June 13, 1944. O. D. JENNINGS ET AL 2,351,432

VENDING MACHINE

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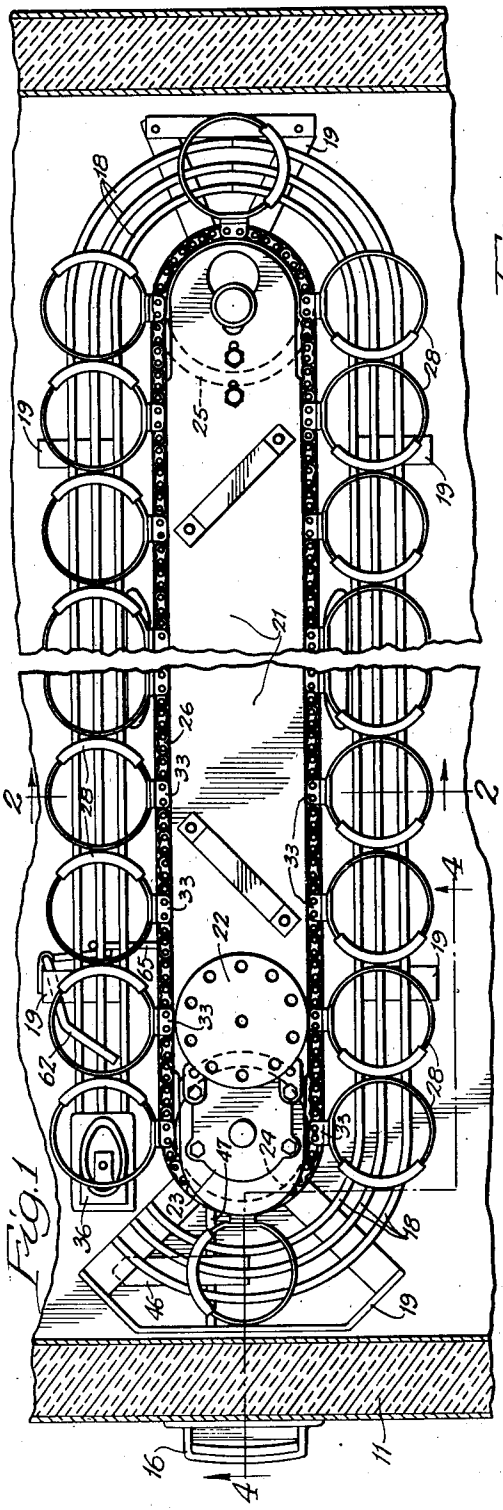


