Nov. 17, 1959 R. L. LAMB 2,913,087

COIN OPERATED MULTI-PRODUCT DISPENSING APPARATUS

Filed Jan. 31, 1958

3 Sheets-Sheet 1

Fig. 1

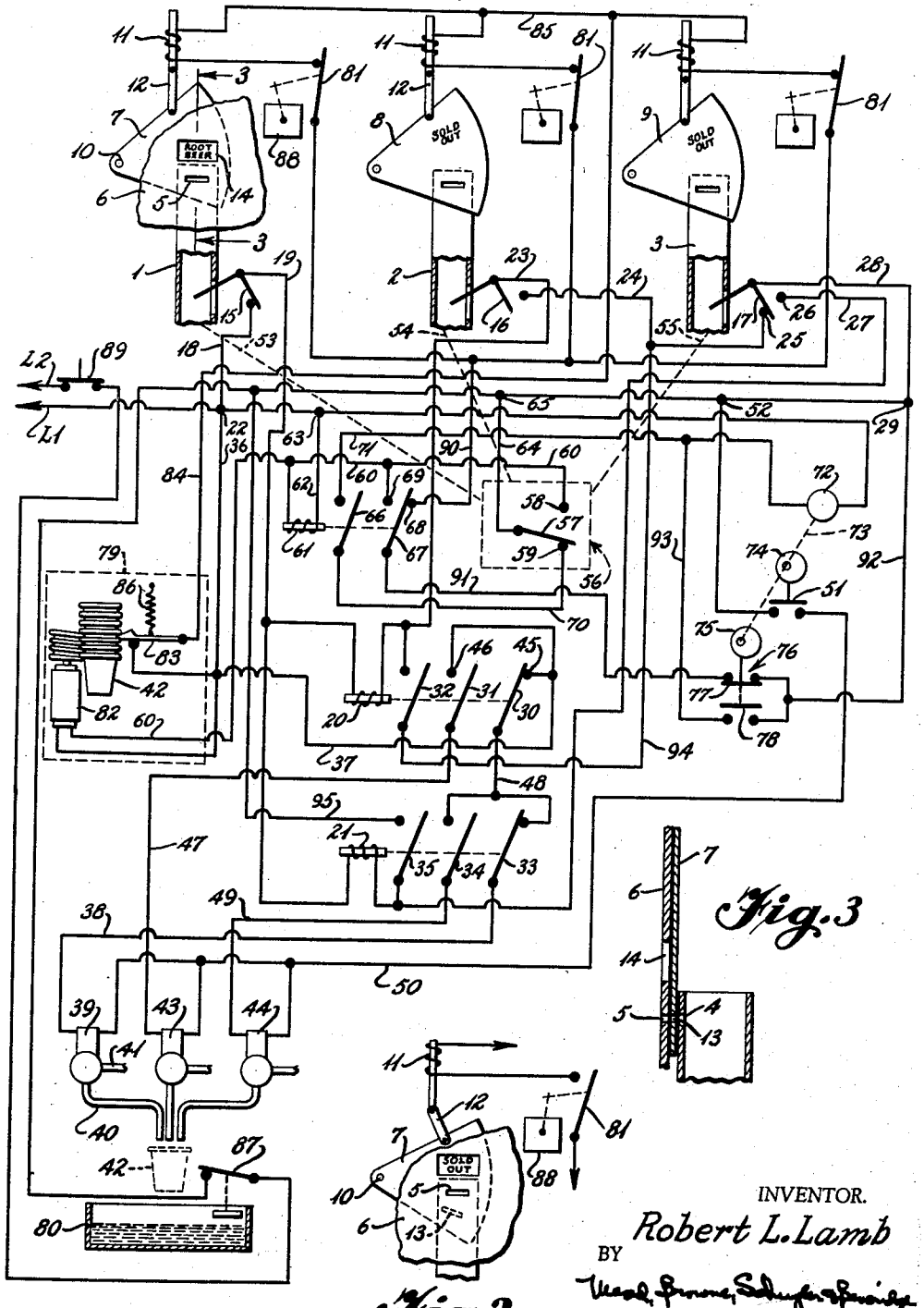


Fig. 3

Fig. 2

INVENTOR.

