April 7, 1953 H. S. CHILDERS 2,633,958

DISPENSING APPARATUS

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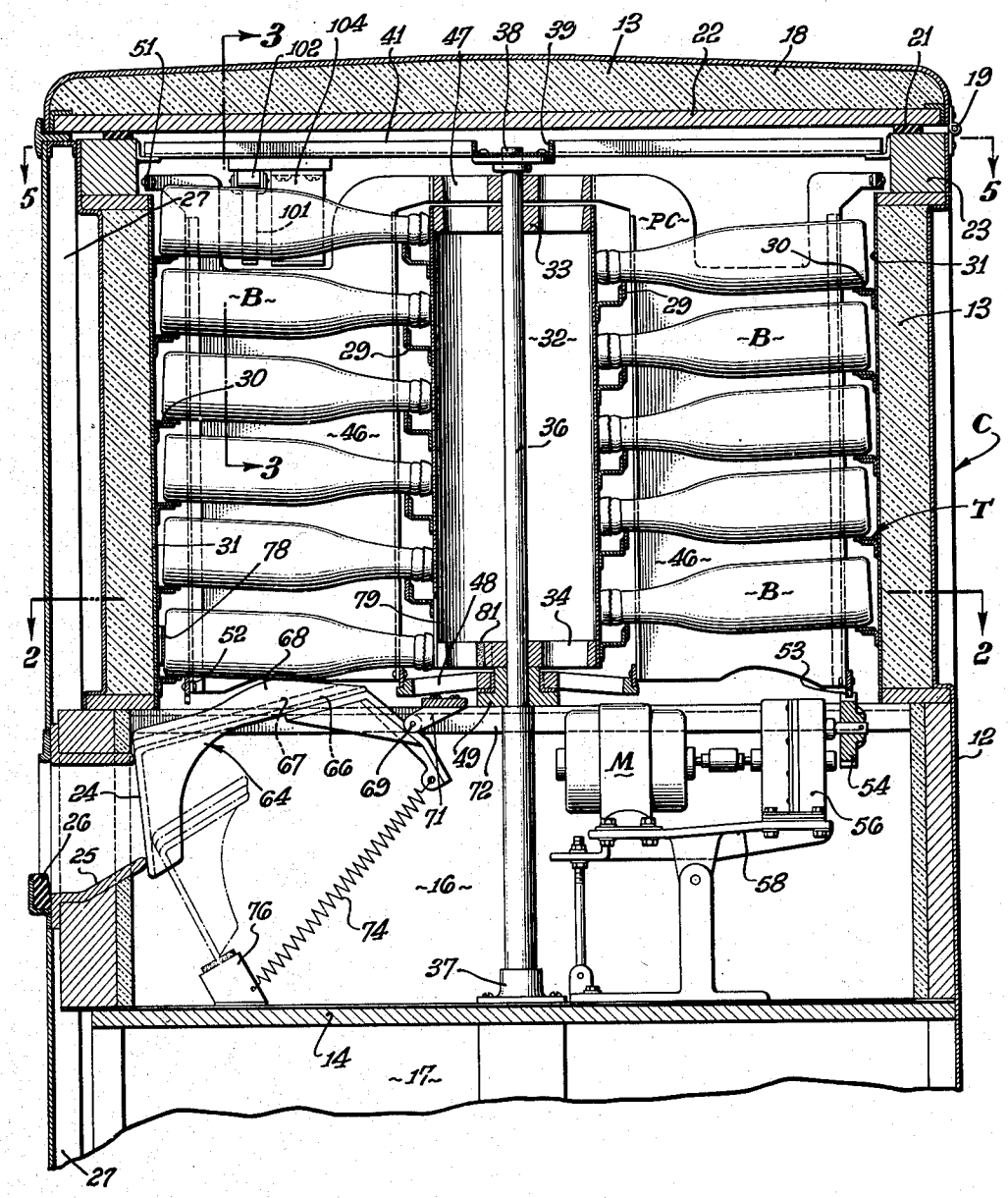



Fig. 1.

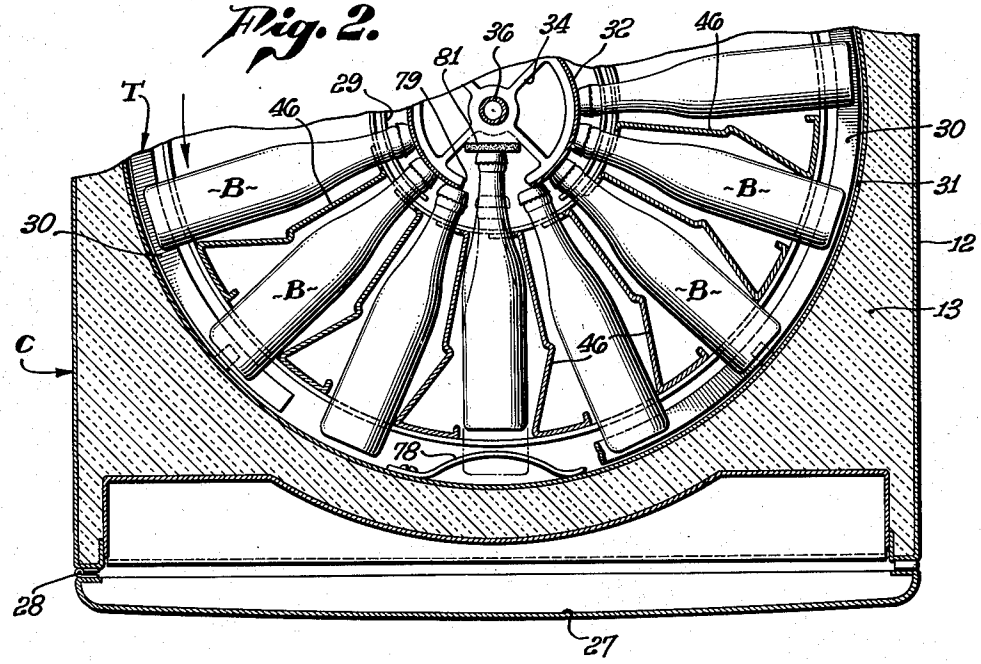
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DISPENSING APPARATUS

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Fig. 2.