Fig. 1

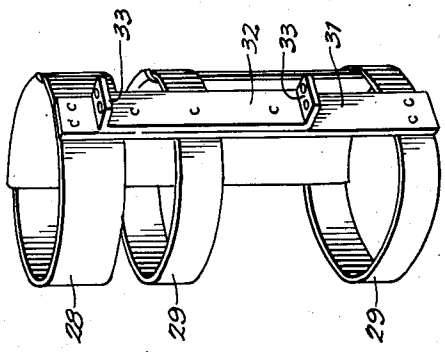


Fig. 3

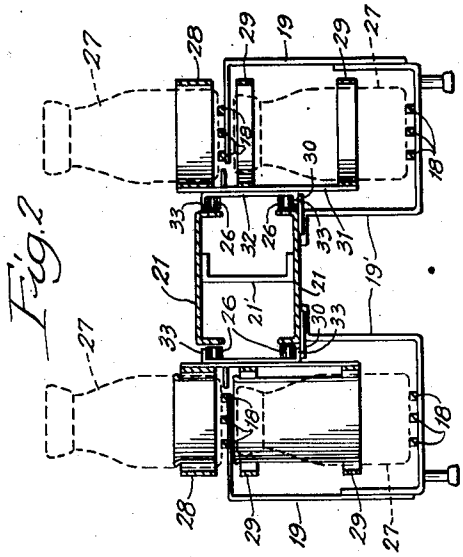


Fig. 2

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Fig. 4

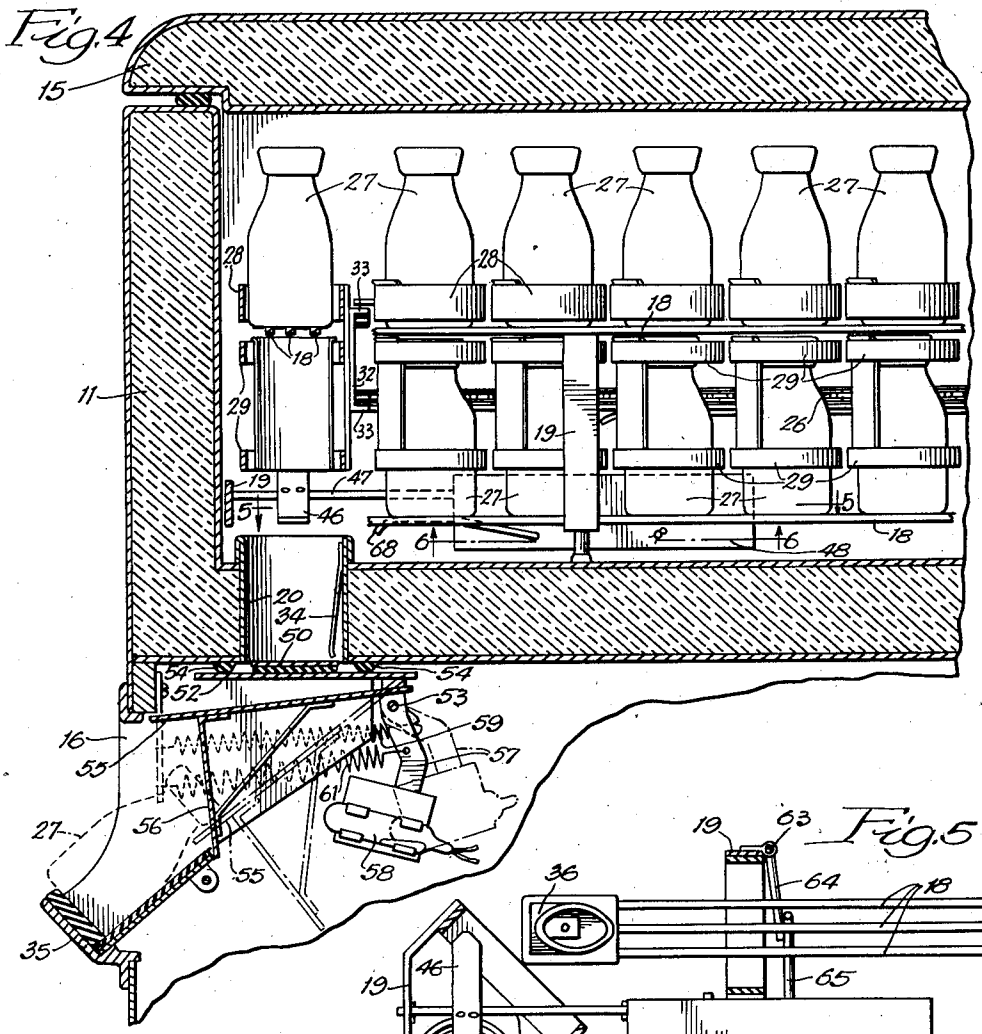
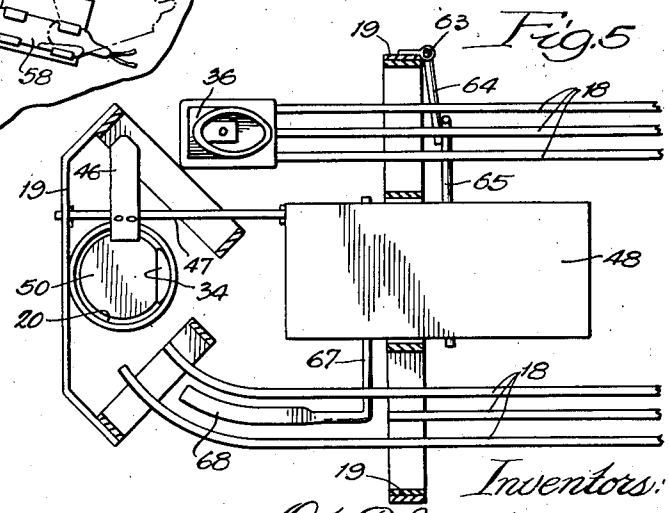


