

Dec. 11, 1945.

W. W. HIGHAM

2,390,535

VENDING MACHINE

Filed March 23, 1942

6 Sheets-Sheet 1

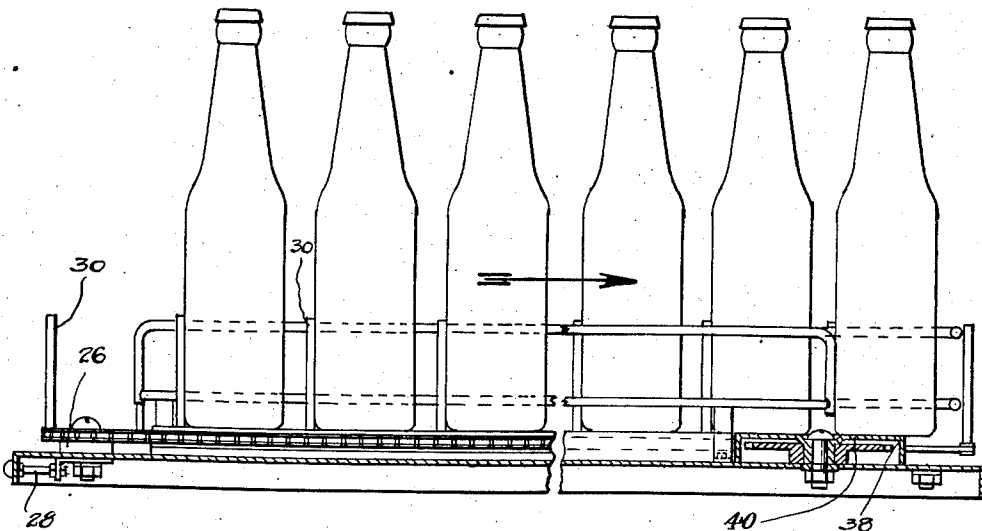
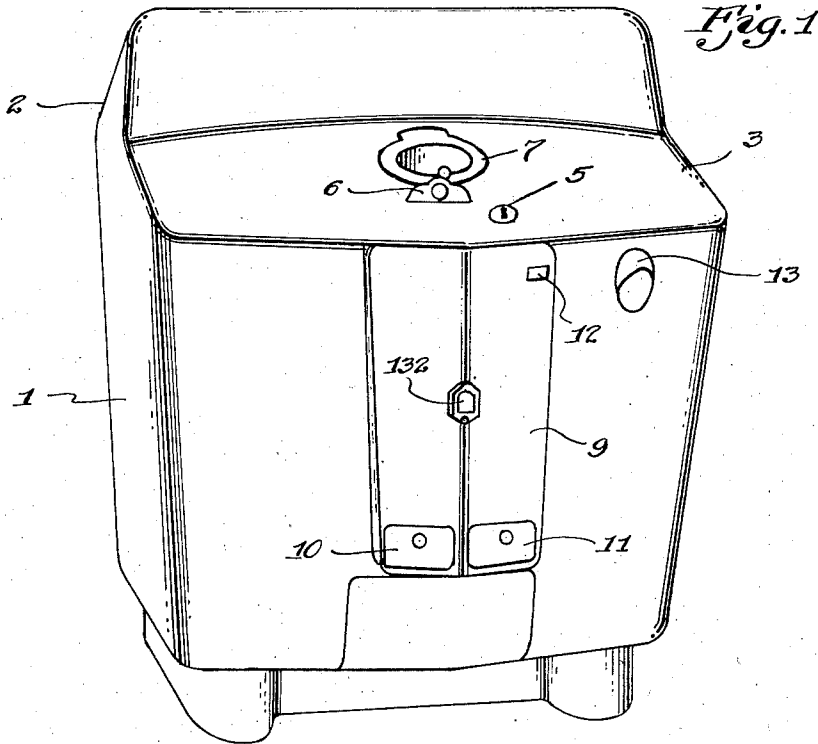


Fig. 3

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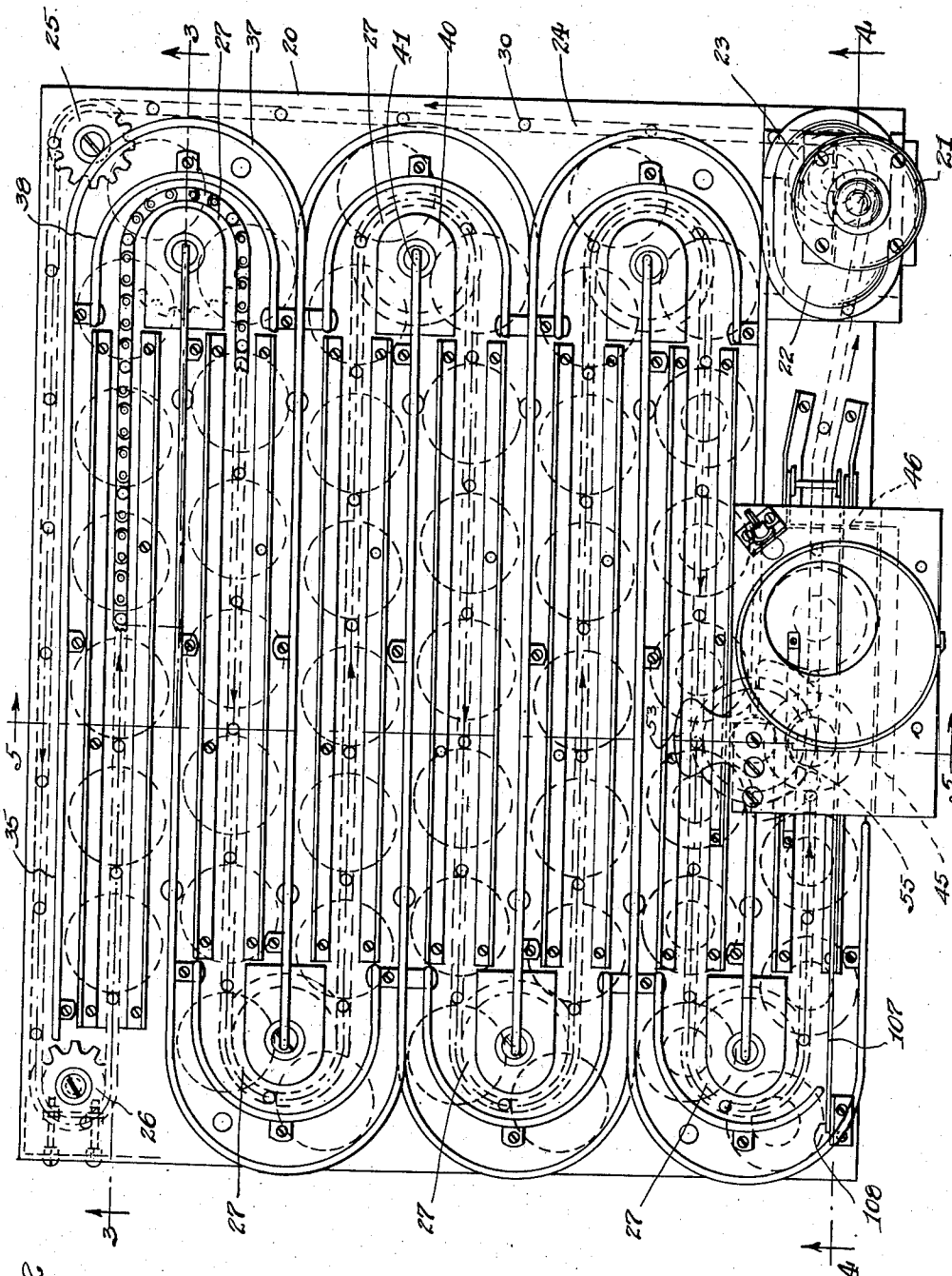