Robert L. Lamb

BY

ATTORNEYS

Nov. 17, 1959 R. L. LAMB 2,913,087

COIN OPERATED MULTI-PRODUCT DISPENSING APPARATUS

Filed Jan. 31, 1958 3 Sheets-Sheet 2

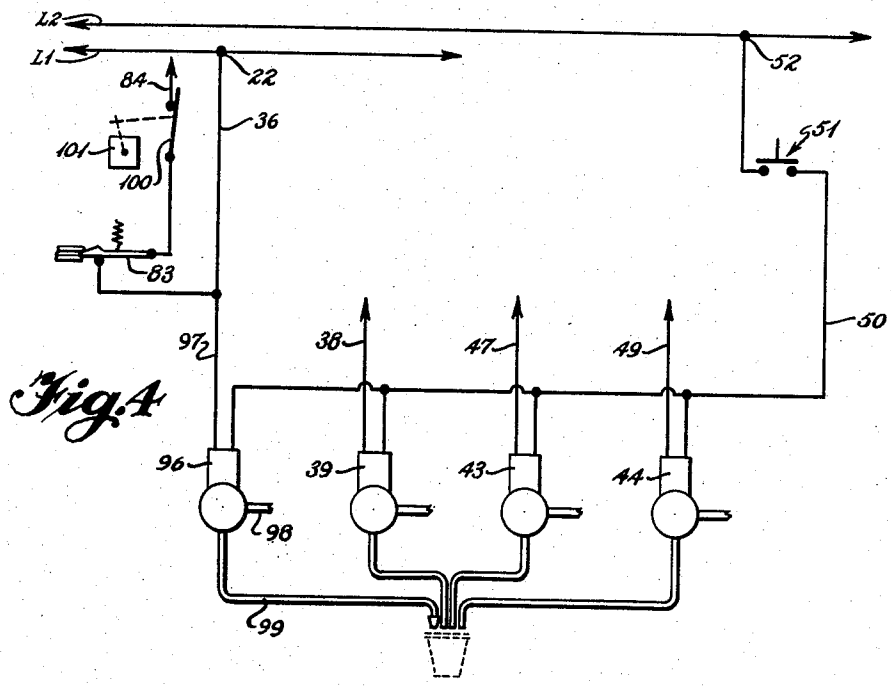


Fig. 4

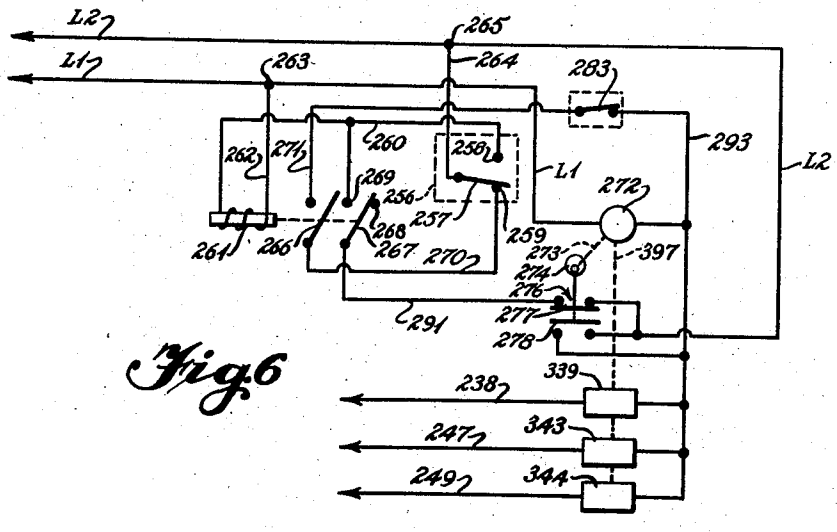


Fig. 6

INVENTOR.
Robert L. Lamb
BY
Mead, Groome, Schafer & Burridge
ATTORNEYS

Nov. 17, 1959 R. L. LAMB 2,913,087

COIN OPERATED MULTI-PRODUCT DISPENSING APPARATUS

Filed Jan. 31, 1958

3 Sheets-Sheet 3

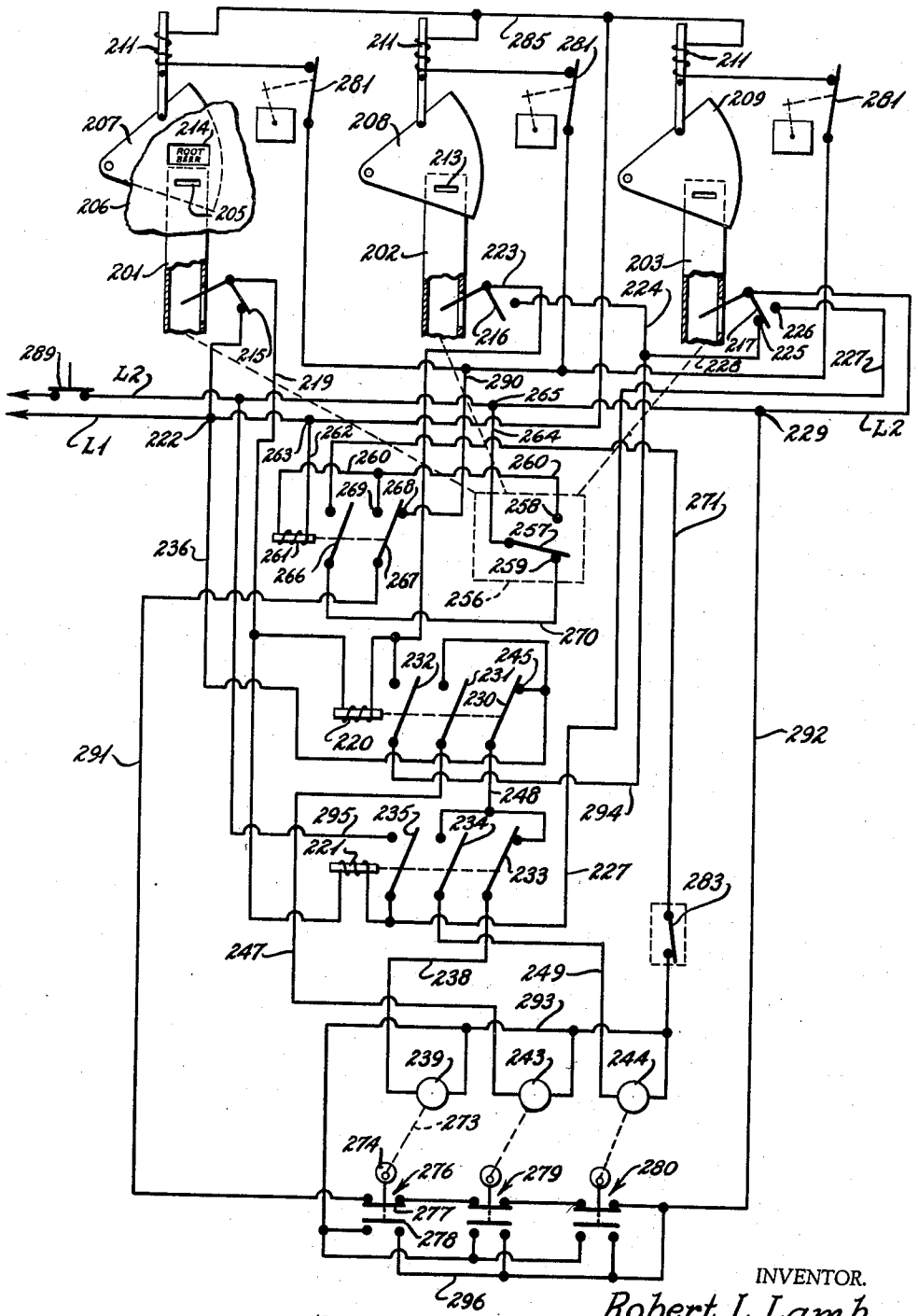


Fig. 5

INVENTOR.
Robert L. Lamb
BY
Wood, Brown, Schuyler & Spring
ATTORNEYS

United States Patent Office 2,913,087
Patented Nov. 17, 1959

2,913,087

COIN OPERATED MULTI-PRODUCT DISPENSING APPARATUS

Robert L. Lamb, East Point, Ga., assignor to The Coca-Cola Company, Atlanta, Ga., a corporation of Delaware

Application January 31, 1958, Serial No. 712,342

16 Claims. (Cl. 194—13)

This invention relates to coin operated multi-product dispensing apparatus and more particularly to such apparatus wherein the particular product to be dispensed is selected by inserting a coin into a coin receiving chute corresponding to the product desired. The apparatus may be either a bulk beverage dispensing apparatus or a packaged product dispensing apparatus. If it is a bulk beverage dispensing apparatus, it may be either a "pre-mix" or "post-mix" apparatus, the latter differing from the former in that plural liquids are discharged simultaneously into a cup or the like made available at the start of each dispensing cycle, the mixing of the ingredients taking place in the cup.

While coin operated vending machines, including beverage vending machines, are known in general, they do not include, insofar as I am aware, product selection circuitry which is readily adaptable for either bulk beverage or packaged product dispensing. Moreover, and this applies to prior art beverage vending machines with which I am familiar, they do include what I consider to be complicated electrical circuitry for preventing selection of a product other than the product intended, for preventing insertion of a coin or returning a coin if a particular product is exhausted, and for warning that a particular product line is exhausted. In addition to employing what I consider to be complicated electrical circuitry, such apparatus often includes selection buttons, knobs, or dials which project from the casing and thus, in addition to requiring manual actuation, are subject to possible damage during use. The result of all of this is that maintenance cost in regard to such equipment is oftentimes relatively high.

It is therefore an object of the present invention to provide a new and improved coin operated multi-product dispensing apparatus which is reliable in operation and is less costly to maintain than comparable apparatus known to me prior to my invention.

It is another object of the present invention to provide such an apparatus wherein product selection is accomplished by inserting a coin into the apparatus, thus eliminating the necessity for selection buttons, knobs dials or the like.

It is a further object of the present invention to provide such an apparatus which includes new and improved electrical circuitry whereby a lesser number of control relays are required for the number of products which may be dispensed by the apparatus.

It is still another object of the present invention to provide such an apparatus which includes means to positively prevent insertion of a coin into the apparatus if there is a power failure, if the apparatus is empty, and, in the case of a beverage dispensing apparatus employing cups, if there is cup failure, waste overflow, or the like.

It is a still further object of the present invention to provide such an apparatus which includes means to insure that a previous insertion of a counterfeit coin or slug into the apparatus does not prevent the apparatus from dispensing the proper selected product when a good coin is subsequently inserted into the apparatus.

Briefly described, a preferred embodiment of an apparatus according to the present invention comprises a

plurality of coin receiving chutes each including a coin responsive switch actuable by a coin passing through the chute with which the coin responsive switch is associated. There is a product dispensing device corresponding to each coin receiving chute and a product selection circuit connected to each product dispensing device, the latter being operable when actuated to dispense a product corresponding to the product selected by inserting a coin in a particular coin receiving chute. A plurality of product selection relays, totalling one less than the number of product selection circuits, are connected to and control the product selection circuit. The coin responsive switches are connected to the product selection relays in a manner such that actuation of a particular coin responsive switch causes the relays to partially complete the product selection circuit to the corresponding product dispensing device.

The coin receiving chutes all lead to a common vend switch which is actuable, subsequent to actuation of any of the coin responsive switches, by a coin passing through any of the coin receiving chutes. This vend switch is connected to and controls a vend relay which, when energized, causes the partially completed product selection circuit to be completed whereby a product dispensing device is actuated.

Each coin receiving chute has a coin slot blocking device associated therewith and the blocking devices operate to prevent insertion of a coin into a coin chute after a dispensing operation has been initiated. They also operate to block coin insertion in the event of a power failure, when a particular product is exhausted, and, in the case of liquids, when the cup supply is exhausted or the waste tank is full. The blocking devices are arranged to fall into blocking position in response to the force of gravity whereby they provide "fail safe" protection for the apparatus.

Other objects and advantages of the present invention will become more apparent from the following detailed description taken in conjunction with the attached drawings, wherein:

Fig. 1 is an electrical circuit diagram, including associated mechanical components, showing my invention as embodied in a "pre-mix" type of dispensing apparatus;

Fig. 2 is a detail view of a portion of the apparatus shown in Fig. 1 and showing a coin slot blocking device in slot blocking position;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is an electrical circuit diagram, including associated mechanical components, showing how the apparatus according to Fig. 1 may be modified to provide a "post-mix" type of dispensing apparatus;

Fig. 5 is an electrical circuit diagram, including associated mechanical components, showing my invention as embodied in a packaged product type of dispensing apparatus wherein there is a separate electrical dispensing motor for each product; and

Fig. 6 is an electrical circuit diagram, including associated mechanical components, showing how the apparatus according to Fig. 5 may be modified to include a common electrical dispensing motor rather than separate electrical dispensing motors as shown in Fig. 5.

As previously mentioned, an apparatus according to the present invention may be either a bulk beverage dispensing apparatus or a packaged product dispensing apparatus and if it is a bulk beverage dispensing apparatus it may be either a "pre-mix" or a "post-mix" apparatus. Therefore, in order to facilitate the detailed description which follows, the description is presented under subject headings applicable to the type of apparatus involved.

"Pre-mix" beverage dispensing apparatus

This portion of the detailed description makes reference to Figs. 1–3 wherein the reference numerals 1, 2 and 3

designate three separate coin receiving chutes. Each coin receiving chute includes a coin slot which is located behind a coin slot of similar size and shape which is provided in the outer casing of the apparatus. Thus, referring to Figs. 1 and 3 it is noted that chute 1 includes a coin slot 4 located behind coin slot 5 which extends through the casing of the apparatus, a portion of this casing being indicated by the reference numeral 6. Assuming that nothing blocks the space between slots 4 and 5, a coin can be inserted from the exterior of the apparatus into slot 5 and then through slot 4 whereby it can pass into coin receiving chute 1. The casing and coin chute slot arrangement is similar for the other two coin chutes 2 and 3.

One feature of the present invention is the provision of means to insure that coins cannot be inserted into a particular coin chute from the exterior of the apparatus when it is desired that such coin insertion be blocked. This is achieved by providing a coin slot blocking device which is so positioned with respect to each casing slot and each coin chute slot that the device may drop between these slots and thus interpose a solid barrier to the passage of coins into the coin chutes.

As shown in Figs. 1–3, each coin slot blocking device is preferably in the shape of a sector or pivotally mounted flag and is located so that the device is movable between casing 6 and a coin chute slot. Reference numeral 7 designates the coin slot blocking device associated with coin chute 1 while reference numerals 8 and 9 designate the coin slot blocking devices associated with coin chutes 2 and 3, respectively. Since all of the coin slot blocking devices are constructed and operate similarly, only the construction and operation of slot blocking device 7 is described in detail, it being understood that this description is equally applicable to blocking devices 8 and 9.

Blocking device or flag 7 is pivotally mounted at 10, by suitable means not shown, so that it is capable of movement in an arcuate path from an unblocking position shown in Figs. 1 and 3 to a blocking position shown in Fig. 2, and vice versa. Flag 7 is raised to and held in slot unblocking position by solenoid 11 which has its armature connected to the flag by any suitable means such as the linkage indicated by the reference numeral 12. When solenoid 11 is de-energized, as is explained in greater detail hereinafter, it permits flag 7 to drop by its own weight, and thus in response to the force of gravity, to the slot blocking position shown in Fig. 2.

Flag 7 includes a coin slot 13 of similar size and shape to coin slots 4 and 5 and this coin slot 13 is aligned with coin slots 4 and 5 when flag 7 is in slot unblocking position as shown in Figs. 1 and 3. With the three coin slots thus aligned, it is, of course, possible to insert a coin from the exterior of the apparatus into coin chute 1 and it is therefore evident that when the apparatus is ready for operation all of the slot blocking devices or flags 7, 8 and 9 will be in the position shown in Fig. 1.

However, when any of the flag retaining solenoids is de-energized, the flag retained thereby is permitted to drop to block entry of coins into the coin receiving chute associated therewith. Thus, referring to Fig. 2, solenoid 11 is shown as being de-energized and has permitted slot blocking device or flag 7 to drop to such an extent that its coin slot 13 is moved out of alignment with coin slots 4 and 5, thereby interposing the solid body of the flag between slots 4 and 5 to block entry of coins into coin chute 1. Casing 6 preferably includes a window opening 14 opposite each slot blocking flag, and each flag preferably includes a legend such as "Sold Out" thereon which comes into view through window 14 when the flag has dropped to slot blocking position, as shown in Fig. 2. The legend is raised away from window 14 and is thus out of view when the flag is in slot unblocking position. Each flag also preferably includes a legend indicating the product available, which legend comes into view through window 14 when the flag is in slot unblocking position.

