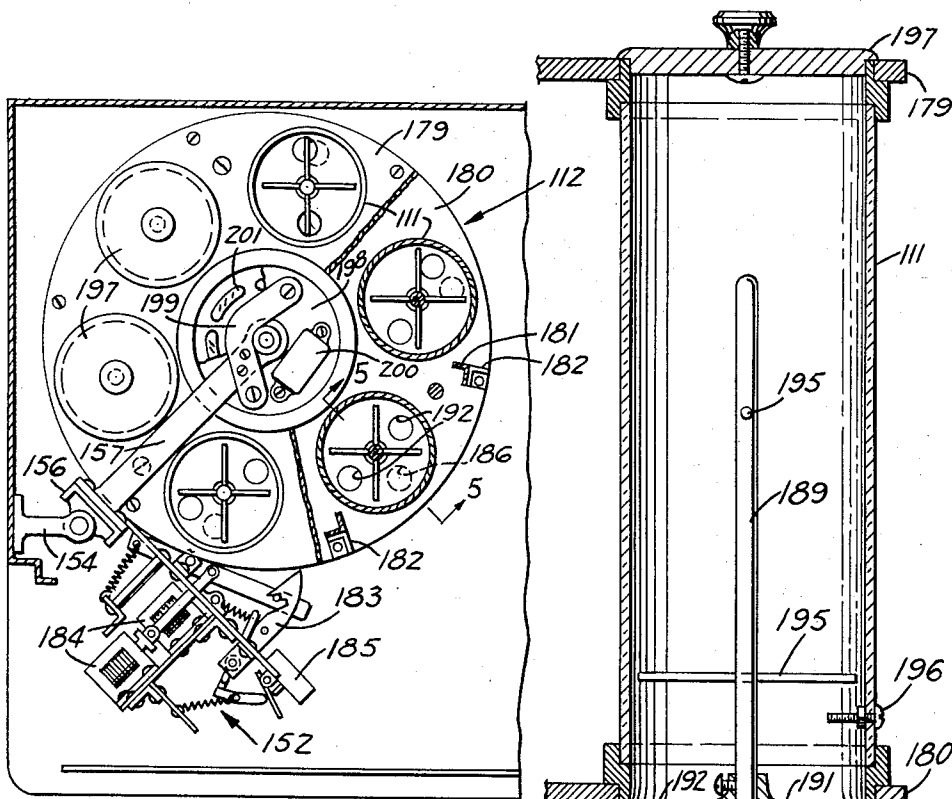


FIG. 4

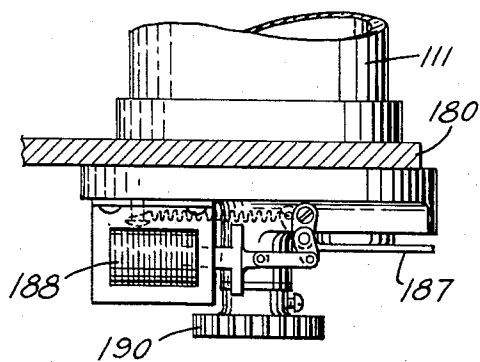


FIG. 6

FIG. 5

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12 Sheets-Sheet 5

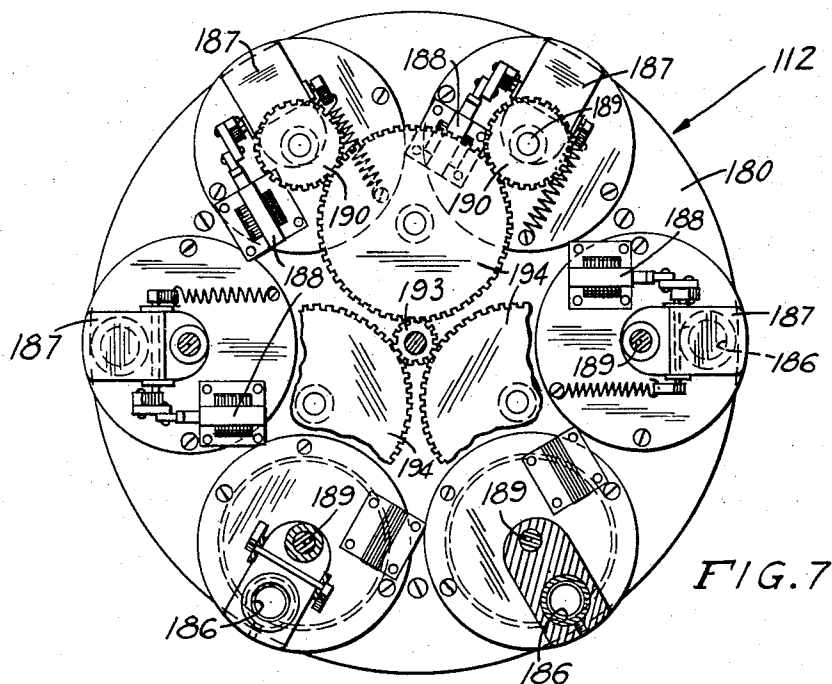


FIG. 7

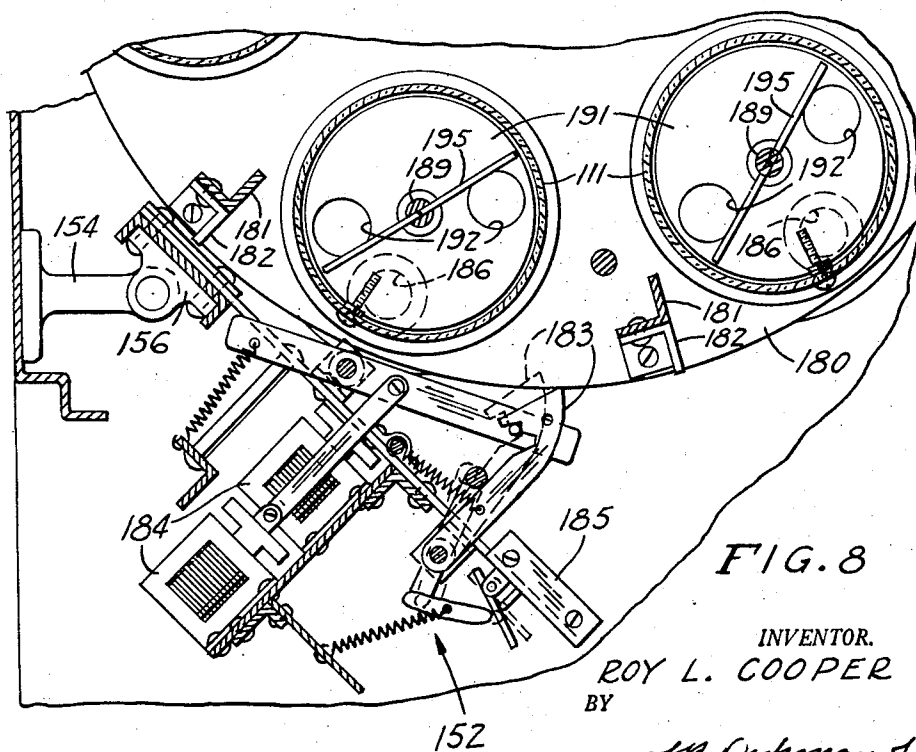