Fig. 2

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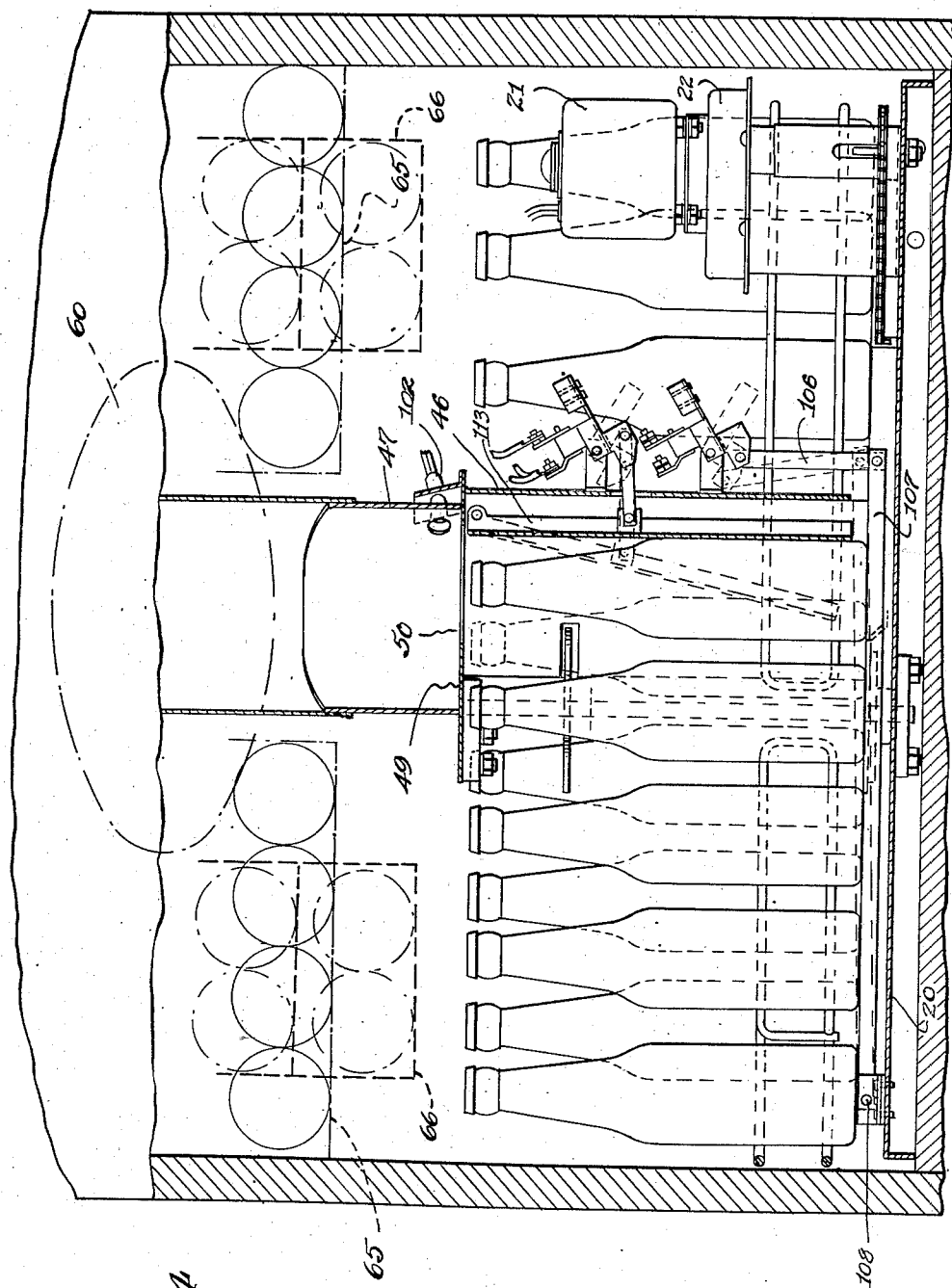


