United States Patent [19]

Bowman

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[45] **Dec. 4, 1973**

[54] **CONTROL APPARATUS FOR DUAL PRICE VENDING MACHINE**

[75] Inventor: **Raymond D. Bowman,** Ringgold, Ga.

[73] Assignee: **Cavalier Corporation,** Chattanooga, Tenn.

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[52] **U.S. Cl.** **194/10**

[51] **Int. Cl.** **G07f 5/16**

[58] **Field of Search**..... 194/10, DIG. 1, DIG. 2, 194/1 G, 1 M, 1 N

[56] **References Cited**

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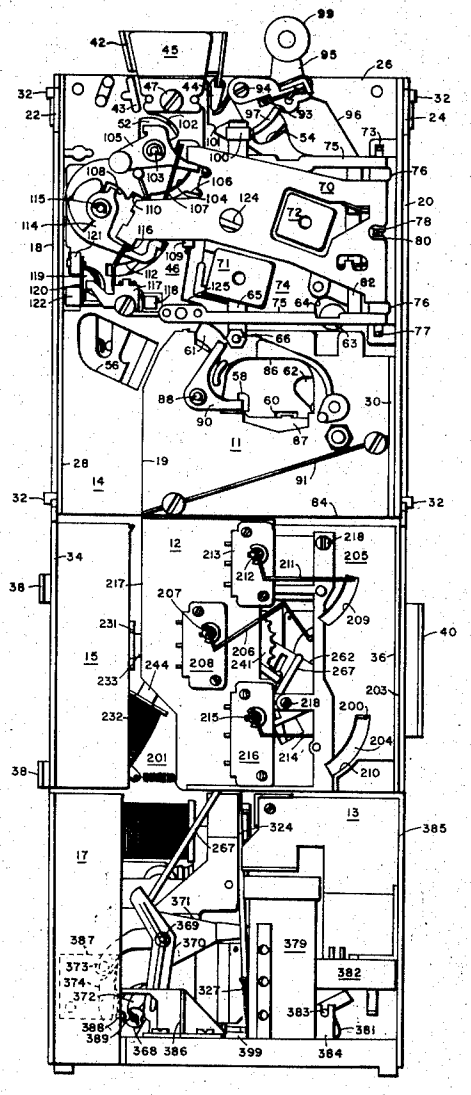
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Primary Examiner—Stanley H. Tollberg
Attorney—Edward J. Kondracki

[57] **ABSTRACT**

A dual price coin changer and vend control circuit for an article vending machine establishes credit at one of two prices. The prices may be preset with a price spread of up to 30 and a payout motor energized upon vend selection effects payout of correct change. A split pricing cam is indexed in accordance with the value of coins deposited in the vending machine. Microswitches positioned to be actuated in accordance with the position of the split cam control energization of price relays of the vend control circuit to enable low or high price vend selection of selected articles from a multiplicity of columns, in accordance with the value of coins deposited in the vending machine.

