

March 21, 1961

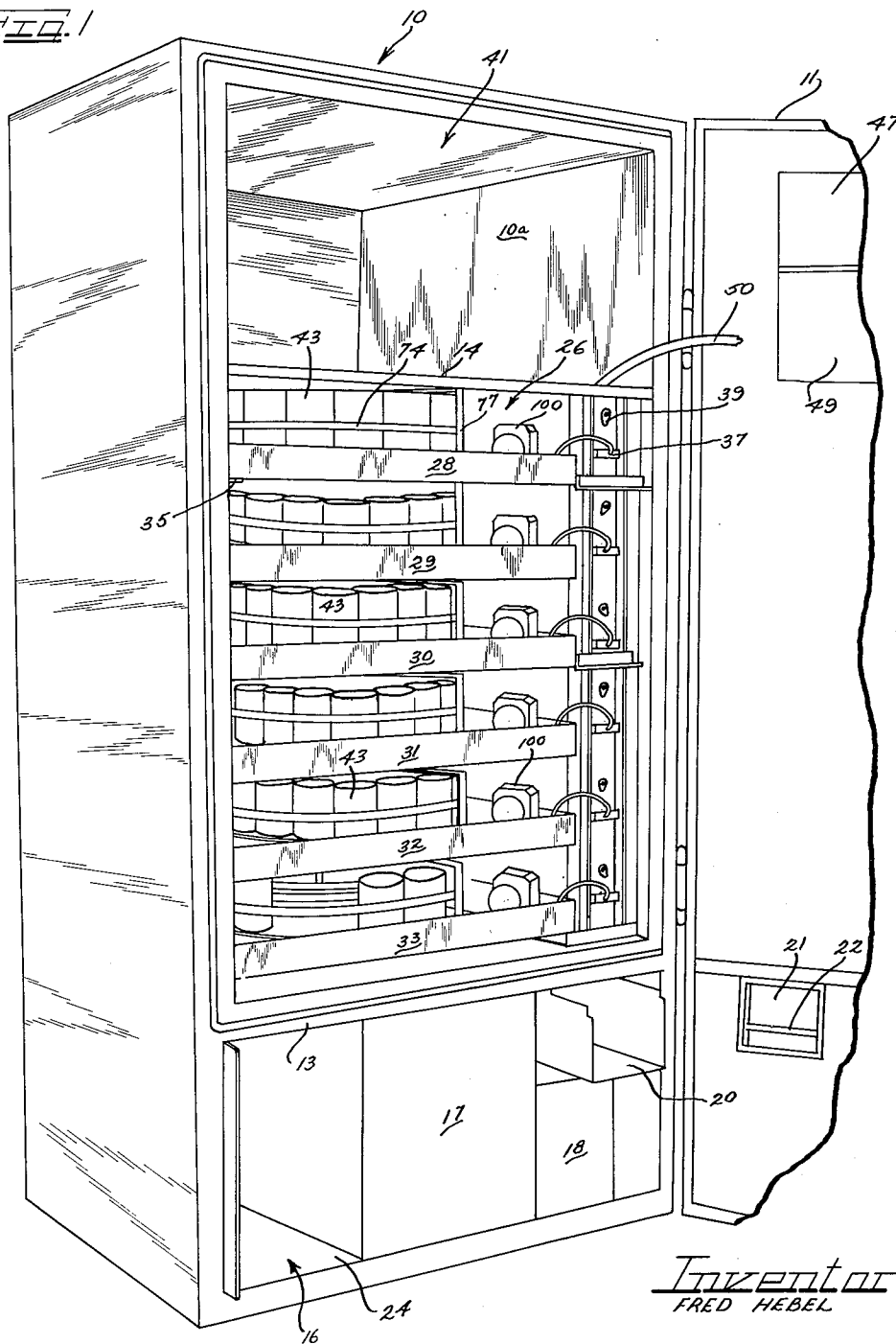
F. HEBEL
DISPENSING MACHINE

2,975,935

Filed Nov. 7, 1957

5 Sheets-Sheet 1

FIG. 1



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March 21, 1961

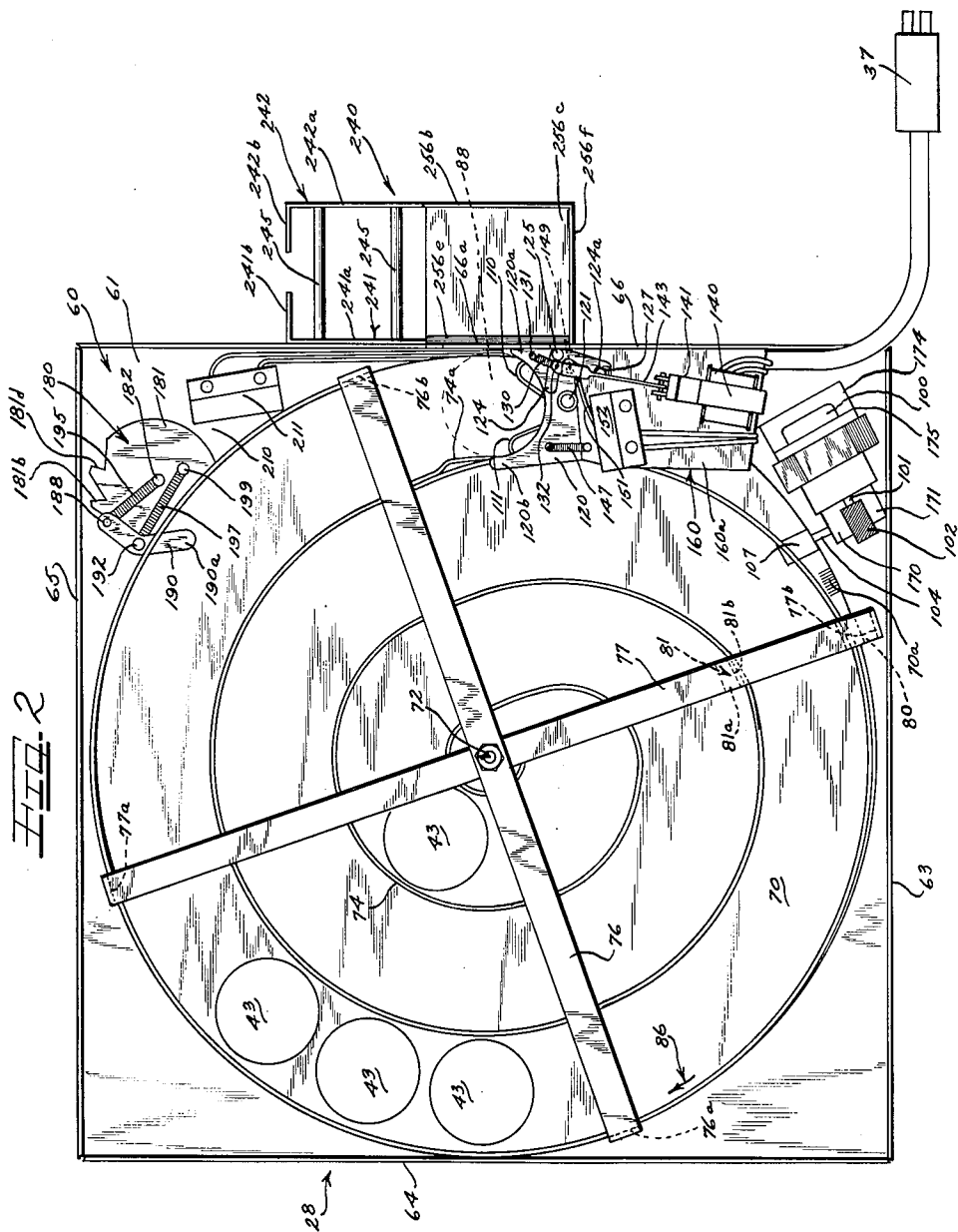