Fig. 4

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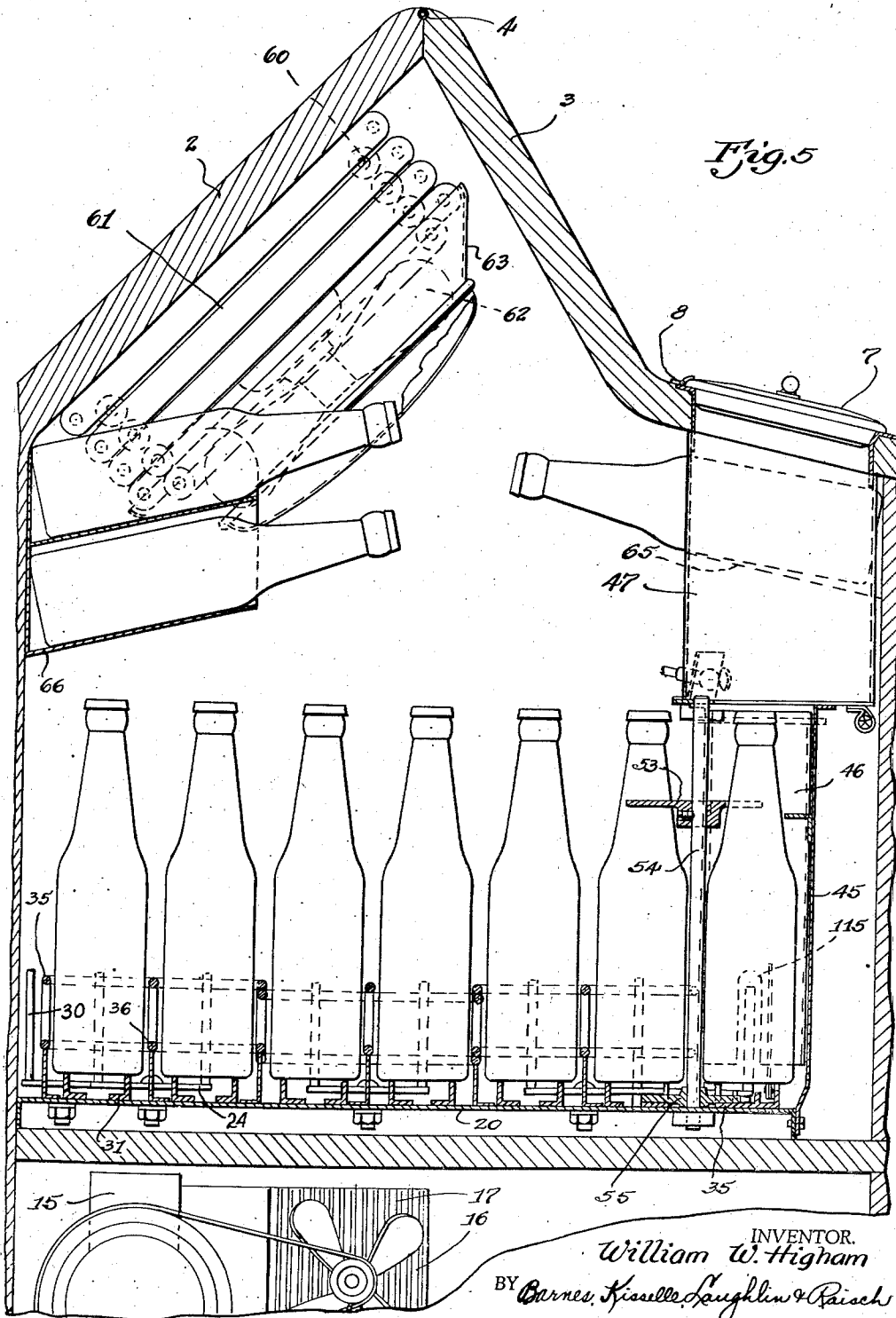
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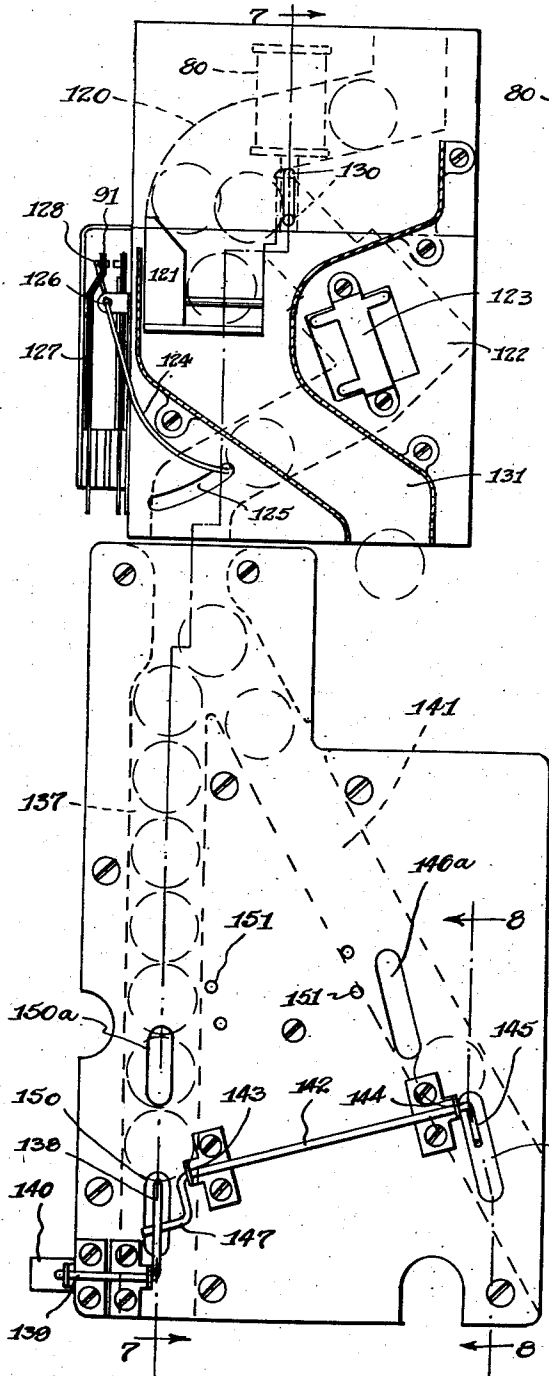