FIG. 8

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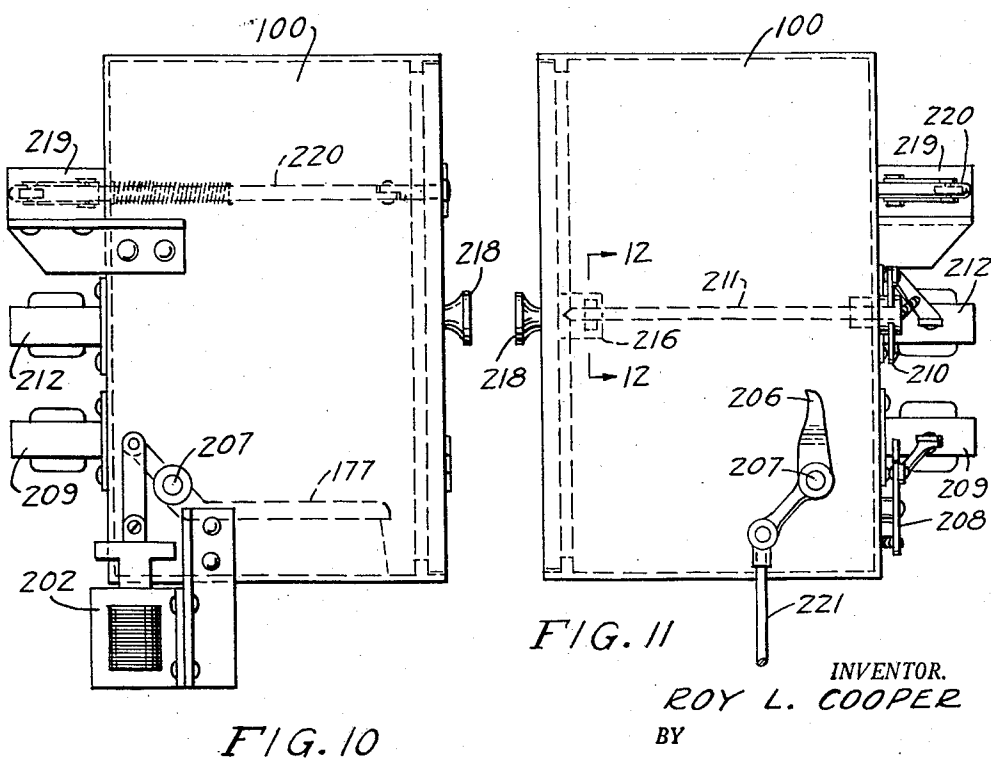
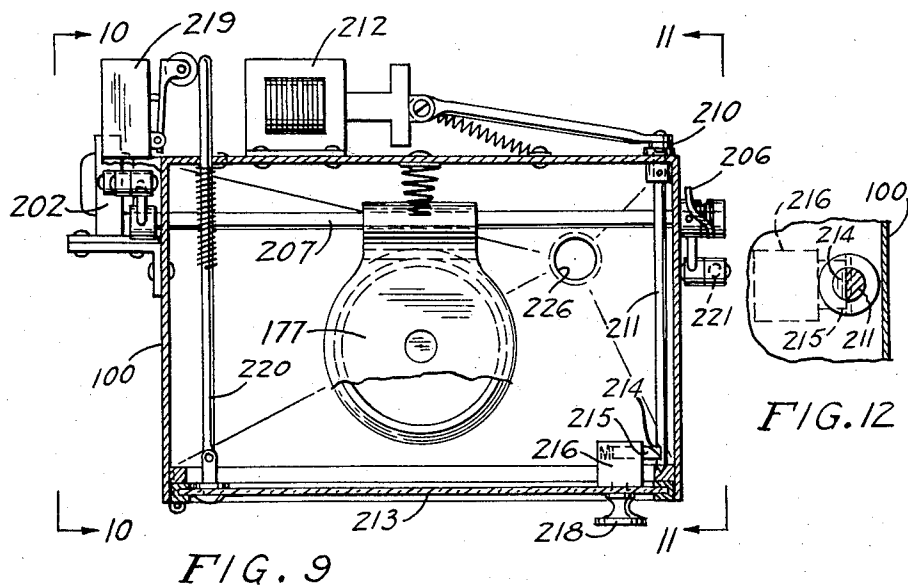
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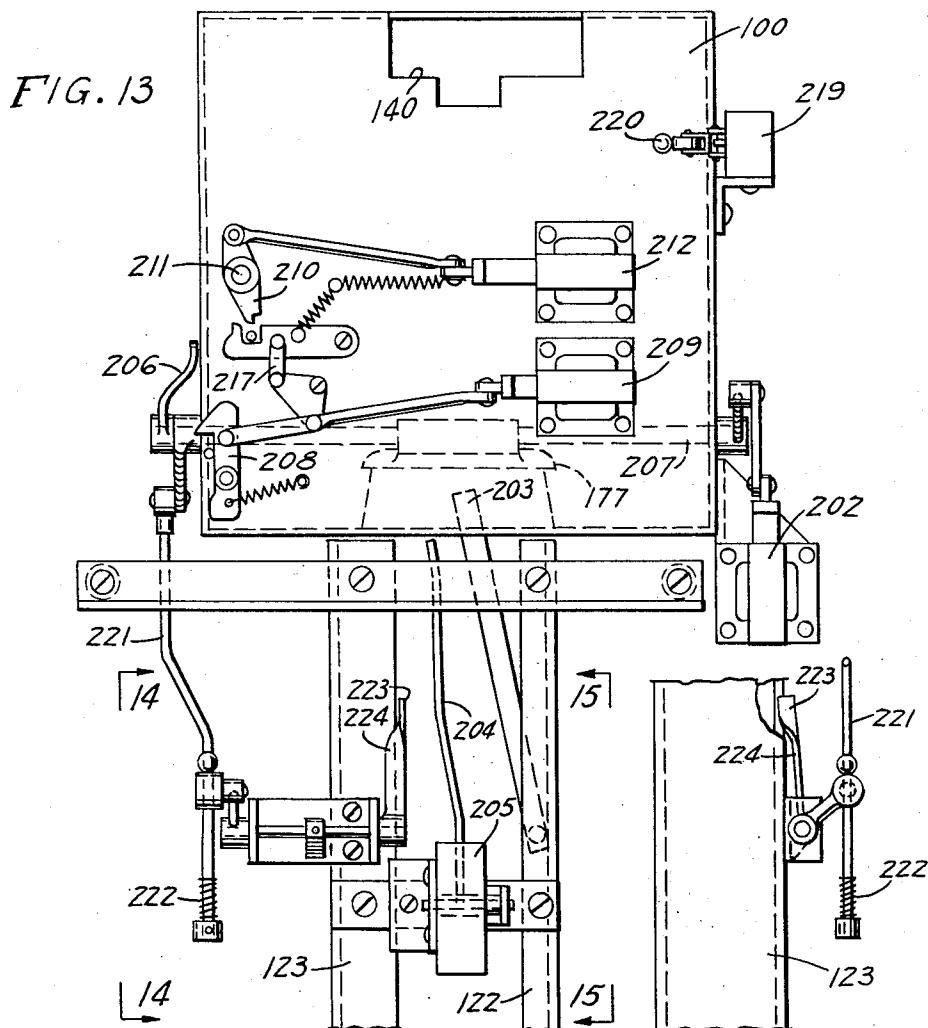
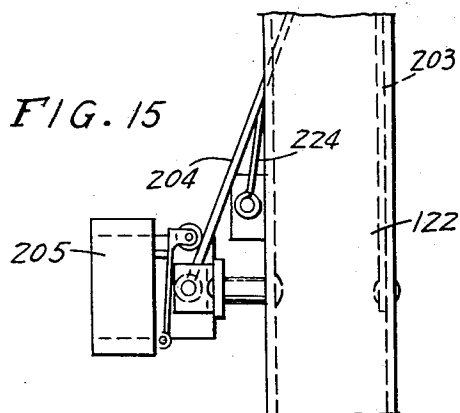