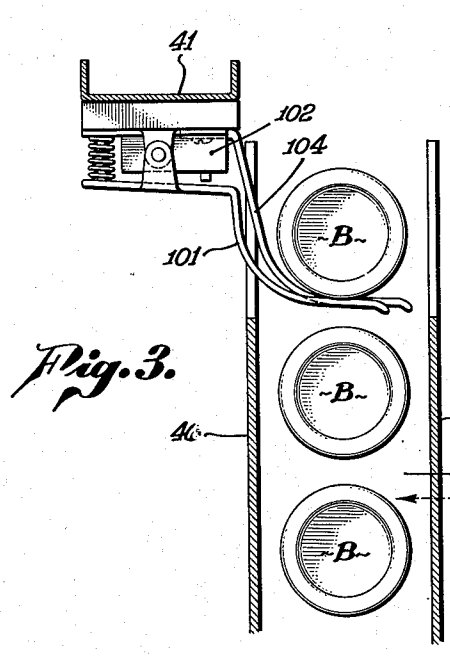




Fig. 3.

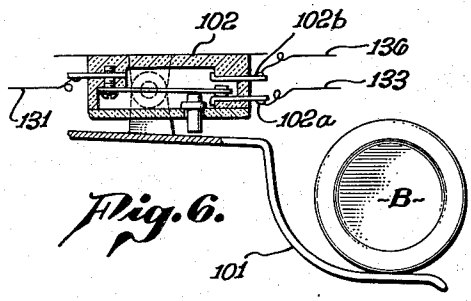
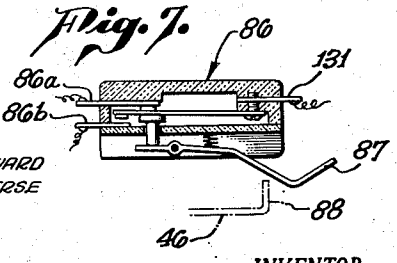



Fig. 6.

Fig. 7.



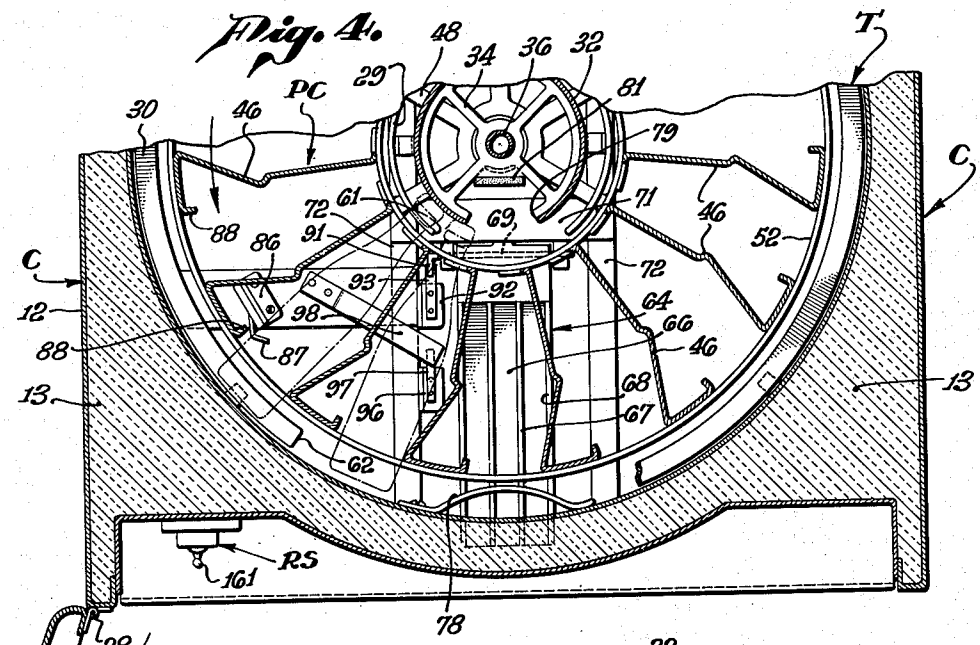

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DISPENSING APPARATUS

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Fig. 4.



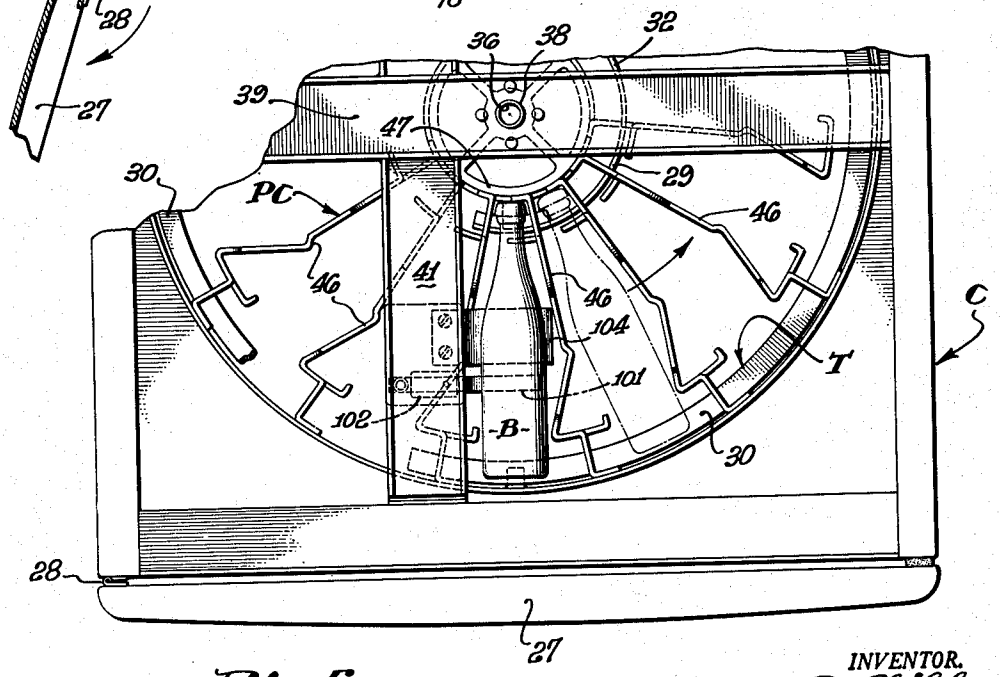




Fig. 5.