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DISPENSING MACHINE

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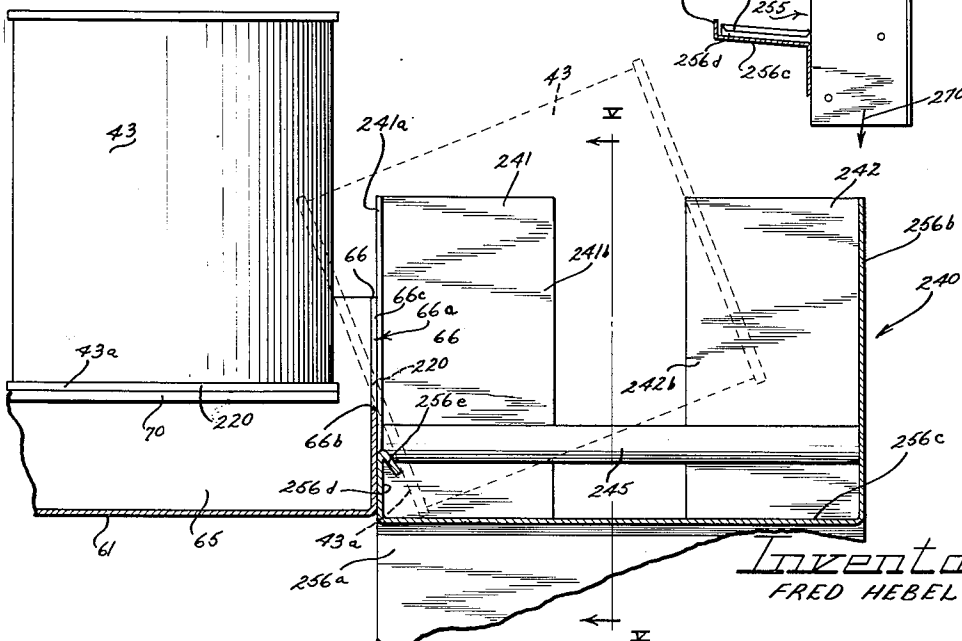
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DISPENSING MACHINE