Fig. 5



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VENDING MACHINE

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Fig. 6

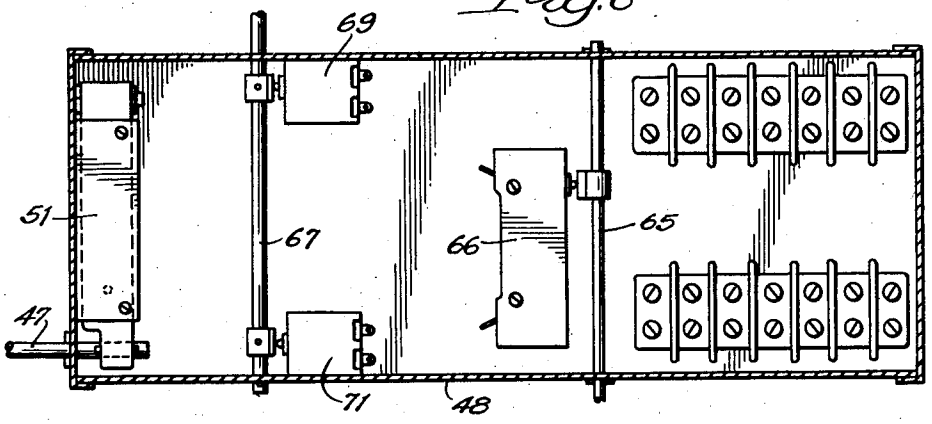


Fig. 7

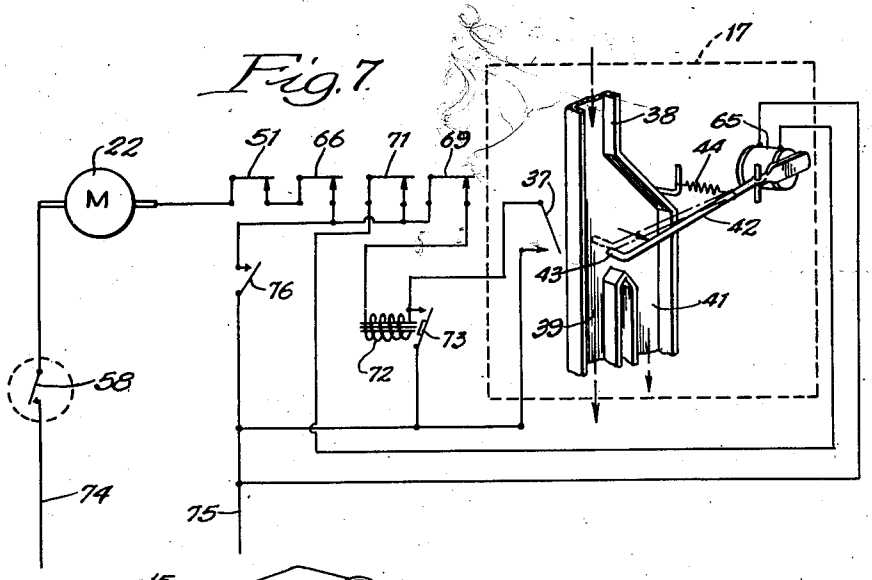
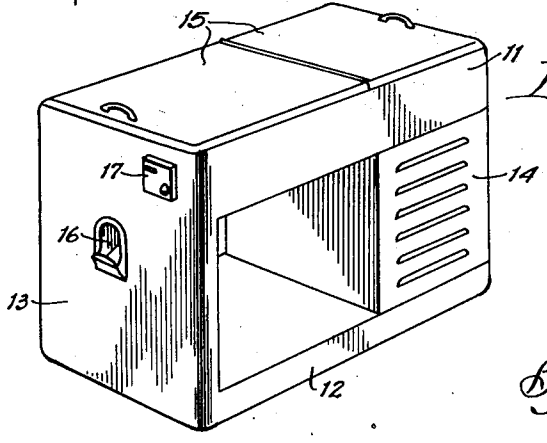


