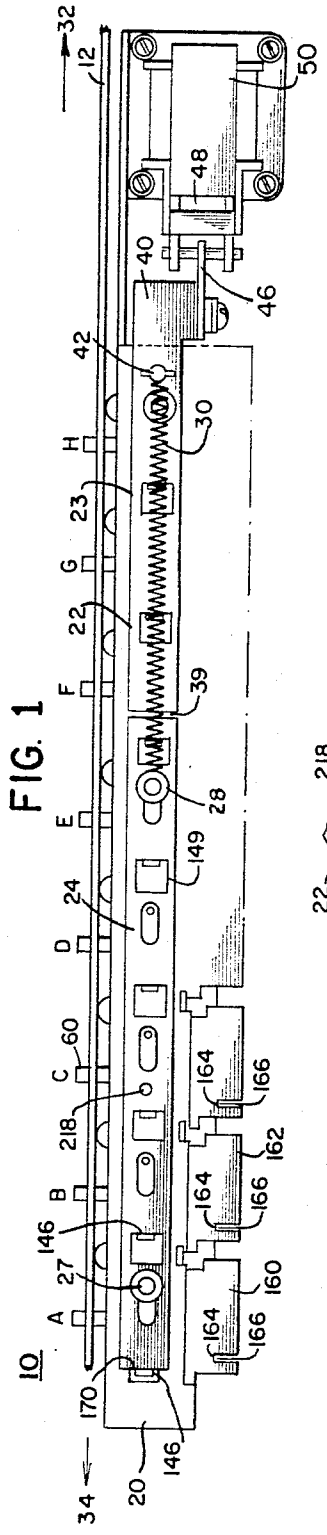
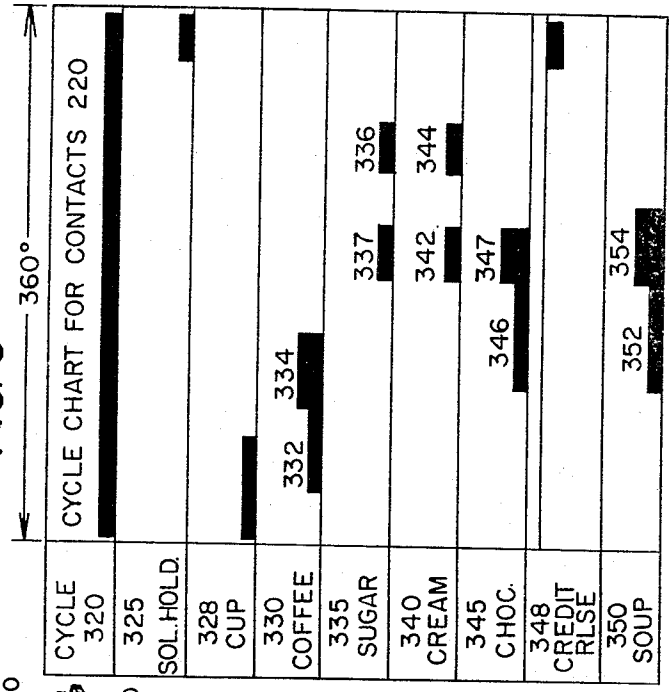
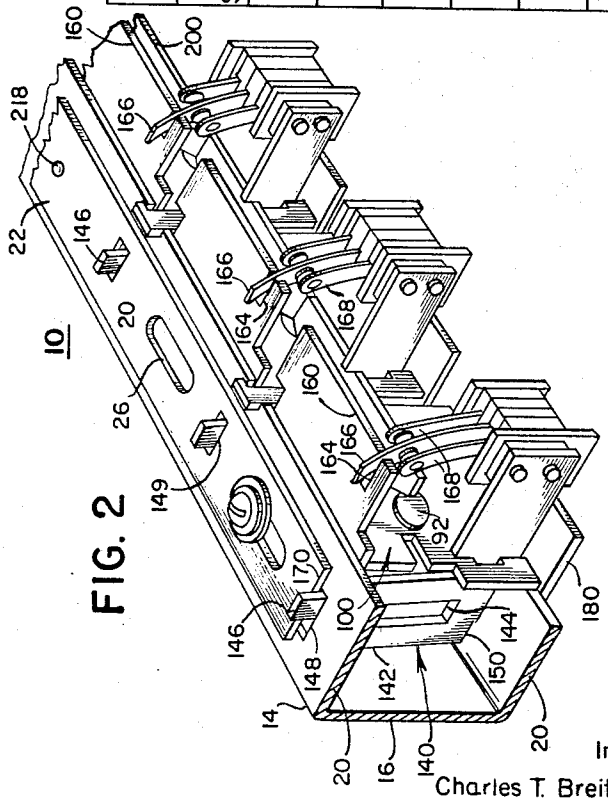
Aug. 1, 1967 C. T. BREITENSTEIN ET AL 3,333,734