29 Claims, 5 Drawing Figures



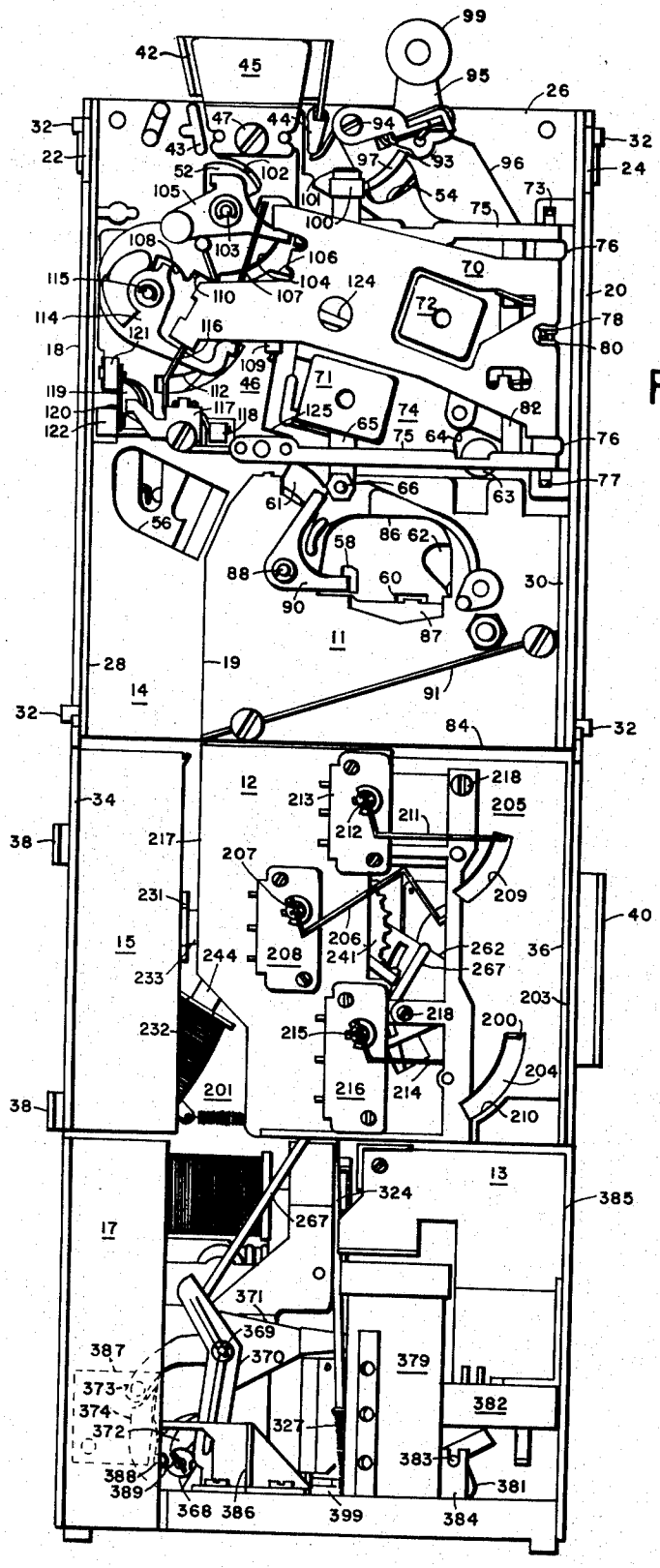

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FIG. 1

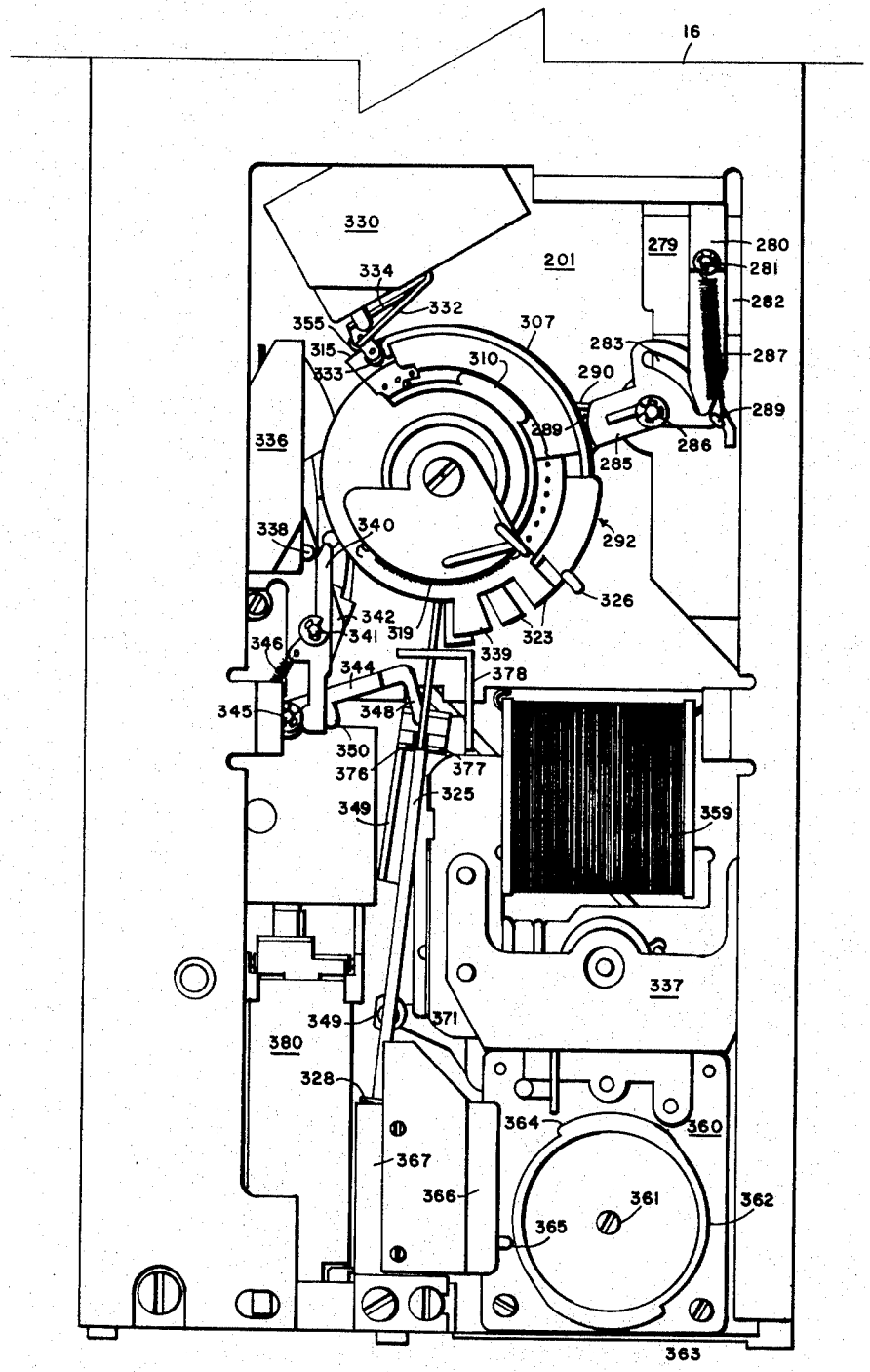

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FIG. 2A

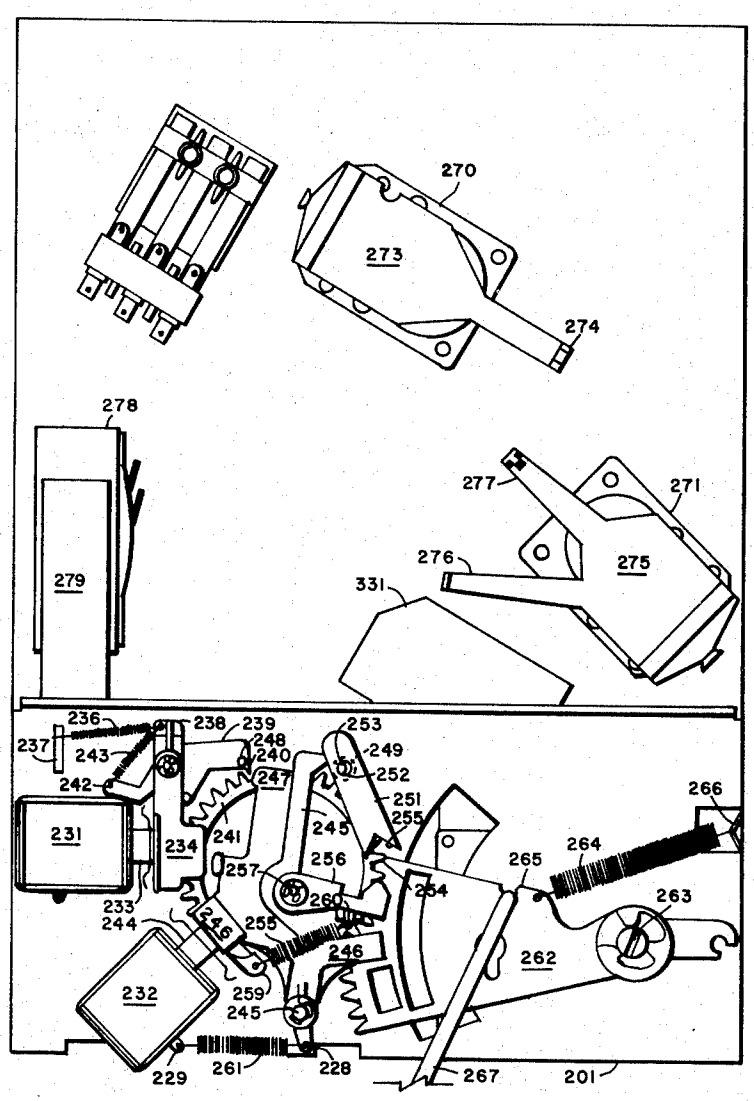

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FIG. 2B

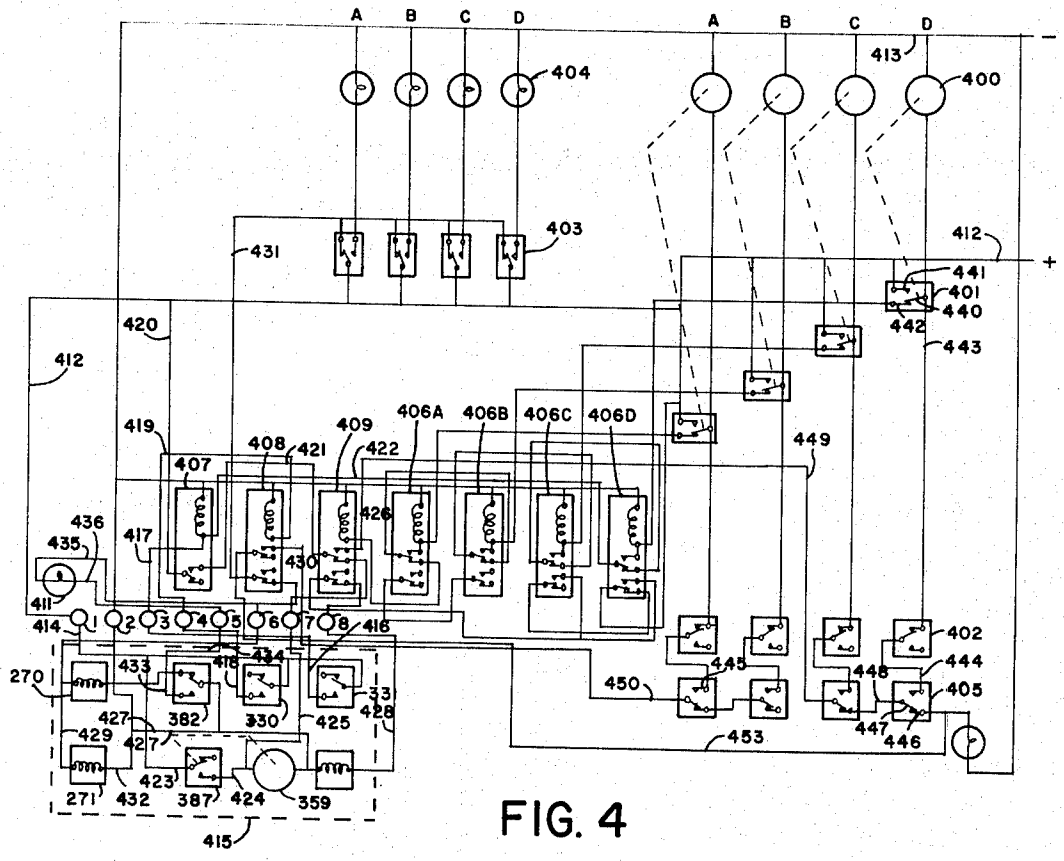

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FIG. 4

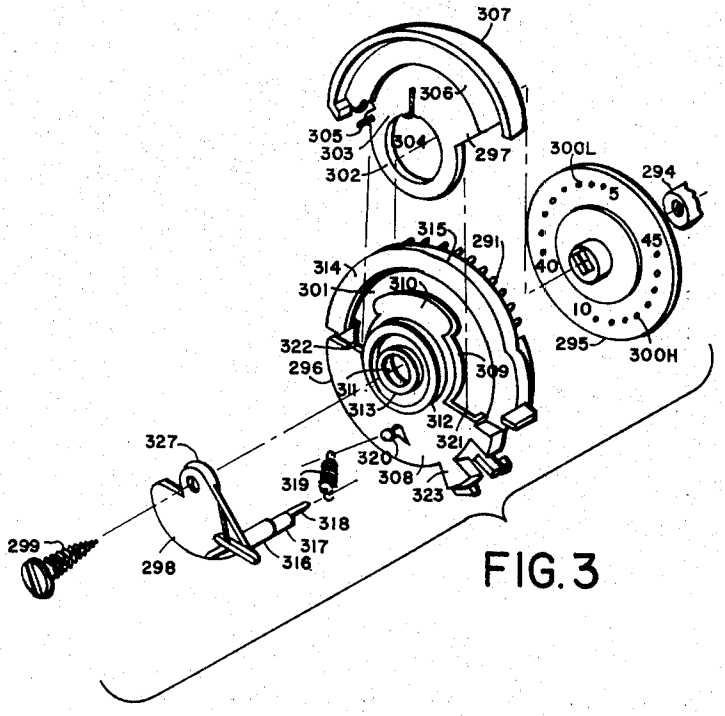

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FIG. 3

CONTROL APPARATUS FOR DUAL PRICE VENDING MACHINE

BACKGROUND OF THE INVENTION

This invention relates generally to coin operated vending machines for selectively dispensing articles one at a time from a plurality of sources and more particularly to an improved dual price coin changer and a vend control circuit for a coin operated vending machine having a multiplicity of storage columns, each of which is adapted to receive a plurality of articles to be selectively dispensed upon energization of a vend circuit selected by a customer, the coin changer being capable of establishing credit corresponding to two unit prices and paying out change when the value of the coins deposited total more than the unit price of the selected and dispensed article.

Because of the variety of products available for sale from vending machines, there is a great demand for vending machines that permit operation at multiple prices. A vending machine that can vend multiple price articles has a distinct advantage over vending machines limited to vending single price articles, because of being able to satisfy the individual tastes of various customers by being able to accommodate a variety of different priced articles.

A vending system for vending at different prices should provide for the payout of change where the total value of coins deposited exceeds the unit price of the selection. Known systems of this type generally require a relatively complex and expensive totalizing unit, usually incorporating printed circuit boards or rotating drums and associated wiper elements. The control circuits associated with such units are also relatively complex and expensive and are subject to a variety of malfunctions. An example of multiple price vending machine incorporating a totalizer having a printed circuit board and associated wiper elements is illustrated in U.S. Pat. No. 3,335,838.

Where vending machines are installed outdoors, such as at swimming pool site locations, loading ramps, etc., it is desirable to avoid the use of wiper elements and printed circuit boards and minimize the amount of exposed contacts, because exposure to climatic changes may result in frequent and undesirable malfunctions due to dust accumulation and moisture absorption, particularly in areas of high humidity or dampness.

In recent years, continuous increases in the cost of living and the consequent erosion of the value of the dollar have resulted in frequent changes in the cost of canned and bottled beverages. As a result there has been established the need for a coin changer for vending machines which can be readily modified to accommodate a change in price with a minimum of effort. Further, it should be apparent that there exists throughout the industry a vast quantity of vending equipment having outdated coin changing equipment incapable of multi-price vending. It was recognized in U.S. Pat. No. 3,550,742 that the cost of updating equipment could be held to a minimum if existing coin changers in wide spread use could be modified to permit operation at either 15 or at 20 vend price and convertible price coin changer was proposed. However, the conversion effected in accordance with U.S. Pat. No. 3,550,742 merely provides for one price selection of a single item at one of two preset unit prices. Such a convertible price coin changer is not adapted for dispensing of multiple-price items from a multiplicity of stacks.

It is therefore, the primary object of the present invention to provide a coin changer of relatively uncomplex design for establishing credit to the vend circuit of a vending machine at one of two unit prices, the price spread of which may be readily adjusted within a set limit, and which effects payout of correct change upon a vend selection when the total value of the coins deposited exceeds the unit price of the selected item.

Another important object of the present invention is to provide an improved control circuit for selectively dispensing articles one at a time from a plurality of columns with means for enabling the vend circuits of certain columns in accordance with the total value of the coins deposited in the vend machine.

Still another important object of the present invention is to provide a coin changer and control circuit which makes it possible to readily convert existing single price electromechanical vending machines to dual price vending machines operable at two price levels.

It is also an object of the present invention to provide an improved dual pricing system which removes established credit at the proper time and insures delivery of only one article per established credit with payout of change where the value of established credit is greater than the value of the selected article and which is characterized by minimum requirements of power for operation and minimum interference of elements, thereby allowing a flexibility in construction and operation which reduces cost of operation and maintenance of the system.

