A vendor comprising a bank of dispensing modules and a single control module for the dispensing modes, the control module containing the credit system and selector system for all the dispensing modules. Each of the latter comprises a cabinet having a plurality of article dispensers therein one above another adapted to feed articles formed to drop down to a delivery station at the lower front of the cabinet, which has a window in its front door for viewing the articles. Unauthorized access to the dispensers is prevented by a gate which normally blocks off the dispensers from the delivery station, but which opens on initiation of a vend to allow an article to drop down to the delivery station, and which closes in response to dropping of an article. Provision is made for operation of a dispenser for an interval generally sufficient for dispensing an article, and for terminating operation either in response to a drop, or lapse of time if there is no drop.

34 Claims, 19 Drawing Figures
VENDOR PARTICULARLY FOR CARTONS OF CIGARETTES OR LIKE PACKAGES

BACKGROUND OF THE INVENTION

This invention relates to vendors, and more particularly to a vendor for vending cartons of cigarettes or like packages.

The invention is generally in the same field as the vending machine disclosed in the co-assigned U.S. Pat. No. 3,128,013, issued April 7, 1964, and reference may also be made to U.S. Pat. Nos. 2,289,807, 2,590,736, 2,637,611, 2,923,392 and 3,001,669 as prior art known to applicants.

Shoplifting of cartons of cigarettes from the open shelves of supermarkets has come to be a substantial source of loss to the supermarkets, and this invention is particularly directed toward a solution of the problem involving replacement of the open-shelf marketing of cartons by a carton vendor. It will be understood, however, that the principles of the invention are applicable to vendors for a wide variety of articles other than cigarette cartons, e.g., any cartoned merchandise.

SUMMARY OF THE INVENTION

Among the several objects of the invention may be noted the provision of an improved vendor for articles such as cartons of cigarettes, which assures maximum security against pilferage, and which provides for effective display of the articles stocked in the vendor; the provision of such a vendor which, for a minimum of floor space, has a relatively high capacity as regards both selection of items to be vended (e.g., different brands of cigarettes) and number of items in each selection (e.g., number of cartons of each brand of cigarettes); the provision of such a vendor of modular construction enabling installation of a merchandising bank with a number of dispensing modules as may be needed for a particular location, and including a single control module for all the dispensing modules in the bank; the provision of such a vendor which may be controlled by means of validation cards to be purchased by customers, the control module having means for validating inserted cards; the provision of such a vendor which is operable on the first-in first-out principle and as to which the customer receives the article he sees and selects; the provision of such a vendor which may be quickly and easily loaded; and the provision of such a vendor which is reliable and efficient in operation.

In general, a vendor of this invention comprises a cabinet having a front door, with a plurality of article dispensers in the cabinet, one above another, each adapted to hold a row of articles to be vended extending in rear-to-front direction. The forward ends of the dispensers are spaced rearward from the front of the cabinet so that there is a passage between the closed front door of the cabinet and the forward ends of the dispensers. Each dispenser comprises means for feeding the articles forward and discharging the forward article off the forward end of the dispenser to drop down through said passage. The front door has a window for viewing the articles held by the dispensers. At the lower end of the passage below the level of the lowermost dispenser is a delivery chamber for receiving an article dropping from the passage, the front door having a delivery opening for access to this chamber. A gate is movable between a closed position closing off the passage from the delivery chamber below the level of the lowermost dispenser and an open position enabling an article to drop down into said delivery chamber, this gate normally occupying its closed position. Purchaser-operable means is provided for initiating operation of any one of said dispensers to effect discharge of the forward article off the forward end of said dispenser. Means is provided for sensing dropping of an article in the passage, located at a level between the level of the lowermost dispenser and the gate. Means operable independently of the sensing means in response to initiation of operation of any one of said dispensers by said purchaser-operable means is provided for moving the gate from its closed to its open position to enable the article dropping down in said passage to drop into said delivery chamber, and means operable by said sensing means in response to dropping of an article following operation of a dispenser is provided for terminating the operation of the dispenser and returning the gate to its closed position and in response to dropping of an article without operation of a dispenser onto the closed gate for precluding operation of any of the dispensers.

Other objects and features will be in part apparent and in part pointed out hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective of a vendor of this invention, particularly for cartons of cigarettes, comprising four dispenser modules and a control module;

FIGS. 2 and 2A are enlarged fragments of FIG. 1;

FIG. 3 is a front elevation of one of the dispenser modules;

FIG. 4 is a front elevation of the module shown in FIG. 3 with its front door open and broken away;

FIG. 5 is a side elevation of the module shown in FIG. 3 showing a rack of the module pulled out for loading;

FIG. 6 is an enlarged vertical section on line 6—6 of FIG. 3;

FIG. 7 is an enlarged section generally on line 7—7 of FIG. 6;

FIG. 8 is a plan of a vend flap of one of the dispenser modules;

FIG. 9 is an enlarged fragment of FIG. 6;

FIG. 10A is a vertical section showing details of a gate-operating mechanism of a dispenser module with the gate in closed position;

FIG. 10B is a view similar to FIG. 10A showing the gate in open position;

FIG. 10C is a rear view of FIG. 10A;

FIG. 11 is a front elevation of a delivery door mechanism of a dispenser module;

FIG. 12 is a section on line 12—12 of FIG. 11; and

FIGS. 13—16 together constitute a diagram of the electrical circuitry of the vendor.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, first more particularly to FIG. 1, there is generally indicated at 1 a bank of four dispensing modules each generally designated D and each having a plurality of article dispensers 3, and a control module CM common to all the dispenser modules making up a complete vendor of this invention. The four dispenser modules are individually designated D1-D4 and while four of these are shown in a bank, it
is contemplated that different numbers of dispenser modules may be provided under control of the single control module CM; generally there may be from one to four dispenser modules in the bank, and perhaps more. As shown, for the four-dispenser-module installation, it is preferred that two dispenser modules D1 and D2 be provided on one side and two (D3 and D4) on the other side of the control module. The latter contains a credit system for setting up credit via insertion of a validation card (purchased by the customer) for controlling the dispensing of an article from any of the four dispenser modules. Selector means 5 interconnected with the dispensers 3 of all the dispenser modules and operable by a customer to select for operation any one of the dispenser modules, and means constituted by a so-called delivery push button 7 operable by a customer upon establishment of credit via the credit system and selection of the desired article via said selector means for initiating a vend cycle of the selected dispenser.

The dispenser modules D1-D4 are generally identical, each comprising a cabinet generally designated 9 having a front door 11, and a plurality of article dispensers 3, one above another, in the cabinet. Each dispenser 3 is adapted to hold a row of cigarette cartons C to be vended extending in rear-to-front direction. The forward ends of the dispensers 3 are spaced rearward from the front of the cabinet so that there is a vertical passage 13 (see FIG. 6) between the closed front door 11 of the cabinet and the forward ends of the dispensers. Each dispenser comprises means 15 for feeding the cartons forward and discharging the forward carton off the forward end of the dispenser to drop down through the passage 13. The front door 11 is windowed, as indicated at 17 for viewing the cartons held by the dispensers, i.e., for viewing the front of the forward carton of each row. At the lower end of passage 13 is a delivery chamber 19 for receiving a carton dropping from the passage. The front door 11 of the cabinet has a delivery opening 21 for access to this chamber, a delivery door 23 being provided for closing this delivery opening. At 25 is indicated a gate movable between a closed position closing off passage 13 from the delivery chamber 19 below the level of the lowermost dispenser and an open position enabling a carton to drop down into the delivery chamber, this gate normally occupying its closed position. Operation by a purchaser of the delivery button 7 (after establishment of credit and making a selection) initiates operation of the selected dispenser 3 as will appear to effect discharge of the forward carton off the forward end of the dispenser. In accordance with this invention, means indicated generally at 27 in FIG. 6 is provided responsive to initiation of operation of any one of the dispensers by button 7 for moving the gate from its closed to its open position to enable the carton dropping down in passage 13 to drop into the delivery chamber 19. And sensing means indicated generally at 29, which may also be referred to as the vend flap means, is provided, operable in response to dropping of a carton for terminating the operation of the dispenser and returning the gate to its closed position.