Fig. 8



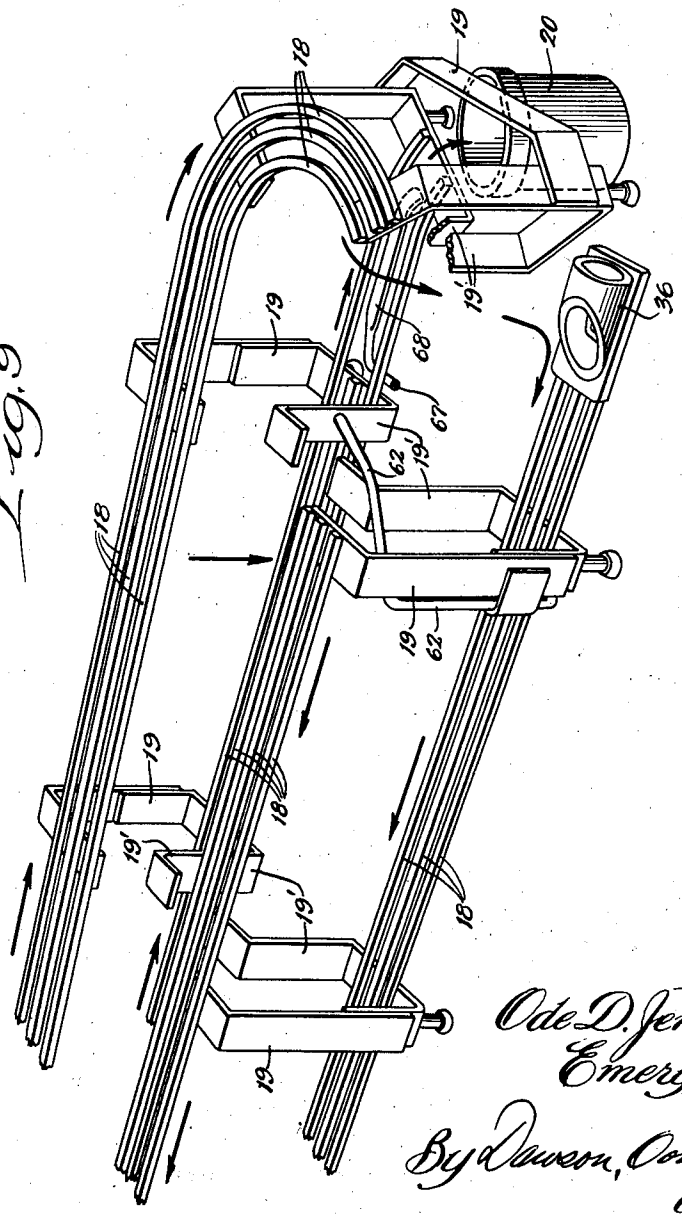
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VENDING MACHINE

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Fig. 9



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Patented June 13, 1944

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UNITED STATES PATENT OFFICE

2,351,432

VENDING MACHINE

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Application August 27, 1941, Serial No. 408,412

6 Claims. (Cl. 312—96)

This invention relates to vending machines and more particularly to machines for vending refrigerated packaged liquids.

The invention is particularly adapted for and is illustrated in connection with a machine for dispensing milk or the like in the usual glass bottle closed by a paper disc, but it will be understood that it is applicable to the vending of liquids in other containers and of non-liquid articles, either refrigerated or unrefrigerated.

One of the objects of the invention is to provide a vending machine in which articles are maintained in an upright position in the machine and during vending.

Another object of the invention is to provide a vending machine having a large storage capacity in a relatively small space.

Still another object of the invention is to provide a vending machine in which articles are supported in a plurality of vertically spaced rows or layers and are dispensed from the bottom layer, the upper layers serving to replenish the bottom layer.

Yet another object of the invention is to provide a vending machine which is so controlled as to prevent damage to the machine or articles being vended in the event of sticking or other improper operation.

A further object of the invention is to provide a vending machine in which operation is stopped upon delivery of an article and is prevented as long as the article remains in the delivery chute, and is further prevented when the machine is empty.

The above and other objects, advantages and novel features of the invention will be more clearly understood from the following description of the machine shown in the accompanying drawings, in which:

Figure 1 is a partial plan view, with parts broken away, of a machine embodying the invention;

Figure 2 is a section on the line 2—2 of Figure 1;

Figure 3 is a perspective view of a sleeve member;

Figure 4 is a partial vertical section through the machine, with parts in elevation;

Figure 5 is a partial plan view of the lower track;

Figure 6 is a horizontal section through the control switch box;

Figure 7 is a wiring diagram;

Figure 8 is a reduced perspective view of the complete machine;

Figure 9 is a partial perspective view of the tracks with parts omitted for clarity.