SELECTOR SWITCH CONTROL MECHANISM FOR VENDING MACHINES

Filed Dec. 10, 1965 3 Sheets-Sheet 1







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SELECTOR SWITCH CONTROL MECHANISM FOR VENDING MACHINES

Filed Dec. 10, 1965 3 Sheets-Sheet 2

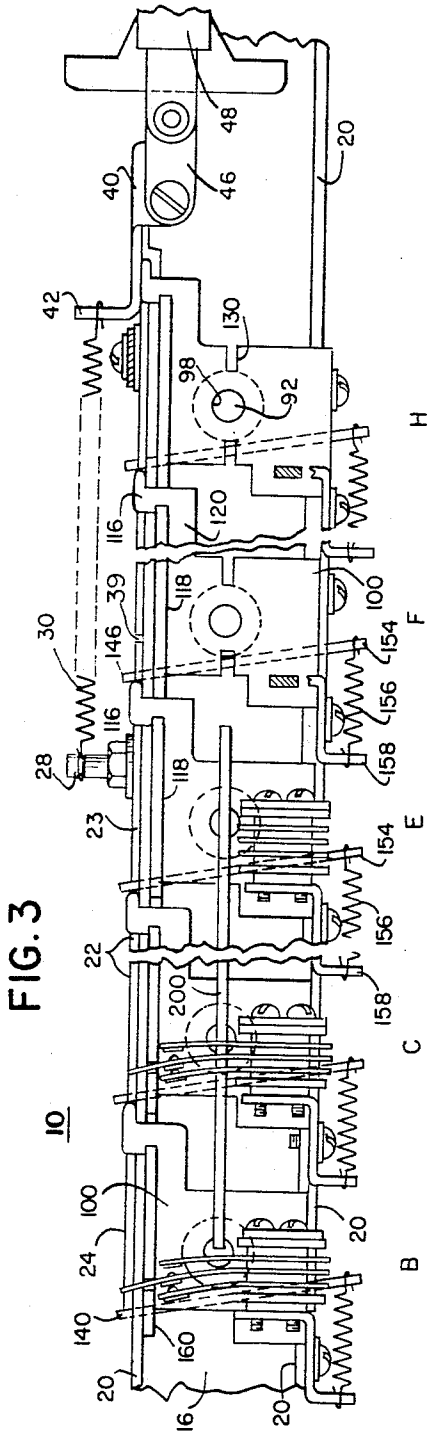


FIG. 3

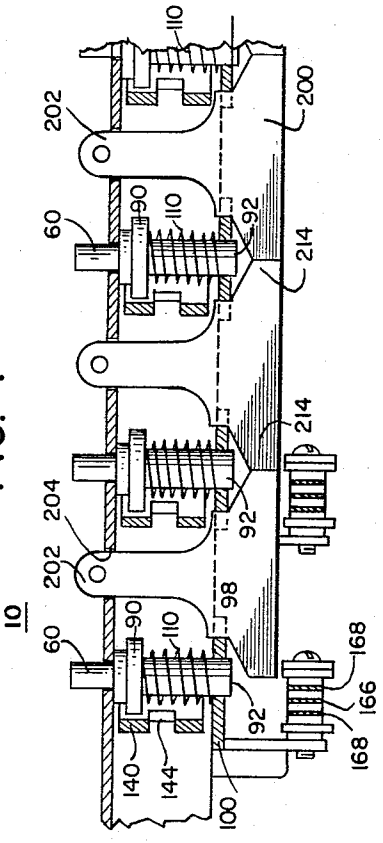


FIG. 4

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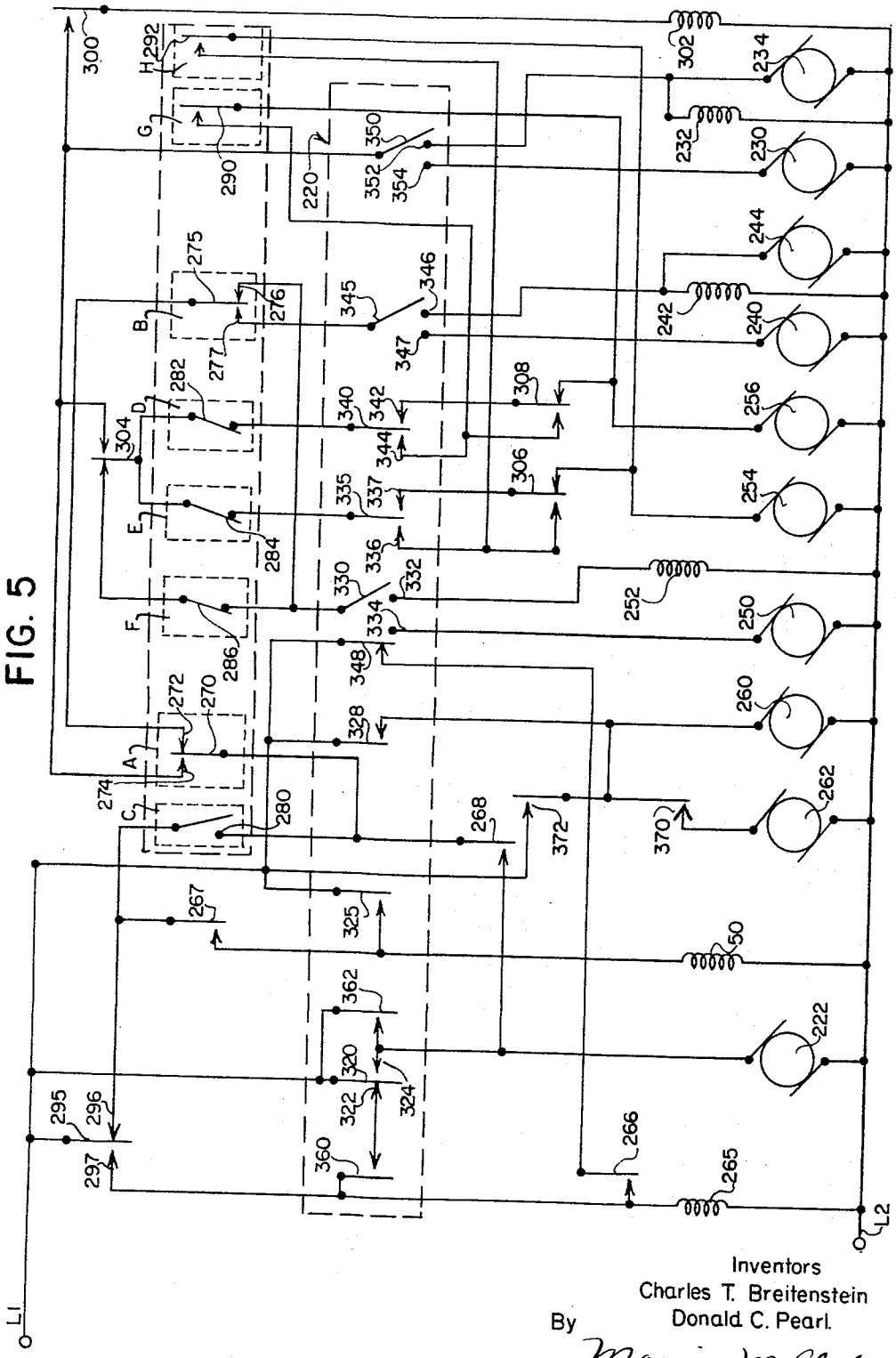
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SELECTOR SWITCH CONTROL MECHANISM FOR VENDING MACHINES

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3 Sheets-Sheet 3

FIG. 5



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SELECTOR SWITCH CONTROL MECHANISM FOR VENDING MACHINES

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8 Claims. (Cl. 222—2)

ABSTRACT OF THE DISCLOSURE

The apparatus shown is a multiple push button selector switch for an electrically operated vending machine. The selector buttons are latched against being actuated until the control solenoid releases a ladder drawbar indicating necessary coinage has been inserted.

Of the selections, one group is considered primary selections each representative of a different finished product. Each selection button controls the mechanical actuation of its mechanism by moving the released drawbar on selection. One of these selection mechanisms (that controlling the most complex product available), is permanently connected to the drawbar so that movement of the drawbar in response to any selection of this group actuates the most complex product selection mechanism. With this most complex selection mechanism actuated, the selected mechanism (if not the most complex) either subtracts functions from the most complex, or modifies functions of the most complex to implement the selection actually made.

The present invention relates to vending machines which dispense one of a plurality of products on selection and more particularly to the use in such machines of an improved control switch apparatus. The present invention constitutes an improvement over the switch mechanism of the type shown in Patent application Ser. No. 350,724 of C. T. Breitenstein for Selector Switch Mechanism for Vending Machines, filed Mar. 10, 1964, now U.S. Patent 3,243,080 issued Mar. 29, 1966.