Each coin receiving chute includes a coin responsive device actuable by a coin passing through the chute with which the device is associated. Thus, referring to the upper portion of Fig. 1, it is noted that coin receiving chute 1 includes a coin responsive switch 15, coin receiving chute 2 includes a coin responsive switch 16, and chute 3 includes a coin responsive switch 17. Switches 15, 16 and 17 are indicated as each including an arm which projects into the chute with which the switch is associated so that the switch is actuated by a coin passing through the chute. The switches may be of any suitable construction for the purpose intended.

Switch 15 is a normally closed switch and is connected in an electrical circuit which includes lead 18, switch 15, and lead 19 which, as shown in Fig. 1, is connected to one side of each of product selection relays 20 and 21. Lead 18 is connected to power lead L1 at 22 and switch 15 is therefore located in an electrical circuit extending from a power lead to one side of both of the product selection relays whereby either relay will be de-energized by the opening of switch 15 if the relay was energized prior to such switch opening.

Switch 16 is a normally open switch and is connected in series with product selection relay 20 by lead 23 which extends to the other side of relay 20 as shown in Fig. 1. Thus, assuming that power is available on lead 24, when switch 16 is closed, power is thus made available to one side of relay 20 or, to put it another way, a circuit is completed from one side of relay 20 to lead 24.

Switch 17 is a double-throw switch which includes a normally closed contact 25 and a normally open contact 26 from which a lead 27 extends to the other side of product selection relay 21 as shown in Fig. 1. Switch 17 is in an electrical circuit which includes lead 28 which is connected to power lead L2 at 29. It is thus apparent that when switch 17 is actuated to close the circuit at contact 26, relay 21 is connected to power lead L2 via lead 28, switch 17, and lead 27. It is to be noted in addition that when switch 17 is in its normally closed position as shown in Fig. 1, and switch 16 is subsequently closed, relay 20 is connected to power lead L2 via lead 28, switch 17, contact 25, lead 24, switch 16, and lead 23. Since coin switch 15 is normally closed and connects one side of each product selection relay 20 and 21 to power lead L1, the closing of either coin switch 16 or coin switch 17 will connect the other side of its associated relay to power lead L2 and thus place the relay electrically across the power leads.

Product selection relay 20 includes a normally closed contact arm 30 and two normally open contact arms 31 and 32. Similarly, product selection relay 21 includes a normally closed contact arm 33 and two normally open contact arms 34 and 35.

Normally closed contact arms 30 and 33 are connected in an electrical circuit which includes lead 36, connected to power lead L1 at 22 (see the upper left portion of Fig. 1), lead 37, the contact arms 30 and 33 in series, and lead 38 which extends to one side of a product dispensing device 39. Since the products being dispensed are liquids, device 39 is any suitable device known to those skilled in the art, such as a solenoid operated valve, capable of connecting dispensing pipe 40 to a supply pipe 41 to permit a selected liquid to flow into a cup 42 shown in broken lines. As is described with greater particularity hereinafter, product dispensing device 39 is the product dispensing device corresponding to coin receiving chute 1. There are three product dispensing devices 39, 43 and 44 with device 43 being associated with coin receiving chute 2 and device 44 being associated with coin receiving chute 3. Dispensing devices 39, 43 and 44 are all of similar construction and all operate similarly whereby, when any one of the dispensing devices

is energized, it operates to permit the particular liquid involved to flow from a supply source to the customer's cup.

Referring back to the electrical circuit which extends from power lead L1 to one side of product dispensing device 39, it will be noted that lead 37 of this circuit extends both to normally closed contact 45 of product selection relay 20 and to normally open contact 46 of this relay. Therefore, when relay 20 is energized to open its normally closed contact arm 30 and close its normally open contact arm 31, an electrical circuit is completed to one side of product dispensing device 43, this circuit extending from power lead L1 and including lead 36, lead 37, contact arm 31, and lead 47 which, as shown in Fig. 1, is connected to one side of product dispensing device 43.

Similarly, when product selection relay 21 is energized, relay 20 being de-energized, an electrical circuit is completed from power lead L1 to one side of product dispensing device 44, this circuit including lead 36, lead 37, normally closed contact arm 30 of relay 20, lead 48, contact arm 34 of relay 21, and lead 49 which, as shown in Fig. 1, extends to one side of product dispensing device 44. The other side of each product dispensing device 39, 43 and 44 is connected to a common lead 50 which extends to power lead L2 via a normally open motor operated switch 51. As is shown in the right hand portion of Fig. 1, lead 50 is connected to power lead L2 at 52 and the circuit from one side of each of the product dispensing devices 39, 43 and 44 to power lead L2 is completed when motor operated switch 51 is closed.

Referring back to the coin receiving chutes 1, 2 and 3, these chutes converge at their lower ends as is indicated by broken lines 53, 54 and 55, into a common chute (not shown) which directs all coins into a coin mechanism (indicated generally by broken lines 56) of any suitable electrical or mechanical type known to those skilled in the art. Coin mechanism 56 includes a slug rejector (not shown in detail since such rejectors are also well known to those skilled in the art) which acts to eject from the mechanism any spurious coin or slug so that the same will not actuate vend switch 57 herein described. Coin mechanism 56 also includes a double-throw vend switch 57 which is normally closed at contact 59 as shown in Fig. 1, but is actuable, in response to a proper coin received in coin mechanism 56 from any of the coin receiving chutes, to move from its normally closed position at contact 59, first to an open position, then to a momentarily closed position at contact 58, and then back to its normally closed position at contact 59. Switches of this type, operable as described, are well known to those skilled in the art and further detailed description thereof is unnecessary except to point out that switch 57 does include a normally open switch contact 58 which is closed briefly when the switch is operated by a proper coin. Switch 57 also includes a normally closed contact 59 which, as stated, is normally contacted by the switch arm.

Normally open contact 58 of switch 57 is connected, via lead 60, to one side of a vend relay 61. The other side of relay 61 is connected by a lead 62 to power lead L1 at 63. Switch 57 is connected by a lead 64 to power lead L2 as indicated at 65. It is therefore evident that when switch 57 moves to close normally open switch contact 58, vend relay 61 is connected across the power leads.

Vend relay 61 includes a normally open contact arm 66 and a normally closed contact arm 67, the latter being normally in contact with a normally closed contact 68 but being moved, when the vend relay is energized, into contact with normally open contact 69. Normally open contact arm 66 is in a circuit extending from power lead L2, said circuit starting at connection 65 to power lead L2 and proceeding via lead 64, vend switch 57, lead 70, normally open contact arm 66, and lead 71 which extends to one side of motor 72.

Motor 72 is preferably a synchronous timer motor which, when energized, rotates a cam shaft, indicated by the broken lines 73, at a rate of approximately six revolutions per minute. Cam shaft 73 carries two cams 74 and 75. As indicated in Fig. 1, cam 74 operates cam switch 51 and cam 75 operates the cam switch indicated generally by the reference numeral 76. The other side of timer motor 72 is connected directly to power lead L1 so that, when vend relay contact arm 66 is closed, the timer motor is energized. Motor operated switch 76 includes a normally closed contact arm 77 and a normally open contact arm 78, the purpose of which is described more fully hereinafter.

Further components of the apparatus include a cup dispensing device indicated generally by the broken lines 79, a waste tank 80, and a product empty switch 81 (see the upper portion of Fig. 1) associated with each coin slot blocking device or flag.

Cup dispenser 79 is of any suitable type known to those skilled in the art which is operable, when actuated, to cause a cup to be dispensed and made available to receive a liquid dispensed by any of the product dispensing devices 39, 43 and 44. Therefore, details of the cup dispenser are omitted except to point out that the dispenser includes a means 82 which is operable when energized to free a cup 42 from the stack of cups and thus make the cup available to receive a liquid to be dispensed. Lead 36 is connected to one side of cup dispenser means 82 and lead 60, which extends from normally open contact 58 of vend switch 57, is connected to the other side of the cup dispenser means 82. Normally open contact 69 of vend relay 61 is connected to lead 60 whereby, when the vend relay is energized, as is pointed out more fully hereinafter, the cup dispenser means 82 is also energized to cause a cup to be dispensed in advance of the dispensing of any liquid.

Cup dispenser 79 also includes a switch 83 which is held closed, as shown in Fig. 1, when cups are available to be dispensed. Switch 83 is in a circuit extending from power lead L1, starting at connection 22 and proceeding via lead 36 to switch 83 and then to lead 84 which is connected to lead 85, the latter being a common lead connected to one side of each of the coin slot blocking device solenoids 11 (see the upper portion of Fig. 1). Cup empty switch 83 is biased to open position by any suitable biasing means such as spring 86 whereby, when the cup dispenser 79 is empty, switch 83 is moved by its biasing means to open position to break the circuit just described.

Referring to the the bottom portion of Fig. 1, waste receptacle 80 has a waste switch 87 associated therewith, said switch being normally closed as shown in Fig. 1 when the waste receptacle is not too full. When the waste receptacle is too full, switch 87 is actuated by any suitable means, such as the float means indicated in Fig. 1, and is opened thereby to break power lead L2.

Referring to the upper portion of Fig. 1, one side of each of the coin slot blocking device solenoids 11 is connected in series with a product empty switch 81 which must be closed if the solenoid is to be energizable or is to remain energized. Each product empty switch is connected to any suitable electrical or mechanical means, indicated generally by the reference numeral 88, which is capable of opening switch 81 when the particular product involved is no longer available. Thus, should there be a failure of the liquid supply to supply pipe 41 (lower left of Fig. 1) then product empty device 88 operates to move product empty switch 81 associated therewith to open position and thus open the circuit leading to one side of solenoid 11. Each coin slot blocking device solenoid has a product empty switch associated there-

with whereby exhaustion of a product causes the corresponding product empty device to de-energize the corresponding solenoid 11 and permit the associated coin slot blocking device to drop and block the associated coin chute from receiving any further coins.

Summary of operation of "pre-mix" beverage dispensing apparatus

As shown in Fig. 1, the apparatus is ready for operation in the sense that the master control switch 89 is closed, waste switch 87 is closed, cup empty switch 83 is closed, and each of the product empty switches 81 is closed. Power leads L1 and L2 are, of course, connected to a suitable source of electrical power, not shown, thereby making electrical power available to the apparatus and, since the cup empty switch 83 is closed and each product empty switch 81 is closed, cups are available and each of the three liquids capable of being dispensed by the apparatus is available.