SUMMARY OF THE INVENTION

The invention is especially related to article vending machines adapted to accept nickels, dimes and quarters and a control circuit for controlling operation of the vending machine for vending items at dual prices having a preset price spread up to 30 and which is adapted to issue change in the appropriate amount when the total of the coins deposited exceeds the unit price of the selected item.

Another feature of the invention is that the coin changer and associated control circuit is of relatively uncomplex design and enables field conversion of existing single price changers and associated control circuits to update the latter for operation at multiple vend prices without altering the basic mechanical design of the changer unit or the control circuit.

Other objects and features and attendant advantages of the present invention will be apparent from the following description taken in connection with the accompanying drawings. Although one specific form of the invention is illustrated, it is to be especially understood that the drawings are for the purpose of illustration only and are not intended to represent the full scope of the invention as defined by the appended claims which particularly point out and distinctly claim the subject matter of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings, wherein like characters represent like component parts throughout the several views,

FIG. 1 is a front elevational view of the coin changing apparatus of the present invention, the cover plate nor-

mally positioned thereover being removed to show the internal construction;

FIG. 2A is a fragmentary rear elevational view of the pricing cam and payout mechanism of the coin changer;

FIG. 2B is a front elevational view of the pricing cam operating mechanism and upper section of the coin changing apparatus of FIG. 1, with the coin acceptor section removed for clarity;

FIG. 3 is an exploded view of the split pricing cam of the present invention, and;

FIG. 4 is a schematic view of the control circuit of the present invention.

The invention is particularly adapted for use in connection with a coin separator mechanism and payout mechanism of the type found in he Simplex V 08-40 Series Electrical Coin Changer of National Registers Inc. of St. Louis, Missouri and control circuits for coin operated vending machines for selectively dispensing articles one at a time from a plurality of sources as shown for example in U.S. Pat. Nos. 3,349,881 and 3,613,854. Typical arrangements of coin operated vending machines for selectively dispensing articles, one at a time from a plurality of columns employing the above-noted Simplex Coin Changer and control circuits are exemplified in the U.S. Pat. Nos. 2,280,323; 2,549,081; 2,686,583; 2,956,660; 3,348,773 and 3,507,419.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings and in particular to FIG. 1, there is illustrated the coin changer mechanism of the present invention designated generally by reference character **10.** The mechanism **10** comprises a removable coin separator module **11,** a removable credit registry module **12** and a payout module **12.** The coin separator module, as the name implies, is adapted to separate coins which are made from coins or slugs made of other materials and cause the separated fake coins or slugs to be rejected and passed through a coin chute **14** for rejected coins to a coin return box disposed at the exterior of the associated vending machine. Coin chute **14** advantageously aligned with chute sections **15** and **16** extending from the lower part of the coin separator module to the payout module, along the left side, as viewed in the drawing. A coin separator of this type is well known and by itself forms no part of the present invention. Such coin separators are shown for example in U.S. Pat. No. 3,193,075.

Coin mechanism **10** is vertically oriented within the vending machine and includes a rear frame **16** and a pair of forward extending flanges **18** and **20.** Flanges **18** and **20** form a U-shape cradle within which the component parts of the coin changer mechanism are received. To this end, flanges **18** and **20** are advantageously notched adjacent their upper portions thereof and support in the notched portions a pair of releasable latch members **23** and **24.**

Coin separator **11** includes a rear frame **26** and a pair of forwardly extending flanges **28** and **30** forming a U-shape support for the separator components. The U-shape support is received within flanges **18** and **20.** To this end, pins **32** project outwardly beyond the outer faces of flanges **28** and **30.** Two pins are disposed adjacent the top edges of the flanges and two pins are disposed adjacent the bottom edges of the flanges. The lower pins are received within notches formed in flanges **34** and **36** of the credit registry module **12.** Module **12** is also U-shape and includes a rear frame or plate **201.** Flanges **34** and **36** are received within ears **38** and **40** extending from flanges **18** and **20** and held securely thereto by screws.

It should be apparent that separator **11** may be pivoted about the supporting surfaces of the lower notched portions of flanges **34** and **36** and, upon depression of releasable latch members **22** and **24,** the top portion of the separator may be swung outwardly, away from the plane of the paper, as viewed in the drawing, after which the entire coin separator module **11** may be removed from the coin changer unit **10.** Likewise, removal of the screws holding flanges **34** and **36** to ears **38** and **40** permits removal of the credit registry module.

A coin guiding member **42** is secured and projects upwardly above the top edge of the frame **26.** Member **42** has three inclined sides which form an open coin receiving chute above guides **43** and **44.** Guide **44** supports the coin guiding member **42.** The coin receiving chute is completed by a forwardly disposed coin guiding member **45** which is secured to a movable gate **46** by screw **47.** Member **45** also has an inclined side.

Coins received through the chute formed by guides **42** and **45** are further directed by a plurality of cradles through the separator. To this end, shallow arcuate slot **52** is provided in the front face of frame **26** below, but immediately adjacent, guide **43.** A further arcuate recess **54** is provided to the right of at about the same level as, the recess **52.** An inclined opening **56** is provided adjacent flange **28.**

A shallow, generally rectangular recess **58** is provided disposed below the level of and to the right of opening **56.** Numeral **60** designates a shallow, horizontally directed recess to the right of recess **58.** Another opening **62** is provided to the right of and a short distance above the level of recess **60.** Still another opening **64** having an arcuate upper end is disposed above opening **62.**

Numeral **70** denotes a knockout plate which overlies part of the front face of gate **46.** Knockout plate **70** has a rectangular opening therein which is in register with a magnet housing **72** and is pivoted about pin **73.** Also pivotally supported about pin **73** is gate **46** and rearward plate **74.** Gate **46** is pivoted by means of arms **75,** while plate **74** is pivoted by means of ears **76.** Pivot pin **73** has its upper and lower ends thereof received within slots **77.**

One end of spring **78** overlies an ear on the knockout plate and the other end of that spring extends through an opening, not shown, frame **26.** One end of spring **80** overlies a rib on gate **46** and the other end extends through an opening, not shown, in frame **26.** Springs **78** and **80** hold the knockout plate and gate in assembled relation with the frame **26** and bias the free edges of the gate and knockout plate toward the frame.

A rectangular plate **84** is secured to the lower end frame **26** and has a generally rectangular opening **86** therein. Opening **86** is in register with recesses **58** and **60** plus a portion of the opening **62.** Plate **84** also includes an inclined lip **102** in engagement with frame **26.** A pivot **88** is mounted on plate **84** and a bifurcated gate **90** is rotatably mounted on that pivot. Gate **90** includes coin engaging projections one of which extends into recess **58,** while the other projection extends into

a recess 61. A runway 91 is formed on the front face of plate 84.

Plate 74 which underlies gate 46 supports a pair of housings 71 and 72, each of which encases and supports a permanent magnet. An ear 65 extends downwardly from the lower edge of the plate and a set screw 66 is adjustably held within a threaded opening in that ear. The set screw and ear overlie plate 84 and limits the position of plage 74 with respect to frame 26.

Magnetic flux lines developed by the permanent magnets within housings 71 and 72 coact with a pair of discs (not shown) mounted on frame 26 adjacent the housings to bias theplate 74 toward the front face of the frame. Set screw 66 is adjusted so that plate 74 is normally substantially parallel to the front face of frame 26. As a result, plate 74 and the front fsce of frame 26 coact to define part of a coin receiving passageway.

A pivot 94 extends forwardly from the front face of frame 26 adjacent the top edge of the frame. Pivot 94 rotatably supports a wiper blade 96 having an actuator 98. Actuator 98 includes a cam element 97 and a roller 99, thereon. A spring 93 encircles pivot 94 and has one end thereof hooked under guide 44 and the other end hooked around arm 95 for the wiper blade 96. Spring 93 biases the wiper blade to the position shown, but it can yield upon rotation of the wiper blade in the clockwise direction above pivot 94. Upon movement, cam element 97 engages a bearing 100 on arm 101 extending upward on frame 46 and causes frame 46 to be pivoted outwardly away from the back surface 26.

An arcuate notch 102 is formed in the left hand edge of the gate 46 immediately below the coin guiding member 42. Part of the notch is in register with part of the arcuate recess 52 in the front face of the frame 26. An arcuate slot 104 in gate 46 is provided below and to the right of the notch 102 while a notch of generally rectangular configuration 106 is contiguous to slot 104. An arcuate slot 108 is provided in gate 46 below and to the left of slot 104. A straight slot 110 communicates with arcuate slot 108. Slot 110 inclines sharply upwardly from the lower left to upper right as viewed in the drawing. A further arcuate slot 112 is provided in gate 46 below the level of slots 104 and 108.

Reference character 103 denotes a pivot which is secured to and which projects forwardly from gate 46 and which rotatably supports a cradle 105. One of the coin-receiving fingers of cradle 105 is disposed within a slot 102 while the other finger of cradle 105 is disposed within arcuate slot 104. A feeler wire 107 is disposed behind knockout plate 70. A weight 109 is secured to the lower end of the feeler wire 107 and biases the upper end of the feeler wire for movement into arcuate slot 104. Normally, however, the lower arm of cradle 105 underlies the upper end of the feeler wire and keeps the wire out of the slot.

Another cradle 114 is rotatably mounted on pivot 115 also on gate 46. Cradle 114 has one of its coin receiving fingers positioned into arcuate slot 108 and another of its fingers in arcuate slot 112. A feeler 116 is disposed within a groove in a supporting plate 117, which maintains the feeler wire in assembled relation with gate 46 while permitting rotation of the feeler wire relative to that gate. A weight 118 secured to the lower end of wire 116 and biases the upper end of the wire for movement into a slot, not shown, in gate 46. Normally, the lower arm of cradle 114 underlies the upper end of wire 116 and keeps that upper end out of the slot.

A coin guiding member 120 is rotatably secured on ear 121 provided at the lower left hand corner of gate 46 and a weight 122 is secured to the member 120. A portion of member 120 extends rearwardly into an opening 119 in frame 26.

A runway 124 is provided on the rear face of gate 46, the runway being shown partially in FIG. 1. The runway inclines downwardly at a shallow angle from the upper left to the lower right. A second runway 125 is provided on gate 46 adjacent magnet housing 71. Runways 124 and 125 and an abutment on the rear face of gate 46 engage the front face of frame 26. Those runways and the abutment normally held keep the rear face of the gate substantially parallel to the front face of the frame. As a result, the gate and frame define part of the coin receiving passageway.