In recent times, there has been an increasing use of vending machines especially of the more complex, multiple-selection type. The greatest amount of innovation has taken place in the field of machines which store individual ingredients and which on a selection having been made combine the ingredients into the finished product for dispensing. Such machines include those vending hot drinks, carbonated drinks, and iced drinks. In such machines, with the complex cycle of operations necessary to process the product and dispense it, electrical control mechanisms have become indispensable. In the usual electrical control mechanism, the normal technique is to provide each selection with the circuit controllers necessary to complete the cycle of the product selected. Thus, each selection requires sufficient contactors (or other means) to control the production cycle for the selected product. Such a production cycle may include the steps of: positioning a carrier to receive the product, feeding the ingredients in proper amounts to a production area, joining the ingredients together in the necessary process, and dispensing the finished product to the carrier. This approach, the straight-forward one, requires a great number of controllers or contact actuators at each selection. Since each contact actuator uses precious or semi-precious metal contacts, this approach can result in a mechanism having a considerable number of precious metal contacts, each capable of malfunctioning, and in general can lead to mechanisms of considerable cost and low reliability.

It is, therefore, an object of the invention to provide for use in coin-actuated devices such as vending machines, an improved control and selector switch mechanism which minimizes the number of necessary contactors and circuit controlling elements.

It is a further object of the invention to provide a new and improved control and selector switch mechanism for a coin-actuated machine in which a certain one of the selection units is actuated on all selections in addition to the selection made by the purchaser.

It is still a further object of the invention to provide a vending machine with an improved control switch mechanism in which a basic cycle operation of the machine is initiated on all selections, and in which the selection actually made by the customer merely subtracts from or otherwise alters the operation of the basic cycle.

One possible use to which the present invention may be applied is that of a vending machine, such as a hot drink machine. In such a machine there may be a number of individual selections each of which would result in a hot drink of a particular principal type being dispensed. Certain auxiliary ingredients may be added to the drink during the operative cycle by the customer, although all other principal selections should be prevented once a selection has been made. For example, in such a machine there may be the following principal selections: a soup (tea) selection, a hot chocolate selection, a black coffee selection, a coffee with cream selection, a coffee with sugar selection, and a selection of coffee with both cream and sugar. In addition to these principal selections, there could be provided such auxiliary selections as extra cream and extra sugar, these latter selections to be actuated, if desired, in addition to a selection of one of the principal coffee items, listed above. All selections both principal and auxiliary would be locked until released by the proper amount of coinage having been deposited. Once the selected drink had been produced and dispensed, the selector mechanism would again be locked awaiting the next sale. This use is merely cited as an example of an application for which the present invention can be readily be used.

Briefly describing the construction and operation of the present invention, there is provided a selector mechanism with a separate selector unit for each possible selection. Overlying all selector units is a two-selector solenoid-actuated ladder or drawbar which normally latches all selector units against actuation.

The latter is released from its latched condition by solenoid induced movement in response to the proper amount of coinage having been deposited. The ladder sections are joined by a heavy tension spring to move as a unit, so that actuation of the solenoid moves both sections of the ladder to their released condition. This release movement of the ladder frees all the individual selector units for selections. Freeing of the selector units is merely a preparatory step. Actuation of a particular selection is effected by depression of the button representing the desired drink. This depression always causes the actuation of one basic selector unit, that representing the coffee with cream and sugar selection. In addition, depression of the particular selector button actuates its own selector unit. The selection actually made (assuming it is not the basic selection) merely acts to modify the cycle which had been started by the actuation of the basic selection unit. For other coffee selections (without cream, without sugar, or without cream and sugar), the one or both of the ingredients (cream and/or sugar) is omitted from the basic cycle (coffee with cream and sugar) by the opening of a normally closed circuit at the specific selection. For the dispensing of other drinks such as soup or chocolate, normally closed circuits to coffee, cream, and sugar feed control are opened as well as those controlling coffee produc-

tion. The basic cycle is started, and the specific dispensing circuit for soup or chocolate powder is closed. In addition, if tea is desired in place of soup, the tea dispensed is plain, with cream and sugar optional.

By this construction, with the subtraction of functions from, or modifications in the basic circuit, there need only be a single break contact set at each coffee selector unit and only a single break-make combination at each of the selector units for other drinks, such as soup or chocolate. The selector units for the auxiliary ingredients—extra cream or extra sugar—require only a make combination. In this way, the number of contacts at each selection unit is minimized, greatly reducing the cost and complexity of the switch mechanism and greatly increasing its reliability.

The invention both as to organization and principle of operation, together with further objects and advantages thereof will best be understood with respect to the following specification taken in connection with the accompanying drawings in which:

FIGURE 1 is a side elevational view of a preferred embodiment of the invention;

FIGURE 2 is an enlarged partial view in perspective of the rear side of the invention and of the side shown in FIGURE 1 viewed from the remote thereof;

FIGURE 3 is a view in elevation of the rear of the mechanism;

FIGURE 4 is a sectional interior view taken along line **4—4** of FIGURE 2, the view showing the mechanism in its normal position;

FIGURE 5 is a schematic diagram of a portion of a control circuit for a hot drink vending machine utilizing the mechanism shown; and

FIGURE 6 is a cam closure diagram for use with the diagram of FIGURE 5.

Viewing the drawings in detail, there is shown a switch mechanism **10** of the type shown generally in the cited Breitenstein application, over which the present invention comprises an improvement. The mechanism **10** which with its control circuit forms the basis of the present invention, is shown for reference purposes aligned with a partial panel **12** (FIGURE 1) which represents the front panel of a vending machine or the like.

The switch mechanism **10** has as its main structural member an elongated channel frame **14** having a web **16**, and two side flanges **20**. The channel web is considerably longer than it is wide, the length providing room for a plurality of selectors or selector units (A–H) spaced along its length, from one longitudinal end as indicated by the direction arrow **32**, to the other indicated by the arrow **34**. At each selector unit, the channel has a number of slots and circular holes in both flanges and in the web for mounting thereto the operative components of the mechanism.

Mounted slideably to the outside of the left flange is a ladder-shaped drawbar **22** which extends past all the selector units. The drawbar includes two rectilinear sections **23** and **24** joined by a tension spring **30**. The drawbar sections have a series of spaced, longitudinally elongated slots **26** within certain of which are mounted bolts **27**, the bolts being affixed into suitably threaded holes in the flange **20**. This bolt in slot arrangement constrains the drawbar to slide motion along the flange. An intermediate one of these bolts has a knobbed stud **28** above drawbar section **24**, the bolt being affixed to the flange and extending outwardly to anchor one end of a tension spring **30** to the wall of one flange **20**.

Adjacent the channel end **32**, the drawbar terminates in a reinforcing bracket **40**. Bracket **40** has an offset tip **42** extending parallel to stud **28** to anchor the other end of tension spring **30**. In this way, the drawbar **22** is normally biased as a unit by spring **30** toward the stud **28** and therefore toward remote end **34** of the mechanism. The drawbar sections **23** and **24**, as mentioned, are in effect joined by tension spring **30** to generally move the drawbar as a unit in both longitudinal directions. The slit **39** in the drawbar separating both sections occurs as shown in FIGURE 1 between the second and third selector unit from the solenoid end **32** of the drawbar.