Each of the three coin slot blocking device solenoids 11 is energized since each solenoid is connected across the power leads in a circuit extending from power lead L1 at connection 22 then via lead 36, cup empty switch 83, and leads 84 and 85 to one side of each solenoid 11. The other side of each solenoid is connected, via its associated product empty switch 81, to a common lead 90, and then through normally closed contact arm 67 of vend relay 61, lead 91, normally closed motor operated switch 77, and lead 92 to the other power lead L2 (see connection 29 shown in the right hand portion of Fig. 1). With solenoids 11 being thus energized, all of the coin slot blocking devices or flags 7, 8 and 9 are in their raised or slot unblocking position whereby (see Fig. 3), a coin may be inserted into any of the coin receiving chutes 1, 2 or 3.

Assuming that a coin is inserted into coin receiving chute 1, the coin drops and first actuates coin switch 15 which opens to brake the circuit extending from power lead L1 to one side of each of the product selection relays 20, 21. This insures that any one of these relays which may be energized is de-energized whereby both of the normally closed relay contact arms 30 and 33 are in the position shown in Fig. 1. When these relay contact arms are in the position thus shown, the product selection circuit extending to product dispensing device 39 is partially completed in the sense that there is a circuit extending thereto from power lead L1 (connection 22) via lead 36, lead 37, series contact arms 30 and 33, and lead 38. However, lead 50, which is connected to the other side of product dispensing device 39, is open because motor operated switch 51 is open at this stage.

After it has actuated coin switch 15, the coin continues its passage until it reaches coin mechanism 56. There it actuates vend switch 57 which, as previously mentioned, briefly closes contact 58 when it is actuated and then returns to the position shown in Fig. 1. When switch 57 closes normally open contact 58, vend relay 61 is energized since it is connected across power leads L1 and L2 in a circuit extending from power lead L1 (connection 63) via lead 62, vend relay 61, lead 60, vend switch 57, through contact 58, and lead 64 which is connected to power lead L2 at connection 65. Energization of vend relay 61 causes its normally closed contact arm 67 to move to break the circuit to normally closed contact 68 and make a circuit to normally open contact 69. Breaking of the circuit including normally closed contact 68 breaks the circuit to common lead 90 which goes to one side of each of the coin slot blocking device solenoids 11. These solenoids are therefore de-energized, permitting each slot blocking device or flag 7, 8 and 9 to drop to the position shown in Fig. 2. This insures that no further coins can be inserted into the apparatus while a dispensing operation is taking place.

When vend relay contact arm 67 comes in contact with normally open vend relay contact 69, lead 60 is connected, via contact arm 67, lead 91, normally closed motor operated switch arm 77, and lead 92, to power lead L2 (connection 29 shown at the right of Fig. 1). This connects one side of vend relay 61 to one of the power leads and, since the other side is connected to power lead L1 by lead 62, vend relay 61 remains energized even through vend switch 57 drops back to reopen contact 58 and thus break the circuit formerly established to power lead L2.

Closing of normally open contact 69 of vend relay 61 also connects one side of cup dispenser operating means 82 to power lead L2, the other side of the cup dispenser means being connected to power lead L1 via lead 36. Therefore, when vend relay 61 is energized, the cup dispenser is also energized to cause a cup to be dispensed in advance of any liquid.

Normally open contact arm 66 of vend relay 61 is, of course, also closed when vend relay 61 is energized. Closing of contact arm 66 completes a circuit to timer motor 72 via lead 71, it being understood that the return of vend switch 57 to its normally closed position as shown in Fig. 1 connects one side of the timer motor to power lead L2 whereby the motor is energized since its other side is permanently connected to power lead L1 as shown in Fig. 1.

After timer motor 72 starts turning cam shaft 73, cam 75 carried by the cam shaft first closes cam switch 78 to complete a holding circuit for motor 72 extending from power lead L2 via lead 92, cam switch 78, and lead 93. Cam 75 then opens cam switch 77, thus breaking the holding circuit for vend relay 61 whereby the latter is de-energized and drops out, returning to the position shown in Fig. 1 wherein normally closed contact arm 67 is again in contact with normally closed contact 68. However, the coin slot blocking device solenoids 11 are not re-energized at this point because cam switch 77 is open.

Continued operation of motor 72 causes cam 74 to close cam switch 51, thus completing the product selection circuit from lead 50 to power lead L2. This circuit was already completed to one side of product dispensing device 39 via lead 38 and normally closed contact arms 30 and 33 of product selection relays 20 and 21. Product selection device 39 is therefore energized to dispense a liquid corresponding to that chosen by the insertion of a coin into coin receiving chute 1. The liquid dispensing continues as long as cam switch 51 remains closed, this, of course, being predetermined in accordance with the desired amount to be dispensed.

As timer motor 72 continues its operation, cam 74 ultimately moves cam switch 51 to open position, thereby de-energizing product dispensing device 39 to stop the dispensing of the liquid. Continued operation of timer motor 72 causes cam 75 to close cam switch 77 and open cam switch 78. When cam switch 77 is closed, the coin slot blocking device solenoids 11 are re-energized and thereby raise all of the blocking devices or flags 7, 8 and 9 to again unblock the coin slots. Opening of cam switch 78 de-energizes motor 72 and the apparatus comes to rest again in the condition shown in Fig. 1 wherein it is ready to receive another coin.

Assuming that a coin is inserted into coin receiving chute 2, coin switch 16 is actuated first to connect one side of product selection relay 20 to power lead L2 proceeding from connection 29 (see right hand portion of Fig. 1) via lead 28, coin switch 17, lead 24, coin switch 16, and lead 23 which goes to one side of product selection relay 20. The other side of relay 20 is connected to power lead L1 via lead 19, coin switch 15, and lead 18 which is connected to the power lead at connection 22. Product selection relay 20 is therefore energized, opening normally closed contact arm 30 and closing normally open contact arms 31 and 32. Closing of normally open contact arm 31 partially completes the second product selection circuit in the sense that lead 47, which is con-

nected to one side of product dispensing device **43**, is connected to power lead L1 via contact arm **31**. Closing of normally open contact arm **32** completes a holding circuit for product selection relay **20** since one side of the relay is connected, via contact arm **32** and lead **94**, to closed coin switch **17** which is connected to power lead L2 at **29** via lead **28**.

After product selection relay **20** has been energized as thus described to partially complete the product selection circuit capable of energizing product dispensing device **43**, the remainder of the operation proceeds in accordance with the description set forth above in connection with insertion of a coin into coin receiving chute **1**. In other words, motor **72** ultimately causes the product selection circuit to be completed, when cam switch **51** is closed. The second product is dispensed for the predetermined length of time during which dispensing is to occur, the coin slot blocking devices drop to prevent coin insertion following actuation of vend relay **61**, and the apparatus ultimately comes to rest again with the various components in the position shown in Fig. 1, except that product selection relay **20** remains energized pending the selection made by the next customer. The apparatus is now ready to receive another coin.

If a coin is inserted into coin chute **3**, coin switch **17** is first actuated, thereby opening normally closed contact **25** and then closing normally open contact **26**. Opening of normally closed contact **25** breaks the holding circuit extending to product selection relay **20** whereby this product selection relay is de-energized if it was energized at the time a coin was inserted into coin receiving chute **3**. When normally open contact **26** is closed, a circuit is completed from power lead L2 (connection **29**) via lead **28**, switch **17**, and lead **27** to one side of product selection relay **21**. The other side of this product selection relay is connected to power lead L1 via lead **19**, coin switch **15**, and lead **18**. Product selection relay **21** is therefore energized.

When product selection relay **21** is energized, its normally closed contact arm **33** opens and its normally open contact arms **34** and **35** close. Closing of contact arm **34** partially completes the third product selection circuit in the sense that one side of product dispensing device **44** is connected to power lead L1 via lead **36**, lead **37**, normally closed contact arm **30**, lead **48**, contact arm **34**, and lead **49**. Closing of normally open contact arm **35** completes a holding circuit for product selection relay **21** since one side of the relay is connected to power lead L1 as just described, and the closing of contact arm **35** connects the other side of the relay to power lead L2 via lead **95**. After product selection relay **21** is energized, the remainder of the operation of the apparatus is the same as has been described above in connection with insertion of a coin into coin receiving chute **1** except, of course, that product dispensing device **44** is energized instead of dispensing device **39**.

"Post-mix" beverage dispensing apparatus

Fig. 4 shows a modification of the apparatus shown in Fig. 1, the modified apparatus being of the type wherein plural liquids are discharged simultaneously into a cup or the like made available at the start of each dispensing cycle, the mixing of the ingredients taking place in the cup. A typical example of the plural liquids involved is that a stream of carbonated water and a stream of flavoring syrup are discharged simultaneously into the cup.

The "post-mix" apparatus operates identically to the "pre-mix" apparatus with the addition that in the "post-mix" apparatus an additional liquid dispensing device goes into operation when any of the three other liquid dispensing devices goes into operation, whereby two liquids are discharged simultaneously into the cup. Therefore, in order to avoid unnecessary repetition of description, Fig. 4 shows only the product dispensing devices involved and their associated leads, the same reference numerals being utilized between Figs. 1 and 4, wherein the parts are identical, it being understood that the description given above in connection with Fig. 1 applies with respect to those parts shown in Fig. 4 which are identical to corresponding parts shown in Fig. 1.

Referring to Fig. 4, it will be noted that product dispensing device **96** has one side connected directly to power lead L1 at **22**, via leads **97** and **36**. The other side of device **96** is connected to lead **50** which, as explained above in connection with Fig. 1, goes to power lead L2 via motor operated cam switch **51**. Therefore, whenever switch **51** is closed, product dispensing device **96** is actuated to dispense the particular product to be dispensed thereby. Device **96** is thus similar to each of the previously described product dispensing devices **39**, **43** and **44** and operates in identical manner to these previously described devices.

Since, in the "post-mix" type of apparatus, product dispensing devices **39**, **43** and **44** will normally each dispense a flavoring syrup, product dispensing device **96** will normally be a carbonated water dispensing device which goes into operation to dispense carbonated water from a supply pipe **98** to a discharge pipe **99** each time that motor operated cam switch **51** closes. As has been described above in connection with Fig. 1, the selected one of the other three product dispensing devices **39**, **43** and **44** also goes into operation when cam switch **51** closes whereby the selected syrup is dispensed simultaneously with the dispensing of carbonated water.