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DISPENSING MACHINE

Filed Nov. 7, 1957

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FIG. 6

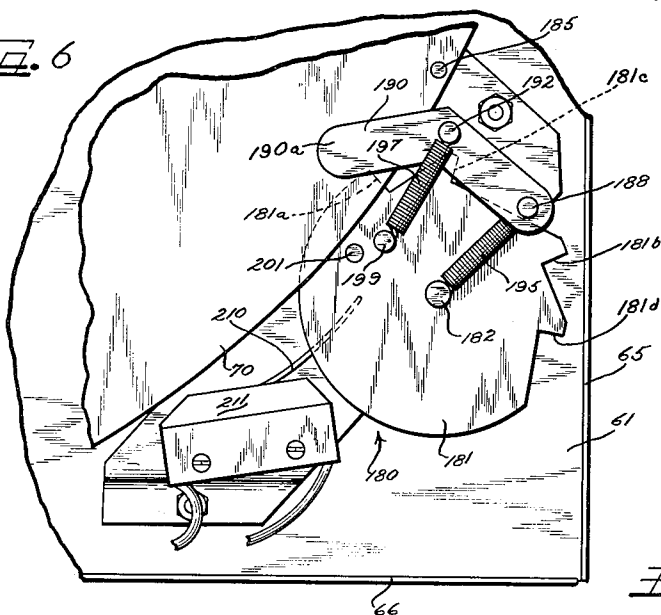
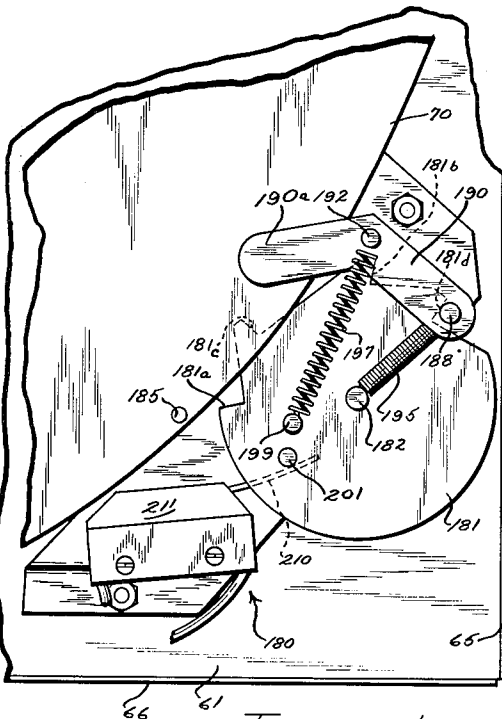
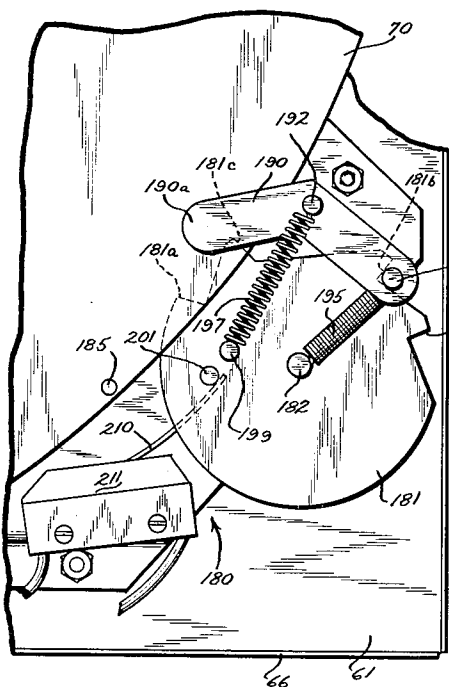


FIG. 8

FIG. 7



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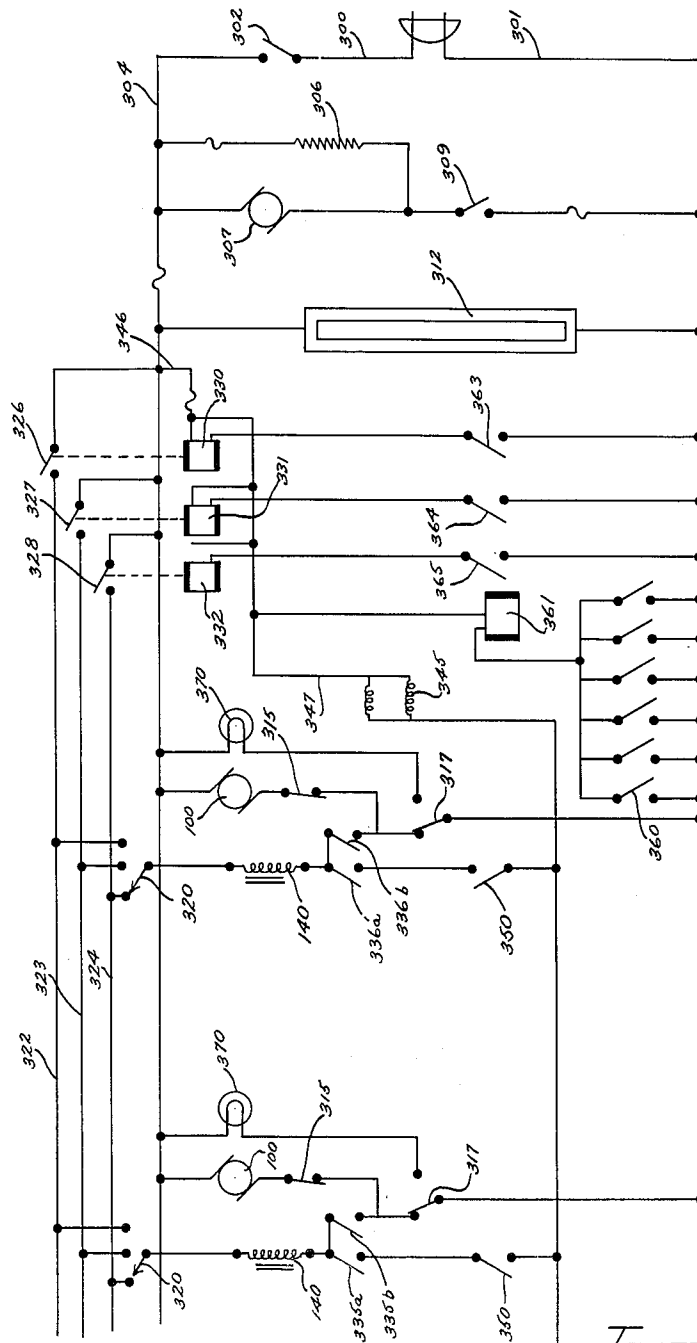
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DISPENSING MACHINE

Filed Nov. 7, 1957

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2,975,935

DISPENSING MACHINE

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Filed Nov. 7, 1957, Ser. No. 695,100

5 Claims. (Cl. 221-14)

This invention relates to a dispensing machine and particularly to a dispensing machine for foods packaged in metal containers and the like.

It is an object of the present invention to provide a novel dispensing machine and a novel dispensing drawer sub-assembly for a dispensing machine.

It is another object of the present invention to provide a dispensing machine accommodating containers of varying height.