The reinforcing bracket **40** is connected through a motion transferring member **46** to the plunger **48** of a solenoid **50**. This solenoid is mounted in the channel, so that its plunger **48** is reciprocable within the channel parallel to the channel web and flanges. On actuation, this solenoid attracts its plunger to pull drawbar **22** toward the end **32** of the mechanism against the bias of tension spring **30**. Spring **30** supplies a restoring force for returning the drawbar to its unoperated position when the solenoid is de-energized. With the solenoid de-energized, the drawbar **22** is held in a position preventing all selections, in a manner to be described.

In FIGURE 1, there can be seen a plurality of aligned selector buttons or shafts **60** which protrude through suitable spaced apart circular openings in the web **16** of the channel frame **14**. These buttons also extend through similar openings in the front panel **12** (FIGURE 1) of the vending machine (not shown) to afford an exposed shaft portion depressible from the exterior of the machine. Each of these shafts may have mounted thereon an enlarged button head (not shown). Each button or shaft represents what will be called herein a selector unit. Each of these selector units has a mechanical structure similar if not identical to that of its neighbor unit, and has electrical circuit contactors responsive to the actuation of the particular unit to effect the dispensing of a product differing in some way from the product dispensed in response to a selection at each other unit.

The earlier described channel, drawbar, and solenoid are disposed commonly with respect to all the selector units A–H.

Viewing a typical unit, as seen in FIGURES 1–4, it can be seen that each button **60** has a radially extending stepped collar **90** midway along its length, this larger diameter collar continuing rearwardly for a short distance. Rearward of the collar, button **60** has a reduced diameter shaft section **92**. Collar **90** is larger in diameter than the adjacent web opening and acts to position button **60** against the web and limit the forward movement of the button.

Each button **60** is journalled adjacent its front in the opening of web **16** and its rear is journalled in an axially aligned opening **98** in a rear bearing plate **100**, individual to the unit. Each bearing plate has mounting configurations extending from the bearing plate (see FIGURE 2) to abut against the outside wall of right flange **20** and be supported thereon by suitable mounting means.

Encircling shaft section **92** between rear bearing plate **100** and collar **90** is a compression spring **110** which biases the button **60** forwardly through web **16**. On depression, the depressed button moves axially rearwardly against the bias of spring **110**.

Adjacent the remote end side each of bearing plate **100**, a latch lever **140** is mounted between the channel flanges. This lever, shown best in FIGURE 2, fits through suitable slots in the flanges to extend across the web perpendicular thereto. The lever has a rectangular main body **142** slightly shorter in length than the width of web **16** and has a rectangular cutout **144** at its center. From one transverse end of the main body **142**, a prong **146** protrudes. This prong fits through an enlarged port **148** in the drawbar side flange **20** approximately midway in the flange depth and continues outwardly through a slot **149** in the drawbar **22**. Toward the opposite end of the lever main body **142**, aligned opposite rectangular recesses **150** are inset into the side edges of the body **142**. These recesses mate in suitable slots in the flange **20** with a spring mounting tab **154** projecting integrally from the lever outwardly past the drawbar flange. The flange slots receive recesses **150** and hold the lever firmly. The lever is mounted pivotally in the channel in a manner eliminat-

ing the necessity for pivot pins and the like. Spring mounting tab **154** holds one end of a tension spring **156** which extends from the lever to a mounting **158** fixed to the channel **14** in the remote end direction to bias each lever in the body of the flange slot. This spring also biases the lever prong **146** toward the solenoid end of the channel.

The latch lever **140** serves to support in a movable manner a contact actuating card **160** which is fabricated of suitable insulating material such as paper or cloth base phenol fiber. This card has in its most exposed edge **162** one or more notched grooves **164**. One of these grooves receives an armature contactor **166** for opening and closing circuits in a known manner. The card **160** is supported for slide motion in a plane parallel and contiguous to the left channel flange. The card rests along the inside of flange **20** and is held thereagainst by an edge **118** of bearing plate **100**. Card **160** is inset with oppositely directed recesses (not shown) aligned to receive mounting members of bearing plate **100** such as aligning lug **116** at one end and elbow **120** leading to lug **116**. The recesses are elongated to allow slide movement of the card relative to the channel while restricting the card to this form of movement only.

To provide the motive force for card **160**, the card has a slit to receive prong **146** of the latch lever therethrough. The lever projects through the card slit and through aligned ports in flange **20** and drawbar **22**. Note that prong **146** of unit A extends through channel slot **148** and terminates adjacent the remote end **170** of drawbar **22**. Drawbar **22** bears against all latch lever prongs to maintain all the latch levers immobile until the drawbar is released on the energization of solenoid **50**, such release preparing the levers for movement of one of their number when it is released by depression of its button **60**.

Each latch lever **140** is normally biased to an unoperated position by its individual tension spring **156** which is attached to the latch lever spring mounting tab **154**. Spring **156** is attached at its opposite end (toward remote end **34**) to a similarly shaped tab **158** of a spring assembly stationary bracket **180**. This bracket is suitably fastened to the outer side of flange **20**, and extends in the main perpendicularly away from the web **16**. At one end, the bracket **180** has a spring assembly **192** including the contactors which comprise an armature spring **166** and one or two stationary springs **168** mounted in a spring pile-up with suitable rectangular insulators spacing and insulating adjacent contact springs. Each armature spring extends through the groove **164** in its card **160** for movement with the card. On such movement, the armature spring **166** makes or breaks circuits to the stationary spring or springs **168** within the spring assembly, as will be explained.

Between each of the selector units which are to be interlocked, there is provided a T-shaped pivot member **200** (FIGURE 4). Each pivot member **200** has a mounting leg **202** extending through a slot **204** in web **16** sized to allow longitudinal pivotal motion of the pivot member **200**. The leg may be mounted to the web by any suitable method, allowing pivotal movement of wings **214** of T-member **200** in a plane longitudinal to the channel web **16** and parallel to both flanges **20**. Wings **214** fit within notches **130** along the center line of the rear bearing plate **100** on either side of pivot member **200**. In this way, the wings **214** are poised outwardly of the rear ends **92** of the buttons **60** of the adjacent units. Thus, the leftmost member **200** extends to the rear of both adjacent selector units A and B. All units are interlocked but the G and H units since they are used to select extra or auxiliary ingredients, i.e., cream and sugar for the dispensed product.

In the description heretofore, a typical unit has been described. Other selector units differ in mechanical construction from that described in detail only, some of the differences of consequence being as follows:

One unit, the C unit, has its card **160** pinned to the ladder section **24** by means of a rivet **218**; this rivet passes through a slot in one of the flanges **20** and causes card C to move the ladder on actuation of any of the units A–F. Selector units G and H are the only ones whose operating levers **140** engage drawbar section **23**, such that their actuating does not affect selector unit C. In the units B–F listed above, the lever prong **146** extends through individual slots **149** in drawbar **22** while the prong **146** of the A unit extends and is maintained adjacent the drawbar end **170**, as indicated for unit A. In addition, for those selections which are not to be interlocked, no pivot member **200** is provided, and thus no wings **214** of a pivot member are poised adjacent the rear end of button **60** of such unit.