Fig. 6

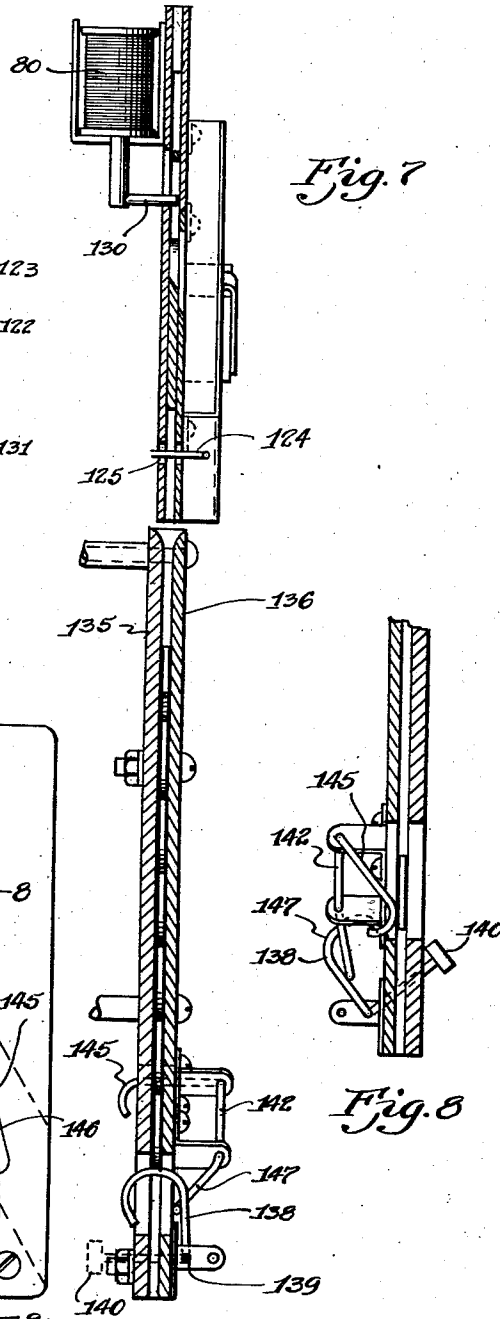


Fig. 7

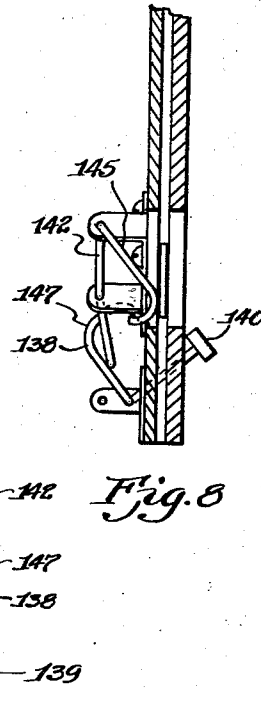


Fig. 8

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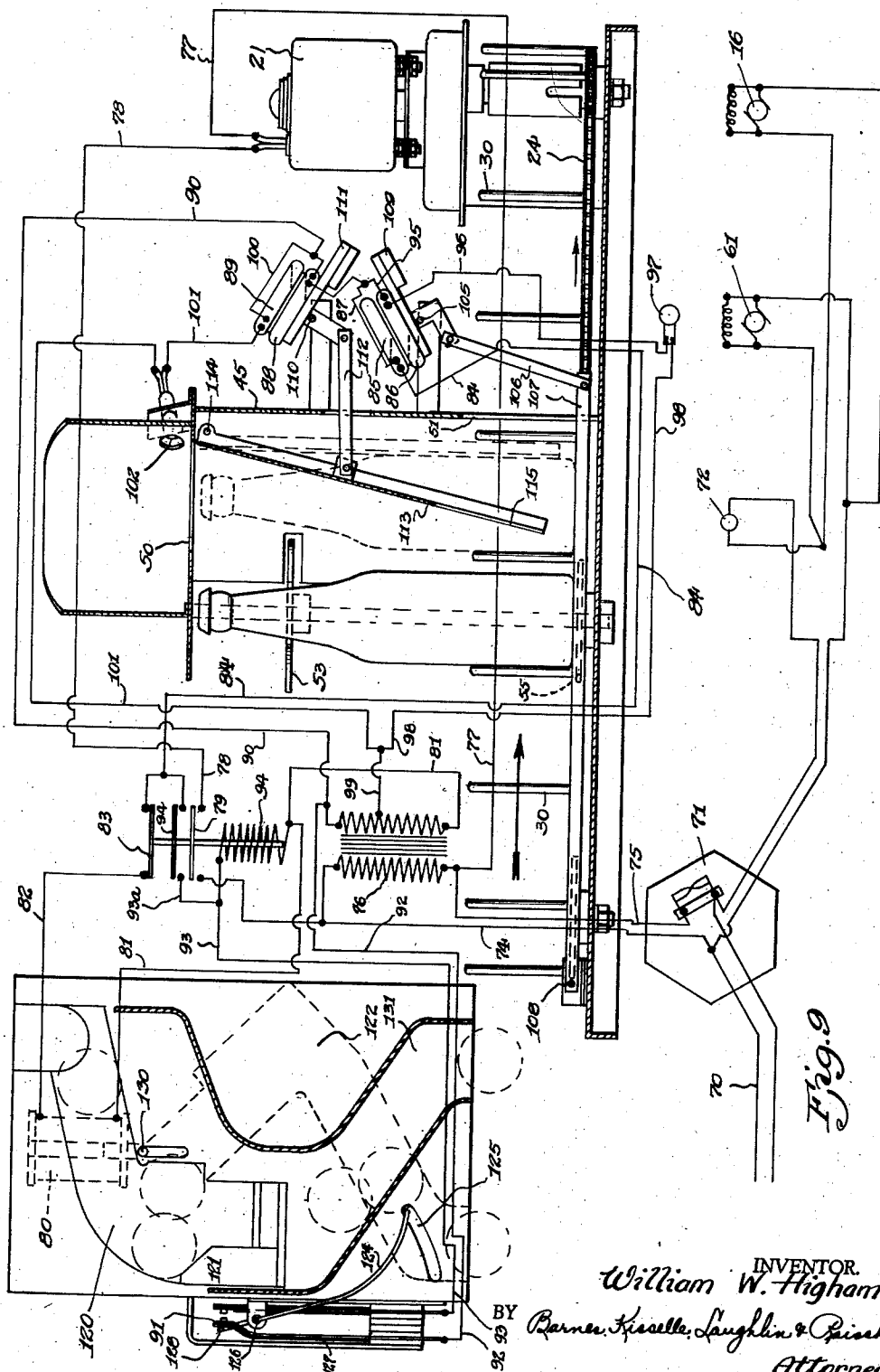
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VENDING MACHINE