Another object of the invention is to provide a novel dispensing machine which is readily reloaded with containers and otherwise readily accommodates servicing operations.

Still another object of the present invention is to provide a dispensing machine having novel means for sensing an empty condition in a section of the machine.

Another and further object is the provision of safety means for preventing inadvertent dispensing of an article.

A yet further object of the invention is to provide a dispensing machine having novel means for agitating the contents of containers during delivery of the containers to the purchaser.

Another object of the present invention is the provision of a dispensing mechanism particularly adapted to hot foods packaged in metal cylindrical containers and the like.

A further object of the invention is the provision of a novel control system for a dispensing machine.

Other and further important objects, features and advantages of the present invention will be apparent from the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a partial perspective view illustrating a dispensing machine in accordance with the present invention with the front closure door opened to provide access to the dispensing drawers for servicing or the like.

Figure 2 is a top plan view of a dispensing drawer removed from the dispensing machine of Figure 1 but illustrating the drawer in operative relation to the delivery conveyor which extends vertically past the successive dispensing drawers in the machine for receiving the articles to be delivered from the machine;

Figure 3 is a fragmentary side elevational view illustrating a container at the discharge position of the dispensing drawer of Figure 2;

Figure 4 is a vertical sectional view taken generally along the line IV-IV of Figure 3 and illustrating the manner in which a container is moved from the dispensing drawer discharge position into the delivery conveyor for delivery to the customer;

Figure 5 is a vertical sectional view of the delivery conveyor of the present invention and taken generally along the line V-V of Figure 4;

Figure 6 is a fragmentary enlarged top plan view illustrating the empty switch associated with the dispensing drawer of Figure 2 in its normal condition;

Figure 7 illustrates the switch of Figure 6 stepped to

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its first position position indicating a first revolution of the dispensing drawer turntable;

Figure 8 is a view similar to Figure 6 but illustrating the switch stepped to its second position indicating an empty condition of the dispensing drawer; and

Figure 9 is a schematic electric circuit diagram illustrating a control system for the dispensing machine of the present embodiment.

As shown on the drawings:

As illustrated in Figure 1, a dispensing machine in accordance with the present invention may comprise a housing 10 including a hinged door 11 across the front thereof which may be opened to provide access to the interior of the machine for servicing. The door 11 is normally locked in a closed position to provide a closed interior space which may be suitably insulated if the articles being dispensed are to be heated or refrigerated. In the illustrated embodiment, the interior space of the housing is divided into three separate compartments by means of horizontal partitions 13 and 14. The lower compartment indicated generally by the reference numeral 16 may receive the coin mechanism schematically indicated by the blocks 17 and 18 and may also accommodate the lower article delivery chute 20. Access is provided to the lower end of the chute 20 by means of a window 21 in the door 11 having a bar 22 thereacross to stop an article which rolls down the chute 20. The article is removed through the window 21 by the customer from the exterior of the machine. The lower compartment 16 also provides a storage space 24 for storing further articles in excess of the capacity of the dispensing units of the machine.

An intermediate compartment of the machine designated generally by the reference numeral 26 is illustrated as receiving six individual dispensing units or drawers 28 through 33 which may be identical and interchangeable. The units 28-33 may be slidably mounted in the housing 10 by means of brackets such as indicated at 35 so as to be horizontally slidable out of the compartment 26 to facilitate reloading of the units and the like. Each of the units may be electrically connected with the control circuit by means of a detachable plug such as indicated at 37 which may be temporarily disconnected in order to slide out the associated dispensing unit. A suitable selector switch such as indicated at 39 may be associated with each dispensing unit for selecting the desired price at which articles in the dispensing unit will be sold. For example, the switch 39 may have three positions corresponding to prices of five cents, ten cents and twenty-five cents, and this selector switch would be electrically connected to the coin mechanism in the lower compartment 16 in a manner which will hereinafter be described in connection with Figure 9.

A top space 41 may be provided within the housing for receiving additional articles. In the illustrated embodiment, the articles in the dispensing compartment 26 are heated by means of an electrical heater element 306, Figure 9, extending in an air intake duct at the rear right of the machine. This duct discharges heated air at the lower part of the compartment 26 which then flows upwardly through the successive dispensing units to heat the contents of the containers indicated at 43 in the respective dispensing units. Preferably, the partition 14 is suitably apertured so that containers in the upper storage compartment 41 will be preheated.

The door 11 may be provided with a suitable space 47 for displaying containers of the type to be found at the respective dispensing units. For example, each dispensing unit may have containers with a different type of soup therein, and containers with labels indicating the respective types of soup may be disposed in horizontal series in the compartment 47 and be visible from the ex-

terior of the machine by means of a window. A suitable selector means may be provided which may be correlated with the various display positions in the compartment 47 and suitable electric switch means may be associated with the selector in a compartment 49. The selector switches in the compartment 49 may be connected with the remainder of the control circuit by means of a flexible cable 50 and may be correlated with the remainder of the control circuit in the manner herein-after to be described in connection with Figure 9.

By way of example, the dispensing unit 28 of Figure 1 is illustrated in detail in Figure 2 and will now be described. The dispensing unit 28 which is identical to units 29-33, may comprise a tray 60 having a flat rectangular bottom 61 and upturned integral side walls 63, 64, 65 and 66. The bottom 61 may have suitable apertures for accommodating the upward flow of heated air in compartment 26 of the machine. Within the tray is mounted a flat circular disk member or turntable 70 which is mounted for rotation in a horizontal plane about a vertical spindle indicated at 72. Disposed over the turntable 70 is a stationary spiral guide structure including a spirally disposed guide strip 74 mounted by means of stationary cross pieces 76 and 77 having leg portions 76a, 76b, 77a, 77b. The leg portions terminate in outturned foot portions 80 which are suitably secured to the bottom wall 61 of the tray 60. Suitable support strap members such as indicated at 81 have horizontal leg portions such as 81a secured to the underside of the cross pieces 76 and 77 and have vertical depending portions such as 81b secured to the spiral strip 74 to support the same above the level of the turntable 70.