Each unit represents a particular selection to be made by the customer. The A unit represents the soup selection or optionally a tea selection, B the chocolate selection, C the coffee with both cream and sugar selection, D the coffee with sugar selection, E the coffee with cream selection, and F the black coffee selection. The G and H selections represent extra cream and extra sugar, respectively. These last units (G and H) may be actuated in addition to the selection for the principal selection, when an extra amount of one or both of these ingredients is desired.

Now turing to FIGURE 5, there is shown a portion of the circuitry for a vending machine necessary to complete the description of the operation of the switch mechanism **10**. Deleted from the showing of FIGURE 5 are other necessary elements of a hot drink machine, such as water level control, heat control, etc. The apparatus of FIGURE 5 includes the electrical circuit contactors which are generally designated **166** and **168** in FIGURES 1–4. The armature contactors **166**, as mentioned previously, are actuated by the mechanism **10**. In addition, FIGURE 5 includes a set of motor-driven cam controlled contact sets generally designated **220**, various control relays, ingredient motors, and a cycle controlling motor **222**. Motor **222** is a conventional timing or cycle control motor which rotates a cam shaft (not shown) through a gear reduction, such that the cam shaft makes one complete revolution and one cycle of its driven cam contact sets **220** in approximately ten seconds.

The circuit of FIGURE 5 is energized by a 110 volt 60 cycle AC source indicated by conductors L1 and L2. Connected to lead L2 are a number of ingredient feed and processing motors and solenoids. For a soup dispensing cycle, there is provided a soup powder feed motor **230**, a soup hot water feed solenoid **232**, and a soup whipper motor **234**. Optionally, a relay **302** with its contact sets **304**, **306**, and **308** may be provided to allow an optional choice of soup in place of tea. This relay is actuated by the manual closure of switch **300** to dispense tea in place of soup. Only one of these options, tea or soup, may be set at any one time.

For a chocolate cycle, there are provided a chocolate powder feed motor **240**, a chocolate hot water feed solenoid **242**, and a chocolate whipper motor **244**. For the basic coffee cycle, and its variations, there are provided a coffee feed motor **250**, a coffee hot water feed solenoid **252**, a sugar feed motor **254**, and a cream feed motor **256**.

In addition, FIGURE 5 includes a cup dispensing motor **260**, a cup turret indexing motor **262**, the selector solenoid **50**, and a credit relay **265**. Credit relay **265** has three normally open contact sets **266**, **267**, and **268**.

The contactors **166** and **168** of the mechanism **10** are labelled A through H to agree with the units previously designated. Within the selection contactors, at selection A there is a break contact combination with an armature contactor **270** which is normally closed to stationary contact **272**. On actuation of selector unit A, armature contactor **270** is moved to open the circuit to stationary contact **272** and to close a circuit to contact **274**. Similarly, at chocolate selection B, there is a break-made contact com-

bination with an armature contactor **275**, normally closed to stationary contact **276**, and on actuation of the button at selection B, this armature contactor opens its circuit to contact **276** and closes to stationary contact **277**. At the remaining selections C through G, there is only provided either a make combination or break combination. At selection C, there is a normally-open, make contact combination **280**. At selections D, E, and F, there are individual normally-closed, break contact combinations, respectively numbered **282, 284** and **286**. Selections G and H have normally-open, make combinations **290** and **292**, respectively.

In addition, the circuit of FIGURE 5 includes coin-actuated switch contact **295** which responds to the insertion of coinage of the proper amount to momentarily open the circuit at its back contact **296** and to close a circuit to its other contact **297**.

The previously mentioned soup or tea toggle switch **300** is shown in the position to produce soup on the depression of button A. When the machine service personnel desires that tea to be dispensed from the A selection in place of soup, the feed ingredients are changed and switch **300** is closed. This closure prepares a path to the soup or tea choice relay **302**. This relay controls three break-make contact combinations **304, 306,** and **308** which complete various circuits for tea vending. The only major difference, in principle, between soup and tea vending, is that provision must be made to add sugar and cream to tea, if desired. For soup, feeding of these added ingredients must be prevented.

Controlled by brewer motor **222** are the previously mentioned sets of cam actuation sequence control contacts indicated generally by the numeral **220**. These cam actuated contacts govern the duration and sequence of operation of the steps necessary to a vend cycle. These contacts control the amount of feed of the ingredients in a cycle. The cams (not shown) for these contacts preferably should be adjustable in throw, so that the amount of feed of each ingredient can be closely controlled and set. Such controls are well-known in the art, and need not be explained in detail. This allusion to the cams is made to emphasize the fact that these control contacts could not be directly added to the selection switch mechanisms without the addition of timing controls and many added circuit components which in themselves would have to perform the timing control function.

The specific details of the closure of the cam actuated contact set **220** are shown in the cam control chart of FIGURE 6 and will now be described briefly. A first of these contacts, movable contact **320**, is normally closed to stationary contact **322**. At the beginning of the operative cycle of the machine, armature contact **320** opens the circuit at contact **322** and closes to contact **324**. This latter circut remains closed for the duration of the machine dispensing cycle. This circuit acts as a holding circuit for cycle control motor **222**, maintaining the control motor operative. Just prior to the end of the machine operative cycle, contact **320** restores to its normal position, releasing the cycle control motor **222**. The adjacent contact set **325** is normally open; it closes once briefly toward the end of the operative cycle and opens prior to the end of the operative cycle. Its function is that of holding solenoid **50** operated once the solenoid initial operating path is opened, as will be explained later.

The next contact set **328** is normally open and pulses once. This pulsing is of brief duration occurring toward the beginning of the operative cycle to initiate the placement of a fresh cup in the liquid receiving station. The cup must be placed to receive the later prepared hot drink at a location accessible to the drink purchaser. The next contact set includes an armature contactor **330** which is normally open with respect to both its stationary contacts **332** and **334**. Contact **330** closes to contact **332** to initiate hot water feed by energizing water feed solenoid **252**. Contact **330** thereafter closes to contact **334** to complete a circuit to coffee feed motor **250** and feed ground coffee while maintaining the closure to contact **332**. Armature contact **330** opens both circuits when the metered amount of water and coffee grounds is dispensed. The next contact set includes an armature contact **335** which is normally open to both of its stationary contacts **336** and **337**. This contact is used to control the feeding of sugar to the drink, whenever necessary, as indicated by the selection closures at switch mechanism **10**. Contact **335** first closes to contact **337** for a timed period to feed sugar to the drink, if desired. At the end of this feed time, armature contact **335** opens the circuit to contact **337** and later closes to **336** to prepare the extra sugar circuit for selection.

The next contact set includes an armature contactor **340** normally open to both its stationary contacts **342** and **344** and which operates in a manner similar to that of contact **335** for the purpose of feeding cream, as necessary. In the next contact set, there is an armature contactor **345** which is normally open to both its stationary contacts **346** and **347**. Armature contact **345** is of the type which will close first to contact **346** and then close to contact **347** maintaining its closure to both of these contacts to meter the amount of hot water and chocolate powder fed to the drink and to control the duration of the whipping action on the resulting beverage. A further contact set **348** is normally closed and opens just prior to the end of the operative cycle of motor **222** to release the hold path to credit relay **265**, and thereby start the release sequence. A final set of cam actuated contacts is operative for the soup cycle, and includes an armature contactor **350** which is normally open to its stationary contacts **352** and **354**. Contact **350** will close to contact **352** to prepare a path to the soup whipper motor and the soup hot water solenoid and will thereafter close to contact **354** to operate the soup powder dispensing motor maintaining a closed circuit to both these contacts for a metered length of time.