Referring first to Figure 8, there is shown a machine for vending bottled milk or the like comprising an insulated, substantially rectangular box 11, supported on a base 12, by a front panel 13 and a rear pedestal 14. The panel and pedestal are spaced apart to provide a space above the base 12 for storage of empty bottle cartons or the like. The pedestal 14 is enlarged and is adapted to contain a refrigerator unit communicating with the box for cooling bottles therein. The top of the box is closed by a pair of hingedly connected doors 15, either or both of which may be opened, or which may be completely removed from the box for replacement or repair of the mechanism. Bottles are adapted to be dispensed from the box singly through a delivery chute, indicated generally at 16, under the control of a coin box 17, supported on the front of the box. If desired, this unit may be equipped with casters or wheels for moving it easily from place to place, and may be made of any desired size, containing one or more delivery units controlled by separate coin boxes, or by a selector switch mechanism on a single coin box.

The delivery mechanism, as best seen in Figures 1 to 5, comprises a pair of vertically spaced tracks formed by metal tracks 18, supported in the box by means of brackets 19. The tracks are formed in plan to provide a substantial oval and each track is provided with a gap therein, the gaps in the tracks being spaced around the length thereof. The lower track, as best seen in Figure 5, is formed with a gap at one end of the machine registering with a sleeve 20 extending through the bottom wall of the box 11 and communicating with the delivery chute 16. The gap in the upper track, as seen in Figure 1, is spaced from the gap in the lower track around the tracks in the direction of travel of the bottles thereon a distance equal to the distance between adjacent bottles on the tracks, for a purpose to appear later.

Within the circumference of the tracks, a housing comprising upper and lower plates 21 connected by webs 21', is supported by extensions 19' carried on the brackets 19, and the upper plate carries a motor 22 and a transmission 23 driving a pair of vertically spaced sprockets 24. Similar sprockets 25 are mounted at the opposite end of the frame, and a pair of endless sprocket chains 26 pass around the sprockets adjacent to the inner edge of the tracks. The plates 21 are preferably formed with side flanges as shown in Figure 2 which are omitted at the ends as indi-

cated in Figure 1 to permit meshing of the chains with the sprockets. Guide plates 30 are supported between the bottom plate 21 and the extensions 19' underlying the lower sprocket chain and a connecting bracket 32 carried by both chains to support them against downward vertical movement.

The tracks are adapted to support a plurality of articles to be vended, illustrated as standard milk bottles 27, which are supported in an upright position on the tracks. The bottles are adapted to be moved around the tracks by a sleeve mechanism, shown in detail in Figure 3 as comprising an upper open sleeve 28 and a pair of lower sleeves 29 spaced vertically and connected by a strip 31. A bracket 32 is rigidly secured to the strip 31 and has its ends bent outwardly, as indicated at 33, for connection to the chains 26. As seen in Figures 2 and 4, the spaced sleeves 29 lie above and spaced from the lower track 18, and the sleeve 28 lies above and is spaced slightly from the upper track. The sleeves are of a size to receive loosely the milk bottles or other articles to be dispensed, and are adapted to move such articles around the tracks as the chains are moved by the motor drive.

The delivery mechanism, as best shown in Figure 4, includes a spring 34 in the sleeve 20 to cushion the bottle during delivery, and a supporting plate 35, which is preferably padded by sponge rubber or the like to receive a bottle and support it until it is removed by the operator.

In operation of the mechanism as so far described, a milk bottle or other article to be vended is placed in each of the sleeves in both the upper and lower tracks. As the motor is operated, a milk bottle on the lower track will be moved into register with the gap of the track and with the delivery sleeve 20, so as to drop therethrough by gravity into the delivery chute, to be held by the plate 35 until removed by an operator. At the same time, a milk bottle on the upper track is moved into register with the gap therein over a sleeve in the lower track which has been emptied in the previous operation and the bottle therein drops through the gap in the upper track on to the lower track. The bottle may be received by the bumper 36 on the lower track, shown as formed by a piece of standard rubber hose cut off at an angle so as to cushion the fall of the bottle and to prevent it from breaking. The tubing is cut at an angle as shown so the bottle will slide over it more easily onto the lower track. As the conveyor mechanism is advanced further, the bottles on the lower track will be successively dispensed through the delivery chute, and the bottles on the upper track will fall through to the lower track to refill it, this operation continuing until all of the bottles have been dispensed. The delivery mechanism may be refilled at any time, either before or after emptying, by filling the spaces in the upper track and operating the conveyor mechanism to cause the bottles on the upper track to drop through to the lower track until it is filled. If the lower track is only partially filled, the mechanism may be backed up either by hand or by reversing the motor 22, until the last bottle on the lower track is in the space below the gap in the upper track. Then, by filling the upper track and advancing the conveyor, the lower track may be filled and the upper track may be filled by inserting bottles therein. It will be understood that more than two vertically spaced tracks could be provided if desired, the gap in each track being spaced the distance between the sleeves ahead of the gap in the track just below it.