When containers such as indicated at 43 are loaded on the turntable 70 within the guide 74 as shown in Figure 2 and turntable 70 is rotated in the direction of the arrow 86, it will be understood that the guide 74 causes the containers 43 to slide radially outwardly on the turntable 70 as the containers move arcuately with the turntable. By this means, containers in the dispensing unit 28 will be delivered to the discharge position indicated by the dotted circle 88. When a container has reached this discharge position 88, rotation of the turntable 70 is interrupted, and the dispensing unit is ready to dispense a container upon receipt of the proper coins. Each dispensing unit carries a motor 100 mounted on the tray bottom wall 61 and including an output shaft 101 having a suitable driving worm 102 meshing with a worm wheel on shaft 104 to drive a friction roller 107 which engages the rim of the turntable 70. This rim may be suitably roughened as by means of radial grooves 70a to improve the driving engagement between the rim and the roller 107. When a container reaches discharge position 88, it actuates switch arms 110 and 111. Switch arm 110 may be operative to interrupt energization of the motor 100 as will hereinafter be described in connection with Figure 9. The switch controlled by arm 111 controls a coin lock-out solenoid 345, Figure 9, so that coins are accepted only when a container is at the discharge position 88.

In discharge position, a container is embraced by an ejector arm 120 which is mounted for movement about a vertical shaft indicated at 121 in ejecting containers from the discharge position. The arm 120 is locked in its normal position shown in Figure 2 by means of a bell crank lever 124 secured to the arm 120 by means of a pivot pin 125. The bell crank 124 has a notch 124a therein which receives a fixed pin 127 and the bell crank is normally urged against the pin 127 by means of a spring 130 extending between a pin 131 fixed to the arm 120 and a pin 132 fixed to the bell crank 124 so as to tend to rotate the bell crank in the clockwise direction on its pivot 125. Rotation of the arm 120 on its shaft 121 is prevented by the pin 127 which engages a shoulder on the bell crank 124. In normal locked position, an arm portion 120a of the eject arm 120 prevents the container 43 in discharge position 88 from being moved from the

discharge position without insertion of the proper coins. The container is securely held in discharge position and cannot be removed therefrom by tilting or shaking of the machine.

For actuating the ejector arm 120, a solenoid 140 has an armature 141 connected with the pin 132 by means of a linkage 143 so that upon energization of the solenoid 140, the bell crank 124 is first rotated slightly in the counterclockwise direction about pivot pin 125 and against the action of spring 130, after which further retraction of the armature 141 causes the rotation of the arm 120 about the shaft 121 against the action of return spring 147 to eject a container from the discharge position 88. A pin 149 on the ejector arm 120 is disposed to limit counterclockwise rotation of the bell crank 124 so that as soon as the notch 124a is disengaged from the pin 127, further retraction of the armature 141 is transmitted through the bell crank 124 and pin 149 to cause rotation of the ejector arm 120. The pin 149 is further disposed to actuate a switch arm 151 of a switch 152 to cause deenergization of the solenoid 140 as soon as it has performed a complete eject stroke.

When the ejector arm 120 is in actuated position, arm portion 120b moves to a position overlying the discharge position 88 so that a succeeding container on the turntable 70 is prevented from moving into the discharge position as long as the ejector arm 120 is in actuated position. This construction positively prevents more than one container from being delivered from a dispensing unit for a given energization of the solenoid 140. In normal position of the arm portion 120b as seen in Figure 2, an auxiliary guide rail piece 74a is provided which guides the containers into the discharge position 88 without being engaged by the arm portion 120b. It will be noted that the solenoid 140, switch 152 and arm 120 may all be mounted on a horizontal portion 160a of a bracket 160 which as seen in Figure 3 projects above the top of the side wall 66 and may have its vertical leg secured thereto by means of bolts such as 162. The arm 120 as seen in Figure 3 thus engages the containers near the top thereof and above the center of gravity.

The shaft 104 which serves to drive the turntable 70 through the roller 107 may be supported by means of a pair of spaced yoke members 170 and 171 and the worm wheel (not shown) fixed to the shaft 104 is disposed between the yoke portions 170 and 171 which are secured to the motor housing. The motor housing may advantageously be mounted by means of a hinge leaf 174 secured to the bottom wall 61 of the tray and a relatively strong wire spring (not shown) may be provided for normally urging the motor housing downwardly about the hinge axis indicated at 175 so as to press the wheel 107 into driving engagement with the turntable 70.

When the last container has been ejected from the turntable 70, it is necessary to provide means for preventing indefinite rotation of the turntable. Further, such means should allow for a reasonable amount of rotation of the turntable before signaling an empty condition, since it is possible that there may be a considerable space between successive containers in the dispensing unit. The means herein utilized for this purpose comprises a stepping switch device 180 including an actuating plate 181 mounted for rotation on a central vertical pin indicated at 182. Figures 6, 7 and 8 illustrate the successive positions of the stepping switch 180. In normal position as illustrated in Figure 6, a tooth 181a is presented for engagement with a pin 185 which depends from the turntable 70 at the rim thereof. As the turntable 70 rotates, the pin 185 engages the tooth 181a and rotates the plate 181 through a predetermined arc, whereupon a ratchet pin 188 on a ratchet arm 190 moves into engagement with a tooth 181b of the plate 181. The ratchet arm 190 is mounted on a pivot pin