A cover plate, not shown normally overlies plate 84. The cover plate extends the width of flanges 18 and 20 and coacts with the runway 91 to guide slugs downwardly and to the left as viewed in the drawing. The cover plate also forms the front wall of chute 14, the rear wall of which is formed by the lower left portion 19 of frame 26 as viewed in the drawing.

The coin separator thus far described is similar to conventional coin separators and operates in a well known manner. For a detailed description of the operation of the coin separator mechanism, reference may be made to U.S. Pat. No. 3,193,075.

Briefly, when a dime is introduced into the coin entrance defined by the coin guiding members 42 and 45, the dime will be guided toward cradle 105. Cradle 105 is intended to intercept coins and slugs with diameters which equal or exceed the diameter of a quarter. Thus, the dime will fall freely between the coin intercepting fingers of that cradle and will be directed toward cradle 114. Cradle 114 is intended to intercept coins and slugs with diameters which equal or exceed the diameter of a nickel. Thus, the dime will pass downwardly between the coin intercepting fingers of that cradle. The dime will then engage the rearwardly extending portion of the coin guiding member 120 and which will guide the dime rearwardly to an opening, not shown, in the frame 26. Thereafter, the dime will pass the testing engaging components of standard and usual design which are mounted at the rear face of the frame 26. Subsequently, the dime will pass to an outlet chute defined by a thickened portion of the frame and a rearward partition and be directed to a dime coin chute in credit registry module 12.

A nickel introduced into the coin guide passes through cradle 105 and is intercepted and held by coin intercepting fingers of cradle 114. Cradle 114 will rotate in a clockwise direction and, as the cradle rotates, the upper end of the feeler wire 116 responds to weight 118 and moves toward and engages the surface of the nickel. The nickel will be transferred to and will roll along runway 125 and be directed to the nickel coin passageway defined by plate 84 and the front surface of frame 26 and passed through the space intermediate a thickened portion of the frame and plate.

Upon the introduction of quarters, each quarter is intercepted and held by fingers of cradle 105. As the cradle rotates, weight 109 urges the upper end of the feeler wire 107 inwardly into engagement with the quarter. The quarter will be transferred and will roll

along runway **124** to the coin chute defined by plate **84** and the front face of the frame **26.** The quarter is guided by the runway by which it will roll downwardly toward flange **30** and into a rear chute, not shown, which conducts the quarters to a coin receptacle exterior of the coin actuator device. Slugs are directed along runway **91** toward the rejected coin return chute **15.**

Valid coins discharged from the coin separator are received by the credit registry module **12** mounted between ears **38** and **40** extending forwardly from cutaway portion of flanges **18** and **20.** Module **12** comprises plate **201** having forwardly extending flanges **202** and **203.** Supported to flange **203** is a coin chute arrangement including a rear plate **204,** an intermediate plate, not shown, and a front plate **205.** The front face of the rear plate and the back face of the intermediate plate are channeled and cooperatively arranged to form a quarter coin chute. A side opening, not shown, is provided between the plates in which there extends one end of an actuating arm **206.** The other end of the actuating arm **206** is connected to pivot **207** of switch **208** which internally has its contacts arranged in a normally open position. Arm **206** is actuated upon passage of a quarter through the quarter chute from its uppermost position as shown in FIG. **1** to a lower position thereby causing the contacts of switch **208** to close.

A dime coin chute is formed between the front face of the intermediate plate and the rear face of front plate **205,** while a nickel chute is formed by the front face of plate **205** and a cooperating cover plate of the coin change mechanism, not shown. Front plate **205** is provided with a pair of arcuate slots **209** and **210.** Slot **209** is disposed toward the top of the coin chute arrangement and viewed in the drawing and receives one end of actuating arm **211,** which extends across both the nickel and dime coin chutes. The other end of actuating arm **211** isconnected to pivot **212** of switch **213.** Switch **213** includes a pair of normally open contacts adapted to be actuated to their closed position upon movement of arm **211** from its uppermost position as shown in FIG. **1** to its lowermost position in arcuate slot **20.** A further slot, not shown, is provided at the lower side of front plate **205** adjacent arcuate slot **210.** Actuating arm **214** extends through this side slot and one end **215** of arm **214** terminates at the topmost portion of slot **210** in the nickel coin chute while the other end is connected to pivot **215** of switch **216.** Switch **216** includes a pair of normally open contacts adapted to be actuated to their closed position upon movement of arms **214** from its uppermost position in slot **210,** as shown in FIG. **1** to its lowermost position in the slot.

As should be apparent both arms **211** and **214** are actuated upon the passage of a dime through the dime chute, while only arm **211** is actuated upon the passage of a nickel through the nickel chute formed by the front face of plate **209** and the cooperating cover plate of the coin changer mechanism. Switches **208, 213** and **216** are mounted to a supporting plate **217** which is in turn mounted by screws **218** to front plate **205.**

Supported to flange **202** and inwardly extending therefrom is the central coin reject chute **15** adapted to receive coins directed from runway **91** or otherwise rejected by the coin separator. Behind chute **15** and mounted to plate **201,** as more clearly shown in FIG. **2B,** are a pair of solenoids **231** and **232.** Solenoid **231** is mounted above solenoid **232** and has its armature **233** connected to pawl **234.** Pawl **234** is rotatably mounted on pivot **235.** A coiled extension spring **236** has one end hooked to segment **237** on plate **201,** and its other end hooked about ear **238** formed on the end of pawl **234.**

Also rotatably mounted about pivot **235** is a cooperating arm **239,** which extends at substantially a right angle with respect to pawl **234.** An ear **240** formed at one end of arm **239** and is pointed so that it can readily move into spaces between adjacent teeth on rachet wheel **241.** The other end of extension **239** includes an ear **242** having an aperture therein adapted to receive one end of spring **243.** The other end of spring **243** is hooked to ear **238** at pawl **234.**

Springs **243** and **236** bias pawl **234** and arm **239** for cooperative movement toward engagement of ear **240** with the teeth of the ratchet wheel upon energization of solenoid **231** which pulls in arm **233.**

Extension **230** on arm**239** is disposed adjacent pawl **234** and bears against the pawl so as to cause ear **240** clear the ratchet wheel teeth when solenoid **231** is deenergized and arm **233** released. Solenoid **231** is connected to be energized upon the actuation of either of switches **213** or **216** to step the ratchet wheel one step upon each actuation. Thus, solenoid **231** is actuated once each time a nickel passes through the nickel coin chute and twice, each time a dime passes through the dime coin chute.

The ratchet wheel actuating mechanism connected to the armature **244** of solenoid **232** is adapted to step the ratchet wheel an angular distance of approximately **5** teeth position upon energization of solenoid **232.** To this end, the actuating mechanism is rotatably supported on pivot **245** and includes a pawl **246** connected to armature **244.** Extending from pawl **246** is an upwardly disposed arm **245** and a sideward extension **246.** Arm **245** includes a shoulder **247** adapted to engage extension **248** on arm **239** when arm **245** is rotated counterclockwise to ensure that ear **240** is clear of the ratchet wheel teeth. Adjacent shoulder **247** is a stop member **248** which normally bears against a boss **249** extending from plate **201.** Boss **249** is supported by pin **250** which forms a pivot for latch link **251.** One end of link **251** includes an oversized aperture **252** within which is received pin **253** mounted to plate **201.** The other end of link **251** includes a V notch **255** adapted to receive the V-shaped ear **254** of link **256** when the link is rotated counterclockwise. To this end, link **256** is provided with a lost motion connection and is pivoted at one end on pin **257.** The other end of link **256** normally rests against arm **246** and includes an inwardly extending pin, not shown, adapted to engage the teeth of ratchet wheel **241.** A return spring **258** connected between ears **259** and **260** provides a lost motion connection for link **256** enabling **5** step movement of the ratchet wheel upon energization of solenoid **232.** Return spring **261** for **5** step actuator is connected between ear **228** extending from the actuator and ear **229** on the solenoid support.

Numeral **262** designates a reset gear segment which is pivoted about pin **263** extending from plate **201.** Reset spring **264** is connected between ear **265** on segment **262** and ear **266** on plate **201.** A reset link **267** connected to the payout assembly is connected to drive the gear segment which is in turn connected to a gear, not shown, behind ratchet wheel **241** and affixed to a common shaft for rotation therewith so as to effect re-

setting of the ratchet wheel to its "home" position after a selection has been made.

The coin operated rotatable ratchet mechanism herein described can be rotated between limits in response to deposit of coins to provide unit and multiple unit advancements of the ratchet wheel. Such ratchet mechanisms may take a variety of forms. One form of a coin operated ratchet mechanism which responds to a nickel deposit to provide a unitary advancement of a ratchet, to a dime deposit to provide a two-unit advancement and to a quarter deposit to provide a 5 unit advancement, reference is shown in U.S. Pat. No. 3,186,532. Accordingly, it should be readily apparent that the concept of providing unit and multiple unit advancements by itself forms no part of the present invention.

Mounted above plate **201** and to frame **16** and behind coin separator module **11** are a plurality of electrical components, including solenoids **270** and **271**. Solenoid **270** includes an armature **273** having a finger **274** extending substantially at right angles thereto. Finger **274** extends through an opening **63** in frame **26** of the coin separator to block quarters from passing to the quarter coin chute when solenoid **270** is deenergized. If solenoid **270** is energized, armature **273** is pulled in and finger **274** is held clear of the coin path.

Numeral **275** designates the armature of solenoid **271** and includes two outwardly extending fingers **276, 277** which extend into the coin paths when solenoid **271** is deenergized to block coins from entering the normal coin chutes and cause them to be directed to the coin return path. Solenoid **271** is energized upon the establishment of high price credit.

Numeral **278** designates a low price solenoid which is energized upon establishment of low price credit and is mounted to bracket **279** which is in turn secured to plate **201,** as more clearly shown in FIG. 2B. Solenoid **278** includes an armature **280** which is bifurcated at its lower end and which has a pin **281** extending through the bifurcated end. Link **282** has one end which is received in the bifurcated end of armature **280** and about pin **281** so as to rotate about the pin. The other end of link **282** includes an inward extension, not shown, which is received in arcuate slot **283** formed in extension **284** on gear segment **285.** Segment **285** and extension **284** comprise an integral member which is pivoted about pin **286** mounted to bracket **279.** Spring **287** extends between pin **281** on the bifurcated armature and ear **288** on extension **284.**

Segment **285** includes a plurality of teeth-like members formed by perpendicular extensions **289** on surface **290.** These teeth members cooperate with rearward extending pins **291** (shown in FIG. 3) to cause the pricing cam **292** to be rotated clockwise each time the low price solenoid is energized. Pricing cam **292** is rotated sufficiently to enable abutment **323** to be properly positioned with respect to change control payout rods and place abutment **339** against arm **40** forcing it to turn about its pivot. Rod **324** controls the nickel payout and rod **325** controls the dime payout as will be hereinafter described.