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DISPENSING APPARATUS

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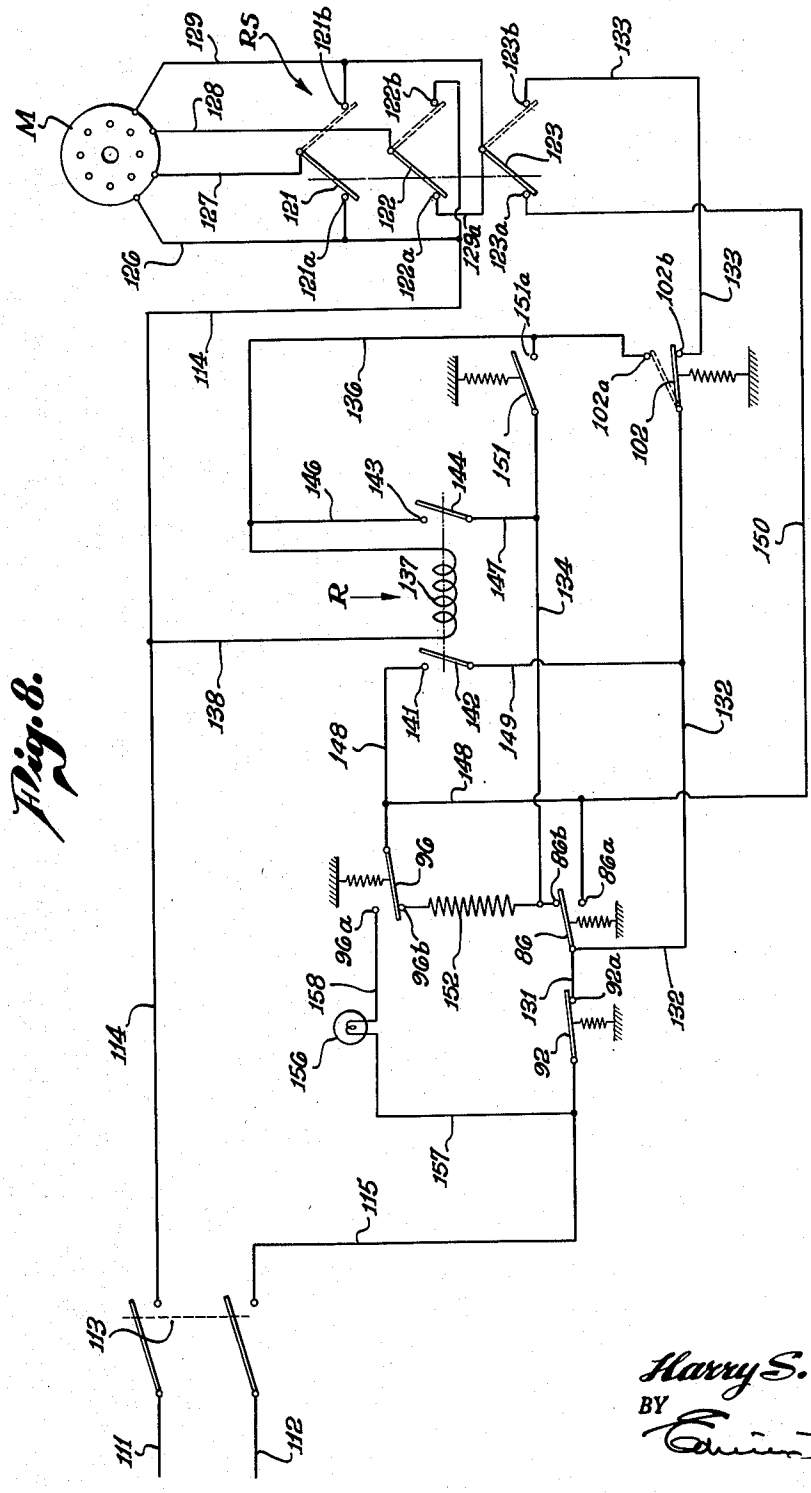



Fig. 8.

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Patented Apr. 7, 1953 2,633,958

# UNITED STATES PATENT OFFICE

2,633,958

## DISPENSING APPARATUS

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Application November 12, 1946, Serial No. 709,209

7 Claims. (Cl. 194—10)

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My present invention relates to dispensing apparatus in general and particularly to a bottle dispensing apparatus of the coin-controlled type. Especially the invention relates to dispensing machines for bottled beverages which automatically deliver to the purchaser a bottle of refrigerated beverage upon the depositing of a coin.

Coin-operated vending machines are found today in many public places ready to dispense an article which is usually of the packaged or bottled type. Such machines are usually serviced during those hours of the day in which they receive little use and usually by a person having charge of a large number of units. These service men have regular routes and the difficulty of servicing a particular machine and the length of time required determines the number of machines which can be put under his care. If the loading operation is simple and expeditiously carried out, the operating cost is reduced and accordingly the profits to the owner increased. Above all, however, the machine must promptly and with accuracy deliver the purchased article upon the insertion of the purchasing coin and also must refuse to accept additional coins when empty.

In the dispensing machine constructed in accordance with the present invention the purchased article is delivered promptly and positively upon the insertion of a coin and the operation is repeated as frequently as coins are inserted until the machine is empty. When empty it is conveniently serviced from above by a system which insures that it will be completely filled even though it was not completely empty at the beginning of the filling operation.

With the foregoing in mind, it is the purpose of my invention to provide a dispensing apparatus for bottles and the like which is characterized by its simplicity, ease of servicing, durability and by its positive operation.

It is also a purpose of my invention to provide a dispensing apparatus in which bottles are fed into the top of the machine and are dispensed therefrom at a lower point.

It is a further object of my invention to provide a bottle dispensing machine in which bottles to be dispensed are movably supported upon a helically extending track onto which they are fed at the upper end and from which they are dispensed at the lower end.

It is still another purpose of my invention to provide a dispensing apparatus in which bottles are movably supported upon a helical track and on which they are propelled downwardly to the delivery position and on which they are propelled upwardly during the filling operation.

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A still further object of my invention is to provide a dispensing apparatus in which bottles are dispensed from the lower end of a helical track on which they travel downwardly in normal operation and on which they travel upwardly as a preliminary step in the feeding operation to insure that the machine will be filled to its maximum capacity.

It is a still further object of my invention to provide a dispensing machine in which bottles are fed into the top and advanced downwardly in a step-by-step movement.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings.

Referring now to the drawings in which a preferred embodiment of the invention is illustrated:

Figure 1 is a vertical section through the top part of a dispensing apparatus constructed in accordance with the present invention and shows the arrangement of the bottles upon the helical track in the machine interior;

Figure 2 is a partial transverse section upon the line 2—2 of Figure 1 and discloses the spacing of the bottles by the bottle propelling cage;

Figure 3 is a partial vertical section upon the line 3—3 of Figure 1 and illustrates the bottle-actuated loading finger switch;

Figure 4 is a view similar to Figure 2 but with the bottles removed to show the control switches and the delivery chute;

Figure 5 is a partial section upon the line 5—5 of Figure 1 and illustrates the top feeding of the unit;

Figure 6 is a vertical section through the loading finger switch illustrated in Figure 3;

Figure 7 is a section through the cage-operated carrier switch shown in Figure 4; and

Figure 8 is a diagrammatic showing of the electrical circuit of the unit.

Referring again to the drawings, a preferred embodiment of the invention is illustrated and is seen to comprise a cabinet, indicated generally by the reference character C and which preferably includes a metallic casing 12 suitably lined interiorly with insulation 13 above a horizontal platform 14 which divides the cabinet into an upper chamber 16 and a lower enclosure 17. Chamber 16 houses the bottles to be dispensed and is preferably refrigerated by suitable means, while the enclosure 17 may serve as the compartment housing the refrigerating mechanism and as a storage compartment for goods. The open top of cabinet C is closed by a door or cover 18 pivoted at one side at 19 and interiorly insulated

at 13 in the manner of the cabinet casing 12. A suitable encircling seal 21 is compressed between the cover inner wall 22 and a peripheral casing member 23 to provide a hermetically sealed chamber. As will be apparent, the pivoted top enables the apparatus to be loaded with ease from above. For the discharge of the bottles there is provided a delivery chute 25 sloping downwardly and outwardly at a slight distance above platform 14. Chute 25 is normally closed interiorly by a door 24, movably mounted as will be described, and is also provided at its outer end with a resilient bumper 26 to interrupt the outward movement of the bottle being delivered.

Cabinet C may be of any desired shape—round, square, or as desired. Normally, however, it will be arranged with its major dimension extended vertically as illustrated in the drawings, but its exact shape is not of the essence. Additionally, in the preferred embodiment a side door 27 is mounted upon hinges 28 in the manner illustrated in Figures 1, 2, 4 and 5. Door 27 is actually outside of the cabinet proper, being outside of the insulated upper portion or chamber 16 thereof, but it does provide means by which entrance may be gained to lower enclosure 17.

The track system upon which the bottles within the cabinet chamber 16 are movably mounted for travel from the top to the bottom is indicated generally by the character T and comprises fixed inner and outer rails 29 and 30, respectively. Rail 30 is carried by a cylindrical member 31 which forms an inner enclosing wall for the insulation 13 of cabinet casing 12, while the inner rail 29 spirally encircles and is supported upon a centrally positioned vertically extending stationary cylinder 32 carried top and bottom by spiders 33 and 34, respectively. The spiders are themselves carried by a vertically extending stationary post 36 supported at its lower end in a socket seat 37 carried by the top surface of platform 14. The upper end of the shaft is seated at 38 in a channel member 39 which forms, together with transverse channel member 41, a spider the outer end of which seats upon the casing member 23.

Shaft 36 is non-rotatable and the cylinder 32 carrying the inner rail 29 is fixed relatively thereto. It is to be noted that on any given radius the inner rail 29 is positioned slightly above the outer rail 30. This is clearly illustrated in Figure 1 and the purpose of the arrangement is to support a bottle substantially horizontally for rolling movement despite the fact that its capped end supported by rail 29 is of smaller diameter than its opposite end carried by rail 30.

To get the bottles, illustrated in the drawings and bearing the character B, onto the track system the cover or top 18 is pivoted from its closed position, illustrated in Figure 1, to its open position, illustrated in Figure 5, in which the upper end of the track is exposed. To space the bottles at desired intervals to prevent scratching and also to provide means by which they may be propelled, there is provided a propelling cage indicated by the reference character PC. This cage comprises a multiplicity of radially extending circumferentially spaced pushing elements or plates 46 which are contoured as illustrated clearly in Figures 4 and 5, and so positioned as to accommodate a bottle B between each pair. Longitudinal movement of each bottle is prevented by the concentric rail-supporting cylinders 31 and 32 which are spaced apart a distance only slightly greater than the length of the bottles. Clearly, if bottles are fed into the track system, at the upper end and between adjacent pusher elements or walls 46, as illustrated in Figure 5, and if the propelling cage PC is rotated about its supporting post 36 in the proper direction, the bottles will be propelled downwardly toward the lower end of the track.

It is desirable that delivery be accomplished automatically and, of course, imperative that the pusher plates 46 move in synchronism and at the same rate. To effect these results, the inner upper and inner lower extremities of each pusher element 46 are secured fixedly to spiders 47 and 48, respectively. Spider 47 is located at the top of chamber 16 immediately below the stationary channel members 39 and 41 while lower spider 48 is rotatably supported upon a suitable thrust bearing 49 carried by post 36. Similarly the upper and lower outer extremities of plates 46 are secured to rings or rims 51 and 52, respectively, to provide a rigid construction divided longitudinally by the elements 46 into a plurality of individual cages or chambers. The underside of lower ring or rim 52 is toothed at 53 to mesh with a gear 54 driven through a speed-reducing mechanism 56 by an actuating motor M. The motor and the speed-reducing mechanism are both carried by an adjustable platform 58 supported by and above the cabinet interior platform 14. The energization of the motor effects the rotation of the gear 54 and so the rotation of the propelling cage PC with its pusher elements 46 and the movement of the bottles B positioned therebetween. It is clear that with the motor M rotating in one direction, unit PC will travel as to advance the bottles downwardly from the top to the bottom of the track system T. Equally clear is the fact that upon the rotation of motor M in the opposite direction the bottles present in the track system will be advanced toward the top.

In the normal operation of the machine and upon the energization of the driving motor M by the insertion into the common type coin-controlled mechanism of the machine of a suitable coin, the lowermost bottle will move along the track system T until it passes beyond the lower extremities of rails 29 and 30, indicated at 61 and 62, respectively, at which time it will be supported by the outer rim 52 of cage PC and by the rim of lower spider 48 of cage PC, as illustrated in Figure 1. The continued rotation of the propelling cage PC carries the lowermost bottle to a position immediately above the pivoted discharge flap 64 which, incidentally, includes the chute-closing door 24. Flap 64 is formed with a flat base 66 lined with parallel ridges 67 upon which a bottle may slide easily, and it also has side detaining walls 68. The flap is mounted adjacent its inner end by a pivot pin 69 upon a bracket 71 the extremities of which are supported by fixed parallel cross members 72 positioned upon opposite sides of the central supporting post 36. A coil spring 74 is connected between the inner extremity of flap 64 and a fixed stop 76 and at all times exerts a force which tends to hold the flap in its upper chute-closing position, as illustrated in full lines in Figure 1.