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192 and is urged to rotate in the clockwise direction about the pin 192 by means of a spring 195 extending between the ratchet pin 183 and the pivot pin 182. A second spring 197 extends between pivot pin 192 and a pin 199 carried on the plate 181 to tend to rotate the plate in the clockwise direction. The ratchet pin 188 as shown in Figure 7 prevents this counterclockwise rotation so long as the pin is engaged with the tooth 181b. If a container travels past the ratchet arm 190, it engages the arm portion 190a which extends into the path of travel of the containers in the dispensing unit as seen in Figure 2. The ratchet arm 190 will then be rocked in the counterclockwise direction as seen in Figures 2 and 7 against the action of the spring 195 whereupon the spring 197 will rotate the plate 181 in the clockwise direction back to the position shown in Figure 6. Rotation of the plate 181 in the clockwise direction may be limited by engagement of a pin 201 depending from the plate 181 with a stop (not shown) carried by the bottom wall 61 of the dispensing tray.

If, with the plate 181 in the position shown in Figure 7, no container is advanced into a position to engage the ratchet arm portion 190a, the pin 185 on the turntable will engage a tooth 181c on the actuating plate 181 to rotate the plate a further amount. After the pin 185 has moved past the tooth 181c, the indexing plate tends to rotate in the clockwise direction, but is prevented from fully returning to its former position by engagement of the ratchet pin 188 with tooth 181d of the plate 181 as indicated in Figure 8. In the position of Figure 8, pin 201 engages a switch arm 210 of a switch 211 to maintain the contacts of the switch in open condition and thus to interrupt the motor energizing circuit and stop rotation of the turntable 70. Upon reloading of the dispensing unit, the ratchet arm 190 may be manually released to allow the actuating or stepping plate 181 to return to its initial position shown in Figure 6. In this condition, switch arm 210 returns to its normal de-actuated position with the aforementioned contacts of switch 211 closed to accommodate energization of the motor 100.

Figures 3, 4 and 5 illustrate the manner in which the containers are tipped from a vertical to a horizontal position in a preferred method of delivering the containers to the chute 20 seen in Figure 1. Alternatively, the containers may be delivered to an inclined chute in their vertical disposition. In the illustrated embodiment, each tray side wall 66 has a notch 66a therein in alignment with the discharge position 88 seen in Figure 2 so that the container 43 is moved through this notch upon actuation of the eject arm 120. The bottom wall 66b of the notch may be disposed below the top surface of the turntable 70 a slight distance. As seen in Figure 3, the width of the notch 66a at the level of the top of the turntable 70 is preferably slightly less than the diameter of the rim 43a of the container so that the container is forced to tip before it can move completely through the notch 66a. The side edges 66c and 66d of the notch preferably slope so that the diameter of the container can pass through the notch at a level somewhat above the level of the top of the turntable 70.

By way of example of specific dimensions, a metal can containing seven fluid ounces may have a rim diameter of $2\frac{1}{16}$ inches and a height of approximately 3 inches. The notch 66a may have a width along the bottom edge 66b of approximately $2\frac{1}{2}$ inches, and a width at the level of the turntable 70 of approximately $2\frac{9}{16}$ inches. The notch may be approximately one-inch deep and have a width at the top of $2\frac{7}{8}$ inches. Thus, the can 43 in being ejected will engage the edges 66c and 66d at points on the circumference of the can corresponding to a chord of between $2\frac{1}{2}$ and $2\frac{9}{16}$ inches. The edges 66c and 66d must at least have the slope of the tangents to the can rim at these respective points of contact of the can with the edges of the notch so as to allow the remaining larger

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diameter portions of the can rim to move through the notch as the can pivots on these points of contact as illustrated in Figure 4. The points of contact just referred to may be located generally as indicated at 220 in the can shown in solid outline and in dotted outline in Figure 4. It will be readily appreciated that this form of tipping mechanism for the cans is not critical and can readily accommodate manufacturing tolerances and other slight variations encountered in practice.

For conveying the containers vertically from the respective discharge positions 88 to the chute 20 seen in Figure 1, a conveyor structure generally indicated by the reference numeral 240 is provided. The conveyor unit, as seen in Figure 2, is disposed at the right side of the dispensing units. The conveyor unit extends vertically within the housing 10 and is disposed between the side wall 10a of the housing and the dispensing units 28-33 and is secured to the housing. The dispensing units are free to slide out of the housing as previously described and are not secured to the conveyor structure. The conveyor structure comprises a pair of vertical channel members 241 and 242 having respective side wall portions 241a and 242a and respective intumed rear wall portions 241b and 242b. The side walls 241a and 242a have a series of horizontal bars 245 extending therebetween to define a zig-zag path for a container 43 as it travels downwardly in the passage as indicated in Figure 5. At the lower end of the conveyor structure 240, the container drops into the rear end of the chute 20 seen in Figure 1 and rolls to a forward position against the bar 22, from which the container may be removed through the opening 21. The container 43 is jarred by its successive engagements with the bars 245 in such a manner as to shake up the contents of the container. Further, the speed of descent of the container is controlled by its successive contacts with the bars 245 so as to avoid any danger of damaging the container.

The containers are delivered to the vertical passage of the conveyor structure through a series of inlet openings at the level of the respective dispensing units by means of inclined guide structures such as indicated at 256 in Figure 5. Each guide structure comprises a sheet metal member including a front wall portion 256a, a side wall portion 256b, a sloping bottom wall portion 256c and a side wall 256d with an inclined edge portion 256e for guiding the bottom of the container into proper position on the inclined bottom wall 256c. The guide structure also has a front edge 256f as seen in Figures 2 and 5.