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6 Sheets-Sheet 6



UNITED STATES PATENT OFFICE

2,390,535

VENDING MACHINE

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Indiana

Application March 23, 1942, Serial No. 435,846

6 Claims. (Cl. 194—10)

This invention relates to a vending machine, and it has to do particularly with a machine for vending merchandise in individual units such as bottled beverages.

The apparatus with which the invention is concerned is one where the apparatus or cabinet is charged with a supply of filled bottles to be dispensed and where, incident to the insertion of a coin or coins, the bottles are successively brought to a dispensing position one by one. There are a number of objects of the invention and some of them are set forth below. One object is to provide an improved control means whereby the apparatus is automatically operated by a power means but wherein an operating cycle is not obtained and the coin or coins are returned to the operator in the event there are no articles of merchandise in the machine to be disposed. The particular arrangement shown is one where the apparatus is automatically operated by electric power, and a circuit arrangement is provided for automatically taking care of a number of conditions including a simple arrangement for preventing operation of the machine in the event of failure of power.

Another object is to provide a simple theft-preventing arrangement so that no more than one bottle can be obtained at any one time. A further object is to provide a novel arrangement for the cooling of the cabinet, that is the cooling of the cabinet by a mechanical cooling system, and in this connection a novel construction is provided so that the cabinet has an excess capacity which can be employed for pre-cooling a number of the filled bottles before they are placed in the apparatus for dispensing purposes. A still further object of the invention is to provide a coin divider so that a certain number of coins deposited into the machine are collected in one receiver and a certain predetermined number of coins are collected in another receiver, so that there is an automatic proportioning of the total receipts. In addition to these specific objects it may be stated that the general thing in mind is the provision of an apparatus which can be produced and supplied to the public at a reasonable cost and which, although of simplified form, is positive in its operation and will properly function over a long period of time and with a minimum of inspection even though the machine be subjected to considerable abuse and rough usage.

The invention is exemplified by the apparatus shown in the accompanying drawings. In these drawings

which may be employed for housing the vending machinery and the refrigerating machinery.

Fig. 2 is a plan view of the vending mechanism.

Fig. 3 is a sectional view taken substantially on line 3—3 of Fig. 2 showing some of the mechanism with the bottles placed thereon.

Fig. 4 is a view looking substantially on line 4—4 of Fig. 2 illustrating certain of the controls and showing the arrangement for the dispensing of a bottle and also illustrating some of the bottles in pre-cooling position.

Fig. 5 is a sectional view looking through the cabinet and taken substantially on line 5—5 of Fig. 2 illustrating the dispensing opening, the cooling unit and showing some of the bottles to be dispensed and others in pre-cooling position.

Fig. 6 is a view partly in section and partly in elevation illustrating the coin chute and the coin divider.

Fig. 7 is a cross sectional view taken substantially on line 7—7 of Fig. 6.

Fig. 8 is a sectional view illustrating how a coin trips the coin dividing mechanism.

Fig. 9 is a view of a schematic nature illustrating the wiring diagram and also showing the apparatus and the relationship of the same to the electrical system.

The form of the cabinet as shown herein is, of course, subject to variation in structure and design insofar as many features of the invention are concerned, but, as illustrated in Fig. 1, the cabinet 1 has its back wall extending above the front wall as shown, and the upper back portion of the wall may incline forwardly as at 2. A cover 3 may be hinged to the top of the wall 2 as at 4 (Fig. 5) and may be held in closed position by a lock 5. The cover is equipped with a coin receiver 6 and a closure 7 for the dispensing opening and which may be hinged to the cover as at 8 (Fig. 5). On the front of the cabinet is a shell 9 for containing the coin mechanism, and where the coin divider is used, there are two coin boxes 10 and 11, access to which may be had by the use of a key, while an opening 12 for an "empty" light is provided in the shell 9. The cabinet may be supplied with a conventional bottle opener 13.

The lower part of the cabinet holds the refrigerating mechanism which, as shown in Fig. 5, may include a compressor 15, a motor 16 for driving the same and a condenser 17. Various types of refrigerating mechanism may be employed and the showing in Fig. 5 is more or less diagrammatic. At about the mid point of the cabinet

Fig. 1 is a general perspective view of a cabinet

there is a dividing partition which separates the lower machinery compartment from the upper refrigerating compartment, and this partition includes a sheet metal support 20 upon which substantially the entire dispensing apparatus is mounted. Mounted on one corner of the support is a driving motor 21 which drives, through a reduction gear box 22, a sprocket 23, over which runs an endless chain 24. Following the path of this chain in Fig. 2, it will be noted that the chain runs over a sprocket 25, a sprocket 26, and then the chain is fashioned into several runs extending back and forth across the support 20. For this purpose the chain operates over a series of sprockets 27 and finally back to the driving sprocket 23. The sprocket 26 (Fig. 3) may be provided with adjusting means 28 which can be adjusted to tighten the chain.

At spaced points the chain is provided with posts 30, and the bottles are disposed between the posts, as shown in Fig. 3 so that movement of the chain causes the posts to move the bottles therewith. Mounted on the base 20 and extending between the sprockets are supporting devices for the bottles (Fig. 5). The supports may be in the form of channels 31, the flanges or legs of which are disposed on opposite sides of the chain and extend above the same so that the bottles rest thereon as shown. Rails or guides are provided to hold the bottles in line and to keep them from tipping, and these rails or guides may be in the form of a wire frame work having guiding portions 35 and lower guiding portions 36 paralleling the runs of the chain and having reverse curved portions 37 adjacent the sprockets 27.

Also, adjacent the sprockets 27 there are curved supports 38 of the height of rails 31, the ends of which line up with portions of the supporting rails 31 while partially overlying each sprocket 27 is a plate 40, the elevation of which corresponds to the curved support 38. It will be noted that each guide 35 has its end terminating as at 41 substantially on the axis of one of the sprockets 27. Accordingly, it will be observed that a bottle positioned between two posts of the chain rests upon the channel support 31 and is guided and supported laterally by the guides 35 and that the bottle will be moved along with the chain. When the bottle approaches the end of a run and is in the curved portion of the guiding means it is supported vertically by the support 38 and plate 40, while the curved guide 37 changes the direction of the bottle. Thus the bottles move back and forth with the chain, and ultimately the bottles arrive one by one at the dispensing station. The direction of movement of the chain is shown by the arrows in Fig. 2.

The dispensing station comprises a boxing or housing 45 into which the bottles move. The housing may have three walls, that is, one on each side and a rear wall 46 so that the bottle enters the open side, and surmounting the boxing and attached thereto is an upstanding tubular member 47 which lines up with the opening in the top and which is closed by the cover 7. An apertured plate 49 may be positioned between the boxing and the tubular member, and its aperture 50 is preferably of such a size to allow an operator to grasp the top of a bottle with the fingers and withdraw the same upwardly. The back plate 48 is slotted as at 51 for the passage of the posts on the chain therethrough.

Adjacent the entrance of the boxing is what may be termed a turnstile 53 which, as shown in Fig. 2, has three arms and three notches, and it

is mounted upon a post 54 journaled at the top and bottom. A sprocket 55 which is fixed to the shaft meshes with two runs of the chain. Thus the turnstile rotates in unison with the movement of the chain, and as a bottle approaches dispensing position the neck thereof moves through the turnstile as shown in Fig. 2. This prevents a person from removing more than one bottle. The bottles may be loaded onto the mechanism until the maximum capacity is provided, as shown in Fig. 2. The empty portion of the chain extends from the dispensing position around sprockets 23, 25 and 26.

The cooling unit is advantageously mounted on the back inclined wall 2 of the cabinet. This cooling unit or evaporator is generally shown at 60 and it has a number of finned convolutions of tubing surrounding a central area in which is positioned an electric motor 61 for driving a fan 62. A shroud 63 is positioned so as to cause the air to move through the coil 60 and then the air is blown downwardly over the bottles. Accordingly, the cooling compartment is "dry," and the bottles are not immersed or partially immersed in water. Pre-cooling racks are placed near the front of the cabinet on each side of the outlet tube 47. These racks are shown at 65, and, as shown, each has a capacity of four bottles, but this is variable. Pre-cooling racks are also provided on opposite sides of the evaporator. These racks are shown as at 66 and, as shown, each has a capacity of four bottles. When the machine is empty these pre-cooled bottles should be placed on the conveyor so as to be the next ones to be dispensed, with the warmer bottles positioned to the rear thereof so that they are cooled by the time the bottles reach dispensing position.

The controlling electrical circuits and operating controls are shown in Fig. 9. The power line 70 extends into a junction box 71 and then to the evaporator fan motor 61 and to the refrigerating unit motor 16, which are connected across the line in parallel, and the circuit for which runs through a thermostatic control 72. From the junction box, lines 74 and 75 run through the primary of a transformer 76. Line 77 running from line 75, extends to the conveyor driving motor 21, while line 78 extends from the motor through a normally open relay switch 79 between the line 78 and the line 74. In the coin chute soon to be described, is a solenoid 80 connected by a line 81 to the secondary of the transformer and a line 82 through a normally closed switch 83 to a line 84. The line 84 leads to a pivotally mounted mercury switch 85 which is operable with another mercury switch 86. Leading from the switch 86 is a line 87 which extends to a pivotally mounted mercury switch 88 adjacent another mercury switch 89. Connected to the mercury switch 88 is a line 90 which extends back to the secondary of the transformer 76.

A normally open coin controlled switch 91 is connected by line 92 to one side of the transformer secondary and by a line 93 to a coil 94 of a relay, this circuit being completed by the line 81. The line 93 has a branch 93a extending to a switch 94 which is normally open, and which is connected to the line 84 which is common with the switch 83. Following this route through the line 84, mercury switch 85 and line 87, it will be seen that line 95 extends to the mercury switch 86, while the line 96 extends from this mercury switch to lamp 97 which is the "empty" light; and from the lamp 97 a line 98 extends back to the

secondary of the transformer through a connecting line 89. It will be seen that the line 89 connects through 100 to the mercury switch 88, while line 101 extends through a lamp 102 which may be called the "delivery" light and back to the secondary of the transformer through the common connector line 90.

The mercury switch unit, including switches 88 and 86, is pivoted as at 105 and is connected by a link 106 to an arm 107 pivoted as at 108 and underlying the bottles approaching the delivery station (Figs. 2, 4 and 9). The weight of the bottles depresses the arm 107 and swings the switch unit to the position shown in Fig. 9. This unit includes a gravitating weight 109. The mercury switches 88 and 86 are mounted as a unit pivotally as at 110, acted upon by a weight 111, and the unit is connected by a link 112 to a member 113 pivoted as at 114 and positioned in front of the back wall 48 of the delivering boxing. The pivoted member 113 is slotted as at 115 for the passage of the pusher pins therethrough (Fig. 9).

The coin control means (Figs. 6 and 9) has a slot 120 through which the coins fall. The coins strike an abutment 121 and are deflected into a slot 122. A suitable coin detector 123 for detecting the expelling slugs is associated with the slot 122. An arm 124 has one end projecting through an arcuate opening 125 and into the passage or slot 122, and this arm is pivoted as at 126 and embraces the spring arm 127 of the switch 91 at the point 128. When a coin falls through the slot 122 it strikes the spring arm 124 and causes it to swing clockwise as Fig. 9 is viewed and establishes momentarily a contact at 91. Then the coin falls on through and the contact at 91 opens. The solenoid 80 has a pin 130 secured to its armature and the pin extends through a slot and into the entrance way of the passage 122. When the armature and pin are down, the pin 130 blocks the entrance to the passage 122 and therefore the coin falls through a chute 131 which extends to a coin return device 132. When the pin is up the coin is deflected and passes through the passage 122.

The coin divider, as shown in Figs. 6, 7 and 8, is positioned under the coin controlling mechanism to receive the coins dropping through the slot 122. This divider, as shown, has two body plates 135 and 136 connected together and forming a passage 137. A support 138 pivoted as at 139 and held in position by a gravity weight 140 blocks the passage 137 so that the coins come to rest thereon. The support extends through an opening 150. Another passage 141 extends angularly, and a trip member 142 in the form of a length of wire pivoted as at 143 and 144 has an arm 145 projecting into the passage 141 through an aperture 146. This trip member has a crank arm 147 which engages behind the member 138.

As the coins are deposited in the machine they fall from the slot 122 of the coin control mechanism into the passage 137, and the coins stack up upon one another, as shown in Fig. 6. When the passage 137 is filled and no more coins can enter the passage, the next coin is deflected by the uppermost coin into the passage 141. This coin strikes the portion 145 of the trip and pivots the same as illustrated in Fig. 8, in which action the crank arm 147 swings the support 138 out of the way so that the coins in the passage 137 fall therefrom. The coins from the passage 137 may be directed to one of the coin boxes 10-11 while the coins passing through the passage 141 may

be directed to the other coin box. Thus there is an automatic division of the funds received. Of course, after the trip has functioned the parts return to the position shown in Figs. 6 and 7. As illustrated in Figs. 6 and 7, seven coins are stacked up in the passage 137 and as a result every eighth coin is divided and directed to the other coin box. The proportions, of course, can be varied as desired, and as shown the body of the coin divider is formed with an aperture 148a for the trip arm 145, the passage 137 is provided with an opening 150a for the supporting arm 38 and the body is provided with openings 151 for receiving the brackets for the pivotal mounting of the trip member 142. If the trip member 142 is elevated to this position, then every sixth coin will be divided from the remaining coins.

The operation of the device, insofar as the movement of the chain and the advancing of the bottles is concerned has already been described, and in a sense merely amounts to the travel of the chain in its tortuous passage moving the bottles with it. The operation of the mechanism having particular regard to the electrical circuit arrangement and with particular reference to Fig. 9 is as follows:

First assume that there is a bottle in the position shown in the full lines of Fig. 9 so that the arm 107 is held depressed and the switch unit 85-86 is in the position shown. So long as current is supplied from the source, the solenoid 80 is energized through the line 81, the line 82, the normally closed switch 83, line 84, switch 85, line 87, switch 88 and line 90 which extends back to the secondary of the transformer. This causes the solenoid to elevate the pin 130 to condition the coin-receiving apparatus. If there is a failure of current the solenoid 80 is de-energized, the pin 130 will block the passage 132 and the coin will be returned through the passage 131. If the machine is empty then the weight 109 will swing the switch unit 85-86 clockwise, or in other words, to a position corresponding to the position the switch unit 88-89 is in, thus breaking the solenoid circuit so that the machine will not operate and the coin is returned.

With the parts in the position shown in Fig. 9, a coin momentarily closes the switches 91. This energizes the relay solenoid 94 through line 92, line 93 and line 81, and the relay solenoid thus functions to open the switch 83, close the switch 94 and close the switch 79. This sets the driving motor 21 in operation, the circuit being through line 77, line 78, switch 79 back to line 74. The switch 94, upon closing, closes a holding circuit for maintaining the relay 94 energized as the switch 91 opens; this circuit is through line 81, 93a, switch 94, line 84, mercury switch 85, mercury switch 88, and line 90. Therefore, so long as this condition maintains the driving motor functions to advance the chain with the bottles carried thereby. At this time, however, solenoid 80 is de-energized by the opening of the switch 83 so that if another coin is inserted it will be returned to the customer. The foremost bottle is thus advanced from the full line position shown in Fig. 9 to the dotted line position, and the bottle strikes the member 113 and swings it to the dotted line position. This swings the mercury switch unit 88-89 counter-clockwise and breaks the holding circuit for the relay at switch 88. This de-energizes the relay 94, thus breaking the motor circuit across the switch 79 and opening the switch 94 in the holding circuit and closing the switch 83, and the machine comes to a stop. But

the energizing circuit for the solenoid 80 is broken now at the mercury switch 88 so that so long as a bottle remains in the dotted line position a coin dropped into the mechanism is returned to the customer and does not start a new cycle of operation. At this time the delivery lamp 102 is lighted. Its circuit is through the line 90, line 100 and line 101 which connects to the secondary transformer through the connection 99. An operator now opens the door 7, reaches down into the tubular outlet 47 and removes the bottle in the dotted line position. As soon as the bottle is removed the switch unit 88-89 returns to the position shown, thus breaking the circuit for the delivery lamp 102 and making the circuit for the solenoid 80, thus conditioning the apparatus for a subsequent operation.