Referring to FIG. **3,** there is illustrated in perspective, the split pricing cam **292** of the present invention which enables dual payout. The pricing cam is mounted to shaft **294** which extends through frame **16** and which rotatably supports on the other side of the frame the ratchet wheel **241.** Pricing cam **292** comprises four major elements, a pricing wheel **295,** a high price cam **296,** low price cam **297** and lock plate **298.** Cam **292** is secured to shaft **294** by screw **299.** Shaft **294** is squared off at its end and provided with a threaded hole adapted to receive screw **299.** Wheel **295** includes a centrally disposed squared opening adapted to be snugly received over the end of the shaft for rotation therewith. A plurality of pin holes **300** divided into two sets designated L and H are circumferentially disposed about the front face of the wheel **295.** Holes **300** are spaced at intervals corresponding in five-cent increments or unit displacement of the ratchet wheel. Advantageously, to facilitate price setting for the articles to be dispensed, the holes are designated with visual markers corresponding to their price index and the set prices are visible through a window **301** in the high price cam **296.**

When reference is made to a high price element or a low price element it should be apparent that such reference has nothing to do with the cost of that element. Rather it identifies that element as being particularly related to function in connection with the setting of one of two prices for items to be vended, one of the selected prices being higher than the other, hence the designation low price and high price.

Low price cam **297** includes a central ring member **302** which is integral with arcuate segment **303.** Segment **303** includes a recessed section **304** which has a locating and limit pin **305** at one end thereof. Pin **305** extends through sgement **303** so that one end may be selectively positioned in one of the pin holes **300** L to set the low price of the system. The other end serves to limit clockwise rotation of cam **296** as will be hereinafter described. Adjacent section **304** is an arcuate shoulder **306** which is integral with upward facing arcuate cam surface **307.**

High price cam **296** comprises a substantially circular member having recessed back section and a window **301** in its upper half, as viewed in the drawing. Numeral **308** designates the lower half planar surface having an extension **309** from which extends a lip **310.** Extension **309** includes a centrally disposed axial opening **311** and a pair of concentric ring member s **312** and **313.** Planar surface **308** is displaced in a plane forward to the plane of the arcuate joining rib **314,** the top surface of which forms a cam surface **315** for the high price setting. To the rear of cam **296** spaced adjacent the periphery thereof there projects a plurality of pins **291** adapted to be engaged between the extensions **289** of gear segment **285** which causes the high price cam **296** to be rotated clockwise when solenoid **278** is energized.

To this end, cams **296** and **297** are arranged for movement relative to each other in one direction, cam **297** being held stationary while cam **296** is rotated. Cams **296** and **297** are also arranged to rotate together in the counterclockwise direction when ratchet wheel **241** is stepped.

In the assembled position, ring **302** is positioned behind extension **309** with lip **310** being positioned adjacent the surface **303** in overlying relationship. Lock plate **298** includes an arcuate segment having an inwardly extending rod **316** having a first reduced diameter portion **317** and a further reduced diameter section forming a pin **318.** Rod **316** passes through window **301** and pin **318** is selectively positioned in one of the pin holes **300** H to set the high price.

As shown in FIG. 2A, the pins of pricing cam **292** are set in appropriate holes **300** of the pricing wheel **295** for vending of 15 cent and 25 cent items. Spring **319** has one end hooked about ear **320** on surface **308** and its other end about rod **316.** Thus, cam **296** is biased by spring **319** such that its shoulder **321** bears against the reduced diameter portion **317** with pin **318** in the hole **300** H corresponding to the 25 cent price. Cam **296** may be rotated clockwise, independent of cam **297** until shoulder **322,** diametrically opposite shoulder **321,** engages the forward extending end of pin **303** which acts as a stop.

Wheel **295** is received within the rearward recessed section of cam **296** and held thereto by screw **299** which seats a raised portion **327** of plate **298** against inner ring **313.** Outer ring **312** on cam **296** rotates clockwise relative to plate **298** when cam **296** is rotated by segment **285,** however, because both the low and high price cams **295** and **297** have their pins positioned in price setting pin holes of wheel **295,** both cams are rotated simultaneously clockwise and counterclockwise when the pricing wheel is driven through the ratchet wheel assembly.

In order to effect a proper payout, the high price cam **296** includes a plurality of selectively spaced projections **323** which cooperate with payout rods **324** and **325.** An extension **326** on cam **296** limits clockwise movement of the pricing cam **292** to the point where extension **326** engages rods **324** and **325.** An extension **326** on cam **296** limits clockwise movement of the pricing cam **292** to the point where extension **326** engages rods **324** and **325.**

Referring to FIG. 2A, the pricing cam **292** is shown as it appears when indexed to a position corresponding to the deposit of coins having a total value of fifteen cents. For sensing when the value of coins deposited corresponds to either the preselected low or high setting of the pricing cam, a pair of microswitches **330** and **331** are mounted adjacent each other and on plate **201** with their actuating arms extending in the path of movement of cam surfaces **307** and **315.** Switch **330** is the low price switch and includes a pair of internal normally open contacts adapted to be actuated to the closed position when pricing cam **292** is indexed to its low price position corresponding to the position shown in FIG. 2A.

To this end, the internal switch contacts of switch **330** are connected in a conventional manner to an actuating arm **332,** having a follower roller **333** mounted at its free end. Roller **333** normally rides along the cam surface **307.** So long as roller **333** is in engagement with surface **307,** the contacts of switch **330** remain open. As cam **292** is stepped in the clockwise direction as viewed in FIG. 2A, roller **333** eventually reaches the edge of the cam surface **307** and drops below the surface as the cam is further stepped. In this position, the contacts of switch **307** are closed to signal the establishment of low price credit to the control circuits.

High pricing switch **331** includes a pair of normally open contacts and operates in a manner similar to switch **330.** An actuating arm **334** is connected to its normally open contacts. The free end of arm **334** has a roller **335** mounted there to which rides in cam surface **315.** So long as roller **335** is on surface **315,** the contacts of switch **331** remain open.

Mounted to the left of the pricing cam **292** on frame **201** is microswitch **336** which functions as a double cycle payout switch. Switch **336** is electrically connected with the payout motor **337** to enable the payout motor to be cycled twice when more than 15 cents change is required. Switch **336** includes a pair of normally open contacts which may be actuated to their closed position upon depression of actuator **338** which extends beyond the switch housing. Actuator **338** is depressed when the outermost abutment **339** on cam **296** bears against lever arm **340.** This occurs, for the fifteen cent setting as shown in FIG. 2A after 35 cents or more has been deposited and a low selection made and for the 25 cent setting after 45 cents has been deposited and either a high or low selection is made.

For example, assuming 35 cents has been deposited, pricing cam **292** is indexed clockwise seven steps. At this point, abutment **339** is still two steps shy of the point where it hits arm **340** to cause actuator **338** to be depressed. Both switches **330** and **331** have been actuated to indicate the establishment of high and low credit. A high price selection of 25 cents requires only a 10 cent payout of change which is normally accomplished on a single cycle of the payout motor. A low price selection of 15 cents requires a 20 cent payout. Because the payment module includes only 5 cent and 10 cent tubes, the maximum payout per cycle is 15 cents. To enable a payout of up to 30 cents, the payout motor must be cycled twice. In the specific example, should the high price selection be exhausted, a low price selection may be made in which case low price solenoid **278** is energized and armature **280** is pulled in. Gear segment **285** rotates counterclockwise and its extension **289** engages the rear pins on teeth **291** of the pricing cam, rotating it clockwise until abutment **339** contacts arm **340** causing actuator **338** to be pushed inward to close the switch contacts.

Lever arm **340** is pivotally supported on pivot **341** mounted on bracket **342.** The lower end of arm **340** as viewed in the drawing bears against a roller surface **343** extending outwardly from cross arm **344.** Arm **344** is pivoted on pin **345** and normally rests on an pin, not shown, inwardly extending from arm **340.** This pin bears against a cam surface on latch lug **350.** A spring **346** has one end hooked to ear **347** on arm **340** and its other end hooked to an ear, not shown, on the hidden arm of arm **344** and biases the arm **340** in position as shown. Arm **344** includes a right angle downward depending extension **348** adapted to be actuated by the payout rod drive linkage **349** each time it is driven to a raised position.

In operation, as abutment **339** engages arm **340,** the arm rotates counterclockwise about its pivot causing the lower inward pin, not shown, to move along the surface of lug **350,** until it clears the edge of the lug. The lug then falls behind the pin and locks arm **340** to keep switch **336** closed during the initial cycle of the payout motor. Upon completion of its initial cycle, the power to the payout motor is still maintained through switch **336** and a second cycle begins. During the initial cycle, abutment **339** is maintained in engagement with arm **340** until after linkage **349** is on its return stroke and out of contact with extension **348.** Pricing cam **292** is then returned to its "home" position and the second payout cycle started. Linkage **349** is driven upwardly, contacting extension **348** causing arm **344** to rotate about its pivot until lug **350** is clear of the inward pin, not shown. The latch is thus broken and arm **340** ro-

tates clockwise about its pivot enabling actuator **338** to spring out and switch **336** to open.

The payout module **13** shown in FIGS. **1** and **2A** is generally of conventional construction and incorporates a motor driven cam-slide mechanism adapted to dispense nickels and dimes in controlled amounts. The cam slide mechanism is located at the base of coin changer **10** and is designated generally by reference character **399.** Such slide arrangements are shown for example in U.S. Pat. Nos. 3,159,268 and 3,244,185 and accordingly reference thereto may be made for a detailed description thereof.