Operation of the machine is normally controlled by the coin mechanism 17, shown in Figure 8, so that the motor 22 is temporarily energized for a length of time sufficient to move the conveyor mechanism just far enough to dispense one bottle. For this purpose, the coin mechanism operates to close a switch, indicated diagrammatically at 37 in Figure 7, the complete mechanism for effecting closing of this switch by the coin being of a more or less standard construction, and therefore not illustrated. However, as shown in Figure 7, the coin mechanism includes a chute 38 in which the coin is received. A second chute 39 is in vertical alignment with the chute 38 and normally receives the coins dropped therein to effect closing of the switch 37. A coin return chute 41 is arranged at one side of the chute 39 to receive and return to the operator, through the usual return opening, any coins which are rejected by the machine.

In order to prevent passage of coins through the chute 39 and into the coin box when the machine is empty, or when, for some other reason, it should not be operated, there is provided a lever 42 pivoted adjacent the coin chute and having a turned-down end 43 adapted to project into the path of the chute 39, and to divert coins into the return chute 41. The lever is normally urged to the dotted passage shown in Figure 7, in which it will divert coins to the return chute by a spring 44, the lever being rocked in the opposite direction to open the coin chute 39 by a solenoid 65.

When the switch 37 is closed by operation of the coin mechanism, the motor 22 will be energized to start operation of the conveyor. The conveyor will continue in operation until the motor circuit is interrupted, and for this purpose, there is provided a trip lever 46 adjacent the delivery sleeve 20, as seen in Figures 1, 4 and 5. This trip lever has an end portion projecting downwardly at an angle adjacent the delivery sleeve in a position to be engaged and rocked by a bottle on the lower track when the bottle is moved into register with the delivery sleeve. The lever is secured to a rock shaft 47, extending into a switch box 48 and connected to operate a switch 51 in the motor circuit. When the switch 51 is opened, the circuit will be interrupted to stop operation of the motor so that only one bottle will be dispensed each time a coin is dropped into the control mechanism.

In order to prevent delivery of a second bottle while one bottle is held in the delivery chute, thereby to prevent possible breakage, the delivery chute is provided with a control mechanism to prevent operation of the motor until the chute is empty. As shown in Figure 4, the lower end of the delivery sleeve 20 is closed by a plate 52, pivoted at 53, and engaging a sealing ring 54 around the lower end of the sleeve. The plate may carry a pad 50, if desired, to receive and cushion the drop of the bottle. A second and larger plate 55 is pivoted also at 53, and underlies the plate 52. Preferably, the plate 55 has a downwardly projecting portion 56, normally closing the delivery slot. An arm 57 on the plate 55 carries a mercury switch 58, arranged in one of the main circuit lines, as shown in Figure 7, so that when the mercury switch is open, both the motor circuit and the circuit to the coil 65 are interrupted. Thus, when the plate 55 is rocked down to its dotted line position, as shown in Figure 4, the switch 58 will be opened and the motor cannot be energized. A coin inserted in the coin

box at this time will be returned to the operator, this mechanism effectively preventing operation of the machine in any manner as long as the plate is rocked downwardly.

In operation of this mechanism, when a bottle drops through the delivery sleeve, it engages the plate 52 and moves it down into engagement with the lower plate 55. The weight of the bottle rocks both plates down until the plate 55 lies in its dotted line position with the upper end of the bottle resting on the edge thereof, as shown, so that as long as the bottle is in the chute, the plate 55 will be held down. As the bottle drops down, however, the edge thereof clears the plate 52, allowing it to be returned to its upper position under the influence of a spring 59, so as to close the outlet sleeve 20, thereby preventing spillage of cold air from the box 11. When the bottle is removed from the delivery chute, the lower plate 55 will be returned to its uppermost position by a similar spring 61, ready for the next operation. Return of this plate will close the switch 58, thereby enabling the coin mechanism and the motor to operate.