When the last bottle is dispensed and its weight is removed from the arm 107 the switch unit 85-86 swings counter-clockwise to break the circuit in the switch 85 to thus de-energize the solenoid 80. At the same time a circuit for the empty light 97 is made. This light is positioned to illuminate an empty sign in the opening 12. The circuit for this lamp is as follows: through line 98, which connects to the transformer secondary through the common line 99, line 96, through switch 86, line 95, through switch 88, and back through line 90 to the transformer secondary.

Thus it will be seen that a coin will not cause an operation of the machine if the power is off or if the machine is empty; that a coin will not cause operation of the machine as long as there is a bottle in dispensed position which has not been removed. That otherwise a coin sets the machine into operation and the operation continues until a bottle is in dispensing position, at which time the motor circuit is broken and the delivery lamp energized. Upon removal of the bottle the delivery lamp is de-energized and the circuit closed to energize the coin control solenoid 80.

I claim:

1. In a bottle dispensing apparatus having a conveyor for moving bottles, a dispensing station from where the bottles may be removed successively, an electric motor for driving the conveyor, a circuit therefor, a relay in the circuit, a coin controlled switch for energizing the relay to close the motor circuit, a holding circuit closed by the relay to maintain the relay energized for the continued operation of the motor, a delivery lamp and a circuit therefor, a switch in the holding circuit and a switch in the delivery lamp circuit, and movable means operable as a bottle arrives at the delivery station for breaking the holding circuit switch for the cessation of motor operation and for closing the delivery lamp circuit to energize the same.

2. In a bottle dispensing apparatus having a conveyor for moving bottles, a dispensing station from where the bottles may be removed successively, an electric motor for driving the conveyor, a circuit therefor, a relay in the circuit, a coin controlled switch for energizing the relay to close the motor circuit, a holding circuit closed by the relay to maintain the relay energized for the continued operation of the motor, a delivery lamp and a circuit therefor, a switch in the holding circuit and a switch in the delivery lamp circuit, and movable means operable as a bottle arrives at the delivery station for breaking the holding circuit switch for the cessation of motor operation and for closing the delivery lamp circuit to

energize the same, and means operable upon the removal of a bottle from the delivery station to close the holding circuit switch and open the delivery lamp switch.

3. In a bottle dispensing apparatus having a conveyor for moving bottles, a dispensing station from where the bottles may be removed successively, a rotary electric motor for driving the conveyor, a circuit therefor, a relay in the circuit, a coin controlled switch for energizing the relay to close the motor circuit, a holding circuit closed by the relay to maintain the relay energized for the continued operation of the motor, a switch in the holding circuit, movable means operable by a bottle as said bottle arrives at the delivery station for operating the switch to break the holding circuit of the relay for cessation of the operation of the driving motor, means operable upon removal of the bottle from the delivery station to close the holding circuit across said switch, a controlling solenoid for the coins, a circuit therefor, a switch in the circuit, and means actuated by a bottle in a position in advance of the delivery station to hold the last named switch closed to thereby maintain the solenoid energized to condition the same for the reception of a coin to actuate the coin controlled switch.

4. In a bottle dispensing apparatus having a conveyor for moving bottles, a dispensing station from where the bottles may be removed successively, a rotary electric motor for driving the conveyor, a circuit therefor, a relay in the circuit, a coin controlled switch for energizing the relay to close the motor circuit, a holding circuit closed by the relay to maintain the relay energized for the continued operation of the motor, a switch in the holding circuit, movable means operable by a bottle as said bottle arrives at the delivery station for operating the switch to break the holding circuit of the relay for cessation of the operation of the driving motor, means operable upon removal of the bottle from the delivery station to close the holding circuit across said switch, a controlling solenoid for the coins, a circuit therefor, a switch in the circuit, means actuated by a bottle in a position in advance of the delivery station to hold the last named switch closed to thereby maintain the solenoid energized to condition the same for the reception of a coin to actuate the coin controlled switch, an "empty" light, a circuit therefor and a switch in the circuit held closed by a bottle in the position in advance of the delivery station, and means for closing the last named switch to energize the "empty" light in the absence of a bottle in the position preceding the delivery station.

5. In a bottle dispensing apparatus having a conveyor for moving bottles, a dispensing station from where the bottles may be removed successively, an electric motor for driving the conveyor, a circuit therefor, a relay in the circuit, a coin controlled switch for energizing the relay to close the motor circuit, a holding circuit closed by the relay to maintain the relay energized for the continued operation of the motor, a pivotally mounted unit comprising two mercury switches, one of which is in the holding circuit, a delivery lamp, a circuit therefor running through the other mercury switch, means operable as a bottle arrives at dispensing position to pivot the switch unit to break the holding circuit for the cessation of the operation of the motor and to close the delivery lamp circuit, said unit being pivotal back to its original position upon the removal of the bottle from the delivery station.

6. In a bottle dispensing apparatus having a conveyor for moving bottles, a dispensing station from where the bottles may be removed successively, a rotary electric motor for driving the conveyor, a circuit therefor, a relay in the circuit, a coin controlled switch for energizing the relay to close the motor circuit, a holding circuit closed by the relay to maintain the relay energized for the continued operation of the motor, a pivotally mounted unit comprising two mercury switches, one of which is in the holding circuit, a delivery lamp, a circuit therefor running through the other mercury switch, means operable by a bottle as said bottle arrives at dispensing position to pivot the switch unit to break the holding circuit for the cessation of the operation of the motor and to close the delivery lamp circuit, said unit being

pivotal back to its original position upon the removal of the bottle from the delivery station, another pivotally mounted switch unit comprising two mercury switches, an "empty" light, a solenoid for conditioning the coin controlled means for initiating operation of the driving motor, a circuit for the "empty" light extending through one of the last named mercury switches, a circuit for the solenoid extending through the other last named mercury switch, and means operable by the presence of a bottle in a position in advance of the delivery station to hold the last named switch means positioned to close the circuit for the coin controlling solenoid and to open the circuit for the "empty" lamp.

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