Referring to FIG. **2A**, numeral **337** designates a shaded pole motor supported on housing **360** within which is housed a gear train. The gear train is associated with and forms part of motor **337.** Numeral **361** denotes the output shaft of the gear train within the gear housing **360** and is, effectively, the output shaft of the motor except that it rotates at a considerable lesser speed than that of the motor through gear reduction. Shaft **361** supports a timing cam **362** which is rotated one-half of a revolution and then brought to rest during each normal cycle of operation of the payout motor. Timing cam **362** includes a pair of raised lobes **363, 364** adapted to contact a pair of switch actuators **365** of two adjacent switches **366,** only one of which is shown. Each of the switches **366** is mounted on bracket **367** adjacent the timing cam and includes a pair of normally open contacts adapted to be closed when its actuator **365** is pushed in. The contacts of switches **366** serve to break the hot line connections to CREM **270** and **271** to thereby deenergize the solenoids and block coins from being received during the payout cycle.

The other end of shaft **361** supports a control or timing cam **368** and cams **372** and **374,** all of which are adapted to be rotated one-half revolution for each cycle of the payout mechanism. Cam **368** includes symmetrical lobe surfaces for an actuating follower on each cycle of the payout motor. Numeral **369** designates a boss mounted to housing **360.** Rotatably supported on boss **369** are a pair of levers **370** and **371.** Lever **370** supports at one end thereof, the lower end as viewed in the drawing, a follower, not shown, which rides on a multilobe cam **372,** generally of an S shape configuration having a pair of oppositely disposed lobes. The other end of lever **370** has hooked thereto the lower end of a reset linkage **267** so as to drive reset gear **262** once each cycle in response to operation of the payout mechanism. Lever **371** supports at one end a cam follower **373** which rides on one of the lobes of multilobe cam **374.** Cam **374** is generally of S configuration and is disposed in a plane inwardly of the plane of cam **372.** The other end of lever **371** is connected to payout rod linkage **349** disposed between payout rods **324** and **325.**

Rods **324** and **325** are spring biased by springs **327** and **328** against linkage **349** and extend in front of coin eject openings, not shown, disposed below and adjacent nickel tube **379** and dime storage tube **380.** Payout rods **324** and **325** each include a reduced diameter portion **375** forming a shoulder **376** on each rod which bears against the side edges **377** of opposite facing channels formed in linkage **349.** The extreme ends of rods **324** and **325** pass through guide openings provider in bracket **378** mounted to the motor **337.**

Numeral **388** designates a conventional insufficient change switch arrangement which monitors the supply of nickels and dimes in the change tube reservoirs. If an inadequate supply of coins are in the reservoirs feeler **382** is allowed to swing inwardly to enter a slot, not shown, in the side of the change tube to cause switch **381** to switch its contacts and energize a lamp in the vending machine which is associated with a sign indicating that correct change should be used. Feeler **382** includes side pins **383** which are freely supported for rotation on oppositely disposed side brackets **384.** Positioned above switch **381** and the nickel and dime reservoir is a coin guide **385** which receives nickels and dimes from the chutes of the credit registry module **12** and guides the coins into the proper nickel and dime storage chuts.

Numeral **386** designates a manual inventory slide actuator which cooperates with switch **387** mounted behind coin return chute **17** to enable an operator to empty the contents of the storage tubes by continuous energization of the payout motor. Switch **387** includes an actuator arm **388** having a cam follower **389** normally received in one of two depressions on cam **368** and times operation of the payout motor. To this end, upon selection of a vend cycle and initial energization of the payout motor, rotation thereof causes shaft **368** to turn and follower **389** to be raised out of its depression and on the surface of cam **368.** In this position, the normally open switch **387** is actuated to a closed position and maintains the payout motor energized until the follower **389** falls into the next depression. At this point the payout motor times out and is deenergized unless a double payout has been indicated by actuation of switch **336** which is connected incircuit to allow the payout motor to be energized through a second cycle.

The circuit of the present invention controls the vend cycle of a multi-selection coin operated vending machine having a plurality of columns containing articles to be vended at two different prices, wherein dispensing from each column is controlled by a vend motor or solenoid. In the illustrated embodiment, the control circuit is shown in connection with a four column vending machine wherein dispensing from each column is controlled by a vend motor. Reference may be made to U.S. Pat. Nos. 2,835,409; 3,175,728 and 3,349,961 for a general description of known forms of dispensing apparatus with which the circuit of the present invention may be used. It should also be recognized that the control circuit of the present invention is readily adapted for conversion of existing single price vend control systems of the type shown, for example, in U.S. Pat. Nos. 3,349,881; 3,486,601 and 3,613,854. Further, it is possible to set cams **296** and **297** so that their fall-off edges coincide. In such an arrangement, each cam would still enable the selection circuits of its associated columns, but all articles would be vended at the same unit price.

For convenience, the control circuit is illustrated in FIG. **4** in connection with a coin operated vending machine having four columns or stacks of articles designated A, B, C and D. More or less than four columns may be utilized without changing the operating sequence for dispensing an article from any one column, it generally being a requirement that for dual price vending at least two storage columns must be provided.

To facilitate a description of the invention, each component in the operating circuit of one column corresponding to a like component in the operating circuit of another column is designated with a like numerical reference character. Where reference is to be made to

the component in relation to its operation with respect to a particular column, an alphabetical character corresponding to the particular column with which the component is associated with be used in conjunction with the numerical reference character.

By way of example, the circuit is illustrated in the standby condition with the pricing cam **292** set for vending of 15 cents and 25 cents articles, and columns A and B having the higher priced articles stored therein, while columns C and D store the lower priced articles.

Briefly summarizing the operation of the circuit, the coin changer mechanism **10** cannot accept coins to actuate the high or the low price switches **331** and **330**, respectively, unless the coin reject electromagnets, hereinafter designated CREM, **270** and **271** are energized. A separate energization control circuit is provided for the 25 cents CREM **270** through change tube switch **382** to insure that a proper amount of change is available before quarters are accepted. Actuation of either the low price switch or both the low and the high price switch establishes credit for the corresponding columns by means of an enabling circuit established to the customer selection switches **405**. Upon establishment of the enabling circuit to the selector switches, actuation of a selector switch **405** in accordance with established credit initiates a vend cycle to cause delivery of an article from a selected column with correct change payout. The vend motor **400** energized upon actuation of the associated selector switch **405** has a cam driven member associated therewith which actuates a timer switch **401** which breaks the initial power circuit to the vending motor insuring delivery of only one article per established credit. Also, the payout motor actuates a pair of switches **366** connected to effect energization of CREM **270** and **271** and prevent the coin changer mechanism from accepting coins during a payout cycle.

Referring to FIG. **4**, each column has associated therewith a vend motor **400**, a timer switch **401**, a pair of sold-out switches **402** and **403**, a sold-out indicator light **404**, a selector switch **405** and a selector relay **406**. In addition to the components associated with aparticular column, a number of common control components are provided including high price switch **330**, low price switch **331**, insufficient change switch **382**, payout motor timer switch **387**, low price solenoid **378**, CREM's **270** and **271**, vend relay **407**, high price relay **408**, low price relay **409**, payout motor **359**, credit light **410** and use correct change light **411**.

Power to the circuit is applied across a pair of supply conductors **412** and **413** which may be connected to a conventional supply source, not shown. The positive (+) terminal connected to line **412** designates the "hot line", while the (−) terminal connected to line **413** designates the ground return line.

When the machine is in normal working order, credit is established upon insertion of the proper value of coinage into the machine and actuation of one or both of the associated high and low price coin switches **331** and **330**, respectively. Each price switch is a single pole single throw switch having a pair of normally open contacts adapted to be actuated to a closed position upon stepping of the pricing cam **292** to the established price position. As should be apparent, coin changer **10** is adapted to receive coins of greater value than the cost of an article to be selected. Accordingly, closure of switch **330** enables the low price selection circuit, while closure of switch **331** (which necessitates closure of switch **330**) enables both the high and low price selection circuits. This permits alternate selection of high or low price items even though sufficient change is inserted for a high price item.

To this end, low price switch **330** includes a movable contact arm adapted to be displaced from a first position to a second position which establishes the closed position of the switch. Likewise, switch **331** includes a movable contact arm adapted to be displaced from a first position to a second position which establishes the closed position of that switch. Switch **330** is closed when coins having a value corresponding to the low price setting of the pricing cam **292** have been received. In the present example, this value is 15 cents. High price switch **331** has its movable arm actuated to establish the closed position of the switch when the total value of coins deposited reaches the high price setting, i.e., 25 cents. The movable contact arms of switches **330** and **331** are connected to conductor **414** which is in turn connected to power line **412** through terminal **1**.

Reference character **415** identifies the dash lines which set apart those components of the system mounted within the coin changer mechanism **10**. Thus, the components within the coin changer mechanism are electrically connected in a convenient manner to the components within the vending machine proper by means of a conventional Jones plug or other suitable terminal board arrangement designated by terminals **1** through **8**.

The lower fixed contact of switch **330** as viewed in the drawing is connected via conductor **416** and terminal **3** and conductor **417** to one end of the operating coil of vend relay **407**. The lower contact of switch **331** as viewed in the drawing is connected via conductor **418**, terminal **4** and conductor **419** to one end of the high price relay. The other end of the operating coils vend relay **407** and high price relay **407** are returned directly to the ground power line **413**.

Thus, upon closure of either the low price switch **330** or the high price switch **331** (low price switch **330** is always closed when high price switch **331** is closed) power is applied across the operating coil of the vend relay. Upon closure of high price switch **331**, power is also applied across the operating coil of high price relay **408**.

Vend relay **407** includes a pair of normally open contacts formed by a movable contact arm and a fixed contact. Upon energization of the operating coil, the normally open contacts close. The movable contact arm of vend relay **407** is connected through conductor **420** to power line **412**. The fixed contact of vend relay **407** is connected through conductor **421** to the upper movable contact arm, as viewed in the drawing of low price relay **409**. Terminal **3** of the Jones plug is also connected to one end of the low price relay through conductor **422** and the normally closed upper set of contacts as viewed iin the drawing of each of the selector relays.

Thus, upon closure of the low price switch **331**, terminal **3** of the Jones plug is made hot and power is applied across the operating coil of vend relay **407** and the operation coil of low price relay **409**. Upon closure of the high price switch, which also necessitates closure of the low price switch, power is also applied through

terminals 4 and across the operating coil of the high price relay 408, thus energizing both the high and the low price relay.