Another feature of the apparatus shown in Fig. 4 is that it includes a product empty switch **100** which is connected to any suitable electrical or mechanical means, indicated generally by the reference numeral **101**, capable of opening switch **100** when the product normally available through pipe **98** is no longer available. Thus, assuming that this product is carbonated water, should the supply of this become exhausted, device **101** goes into action to open normally closed switch **100**. Opening of switch **100** breaks the circuit proceeding via lead **84** to one side of each of the coin slot blocking device solenoids, thereby de-energizing these solenoids. The blocking flags then drop to block coin insertion into any of the coin chutes.

Packaged product dispensing apparatus—plural motor

As is believed to be evident from a comparison of Figs. 1 and 5, the packaged product dispensing apparatus shown in Fig. 5 is essentially similar to the "pre-mix" dispensing apparatus shown in Fig. 1 in that both types of apparatus include a plurality of coin receiving chutes, a coin slot blocking device or flag operatively associated with each coin receiving chute, a coin actuated switch operatively associated with each coin receiving chute, two product selection relays, a vend switch, and a vend relay. The two types of apparatus are different in that the packaged product dispensing apparatus of Fig. 5 includes a plurality of product dispensing motors each operative, when energized, to cause a packaged product to be dispensed by the apparatus whereas the "pre-mix" apparatus includes a plurality of product dispensing devices each operative, when actuated, to cause a stream of liquid to be dispensed by the apparatus. Since a packaged product, rather than a stream of liquid, is dispensed by the Fig. 5 apparatus, this apparatus does not include any cup dispenser or waste tank means. However, it does include a switch, hereinafter called a flap switch, which prevents completion of another vending cycle until after the packaged product made available during the preceding vending cycle has been removed from the apparatus.

Because of the overall similarity between Figs. 1 and 5, components of the Fig. 5 apparatus corresponding to components of the Fig. 1 apparatus are given reference

numerals in the "200" series corresponding, insofar as is possible, to the corresponding components of the Fig. 1 apparatus. Thus, the apparatus shown in Fig. 5 includes a plurality of coin receiving chutes **201**, **202** and **203**, corresponding in structure and function to the coin receiving chutes **1**, **2** and **3** shown in Fig. 1; and outer shell or casing **206**, shown in part, and corresponding in structure and function to the outer shell or casing **6** shown in part in Fig. 1; and a plurality of coin slot blocking devices or flags **207**, **208** and **209**, corresponding in structure and function to the coin slot blocking devices or flags **7**, **8** and **9** shown in Fig. 1.

Each coin receiving chute shown in Fig. 5 has a switch associated therewith capable of being actuated by a coin inserted into the chute with which the switch is associated. Thus, switches **215**, **216** and **217** are shown as being associated with coin receiving chutes **201**, **202** and **203**, respectively, and these switches correspond in structure and function to the switches **15**, **16** and **17** shown in Fig. 1. A coin mechanism **256**, vend switch **257**, and a vend relay **261** correspond in structure and function to coin mechanism **56**, vend switch **57** and vend relay **61** shown in Fig. 1. Likewise, product selection relays **220** and **221** correspond in structure and function to product selection relays **20** and **21** shown in Fig. 1.

Referring to the bottom portion of Fig. 5, each of the reference numerals **239**, **243** and **244** designates a packaged product dispensing motor operative, when energized, to cause a packaged product to be dispensed corresponding to the packaged product selected by inserting a coin into a particular coin receiving chute. Motors **239**, **243** and **244** thus correspond generally to product dispensing devices **39**, **43** and **44** shown in Fig. 1. The means actuated by a particular dispensing motor to cause a selected packaged product to be dispensed is not shown in Fig. 5 since any suitable means for this purpose may be employed as will be appreciated by those skilled in the art. Suffice it to say that whenever a dispensing motor **239**, **243** or **244** is energized, the packaged product caused to be dispensed by the energized motor is made available to the customer. In this connection, it is to be understood that the term "packaged product" includes bottled beverages.

Each dispensing motor has a cam shaft connected to and driven thereby and each cam shaft carries a cam capable of actuating a cam switch operatively associated with the cam as will be understood by those skilled in the art. Thus, as shown in Fig. 5, a cam shaft **273** is indicated in broken lines as being connected to and driven by dispensing motor **239**. Cam shaft **273** carries a cam **274** capable of actuating cam switch **276** which is operatively associated with the cam. Cam switch **276** includes a normally closed switch arm **277** and a normally open switch arm **278**. Cam switches **279** and **280** (which are like cam switch **276**) are operatively associated with and capable of being actuated by the cams driven by dispensing motors **243** and **244**, respectively.

Referring to the lower right hand portion of Fig. 5, the reference numeral **283** designates a normally closed switch which I call a flap switch. As will be understood by those skilled in the art, this switch is preferably located at the packaged product outlet of the apparatus and is any suitable type of switch capable of being held open by a packaged product made available at said outlet and then capable of reclosing when the packaged product is removed from the outlet. As is described more fully hereinafter in connection with the operation of the apparatus according to Fig. 5, the purpose of flap switch **283** is to assure that another vending cycle cannot be completed until after the packaged product made available during the preceding vending cycle has been removed by the customer, thus preventing jamming the outlet with a plurality of packages.

Operation of packaged product dispensing apparatus—plural motor

Because of the essential similarity of the apparatus shown in Fig. 5 to the apparatus shown in Fig. 1, in describing the operation of the Fig. 5 apparatus, corresponding reference numerals in the "200" series are used to designate electrical leads, contacts, and contact arms corresponding to similar leads, contacts, and contact arms shown in Fig. 1.

As shown in Fig. 5, the apparatus is ready for operation in the sense that power leads **L1** and **L2** are connected to a suitable source of electrical power (not shown), main switch **289** is closed, and there are packaged products available within the apparatus to be dispensed by each of the dispensing motors **239**, **243** and **244**. Because there is a packaged product available to be dispensed by each dispensing motor, each product empty switch **281** is closed (see the top portion of Fig. 5). Switches **281** correspond in structure and function to product empty switches **81** shown in Fig. 1. When switches **281** are closed, solenoids **211** are energized since one side of each solenoid is connected to power lead **L1** through a common lead **285** and the other side of each solenoid is connected to power lead **L2** through a circuit including its associated product empty switch **281**, lead **290**, normally closed contact arm **267** of vend relay **261**, lead **291**, the series connected normally closed switch arms of cam switches **276**, **279** and **280**, and lead **292**. Since solenoids **211** are energized, they hold up their associated coin slot blocking devices or flags **207**, **208** and **209**, thus unblocking the coin slots of the coin receiving chutes (see Fig. 3).

Assuming that a coin is inserted into coin receiving chute **201**, the coin first actuates normally closed switch **215**, causing this switch to open. The opening of switch **215** breaks a circuit extending from power lead **L1** at connection **222** and via lead **219** to one side of each of product selection relays **220** and **221**. Therefore, if either of these product selection relays was energized, it will be de-energized by the opening of switch **215**. As is brought out more fully hereinafter, this insures that the product selection circuit associated with coin chute **201** is partially completed.

The coin continues on to coin mechanism **256**, where it actuates vend switch **257**, causing this switch to close its normally open contact **258** and complete a circuit to one side of vend relay **261** via lead **264** (connected to power lead **L2** at **265**), vend switch **257** and lead **260**. Since the other side of vend relay **261** is connected to power lead **L1** at **263** by lead **262**, the vend relay is energized to move its contact arm **267** to break the circuit to its normally closed contact **268** and make a circuit to its contact **269**, and close its normally open contact arm **266**. Opening of normally closed contact arm **267** breaks the circuit extending from power lead **L2** to one side of each of flag retaining solenoids **211**, whereupon these solenoids are de-energized, permitting coin slot blocking flags **207**, **208** and **209** to drop under force of gravity to slot blocking position (see Fig. 2). Closing of contact **269** completes a holding circuit for vend relay **261**, said circuit extending from lead **260**, which is connected to one side of vend relay **261**, through vend relay contact arm **267**, and via lead **291**, series connected normally closed switch arms of cam switches **276**, **279** and **280**, and lead **292** to power lead **L2** at connection **229**.

Closing of vend relay contact arm **266** completes a circuit extending from power lead **L2** (at connection **265**) via lead **264**, vend switch **257**, lead **270**, contact arm **266**, lead **271**, flap switch **283**, and lead **293** to one side of each of product dispensing motors **239**, **243** and **244**. It will be recalled from the description of the Fig. 1 apparatus that vend switch **57** shown in Fig. 1 is actuated by a coin received in coin mechanism **56** so that its switch arm moves into contact with contact **58** for a

brief period and then returns into contact with contact 59. Since vend switch 257 is similar in structure and function to vend switch 57, after vend switch 257 was actuated by a coin, the movable arm of the vend switch returned into contact with contact 259 as shown in Fig. 5, thus enabling the circuit to be traced as just described.

Although the closing of vend relay 261 completes a circuit from power lead L2 to one side of each of the product dispensing motors 239, 243 and 244, only one of these motors has its other side connected to power lead L1 at this time. Thus, starting from power lead L1 at connection 222, a circuit extends to the other side of product dispensing motor 239 via lead 236, product selection relay contact arm 230, lead 248, product selection relay contact arm 233, and lead 238. Product dispensing motors 243 and 244 are not connected to power lead L1 because lead 247 of motor 243 is connected to product selection relay contact arm 231 which is open, and lead 249 of motor 244 is connected to product selection relay contact arm 234 which is also open. It will be recalled that opening of coin actuated switch 215 associated with coin receiving chute 201 insured that both product selection relays 220 and 221 were de-energized, thus partially completing a product selection circuit to product dispensing motor 239 only.

Therefore, when vend relay 261 does close, product dispensing motor 239 is connected across power leads L1 and L2 and is thus energized. Through suitable means not shown, motor 239 starts the dispensing of the selected packaged product. At the same time, the motor turns its associated cam shaft 273, thus turning cam 274 which actuates cam switch 276 to open its normally closed switch arm 277 and close its normally open switch arm 278. Opening of switch arm 277 breaks the holding circuit extending from power lead L2 to one side of vend relay 261, thus de-energizing this vend relay whereupon it returns to the position shown in Fig. 5. Closing of switch arm 278 completes a holding circuit for motor 239, this holding circuit extending from lead 293, and through switch arm 278, lead 296, and lead 292 to power lead L2 at connection 229. The other side of motor 239 remains connected to power lead L1 through the normally closed contact arms 230 and 233 of product selection relays 220 and 221.