In the event that a bottle should fail to drop properly from the upper track to the lower track, severe damage to the machine might result, and in any event, the bottle would be crushed, thereby spilling the liquid over the machine and leaving broken glass lying loosely therein. In order to prevent this possibility, a safety mechanism is provided shown as comprising a lever 62 lying adjacent the trailing side of the gap in the upper track and having a vertical rod portion 63, rotatably supported in one of the supporting brackets 19. The lower end of the shaft has an extension 64 engaging the offset end of a rock shaft 65 extending into the switch box 48 to operate a switch 66. As shown, in Figure 7, the switch 66 is arranged in the motor circuit so as to stop the motor immediately upon opening of the switch, thereby to prevent damage to the machine.

The rock shaft 65 of the lever mechanism 62, 63 and 64, is normally urged to the position shown in Figure 1 by a suitable spring, not shown, in which position the switch 66 is closed. However, if a bottle or other article should fail properly to drop from the upper to the lower track, it would engage the arm 62 and rock it in a direction to open switch 66 and stop the motor, so as to prevent damage to the machine.

In order to prevent operation of the machine when no bottles or other articles to be vended are contained therein, mechanism is provided to lock the coin box and to interrupt the circuit to the motor when the machine is empty. As shown, the switch mechanism comprises a shaft 67 pivoted in the switch box 48 and extending from one side thereof. The shaft 67 has the arcuate extension 68 lying below the lower track and normally urged upwardly through the lower track by a suitable spring mechanism, not shown. When there are bottles or other articles on the lower track, one or more of such articles will rest on the extension 68 and rock it downwardly in a direction to close a pair of switches 69 and 71, within the switch box 48. If the lower track is empty, the shaft 67 and projecting arm 68 will rock in the opposite direction to permit the switches 69 and 71 to open.

As shown in Figure 7, the switch 69 is arranged in the circuit of the motor 22, so that the motor cannot be operated unless this switch is closed. The switch 71 is in circuit with the coil 65, so that it will be de-energized to permit finger 43 to block the coin chute 39, except when the lower track carries one or more bottles in a position to be vended.

Figure 7 illustrates diagrammatically one simple control circuit for the dispensing mechanism including, in addition to the parts described above, a low impedance holding relay 72 operating when energized to close a holding switch 73. One of the power lines shown at 74 is connected through the mercury switch 58 to one side of motor 22 and the other side of the motor is connected to the other power line 75 through switches 51, 66 and 69, relay 72 and switch 37 or 73, the last two switches being in parallel. The coil 65 is connected to line 75 and through switches 71, 66, 51, motor 22 and switch 58 to line 74. A manual switch 76 is preferably provided to connect the motor 22 to line 75 through the switches 51 and 66 so that the motor may be controlled manually for filling or the like.

In operation when a coin is dropped in the coin mechanism the switch 37 will be momentarily closed to establish a circuit from line 75 through switch 37, relay 72, switches 69, 66, 51, motor 22 and switch 58 to line 74. This energizes relay 72 to close switch 73 so that the circuit will be maintained after switch 37 opens. It will be noted that there is a continuous circuit through the motor from line 75 through coil 65, switches 71, 66 and 51, motor 22 and switch 58, but coil 65 is a high resistance coil and will not pass enough current to affect the motor. Relay 72, however, is a low resistance coil and allows sufficient current to pass to cause the motor to run.

Thus after the circuit described above has been energized by momentary closure of the coin switch 37 the motor will operate to move the conveyor mechanism. When a bottle is in register with the delivery sleeve it will open the switch 51 to interrupt the circuit, stopping the motor and de-energizing relay 72 so that switch 73 may reopen. As the bottle drops through the delivery chute it will open the switch 58 and will hold it open as long as the bottle remains in the chute. At this time the circuit through coil 65 is broken so that the coin chute is blocked and the machine cannot be operated. When the bottle is removed switch 58 will again be closed and the machine is ready for another operation.

If a bottle should fail to drop properly from the upper to the lower track it will open the switch 66 thereby immediately stopping the motor and de-energizing relays 65 and 72. Thus the machine cannot be operated until the bottle has been straightened out to allow switch 66 to close.