As seen in Figure 4, the container as it moves through the notch 66a in side wall 66 of the dispenser tray tips into the conveyor structure 240 so as to have its periphery in rolling engagement with the bottom wall portion 256c of the guide structure. The container then rolls rearwardly relative to the dispensing machine on the bottom sloping wall 256c of the guide structure through an opening such as 250 and into the vertical passage of the conveyor structure, following the zig-zag downward path as previously described.

The actual movement of the ejector arm 120 in the illustrated embodiment extends through a distance such that the arm 120 engages the pin 127 as seen in Figure 2. This distance, in itself, need not be sufficient to tip the container into a position such as shown in Figure 4 where the center of gravity of the can is beyond the contact points 220, since the eject arm may give the container sufficient momentum by a rapid stroke to carry the container past this position due to its own velocity of movement. It will be understood that containers from each of the dispensing units are discharged at the lower end of the conveyor structure in the direction of the arrow 270 in Figure 5 with the long axis of the container extending horizontally and generally laterally with respect to the front of the machine. The container drops directly into the rear end of the chute 20 in this lateral disposition

so that it rolls down the incline chute 20 as previously described.

Electric control circuit

Figure 9 illustrates the electrical control circuit for the machine which may be connected to any 115 volt 60 cycle supply, for example, to energize supply lines 300 and 301. When a switch 302 is closed, voltage is supplied to the line 304 to energize heater 306 and blower motor 307 in parallel. As previously mentioned, the heater is disposed in an air intake duct from which heated air is forced into the dispensing compartment 26 by a suitable blower driven by the motor 307. A suitable switch 309 may be thermostatically controlled to control the temperature within the compartment 26. A fluorescent lamp 312 may also be associated with the machine, for example in the space 47 in Figure 1, and may be energized upon closure of the switch 302.

With the circuit in the condition illustrated in Figure 9, it will be observed that each of the motors 100 for driving the respective turntables 70 would be energized through a circuit extending from line 304 through the motor 100, through contact 315 of the switch associated with switch arm 110 in Figure 2, and through contact 317 of the single pole double throw switch 211 associated with the stepping mechanism 180 and operated by the switch arm 210. As soon as a container reaches the discharge position 88, switch arm 110 will be actuated to open switch 315 of the associated dispensing unit to deenergize the associated motor 100 and interrupt rotation of the turntable 70. It will be understood that, while two dispensing unit circuits including motors 100 are illustrated in Figure 9, there would actually be six such circuits for the illustrated embodiment. Switches 39 seen in Figure 1 control movable switch arms such as 320 in Figure 9 to connect the respective solenoid energizing circuits for the eject solenoids 140 with line 322, 323 or 324. These lines are respectively connected with the line 304 by means of contacts 326, 327 and 328 which in turn are controlled by totalizer relays 330, 331 and 332. By way of example, the relays 330, 331 and 332 may be associated with a conventional coin mechanism in such a manner that the switch 363 is actuated and relay 330 is energized when a five cent coin has been received, switch 364 is actuated and relay 331 is energized when ten cents has been received, and switch 365 is actuated and relay 332 is energized when 25 cents has been received. Thus by adjustment of the switch arm 320 by means of the switches such as 39 in Figure 1, each dispensing drawer may be adjusted to dispense a container at a price of five cents, ten cents or twenty-five cents, for example. With the switch arm 320 in the position indicated, it is necessary to deposit twenty-five cents to energize the relay 332, to thus close contact 328 and energize the associated eject solenoid 140 to eject a container from the discharge position 88 seen in Figure 2. The specific one of the solenoids 140 to be energized is controlled by means of a suitable selector switch operated by the customer which selectively closes pairs of contacts such as 335a, 335b or 336a, 336b depending on the choice of the customer. By way of example, an energizing circuit for the first solenoid 140 illustrated in Figure 9 would include conductor 304, contact 328, line 324, switch arm 320, solenoid 140, contact 335b, contact 317 and line 301.

The coin mechanism may be provided with a lock-out solenoid such as indicated at 345 which must be energized before the coin mechanism will accept coins. It will be observed that one side of the lock-out solenoid 345 is connected to line 304 through lines 346 and 347, while the other side of the solenoid is connected with line 301 under the control of contacts such as 350 as well as the selector switch contact pairs such as 335a, 335b. Thus, in order to energize the lock-out solenoid to accept coins, the contact 350 which is associated with

the actuating arm 111 in Figure 2 must be closed indicating that a container is in the dispensing position in the associated dispensing unit ready to be delivered to the customer. If for some reason, switch arm 111 is not properly actuated in a given dispensing unit, the coin mechanism will not accept coins as long as the customer selects this dispensing unit.

When an eject solenoid 140 is energized, a switch contact corresponding to that solenoid, such as 360 of switch 152 is actuated by the arm 151 in Figure 2 to close momentarily, energizing reset solenoid 361 which then opens the coin switches 363, 364 and 365. These coin switches control the energization of the relays 330—332 and are closed upon receipt of five cents, ten cents and twenty-five cents by the coin mechanism. When these switches are opened by the relay 361, the solenoids 330—332 are all in deenergized condition and switch contacts 326—328 are in open condition to interrupt the energizing circuit for the solenoid 140, allowing the ejector arm 120 to be returned to its normal position by means of spring 147. Upon ejection of a container from dispensing position, the corresponding contact 315 under the control of switch arm 110 will be closed and the motor 100 energized to bring a new container into the dispensing position. It will be understood that deenergization of the solenoid 361 upon reopening of the switch 360 as the eject arm returns to normal position does not cause closure of the coin switches 363—365.

Summary of operation

The operation of the machine may now be summarized as follows.