Product dispensing motor 239 continues to turn throughout its predetermined duration of operation sufficient to cause the dispensing of the selected packaged product. Near the end of its predetermined duration of operation, cam 274 actuates cam switch 276 to re-close switch arm 277 and re-open switch arm 278. Closing of switch arm 277 re-energizes solenoids 211 and thus raises all of the coin slot blocking devices or flags 207, 208 and 209 to slot unblocking position as shown in Fig. 5. Re-opening of switch arm 278 breaks the holding circuit to motor 239 whereupon the motor is de-energized and stops its rotation. A vending cycle has thus been completed, the packaged product dispensed being that selected by the insertion of a coin into coin receiving chute 201.

Assuming that a coin is inserted into coin receiving chute 202, coin actuated switch 216 is closed and completes a circuit from power lead L2 to one side of product selection relay 220 via switch 217, lead 228, lead 224, switch 216, and lead 223. Since switch 215, associated with coin receiving chute 201, is closed, the other side of product selection relay 220 is connected to power lead L1 via switch 215 and lead 219. Product selection relay 220 is thus energized to open its normally closed contact arm 230 and close its normally open contact arms 231 and 232.

Closing of relay contact arm 231 completes a circuit extending from power lead L1 (at connection 222) through lead 236, contact arm 231, and lead 247 to one side of product dispensing motor 243. This partially completes the product selection circuit associated with coin receiving chute 202 and connected to the corresponding product dispensing motor 243. When vend relay 261 is subsequently energized, as described above in connection with the insertion of a coin into coin receiving chute 201, product dispensing motor 243 is energized and goes through a dispensing cycle as described above in connection with product dispensing motor 239. Product dispensing motors 239 and 244 are not energized during this dispensing cycle because the circuit extending from power lead L1 to one side of motor 239 was broken by the opening of relay contact arm 230, and the circuit extending from power lead L1 to one side of motor 244 is open at relay contact arm 234 during this dispensing cycle. It is to be noted, however, that if product selection relay 221 were energized during this dispensing cycle, the circuit would be broken by arm 230 of product selection relay 220.

When product selection relay 220 was energized, the closing of its normally open contact arm 232 completed a holding circuit extending from one side of relay 220 through contact arm 232, lead 294, lead 228, and switch 217 to power lead L2.

Assuming that a coin is inserted into coin receiving chute 203, switch 217 is actuated whereupon the switch arm moves away from contact 225 and comes into contact with contact 226. Movement of the switch arm of switch 217 away from contact 225 breaks the holding circuit for product selection relay 220 just described, thus assuring that this product selection relay is de-energized if it was in fact energized. Closing of contact 226 completes a circuit extending from power lead L2 through switch 217 to lead 227 which is connected to one side of product selection relay 221. Since the other side of this product selection relay is connected to power lead L1 (at connection 222) via switch 215 and lead 219, product selection relay 221 is energized. When energized, it opens its normally closed contact arm 233 and closes its normally open contact arms 234 and 235.

Closing of relay contact arm 234 partially completes the product selection circuit associated with coin receiving chute 203. This partially completed product selection circuit extends from power lead L1 to product dispensing motor 244 via lead 236 (connected to power lead L1 at 222), normally closed relay contact arm 230, lead 248, contact arm 234, and lead 249. When vend relay 261 is subsequently energized as described above in connection with the insertion of a coin into coin receiving chute 201, product dispensing motor 244 is energized and goes through its dispensing cycle to cause a product to be dispensed corresponding to the product selected by the insertion of a coin into coin receiving chute 203.

Product dispensing motor 239 is not energized during this dispensing cycle because when product selection relay 221 was energized it opened its normally closed contact arm 233, thus breaking the circuit between power lead L1 and motor 239. Likewise, motor 243 is not energized during this dispensing cycle because product selection relay 220 was not energized and contact arm 231 was open, thus breaking the circuit between power lead L1 and motor 243. When product selection relay 221 is energized it completed a holding circuit extending from one side of the relay through its contact arm 235 and lead 295 to power lead L2.

Packaged product dispensing apparatus—single motor

Fig. 6 shows a modification of a portion of the apparatus shown in Fig. 5, the modified apparatus being of the type wherein a single packaged product dispensing motor and associated clutch means operate to dispense the selected product. The apparatus shown in Fig. 6 operates identically to the apparatus shown in Fig. 5 with the exception that, for each dispensing cycle, a common dispensing motor is energized and a selected clutch mechanism is also energized, the latter causing the selected product to be dispensed.

Referring more specifically to Fig. 6, it will be noted that there is a single product dispensing motor 272. The broken lines designated by the reference numeral 273 represent a cam shaft which is connected to and driven by motor 272 whenever the latter is energized. Cam shaft 273 carries a cam 274 which is operatively associated with a cam switch designated generally by the reference numeral 276. The latter has a normally closed switch arm 277 and a normally open switch arm 278.

The broken lines designated by the reference numeral 397 represent a shaft connected to and driven by motor 272 whenever the latter is energized. Shaft 397 carries three clutch mechanisms designated, respectively, by the reference numerals 339, 343 and 344. Each clutch mechanism is preferably a solenoid operated clutch which, when energized, couples a driven clutch member to a driving clutch member, the latter being driven by dispensing motor 272 when it is energized. Since such clutches are well known to those skilled in the art, further description thereof is deemed to be unnecessary. When a clutch is energized, and motor 272 is also energized, the clutch actuates a suitable mechanism, not shown, to dispense the selected packaged product. This arrangement is thus similar to the plural dispensing motor arrangement of Fig. 5 wherein, instead of the clutches, a separate dispensing motor is utilized for each product to be dispensed.

Leads 238, 247 and 249 are shown as being connected to one side of clutches 339, 343 and 344, respectively. As has been described above in connection with the description of the Fig. 5 apparatus, lead 238 is connected through to power lead L1 when a coin is inserted into coin receiving chute 201, lead 247 is connected through to power lead L1 when a coin is inserted into coin receiving chute 202, and lead 249 is connected through to power lead L1 when a coin is inserted into coin receiving chute 203. Each of these three leads is thus in a product selection circuit which is partially completed in response to insertion of a coin into the coin receiving chute with which the product selection circuit is associated. Therefore, one of the three clutch mechanisms 339, 343 and 344 has one side connected to power lead L1 after a coin is inserted into the corresponding coin receiving chute and the other side of the clutch will be connected to power lead L2 after the vend relay 261 is actuated. As has been described above in connection with the Fig. 5 apparatus, only one of the leads 238, 247 and 249 can be connected through to power lead L1 at any given time.

After the coin reaches coin mechanism 256 and actuates vend switch 257 to energize vend relay 261, vend relay contact arm 266 completes a circuit extending from power lead L2 (at connection 265) to lead 293 which is connected to one side of the common product dispensing motor 272 and to one side of each of the clutches 339, 343 and 344. As shown in Fig. 6, the other side of motor 272 is connected directly to power lead L1 and the motor is therefore energized when vend relay 261 is energized. This assumes, of course, that flap switch 283 is closed, meaning that a product made available in a preceding dispensing cycle has been removed by the customer.

When motor 272 is energized, it rotates both cam shaft 273 and clutch shaft 397. Since, simultaneously with energization of motor 272, one of the clutch mechanisms 339, 343 or 344 was energized, dispensing of the selected products starts.

As motor 272 turns cam shaft 273, cam 274 carried thereby actuates cam switch 276 to open switch arm 277 and close switch arm 278. Opening of switch arm 277 breaks the holding circuit to vend relay 261 established by relay contact arm 267 coming into contact with contact 269. Closing of switch arm 278 establishes a holding circuit extending from power lead L2 to common lead 293, thereby maintaining common dispensing motor 272 and the selected clutch mechanism energized throughout the predetermined length of the dispensing cycle. When motor 272 approaches the end of its predetermined duration of energization, it re-closes switch arm 277 and re-opens switch arm 278, thereby breaking the circuit to the motor and to the selected clutch. The apparatus is then ready to start another dispensing cycle.

Conclusion

It will be seen from the foregoing that a dispensing apparatus according to the present invention is readily adapted for either bulk beverage or packaged product dispensing. Furthermore, the particular product to be dispensed is selected by inserting a coin into a coin receiving chute of the apparatus corresponding to the product desired. The customer therefore does not have to manipulate any knobs, dials or the like and the outer shell or casing of the apparatus is free of projecting knobs, dials or the like which are subject to damage during usage of the apparatus.

The internal electrical circuitry of the apparatus is compact in the sense that the product selection circuits corresponding to the products capable of being dispensed by the apparatus are controlled by a lesser number of product selection relays. For example, as shown in the drawings, three product selection circuits are controlled by two product selection relays. This is made possible by arranging the circuitry so that the last coin inserted into the appartus determines the product to be dispensed during the dispensing cycle commencing with the insertion of said coin, and preventing the insertion of any other coins into the apparatus until after this dispensing cycle is in fact completed. In other words, should a person insert a slug into one coin receiving chute in an effort to set up one product selection circuit and then subsequently insert a good coin into another coin receiving chute in the hope that two products will be dispensed by the apparatus, the slug is ineffective. The partial completion of a product selection circuit in response to coin actuation of any of the selection switches (for example, switches 15, 16 or 17 shown in Fig. 1), which coin, spurious or otherwise, was later ejected by the slug rejector and not allowed to pass to vend switch 57, is of no consequence since it is believed to be apparent from the foregoing description that the final completion of a product selection circuit is controlled by the actuation of the selection switch last actuated prior to the passage of the coin to the vend switch.

In this connection, it is to be noted that although a product selection relay may be energized at the time a coin is inserted into the apparatus, this will not affect the control exercised by the last good coin in determining which product is to be dispensed. For example, referring to Fig. 1, product selection relay 21 may be energized because a coin was inserted into coin receiving chute 3 in a previous dispensing cycle. Once energized, this relay holds itself in until its holding circuit is broken which, in the normal operation of the apparatus, occurs only when coin actuated switch 15, associated with coin receiving chute 1, is actuated.

If, when relay 21 is energized, a coin is inserted into coin receiving chute 2, switch 16 is actuated to energize product selection relay 20 and partially complete the product selection circuit including product dispensing device 43. When relay 20 is energized, it opens its normally closed contact arm 30 and thus breaks the circuit extending from power lead L1 to one side of product dispensing device 44. Therefore, when timing motor 72 subsequently causes switch 51 to close, product dispensing device 43 is energized but product dispensing device 44 cannot be energized. Therefore, even though product selection relay 21 remains energized, the product dispensed is determined by the coin inserted into coin receiving chute 2.