When the machine is empty both switches 69 and 71 will be opened, switch 69 breaking the motor circuit and switch 71 breaking the circuit to coil 65. These switches will remain open until the machine is filled and will prevent operation of the motor except under control of the manual switch 76. The motor can be operated by closing the manual switch at any time except when switches 51 or 58 is opened by a bottle in the chute or when switch 66 is opened by a bottle stuck between the tracks.

While one embodiment of the invention has been shown and described in detail, it will be understood that this is illustrative only, and is not to be taken as a definition of the scope of the

invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. A vending machine comprising a pair of vertically spaced conveyors, means on said conveyors in vertical alignment to hold a plurality of articles to be dispensed, means to dispense articles from the lower conveyor at a predetermined point, means at another predetermined point to direct an article from the upper conveyor into an empty space in the lower conveyor, a motor to drive the conveyors, an operating circuit for the motor, a switch in the circuit, and means operated by articles on the lower conveyor to hold the switch closed, the switch opening when the lower conveyor is empty to prevent operation of the motor.

2. A vending machine comprising a plurality of vertically spaced flat tracks shaped in plan to form a closed circuit and each adapted to support a series of bottles in upright position; a series of vertically spaced sleeve members fitting over the upper surfaces of said tracks respectively, and each adapted to receive a bottle, an endless chain connected to said sleeve members for moving them along the tracks, a motor for driving said chain, the lowermost track having a gap therein, delivery means registering with said gap to receive a bottle dropping therethrough, the next higher track having a gap therein spaced around the track from the first named gap and through which bottles may drop from the upper to the lower track, means for normally controlling operation of the motor, an arm pivotally mounted adjacent the gap in the upper track to be engaged by a bottle improperly passing from the upper to the lower track, and means operated by movement of said arm to prevent operation of the motor.

3. A vending machine comprising a plurality of vertically spaced flat tracks shaped in plan to form a closed circuit and each adapted to support a series of bottles in upright position; a series of vertically spaced sleeve members fitting over the upper surfaces of said tracks respectively, and each adapted to receive a bottle, an endless chain connected to said sleeve members for moving them along the tracks, a motor for driving said chain, the lowermost track having a gap therein, delivery means registering with said gap to receive a bottle dropping therethrough, the next higher track having a gap therein spaced around the track from the first named gap and through which bottles may drop from the upper to the lower track, means for normally controlling operation of the motor, an arm pivotally mounted adjacent the gap in the lower track in a position to be held down by bottles on the lower track, and projecting above the track when there are no bottles on the track, and means operated by the arm when it projects above the track to prevent operation of the motor.

4. A vending machine comprising a plurality of vertically spaced flat tracks shaped in plan to form a closed circuit and each adapted to support a series of bottles in upright position; a series of vertically spaced sleeve members fitting over the upper surfaces of said tracks respectively, and each adapted to receive a bottle, an endless chain connected to said sleeve members for moving them along the tracks, a motor for driving said chain, the lowermost track having a gap therein, delivery means registering with said gap to receive a bottle dropping therethrough, the next higher track having a gap therein spaced around the track from the first named gap and through which bottles may drop from the upper to the lower track, means for normally controlling operation of the motor, means movably mounted adjacent the delivery means to be engaged and moved by a bottle in the delivery means, and means operated by said last named means to prevent operation of the motor when there is a bottle in the delivery means.

5. A vending machine comprising a housing formed with a delivery opening in one wall thereof, mechanism in the housing to deliver articles singly through said opening, a motor for operating said mechanism, a movably mounted plate normally closing said opening and moved away therefrom by an article delivered therethrough, means forming a delivery chute registering with said opening, a second plate movably mounted adjacent the delivery chute in the path of movement of the first plate and extending beyond the first plate, and control means for the motor operated by the second plate.

6. A vending machine comprising a pair of vertically spaced tracks, means on said tracks in vertical alignment to hold a plurality of articles to be dispensed on the tracks, means to move the holding means around the tracks, the lower track having a gap therein at a predetermined point through which articles are dispensed, the upper track having a gap therein spaced along the track from said predetermined point through which articles may pass through an empty holding means on the lower track, and means operated by an article between the upper and lower tracks which fails to pass properly therebetween to stop the means for moving the holding means.

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