Terminal 1 is also connected via conductor 423 to the movable contact arm of normally open single pole payout timer switch 387. The lower contact of switch 387 as viewed in the drawing is connected to one end of payout motor 359 via conductor 424. That end of payout motor is also connected to terminal 7 of the Jones plug via conductor 425. Terminal 7 is in turn connected by conductor 426 in series with the normally closed upper set of contacts of low price relay 409. The movable contact arm of that set of contacts of relay 409 is returned to the power line 412 through the contacts of relay 307 when relay 407 is energized. The other side of the payout motor is returned through conductor 427 to terminal 2 of the Jones plug and thence to the ground line. Terminal 2 which returns toground line 413 is also connected via line 427 to one end of the operating coil of low price solenoid 278. The outer end of solenoid 278 is returned to terminal 8 through conductor 428. Terminal 8 of the Jones plug is in turn serially connected through the lower set of normally closed contacts of relay 409 to the normally open lower set, as viewed in the drawings, of contacts of selector relays 406C and 406D. CREM's 270 and 271 provide a conventional coin blocking function through operation of their armatures as hereinbefore described and have one end of their operating coils connected in common through conductor 429 to terminal 6 of the Jones plug. The other side of terminal 6 is returned to the hot line 412 via conductor 430 and the normally closed lower set of contacts, as viewed in the drawing, of relay 408, conductor 431 connected to the movable contact arm of that set of contacts and one or more of the normally closed contacts of sold-out switches 403. The other side of CREM's 270 and 271 are separately returned to the ground line 413. To this end, the operating coil of CREM 271 has its other side connected through conductor 432 directly to terminal 2 while the other side of the operating coil of CREM 270 is returned to terminal 2 through conductor 433 and the normally closed contacts of switch 382. Switch 382 is a single pole two position switch which in one position establishes a power circuit to CREM 270 as described, and in its other position establishes a connection between the ground line 413, conductor 434 and terminal 5 of the Jones plug. Use correct change lamp 411 is connected across terminals 5 and 6 of the Jones plug. Terminal 6 is returned to the hot power line 412 through conductor 430 and the normally closed lower set of contacts of relay 408. Terminal 5 is returned via conductor 436 to one end of the use correct change lamp 411. The other end of the lamp is connected via conductor 435 to terminal 6.

Each vend motor 400 has cooperatively associated therewith a corresponding timer switch 401. Each timer switch comprises a single pole double throw switch cammed to operate from its associated motor as indicated by the linking dash lines. Each switch includes a movable contact arm 440 and a pair of fixed contacts 441 and 442. Fixed contacts 441 are connected in common directly to power line 412. Fixed contact 442 of each switch is connected to one side of the operating coil of the associated selector relay 406. The movable contact arm 440 of each switch 401 is connected to an associated sold-out switch 402 through conductor 443. Each sold-out switch includes an pair of normally closed contacts adapted to open and deenergize the vend motor circuit upon depletion of the supply of articles in an associated column. Conductor 444 connects the sold-out switch to its associated selector switch 405. Each selector switch comprises a single pull, double throw switch having a pair of fixed contacts 445 and 446 and a movable contact arm 447. As shown in FIG. 4, movable contact arm 447D is serially connected to fixed contact 446C through conductor 448. Movable contact arm 447C is connected via conductor 449 to the normally open upper set of contacts of low price relay 409. Likwise, the movable contact arm 447B is connected to contact 446A and contact 447B is connected via conductor 450 to the normally open upper set of contacts, as viewed in the drawing, of high price relay 408.

As is customary in the art, two groups of sold-out switches are provided. One group comprising switches 402 in each column is provided in series with the associated vend motors to prevent establishment of an energizing circuit for corresponding vend motor when the supply of articles in that column is depleted. A second group of sold-out switches 403 is provided in series with power line 412 and each switch of this group is connected to an associated sold-out lamp 404, one each corresponding to a column of articles to be dispensed. Upon depletion of the supply of articles in a column, the switch for that column is actuated from a first position to a second position to connect the corresponding sold-out lamp across the power circuit to provide an external indication of the exhaustion of the supply of articles in that column. Switches 403 are connected in parallel and through conductor 431 to the lower set of normally closed contacts of relay 409, terminal 6 and thence to the common side of electromagnets 270 and 271. Thus, should all columns be ex hausted, the power circuit to electromagnets 270 and 271 will be broken preventing the coin vending machine from further accepting coins.

The second position of each timer switch 401 after energization of the corresponding vend motor, establishes a bypass energizing circuit for the motor via conductor 451 which is maintained until the vend motor complets its cycle. Advantageously, each timer switch may take the form of a microswitch having its movable contacts biased in the first position and adapted to be released to a second position by a timer cam, not shown, driven from the shaft of a corresponding vend motor. Upon energization of the appropriate vend motor, the corresponding timer cam is driven so as to allow the corresponding timer switch to snap to its second position whereupon contacts 440 and 442 close. As the motor approaches the end of its cycle position, arm 440 is returned to its initial position to open the bypass circuit.

Each of the selector relays 406 comprises an operating coil and two sets of contacts, an upper set and a lower set as viewed in the drawing. One end of the operating coil of each selector relay is connected in common directly to the ground return line 413 via conductor 442. The other end of each selector relay coil is adapted to be connected to the hot line 412 via an establish credit circuit wich may be traced via conductor 451, the normally closed contacts of timer switch 401, conductor 443, the closed contacts of a sold-out switch 402, the closed contacts of an actuated selector switch

405, either conductor 449 or 450, depending on whether low or high price credit has been established, the closed upper set of contacts of the low or high price relay, depending which is energized, the closed contacts of the energized vend relay 407 and conductor 420. In the case of a high price selection an intermediate enabling circuit is established between the selector switch and the upper closed contacts of low price relay 409. This intermediate circuit may be traced as follows: from a high price selector switch 405, conductor 450, the upper set of contacts of the energized high price relay 408, conductor 453, the series connected low price selector switches 405 and conductor 449. Credit lamp 410 connected across contact 446 and line 413 lights to indicate credit is whenever power is present at the low price switch contacts.

The operation of the present invention will now be described by way of example with respect to a low price selection made after deposit of two dimes. All columns are assumed full and sufficient change is present in the nickel and dime change tube columns so that change tube switch is in its up position as shown in FIG. 4, and the circuit is in the stand-by condition. With switch 382 up, power is applied across the operating coils of both CREM's 270 and 271 so that their armatures are pulled in and coins in the nickel, dime and quarter denomination may be received and passed through the coin separator 11.

The coin separator processes the two dimes deposited in accordance with the present example and directs the dimes one at a time through the dime chute in credit registry module 12. As the first dime passes through module 12 it actuates switches 212 and 215 in succession as it contacts and forces down actuating arms 211 and 214 during its passage through the dime chute. The second dime likewise actuates switches 212 and 215 in succession. Each time switch 212 or 215 is actuated, solenoid 221 is pulsed to step ratchet wheel one position counterclockwise as viewed in FIG. 2B. As the ratchet wheel is stepped for the third time, roller 333 which was riding on surface 307 passes the edge thereof and falls downward causing low price switch 330 to be actuated to its closed position. The fourth step of the ratchet wheel has no effect as roller 335 is still riding on surface 315.

Closure of the contacts of switch 330 establishes low price credit by connecting the operating coils of vend relay 407 and low price relay 409 across power lines 412 and 413. Power to low price relay 409 is applied through the series connected upper set of contacts of the deenergized selector relay. Upon energization of relay 409 its contacts are pulled in (upward as viewed in the drawing) and power is applied to the low price select switches 405C and 405D. The circuit may be traced from line 412 through conductor 420. The closed contacts of vend relay 407, conductor 421, the now closed contacts of relay 409, conductor 449, switch circuit 447C, 446C, jumper 448, switch contacts 447D, 446D and credit lamp 410 to line 413.

The unit is now ready for a low price selection which is made by the operator by actuation of a low price selector switch say, for example, in column C. Contacts 447C and 445C close and power is applied via conductor 443C to effect initial energization of vend motor 400C, while the power to switch 405D is simultaneously interrupted. Closure of contacts 447C and 445C also results in power being applied across the operating coil of selector relay 405C through contacts 440C and 442C of the vend motor timer switch 440C. Energization of relay 406C causes its contacts to pull in, upward as viewed in the drawing. The upper set of contacts of relay 406C now establish a temporary holding circuit for the vend motor 400C and selector relay 406C when the selector switch 405C is returned to its normal position removing power from conductor 443C. The holding circuit may be traced as follows: from the lower end of the operating coil of energized relay 406C, through its upper set of contacts, through the upper set of contacts of the deenergized relay 406D, conductors 422, 417, pin 3, now closed low price switch 331 and pin 7 to conductor 412.

Energization of selector relay 406C also removes power from the operating coil of low price relay 409 previously energized through the upper set of contacts with relay 406C deenergized. The upper set of contacts of the energized vend relay were utilized to provide power to select switches 405C and 405D. The lower set of contacts, now pulled up, of the energized establish the power circuit for the low price solenoid which, as will be recalled, rotates the pricing cam for proper positioning of the payout abutments 323. This circuit may be traced from solenoid 278 through conductor 428, pin 8, the lower set of contacts of the now deenergized low price relay 409, the lower set of contacts, now pulled up, of selector relay 406C and the lower set of contacts of deenergized relay 406D to line 412. Deenergization of low price relay 409 establishes power to the payout motor through its upper set of contacts and the closed contacts of the vend relay.

After a short interval following energization of vend motor 400C, timer switch 401C is switched to its other or up position. Power is maintained on the motor through contacts 440C and 441C, the latter being returned to line 412. In the machine, payout motor 359 runs through its cycle operating reset link 267 to reset the pricing cam and thereby returning low price switch 330 to its initial condition. This removes power from all relays, but power to the payout motor is maintained through its own cam operated timer switch 387 which now connects the motor across terminals 1 and 2. The payout motor remains energized until the payout motor cam returns the switch 387 to its initial condition. Likewise, vend motor 400C remains energized until its timer switch 401C is returned to its initial condition.

There has thus been described an operating sequence for a low price selection. It will now be apparent that a high price selection follows a similar sequence upon closure of the high price switch 331 and can be traced from the drawings.

During the course of the foregoing description, frequent reference has been made to terms such as "upper set", "lower set", "clockwise", "counterclockwise", "front", "back", "top", "bottom", "up", "down", etc. It should be apparent that these are relative terms and are used to aid in the description of the component parts as viewed in the drawings and are not intended to limit the physical structure of the referred to component.

While there has been described and illustrated one specific embodiment of the invention, it will be apparent from a reading of the foregoing description that variations of the details of construction which are specifically illustrated and described may be made without department from the true spirit of the invention. Ac-

cordingly, reference should be made to the appended claims to determine the full scope of the invention.