Since insertion of a coin into coin receiving chute 3 breaks the holding circuit for product selection relay 20,

this insures that only product selection relay 21 is energized in response to insertion of the coin into coin receiving chute 3. Likewise, the insertion of a coin into coin receiving chute 1 breaks the circuit extending from power lead L1 to both product selection relays, thus insuring that both relays are de-energized when coin receiving chute 1 is selected as the chute to receive a coin.

The mechanical means which blocks coin insertion after a dispensing cycle is initiated also operates to block coin insertion into a coin receiving chute for which the product supply is exhausted, and gives the customer visible information that this particular product is in fact exhausted. Should there be a power failure rendering the apparatus incapable of operation, the coin slot blocking devices fall automatically, under force of gravity, into blocking position, thus causing the apparatus to "fail safe."

While I have described and illustrated embodiments of my invention, I wish it to be understood that I do not intend to be restricted solely thereto but that I do intend to cover all modifications thereof which would be apparent to one skilled in the art and which come within the spirit and scope of my invention.

What I claim is:

1. A coin operated multi-product dispensing apparatus comprising a plurality of coin receiving chutes each including a coin responsive device actuable by at least one coin passing through the chute with which said coin responsive device is associated, a plurality of product dispensing devices, there being a product dispensing device corresponding to each coin receiving chute, a plurality of product selection circuits, there being a product selection circuit connected to each product dispensing device and each product dispensing device being operable to dispense a product when its product selection circuit is completed, a plurality of product selection relays connected to and controlling said product selection circuits, the total number of said relays being one less than the total number of said product selection circuits, means electrically connecting one of said coin responsive devices in an electrical circuit extending to all of said product selection relays, said one coin responsive device being operable when actuated to break said electrical circuit and thereby de-energize any energized product selection relay to partially complete one of said product selection circuits, means electrically connecting each of the other coin responsive devices in series with a corresponding product selection relay, each other coin responsive device being operable when actuated to energize its corresponding product selection relay to partially complete one of the other product selection circuits corresponding to the actuated other coin responsive device, a vend switch common to all of said coin receiving chutes and actuable, subsequent to actuation of any of said coin responsive devices, by at least one coin inserted into any of said coin receiving chutes, and means electrically connected to said vend switch and operable in response to actuation of said vend switch to complete the product selection circuit selected by said product selection relays whereby the insertion of at least one coin into a particular coin receiving chute determines the product which is dispensed.

2. A coin operated multi-product dispensing apparatus comprising a plurality of coin receiving chutes each including a coin responsive switch actuable by at least one coin passing through the chute with which said coin responsive switch is associated, a plurality of product dispensing devices, there being a product dispensing device corresponding to each coin receiving chute, a plurality of product selection circuits, there being a product selection circuit connected to each product dispensing device and each product dispensing device being operable to dispense a product when its product selection circuit is completed, a plurality of product selection relays connected to and controlling said product selection circuits, the total number of said relays being one less than the total number of said product selection circuits and each relay including a normally closed contact arm, means electrically connecting one of said coin responsive switches in an electrical circuit extending to all of said product selection relays, said one coin responsive switch being operable when actuated to break said electrical circuit and thereby de-energize any energized product selection relay, said normally closed relay contact arms being connected in series and partially completing one of said product selection circuits when said product selection relays are de-energized, means electrically connecting each of the other coin responsive switches in series with a corresponding product selection relay, each other coin responsive switch being operable when actuated to energize its corresponding product selection relay to partially complete one of the other product selection circuits corresponding to the actuated other coin responsive switch, a vend switch common to all of said coin receiving chutes and actuable, subsequent to actuation of any of said coin responsive switches by at least one coin inserted into any of said coin receiving chutes, and means electrically connected to said vend switch and operable in response to actuation of said vend switch to complete the product selection circuit selected by said product selection relays whereby the insertion of at least one coin into a particular coin receiving chute determines the product to be dispensed.

3. A coin operated multi-product dispensing apparatus according to claim 2, wherein said means electrically connected to said vend switch and operable in response to actuation of said vend switch to complete the product selection circuit selected by said product selection relays includes a vend relay electrically connected to and energizable in response to actuation of said vend switch, a timer motor connected to and energizable in response to energization of said vend relay, and a normally open switch connected to and closable in response to operation of said motor to complete the product selection circuit selected by said product selection relays.

4. A coin operated multi-product dispensing apparatus according ot claim 1, including a cup dispensing device operable when actuated to dispense a cup, and means electrically connecting said cup dispensing device to said vend switch, said cup dispensing device being operable in response to actuation of said vend switch to dispense a cup in advance of the dispensing of a product by any of said product dispensing devices.

5. A coin operated multi-product dispensing apparatus according to claim 1, wherein each of said product dispensing devices dispenses a liquid, and said apparatus includes an additional liquid dispensing device, an electrical circuit connected to said additional liquid dispensing device, said additional liquid dispensing device being operable when said last named electrical circuit is completed to dispense an additional liquid, and means electrically connected to said vend switch and operable in response to actuation of said vend switch to complete said additional liquid electrical circuit substantially simultaneously with completion of any of said product selection circuits whereby the selected liquid and the additional liquid are dispensed concurrently.

6. A coin operated multi-product dispensing apparatus comprising three coin receiving chutes each including a coin responsive device actuable by at least one coin passing through the chute with which said coin responsive device is associated, three product dispensing devices, there being a product dispensing device corresponding to each coin receiving chute, three product selection circuits, there being a product selection circuit connected to each product dispensing device and each product dispensing device being operable to dispense a product when its product selection circuit is completed, two product selection relays connected to and controlling said product selection circuits, each of said relays including a normally closed contact arm and a normally open contact arm, means

electrically connecting one of said coin responsive devices in an electrical circuit extending to both of said product selection relays, said one coin responsive device being operable when actuated to break said electrical circuit and thereby de-energize any energized product selection relay, said normally closed relay contact arms being connected in series and partially completing one of said product selection circuits when said product selection relays are de-energized, means electrically connecting each of the other coin responsive devices in series with a corresponding product selection relay, each other coin responsive device being operable when actuated to energize its corresponding product selection relay, the product selection circuit corresponding to the actuated other coin responsive device being partially completed by the closing of the normally open contact arm of the corresponding product selection relay, a vend switch common to all of said coin receiving chutes and actuable, subsequent to actuation of any of said coin responsive devices, by at least one coin inserted into any of said coin receiving chutes, and means electrically connected to said vend switch and operable in response to actuation of said vend switch to complete the product selection circuit selected by said product selection relays whereby the insertion of at least one coin into a particular coin receiving chute determines the product to be dispensed.

7. A coin operated multi-product dispensing apparatus comprising three coin receiving chutes each including a coin responsive switch actuable by at least one coin passing through the chute with which the coin responsive switch is associated, three product dispensing devices, there being a product dispensing device corresponding to each coin receiving chute, three product selection circuits, there being a product selection circuit connected to each product dispensing device and each product dispensing device being operable to dispense a product when its product selection circuit is completed, two product selection relays connected to and controlling said product selection circuits, each of said relays having a normally closed contact arm and a normally open contact arm, one of said product selection circuits including both of said normally closed contact arms connected in series, another of said product selection circuits including a normally closed contact arm of one of said relays and a normally open contact arm of the other of said relays connected in series, and the third of said product selection circuits including one of said relay normally open contact arms, means electrically connecting one of said coin responsive switches in an electrical circuit extending to both of said product selection relays, said one coin responsive switch being operable when actuated to break said electrical circuit and thereby de-energize any energized relay to partially complete one of said product selection circuits, means electrically connecting each of the other coin responsive switches in series with a corresponding product selection relay, each other coin responsive switch being operable when actuated to energize its corresponding product selection relay to partially complete one of the other product selection circuits corresponding to the actuated other coin responsive switch, a vend switch common to all of said coin receiving chutes and actuable, subsequent to actuation of any of said coin responsive switches, by at least one coin inserted into any of said coin receiving chutes, and means electrically connected to said vend switch and operable in response to actuation of said vend switch to complete the product selection circuit selected by said product selection relays whereby the insertion of at least one coin into a particular coin receiving chute determines the product to be dispensed.

8. A coin operated multi-product dispensing apparatus comprising a plurality of coin receiving chutes each including a coin receiving slot and a coin responsive device actuable by at least one coin passing through the chute with which said coin responsive device is associated, a coin slot blocking device positioned adjacent each coin slot, each coin slot blocking device being movable from a position in which its associated coin slot is blocked by said coin slot blocking device to a position in which said slot is unblocked by said device and vice versa, said slots being normally unblocked by said coin slot blocking devices when said dispensing apparatus is ready for operation, a vend switch common to all of said coin receiving chutes, said vend switch being actuable, subsequent to actuation of any of said coin responsive devices, by at least one coin inserted into any of said coin receiving chutes, a plurality of product dispensing devices, there being a product dispensing device corresponding to each coin receiving chute, and each product dispensing device being operable when actuated to dispense a product, means electrically connected between said vend switch and each of said product dispensing devices to actuate, in response to actuation of said vend switch, only the product dispensing device corresponding to the coin receiving chute which last receives at least one coin, and means electrically connected between said vend switch and each of said coin slot blocking devices to move all of said coin slot blocking devices from slot unblocking to slot blocking position whereby all coin slots are blocked during dispensing of a product, said last named means being operable following actuation of said vend switch.

9. A coin operated multi-product dispensing apparatus comprising a plurality of coin receiving chutes each including a coin receiving slot and a coin responsive switch actuable by at least one coin passing through the chute with which said coin responsive switch is associated, a coin slot blocking device positioned adjacent each coin slot, each coin slot blocking device being movable from a position in which its associated coin slot is blocked by said coin slot blocking device to a position in which said slot is unblocked by said device and vice versa, means connected to said coin slot blocking devices and operable when energized to retain said coin slot blocking devices in slot unblocking position, said slots being normally unblocked by said coin slot blocking devices when said dispensing apparatus is ready for operation, a vend switch common to all of said coin receiving chutes, said vend switch being actuable, subsequent to any of said coin responsive switches, by at least one coin inserted into any of said coin receiving chutes, a plurality of product dispensing devices, there being a product dispensing device corresponding to each coin receiving chute, each product dispensing device being operable when actuated to dispense a product, means electrically connected between said vend switch and each of said product dispensing devices to actuate, in response to actuation of said vend switch, only the product dispensing device corresponding to the coin receiving chute which last receives at least one coin, means electrically connected between said vend switch and each of said coin slot blocking device retaining means to de-energize all of said coin slot blocking device retaining means to permit all of said coin slot blocking devices to drop from slot unblocking to slot blocking position under the influence of gravity, said de-energizing means being operable following actuation of said vend switch and prior to actuation of any product dispensing device whereby all coin slots are blocked during dispensing of a product, and a product empty switch electrically connected to each slot blocking device retaining means, each retaining means being de-energized when its associated product empty switch is moved to open position whereby the associated coin slot blocking device drops to slot blocking position to prevent insertion of a coin into the coin chute corresponding to the exhausted product.

10. A coin operated multi-product dispensing apparatus comprising a plurality of coin receiving chutes each including a coin slot and a coin responsive device actuable by at least one coin passing through the chute with which the coin responsive device is associated, a coin slot blocking device positioned adjacent each coin slot

and movable from a slot blocking position to a slot unblocking position and vice versa, said slots being normally unblocked by said coin slot blocking devices when said dispensing apparatus is ready for operation, a plurality of product dispensing devices, there being a product dispensing device corresponding to each coin receiving chute, a plurality of product selection circuits, there being a product selection circuit connected to each product dispensing device and each product dispensing device being operable to dispense a product when its product selection circuit is completed, a plurality of product selection relays connected to and controlling said product selection circuits, the total number of said relays being one less than the total number of said product selection circuits, means electrically connecting one of said coin responsive devices in an electrical circuit extending to all of said product selection relays, said one coin responsive device being operable when actuated to break said electrical circuit and thereby de-energize any energized product selection relay to partially complete one of said product selection circuits, means electrically connecting each of the other coin responsive devices in series with a corresponding product selection relay, each other coin responsive device being operable when actuated to energize its corresponding product selection relay to partially complete one of the other product selection circuits corresponding to the actuated coin responsive device, a vend switch common to all of said coin receiving chutes and actuable, subsequent to actuation of any of said coin responsive devices, by at least one coin inserted into any of said coin receiving chutes, means electrically connected between said vend switch and each of said coin slot blocking devices to move all of said coin slot blocking devices from slot unblocking to slot blocking position, said last named means being operable in response to actuation of said vend switch and prior to operation of any of said product dispensing devices, and means electrically connected to said vend switch and operable in response to actuation of said vend switch to complete the product selection circuit selected by said product selection relays whereby the product which is dispensed corresponds to the coin receiving chute which receives at least one coin.

11. A coin operated multi-product dispensing apparatus comprising a plurality of coin receiving chutes each including a coin slot and a coin responsive switch actuable by at least one coin passing through the chute with which said coin responsive switch is associated, a coin slot blocking device positioned adjacent each coin slot, means connected to each coin slot blocking device and operable when energized to move each coin slot blocking device from slot blocking position to slot unblocking position, each coin slot blocking device being movable from slot unblocking position to slot blocking position in response to the force of gravity when its associated connected moving means is de-energized, said coin slots being normally unblocked by said coin slot blocking devices when said apparatus is ready for operation, a plurality of product dispensing devices, there being a product dispensing device corresponding to each coin receiving chute, a plurality of product selection circuits, there being a product selection circuit connected to each product dispensing device and each product dispensing device being operable to dispense a product when its product selection circuit is completed, a plurality of product selection relays connected to and controlling said product selection circuits, the total number of said relays being one less than the total number of said product selection circuits and each relay including a normally closed contact arm, means electrically connecting one of said coin responsive switches in an electrical circuit extending to all of said product selection relays, said one coin responsive switch being operable when actuated to break said electrical circuit and thereby de-energize any energized product selection relay, said normally closed relay contact arms being connected in series and partially completing one of said product selection circuits when said product selection relays are de-energized, means electrically connecting each of the other coin responsive switches in series with a corresponding product selection relay, each other coin responsive switch being operable when actuated to energize its corresponding product selection relay to partially complete one of the other product selection circuits corresponding to the actuated other coin responsive switch, a vend switch common to all of said coin responsive chutes and actuable, subsequent to actuation of any of said coin responsive switches, by at least one coin inserted into any of said coin receiving chutes, means electrically connected between said vend switch and each of said coin slot blocking device moving means and operable in response to actuation of said vend switch to de-energize each of said slot blocking device moving means to permit said slot blocking devices to drop from unblocking position to blocking position prior to operation of any of said product dispensing devices whereby each coin slot is blocked when a product is being dispensed, and means electrically connected to said vend switch and operable in response to actuation of said vend switch to complete the product selection circuit selected by said product selection relays whereby the insertion of at least one coin into a particular coin receiving chute determines the product to be dispensed.

12. A coin operated multi-product dispensing apparatus comprising three coin receiving chutes each including a coin slot and a coin responsive switch actuable by at least one coin passing through the chute with which said coin responsive switch is associated, a coin slot blocking device positioned adjacent each coin slot, a slot blocking device moving means connected to each slot blocking device, each slot blocking device being movable, when its connected moving means is energized, from a slot blocking position to a slot unblocking position and being movable from a slot unblocking position to a slot blocking position in response to the force of gravity when its connected moving means is de-energized, said coin slot being normally unblocked by said coin slot blocking devices when said dispensing apparatus is ready for operation, three product dispensing devices, there being a product dispensing device corresponding to each coin receiving chute, three product selection circuits, there being a product selection circuit connected to each product dispensing device and each product dispensing device being operable to dispense a product when its product selection circuit is completed, two product selection relays connected to and controlling said product selection circuits, each relay including a normally closed contact arm and a normally open contact arm, means electrically connecting one of said coin responsive switches in an electrical circuit extending to both of said product selection relays, said one coin responsive switch being operable when actuated to break said electrical circuit and thereby de-energize any energized product selection relay, said normally closed relay contact arms being connected in series and partially completing one of said product selection circuits when said product selection relays are de-energized, means electrically connecting each of the other coin responsive switches in series with a corresponding product selection relay, each other coin responsive switch being operable when actuated to energize its corresponding product selection relay and close one of said normally open relay contact arms to partially complete one of the other product selection circuits corresponding to the actuated other coin responsive switch, a vend switch common to all of said coin receiving chutes and actuable, subsequent to actuation of any of said coin responsive switches, by at least one coin inserted into any of said coin receiving chutes, means electrically connected between said vend switch and each of said coin slot blocking device moving means and operable to de-energize each of said moving means when said vend switch is actuated

to permit said slot blocking devices to drop from unblocking position to blocking position in advance of operation of any of said product dispensing devices, and means electrically connected to said vend switch and operable in response to actuation of said vend switch to complete the product selection circuit selected by said product selection relays whereby the insertion of at least one coin into a particular coin receiving chute determines the product to be dispensed.

13. A coin operated multi-product dispensing apparatus comprising a plurality of coin receiving chutes each including a coin receiving slot and a coin responsive device actuable by at least one coin passing through the chute with which the coin responsive device is associated, a coin slot blocking device positioned adjacent each coin slot, each coin slot blocking device being movable from a position in which its associated coin slot is blocked by said coin slot blocking device to a position in which said slot is unblocked by said device and vice versa, means connected to said coin slot blocking devices and operable when energized electrically to retain said coin slot blocking devices in slot unblocking position, said coin slot blocking devices being movable automatically from slot unblocking position to slot blocking position when electrical power is cut off from said retaining means, a vend switch common to all of said coin receiving chutes, said vend switch being actuable, subsequent to actuation of any of said coin responsive switches, by at least one coin inserted into any of said coin receiving chutes, a plurality of product dispensing devices, there being a product dispensing device corresponding to each coin receiving chute, each product dispensing device being operable when actuated to dispense a product, means electrically connected between said vend switch and each of said product dispensing devices to actuate, in response to actuation of said vend switch, only the product dispensing device corresponding to the coin receiving chute which last receives at least one coin, means electrically connected between said vend switch and each of said coin slot blocking device retaining means to de-energize all of said coin slot blocking device retaining means following actuation of said vend switch and prior to actuation of any product dispensing device whereby all coin slots are blocked during dispensing of a product, and a product empty switch electrically connected to each slot blocking device retaining means, each retaining means being de-energized when its associated product empty switch is moved to open position whereby the associated coin slot blocking device moves to slot blocking position to prevent insertion of a coin into the coin chute corresponding to the exhausted product.

14. A coin operated multi-product dispensing apparatus according to claim 13 including a cup dispensing device operable when actuated to dispense a cup, means electrically connecting said cup dispensing device to said vend switch, said cup dispensing device being operable in response to actuation of said vend switch to dispense a cup in advance of the dispensing of a product by any of said product dispensing devices, and a cup empty switch electrically connected to each slot blocking device retaining means, each retaining means being de-energized when said cup empty switch is moved to open position whereby said coin slot blocking devices move to slot blocking position to prevent the insertion of a coin into any of said coin chutes while the cup supply is exhausted.

15. A coin operated multi-product dispensing apparatus according to claim 14 including a waste receptacle, and a waste receptacle full switch electrically connected to each slot blocking device retaining means, each retaining means being de-energized when said waste receptacle full switch is moved to open position whereby said coin slot blocking devices move to slot blocking position to prevent insertion of a coin into any of said coin chutes while said waste receptacle is full.

16. A coin operated multi-product dispensing apparatus according to claim 13 wherein each of said product dispensing devices dispenses a liquid, and said apparatus includes an additional liquid dispensing device, an electrical circuit connected to said additional liquid dispensing device, said additional liquid dispensing device being operable when said last named electrical circuit is completed to dispense an additional liquid, and means electrically connected to said vend switch and operable in response to actuation of said vend switch to complete said additional liquid electrical circuit substantially simultaneously with completion of any of said product selection circuits whereby the selected liquid and the additional liquid are dispensed concurrently, and an additional liquid empty switch electrically connected to each slot blocking device retaining means, each retaining means being de-energized when said additional liquid empty switch is moved to open position whereby said coin slot blocking devices move to slot blocking position to prevent insertion of a coin into any of said coin chutes while said additional liquid supply is exhausted.

References Cited in the file of this patent

UNITED STATES PATENTS

2,403,470	Tull	July 9, 1946
2,583,461	Arnett	Jan. 22, 1952
2,617,510	Little	Nov. 11, 1952