FIG. 14



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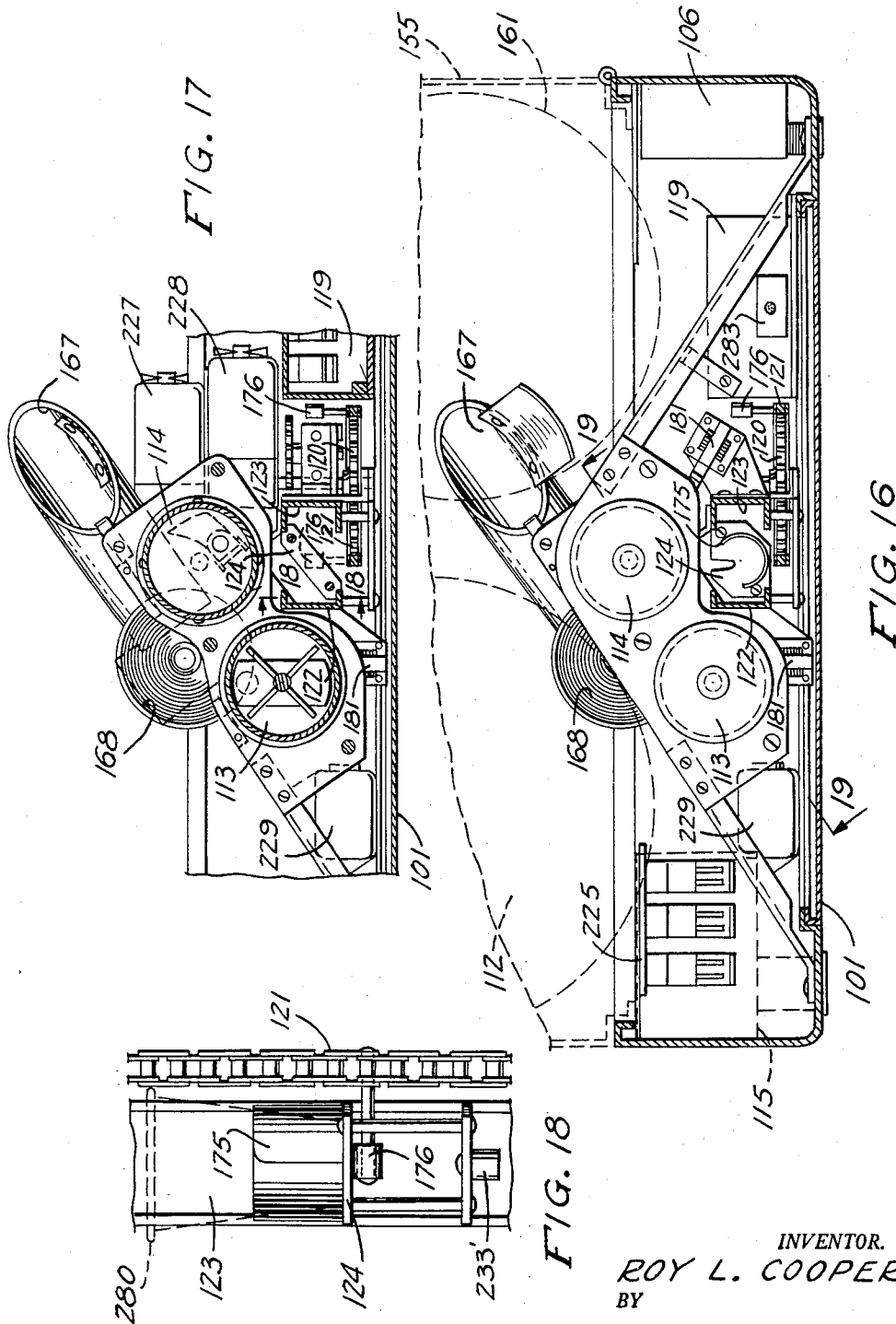
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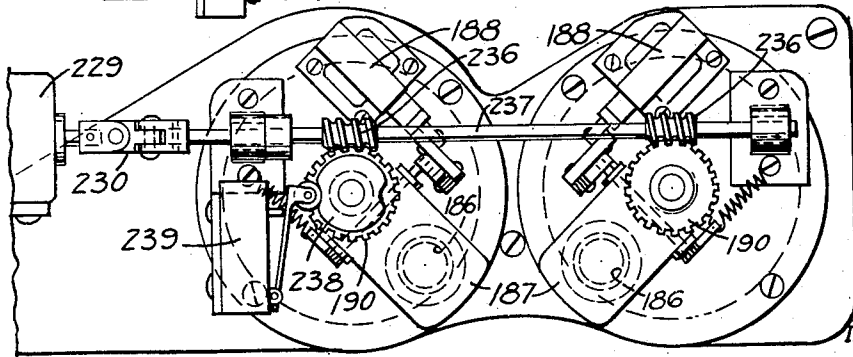
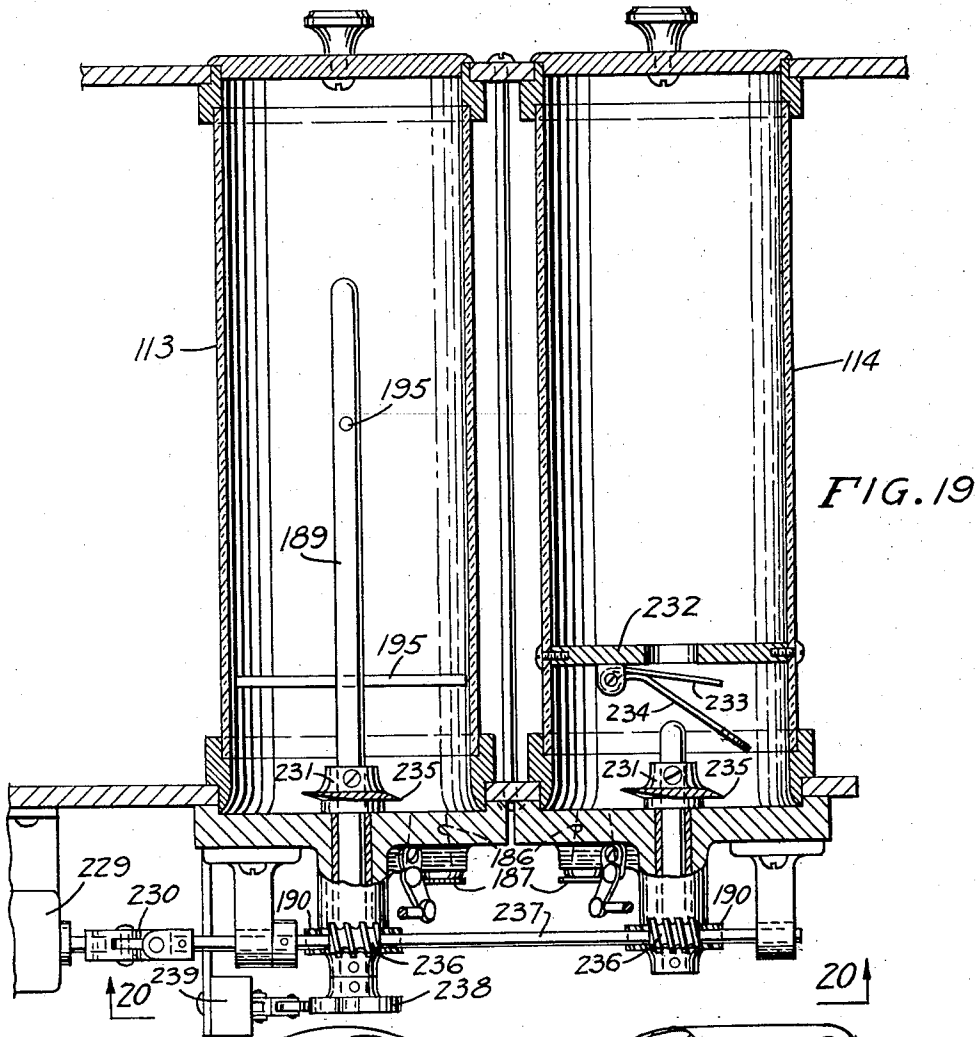
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12 Sheets-Sheet 9