To load the machine with containers, the door 11 is unlocked and opened as shown in Figure 1, preferably with the switch 302 seen in Figure 9 in open condition to deenergize the electric circuit. Each of the dispensing drawers 28—33 may now be successively pulled out, having first removed the corresponding plug 37, to load containers on the turntable 70 within the spiral guide 74 of each unit. Additional containers may be inserted in the preheat storage space 41 and in the unheated storage space 24. The switches 39 are set at the price of the articles of the respective dispensing units. Items corresponding to the respective dispensing units may be displayed in the compartment 47 in association with a suitable selector switch which is to be operated by the customer.

With the drawers 28—33 and plugs 37 returned to the operative positions the electric circuit is now energized by closing the switch 302, and the respective motors 100 will be energized to rotate the turntables 70 until an article is moved to dispensing position as indicated at 88 in Figure 2 for each dispensing unit, after which the motor is deenergized through the action of the switch arm 110 seen in Figure 2 which opens switch 315 seen in Figure 9.

The customer may now select the desired dispensing unit by closing the corresponding contact pair such as 335a, 335b seen in Figure 9. The customer then inserts the required coins to actuate the corresponding coin switch such as 365 in Figure 9, thereby energizing totalizer relay 332 and closing contact 328 to energize the selected ejection solenoid 140. Energization of solenoid 140 as seen in Figure 2 swings the ejector arm 120 in a clockwise direction to eject the container in discharge position through notch 66a as seen in Figure 3. As the container such as 43 moves through the notch 66a, it is tipped into a horizontal orientation as indicated in dash outline in Figure 4, whereupon it rolls upon the corresponding guide structure inclined wall 256c, through the corresponding opening 250—255 of the conveyor structure 240 and descends in a zig-zag path as indicated in Figure 5, being discharged as indicated by arrow 270 in Figure 5 into the rear end of the delivery chute 20, seen in Figure 1. The container then rolls down the delivery chute 20

to bar 22 and is removed through window 21 in the door 11 of the machine.

As soon as a container is ejected from the discharge position 88, Figure 2, switch arms 110 and 111 return to normal position closing switch contact 315 seen in Figure 9 and opening contact 350 seen in Figure 9. In this condition motor 100 is energized to rotate turntable 70 until a further container moves to the discharge position. If no further containers are present on the turntable 70 of a given dispensing unit, the turntable 70 rotates until the pin 185 seen in Figures 6 to 8 has successively engaged the teeth 181a and 181c of stepping plate 181, whereupon switch arm 210 is actuated as seen in Figure 8 to move switch contact arm 317, Figure 9, to its right hand position to cause energization of the corresponding empty lamp 370 and to deenergize the associated motor 100. If a customer later moves the selector switch to select the dispensing unit which is empty, the contact 350 of the dispensing unit will be open because of the lack of a container at discharge position, so that lock-out solenoid 345 will not be energized and coins will not be accepted.

It will be apparent that many modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. In a dispensing machine, a housing having an interior space, a series of dispensing units disposed in superposed relation in said space, each of said dispensing units comprising a turntable and a tray removably disposed in the housing, each of said trays having a discharge position to which successive articles are delivered by the turntable, a delivery conveyor extending vertically in adjacent relation to the discharge positions of said trays and having article receiving openings at the level of each dispensing unit and in alignment with the respective discharge positions for receiving articles in succession from said dispensing units, and means providing an article delivery outlet in said housing communicating with the lower end of said conveyor.

2. In a dispensing machine, a housing having an interior space, a series of dispensing units disposed in superposed relation in said space, each of said dispensing units comprising a rotatable member and a tray supporting said member, each of said trays being removably disposed in the housing and having a discharge position to which successive articles are delivered by the rotatable member, a spiral guide structure disposed above each said rotatable member and operative to engage articles resting on said rotatable member, said guide structure having a configuration to move articles radially on said rotatable member as said rotatable member rotates toward said discharge position, and a delivery conveyor extending vertically in adjacent relation to the discharge positions of said dispensing units for receiving successive articles from said dispensing units.

3. In a dispensing machine, a housing having an interior space, a series of dispensing units disposed in superposed relation in said space, each of said dispensing units comprising a turntable and a tray removably disposed in said housing, each of said trays having a discharge position to which successive articles are delivered by the turntable, a delivery conveyor extending vertically in adjacent relation to the discharge positions of said trays and having article receiving openings at the level of each dispensing unit and in alignment with the respective discharge positions for receiving articles in succession from said dis-

ensing units, means providing an article delivery outlet in said housing communicating with the lower end of said conveyor, and arm means at the discharge position of each dispensing unit for moving each article at such position radially outwardly from said turntable to said delivery conveyor including bell crank means normally preventing discharge movement of said arm means.

4. In a dispensing machine, a rotatable support member, means mounting said support member for rotation on an upright axis, a spiral guide structure disposed above said support member and operative to engage articles resting on said support member, said guide structure having a configuration to move articles radially on said support member to a discharge position as said support member rotates on said axis, means for receiving articles in succession at said discharge position, means for ejecting articles from said discharge position in an ejecting position thereof, means for sensing an empty condition of said rotatable member, and switch means preventing rotation of said rotatable member in response to an empty condition sensed by said sensing means, said sensing means including a pin on said rotatable support member, a stepping plate having teeth adapted to successively engage the pin upon rotation of the rotatable support means in an empty condition thereof, and a pin on said stepping plate actuating said switch means in response to said successive engagement of said teeth.

5. In a dispensing machine, a rotatable support member, means mounting said support member for rotation on an upright axis, a spiral guide structure disposed above said support member and operative to engage articles resting on said support member, said guide structure having a configuration to move articles radially on said support member to a discharge position as said support member rotates on said axis, outlet means for receiving articles in succession at said discharge position and means for ejecting articles from said discharge position for delivery from the machine, said ejecting means including an arm portion movable to a position overlying the outlet means when the ejecting means is in an actuated condition.

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