These cam actuated contacts will function during each cycle in a generally known manner. In each cycle, a number of the described functions will be prepared within timer cam contacts but will not be completed due to open selection circuits indicating that the circuit closures are not necessary to the drink selected.

In addition to the previously described components, there may be provided normally-open test switches **360** and **362** for testing various circuit functions. In addition, the cup dispensing motor **260** has associated with it two normally open contact sets **370** and **372**. These contact sets each close at the start of the operative cycle to maintain the dispenser motor **260** and turret index motor **262** operative for the duration of their respective operative cycles, in a known manner.

Operation

When coins of proper amount are received, the coin switch transfers its armature **295** from its normal closure to back contact **296** to a momentary closure to contact **297**. The closure completes a path from **L1** through contacts **295–297** to credit relay **265**. Relay **265** energizes and closes its contact sets **266, 267,** and **268**. Shortly thereafter, contact **295** restores to back contact **296** and opens the credit relay energizing path. Relay **265**, however, is locked operated over a hold path through its own contacts **266** and normally closed cam-actuated contact set **348** to conductor **L1**.

At contacts **267**, a path is closed to energize the selector solenoid **50** through the now closed contacts **296–295**. Selector solenoid **50**, on energization, draws its plunger in the direction of arrow **32** (FIGURE 1) sliding drawbar **22** in that direction releasing the levers **140** for selection. At contact set **268** of credit relay **265**, a path to the cycle control motor **222** is prepared pending a selection.

Once the coin insertion has been made, selection of the desired product is made by depressing the button corre-

sponding to the product desired. If soup is desired, button A is depressed. Depression of the button at unit A moves the button shaft and its collar **90** rearwardly. Collar **90** engages with cutout **144** and the latch lever at unit A pivots under the effect of its spring **156**. This lever movement at unit A causes the contact card **160** at unit A to slide in the direction of arrow **32** to actuate contact **270** (FIGURE 5) and open a circuit from contact **270** to contact **272** and to close a circuit to contact **274**. This lever actuation slides drawbar **22** (FIGURE 1) in the direction of arrow **32**. The drawbar movement through its direct connection to unit C moves the contact actuating card of unit C in the actuating direction, closing contact set **280** (FIGURE 5).

As mentioned previously, the collar **90** of the depressed button at the selected unit engages the cutout **144** of the latch lever **140** of its unit and will latch that unit actuated for the duration of the cycle. Latching of the A unit will maintain the closed path through contacts **270–274** to implement the soup cycle. The actuation of the one unit will keep the drawbar in its displaced condition maintaining unit C actuated. This latter actuation maintains the closure of the contact set **280** to keep the basic or control circuit operative. The basic circuit through contact set **280** completes the operating path to cycle control motor **222** through credit relay contact set **268** and restored coin actuated contacts **296–295**. This closed circuit will initiate the operation of the cycle motor **222** and as a result the cycle cam actuated contacts **220** will be started.

It should be noted that the circuit to the coffee feed motor **250** and coffee water solenoid **252** includes a series path between contacts **270** and **272** at unit A. These last-mentioned contacts are now open due to the actuation of armature contact **270** and its closure to contact **274** on depression of the button at the A unit. This closure, as mentioned, prepares a path to the soup ingredient feed components.

Cycle control motor **222** once energized, passes into its operative cycle. First, the motor closes its contact **320** to contact **324** to complete its own hold path. This hold path will remain closed for virtually the entire duration of the operative cycle of the motor (see FIGURE 6) and will result in the continuous operation of motor **222**. Shortly after control motor **222** has passed into its operative cycle, contact set **328** closes to complete a path to the cup dispenser motor **260**. The cup dispenser motor starts into its cycle, closing contacts **370** and **372** to close a circuit to cup index motor **262** and to close an alternate path to dispenser motor **260**. These two motors operate through a complete cycle which results in the placement of an empty cup in a cup filling station of the machine and in the indexing of the cup storage mechanism to ready another cup for a subsequent operation. The cup motors **260** and **262** continue through their cycles to place a fresh cup in position to receive hot beverage from the machine. The functioning of such cup dispensing is generally well-known in the art.

Shortly thereafter in the operative cycle of motor **222**, contact **330** closes to **332**. This closure, however, produces no result in that the circuit to the coffee fill components is open between contacts **270** and **272** at unit A contacts and at the now-open cam contacts **335** and **340**. Motor **222** continues in its cycle and thereafter contact **345** closes to contact **346**, a closure which also has no effect. As the cycle progresses, contact **350** closes to **352** and later to **354** to initiate the feed of soup ingredients to a mixing bowl for subsequent passage to the waiting empty cup. The soup hot water solenoid **232** and the coup whipper motor **234** are first energized through a path through closed contacts **352–350**, **274–270**, **280**, and **296–295**. Soup powder feed motor **230** is later energized through contact **354** which is closed to contact **350**, as contact **350** maintains its closure to contact **352**. Thereafter, contacts **335** and **340** close to their respective contacts **337** and **342**. These closures are ineffective since contact **330** has now restored to its open circuit condition. On the conclusion of the feeding of the water and soup powder, contact **350** restores to its open circuit condition as do contacts **335**, **340**, and **345**.

After a continued period of time, contacts **335** and **340** reclose to their respective contacts **336** and **344** to prepare circuits for the extra ingredients (cream and sugar). These circuits are incomplete, however, due to the previously recited open circuit condition at contacts **270–272** of unit A. Contacts **335** and **340** thereafter restore. By this time, the beverage has been mixed, whipped, and dispensed to the waiting cup; the cycle motor must cycle itself to complete its operative cycle. Thereafter, contact set **325** closes to complete an alternate hold path to the selector solenoid **50**, bypassing credit relay contacts **267**. Contact set **348** releases to open the hold path to credit relay **265** which then restores. On restoration, relay **265** opens its contact sets **266**, **267**, and **268**, in the previously-described circuits. Following the restoration of relay **265**, contact set **325** opens to release selector solenoid **50**. This release of the selector solenoid restores drawbar **22** (FIGURE 1) in the direction of arrow **32** under the effect of bias spring **30** and restores the actuated A and C units to their normal positions. The cycle control motor **222** then completes its cycle on restoration of contact set **348** and contact **320**.

It should be noted that in this cycle the circuit to the sugar feed motor **254** is continuously open even though the extra sugar button may be inadvertently depressed to close contacts **292**. All circuits traced from this motor will be found to be open during the closure of contact **335** to contact **336** or **337**. In a similar manner, cream motor **256** will be maintained inoperative through open circuits within the cam contacts.

The operation of a chocolate cycle is similar to that described for soup except that depression of button B will lead to closure of contact **275** to contact **277** to cause chocolate ingredients to be dispensed in place of soup in the previously described cycle. For chocolate dispensing, the series circuit through now open contacts **275–276** of the B unit will lock out feeding of all coffee ingredients, as in the soup cycle. The soup feed components are inoperative due to the open circuits at the A unit.

Motor **222** is energized (through the automatic closure of contact set **280** at unit C) and closes its contacts **320–324** to lock the motor operated for the duration of its cycle. Contact set **328** closes to operate the cup dispensing through a cycle of operation of motors **260** and **262**. Contact **330** closes to contact **332** and later to contact **334** also, but these closures are ineffective due to the open circuit at contacts **275–276**. Contact **345** closes to contacts **346** and later to **347** to energize both the chocolate powder feed motor **240** and whipper motor **244**. Motors **240** and **244** along with hot water feed solenoid **242** are energized in parallel through closed contacts **346–345** and **347–345**, closed contacts **277–275**, **272–270**, **280**, and **296–295**. The remaining closures at contacts **350**, **340**, and **335** are ineffective.

During this cycle, the hot chocolate is made by the mixing of hot water and chocolate powder in a whipping action. The completed beverage passes to the waiting cup and is removed by the purchaser. The cycle control motor cycles itself through the remainder of the cycle in the manner similar to that described for the soup cycle.

When the purchaser desires the product represented by unit C, i.e., coffee with cream and sugar, he inserts his money to momentarily close contacts **295–297** and energize the credit relay. Credit relay **265** again is energized and locks itself through its own contacts. Coin actuated contact **295** restores to contact **296** causing the selector solenoid **50** to become energized. Energization of the solenoid pulls the drawbar **22** to release all levers **140** for selection. In addition, the circuit cycle motor **222** is prepared awaiting depression of button C. On depression of this button, contact set **280** closes and is latched

in the closed position by the engagement of its lever **140** with its button **60**. Cycle control motor **222** is energized through closed contact set **280** and starts its operative cycle. Contact **320** closes to contact **324** to lock cycle control motor **222** operated. Contact set **328** then closes to cycle the cup motors **260** and **262** and to dispense a cup to the beverage receiving position. Shortly thereafter, contact **330** closes to contact **332** to complete a circuit to the hot water solenoid **252** through contacts **276–275**, **272–270**, and contact set **280**. Thereafter, contact **330** closes to contact **334** to complete the circuit to coffee feed motor **250**.

The production of coffee may take either of two forms; in one form the hot water and coffee solids in the form of soluble powder may be mixed together in a mixing chamber for dispensing to the waiting cup. In the second form, brew solids may be intimately mixed with the hot liquid in a brew chamber for subsequent passage to the waiting cup. In either event, the functioning of the described circuitry (as it affects the operation of the present invention) is similar and proceeds under the control of the cycle motor **222**. As the cycle progresses, the chocolate and soup feed armature contacts **345** and **350** close to their stationary contacts through incomplete circuits to their ingredient motors which remain inoperative. Subsequently in the cycle, contact **335** closes to contact **337** to complete a path to the sugar feed motor **254**. This path may be traced from the motor **254** through contact set **306**, closed contacts **337–335**, contact sets **284**, **304**, **286**, and contacts **276–275**, **272–270**, contact set **280**, and contacts **296–295**. At approximately the same time, the cream feed motor is energized by the closure of contacts **340–342** through contact sets **282** and **304** to the previously described path, through the now-closed chocolate and soup unit contacts (B and A). Energization of sugar and cream feed motors feeds these ingredients to the drink being processed for subsequent passage to the waiting cup.

As the cycle of motor **222** progresses, contacts **335**, **340**, **345**, and **350** restore. Thereafter, the contact **335** closes to its stationary contact **336** and contact **340** closes to its alternate closure at contact **344**. This closure activates the extra cream and extra sugar buttons. If either or both of these buttons are depressed, the button or buttons latch the respective unit or units actuated. At these units, circuits are closed through one or both depressed buttons to the respective feed motor or motors through the series circuit including the A and B unit contacts as previously described. If neither of these auxiliary ingredients (cream or sugar) are desired, neither button G nor button H is depressed, and no activity occurs during this second closure of cam contacts **335** and **340**. In any event, these contacts restore at the conclusion of their periods to complete the feeding of ingredients to the dispensed product. The operative cycle of control motor **222** then continues to the end of its cycle through the pulsing of contact sets **325** and **348**, as previously described. This cycle acts to dispense a cup of coffee with both cream and sugar in normal amounts, or with extra amounts of cream and/or sugar.

If the purchaser desires coffee with sugar (omitting the cream) he will, after inserting the proper coinage, depress button D. The coinage insertion will prepare the circuits as previously described and release all buttons for depression. Depression of the D button will also actuate the C unit through the connection of the C unit card to the drawbar **22**. This depression of the D button opens contact set **282** which is then latched in the open condition for the duration of the operative dispensing cycle of the machine. As described previously, actuation of the D button causes actuation and closure of the C unit contact set **280**. Actuation of the C unit will initiate the operation of cycle control motor **222** through contact set **280**, and as the cycle begins, a cup is dropped to receive the completed beverage and is followed by the feeding of both hot water and coffee solids, as explained previously.

As the cycle passes into the period of closure of contacts **335** and **337**, and **340** to **344**, the dispensing of sugar will be allowed but the dispensing of cream will be prevented. The path to the sugar feed motor **254** may be traced through contacts **306**, **337–335**, contact sets **284**, **304**, and **286** through contacts **276–275**, **272–270**, and contact set **280**. At contact set **282**, the path to the cream motor will be open and remain so for the duration of this dispensing cycle. Thus, no cream can be fed during either this part of the cycle or during the subsequent cycle. In all other respects, this cycle is similar to that previously described for coffee with cream and sugar. In this instance, the actuation of unit D opens contact set **282**, to alter the basic circuit and prevent cream from being added to the beverage.

If the purchaser desires coffee with cream (omitting the sugar), he inserts the coinage and depresses the E button. Depression of this button opens contact set **284** at the E unit, and closes the C unit contact set **280**. Contact set **280** initiates the operation of the cycle control motor **222** and during the cycle will at the proper time initiate the feed of the cup, hot water, and coffee solids. Cream will be fed to the beverage on the closure of contacts **340–342** through closed contact set **282** and the previously described path. The open circuit at open contacts **284** will prevent the feeding of sugar at any time during the cycle. The cycle will progress through the extra feed period and will conclude in the manner previously described. In this case, the open circuit at the actuated unit E opens contact set **284** to omit sugar from the beverage being prepared.

If the purchaser desires black coffee (omitting cream and sugar) he inserts his coinage to release the mechanism for the depression of the F unit button. Depression of this button will cause contact set **286** to open and will close the unit C contact set **280**. Contact set **280** again initiates the operative cycle, the cup feed, and the feed of coffee ingredients. The circuits to both the cream and sugar feed motors will be open at open contact set **286**, so that these ingredients are omitted from the beverage being produced.

From the foregoing it can be seen that on actuation of any of the principal drink selections (A–F), the contact set **280** of the C unit is actuated. This contact set begins the basic cycle. The circuit for feeding coffee ingredients is a series one which must be completed through both the chocolate drink unit (B) and the soup drink unit (A). Depression of either of these last-mentioned units will prevent the feeding of coffee ingredients and will feed the ingredients of the respective drink selected. This alteration of the basic circuit is accomplished through the break-make spring combination at the two non-coffee beverage selection units.

The auxiliary ingredients of a coffee beverage, such as cream and sugar, are subtracted from the ingredients fed to the basic beverage, i.e., coffee with cream and sugar. For omitting these ingredients singly or in combination, individual break-spring combinations are employed to subtract the ingredient or ingredients omitted from the beverage.

While there has been described what is at present thought to be the preferred embodiment of the invention, it will be understood that modifications may be made therein, and it is intended to cover in the following claims all such modifications which fall within the true spirit and scope of the invention.

What is claimed is:

1. In a selection and dispensing control apparatus wherein a number of different products are available for selection, comprising:

(a) a selector switch mechanism including a plurality of manually actuatable selector units, one for each available output product,

(b) switching control means individual to each of said units, said switching control means each individually

operable in response to actuation of the unit individual thereto,

the invention comprising:

(c) a predetermined one of said units actuatable automatically responsive to the actuation of any of said other units, and actuatable in response to a manual selection of the unit individual thereto for operating its switching control means,

(d) circuit controllers at one said unit responsive to the operation of its switching control means for initiating a basic dispensing cycle and for preparing the dispensing of the product represented by said one unit, and

(e) circuit controller sets at each of the remaining units,

(f) said last-mentioned controller sets, each individually responsive to a selective operation of its switch control means to modify the product prepared by the automatic actuation of said one unit to produce the product selected.

2. In an apparatus as claimed in claim 1, the selector switch mechanism comprising:

(a) means mounting said units in rectilinear alignment in said mechanism,

(b) means commonly disposed relative to all said units for preventing said units from being actuated,

(c) release means for disengaging said preventing means to free said mechanism for a selection,

the invention comprising:

(d) means connecting said predetermined one unit to said preventing means, and

(e) means at a unit selectively actuated for moving said preventing means when disenabled and thereby actuating said predetermined one unit concurrently with the actuation of the selected unit.

3. In an apparatus as claimed in claim 1, said selector switch mechanism comprising:

(a) a channel structure with said plurality of units similarly configured and spaced along said channel,

(b) a slide member commonly disposed relative to all said units to prevent said units from being actuated,

(c) means responsive to coin insertions for releasing said slide member for subsequent selection of any one of said units for actuation,

(d) a selector member at each of said units operable to actuate its own unit to select the product represented by its own unit,

(e) means mounting said slide member for slide motion in response to the operation of any one of said selector members,

(f) means connecting said predetermined one unit to said slide member for actuation of said one unit on slide motion of said slide member,

(g) and means for holding said one unit and said selected unit actuated to complete the selected product for dispensing.

4. In a coin-operated selector and dispensing control apparatus for a vending machine wherein one of a number of different output products may be dispensed on selection thereof, and in which there are a plurality of product-making ingredients stored within said machine to comprise each output product, said apparatus comprising:

(a) a selector switch mechanism including a plurality of manually operable selector units, each representing an available output product,

(b) a selection member at each of said units responsive to manual operation thereof to actuate its own unit,

(c) means for debarring more than one of said units from being manually actuated simultaneously,

(d) a plurality of feed means, certain ones of which are operable on actuation of a unit for feeding individual ingredients to produce the product represented by the unit selected,

the invention comprising:

(e) a predetermined one of said units responsive to manual operation of any of said units to become actuated itself,

(f) a set of circuit controllers at said predetermined one unit for initiating a basic dispensing cycle and for preparing certain of the feed means for operation to produce a specific one of said products, and

(g) circuit controller sets at each of the remaining units,

(h) said last-mentioned controller sets, each individually operable on manual, selective actuation of its unit to prevent the operation of one or more prepared feed means and modify the product being dispensed into the product represented by the unit selected.

5. In an apparatus as claimed in claim 4, said mechanism further comprising:

(a) means normally debarring all said units against actuation,

(b) said debarring means responsive to coin insertions for releasing said units for a selection,

the invention comprising:

(c) means affixing said one unit to said debarring means for movement therewith, and

(d) means at each of said units for moving said debarring means on selective actuation of that unit whereby said one unit is actuated automatically with the selected unit.

6. In an apparatus as claimed in claim 5,

(a) said debarring means comprising a ladder structure overlying said units,

(b) a solenoid operated in response to coin insertions to release said ladder structure,

(c) ladder structure moving means at each unit normally engaged against moving said ladder structure, and

(d) means for disengaging the moving means of a selectively actuated one of said units for translatorily moving said ladder structure and operating the circuit controller set of the selected unit,

(e) the circuit controller set of the predetermined unit controlled by the movement of the ladder structure to operate, if not operated by manual selection.

7. In a vending machine, a selector switch mechanism adapted for selective operation comprising:

(a) a plurality of switch units longitudinally spaced along said mechanism, each of said units representative of a product to be vended,

(b) common release means for said units freeing all said units for selection,

(c) wherein each of said units comprises:

(1) a manually actuatable member selectively depressible,

(2) circuit controllers for implementing a selection,

(3) an actuator for operating the circuit controllers of that unit, and

(4) means responsive to the depression of its member only after freeing of said release means for operating its actuator, whereby

(d) the release means responds to the operation of any actuator corresponding to the selection of the unit of that actuator for movement to an operated position,

the invention comprising:

(e) means at one of said units responsive to the movement of said release means for operating the actuator of said one unit to operate the circuit controllers at said one unit,

(f) the circuit controllers at said one unit operative to initiate a vend cycle for the most complex product to be vended, and

(g) the circuit controllers at any of the remaining units operative individually on selection of the unit thereof

to modify the vend cycle of said one unit to that of the product represented by the respective selected unit.

8. In a vending machine, a multiple switch mechanism for selective operation comprising:

(a) a plurality of switch units longitudinally spaced along said mechanism, wherein each unit respectively represents a separate product to be vended,

(b) a common release bar for said units, con-released to free all said units for selection,

(c) each of said units comprising:

(1) a manually actuatable push button selectively depressible,

(2) circuit controllers operable to complete the product to be vended,

(3) a contact actuated for the respective circuit controllers of that unit, and

(4) a lever responsive to the depression of its unit push button only after freeing of said common release means for operating the actuator of that unit,

(d) said release bar responsive to the operation of any of said actuator for movement to an operated position,

the invention comprising:

(e) the circuit controllers at one of said units on operation thereof initiating a vend cycle for the most complex product to be vended,

(f) the circuit controllers at the remaining units individually operable on selection thereof to modify the vend cycle represented by said one unit to that of the product represented by the selected unit, and

(g) the actuator of said one unit directly connected to said release bar for movement therewith to its operated position for operating the circuit controllers of said one unit.

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