Just before a bottle is propelled into a position immediately above the flap 64 its outer end contacts a curved cam element 78, the function of which is to slide the bottle inwardly sufficiently as to displace its outer end from the rim 52 of cage

PC. Cam 78 is so contoured that this result obtains when the bottle is immediately over flap 64. It is noted that this displacement is permitted by the fact that the inner cylinder 32, upon which the inner rail 29 is supported, is cut away at 79 so as not to interfere. In the preferred embodiment illustrated the stationary spider 34 carries a relatively soft resilient abutment element 81 positioned as to limit the inward movement of the bottle but not before its outer end has been moved from the supporting rim 52. Upon being so displaced the outer end of the bottle B drops, under the action of gravity, onto the underlying and downwardly sloping base 66 of flap 64 and, overcoming the holding tension of the coil spring 74, pivots the flap downwardly from its full line position illustrated in Figure 1, to its dotted line position illustrated in the same figure in which its lower end rests upon the stop 76. When so positioned its ridged base 64 merges smoothly with the upwardly and inwardly sloped surface of chute 25 and a bottle may slide into the chute and against the resilient stop 26 and so into a position in which it may be picked up by the purchaser.

The energization of the actuating motor M was accomplished, as stated, by the insertion of a coin into a coin-operated control mechanism of any ordinary type and which is connected to the motor in a circuit which will hereinafter be described. It is, of course, necessary that the motor rotate only sufficiently to discharge a single bottle and that thereafter it be de-energized awaiting a subsequent purchase. To effect the de-energization of the motor after the desired single delivery there is provided a two-position carrier switch 86 the actuating lever 87 of which extends into the pathway of the inturned ends 88 of the pusher elements 46. Lever 87 is shaped as a cam, in the manner illustrated clearly in Figure 4, and when the propelling cage PC has been rotated sufficiently just to eject a bottle, the end 88 of one of the pushers 46 moves at that time into contact with the lever 87 to change its position and to open the motor circuit. When next a coin is inserted into the machine and the motor again energized the rotation of the propelling cage PC causes the end 88 to move past the lever 87 whereupon the latter automatically moves into its motor-operating position and awaits the approach of the oncoming pusher element.

In addition to the necessity for the de-energization of the actuating motor upon the discharge of a single bottle, it is also important that means be provided to prevent its subsequent energization, and even the reception of another coin, while either of two possible conditions exist. These conditions comprise, first, the continued presence of a bottle in the discharge chute, a condition which would be evidenced by the continued holding of the flap 64 in its discharging position illustrated in dotted lines in Figure 1; and, second, the absence of a bottle in position to be discharged upon the actuation of the machine, a condition which can exist because the machine is empty of bottles or because it is in operation and a succeeding bottle has not been advanced to the final position from which it will be discharged. These desirable objectives are obtained in a simple manner.

To prevent the energization of the motor with a bottle still present in the discharge chute, the pivotal pin 69 of the flap 64 is connected to rotate with the flap as it pivots and is provided with a right angle end 91, as shown in Figure 4.



A normally closed flap-actuated switch 92 is provided in series with the operating parts of the apparatus and is carried by one of the transverse support elements 72 and includes a lever arm 93. With flap 64 in its lowered or discharge position, the right angle end 91 of the pivotal pin 69 contacts the switch lever 93, moves it to open the switch, and retains it in that position until, under the actuation of the coil spring 74, the flap moves again into closed position. As the flap will always be lowered with a bottle in delivery position, this arrangement positively prevents the discharge of a second bottle before the removal of the first bottle.

As the switch 92 is also in series with the normally energized lock-out coil 152, hereinafter more fully described, its opening effects the de-energization of that coil and so prevents the insertion of another coin.

To prevent effectively the actuation of the machine or the acceptance of money when there is no bottle in the machine ready for delivery, whether due to the fact the machine is empty or to the fact that it is in operation and the next succeeding bottle has not been advanced to its final position, there is provided still a third switch which is called the "full-empty" switch. This switch, indicated by the reference character 96, is also carried by the supporting element 72 in the manner of switch 92 and, in fact, is located relatively close thereto as is illustrated in Figure 4. Switch 96 includes an actuating lever 97 contacted by a pivoted, flexible overlying cantilever spring element 98. Spring 98 extends over switch lever 97 and into a position such that with a bottle in its final supported position just prior to discharge, that is, its final position just prior to the beginning of the operation which effects its delivery to the purchaser, it will be contacted by the bottle and depressed sufficiently to move the switch lever 97 from a first to a second position. In this second switch position it is possible to energize the motor but if, following discharge of a bottle, no second bottle advances into position for discharge then the switch lever 97 is not held down, switch 96 assumes a different relationship and two results occur immediately. The first result is that the lock-out coil on the previously mentioned coin control mechanism is de-energized and no coins can be accepted, and the second result is that an "empty" warning light is lighted.

In addition to the safeguards to insure satisfactory operation which have been described and which are for the protection of the purchaser, the apparatus constructed in accordance with the present invention also includes features which make it extremely advantageous from the standpoint of servicing. Let it be assumed that the machine is to be serviced. If, upon pivoting the cover 18 to open position the machine is entirely empty, it is only necessary for the service man to feed bottles successively in at the top of the track system T. Bottles are dropped, one at a time, between that pair of pusher plates 46 positioned just to the right of channel member 41, as illustrated in Figure 5. With the bottle so positioned it rests upon and deflects downwardly lever arm 101 of a single pole, double throw switch 102 carried by the underside of the channel member 41. This movement changes the internal connections of the switch 102 so that the actuating motor is energized to rotate the propelling cage PC. The bottle B resting upon lever arm 101 is moved downwardly on the

track T whereupon lever arm 101 assumes its original position, the motor is de-energized, and further movement stops. The insertion of a new bottle effects the same results, each movement being sufficient to permit the acceptance of a new bottle at the top and being equal to the movement to effect delivery of a bottle at the bottom. The operation is repeated until the machine is completely loaded.

Let it be supposed, however, that upon the service man opening the cover 18 he finds the machine is not completely discharged and that a few bottles remain. These bottles will, of course, be positioned below the top of the track and there will be empty spaces at the top equal in number to the sales which have been made. It is imperative that no empty spaces be present between bottles on the track system for, as has been described, upon an empty space reaching the penultimate position in the unit the "full-empty" switch 96 will prevent further operation. Accordingly, means are provided by which the actuating motor M is reversed to drive the propelling cage PC in a reverse direction until the uppermost bottle rides onto a fixed guide 104 positioned adjacent and parallel to the actuating lever 101 of a loading switch 102. In this position the upwardly moving bottle actuates the lever 101 in the manner of a bottle fed into the machine as previously described, and alters the interior relationship of switch 102 whereupon the energizing circuit through the motor is opened and the motor stops rotating. Thereafter if a reversing switch, which is indicated by the reference character RS in Figure 4 and is seen to be positioned between the cabinet proper 11 and the pivoted door 27, is returned to its original normal operating position, the motor M is at once energized, its circuit being closed by the presence of the bottle B on the lever 101, and rotates cage PC sufficiently to move that bottle therefrom as previously described. Thereafter bottles are fed into the machine and upon the switch lever 101 as described in the filling of a completely empty machine.

Turning now to Figure 8, we find illustrated the electrical circuit by which the driving motor M and the various control means of the apparatus are interconnected to effect the desired operations. The various parts are shown positioned in the figure in their ready-to-operate positions. Conductors 111 and 112 represent the outside power leads and connect directly to a double-pole switch 113 from which incoming leads 114 and 115 extend into the machine. Lead 114 passes directly to the reversing switch RS which is seen to comprise three single bladed switches each movable between two fixed contacts and in synchronism with the other blades. These movable blades are indicated by the reference characters 121, 122 and 123 and each is seen to contact, in its normal position in which the motor rotates to eject the bottles, a fixed contact bearing the same reference character supplemented by a suffix "*a*". With the switch blades reversed, as during the reverse direction operation of the motor, each blade makes contact with a fixed contact bearing the same character supplemented by a suffix "*b*". The incoming current-carrying lead 114 connects directly to a lead 126, comprising one of four leads 126, 127, 128 and 129 extending from motor M to the reversing switch RS. Lead 114 also connects directly to stationary contact 122*b* on the reversing side of the switch.



Leads 126 and 129 from the motor M can be considered as the armature connections and are seen to connect respectively to the fixed contact 121*a* and incoming lead 114, in the case of lead 126, while lead 129 connects to the stationary contact 121*b* on the reversing side and to the fixed contact 122*a* on the forward drive side of the switch. Leads 127 and 128 can be taken as the leads to the motor field and the primary function of reversing the position of blades 121 and 122 is to reverse the direction of flow of current through these leads. To effect this result, lead 127 is connected to the pivotal point of blade 121 so that, depending upon whether that blade seats upon stationary contact 121*a* or 121*b*, it receives current directly from incoming conductor 114 or from incoming power lead 115 through a circuit which will be described. Similarly lead 128 connects to the mid-point of pivoted blade 122 and is adapted to receive current from fixed contact 122*a*, and so indirectly from the incoming power lead 115, or, with the blade 122 in the reverse drive direction in which it seats upon contact 122*b*, to receive current from the incoming lead 114. It is seen, then, that the reversal in position of pivoted switch blades 121 and 122 between the full line and dotted line positions of Figure 8 will effect the reversal in the flow of current in the motor field and so the direction of rotation of the motor.

Current from the incoming power lead 115 does not pass directly to the reversing switch RS in the manner of lead 114 but instead is conveyed thereto by a more devious path. Conductor 115 connects directly to the normally closed bottle-actuated "flap" switch 92 and unless that switch is closed, a condition which exists at all times except when the flap 64 is in its lowered position, current cannot flow through the driving motor. A lead 131 connects the fixed contact 92*a* of switch 92 directly to the blade of carrier switch 86 which is adapted to make contact with either of its stationary contacts 86*a* or 86*b*. Switch 86 is normally biased, as shown, to close upon contact 86*a* but is held in contact with contact 86*b* with the machine ready to operate by the end 88 of a pusher plate 46, as previously described. Lead 131 also connects to lead 132 in series with the blade of loading finger switch 102 which is adapted to seat upon either of its contacts 102*a* and 102*b*, being normally biased into contact with the latter and connecting directly therethrough, by means of still another lead 133, to the fixed contact 123*b* of the reversing switch RS.

As stated, the carrier switch 86 is held, with the apparatus in the ready-to-operate condition, in the position illustrated in Figure 8 with its blade in contact with stationary contact 86*b* and under the actuation of the element 88 which moves with the bottle pusher element 46. Incoming current from lead 115 is conducted from stationary contact 86*b* by a lead 134 directly to the coin controlled switch 150 and in particular to the movable contact thereof. The latter is normally held in open position as illustrated but, in the presence of an inserted coin, moves to contact its stationary contact 150*a*. The latter is connected through lead 136, as is the contact 102*a* of "loading" switch 102, to the coil 137 of a relay R, the opposite side of the coil being connected by lead 138 to the incoming power lead 114. Insertion of a coin closing the switch 150 effects the energization of the relay coil 137 whereupon its normally open contacts 141, 142, and 143, 144 are closed. The latter pair are con-

nected by leads 146, 147 in parallel with the coin control switch 150 so that as the coin switch opens upon the passage of the coin, the relay coil 137 nevertheless remains energized to hold the contacts closed. Relay contacts 141 and 142 are connected respectively to leads 148 and 149. The latter connects directly to lead 132 while the former connects to a lead 150 directly connected to stationary contact 123a of switch 123. With relay contacts 141 and 142 closed, the incoming current from lead 115, which is present in lead 132 by virtue of the fact that "flap" switch 92 is closed, is conducted directly to the direct driving side of the reversing switch at 123a. As motor lead 129 is connected to blade 123, the motor is energized and rotates, the motor armature circuit comprising contact 123a, blade 123, lead 129, the motor armature, and lead 126 to the opposite incoming line 114. Current to the motor field is conducted from blade 123 through lead 129a to stationary contact 122a, through blade 122 to lead 128, and into the motor field from which it returns via lead 127 to blade 121 and thence to stationary contact 121a to join lead 126 which connects directly to incoming power lead 114.

Immediately the motor begins to rotate the lever 87 of carrier switch 86 is released by its pusher actuating element 88 and the movable switch blade moves into contact with its stationary contact 86a placing it in direct connection with lead 150 connected to RS contact 123a. Motor M continues to rotate until "flap" switch 92 is opened by a bottle. By this time the next following pusher blade 46, and in particular its end 88, will have contacted lever 87 of switch 86 to move its movable contact from stationary contact 86a to stationary contact 86b so that the circuit which includes the relay coil 137 and the coin switch 151 will be ready for re-energization upon the deposit of a second coin again to close switch 151.

As the flap-controlled switch 92 is in series with the incoming power line 115, and as all motor energizing current must pass through it, it is clear that with the flap lowered and accordingly switch 92 in its opened position, the motor 57 cannot under any circumstances be energized. This prevents the possibility of damage to the machine from an attempt to drop a bottle into the chute with a bottle already present therein.

To prevent the acceptance of a new coin by the coin controlled mechanism under certain undesirable conditions as previously described, a lock-out coil 152 is provided which connects directly between stationary contact 86b of carrier switch 86 and stationary contact 96b of "full-empty" switch 96. So long as coil 152 is energized it is possible for additional coins to be inserted into the coin-operated mechanism to close switch 151. Whenever coil 152 is de-energized, a coin inserted will be rejected. The specific mechanism by which this rejection is accomplished is not a part of the present invention and any standard coin-controlled switch mechanism with lock-out means making use of a constantly energized lock-out coil may be adapted for use herein. Both carrier switch 86 and "full-empty" switch 96 are shown in their normal, machine-ready-to-operate condition in Figure 8 and it is clear that current will normally flow through the lock-out coil 152, the switch 96 being connected directly by lead 150 to the motor which, with the reversing switch in its normal position as illustrated in full lines, has its opposite side connected to incoming lead 114. The value of the current which flows, however, is insufficient to actuate the motor and results in but a very slight power loss. Clearly with the blade of switch 96 in contact with stationary contact 96a, a condition which exists when there is no bottle resting upon the leaf spring 98 which contacts the actuating lever 97 of the switch, the switch will be opened, and it will be impossible to insert a coin into the machine. Similarly with the carrier switch 86 moved from its contact 88b to its contact 86a, a condition which exists during the operating cycle at all times except at the end of each delivery operation, the lock-out coil will be de-energized. With the switch 96 positioned in the empty position, that in which the blade 96 contacts the contact 96a, the current will flow through a signal light 156 connected by leads 157 and 158 to the incoming current lead 115 and to the contact 96a, respectively. As in the case of the lock-out coil 152, current will flow through light 156 whenever the machine is empty for the switch 96 is then so positioned that its blade contacts stationary contact 96a, the reversing switch RS being positioned for normal operation as indicated in the drawing in full lines. Here again the current consumed is a minimum, being sufficient only to light the light.

The return of the bottles in the machine to the top thereof as previously described and prior to inserting new bottles is accomplished by changing the position of the reversing switch blades 121, 122 and 123 from their full line positions to their dotted line positions of Figure 8. Current will then flow through the motor armature, to which the leads 126 and 129 connect, in the same direction as before, entering from the incoming lead 115 and the intermediate connections including the loading finger switch 102 at the stationary contact 123b. Thence the current will flow through blades 123, lead 129, into the armature and out from the armature through lead 126 to incoming lead 114. Current will flow in the reverse direction through the field for the motor leads 127 and 128 are now reversed with respect to leads 114 and 115. Current will now enter lead 127 from contact 121b connected directly to lead 129 and so to switch 123 and stationary contact 123b which, as described, is connected to incoming power lead 115. The second field lead 128 now connects to lead 114 by way of the blade of switch 122 and its stationary contact 122b.

To accomplish this reversal of connections in the reversing switch RS it is only necessary to open the side cover or door 27 and to operate manually the switch lever 161 which controls simultaneously the movement of three blades 121, 122 and 123. This change of position in the reversing switch RS automatically energizes the driving motor M for current from the lead 115 now enters through normally closed flap switch 92, through lead 131 and lead 132 to closed loading finger switch 102, and then through lead 133 to stationary contact 123b of the switch 123. As the loading finger switch 102 is normally closed on contact 102b, the motor rotates and drives the propelling cage PC to move the bottles upwardly upon their track T until, and as previously described, the uppermost bottle rides upon the lever 101 of switch 102 whereupon the flow of current is instantly interrupted. The service man then knows that he can begin to place bottles

into the machine. He thereupon reverses switch RS to its original position, that is, moves the blades 121, 122 and 123 into their full line positions of Figure 8. As the uppermost bottle is resting upon the actuating lever 101 of loading switch 102, the motor is immediately energized and through the following circuit. Current enters one side of the motor from the incoming power lead 114 passing through the lead 126 to the armature and through switch 121 and lead 127 to the field. It leaves via lead 148 to which armature lead 129 connects through switch 123 and to which field lead 128 connects by way of switch 122, lead 129 and switch 123. Lead 150 connects directly to lead 148 which connects in turn to contact 141 of relay R, the opposite member 142 of which connects through lead 149 to lead 132 leading back to lead 131 and to the incoming current-conducting lead 115. Contacts 141 and 142, however, are shown open but with the loading finger switch 102 in the dotted line position of Figure 8, in which it is held by the uppermost bottle resting upon the switch lever 101, current can flow from the incoming lead 115, through "flap" switch 92, lead 131, lead 132 to "loading" switch 102 and thence via its contact 102a through lead 136 to the relay coil 137 and thence via conductor 138 to the opposite incoming power lead 114. This effects the energization of the relay coil 137 instantaneously upon the reversal of the reversing switch RS to its normal position as shown in full lines and, accordingly, with a bottle resting upon loading switch lever 101 the relay R is instantly closed, whereupon current is available to the motor immediately upon the closing of contacts 141 and 142 as suggested. The motor rotates as previously described until the bottle resting upon the lever arm 101 moves therefrom. Thereupon the blade of switch 102 will move from its dotted line position to its full line, the relay coil 137 will be de-energized, whereupon contacts 141 and 142 will open and current to the motor will be cut off.

The loading then comprises, as previously described, the insertion of the bottles into the machine upon the lever 101 of "loading" switch 102, whereupon the operation just described is repeated successively and the motor actuated to move the propelling cage step-by-step until finally all of the spaces upon the track T are filled. Should the operator insert one bottle too many the result merely will be that the lowermost bottle will be ejected from the machine.

It is believed from the foregoing that the operation of the present invention is clear. Briefly to summarize, with the machine filled with bottles the purchaser need only insert a coin into the proper slot whereupon the motor M is energized and the propelling cage PC is rotated sufficiently to effect the disengagement of the lowermost bottle from its supporting means and its outward projection under the action of gravity onto the awaiting flap 64 whence it slides into the delivery chute 23. This operation may be repeated successively by inserting one coin after another. When finally there remain no bottles to be ejected from the machine, the machine will refuse to accept additional coins for its "full-empty" switch 96 will indicate the absence of the necessary bottle and will effect the de-energization of the lock-out coil 152 to effect the rejection of coins. Warning that the machine is empty is given by a warning light 156 also controlled by "full-empty" switch 96.

The loading operation of the machine is simple and easy. The operator or loader need only pivot to open position the covering top 18 whereupon bottles can be fed one by one into an awaiting top position, their entrance effecting the closing of the loading switch 192 which energizes the motor and actuates the propelling cage sufficiently to advance the bottle resting upon the lever 101 of the switch 102 sufficiently as to enable the switch to return to its original position. Successive positioning of bottles causes the propelling cage to advance step-by-step until the entire machine is filled.

Should the machine be only partly unloaded at the time the loading takes place, and to insure that no empty space resides between the newly inserted bottles and those bottles now in the machine, means are provided whereby the bottles in the machine are carried to the top of the carrying track. These means include a reversing switch RS reached by opening the pivoted door 27 on the side of the unit. Reversing switch RS by the movement of its actuating lever 161 immediately causes the motor to rotate in a reverse direction and to actuate the propelling cage PC to advance the contained bottles upwardly on their spiral track. When the uppermost bottle rides onto the lever 101 of the switch 102 current is cut off, the motor de-energized, and no further movement takes place. Upon reversing the switch RS again to its original normal operating position, the presence of a bottle upon the switch lever 101 effects the immediate energization of the motor whereupon the propelling cage is advanced in the manner previously described in connection with the loading of the empty machine. Bottles are then fed into the machine one by one as though it had been completely empty at the beginning of the loading operation.

While the particular apparatus herein shown and described in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim

1. In a vending machine having a cabinet provided with a loading opening and a delivery opening, an article track extended between the loading opening and the delivery opening, reversible article propelling means movable along the track to advance articles to the loading opening and to the delivery opening, and reversible motivating means having driving connection to the propelling means; a double throw switch having electrical connection to the reversible motivating means mounted adjacent to the track and to the loading opening engageable by articles loaded onto the track through the loading opening controlling the reversible motivating means to advance articles toward the delivery opening and engageable by articles advanced toward the loading opening upon reversing of the propelling means to interrupt operation of the motivating means and the propelling means.

2. In a dispensing machine having a continuously downwardly inclined stationary pathway constructed and arranged to support vendable articles, a reversible propelling member movable along said pathway to advance articles selectively upwardly and downwardly of said pathway, and a reversible electric motor having driving con-

nection to the propelling member, the combination of an electrical circuit for the motor including a manually controlled reversible switch, a coin controlled switch adapted to energize the motor in response to receipt of a coin, a limit switch engageable with the propelling member adapted to interrupt the electric circuit for the motor in response to movement of the propelling member downwardly of the pathway a predetermined increment of travel, and a double throw switch disposed in the pathway at the upper end thereof engageable by articles when the reversible switch is positioned to advance articles downwardly of the pathway to establish electrical connection to the motor in by-pass relation to the coin controlled switch and engageable by articles when the reversible switch is positioned to advance bottles upwardly of the pathway to interrupt electrical connection to the motor.

3. A bottle dispensing machine comprising a cabinet, a downwardly inclined stationary helical bottle carrying track in the cabinet, a cage to propel a multiplicity of bottles along said track including vertically extended pusher elements in association with the track defining individual bottle compartments, electrical driving means having driving connection to the cage, a reversible control switch adapted to energize the driving means selectively to drive the cage to advance bottles up and down the track, a limit switch mounted for engagement with the pusher elements to interrupt motivation of the cage in a direction advancing bottles downwardly of the track upon each successive movement of a bottle compartment to a predetermined delivery position, a coin controlled switch adapted to re-energize the driving means to advance bottles downwardly of the track, and a double throw switch mounted at the upper end of the track engageable by bottles electrically to by-pass the coin controlled switch when the reversible switch is positioned to advance bottles downwardly of the track and engageable by bottles to interrupt operation of the driving means when the reversible switch is positioned to advance bottles upwardly of the track.

4. In a bottle dispensing machine, a cabinet having a loading opening in a top portion thereof and a discharge opening in a bottom portion thereof; a helical track for bottles in said cabinet extending downwardly therein from the loading opening to the discharge opening; a propelling member to propel bottles along said track; a reversible motor having driving connection to the propelling member whereby bottles are moved selectively in either direction on the track; a reversing switch electrically connected to the motor; a limit switch wired electrically in series with the reversing switch and the motor engageable by the propelling member to interrupt movement of the propelling member to advance bottles downwardly of the track after a predetermined increment of travel; a coin controlled switch electrically connected in series with the reversible switch, limit switch, and motor adapted to energize the motor in response to receipt of a coin; and a double throw loading switch mounted adjacent to the loading opening in a position engageable by bottles loaded onto the track through the opening and by bottles advanced upwardly of the track by the propelling means to the opening, said loading switch having a normal path of electrical flow in series with the reversing switch and the motor when the reversing switch is positioned to advance bottles upwardly of the track, which path is interrupted by engagement of the switch by bottles advanced upwardly of the track, and a second path of electrical flow in parallel to the coin controlled switch closed by engagement of the switch with bottles loaded onto the track through the loading opening.

5. A bottle dispensing apparatus including a cabinet, a stationary helical bottle carrying track in the cabinet having an upper loading end and a lower delivery end, a movable cage to propel a multiplicity of bottles along said track, a reversible motor having driving connection to the cage, and an electrical energizing circuit connected to the motor including a manually controlled reversing switch selectively positionable to energize the motor to advance bottles upwardly and downwardly of the track, and a double throw switch disposed for bottle engagement at the upper end of the track conditioned by the reversing switch to energize the motor in response to bottle engagement when the reversing switch is positioned to advance bottles downwardly of the track and to de-energize the motor in response to disengagement by such a bottle, and to energize the motor in the absence of bottle engagement therewith when the reversing switch is positioned to advance bottles upwardly of the track and to de-energize the motor in response to bottle engagement when the reversing switch is so positioned.

6. In a bottle dispensing apparatus, a bottle carrying track having a delivery point at one end and a loading point at an opposite end, a movable cage to propel bottles along the track, a reversible electric motor to actuate said cage to move said bottles toward either end of the track, and an electric circuit to energize said motor including a reversing switch, a coin operated switch and a loading switch connected electrically in parallel, the loading switch having a position in the path of travel of bottles at the loading end of the track and being moved to a second position by engagement with bottles loaded on the loading end of the track and by engagement with bottles moved by the cage toward the loading end of the track, said loading switch in its said second position being electrically connected in series with the motor and arranged to open in response to such bottle engagement to interrupt operation of the motor when the reversing switch is positioned to move bottles toward the loading end of the track and in its first named position being electrically connected in series with the motor and arranged to close in response to bottle engagement when the reversing switch is positioned to move bottles toward the delivery end of the track.

7. A bottle dispensing apparatus including a cabinet, a stationary helical bottle carrying track in the cabinet having an upper loading end and a lower delivery end, a movable cage to propel a multiplicity of bottles along the track, a reversible motor having driving connection to the cage, a manually controlled reversing switch selectively positionable to energize the motor to advance bottles upwardly and downwardly of the track, a double throw switch mounted at the upper end of the track having a control lever extended into the pathway of bottles at the upper end of the track and being displaceable from the pathway in response to bottle engagement, and an electrical circuit interconnecting the motor, the reversible switch and the double throw switch energizing the motor when both

the reversing switch is positioned to advance bottles downwardly of the track and the control lever is displaced from the pathway by bottle engagement and energizing the motor when both the reversing switch is positioned to advance bottles upwardly of the pathway and the control lever is extended into the pathway.

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