More particularly, the cabinet 9, which stands on legs such as indicated at 31, has a bottom 33, left and right side walls 35 and 37, a top 39, and the front door 11. The latter is hinged as indicated at 41 at the left of the front of the cabinet to swing between a closed position, wherein it may be locked by a suitable conventional vendor door lock, and an open position fully opening the front of the cabinet. The door 11 has a lower panel 43 which extends up to a level somewhat below mid-height of the door. In this panel is the delivery opening 21, which is rectangular. Above the panel 43 the door has the glass window 17 extending from the top of the panel substantially to the top of the door and spanning substantially the full width of the door.

The dispensers 3 of each of the dispenser modules D1-D4 are carried one above another in a dispenser assembly or rack indicated in its entirety at 45 (see FIGS. 4 and 5) mounted for movement between an operative position within the cabinet 9 and a forward loading (and servicing) position (see FIG. 5) in front of the cabinet. The rack 45 comprises a bottom plate or pan 47 on a pair of rear wheels each designated 49 and a single central front wheel 51 on a wheel mount 53 which is received in a slot 55 in the bottom 33 of the cabinet when the rack is pushed into the cabinet to its operative position. The rack further comprises a pair of rear posts each designated 57 extending up from the rack bottom 47 at its rear corners and a pair of front posts each designated 59 extending up from the rack bottom at its front corners for supporting the dispensers. These posts extend upwards substantially to the top of the cabinet and are braced at their upper ends by a front brace 61, side braces 63 and a rear brace (not shown).

The delivery chamber 19 (see FIG. 6) has a sheet metal back wall 67 extending across the rack between the front posts 59, extending up generally from just above the level of the bottom of the delivery opening 21 to an elevation somewhat above the level of the top of opening 21. A pair of intermediate side braces 69 extend between the rear posts 57 and the front posts 59 with these braces being slightly inclined upwardly from rear to front and with their forward ends somewhat above the top of wall 67. The rear-to-front dimension of the bottom 47 of the rack is somewhat less than the rear-to-front dimension of the cabinet 9, whereby, when the rack is pushed all the way to its operative position in the cabinet, the front posts 59 of the rack are spaced a predetermined distance rearward of the closed door 11 of the cabinet (see FIG. 6), this distance being sufficient to establish vertical passage 13 between the front of the dispensers 3 carried by the rack and the window 17 for the drop of an item pushed off the front end of any of the dispensers.

The dispensers 3 comprise shelves 71 mounted one above another on the posts 57 and 59 in the rack. As herein illustrated, there may be nine such shelves in the rack (see FIG. 5), each shelf extending from the rear to the front of the rack and from one side to the other of the rack, and being slightly inclined upwardly from the rear to front. Each shelf constitutes a support for two dispensers 3 located side-by-side, with each of the two dispensers adapted to hold a row of cartons extending in rear-to-front direction, and having the means indicated generally at 15 for feeding the row forward to dispense the forward carton C by pushing it forward off the front end of the shelf. Each shelf comprises a flat base plate 75 with upturned integral side flanges 77 and with a central rear-to-front divider 79 dividing it into a left-hand dispenser 3 and a right-hand dispenser 3 for a left-hand and a right-hand row of cartons C. As to each dispenser 3 (i.e., on opposite sides of the divider),
the shelf 71 has a pair of laterally spaced parallel tracks 81 extending from rear to front for supporting the cartons above the base plate 75 and permitting relative free forward sliding of the cartons toward the front of the shelf. Extending from rear to front of the shelf within the channel 83 between each pair of tracks 81 is a feed screw 85 driven via gearing 87 from an electric motor denoted by the reference character M (e.g., a gearmotor) at the rear of the shelf. The two motors for the two feed screws 85 of each shelf unit are mounted on the rear flange 89 of the shelf. Each feed screw is journaled at its rear end in a bearing 91 on this flange and at its front end in a rail 93 at the front of the shelf which is flush with the tracks 81.

The row of cartons C in each dispenser 3 is adapted to be pushed forward to push the forward carton off the rack 93 at the front of the shelf 71 by a pusher 95 adapted to be fed forward by the respective feed screw 85. Referring to FIGS. 6, 7 and 9, the pusher is shown to comprise a plate secured to a block 97 having a bore 99 receiving the feed screw with a sliding fit. A wire bail 101 carried by a lever 103 pivoted at 105 on the block has its crossarm 107 movable in a cutout 109 in the block into and out of engagement with the thread of the feed screw, and is biased by a leaf spring 111 acting on the lever 103 into operative position in engagement with the thread of the screw. The arrangement is such that, with the bail 101 in its operative position with its crossarm 107 in engagement with the thread of the feed screw, rotation of the latter in appropriate direction effects forward feed of the pusher 95 to push the row of cartons C forward. However, the pusher may be released from the feed screw to move it rearwardly independently of the screw for loading by holding down the lever 103.

The delivery chamber 19 includes a vertical front panel 113 spaced in front of its back panel 67 (and spaced forwardly of the plane of the front ends of the shelves), this front panel being mounted on side panels 115 extending forwardly from the front posts 59 of the rack. In the panel 113 is an access or delivery opening 117 which is directly behind and in register with the opening 21 in the front door 11 of the cabinet 9 when said front door is closed. The aforesaid delivery door 23 is vertically slideable on the front of panel 113 between a raised closed position closing the delivery opening 117 and a lowered open position clear of the delivery opening 117, having its side edges slideable in vertical guides 119 at opposite sides of the delivery opening 117. The delivery door is adapted to be locked in its closed position by control means indicated generally at 121, being biased to its closed position against a stop 123 on the panel 113. It has a handle 125 for pushing it down when it is unlocked.

The side panels 115 and the front panel 113 in conjunction with a panel 127 extending downward from the top of panel 67 and curving forward to the bottom of the delivery opening 117 define the delivery chamber 19. The gate 25 is moveable between a forward closed position blocking the top of the delivery chamber 19 and a rearward open position allowing a carton C to drop down through passage 13 to the delivery chamber. Panel 127 is preferably made of a relatively flexible material such as rubber sheeting for cushioning the drop of the carton. The gate 25 is communicated by a sheet metal plate mounted on the upper ends of a pair of arms 129 secured on a horizontal rock shaft 131 extending transversely of the rack 45 just above the bottom 47 of the rack and rearward of the panel 67. The arms 129 extend upward from the rock shaft behind the panel 67, and the gate 25 extends forward from the upper ends of the arms over the top of the panel 67. The rock shaft 131 is journaled at its ends in bearings 133 on the rack bottom 47. The gate is biased to swing to its closed position by a spring 135 connected to one of the arms 129, and swings open in rearward direction against the reverted bias of this spring.

The means 27 for operating the gate 25 comprises a motor 137 (e.g., a gearmotor) for driving the gate to its open position, and permitting it to return to its closed position under the bias of the spring 135. It further comprises a gate-actuating lever 139 pivoted at its lower end as indicated at 141 on a mechanism plate 143, this lever having a pin and slot connection with the gate 25, this connection comprising a slot 145 in the upper end of the lever 139 receiving a pin 147 carried by a bracket 149 extending down from the gate. The lever 139 is operable by a cam 151, the latter comprising a circular disk eccentrically mounted on a camshaft 153 and having 155 formed on its internal cam surface indicated at 157 in FIG. 10A. The lever 139 has a cam follower roller 159 interengageable with this cam surface, and normally engaging said surface under the biasing action of spring 135. The cam normally occupies the home position in which it is shown in FIGS. 6 and 10A in which the lever 139 occupies a forward position (under the bias of spring 135) and the gate 25 is closed. The cam is rotated clockwise from said home position positively to cause the lever 139 to swing rearward to swing the gate 25 rearward to its open position. As will appear, the cam rotates generally through half a revolution from its home position to open the gate, then stops with the gate open until the aforesaid vent flap means 29 has been actuated by a falling carton C. Then the cam returns through the remainder of the revolution to its home position and allows the gate 25 to be returned to its closed position by the spring 135.

At 161 is indicated means for holding the gate 25 from being opened other than by the cam 151 (to prevent it from being manually opened) comprising a ratchet arm 163 pivoted at 165 on the mechanism plate 143 biased to swing downward by a spring 167 and engageable by a pin 169 on the bracket 149 to prevent the gate from being opened. At 171 is indicated means for retracting the ratchet 163 (i.e., raising it) clear of the pin 169 when the cam 151 is in operation to enable the gate 25 to open. This means comprises a cam follower lever 173 pivoted at 175 on the mechanism plate 143 having a roller 177 engageable with a ratchet control cam 179 on the camshaft 153 in front of cam 151 and connected by a link 181 to the ratchet 163. The cam 179 has a notch 183 receiving roller 177 on lever 173 in the home position of the cams 151 and 179 establishing a lowered operative position of the ratchet 163 in which its teeth are engageable by the pin 169. As cam 179 rotates around from its home position, follower lever 173 is swung up to lift the ratchet 163 to its raised retracted position wherein its teeth are clear of the pin 169 to enable the gate 25 to open.

The camshaft 153 is driven by an electric motor 137, which is mounted on the back of the mechanism plate 143. This motor is under control of a pair of switches 187 and 189 controlled by a cam 191 on shaft 153 in
The lever 233 has a finger 247 which is engageable when the lever is in its raised door-closed position with a solenoid-operated latch 249 for locking the lever in this position and hence locking the delivery door 23 in its closed position. The latch is pivoted at 251 on the back of the plate 237, being biased to swing to its latching position through a slot 253 in the plate by a spring 255. The solenoid 257 for operating the latch is also mounted on the back of the plate 237, acting when energized to swing the latch to a retracted position clear of the finger 247 so that the lever may swing down.

The delivery door control means 121 further comprises means for latching the lever 233 down in its door-open position for a predetermined time interval and then releasing it for controlled relatively slow rise slowly to slide the door up to its closed position. This means comprises a latch 259 for the lever 233 pivoted at 261 on the front of the plate 237 having a series of ratchet teeth 263 engageable with the finger 247 on the lever to latch the lever down. The latch 259 is adapted to be held in a retracted position clear of the lever 233 by a detent 265 pivoted at 267 on the front of the plate 237 having a notch 269 receiving a finger 271 on the latch for holding the latch in retracted position. The detent 265 is biased to swing upwardly (clockwise as viewed in FIG. 11) to its operative position when it catches the finger 271 by a tension spring 273 connected between the latch and dentent, and is adapted to be swung downwardly to a retracted position clearing the finger 271 for release of the latch by engagement of the finger 247 on the lever 233 pivoted at 277 on the detent 265 and biased by a spring 279 to swing down against a stop flange 281 at the lower end of the detent. The detent 265 normally holds the latch 259 in its retracted position, as illustrated in FIG. 11. When lever 233 is swung down on opening the delivery door 23 far enough for finger 247 to engage the trip 275, the detent 265 is swung counterclockwise on its pivot 267 to release the latch finger 271 from the notch 269 of the dentent, and latch 259 is thereupon swung clockwise on its pivot 261 by spring 273 for engagement of the lever 233 coming in under the fourth tooth 263 from the lower end of the latch.

On the front of the plate 237 is a door-open signal switch 283 having an operating arm 285 engaged by the finger 247 on the lever 233 when the latter is raised. As the lever 233 is swung down on opening the delivery door 23, the finger 247 moves down away from the operating arm 285 and the latter swings down to deactivate the switch. Also mounted on the front of the plate 237 is another switch 287 having a button 289 controlled by a switch control lever 291 pivoted at 293 on the front of the plate. Lever 291 has an arm 295 at one end engageable with the button 289 and is biased to swing clockwise for engagement of arm 295 with the button by a spring 297. Lever 291 is controlled by latch 259 via a pin 297 at the upper end of the latch and an edge portion 299 of lever 291, the arrangement being such that when the latch 259 is retracted, lever 291 swings clockwise to actuate the switch 287 and when the latch is released by the detent 265 to swing to its latching position, pin 297 acting on the edge portion 299 of the lever 291 swings it counterclockwise to deactivate the switch.

The rise of lever 233 is controlled by a cam 301 on a camshaft 303 driven by a timer motor 305 mounted on the back of the plate 237, and the lever 291 is con-
trolled by another cam 307 on this camshaft, the cam 307 having a notch 309. Lever 291 has a cam follower finger 311 at its end opposite its arm 295 biased by the spring 297 toward engagement with the cam 307. Finger 311 is received in the notch 309 in the home position of the cam 307, enabling lever 291 to swing to its switch-actuating position of FIG. 11. Cam 301 has a rise and a fall 317 so developed and phased that, as the cam rotates through a single revolution cycle clockwise from position 318, in the upward position of FIG. 11, the cam engages a cam follower roller 319 on the lever 233 to swing this lever farther downward to a fully lowered position wherein finger 247 on the lever underlies the lowermost ratchet tooth 263. Shortly after this occurs, the rise 315 of the cam 301 engages the pin 297 on the latch 259 and retracts the latch (i.e., swings it counterclockwise as viewed in FIG. 11) to release the lever 233 so that it may rise and close the door 23. It also recocks the latch 259. Shortly thereafter, the fall 317 of the cam 301 comes around to the follower 319 and, as the cam completes its single revolution cycle, the lever 233 undergoes its controlled rise at a relatively slow rate via engagement of the follower 319 with the fall of the cam 301 relatively slowly to raise the door 23. Motor 305 for the delivery door 23 is energized to start the stated single-revolution cycle by the deactivation of switch 287 on the initial downward swing of arm 295 of lever 291 resulting from the downward swing of lever 233. The cycle is completed when follower finger 311 of lever 291 drops into the notch 309 of cam 307, resulting in actuation of switch 287 to deenergize the door motor 305.

As herein illustrated, each of the four dispensing modules D1–D4 comprises 18 (nine pairs) of the dispensers 3 for a total of 72 dispensers in all so that up to 72 different brands may be vended. It will be understood, of course, that a higher-selling brand may be stocked in two or more dispensers. As to some of the dispensers 3, the cartons C may be placed therein standing on one of their narrow sides with the front face of the forward carton visible through the window 17, and as to other dispensers the cartons may be placed therein flat so that a narrow side of the forward carton is visible through the window. While the latter reduces the capacity of the dispenser (i.e., reduces the number of cartons which may be stocked in the dispenser), it may be used for slower-selling brands and enables closer spacing of the shelves.

Each of the dispensers 3 is alphanumerically coded in relation to the selector means 5, which comprises an alphanumeric selector having a first set of push buttons AB bearing a first code and a second set of push buttons NB bearing a second code. As herein illustrated, the push buttons AB of the first set are alphanumeric buttons bearing an alphanumeric code, nine such buttons being provided, eight of which are used bearing the letters A–H. The push buttons NB of the second set are numeric buttons bearing a numeric code, nine such buttons being shown bearing the numerals 1–9. Each dispenser is assigned a letter and number combination; in the four-module installation with nine shelves 71 and hence 18 dispensers 3 in each of modules D1–D4, the dispensers in the left-hand column of module D1 are assigned the designations A1–A9, and the dispensers in its right-hand column are assigned the designations B1–B9. In module D2, the dispensers are assigned the designations C1–C9 (left) and D1–D9 (right); in module D3 they are assigned the designations E1–E9 (left) and F1–F9 (right); and in module D4, they are assigned the designations G1–G9 (left) and H1–H9 (right). Suitable labels L (such as illustrated in FIG. 2A) are applied to the rails 93 at the front of the shelves 71 bearing these designations for the respective dispensers (72 in all). Thus, the customer may select a particular carton by observing it through the window 17, observing its code designation on the respective label, and pushing in the respective alphanumeric push button AB and numeric push button NB. For example, for selection of the forward carton in dispenser B3, the customer pushes in the button denoted B and the button denoted 3.

Each alphanumeric push button AB acts a pair of normally open switches, these pairs being designated 1A and 2A, 1B and 2B, etc., the last pair being 1H and 2H (see FIG. 14). Thus the push button lettered A when pushed in closes switches 1A and 2A, the push button lettered B when pushed in closes switches 1B and 2B, etc. Each button when pushed in is adapted to be latched in with the respective pair of switches closed by a suitable latch means including a latch solenoid LSI if this solenoid is energized. If it is deenergized, the button will simply snap out. Solenoid LS1 when energized also closes a latch switch LS1a (assuming a button has been pushed in). The numeric push buttons NB operate switches S1–S9, of which S1, S2, S4 and S8 are normally open single-pole switches; S3, S5, S6 and S9 have first and second sets of normally open contacts denoted by a and b, and S7 has three sets of normally open contacts a, b and c. Each of these closes when the respective NB push button is pushed in, and is adapted to be latched closed when the push button is pushed in by suitable latch means including a second latch solenoid LS2 if the latter is energized. Solenoid LS2 when energized also closes a second latch switch LS2a (assuming a button has been pushed in).

In FIG. 15 the delivery motors are charted A1–A9, B1–B9, C1–C9, D1–D9, E1–E9, F1–F9, G1–G9 and H1–H9, A1–A9 and B1–B9 being the delivery motors in dispensing module D1, C1–C9 and D1–D9 being those in the second module D2, E1–E9 and F1–F9 being those in the third module D3 and G1–G9 and H1–H9 being those in the fourth module D4. As shown in FIG. 15, the motors are grouped in eight groups A–H of nine motors each. At MC is indicated a control system for the delivery motors, shown as comprising eight clusters or "relay trees" of relay contacts CA–CH, cluster CA controlling the nine motors of motor group A, cluster CB controlling the nine motors of motor group B, etc. These have a, b, c and d contacts as illustrated in FIG. 15 activated by four relay actuators designated RA, RB, RC and RD. RA actuates the a contacts of each tree; RB actuates the b contacts of each tree; RC actuates the c contacts of each tree; and RD actuates the d contacts of each tree.

The control module CM includes four so-called module relays, one for each of the four dispensing modules D1–D4, these relays being designated MR1–MR4. Either of selector switches 1A or 1B when closed completes a circuit 331 for the module relay MR1 of module D1. Either of selector switches 1C or 1D when closed completes a circuit 333 for the module relay MR2 of module D2. Either of selector switches 1E or 1F when closed completes a circuit 335 for module relay MR3 of module D3, and either of selector switches 1G or 1H
when closed completes a circuit 337 for module relay MR4 of module D4. Selector switches 2A–2H when closed complete respective circuits CCA–CCH to the a contacts of the relay trees CA–CH. At 339 is indicated a circuit for relay RA which is completed when any of switches S1, S3, S5, S7 or S9 are closed. At 344 is indicated a circuit for relay RB which is completed when any of switches S2, S3, S6 or S7 is closed. At 343 is indicated a circuit for relay RC which is completed when any of switches S4, S5, S6 or S7 is closed, and at 345 is indicated a circuit for relay RD which is completed when either of switches S8 or S9 is closed.

Each of the delivery motors (A1–A9, B1–B9, etc.) is connected in a line such as indicated at 347 in FIG. 15 for motor H3 between its respective tree and a terminal of a price board 348. This board has a matrix for setting up any one of five prices for any one of the motors so as to vend cartons C at any one of five prices, the price board end of the line 347 being plugged into the matrix according to the price at which the respective dispenser 3 is to vend into contact with one of the five price conductors PC1–PC5 in the board. At 349 is indicated the validator of the control module CM, this validator being of a known type such as sold by National Rejectors of Hot Springs, Ark., adapted for insertion of a card bearing a magnetic code. Cards of different price levels are provided for insertion in the validator via a slot 350 in the front of the control module to obtain a vend, these cards, in the case of the vendor in a supermarket, being sold to customers at the supermarket checkout counters. The validator 349 comprises means for reading the magnetic code of an inserted card to determine whether or not it is a valid card. If it is a valid card, the reader validates it, resulting in energization of one of a set of five price relays PR1–PR5 according to the amount of credit represented by the card. These relays are interconnected with the validator in the circuit indicated at 351 in FIG. 16, power lines L1 and L2 being shown connected to the validator to supply power for the operation of the validator and the relays. The validator includes a card collection system for delivering validated cards to a collection receptacle in the control module C, and a card return system for returning an inserted card to the customer as, for example, if a customer should desire return of his card before a purchase. Collection is under control of a collection relay 353. Card return is under control of a return relay 355 energized by a card return switch 357 operable by a card return button 359 on the front of the control module.

Each of the validator-controlled price relays PR1–PR5 has a lower set of contacts a, an intermediate set of contacts b and an upper set of contacts c. The lower contacts, which are normally open, are connected to power line L2 in a line 361 including a so-called motor sense relay 363 and connected to the five price conductors PC1–PC5 of the price board 348 via the five price lines indicated at PL1–PL5. The intermediate contacts b of the price relays are connected via a line 365 with the upper contact of a set of contacts b of a so-called vend flap relay 367, and via five lines such as indicated at 369, each including a counter 371 to power line L2 for counting the number of vend at each of the five different prices. The upper sets of contacts c are double-throw contacts, having their movable contacts normally closed upwardly as shown in a circuit 373 from line L1 through the entire set of contacts including normally open upper contacts b of the collect relay 353 and the coil of the vend flap relay 367 to line L2. When the movable contactor of the upper set c of any one of relays PR1–PR5 is pulled down, it directs power from line L1 via a line 375 to the movable contactor of contacts b of the vend flap relay 367.

Referring to FIG. 13, there is shown for dispensing module D4 are respective gate motor 137, gate-actuated switch 203, gate control cam switches 187 and 189 and vend flap switches 227 and 229; also the delivery door motor 305 and locking solenoid 257 and the delivery door switch 283. For purposes of simplifying the illustration, the gate control cam 191 is represented as two separate cams driven by the gate motor 137. Each of the module relays MR1–MR4 for the modules D1–D4 includes four sets of contacts a, b, c and d. Relay MR1 is energized via line 331 whenever either of push button switches 1A or 1B is closed. Relay MR2 if energized via line 333 whenever either of push button switches 1C or 1D is closed. Relay MR3 is energized via line 335 whenever either of push button switches 1E or 1F is closed, and relay MR4 is energized via line 337 whenever either of push button switches 1G or 1H is closed.

The motor sense relay 363 has two sets of contacts a and b. Set a is connected in a gate signal line 377 off power line L1 for signalling the gate motors of the four dispensing modules D1–D4 to start. As to each module, its gate motor 137 is connected in a branch line 379 off the gate signal line 377 including the module relay contacts c, and the gate cycle switch 189 to a connection 381 with power line L2. Thus, with the gate cycle switch 189 closed, when a module relay, e.g., MR4, is energized and the motor sense relay 363 is energized, the respective gate motor 137 is energized. It remains in operation for a half revolution of the camshaft 153, at which point switch 189 opens. The switch 187 (which may be referred to as a full cycle switch) is a double-throw switch having as its movable contactor normally closed on its lower contact, as shown.

Contacts d of each module relay MR, which are normally closed, are connected in a line 383 between line L1 and the movable contactor of switch 187. A line 385 connects the upper contact of switch 187 to line 379 between the switch 189 and the motor 137, and a line 387 including the delivery door-locking solenoid 257 connects the lower contact of switch 187 and the lower contact of gate switch 203 (which is a double-throw switch). The movable contactor of switch 203 is connected to line L2, and its upper contact is connected via a line 389 to a so-called inhibit circuit 391 which includes a line 393 common to the four modules D1–D4 having branch lines 395 for the respective modules, each branch line being connected to power line L2 and including the respective delivery door switch 283 and contacts b of the respective module relay. The delivery door motor 305 of each of modules D1–D4 is connected between lines L1 and L2 in a motor circuit 397 including the switch 287 (which is closed when the delivery door is opened).

At 399 is indicated a so-called operation relay having lower and upper contacts a and b, this relay being connected between lines L1 and L2 in a circuit 401 including the normally closed upper set of contacts c of a so-called delivery relay 403. The inhibit circuit includes a line 404 including the upper contacts b of the operation relay 399 connected between the common inhibit line.
The delivery relay 403 has three sets of contacts indicated at $a$, $b$, and $c$. It is connected off line 375 via the load of its set of contacts $b$ of the vent flap relay 367 in circuit 405 including a delivery switch 407 which is operated by the delivery push button 7, and latch switches LS1a and LS2c, and leading to line L2. The latch solenoids LS1 and LS2 are connected in parallel with one another for simultaneous operation in a circuit 409 taken off circuit 405 on the L1 side of the delivery switch and including a normally closed reset switch 411 operable by a reset push button 413 on the front of the control module CM to deenergize the latch solenoids to enable a change in selection. The movable contactor and lower contact of the set of contacts $a$ of the delivery relay 403 are in a holding circuit 415 for the delivery relay connected via circuit 405 between the lower contact of the set of contacts $b$ of the vent flap relay 367 and the L1 side of the delivery relay. The movable contactors of the letter switches 1A–1H and the numeric switches S1–S9 are connected to branch lines 417 and 419 from a line 421 interconnected with circuit 405 on the L1 side of the delivery relay.

At 423 is indicated a time-delay relay which functions to provide a timed interval for delivery of a carton and return of a carton if a carton should not be delivered within that time interval, which may be, for example, some 40 to 45 seconds. This allows time for forward feed of a carton from the rear to the front of any one of the shelves 11, in accordance with the rate of forward movement of the pusher 95 by the feed screw, so as to provide for delivery in a situation where a service man may have left one carton in a dispenser 3 with the respective pusher 95 at the rear of the dispenser. This relay has a set of normally open contacts $a$ and a set of normally closed contacts $b$. It is connected in a circuit 425 between lines L1 and L2 including the normally closed upper contacts $c$ of the vent flap relay 367, and the normally open lower contacts $a$ of the operation relay 399 to start its time-delay function on closure of contacts $a$ of the operation relay. The latter is a time-delay relay with a time-delay interval, with a delay on opening of the order of 100 milliseconds, for example. It is normally energized, its lower opening contacts $b$ being closed when it is energized (as illustrated in FIG. 14). The movable contactors of switches 2A–2H of the selector 5 are connected to a line 429 including the upper contacts $c$ of the time-delay relay 423 taken off line 425. The lower contacts $a$ of the time-delay relay 423 are connected in a line 431 taken off line 405. The card return switch 357 is connected as shown in FIG. 16 in a line 433 between line 431 and the upper contact of the set of contacts $b$ of the delivery relay 403, with a line 435 connecting the movable contactor of this set to line 415, and a line 437 connecting the lower contact of this set to line 409. The card return relay 355 is connected in a line 437 between line 431 and line L2. Normally open contacts $a$ of the card return relay 355 are connected in a line 439 between a low-voltage power source 441 (associated with the validator) and the card return means (not shown) of the validator for effecting actuation of the latter to return an inserted card. The card collection relay 353, which is a time-delay relay having a delay interval of the order of 100 milliseconds, for example, is connected between L1 and L2 in a line 443 taken off line 425, the circuit being such that the collection relay is deenergized with a time delay when the vent flap relay 367 is deenergized. On deenergization of the collection relay (after its time-delay interval), its lower contacts $a$ close and complete a circuit 445 from the power source 441 to effect collection of an inserted card. Also, its upper contacts $b$ close to complete circuit 372 to reenergize the vent flap relay 367 (assuming price relays P1–P5 are deenergized).

Means is provided for utilizing the time-delay relay 423 to provide for return of an inserted card after a relatively short time-delay interval (e.g., one second) in the event the customer makes a selection of a brand selling at a price other than that represented by the inserted card. This means comprises a resistor 447 connected as indicated at 449 with the relay, and adapted to be shorted via a shorting circuit 451 including the upper contacts $b$ of the motor sense relay 363 in its normally closed condition of these contacts when the relay 363 is deenergized. When resistor 447 is shorted (relay 363 deenergized), the delay interval of relay 363 is short (e.g., one second); when the resistor shorting circuit 451 is open (relay 363 energized) and its contacts $b$ open, the delay interval of relay 423 is long (e.g., 40–45 seconds).

The normally closed contacts $a$ of the four module relays MR1–MR4 are connected in series with the normally closed lower contacts $a$ of the vent flap relay 367 and the vent flap relay 367 itself in a so-called vent flap line 453 between lines L1 and L2. The vent flap relay is normally energized and is connected to contacts $a$, $b$, and $c$ in their condition with this relay energized. As to each of the modules D1–D4, the two vent flap switches 227 and 229 are connected in a shunt circuit 455 around the contacts $a$ of the respective module relay. When any module relay is energized, meaning that its contacts $a$ are open, circuit 455 functions as a holding circuit to maintain the vent flap line 453 and the vent flap relay energized until the circuit 455 is broken.

Operation is as follows:

The customer purchases a validation card to establish credit in the credit system of the control module CM in the amount corresponding to the price of the carton to be purchased, in accordance with directions on the front of the control module, inserts the card in the slot 350 of the validator 349 in the control module. The card (being a valid card) effects energization of the price relay PR corresponding to the card value, and for purposes of illustration it will be assumed that the inserted card effects energization of the first price relay PR1 with resultant closure of its lower contacts $a$ to complete a circuit via price line PL1 to the first price terminal conductor PC1 of the price board 348. This sets up the control module CM for the vending of any carton C selling at the first price. The intermediate set of contacts $b$ of relay PR1 close to set up the control module for actuation of the counter 371 for cartons of the first price. The movable contactor of the upper set of contacts $c$ of relay PR1 closes on the lower contact of the set to complete a circuit from line L1 via line 375, the movable contactor and lower contact of the intermediate set of contacts $b$ of the vent flap relay 367, part of line 405, and line 409 via the reset switch 411 (normally closed) and the parallel circuits for the latch solenoids LS1 and LS2 to line L2, thereby energizing the two latch solenoids. This conditions the al-
In accordance with the directions on the front of the control module, the customer then pushes in the alphabetic button AB and the numeric button NB that may be pushed in. With the buttons pushed in, it also closes latch switches LS1a and LS2a. The phanumeric selector 5 for holding in any one of its alphabetic push buttons AB and any one of its numeric push buttons NB that may be pushed in. With the buttons pushed in, it also closes latch switches LS1a and LS2a.

With alphabetic switch 2H closed (as herein assumed), power is directed via this switch and line CCH to the relay tree 1C (for the H group of delivery motors). With numeric switch 3S closed (as herein assumed), power will have been directed from line 419 (supplied from line L1 via contacts b of the vend flap relay 367 and lines 405 and 421) through lines 339 and 341 to energize relays RA and RB so that the a and b contacts of all the relay trees are closed. With the a and b contacts of tree CH closed, power is directed through line 347 including the delivery motor H3, the price board conductor PC1 to which line 347 is connected, the price line PL1, closed contacts a of the price relay PR1, and line 361 including the motor sense relay 363 to line L2.

The delivery motor H3, thus set into operation, drives the feed screw 85 of the dispenser 3 for the H3 cartons, and the screw drives the respective pusher 95 forward to push the entire row of H3 cartons forward. Immediately upon energization of the motor sense relay 363 and closure of its lower contacts (i.e., in response to starting the delivery motor), a gate signal is transmitted from line L1 via closed contacts a of the motor sense relay, line 377, and line 379 for the module D4, through the closed contacts c of module relay MR4, the closed gate cycle switch 189 and the gate motor 137 to line L2 at 381. The gate motor 137 of D4 therefore starts up and rotates the camshaft 153 and cam 151 to effect opening of the gate 25 of D4. Switch 189 remains closed for half a revolution of the camshaft, noting that after half a revolution, the roller 197 at the end of operating arm 201 of this switch drops into the notch 193 in cam 191 on the camshaft to open the switch. This stops the gate motor 137 with the gate 25 in its open position. When the gate opens, switch 203 is deactuated, i.e., its movable contactor opens off its lower contact and closes on its upper contact.

In the usual course of events, the delivery motor H3 in module D4 continues in operation to push the H3 cartons forward until the forward H3 carton is pushed over the rail 93 at the front of the H3 shelf 71 and drops down in the passage 13, falling into the delivery chamber 19 of D4. As the carton falls in passage 13, it strikes the fingers 219 of the vend flap 29 of D4 and swings this flap down, spring means 225 being light enough to permit the carton readily to swing the flap down, and functioning to swing the flap back up after the carton has passed by the flap. On this actuation of the vend flap of D4 by the falling carton, the vend flap switches 227 and 229 of D4 open, breaking the circuit 453 for the vend flap relay 367 so that its contacts a and c open, and the movable contactor of its set b opens off the lower and closes on the upper contact of set b. Opening of said contacts c opens the circuit 425 to cut off power to the delivery motor H3 and the latter stops before the next carton is pushed off. The opening of the movable contactor off the lower contact of set b opens the circuit 405 to deenergize the latch solenoids LS1 and LS2 for reset of the selector (i.e., for return of its buttons H and 3 to their outward position), and to deenergize the delivery relay 403 and the module relay MR4. Closing of the movable contactor on the upper contact of set b closes the counter circuit 365 to actuate the counter 371 for cartons of the H3 price. Opening of contacts c also opens circuit 443 for the collect relay 353 and, after its time-delay interval, its lower contacts close to signal the validator 349 via line 445 to collect.
the inserted card, upon which the validator deenergizes the price relay PR1. On deenergization of relay PR1, and resultant return of the movable contactor of its set of contacts c to the upper contact, circuit 373 is completed via the upper contacts b (now closed) of the collect relay 353 to reenergize the vend flap relay 367, which closes its lower contacts a to remain energized and closes its upper contacts a to reenergize the collect relay 353.

On deenergization of the module relay MR4, its contacts d re-close. At this point, with cam 191 half way around from its home position of FIGS. 6 and 13, switch 187 is closed on its upper contact. Accordingly, a circuit is completed for the gate motor 137 of module D4 from line L1 via 383, 385 and 379 to 381 and L2. The motor 137 remains in operation for a half revolution of the camshaft 153 and cam 151 to return the gate 25 of module D4 to its closed position, stopping when cam 191 reaches its home position and switch 187 opens off its upper contact via roller 195 on its arm 199 dropping into the notch 193. When the gate is closed, the gate switch 203 is closed back on its lower contact relay 353, and the door lock solenoid 457 for the delivery door 23 of module D4, thereby retracting the door latch 259 to unlock the delivery door.

With the delivery door 23 unlocked, the customer may now push down to open it via the handle 125, and reach in to obtain the vended H3 carton from the chamber 19. As he pushes the door down, the lever 233 is swung down against the return bias of spring 239, and latched down by the latch 259. As it swings down, switch 287 is deactuated to start the door motor 305 operating through a single revolution cycle of the cam 301, which first drives the door 23 down to its fully open position, where it remains for a sufficient length of time for the customer to obtain the carton, and then is driven back upward by its closed position with the controlled rise by the cam via the lever 233.

Operation for cards of other prices and other selections is believed apparent from the above and hence is not described in detail.

As previously noted, on closure of contacts a of the operation relay 399, which occurs after insertion of a card, making a selection and pushing the delivery button 7, a circuit is completed via line 425 to the time-delay relay 423. If the customer should have selected a carton selling for a price different from the price represented by the inserted card, the relay 423 will operate to close its lower contacts a and open its upper contacts b after its short (e.g., one second) time-delay interval, and effect return of the card (without a vend). Assume, for example, the customer inserts a PR2 card for the H3 carton selling at the PR1 price. Since this will energize the PR2 relay instead of the PR1 relay, the circuit through motor H3 (which requires price line PL1) cannot be completed, and the motor sense relay 363 remains deenergized. Accordingly, the resistor 447 remains shunted out, and the relay 423 times out its one-second delay interval, and then its lower contacts a close to complete a circuit for the card return relay 355 via line 437 to return the inserted card to the customer, and its contacts b open to break line 429.

Assuming, however, that the customer has selected a dispenser 3 for carton selling at the price represented by the inserted card, but that this dispenser is empty, on his operating the delivery button 7, the delivery motor for that dispenser will operate and the motor sense relay 361 will be energized in response to operation of the delivery motor to break the short circuit 451 for resistor 447, with the result that the relay 423 proceeds to time out its long delay interval (e.g., 40 to 45 seconds). When this interval expires, without delivery of a carton and hence without operation of the vend flap 29 and the vend flap relay 367, contacts a of relay 423 close for return of the inserted card and contacts b open to cut out line 429. As previously noted, the long delay interval of relay 423 is somewhat longer than the interval of time required for a pusher 95 to push a carton standing on one of its narrow sides from the rear to the front of a shelf, to allow enough time for vending the last remaining carton from a shelf in a situation where the pusher 95 for some reason is at the rear of its stroke.

From the above, it will be observed that prior to a vend, the gate 25 of each of the four dispensing modules D1–D4 is closed and locked in closed position by the interaction of lever 139 and cam 151. The delivery door 23 of each of the modules D1–D4 is unlocked and can be opened, but the gate, being closed, prevents access to the shelf 71 via the delivery opening 21. If a module should be shaken or tilted to cause a carton (or more than one carton) to fall off the forward end of a shelf and down through the passage 11, the carton is interrupted by the closed gate to keep it from falling into the delivery chamber, and swings the vend flap 29 down far enough to open switches 227 and 229, with the result that that module is deactivated. This precludes shacking off one or more cartons and obtaining them by buying one carton. The other modules, however, remain operable. When the gate opens on a vend, the delivery door 23 is locked.

It is remotely possible for a carton dropping into the chamber 19 to stand on end, in which case the gate 25 in returning to its closed position, will jam against the upper end of the standing carton generally midway of its return stroke. This occurs at a point following the unlocking of the delivery door 23. The latter may then be opened, and the carton tugged out, enabling the gate to close. But opening of the gate is precluded by the ratchet 163.

The cartons in each of the dispensing modules D1–D4 are unobstructedly displayed through the window 17, and the carton seen is the carton delivered, as is desirable. At the same time, each dispensing module is easy to load by opening the front door 11 of the cabinet 9 and rolling out the rack 45 for quick easy loading of the shelves 71 from the sides of the rack. Loading of each dispenser 3 is effected by releasing the pusher 95 from the feed screw 85 and sliding the pusher back to the rear of the dispenser, then inserting cartons from the side behind those left in the dispenser for first-in, first-out dispensing. Utilization of the single control module CM (which contains the credit system and selection system for all the dispensing modules) is advantageous not only to simplify the dispensing modules and reduce their cost, but also to reduce their width to a minimum.

As herein illustrated, operation of the vendor is controlled by insertion of a validation card in the validator 349 of the control module CM. It will be understood that the principles of the invention are applicable to a vendor as to which operation is controlled by a payment item other than a card, e.g., currency, a check or token, or piece of scrip. The term "payment item" is
intended to cover any item such as may be inserted to exercise control, which represents the price of an article to be held by the dispensers which may be validated.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. A vendor comprising:
a cabinet having a front door,
a plurality of article dispensers in the cabinet, one above another, each adapted to hold a row of articles to be vended extending in rear-to-front direction,
the forward ends of the dispensers being spaced rearward from the front of the cabinet so that there is a passage between the closed front door of the cabinet and the forward ends of the dispensers,
each dispenser comprising means for feeding the articles forward and discharging the forward article off the forward end of the dispenser to drop down through said passage,
said front door being windowed for viewing the articles held by the dispensers,
a delivery chamber at the lower end of said passage below the level of the lowersmost dispenser for receiving an article dropping from the passage, the front door having a delivery opening for access to said chamber,
a gate movable between a closed position closing off said passage from the delivery chamber below the level of the lowersmost dispenser and an open position enabling an article to drop down into said delivery chamber, said gate normally occupying its closed position, purchaser-operable means for initiating operation of any one of said dispensers to effect discharge of the forward article off the forward end of said dispenser,
means for sensing dropping of an article in said passage, said sensing means being located at a level between the level of the lowersmost dispenser and the gate,
means operable independently of said sensing means in response to initiation of operation of any one of said dispensers by said purchaser-operable means for moving the gate from its closed to its open position to enable the article dropping down in said passage to drop into said delivery chamber,
means operable by said sensing means in response to dropping of an article following operation of a dispenser for terminating the operation of the dispenser and returning the gate to its closed position, and in response to dropping of an article without operation of a dispenser onto the closed gate for precluding operation of any said dispensers.

2. A vendor as set forth in claim 1 wherein each dispenser comprises a shelf for holding said row of articles, and means for pushing the row forward to push the forward article off the front end of the shelf, operation of said pushing means being initiated by said purchaser-operable means and terminated by said article-drop-sensing means.

3. A vendor as set forth in claim 2 wherein said pushing means comprises a feed screw extending from rear to front of said shelf, an electric motor at the rear of the shelf for driving the screw, a pusher, and means for releasably coupling the pusher to the screw.

4. A vendor, as set forth in claim 1 wherein said article-drop-sensing means comprises a flap extending into said passage above the gate.

5. A vendor comprising:
a cabinet having a front door, a plurality of article dispensers in the cabinet, one above another, each adapted to hold a row of articles to be vended extending in rear-to-front direction, the forward ends of the dispensers being spaced rearward from the front of the cabinet so that there is a passage between the closed front door of the cabinet and the forward ends of the dispensers, each dispenser comprising means for feeding the articles forward and discharging the forward article off the forward end of the dispenser to drop down through said passage, said front door being windowed for viewing the articles held by the dispensers, a delivery chamber at the lower end of said passage below the level of the lowersmost dispenser for receiving an article dropping from the passage, the front door having a delivery opening for access to said chamber, a gate movable between a closed position closing off said passage from the delivery chamber below the level of the lowersmost dispenser and an open position enabling an article to drop down into said delivery chamber, said gate normally occupying its closed position, purchaser-operable means for initiating operation of any one of said dispensers to effect discharge of the forward article off the forward end of said dispenser,
means responsive to initiation of operation of any one of said dispensers by said purchaser-operable means for moving the gate from its closed to its open position to enable the article dropping down in said passage to drop into said delivery chamber, and means operable in response to dropping of an article for terminating the operation of the dispenser and returning the gate to its closed position, a delivery door for closing said delivery opening, and means for locking said delivery door closed while the gate is open.

6. A vendor as set forth in claim 5 wherein the delivery door, when unlocked, is adapted to be manually opened, and having means operable in response to opening the delivery door for holding it open for a predetermined time interval and then closing it.

7. A vendor as set forth in claim 6 having means responsive to opening of the gate for unlocking the door.

8. A vendor as set forth in claim 6 having means for inhibiting operation of any of the dispensers in the cabinet in response to the delivery door being opened before initiation of an operation.

9. A vendor as set forth in claim 5 having means for inhibiting operation of any of the dispensers in the cabinet in response to the gate being open before initiation of an operation.

10. A vendor as set forth in claim 9 further having means for inhibiting operation of any of the dispensers
in the cabinet in response to the delivery door being opened before initiation of an operation.

11. A vendor as set forth in claim 1 wherein the dispensers are mounted for movement between an operative position within the cabinet and a loading position in front of the cabinet.

12. A vendor as set forth in claim 11 wherein each dispenser comprises a shelf for holding said row of articles, the shelves being mounted one above another in a rack, the rack being mounted for movement between an operative position within the cabinet and a loading position in front of the cabinet, the rack being open at the sides for side loading of the dispensers.

13. A vendor as set forth in claim 1 having means for insertion of a payment item representing the price of an article, and means operable to effect return of said item if the article-drop-sensing means is not actuated within a predetermined time interval.

14. A vendor as set forth in claim 1 for vending different articles from different dispensers having means for insertion of payment items representing said different articles, and means operable to effect return of an inserted item within a predetermined time interval upon selection of an article different from that represented by said item.

15. A vendor as set forth in claim 14 further having means operable to effect return of said item if the article-drop-sensing means is not actuated within a predetermined time interval.

16. A vendor as set forth in claim 15 wherein the first time interval is relatively short and the second interval is relatively long.

17. A vendor as set forth in claim 16 having a single timer means for said return means, said timer means normally timing out said relatively short interval, and means responsive to operation of the feeding means of any dispenser to actuate the timer means to time out said relatively long interval.

18. A vendor comprising:

a cabinet having a front door,

a plurality of article dispensers in the cabinet, one above another, each adapted to hold a row of articles to be vended extended in rear-to-front direction,

the forward ends of the dispensers being spaced rearward from the front of the cabinet so that there is a passage between the closed front door of the cabinet and the forward ends of the dispensers,

each dispenser comprising means for feeding the articles forward and discharging the forward article off the forward end of the dispenser to drop down through said passage,

said front door being windowed for viewing the articles held by the dispensers,

a delivery chamber at the lower end of said passage below the level of the lowermost dispenser for receiving an article dropping from the passage, the front door having a delivery opening for access to said chamber,

gate movable between a closed position closing off said passage from the delivery chamber below the level of the lowermost dispenser and an open position enabling an article to drop down into said delivery chamber, said gate normally occupying its closed position,

each dispenser comprising a shelf for holding said row of articles, the shelves being mounted one above another in a rack, the rack being mounted for movement between an operative position within the cabinet and a loading position in front of the cabinet, the rack being open at the sides for side loading of the dispensers, and means mounting the gate on the rack below the lower-most shelf.

19. A vendor as set forth in claim 18 having two dispensers side-by-side on each shelf, each dispenser comprising means for pushing the respective row of articles forward to push the forward article off the front end of the shelf.

20. A vendor as set forth in claim 19 wherein said pushing means comprises a feed screw extending from rear to front of said shelf, an electric motor at the rear of the shelf for driving the screw, a pusher, and means for releasably coupling the pusher to the screw.

21. A vendor as set forth in claim 1 comprising a plurality of said cabinets and a control module therefor, said control module comprising a credit system, selector means interconnected with the dispensers of said cabinets and operable by a purchaser to select for operation a dispenser in any one of the cabinets, and means operable upon establishment of credit via said credit system and selection via said selector means for initiating a vend cycle of the selected dispenser.

22. A vendor as set forth in claim 21 wherein each cabinet has means controlled by the article-drop-sensing means therein for precluding operation of any of the dispensers therein if an article falls onto the closed gate therein.

23. A vendor comprising:

a cabinet having a front door,

a plurality of article dispensers in the cabinet, one above another, each adapted to hold a row of articles to be vended extending in rear-to-front direction,

the forward ends of the dispensers being spaced rearward from the front of the cabinet so that there is a passage between the closed front door of the cabinet and the forward ends of the dispensers,

each dispenser comprising means for feeding the articles forward and discharging the forward article off the forward end of the dispenser to drop down through said passage, said front door being windowed for viewing the articles held by the dispensers,

a delivery chamber at the lower end of said passage below the level of the lowermost dispenser for receiving an article dropping from the passage, the front door having a delivery opening for access to said chamber,

gate movable between a closed position closing off said passage from the delivery chamber below the level of the lowermost dispenser and an open position enabling an article to drop down into said delivery chamber, said gate normally occupying its closed position,

purchaser-operable means for initiating operation of any one of said dispensers to effect discharge of the forward article off the forward end of said dispenser and for opening and closing the gate, and means for precluding operation of any of said dispensers if an article falls onto the closed gate.

24. A vendor comprising a bank of modules constituted by a plurality of dispensing modules and a control module therefor, each of said dispensing modules com-
prising an individual cabinet having a plurality of article dispensers therein each adapted to hold a stock of articles and having means for dispensing one of said articles upon a vend cycle, said control module comprising a credit system, selector means interconnected with the dispensers of said individual cabinets and operable by a purchaser to select for operation any one of said dispensers, and means operable upon establishment of credit via said credit system and selection via said selector means for instigating a vend cycle of the selected dispenser.

25. A vendor as set forth in claim 24 wherein the dispensing modules are on opposite sides of the control module.

26. A vendor as set forth in claim 25 wherein said selector means is an alphanumeric selector means comprising a set of alphabetic push buttons and a set of numeric push buttons, and said dispensers are algebraically coded.

27. A vendor comprising a plurality of dispensers operable to vend different articles, and a control therefor comprising means for receiving validation cards representing the different articles and either collecting a card or returning it, selector means for selecting one of the dispensers for operation, and means operable to effect return of a card within a predetermined time interval upon selection of a dispenser containing an article different from that represented by said card.

28. A vendor as set forth in claim 27 having means operable to effect return of a card in response to the failure of the selected dispensing means to complete a vend within a predetermined time interval.

29. A vendor comprising a plurality of dispensers operable to vend at different prices, and a control therefor comprising means for receiving payment items representing the different prices and either collecting an item or returning it, selector means for selecting one of the dispensers for operation, and means operable to effect return of an item within a first predetermined time interval upon selection of a dispenser containing articles of a price different from that represented by said item, and means operable to effect return of an item if the selected dispensing means does not complete a vend within a second predetermined time interval, said first time interval being relatively short and said second time interval being relatively long, said return means including a single timer means, said timer means normally timing out said relatively short interval, and means responsive to operation of the feeding means of any dispenser to actuate the timer means to time out said relatively long interval.

30. A vendor as set forth in claim 29 wherein said timer means comprises a time-delay relay having a resistor connected in a circuit thereof establishing said relatively long interval, and having means shorting out said resistor to establish said relatively short interval, said shorting means being operable in response to operation of a dispenser.

31. A vendor comprising a cabinet having a delivery opening, a door for closing said opening, said door being adapted to be manually opened, and means for automatically moving the door to open position, holding it open for an interval and then closing it, and means operable in response to partial opening of the door for actuating said automatic means to complete the opening of the door, hold it open for said interval, and then close it.

32. A vendor comprising a cabinet having a delivery opening, a door for closing said opening, said door being adapted to be manually opened, and means for automatically moving the door to open position, holding it open for an interval and then closing it, and means operable in response to partial opening of the door for actuating said automatic means to complete the opening of the door, hold it open for said interval, and then close it, said vendor having means for biasing the door closed, said means operable in response to opening the door comprising cam means operable through a cycle for completing the opening of the door, holding it open for an interval and then permitting the door to close at a controlled rate under the bias of said biasing means.

33. In a vendor, a delivery relay operable by a purchaser to initiate a vend, a time-delay relay having a first state for inhibiting a vend and a second state for enabling a vend, said time-delay relay normally being in its first state and being actuated to its second state in response to operation of the delivery relay with a time-delay interval between the operation of the delivery relay and the said actuation of the time-delay relay, and means operable during said time-delay interval for maintaining said time-delay relay in its first state for inhibiting operation of the vendor in response to the vendor being in a condition making it susceptible to pilferage.

34. A vendor comprising:

a cabinet,
a plurality of article dispensers in the cabinet, one above another, each adapted to hold a row of articles to be vended,
each dispenser comprising means for feeding the articles toward one end of the dispenser and discharging an article off said end of the dispenser to drop down through a passage in the cabinet,
a delivery chamber for receiving an article dropping from the passage,
the cabinet having a delivery opening for access to said chamber,
a gate movable between a closed position closing off said passage from the delivery chamber and an open position enabling an article to drop down into said delivery chamber, said gate normally being held in its closed position, purchaser-operable means for initiating operation of any one of said dispensers to effect discharge of an article thereby, means for opening the gate to enable an article to drop into said delivery chamber, a delivery door for closing said delivery opening, and means for locking the delivery door closed while the gate is open.