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12 Sheets-Sheet 10

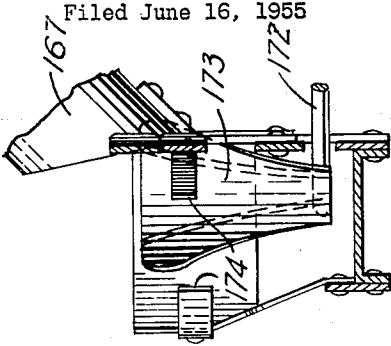


FIG. 22

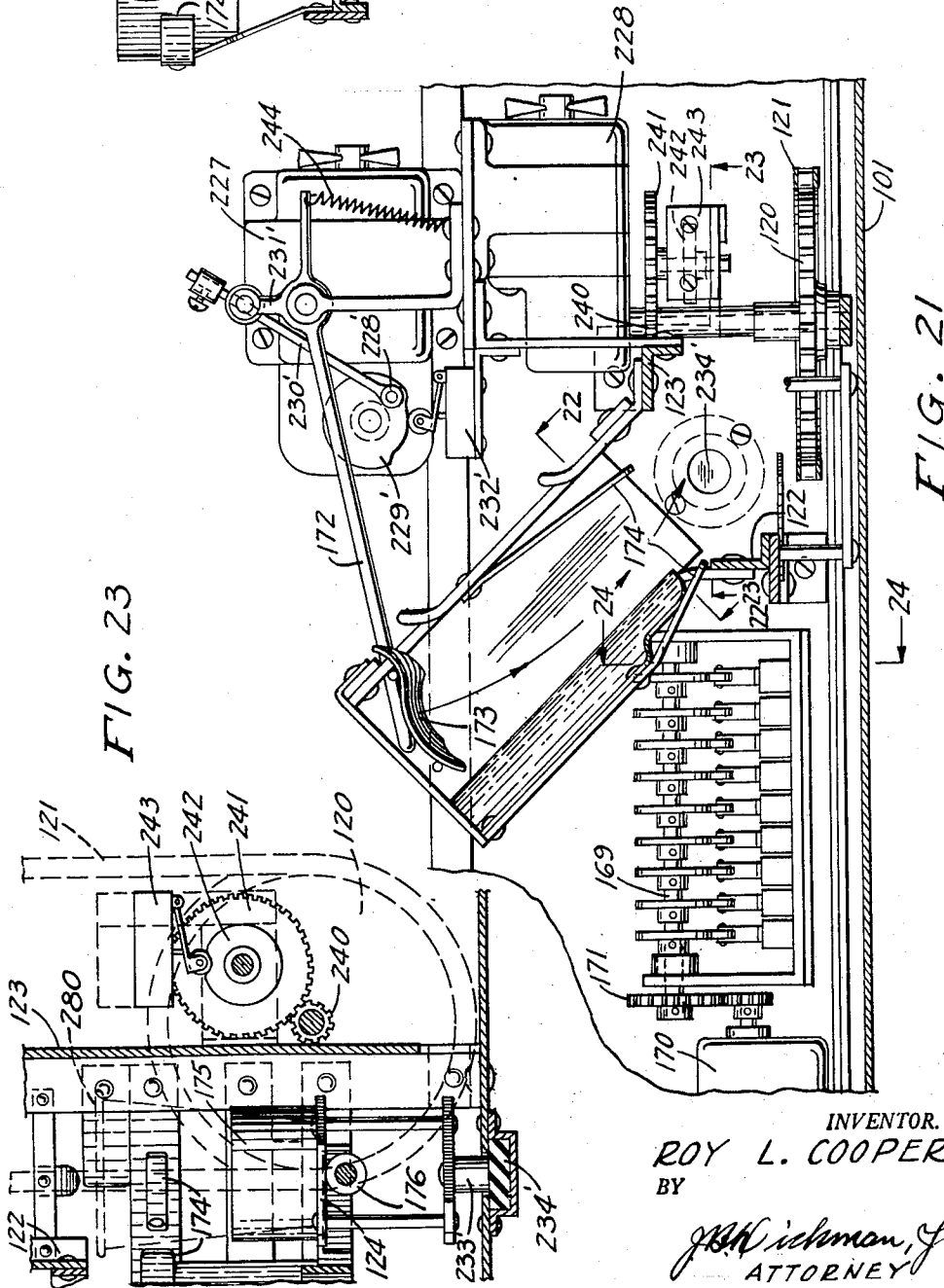


FIG. 23

FIG. 21

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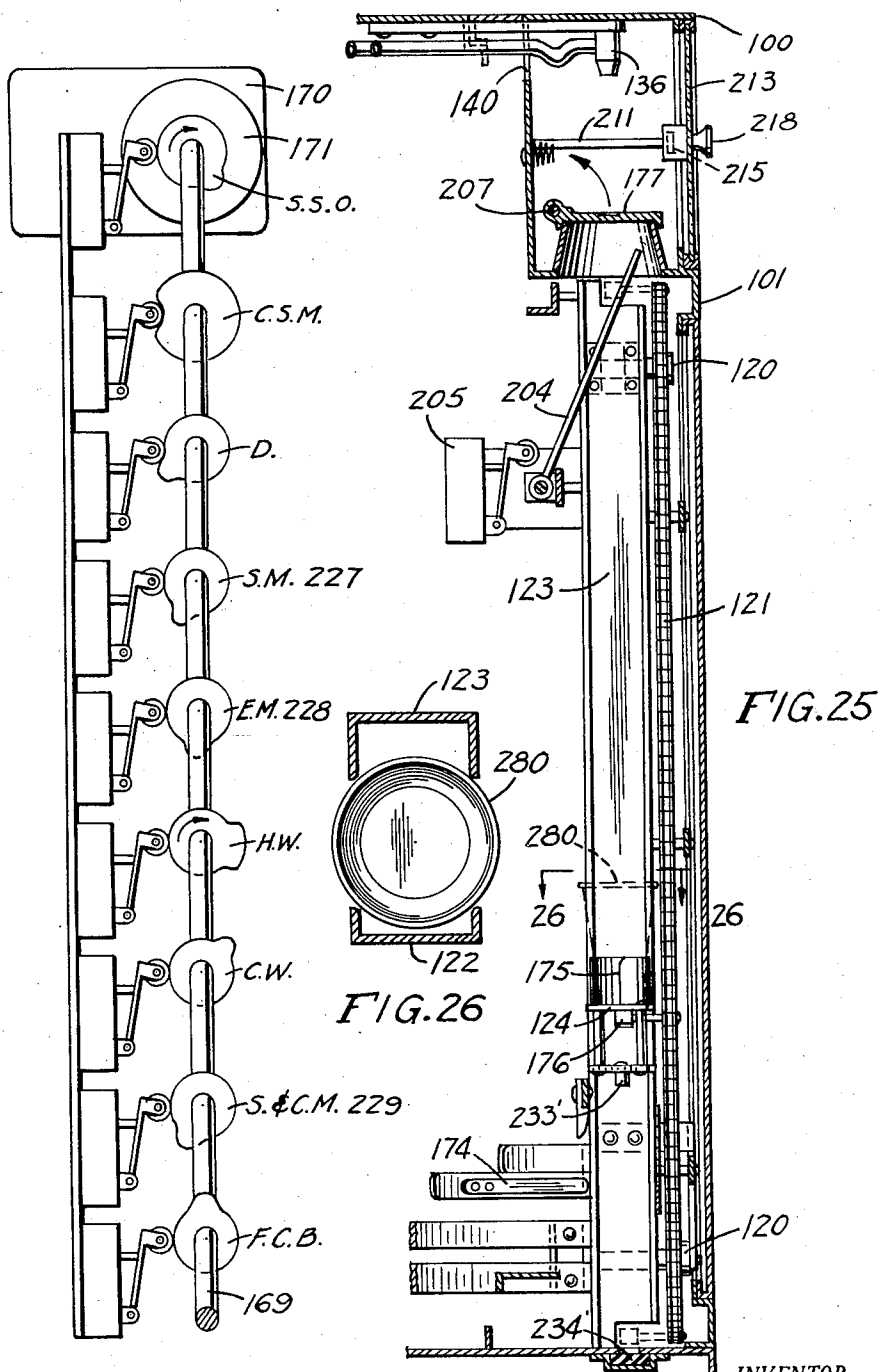


FIG. 24

FIG. 25

FIG. 26

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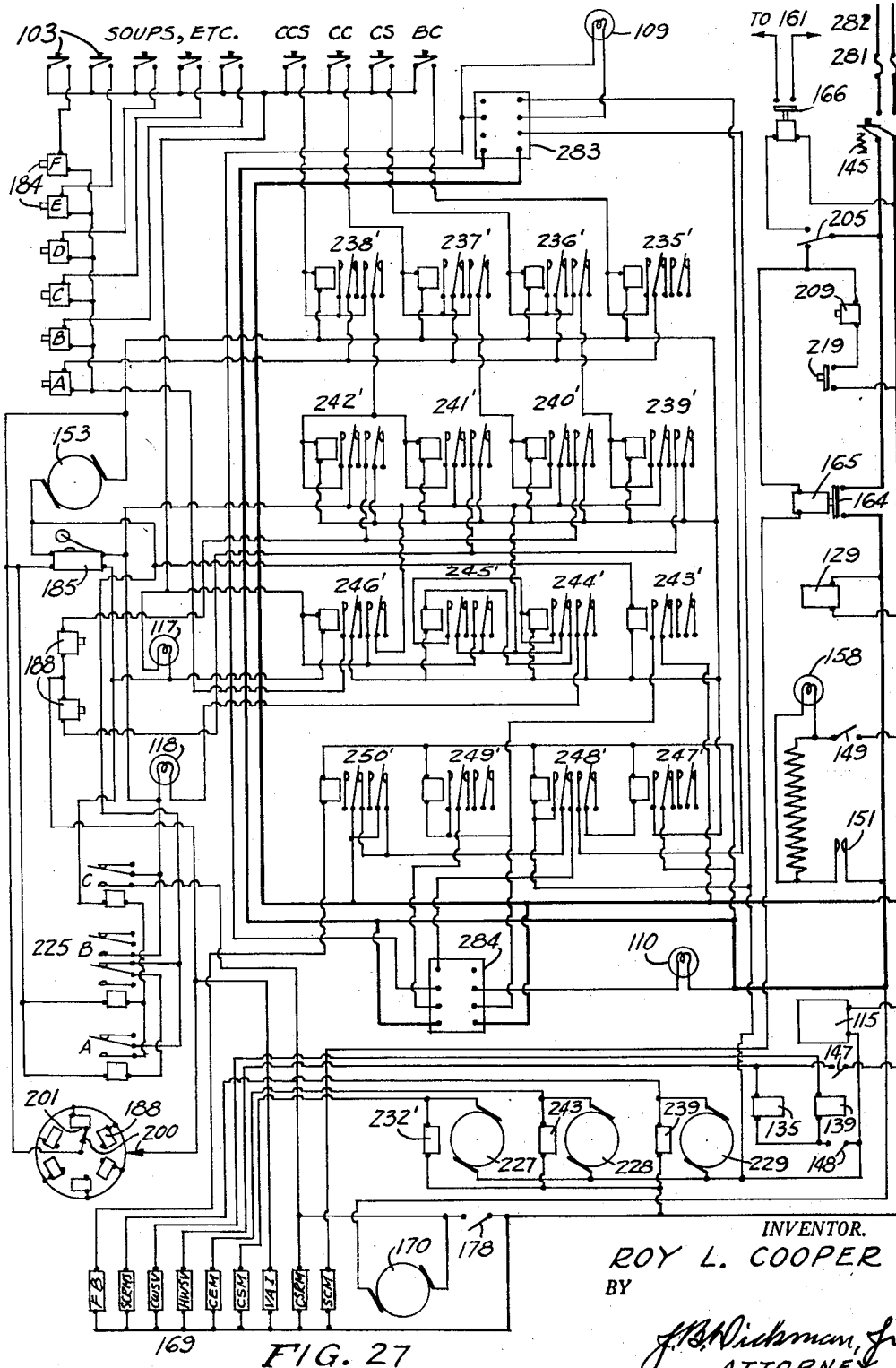
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VENDING MACHINES FOR A MULTIPLICITY OF HOT MIXTURES

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Application June 16, 1955, Serial No. 515,895

6 Claims. (Cl. 141—82)

The present invention relates to vending machines for a multiplicity of hot mixtures made from stable dry ingredients and water.

Present vending machines for hot mixtures are generally bulky and sometimes awkwardly top-heavy, because the material and cup storage bins for dispensing are usually raised above the service level so that the materials may be dispensed and dropped into the serving cup at the service level. This makes the machine unsightly as well as obstructive to panoramic views of any scenery behind them.

Many of them are furthermore inefficient and unsanitary if left unattended for more than a day at a time. They usually require daily cleaning of the valves, mixing vessels and other parts that may be contaminated by the wet mixtures, as well as the liquid containers themselves. Most of the liquids deteriorate and spoil readily. Where dry ingredients are used, there is not sufficient protection against their caking up, due to the presence of moisture and vapors escaping from the hot mixtures served; and their proper dispensing becomes a matter of conjecture.

Furthermore, in many instances, the operation of these machines is too elaborate and confusing to the customer, and the instructions are too lengthy and sometimes not too clear. If the selectors are not properly manipulated strictly in accordance with instructions, the customer may get something he does not expect.

There are many other problems experienced in present day vending machines for hot mixtures; the products are often distasteful because of the presence of sulphur or chlorine, etc. in the local water supply; different localities may prefer different concentrations of the solid ingredients in the mixtures; the serving level is so low it requires considerable stooping; liquid ingredients get stale if not changed frequently; servicing is difficult, requiring considerable dismantling and back-breaking lifting of bulk material to refill bins or liquid containers in the top of the tall cabinets; etc.

The present invention is a solution to all the above problems by a unique rearrangement of all the parts below a convenient serving level, and the use of elevator means for the cup with the selected dry ingredients, after they are dispensed at the bottom of the cabinet, which raises the cup to the serving compartment in the top of the cabinet where the water is admixed to complete the vending cycle. The storage bins for the different dry materials and for the cups are mounted on swivelled arms for swinging out of the cabinet when its front is opened, so that refilling and other servicing may be conveniently performed.

The main object of the present invention is to construct a highly efficient, conveniently operated and sanitary vending machine for a multiplicity of hot mixtures, having large capacity, yet being compact in arrangement of parts and low in height.

A further object is to provide a vending machine for hot mixtures, of an attractive appearance, cabinet style, not over 52" in height, and having the serving compartment enclosed at the front in the top of the cabinet, into

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which the cup, after having been supplied with the necessary dry ingredients, is raised, and where the final step of mixing with boiling water and subsequent addition of the cooling water, is performed.

Another object is to make the above cabinet of conveniently minimum height without sacrificing capacity, by dispensing the cup and the selected dry ingredients into it at the lower level, and then raising the cup to the serving level at the top of the cabinet and there adding the hot and cool water successively to form the mixture.

Another object is to incorporate a water purification unit so that the water may be rid of any distasteful substances such as chlorine, sulphur, etc. which may be found in the water supplied in some public water supply systems.

Another object is to incorporate the use of an accumulator or capacitor in the water supply line, which will fill between vends and make available the required quantity of water during the vending period at a constant supply pressure regardless of the changing condition of the filters in the purification unit causing a changing resistance to flow in the supply.

Another object is to provide interchangeable measuring pocket units for the solid ingredient dispenser units, so that any changes in ingredient concentrations may be readily made by exchanging the corresponding measuring pocket for one having the desired pocket size.

Another object is to prepare a fresh mixture during the vending cycle for each cup dispensed.

Another object is to make the mixture directly in the dispensing cup without the use of any intermediate mixing vessels, so as to eliminate the necessity of frequent cleaning of parts or possible contamination of one mixture with another.

Another object is to eliminate the use of rotary selectors and other confusingly indicated knobs or levers with lengthy and possibly confusing instructions for operation of the machine, and replacing them by simple separate button touch controls for each mixture clearly indicated.

Another object is to provide convenient level cup delivery, requiring no semblance of stooping or other form of contortions for retrieving the mixture serving from the serving compartment.

Another object is to provide ease of servicing the machine by mounting the material bank for the dry ingredients and the cup dispenser bins on swivelled arms, so that they may be swung out of the cabinet when its front is opened, for easy refilling and any other necessary servicing and occasional cleaning at a convenient working level.

Other and more specific objects will appear in the following detailed description of the form of the present invention selected for illustration and shown in the accompanying drawings, wherein:

Fig. 1 is a perspective exterior view of the vending machine, with a portion of the front wall cut away to show the cup elevator mechanism,

Figs. 2 and 3 are internal views looking inside the cabinet with the door open, and looking inside the door space, respectively.

Fig. 4 is a partial sectional view taken on the line 4—4 in Fig. 2,

Fig. 5 is a section through one of the dry ingredient material bins taken on the line 5—5 of Fig. 4,

Fig. 6 is a detail view of the lower portion of one of these bins,

Fig. 7 is a bottom view of the dry ingredient material bank taken at the line 7—7 of Fig. 2,

Fig. 8 is an enlarged detail sectional plan view taken on the line 8—8 of Fig. 2,

Fig. 9 is a sectional plan view through the serving com-

partment or dome at the top of the door taken on the line 9—9 of Fig. 3,

Figs. 10 and 11 are end views of this compartment taken as indicated by the lines 10—10 and 11—11 of Fig. 9, respectively,

Fig. 12 is a partial detail section of the door lock as indicated at 12—12 of Fig. 11,

Fig. 13 is an enlarged rear view of the dome and upper end of the elevator mechanism,

Fig. 14 is a side view of this mechanism taken at line 14—14 of Fig. 13,

Fig. 15 is a side view taken from the other side as indicated at line 15—15 in Fig. 13,

Fig. 16 is a sectional plan view of the door taken at line 16—16 of Fig. 3,

Fig. 17 is a similar view taken at 17—17 of Fig. 3,

Fig. 18 is an enlarged detail view taken on line 18—18 of Fig. 17,

Fig. 19 is a vertical sectional view through the cream and sugar dispenser bins, taken on the line 19—19 of Fig. 16,

Fig. 20 is a bottom view of the sugar and cream ingredient dispensing unit gear mechanism taken on line 20—20 of Fig. 19,

Fig. 21 is a section in plan taken across the lower portion of the door as indicated at 21—21 in Fig. 3,

Fig. 22 is a detail view taken on line 22—22 of Fig. 21,

Fig. 23 is a partial vertical section of the lower portion of the elevator mechanism taken on the line 23—23 of Fig. 21,

Fig. 24 is a fantastic expanded view of the camshaft taken substantially at line 24—24 of Fig. 21,

Fig. 25 is a side view of the elevator mechanism, dome, and associated parts,

Fig. 26 is a sectional plan view taken at line 26—26 of Fig. 25, showing a cup in place on the elevator, and

Fig. 27 is a general schematic wiring diagram for the vending machine.

The form of the invention illustrated comprises a compact arrangement of parts in a conveniently low cabinet, made accessible and easily serviced by placing a good portion of the parts, including the elevator mechanism and serving compartment or dome, in a deep door, forming the hinged front portion of the cabinet, which may be swung fully open to provide maximum accessibility to all parts of the machine, even though they are compactly arranged, to provide maximum capacity. Accessibility and servicing are further enhanced by mounting the material bank and cup dispenser on swivelled arms so that these units may be swung out of the cabinet space when the door is open, thus facilitating reloading the dry ingredient and cup bins, as well as providing better accessibility to other parts behind them in the cabinet.

The general external appearance of the cabinet when closed may be seen in Fig. 1. A dome 100 is formed in the upper portion of the door 101. On a slanting upper surface 102 of the door on either side of the dome 100 may be seen a series of touch button controls 103 with inscription plates 104 over them indicating the specific mixture that will be delivered when the corresponding button is depressed after the proper coin or coins are dropped into the coin chute 105. A standard coin changer, rejector and machine starter 106 may be used having a coin return and change pocket 107. With this coin machine a coin return plunger 108 is provided for returning coins that are dropped in the coin chute by mistake or when the coin machine rejects them for any reason. When the coin machine runs out of change, the translucent disc 109 lights up with a warning sign saying "Use nickels or dimes only." When the vending machine runs out of cups, a disc 110 lights up saying "Empty," and any coins dropped in will be rejected and may be returned to pocket 107 by depressing coin return plunger 108.

The present machine is provided with six dispenser

bins 111 for six different dry ingredient materials located in the material bank 112, besides the cream powder and sugar dispenser bins 113 and 114, respectively, fixedly mounted in the door 101. The machine may be prepared for serving five different soups named on the inscription plates 104 on the left of the dome 100 which may be selected by pressing the proper push button which will cause the corresponding bin 111 to dispense the dry ingredients for making that particular soup by admixture of the water. The sixth bin 111 may contain a dry ingredient material for making coffee, which may be vended by using four of the push buttons on the right of the dome selectively to get black coffee, coffee with cream, coffee with sugar or coffee with both cream and sugar as may be desired. The fifth button 103' on the right of the dome may be used for dispensing a stirring stick from the dispenser 115 located in the left upper portion of the door 101, and which has a dispensing pocket at 116. This dispenser is fully disclosed in my copending application Serial No. 463,342, filed October 20, 1954, now Patent No. 2,838,077, dated June 10, 1958. It automatically places a stirring stick in position for dispensing during each vending cycle, if one is not already in such position, and the push button 103' merely releases such stick into the dispensing pocket 116 by any customer that may desire one with his purchase of a hot mixture to finish stirring it.

The red light 117 and the green light 118 alongside the dome 100, go on as soon as a proper coin is dropped into the slot 105; and when a selection is made by pushing one of the buttons 103, the green light goes out but the red lights stays on for the remainder of the vending cycle and until the serving is removed from the dome. During such period, any coins that might be dropped in the coin slot will be rejected by the coin machine 106 and may be withdrawn from the pocket 107.

In Fig. 1, the break in the front wall of the door exposes a portion of the relay control box 119 and elevator mechanism including the sprocket wheels 120, link chain 121 and the two upright guide channels 122 and 123 between which the cup platform 124 is slidably mounted.

Fig. 2 shows the local water supply 125 connected through shut off valve 126 to a T-connection 127, passing first through a filter 128, then successively through a master solenoid water inlet valve 129, a pressure adjusting valve 130, a pressure gauge coupling having a pressure gauge 131, and an accumulator coupling into which an accumulator 132 is connected. From the T 127 the flow divides into two paths; one going by way of metering valve 133 to the heater tank 134 and then through a solenoid dispensing valve 135 to the outlet nozzle 136; the other, by way of the metering valve 137 and the solenoid dispensing valve 139 to the same outlet nozzle 136 which is located in the top of the dome 100 when the cabinet door 101 is closed. A cut-away portion 140 in the rear well of the dome compartment is provided to allow this nozzle to pass into the dome as the door 101 closes. A safety temperature and pressure valve 141 is provided near the top of the heater tank 134, and drains into the sump tank 142. The sump tank is so mounted that when it becomes half full its projection 143 operates the weighing mechanism 144 to throw the otherwise manually operated main switch 145 to the off position. Switch 145 is mounted in main fuse box 146.

Switch 147 is for opening the normally closed solenoid valve 135 when first filling the heater tank 134 to provide a vent for the displaced air as the water flows into the tank. Switch 148 next to it is for breaking the circuit to both valve solenoids to keep the valves closed when it is desired to test cycle the machine without dispensing any water. Switch 149 is the manual switch for turning the water heater circuit on or off. The indicator light 150 shows when the electric tank heater is functioning and is used for the purpose of visual adjustment of the thermostat 151 when switch 149 is turned on.

The material bank 112, its selector mechanism 152 and turning gear and motor 153 are all mounted on the same framework which is swivably mounted on upper and lower pivot supports 154 fixed to the side wall of the cabinet portion 155 near its front edge. The framework includes the pivoted upright member 156, upper and lower bearing arms 157 and 158 respectively, for rotatably supporting the material bank 112 therebetween, and a third arm 159 at the bottom for supporting the motor 153 and gear coupling 160 for turning the material bank.

The cup dispenser 161 is of standard make and is swivably mounted on arm 162 which is pivoted to pivot support 163 fixed to the side wall of the cabinet wall near its front edge, so that the cup dispenser, like the material bank, might be readily swung out of the cabinet for convenient servicing when the cabinet door portion is fully opened.

The safety shut-off switch 164, which is normally closed, is operated by a solenoid 165 through the safety relay switch 166 into open position whenever no cup is delivered to the dome 100, just before the solenoid water valves are operated, so as to prevent water being poured down the empty elevator shaft.

In Fig. 3, the arrangement of the elements in and attached to the deep cabinet door may be seen. The chute 167 delivers the cup from dispenser 161 into position under the funnel 168 when the cabinet is closed, and a cycle is started by pressing one of the push buttons 103. The material bank 112 is turned to bring the proper ingredient bin over one edge of the funnel 168, which ingredient is dispensed into the cup through the funnel with or without the ingredients from the bins 113 and 114, depending on which mixture was ordered in accordance with the selected push button 103. The sequence of events is controlled by a series of cams 169 on a shaft turned by camshaft motor 170 one turn per cycle through a reduction gearing 171.

The cup with the dry ingredients is then moved by sweep arm 172 with scoop 173, which conforms substantially to the side of the cup, through guideways 174 onto the elevator platform 124 snugly against the arcuate guard band 175, which locates the cups centrally of the platform. Then the extension 176 on one of the chain link pins is moved under the elevator platform and lifts it with the cup to the top of the shaft in which position the cup extends upwardly through the opening in the floor of the dome 100, the elevator cover flap 177 normally closed over this opening having been raised. As soon as the cup reaches this position the water metering valves are operated to mix first the boiling hot water through solenoid valve 135, then after the immediate dissolution of the soluble portions and complete softening and soaking of any insoluble portions of the soup ingredients, the cool tap water through solenoid valve 139 to complete the hot mixture and bring its temperature down from near boiling to something like 155° F., at which temperature the mixture may be safely handled without burning.

The switch 178 is for cycling the sweep arm and elevator mechanisms independently for testing their operation.

The details of the material bank and selector unit may be seen in Figs. 4 to 8. The six bins 111 are concentrically mounted in the rotatably mounted cage structure comprising the upper plate 179 and lower plate 180 braced together by upright angle-iron posts 181, one adjacent each bin 111. Each post 181 has a peripherally projecting angle 182 fixed to it at one of six different levels corresponding to one of the catch levers 183 on the selector unit 152. When a push button 103 is pressed, the corresponding one of the six solenoids 184, which are staggered in two rows of three each, for space conservation, is activated to uncock the corresponding catch lever 183, and close micro-switch 185 to start the material bank

motor 153. Thus as the material bank motor 153 turns the material bank, it will stop only when the proper bin 111 is over the funnel 168, because that is when its circuit will be broken by opening the micro-switch 185 in response to recocking of the catch lever 183 by the corresponding angle 182. The micro-switch 185 has normally open contacts in the material bank turning motor circuit which are normally held open as long as all the levers 183 are held in cocked position, but when any one or more of these catch levers is uncocked the material bank circuit is held closed by switch 185 and the bank will keep turning until the last catch lever is cocked. Switch 185 has another set of contacts which are normally closed to complete the material dispensing circuits, when the selected bin 111 is in dispensing position and the bank stops turning.

Each bin 111 has a dispensing pocket sleeve 186 in its bottom which is replaceable and may be exchanged with a pocket sleeve of any other capacity corresponding to the desired measure of the particular material ingredient that is being dispensed. A flap 187 normally covers the bottom of this pocket and is hinged to open at the proper time by solenoid 188 when the material is dispensed into the cup. A rotatable shaft 189 extends centrally through the bottom of each bin 111 and has a gear 190 fixed to it below the bottom and a disk 191 over the bottom having two diametrically spaced openings 192 which pass over the pocket as the shaft is turned to permit the material to fill the pocket before it is closed off by further turning of the disc. The pocket stays filled until the material in it is dispensed by opening of the flap 187. Gears 190 are twice the size of the stationary central gear 193 from which they receive their drive through idler gears 194 whose size is immaterial. The shaft 189 in each bin 111 therefore turns 180° during each revolution of the material bank. The openings 192 are arranged so that when the bin is in dispensing position its pocket 186 will be covered by the solid portion of the disc 191, and the pockets will always be filled when the bin is on the opposite side of the bank from the dispensing position. A pair of spaced stirring rods 195 are passed through shaft 189 at right angles to each other to keep the material in the bin loose and prevent accidental bridging thereof, and any improper filling of the measuring pockets 186. A protrusion 176 extending inwardly into bin 111 over the pocket 186 may be used to facilitate breaking up of any tendency of bridging at this point, to assure free flow into the pocket. Each bin is provided with a suitable cover 197 easily removable for convenience in refilling with any additional supply of material during the servicing of the machine.

The upper plate 179 of the material bank cage structure has a current distributor incorporated around its bearing support, having a cover 198 fixed to the support arm 157 against rotation with the material bank by bracket 199. A pair of contact brushes are mounted in a terminal block 200 on the cover 198 and extend inwardly for contact with a pair of concentric conductor rings insulatably mounted on the plate 179. One of the rings (not shown) is solid, the other 201 is broken into six segments, each segment being internally connected to one of the solenoids 188, all solenoids having a common return connection to the solid ring, thus providing current only to the solenoid 188 on the bin which is in the dispensing position during the material dispensing period.

The details of the upper part of the elevator mechanism and of the dome 100 and its other cooperating elements may be seen in Figs. 9 to 15.

The top of the elevator shaft registers with the opening in the floor of the dome or serving compartment through which the cup with the dry ingredients is lifted by the elevator 124 into serving position, where the final addition of the hot and cold water completes the hot mixture. The circuit that starts the elevator motor to raise the cup is also directed through solenoid 202, which lifts

the elevator cover flap 177 normally covering the opening. As the cup approaches the opening, the finger 204 is pushed outwardly by it and operates the safety switch 205 to continue the cycle, whereby the cam shaft motor 170 continues to run to the end of the cycle revolution of the camshaft 169. When the machine has run out of cups, and no cup is on the elevator as it comes up, the finger 204 will not be pushed out since the elevator platform has a slot in it, and the finger passes through this slot without being operated, leaving the safety switch 205 in a position to stop the cycle by cutting off the current to the machine at 164, after the elevator reaches the top and the safety cam on the cam shaft operates the micro-switch and completes the safety circuit just before the hot water cam reaches its operative position. Thus no water is dispensed down the empty elevator shaft. To service the machine, the switch 148 is opened while the safety cutoff switch 164 is reset to complete the cycle and bring motor 170 to its starting position.

A pressure finger 203 on the other side of the elevator shaft from the finger 204 may be used to counterbalance the pressure of the latter finger on the cup.

When the cover flap 177 is opened it is latched in open position by the end of the lever 206 fixed to the other end of the flap shaft 207 springing the catch hook 208 and catching under it. This hook is operated to release the flap by a solenoid 209 which simultaneously operates to release a lever 210 on door lock shaft 211 through intermediary linkage 217 so that the door will lock when it is closed. Solenoid 212 unlocks the door 213 to the serving compartment at the end of the vending cycle by turning the lock shaft notch 214 away from the spring biased tongue 215 in the door knob base 216. Thus the tongue 215 is made to ride over the smooth cylindrical portion of the shaft 211 and permits the door to be pulled open by the knob 218.

Switch 219 which is normally closed when the door 213 is opened, is operated by the rod 220 to open position when the door is closed. Thus as soon as the door is opened and the cup is removed the solenoid 209 is actuated to release the flap 177 and to release the elevator platform as well as to return the door locking rod 211 to its locking position, so that if the door is subsequently closed it will latch into locked position. However, if the elevator 124 comes up to the top of the shaft without any cup, as when all the cups have been dispensed, switch 205 is not actuated to the position for completing the circuit through solenoid 209 and the door remains locked, and the cycle has to be reset after servicing the machine with a fresh supply of materials including cups, as already described above. The machine will also reject any coins that might be prematurely dropped into it before the previous customer has removed his serving from the dome and closed the door. The floor of the dome 100 has a drain connected by drain pipe 226 to the sump tank 142, to take care of any accidental spilling.

When the flap 177 is opened and latched, link 221 is pulled up and the spring 222 causes the end 223 of the lever 224 to slip under and hold the elevator platform 124 when it reaches the top of the shaft, and the pin 176 pulls out from under it, as the chain 121 continues to move it around the upper sprocket 120 and down to its starting position.

Figs. 16 and 17 show plan views of the cabinet door assembly at different levels, showing some details and the location of the funnel 168 for receiving the dry ingredients from the selected bin 111 as well as the stationary bins 113 and 114, and the location of the chute 167 for receiving the cup from the cup dispenser. The tri-relay cam shaft motor starter may be seen at 225. Motor 227 is for driving the sweep arm for moving the cup from under the funnel 168 onto the elevator platform 124 at the bottom of the elevator shaft. Motor 228 is the elevator drive motor and is geared to the shaft of the lower sprocket 120. Motor 229 is geared to the paddles in the

cream and sugar bins 113 and 114 through a universal coupling 230, as may be better seen in Figs. 19 and 20.

The dry cream ingredient bin 113 is provided with a stirring and dispensing means similar to that used in the bins 111, except that instead of a disc 191, a paddle 231 is rotated over the dispensing pocket. The sugar bin 114 is further modified by substituting the stirring rods 195 and their supporting part of the shaft 189, by a partition 232 across the lower portion of the bin having an opening to one side of the axis of the bin, and a hinged leaf 233 for closing off this opening in response to a sufficient layer of sugar which has been supplied by the sugar fed through this opening to the point where an extension of the leaf 234 sweeping over the surface of this layer is raised high enough to cause the leaf 233 to stop the flow of sugar through the opening. This prevents packing of the sugar which would occur if a high column of sugar was allowed to act directly on the bottom of the bin and which might not be relieved by any such stirring devices as the rods 195. The dry cream ingredient and the other dry materials not being as heavy as sugar, do not have the same tendency of packing under high columns.

The paddles 231 are feathered slightly and provided with sharp leading edges 235 so as to have a scooping effect and provide relief underneath them to avoid packing of the material in the measuring pockets as they pass over them. The pockets have closure flaps 187 and dispensing solenoids 188 like these under bins 111. The gears 190 in this case, however, are driven by worms 236 on the drive shaft 237. One of the gear shafts has a control cam 238 with two dwells in it for stopping the paddles over the dispensing pockets during the dispensing intervals and turning them 180° after each cycle to stir the ingredients and fill any that might be empty. Switch 239 breaks the motor circuit when its roller drops down into one of the dwells.

As shown more clearly in Figs. 21 and 23, the lower sprocket shaft which is connected to the elevator motor 228, has a small gear 240 which drives a large gear 241 at a gear ratio equal to that of the sprocket to the chain, so that the control cam 242 for stopping motor 228 through the switch 243 will turn one revolution per cycle of the elevator chain drive. Thus the pin 176 for raising the elevator platform will stop in the same starting place at the completion of each vending cycle.

The cup sweep lever 172 is normally held in retracted position as shown in Fig. 21 by a spring 244. It is operated by motor 227 through a crank 228' on the cam 229' driven by the motor, and connecting rod 230' having a sliding lost motion connection to a bell crank 231' on lever 172. The cam 229' controls the cyclic operation of switch 232'.

The bottom of the elevator has a bumper element 233' adapted to strike a rubber or other resilient block 234' fixed in the floor of door 101 when the elevator is released from the top of the elevator shaft after the cup has been removed from the serving compartment in the dome.

In Fig. 24, the switches are all of the type which are normally open, and are closed by the lobes on the cams 169. Starting at the top of the figure, the first cam is the safety shut off cam positioned just barely ahead of the hot water metering valve cam which is the sixth one down, next is cam shaft motor stop cam for stopping the motor after a complete revolution of the cam shaft, next is the dispensing cam for operating all the dispensing solenoids that are set in the circuit, then follows the cam for starting the motor 227 to operate the cup sweep arm 172, then the cam for starting the elevator motor 228, then the hot water solenoid valve cam, then the cold water solenoid cam, then the sugar and cream bin stirring and charging motor 229, and lastly the final circuit breaker.

In Fig. 25, the upright channel 123 is seen cut away

at the top and bottom to permit the pin 176 to leave and enter the elevator shaft during each cycle after raising the elevator to the top.

A cup 280 is shown guided by the four edges of the two channel members 122 and 123 making up the elevator shaft.

The vending cycle is made operative in the manner described by making the necessary electrical connections in accordance with the wiring diagram schematically illustrated in Fig. 27.

The Jones plug 283 indicated at top center in this figure is an 8 prong female plug adapted to receive a male plug from a standard coin changer used in this machine. Another Jones plug 284 near the bottom center received a male plug from the standard cup dispenser used in the machine.

A pair of fuses 281 is preferably inserted into the power supply lines for the machine from a power source 282.

The button 103' for dispensing a stirring stick and its circuit is omitted from the wiring diagram in Fig. 27 because its operation is fully described in the copending application referred to above. As therein brought out, if a purchaser of any hot mixture wishes a stirring stick, a push on this button will release and dispense the stick which has already been positioned by the stick dispenser in readiness during any cycle following one after which the customer has released one.

The relays 235' to 250' are standard two switch relays which are located in the relay box 119, and are wired as shown in Fig. 27.

Starting at the top, relay 235' is operated by the black coffee button (BC) and sets up the vending connection through solenoid 184(A).

Relay 236' locks up relay 239' to include the sugar dispenser in the circuit (CS) when vended with the coffee 184.

Relay 237' locks up relay 240' to include cream with the coffee (CC), and relay 238' locks up relays 242' and 241' to include both cream and sugar with the coffee (CCS).

The remaining five buttons 103 are for other items such as soups, etc., although jumpers can be put between buttons so that two containers in the material bank may contain the same most popular material.

Relay 246' is the button line breaker. This relay is locked up when the coin is deposited and goes dead immediately when any button is pushed and starts the machine.

Relay 245' is a momentary relay, depending on residual magnetism in the core to hold long enough to lock up relay 244', which feeds button line breaker relay 246' until circuit is broken by operation of switch 185, when button is touched and selector closes this switch.

Relay 243' is the cup dispenser relay which feeds current to the cup dispenser contact on the Jones plug 284 as required for operation of the cup dispenser.

Relay 250' is the final circuit breaker relay and goes to the final breaker cam shaft switch.

Relay 249' is a holding relay, which in connection with 248', the master relay and 247', the anti-jackpot relay, serve to operate the cup dispenser and coin changer. These last three relays are merely used as required in the operation of the standard cup dispenser and coin changer units.

The other symbols in the wiring diagram of Fig. 27 are indicated by the same numerals that are used in the other figures to represent the corresponding elements.

In the tri-relay cam motor starter 225, the relay A is momentary, depending on the residual magnetism of the core to set relay B to include one side of the circuit, and relay C completes the other side of the circuit when switch 185 returns to the original position at the completion of the selection as dictated by the particular item selected. This then, feeds a circuit to start the cam shaft

motor 170, which then carries on the remaining operations by the sequence of its cam operated switches.

The stirring rod dispenser 115 is schematically shown with the circuit attached which will operate the mechanism.

It will be noted that when the finger switch 205 moves to the right, due to the removal of the cup with the serving by the customer, at the same time that the door switch 219 is closed, due to the door being still open, the door trip solenoid 209 trips all three things: (1) drops the elevator shaft cover flap, (2) resets the door lock for engagement when the door closes, and (3) drops the cup elevator platform.

When the finger switch 205 is actuated by a cup on the elevator platform, it closes a circuit including the relay 166 which opens the breaker contacts which are included in the main line to the cup dispenser and coin machine. This is to put the coin mechanism in the same condition as if the machine were out of cups and refuse to accept coins as long as a cup remains in the top of the elevator. If someone forgets to take his cup out, or, if some customer gets in a hurry and tries to insert a coin before the last customer can get his cup out, the coin mechanism will reject his coin.

In the event of a shut down in the power supply, as e. g. by actuation of the sump switch 145, the water inlet solenoid valve will automatically close due to the deactivation of the solenoid and will shut off the main water supply.

Obvious modifications in the details and arrangement of parts may be made without departing from the spirit and scope of the present invention as defined in the appended claims.

What is claimed is:

35 1. A cabinet type hot liquid vending machine of substantially table height having means for dispensing dry ingredients for a variety of instant mixes in its lower portion, elevator means for raising said dispensed ingredients to a service level at the top of the machine and means for adding hot water to complete the instant mix at the service level, a deep door comprising substantially the full front of the machine in which a substantial portion of the machine operating parts, including said elevator means, are mounted, said door having a serving compartment at the top of the elevator means, a normally locked transparent door to said compartment, means for unlocking said door when a serving is ready for removal, means in said compartment for adding the liquid contents to complete the mixture being vended, said dry ingredient dispensing means including a multiplicity of dispensers for making different kinds of soup, coffee, dry cream, sugar, etc., and a water supply attachable to the local public water supply system, a series of push buttons, means for dispensing a mixture in response to pressing of a single push button, including a cup dispenser for dispensing a cup and directing it into a position under the cream and sugar dispensers, a selector for moving the dispenser having the dry ingredient required in said mixture over said cup, means for dispensing all the required dry ingredients simultaneously into said cup, means for moving said cup with said dry ingredients to said elevating means, means for heating a portion of the water supply to substantially boiling temperature, and means for delivering a charge of the hot water to said cup in said serving compartment through said liquid adding means followed by a charge of the unheated water to complete the mixture at a safe handling temperature.

2. A vending machine as defined in claim 1, said push buttons including a stirring rod dispenser button, and means for dispensing a stirring rod in response to pressing said button, for stirring said mixture if desired.

3. A vending machine as defined in claim 2, said dry ingredient dispensers except the cream and sugar dispensers being rotatably mounted for selectively positioning one of them over said cup.

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4. A vending machine as defined in claim 3, a rotatable cage on which said dispensers are mounted, and a swivelled frame supporting said cage rotatably on arms pivoted to the side of said cabinet adjacent said door opening, so that said cage with said dispensers may be swung out of the cabinet when the door is open for servicing and to provide better accessibility to parts behind said dispensers in said cabinet.

5. A vending machine as defined in claim 4, said cup dispenser being similarly swivably mounted in the other side of said cabinet for similar purposes.

6. A vending machine as defined in claim 5, said dispensers including storage bins with rotating means in their storage spaces for loosening said dry ingredients continuously during each cycle of operation, to prevent packing or bridging thereof.

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