I claim:

1. In a coin operated vending machine having a plurality of columns of articles, at least one column containing articles to be dispensed at a first unit price, at least one other column containing articles to be dispensed at a second unit price, said articles adapted to be selectively dispensed, one at a time, upon energization of an associated dispensing mechanism for each column according to a vend selection made by a customer, the improvement comprising means for establishing credit corresponding to the first unit price and the second unit price, and payout means adapted to be energized upon vend selection to payout change corresponding to the difference in price between the unit price of a selected article and the value of the coins inserted, said means for establishing credit including a high price circuit and a low price circuit, said low price circuit including first relay means adapted to be energized upon the deposit of coins having a total value equal to at least the first unit price, said high price circuit including second relay means adapted to be energized upon the deposit of coins having a total value equal to at least the second unit price, a selector switch for each column, said first relay means upon energization thereof being arranged to establish a power enabling circuit to the selector switches for the column containing articles at the first unit price and said second relay means upon energization thereof being arranged to establish a power enabling circuit to the selector switches for the columns containing articles at the second unit price.

2. A coin operated vending machine as set forth in claim 1, wherein the selector switches corresponding to columns containing articles at the first unit price are serially connected to each other when said switches are in a first position, said series connection adapted to be broken when any one of said switches is actuated to a second position to thereby energize an associated vend mechanism.

3. A coin operated vending machine as set forth in claim 1, wherein the selector switches corresponding to columns containing articles at the second unit price are serially connected to each other when said switches are in a first position, said series connection adapted to be broken when any one of said switches is actuated to a second position to thereby energize the associated dispensing mechanism.

4. A coin operated vending machine as set forth in claim 2, wherein the selector switches corresponding to columns containing articles at the second unit price are serially connected to each other when said switches are in a first position, said latter series connection adapted to be broken when any one of said latter switches is actuated to a second position to thereby energize the associated dispensing mechanism.

5. A coin operated vending machine as set forth in claim 1, wherein said second unit price is higher than said first unit price and said means for establishing credit further includes a first switch adapted to be actuated from a first to a second position upon deposit of coins equal in total value to at least said first unit price and a second switch adapted to be actuated from a first to a second position upon deposit of coins equal in value to at least said second unit price, said first switch in its second position being connected to apply power to said first circuit and said second switch in its second position being connected to apply power to said second circuit.

6. A coin operated vending machine as set forth in claim 5. wherein said means for establishing credit further includes cam means for actuating said first and said second switches to their second position.

7. A coin operated vending machine as set forth in claim 6, including means for indexing said cam means in accordance with the value of coins deposited in the vending machine.

8. In a coin operated vending machine having a coin receiving means for receiving and separating nickels, dimes and quarters, indexing means adapted to be indexed in accordance with the value of coins received, article dispensing means for storing and dispensing articles, said dispensing means including at least two columns, one column containing articles to be dispensed at a first unit price, the other column containing articles to be dispensed at a second unit price and payout means for change payout, the improvement comprising dual price vend control means for establishing credit corresponding to the first or the second unit price and effecting a payout of change upon vend selection when the total value of coins received is greater than the established credit, said vend control means comprising a first circuit for establishing credit corresponding to the first unit price and controlling the dispensing of articles from the first column and a second circuit for establishing credit corresponding to the second unit price and controlling the dispensing of articles from the second column, said vend control means comprising first switch means for enabling said first circuit and second switch means for enabling said second circuit, the inedexing means including cam means for actuating said first and said second switch means, and said cam means including a pair of adjacent cam surfaces, one of said cam surfaces being shorter than the other, said first and second switch means each having, respectively, an actuator arm for actuating the corresponding switch from a first to a second position, the actuator arm of said first switch being biased against the longer cam surface and the actuator arm of said second switch being biased against the shorter cam surface.

9. In a coin operated vending machine having a coin receiving means for receiving and separating nickels, dimes and quarters, indexing means adapted to be indexed in accordance with the value of coins received, article dispensing means for storing and dispensing articles, said dispensing means including at least two columns, one column containing articles to be dispensed at a first unit price, the other column containing articles to be dispensed at a second unit price and payout means for change payout, the improvement comprising dual price vend control means for establishing credit corresponding to the first or the second unit price and affecting a payout of change upon vend selection when the total value of coins received is greater than the established credit, said vend control means comprising a first circuit for establishing credit corresponding to the first unit price and controlling the dispensing of articles from the first column and a second circuit for establishing credit corresponding to the second unit price and controlling the dispensing of articles from the second column, said vend control means comprising first switch means for enabling said first circuit and second switch means for enabling said second circuit, said first

circuit being a high price circuit and said second circuit being a low price circuit, said low price circuit including first relay means adapted to be energized upon the deposit of coins having a total value equal to at least the first unit price, said high price circuit including second relay means adapted to be energized upon the deposit of coins having a total value equal to at least the second unit price, a selector switch for each column, said first relay means upon energization thereof being arranged to establish a power enabling circuit to the selector switches for the column containing articles at the first unit price and said second relay means upon energization thereof being arranged to establish a power enabling circuit to the selector switches for the columns containing articles at the second unit price.

10. A coin operated vending machine as set forth in claim **9,** wherein the selector switches corresponding to columns containing articles at the first unit price are serially connected to each other when said switches are in a first position, said series connection adapted to be broken when any one of said switches is actuated to a second position to thereby energize an associated vend mechanism.

11. A coin operated vending machine as set forth in claim **9,** wherein the selector switches corresponding to columns containing articles at the second unit price are serially connected to each other when said switches are in a first position, said series connection adapted to be broken when any one of said switches is actuated to a second position to thereby energize the associated dispensing mechanism.

12. A coin operated vending machine as set forth in claim **10,** wherein the selector switches corresponding to columns containing articles at the second unit price are serially connected to each other when said switches are in a first position, said latter series connection adapted to be broken when any one of said latter switches is actuated to a second position to thereby energize the associated dispensing mechanism.

13. In a coin operated vending machine having a coin receiving means for receiving and separating nickels, dimes and quarters, indexing means adapted to be indexed in accordance with the value of coins received, article dispensing means for storing and dispensing articles, said dispensing means including at least two columns, one column containing articles to be dispensed at a first unit price, the other column containing articles to be dispensed at a second unit price and payout means for change payout, the improvement comprising dual price vend control means for establishing credit corresponding to the first or the second unit price and effecting a payout of change upon vend selection when the total value of coins received is greater than the established credit, said vend control means comprising a first circuit for establishing credit corresponding to the first unit price and controlling the dispensing of articles from the first column and a second circuit for establishing credit corresponding to the second unit price and controlling the dispensing of articles from the second column, said second unit price being higher than said first unit price and said vend control means for establishing credit further includes a first switch adapted to be actuated from a first to a second position upon deposit of coins equal in total value to at least said first unit price and a second switch adapted to be actuated from a first to a second position upon deposit of coins equal in value to at least said second unit price, said first switch in its second position being connected to apply power to said first circuit and said second switch in its second position being connected to apply power to said second circuit.

14. A coin operated vending machine as set forth in claim **13,** wherein said indexing means includes cam means for actuating said first and said second switches to their first and second positions.

15. A coin operated vending machine as set forth in claim **1** including a vend motor for each column and a vend circuit operatively connecting each vend motor to an associated selector switch in each column including means for removing established credit upon vend selection and preventing delivery of more than one article per established credit with proper payout of change where the value of credit established was greater than the price of the selected article.

16. A coin operated vending machine as set forth in claim **1** including a vend motor for each column and a vend circuit operatively connecting each vend motor to an associated selector switch in each column including for initiating energization of said payout motor upon vend selection with proper payout of change when the value of credit established is greater than the price of the selected article.

17. A coin operated vending machine as set forth in claim **1** including a vend motor for each column and circuit means operatively connecting each vend motor to an associated selector switch of a column so as to permit individual vend selection from each column while preventing simultaneous energization of two or more vend motors.

18. A coin operated vending machine as set forth in claim **1** including a vend motor for each column and circuit means operatively connecting each vend motor to an associated selector switch of a column and the payout means so as to prevent energization of said vend motor until after the establishment of proper credit and vend selection.

19. A coin operated vending machine as set forth in claim **18** wherein the credit established is for the first unit price and the vend selection is for an article at said first unit price.

20. A coin operated vending machine as set forth in claim **18** wherein the credit established is for the second unit price and the vend selection is for an article at said second unit price.

21. A coin operated vending machine as set forth in claim **18** wherein the credit established is for either the first or the second unit price, said first unit price being greater than the second unit price and the vend selection being for an article at said second unit price.

22. A coin operated vending machine as set forth in claim **13** including a vend motor for each column and a vend circuit operatively connecting each vend motor to an associated selector switch in each column including means for removing established credit upon vend selection and preventing delivery of more than one article per established credit with proper payout of change where the value of credit established was greater than the price of the selected article.

23. A coin operated vending machine as set forth in claim **13** including a vend motor for each column and a vend circuit operatively connecting each vend motor to an associated selector switch in each column including for initiating energization of said payout motor upon vend selection with proper payout of change

when the value of credit established is greater than the price of the selected article.

24. A coin operated vending machine as set forth in claim **13** including a vend motor for each column and circuit means operatively connecting each vend motor to an associated selector switch of a column so as to permit individual vend selection from each column, while preventing simultaneous energization of two or more vend motors.

25. A coin operated vending machine as set forth in claim **13** including a vend motor for each column and circuit means operatively connecting each vend motor to an associated selector switch of a column and the payout means as to prevent energization of said vend motor until after the establishment of proper credit and vend selection.

26. A coin operated vending machine as set forth in claim **25** wherein the credit established is for the first unit price and the vend selection is for an article at said first unit price.

27. A coin operated vending machine as set forth in claim **25** wherein the credit established is for the second unit price and the vend selection is for an article at said second unit price.

28. A coin operated vending machine as set forth in claim **25** wherein the credit established is for either the first or the second unit price, and the vend selection being for an article at said second unit price.

29. A coin operated vending machine as set forth in claim **5** wherein said means for establishing credit includes a coin change mechanism including means for actuating said first and said second switches to their second positions.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,776,339 Dated December 4, 1973

Inventor(s) Raymond D. Bowman

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract of the Disclosure, line 4, "30 " should be --30¢--;
Column 3, line 16, "he" should be --the--;
Claim 6, column 22, line 5, the period after "5" should be omitted;
Claim 25, column 25, line 14, after "means", insert --so--.

Signed and sealed this 21st day of May 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents