

June 21, 1960

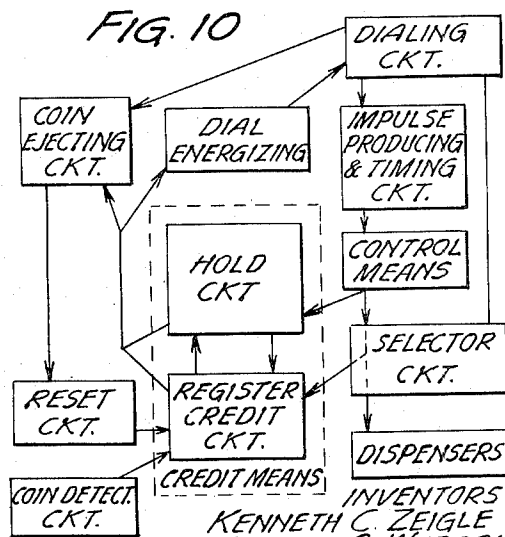
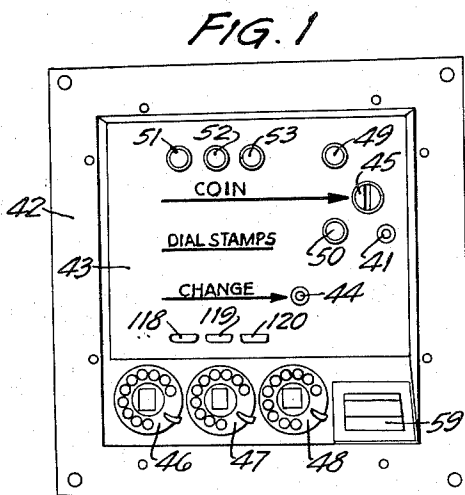
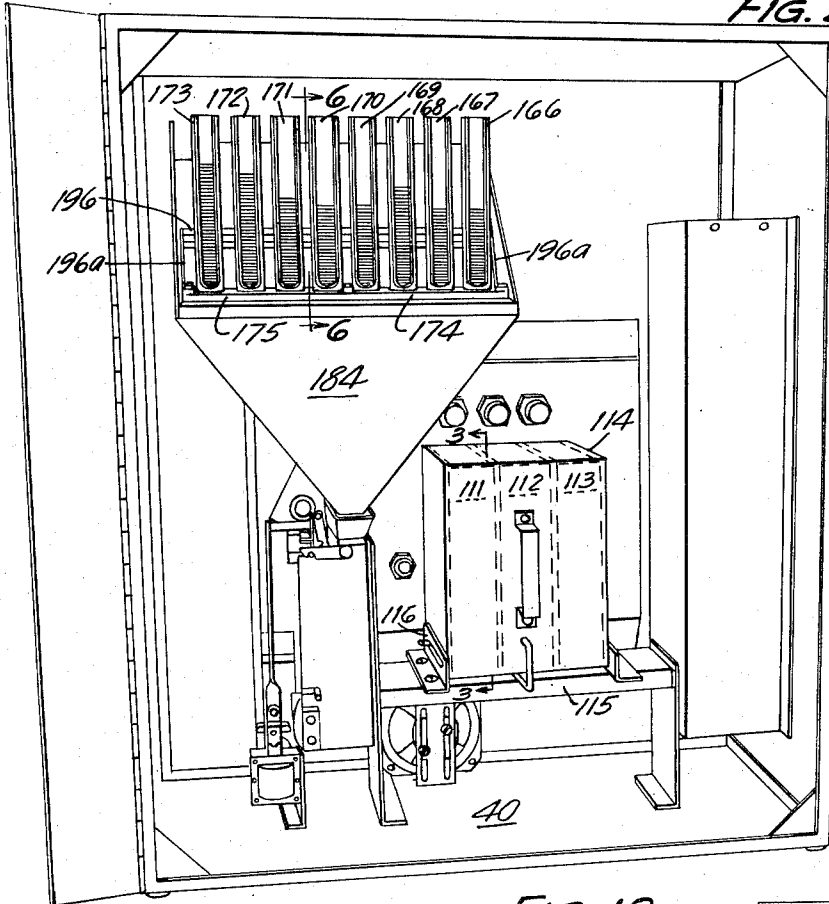
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2,941,644

VARIABLE STAMP VENDING AND MONEY CHANGING MACHINE

Filed Dec. 30, 1957

5 Sheets-Sheet 1



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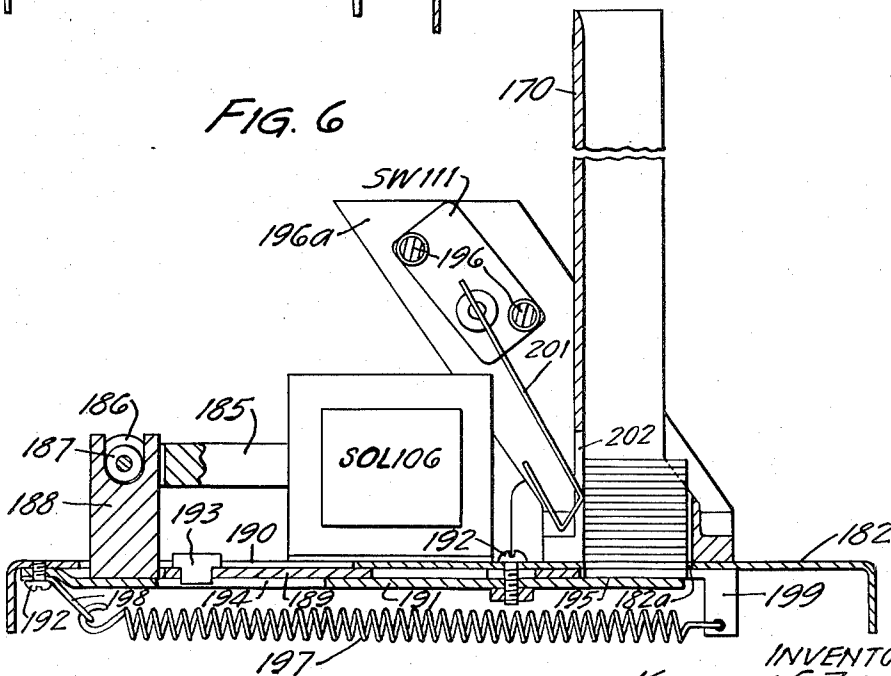
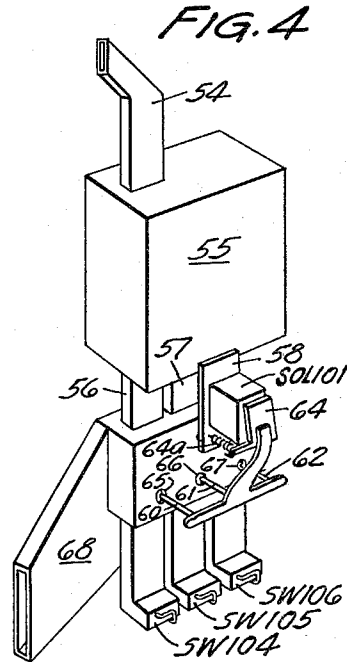
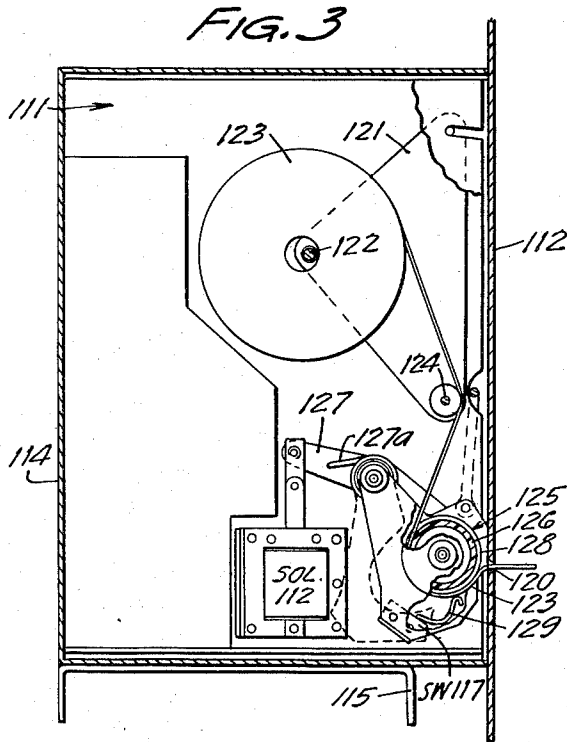
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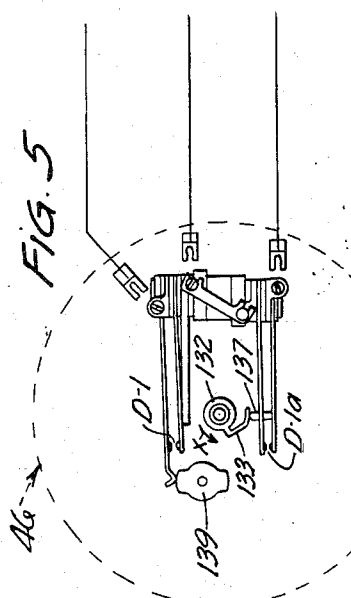
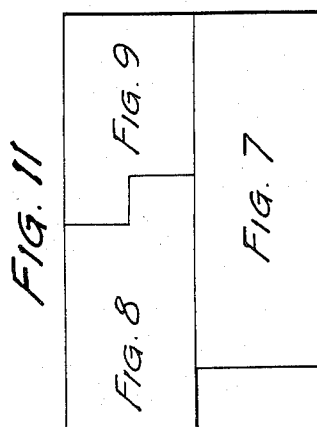
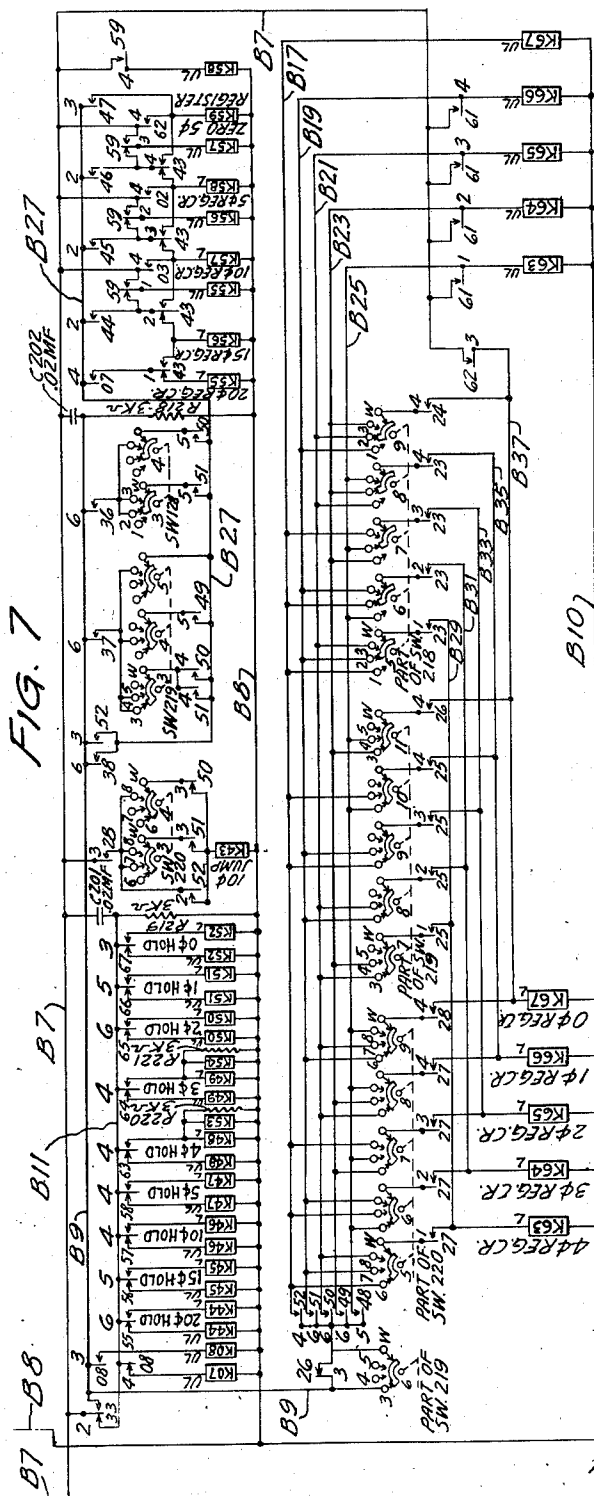
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VARIABLE STAMP VENDING AND MONEY CHANGING MACHINE

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5 Sheets-Sheet 3



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VARIABLE STAMP VENDING AND MONEY CHANGING MACHINE

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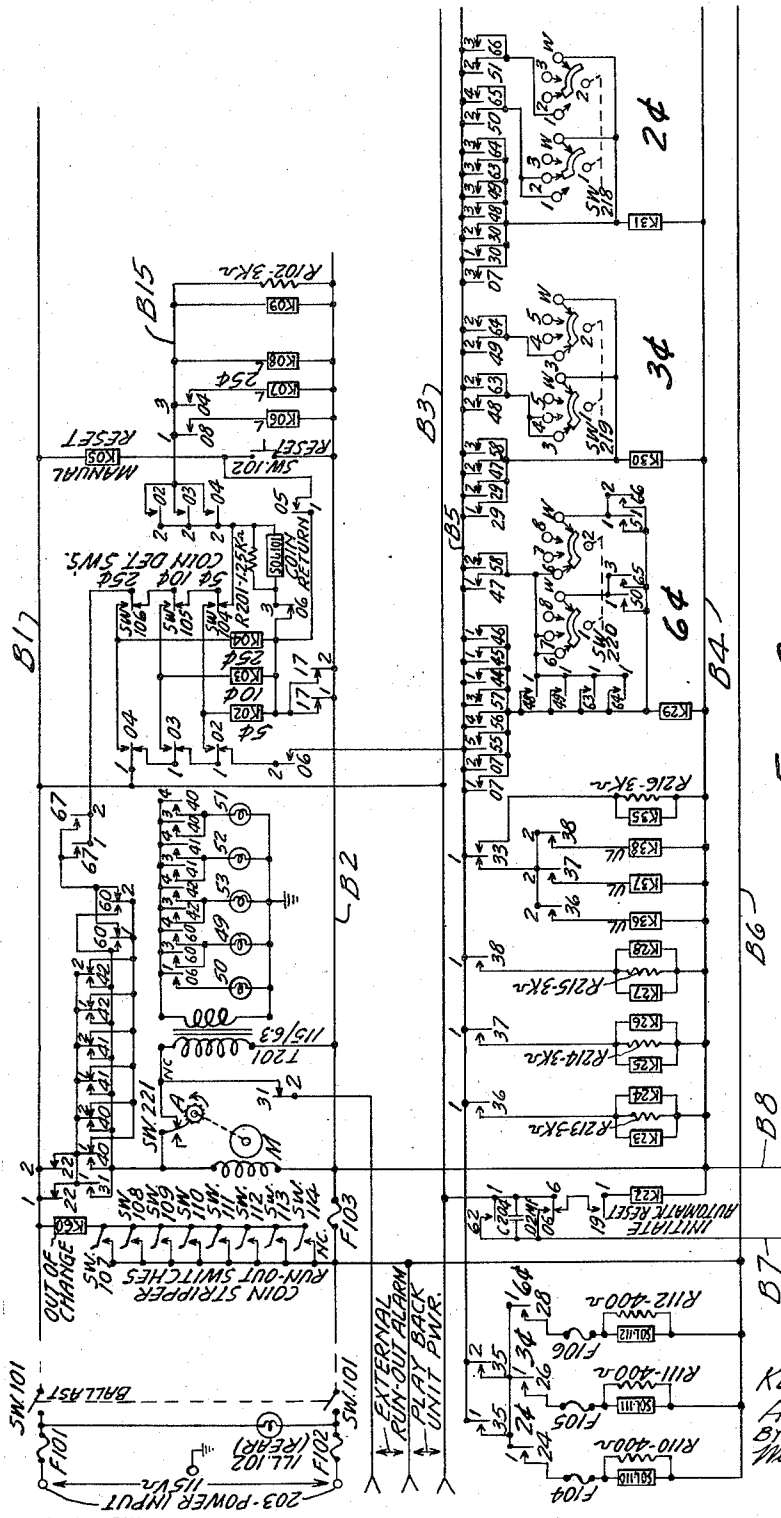


FIG. 8

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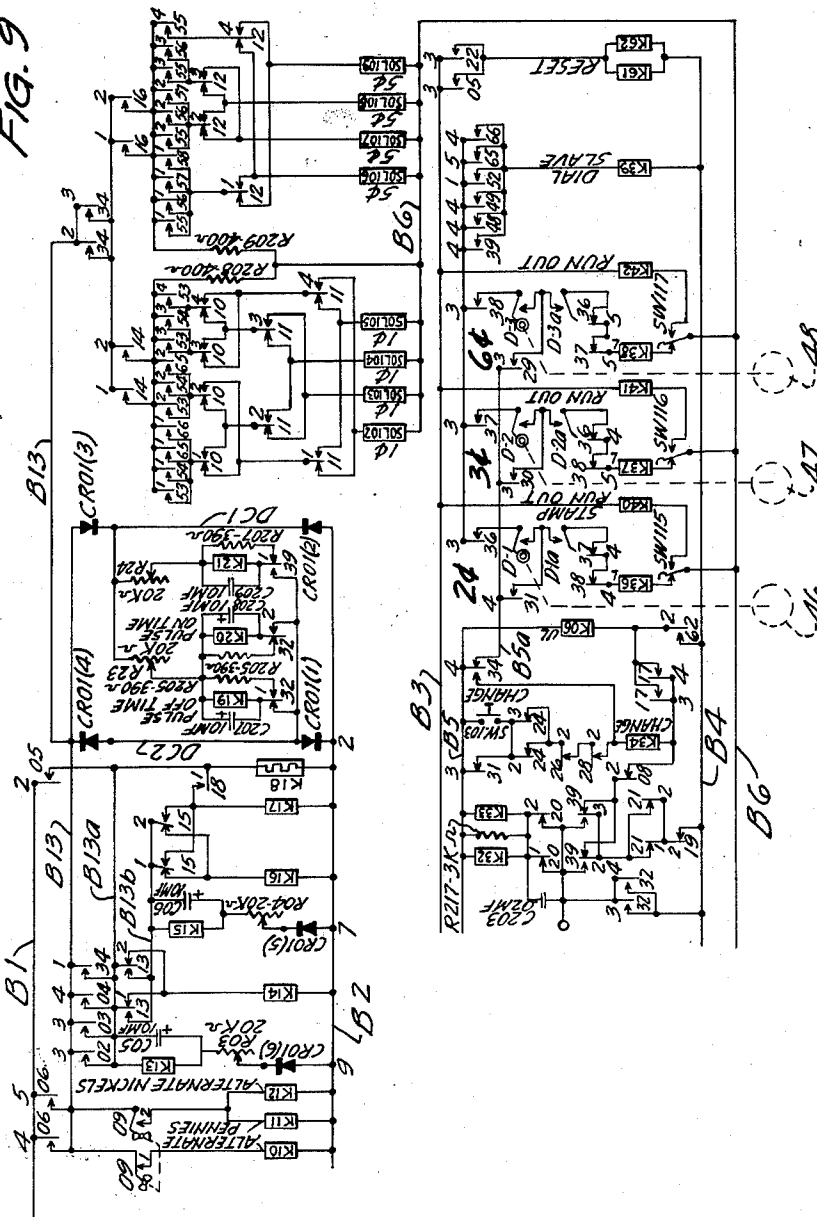
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FIG. 9



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VARIABLE STAMP VENDING AND MONEY CHANGING MACHINE

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Filed Dec. 30, 1957, Ser. No. 706,004

19 Claims. (Cl. 194—10)

This invention relates to vending machines and more specifically relates to such machines of the type for receiving coins of various denominations and for dispensing a variety of articles at different prices.

An object of our invention is to provide in a vending machine of the class described, new and improved means for indicating credit existing for purchase of credit, for quickly and positively subtracting credit in amounts equal to the articles dispensed and simultaneously with the dispensing of articles, and for preventing any additional articles from being dispensed when insufficient credit exists to allow the purchase of an article.

Another object of our invention is to provide in a vending machine of the class described, a customer-operated dialing mechanism which is operated to indicate the number of articles such as stamps to be purchased, and which only triggers the dispensing of each stamp and then loses control so that abnormal operation of the dial or tampering with the dial during its normal operation will be ineffective to vary the maximum rate at which the stamp dispensers are required to operate and also be ineffective to vary the number of stamps which are dispensed.

A further object of our invention is the provision in a vending machine of the class described, of a single impulse producing and timing circuit to control the rate at which stamps are dispensed and to control the corresponding subtraction of credit, along with a plurality of customer operated dialing mechanisms which permit the customer to purchase any of a pre-selected denomination of stamps and which, when operated, cause dispensing of a certain denomination of stamp and cause the value of the stamp to be subtracted from the existing credit.

A still further object of our invention is the provision in a vending machine of the class described, of a change-dispensing mechanism having a number of coin storage tubes and coin dispensers which are controlled in such a manner as to alternate in successive dispensing operations, the dispensers which may be individually operated so that when only a few coins are dispensed, as is frequently the case, the coins will be drawn, in successive operations, from different dispensers and coin tubes so that the supply of coins remaining in the several tubes, remain substantially equal to each other.

In the specification and claims, continuing reference is made to "stamps" of various denominations, but it should be understood that the present invention might as well be utilized for dispensing a wide range of articles, and the terminology "stamps" should be given the broadest interpretation to include articles of all types which are of such a nature as to be handled and dispensed by a vending machine. Furthermore, certain denominations of coins are specifically mentioned, and the particular denominations are mentioned in connection with the disclosed exemplary form of the invention, but the mention of these particular denominations should not be considered as limiting the scope of the invention.

These and other objects and advantages of our inven-

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tion will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to the same parts throughout the several views and in which:

Fig. 1 is a front view of the machine comprising the present invention and showing in particular the control panel thereof;

Fig. 2 is a rear perspective view of the machine showing the arrangement of the operating mechanism and showing the manner of mounting these mechanisms;

Fig. 3 is a section view, partly broken away, taken on a vertical plane as indicated at 3—3 in Fig. 2 and showing in particular the construction of one of the stamp dispensing or vending mechanisms;

Fig. 4 is a detail diagrammatic perspective of the coin receiving sorting and rejecting mechanisms which is shown in part in Fig. 2;

Fig. 5 is a detail elevation of the rear side of one of the dials and particularly showing the switching arrangement thereof;

Fig. 6 is a detail section view taken on a vertical plane as indicated at 6—6 in Fig. 2 and showing in particular the change dispensing mechanism;

Figs. 7, 8 and 9 are schematic diagrams of the electrical circuit, which are to be arranged in the pattern shown in Fig. 11; and

Fig. 10 is a block diagram of the various portions of the electrical circuit.

One embodiment of the present invention is shown in the figures. It should be pointed out that for the most part the electrical conductors and most of the electrical apparatus such as relays have not been shown in the mechanical drawings and it should be understood that the relays can be mounted in any suitable fashion on racks in a separate housing. It should also be noted that although the present invention is constructed to receive and handle nickels, dimes and quarters and is adapted to dispense stamps, several denominations of which have been mentioned, and these examples of the coins and stamps are only cited as exemplary of one form of the invention and that within the scope of the invention other coins and denominations of stamps may be handled and dispensed.

As best seen in Figs. 1 and 2, the invention includes a housing 40 having a front frame plate 42, to which the control panel 43 is affixed. The control panel 43 mounts the control and indicating apparatus and allows the dispensing of change and stamps therethrough. A faulty or bent coin return button 41, a change return button 44, a coin slot 45 and a plurality of manually controllable dials 46, 47 and 48 are all carried by the control panel 43. The control panel 43 also mounts a number of indicator lights, such as indicator 50 which flashes after insertion of a coin to indicate that stamps may be purchased, the indicator 49 which flashes to show that change has run out and to warn a prospective customer that stamps may not be purchased, and indicators 51, 52 and 53 which individually flash when a supply of stamps of a certain denomination is exhausted. The control panel 43 also has a coin return slot and receptacle 59 through which change is dispensed at the end of a transaction and the control panel 43 also has a number of slots 118, 119 and 120 through which stamps of various denominations are dispensed.

The coin receiving mechanism has a coin chute 54 for receiving coins from the slot 45 and for carrying the coins to the sorting mechanism 55 of a conventional type, which causes the coins to pass downwardly through one of the chutes 56, 57 and 58 wherein the coins will either fall through the lower ends of the chutes and will operate one of the switches SW104, SW105 or SW106, or will be returned to the coin return slot and receptacle 59 through

the chute 68. If a coin has been previously inserted to commence a transaction, subsequent coins falling into the chutes 56, 57 and 58 are deflected into the return chute 68 by one of the coin blocking fingers 60, 61 and 62 which are mounted on a control arm 63, which is rigid with the armature 64 of the control solenoid SOL101. As will be described hereinafter, solenoid SOL101 is deenergized during a transaction and the fingers are pulled by spring 64a into the apertures 65, 66 and 67 in the coin chutes so as to deflect any subsequent coins into the chute 68.

Stamp dispensing mechanism

The vending machine is provided with a plurality of stamp dispensing or vending mechanisms which are indicated in general by the numerals 111, 112 and 113 and which are identical in construction so that an understanding of one of these mechanisms, 111, shown in Fig. 3, will suffice for an understanding of each of the mechanisms. The stamp vending mechanisms are mounted in a housing 114 which is supported on a bracket 115. Each of the stamp dispensing mechanisms is individually removable from the housing 114 by sliding the housing 114 rearwardly on the mounting tracks 116 and then swinging the housing 114 downwardly to permit the dispensers to be lifted out. The dispensers 111, 112 and 113 are aligned with the slots 120, 119 and 118 respectively in the front panel.

Dispenser 111 is provided with a roll mounting bracket 121 having a spindle 122 upon which is mounted a roll of stamps 123. A rotary stamp guide 124 guides the stamps to the metering and ejection mechanism 125, which is not shown in minute detail but which is substantially identical to that shown in application for U.S. Letters Patent Serial No. 447,766, filed August 4, 1954 by Kenneth C. Zeigle, Paul C. Nieland and James C. Vance, and now Patent No. 2,878,014, dated March 17, 1959. The mechanism 125 includes a drive wheel 126 which is operated by the dispensing solenoid SOL112 and is connected to the armature thereof by a control arm 127 to which is connected a spring 127a for shifting the arm 127 and solenoid armature back to their normal positions. The solenoid SOL112 is energized and deenergized for each stamp that is vended and a plurality of stamps is dispensed by applying a plurality of current impulses to the solenoid. It should be noted that the other dispensers have similar solenoids SOL110 and SOL111, which are shown in Fig. 8. The dispenser 111 has means for detecting presence or absence of stamps and in the form shown a microswitch SW117 has a feeler 129 which engages the stamps 123 when they overlie the groove 128 in the wheel 126. When the last stamp is dispensed the feeler will shift into the groove and operate the switch. It should be noted that the other dispensers 113 and 112 have similar stamp detecting switches SW115 and SW116 shown in Fig. 9.

Change mechanism

Change making mechanism is provided for returning change to the customer at the end of a transaction in order to give full value for the coin inserted. As best seen in Figs. 2 and 6 the change making mechanism includes a plurality of coin tubes 166-173, each of which has one side portion cut away to facilitate ready and easy placement of coins in the tubes. The coin tubes 166-169 are dimensioned to receive and retain pennies and the other tubes 170-173 receive and retain nickels. The four penny tubes and the four nickel tubes are formed integrally with base plates 174 and 175 respectively which are bolted to the bracket plate 182 which is supported on the upper edge of the coin-receiving hopper or chute 184. The hopper or chute 184 is affixed to the housing 40 and directs the coins to the return slot and receptacle 59.

Each of the coin ejecting mechanisms is identical and

a description of one will suffice for an understanding of all of the mechanisms. The nickel dispensing mechanism shown in Fig. 6 includes a coin ejecting solenoid SOL106 which is mounted on the bracket plate 182 and has the armature 185 connected by a yoke 186, and by means of a resilient drive element 187 extending between the arms thereof to an upstanding connecting arm or post 188 which is formed integrally with the stripper plate 189. Post 187 extends through an elongated slot 190 in bracket plate 182 and is thereby shiftable toward and away from coin tube 170. Stripper plate 189 is supported by guide plate 191 and is secured to the bracket mounting plate 182 as by screws and bolts 192. A guide element 193 is slidable in an elongated opening 194 in guide plate 191 and is affixed to the stripper plate 189. Stripper plate 189 has a semi-circular recess 195 in the forward end thereof which normally communicates with the lower end of tube 170 through the opening 182a in the bracket plate 182. The guide plate 191 normally holds a coin in the stripper plate and precludes it from falling through. The end of stripper plate 189 is shiftable to the right until the recess 195 is disposed outwardly of the end of guide plate 191 whereupon the coin carried by the stripper plate is dropped downwardly into the hopper or chute 184. A return spring 197 is affixed at one end by lug 198 and set screw 192 to the guide plate 191 and is secured at the other end to a depending arm 199 which is formed integrally of the inner end of stripper plate 189.

It should be understood that a solenoid is associated with each of the coin tubes for ejecting coins one at a time therefrom. The solenoids (Fig. 9) SOL102-SOL109 are respectively associated with coin tubes 166-173 for ejecting coins therefrom.

Means are provided for detecting lack of coins in the coin tubes and in Fig. 6, it will be seen that a microswitch SW111 has a feeler finger 201 which extends into the lower portion of the coin tube 170 through a slot 202 in the rear side of coin tube 170. The switch SW111 is mounted on rods 196 which are supported by bracket plates 196a at the ends of the base plates 174 and 175. It will be seen that the coins in the tube hold the feeler finger in the slot 202, but when the number of coins is decreased to the point where no coin will engage the feeler, the feeler will swing inwardly into the tube to operate the switch SW111.

It will be noted that a coin detecting device is provided for each of the coin tubes and switches SW107-SW114 (Fig. 8) are respectively associated with coin tubes 166-173.

The change mechanisms are operated either manually by pressing change button 44 on the control panel or automatically, depending upon the extent of credit remaining in the machine as will hereinafter be more fully described. It will be seen that before change may be had, it is required that a stamp be purchased.

Electric control system

The major components of the electric control circuit of the vending machine are shown in Fig. 10. Briefly, the electrical circuitry includes a credit means responsive to the coin detecting circuits for establishing credit. When credit is established, the dial energizing circuits permit the dialing circuits to operate. Depending upon which dial is operated, the dialing circuits operate the selector circuit so as to prepare for the dispensing of the proper denomination of stamp and prepare for the subtraction of the proper amount of credit. The dialing circuits also trigger the production of impulses which are applied by the control means to the dispensers, and the credit means. The impulse is first applied to the register credit circuit for subtracting credit which prepares the hold circuits for proper operation and then the impulse is applied to the hold circuits so that the credit registered thereby is the same as in the register credit circuit after the subtraction.

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If sufficient credit remains, the dial energizing circuits maintain the dialing circuits in condition for operation. The credit means also will control the number of coins which may be returned as change. The coin ejecting circuit is also controlled by the dialing circuits which will not permit the coin ejecting circuits to operate unless at least one stamp has been purchased. When the coins are ejected for making change, the reset circuits are energized for resetting the credit means.

In the schematic circuit diagrams various devices are indicated by numerals with uniform letter prefixes. Power buses are designated with the prefix "B"; even numbered buses being connected or connectible to one side of the power source and odd numbered buses being connected or connectible to the other side of the power source; relays are designated with the prefix "K," certain of the relays are two coil latching type relays and the coils of these relays are designated with the suffixes "L" (latching) and "UL" (unlatching or releasing); the contacts of the relays are designated by the relay designation followed by a hyphen and the number of the contact and on the circuit diagram the contacts are designated by the relay number and the contact number, one above the other; switches are designated by the prefix "SW" in most cases, with the exception that certain switches directly associated with the dials are designated with the prefix "D"; electric solenoids are designated by the prefix "SOL"; resistors are designated with the prefix "R" and condensers are designated with the prefix "C."

Fig. 7 contains the circuitry for the credit means or mechanism. The hold circuits and relays are positioned in the upper left hand corner of Fig. 7 and are designated K44 to K52. The remainder of the circuit and relays at the upper right hand corner and across the bottom of Fig. 7 are the register credit relays and circuit, and these relays are designated by the numerals K55 to K59 and K63 to K67.

In Fig. 8, power is supplied at the upper left hand corner and adjacent the upper right hand corner is the coin detecting circuits which include relays K02 to K04 and K06, and coin detecting switches SW104 to SW106; at the lower right hand corner of Fig. 8 are the dial energizing circuits including relays K29 to K31; and the stamp dispensers are at the extreme lower left of Fig. 8 and include the solenoids SOL110 to SOL112. Immediately to the right of the stamp dispensers is the selector circuits including relays K23 to K28.

At the lower right hand portion of Fig. 9 are the dialing mechanisms including the interrupter switches D1, D2 and D3 (respectively associated with dials 46, 47 and 48) and the relays K36 to K38; at the upper right hand portion of Fig. 9 are the coin ejecting solenoids SOL102 to SOL109 and their associated control circuits, and the remainder of the coin ejecting circuit is to the left of the dial circuits and includes relay K34 and the manual switch SW103 controlled by the change button 44; the impulse producing and timing circuit is in two portions, one being to the left of the coin ejector mechanism and including relays K19 to K21 and the remainder of the circuit is at the lower left corner of Fig. 9 and includes relays K32 and K33.

Power is supplied to the buses B1 and B2 at 203. The buses B1 and B2 include the main power switch SW101. Buses B1 and B3 are connected for simultaneous energization. Buses B2, B4, B6, B8 and B10 are all interconnected for simultaneous energization.

The coin detecting circuits which sense the insertion of a coin into the machine and cause credit to be set up and prepare other circuits for operation include relays K02, K03 and K04, and relay K06. Relay K04 is connected to bus B2 through contacts K17-1 and K17-2 and is connectible to bus B1 through switch SW106 (located at the bottom of coin tube 58) when operated, contacts K67-1 and K67-2 when operated, contacts K60-1 and K60-2, through one or more of contacts K40-1, K40-2, K41-1,

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K41-2, K42-1 or K42-2 and through contacts K22-1 and K22-2. After relay K04 is energized, connection to bus B1 is maintained through holding contact K04-1. Relay K03 is similarly connected to bus B2 and is connectible to bus B1 through switch SW105 when operated, switch 106, contacts K67-1, . . . K22-1; the connection to bus B1 is maintained after relay K03 is operated through contacts K03-1 and K04-1. Relay K02 is similarly connected to bus B2 and is similarly connectible to bus B1 through switches SW104 when operated, SW105, SW106, . . . K22-1; the connection to bus B1 is maintained after relay K02 is operated through the holding contacts K02-1, K03-1 and K04-1.

Coin return solenoid SOL101 is normally energized to allow coins of any denomination to set up the credit in the machine and is connected to bus B2 through contact K06-3 and contacts K17-1 and K17-2, and is connected to bus B1 through switches SW104, SW105, SW106, contacts K67-1, . . . K22-1. A discharging resistor R201 shunts the solenoid coil SOL101.

Bus B15 is connectible to bus B1 for energizing a number of relays K06 to K09 through one or more of the contacts K02-2, K03-2 or K04-2 and switches SW104, . . . K22-1. The operating or latching coil K06L of relay K06 is connected to bus B2 and is connectible to bus B15 through contact K08-1. Twenty-five cent credit relay coil K07L is connected to bus B2 and is connectible to bus B15 through contact K04-3. Latching coil K08L is connected directly to buses B2 and B15.

Relay coil K09 is also connected directly to buses B2 and B15. Relay K09 is of different design as compared to most of the other relays and is provided with two contacts K09-1 and K09-2 which are cam operated wherein the cams for the contacts are out of phase with each other. The contact-operating cams move one step each time the relay is operated and have an eight-step cycle of operation, the first four and last four steps of the cycle being identical with each other. In the successive eight steps of operation of the relay, contact K09-1 will be closed, closed, open, open, closed, closed, open, open; and contact K09-2 will be closed, open, open, closed, closed, open, open, closed.

In Fig. 9 bus B13 is connectible to bus B1 through contacts K06-4 and K06-5 to prepare for the operation of the coin ejecting solenoids SOL102 to SOL109 and to prepare or operate relays K10, K11 and K12 which alternate the combinations of said solenoids which may operate, and to prepare for operation of relays K14 to K17 which provide for sequential operation of the penny ejecting solenoids SOL102 to SOL105 and then the nickel solenoids SOL106 to SOL109, and bus B13 also supplies power to the timing section of the impulse-producing circuit which includes relays K19 to K21.

Bus B13a is connectible to bus B13 through one of the contacts K02-3, K03-3, K04-4 or K34-1, or bus B13a is connectible to bus B1 through contact K05-2. Bus B13b is connectible with bus B13a through contacts K13-1 and K13-2 when operated.

The connections of the control relays for the coin dispensing solenoids are as follows. Relay K10 and relays K11 and K12 are connected to bus B2 and are connectible to bus B13 through contact K09-1 and K09-2 respectively. Relay K13 is connected to bus B2 through the resistor R03 and rectifier CR01(6), and is connected to bus B13a. A charging condenser C05 is connected in shunt with respect to relay coil K13 to provide a time delay of approximately 100 milliseconds between the time power is applied to the relay coil K13 and the operation of the contacts thereof. Penny dispensing control relay K14 is connected to bus B2 and is connected to bus B13a through contacts K13-1 and K13-2. Relay K15 is connected to bus B13b and is connected to bus B2 through resistance R04 and rectifier CR01(5). Condenser C06 is connected in shunt with respect to relay K15 for providing a time delay of approximately 100 milliseconds from

the energization thereof to the operation of the contacts. Nickel dispensing control relay K16 is connected to bus B2 and is connected to bus B13b through contacts K15-1 and K15-2. Resetting relay K17 is connected to bus B2 and is connectible to bus B13b through contacts K15-1 and K15-2 when operated. Relay K17 is also connectible to bus B13a through contact K18-1 when operated. Relay K18 is connected to buses B13a and B2, and is a time delay relay providing approximately a five second lag between energization of bus B13a and the operation of the contacts. Relay K18 is also connectible to bus B1 through contact K05-2.

The penny dispensing solenoids SOL102 to SOL105 are connected to bus B6 and are connectible to bus B13 through the contacts K11-1 to K11-4 and K10-1 to K10-4 which cumulatively control the operation of the solenoids in successive transactions, and through contacts K53-1, K54-1, . . . K53-4 which indicate the credit remaining and therefore indicate the number of penny dispensing solenoids which will be permitted to operate, and also through contacts K14-1, K14-2, K34-2 and K34-3, when operated.

A solenoid discharging resistor R208 is connectible through a number of the contacts in shunt with respect to the penny dispensing solenoids.

The nickel ejecting solenoids SOL106 to SOL109 are connected to bus B6 and are connected to bus B13 through contacts K12-1 to K12-4 which control the sequence of the solenoid operation in successive transactions, and through contacts K55-1, K56-1, . . . K55-4 which indicate the credit existing and therefore the number of nickel solenoids to be operated, and through contacts K16-1, K16-2, K34-2 and K34-3 when operated.

The ejection of change or coins is initiated by operation of the relay K34 which is energized from buses B4 and B5. Bus B5 is energized from bus B1 through contacts K06-2, K02-1, K03-1 and K04-1. Relay K34 is connectible to bus B4 through contacts K08-2, K39-2 and K39-3, K21-1 and K21-2, and K19-2 when operated; and relay K34 is connectible to bus B5 through contacts K28-2, K26-2, K24-2, K24-3 and through contact K31-3 or switch SW103 which is manually controlled by button 44. After relay K34 is operated connection to bus B5 is maintained through hold contact K34-4.

In connection with the dialing circuits, reference is first made to Fig. 5 which shows the switching arrangement of one of the dials 46 which is identical to the switching arrangements of the other dials. Switch contacts D1a are normally open and are held in this condition by a cam 133 which is mounted on the rotary spindle 132 of the dial and normally engages the post 137 which holds the contacts D1a in operation. When the dial 46 is revolved in the direction of arrow X switch contacts D1a are closed and will remain closed until the dial returns to rest condition. Closing of the contact D1a causes the other dials to be locked out of operation and causes operation of the selector circuit previously mentioned.

The interrupter switch D1 is operated by a rotary cam 139 which is connected in a conventional manner (not shown) to be revolved when the dial is released from the finger of the customer and is allowed to return to its rest position so as to close the interrupter switch D1 a number of times equal to the number selected and dialed by the customer. If the customer dials a certain number, the interrupter switch D1 will produce a like number of current impulses therethrough.

Bus B5a is connected to bus B5 through contact K34-4. A dial slave relay K39 is provided for following the operation of any one of the dial interrupter switches and is connected to bus B4 and is connectible to bus B5a through one of the contacts K48-4, . . . K66-4 or holding contact K39-4, and through contact K36-3, interrupter switch D1 (of dial 46) and contact K31-4. The latching or operating coil K36L is connected to bus B6 through

stamp run-out switch SW115 and is connectible to bus B5 through contacts K38-4, K37-4, the dial off-normal switch D1a and contact K31-4.

The dial slave relay K39 may, alternatively, be connected to bus B5a through contacts K30-3, interrupter switch D2 (or dial 47) and contact K37-3. The latching coil K37L is connected to bus B6 through stamp run-out detector switch SW116 and is connectible to bus B5a through contacts K38-5, K36-4, switch D2a and contact K30-3.

The dial slave relay K39 is similarly connectible to bus B5a through contacts K29-3, interrupter switch D3 (of dial 48) and contact K38-3. Latching coil K38L is connected to bus B6 through stamp run-out switch SW117 and is connectible to bus B5a through contacts K37-5, K36-5, off normal switch D3a and contact K29-3.

The stamp run-out relays K40, K41 and K42 are connected to bus B3 and are connectible to bus B6 through switches SW115, SW116 and SW117 respectively when stamps are exhausted.

The impulse producing and timing circuit is triggered by operation of relay K39 and includes relays K32 and K19, K20 and K21. The rectifiers CR01(1), CR01(2), CR01(3) and CR01(4) connect the buses B13 and B2 to the direct current buses DC1 and DC2. Relays K19 and K20 are connected through resistor R23 to the direct current bus DC1, and are alternately connected to the direct current bus DC2 through the contacts K31-1 and K31-2 respectively. Charging condensers C207 and C208 are connected in shunting relation with respect to relays K19 and K20 respectively for producing a time delay between the time that power is applied to the relay coils and the time at which the contacts thereof are operated. Discharging resistors R205 and R206 are respectively connectible in shunting relation with relays K19 and K20 through the contacts K32-1 and K32-2. Relay K21 is connected to direct current bus DC1 through resistor R24 and is also connectible to the direct current bus DC2 through contact K39-1. Charging condenser C209 is connected in shunting relation with respect to relay K21 and discharging resistor R207 is connectible in shunting relation with respect to relay K21 through the contact K39-1. The time delays between energization and operation of the relays K19, K20 and K21 are of approximately 50 milliseconds, but may be varied slightly by adjusting the resistors R23 and R24.

Relay K32 is connected to bus B5 and is connectible to bus B4 through contacts K20-1, K20-2 and K39-2 and K39-3 when operated, K21-1, K21-2, and K19-2 when operated. Connection to bus B4 is maintained through contacts K32-3 and K32-4 after relay K32 is operated.

The timed impulses of current produced operate the means for controlling the stamp dispensers and the credit mechanism which in the present invention comprises relay K33 which is connected in shunting relation with respect to relay K32. A discharging resistor R217 is also connected in shunt relation with respect to relay K33.

In Fig. 8 the dial energizing circuit which allows operation of the several dials in response to predetermined existing credit, includes relays K29, K30 and K31, all of which are connected to bus B4. Denomination limit relay K29 is connected to bus B5 through any one or more of contacts K07-1, K07-2, K55-5, K56-4, K57-3, K44-1, K45-1 or K46-1, all of which are credit relay contacts and indicate the presence of ten cents or more credit in the machine. Relay K29 determines whether or not dial 48 may operate and in view of the fact that six cent stamps are controlled by dial 48, the dial should be permitted to operate after there is at least six cents credit in the machine. Relay K29 may also be connected to bus B5 through any one of contacts K64-1, K63-1, K49-1 or K48-1 and through contacts K47-1 and K58-1. Relay K29 may also be connected to bus B5 through contacts K50-1 K65-3, and selector switch SW220-1, and

contacts K47-1 and K58-2. The selector switch SW220 is a multi-bank multiple position switch which is adjusted in relation to the denomination of stamps contained in the dispenser 111. The switch SW220 has three switching positions which respectively provide for six cent, seven cent or eight cent stamps to be handled. Relay K29 may also be connected to bus B5 through contacts K51-1 and K66-2 and selector switch SW220-2 and contacts K47-1 and K58-2.

Relay K30, which controls energization of the dialing mechanism 47, is connectible to bus B5 through any one or more of contacts K29-1, K29-2, K47-2 or K58-3; and is also connectible to bus B5 through multi-position selector switch SW219-1 and contacts K48-2 and K63-2; and is also connectible to bus B5 through switch SW219-2 and contacts K49-2 and K64-2. By adjustment of the multi-position switch SW219, the dispenser 112 may handle either three, four or five cent stamps.

Relay K31 which controls the energization of the dial 46, is connectible to bus B5 through any one or more of contacts K07-3, K30-1, K30-2, K48-3, K49-3, K63-3 or K64-3; and is also connectible to bus B5 through multi-position selector switch SW218-1 and contacts K50-2 and K65-4; and is also connectible to bus B5 through switch SW218-2 and contacts K51-2 and K66-3. By adjusting the multi-position switch SW218 the dispenser 113 may handle stamps in the denomination of one cent, two cents or three cents.

The selector circuit for causing the proper dispenser to operate with a corresponding dial and for causing subtraction of the proper credit value, includes the relays K23 and K24 which are connected to bus B4 and connectible to bus B5 through contact K36-1; relays K25 and K26 which are connected to bus B4 and connectible to bus B5 through contact K37-1; and relays K27 and K28 which are connected to bus B4 and connectible to bus B5 through contact K38-1. Discharging resistors R213, R214 and R215 shunt the relays K23, K25 and K27 respectively.

The control means for transmitting the timed impulses to the dispensers and the credit mechanism includes the relay K33, previously mentioned, and relay K35 which is connected to bus B4 and connectible to bus B5 through contact K33-1 and which is shunted by discharging resistor R216.

The solenoids SOL110, SOL111 and SOL112 of the stamp dispensers are connected to the bus B6 and are connectible through contacts K24-1, K26-1, K28-1 respectively, and contacts K35-1, and K35-2 to bus B5. Discharging resistors R110, R111 and R112 shunt the stamp dispensing solenoids.

The coin run-out detector switches SW107 to SW114 are in shunt relation with respect to each other for connecting the out-of-change relay K60 to bus B2. Operation of this relay prevents insertion of any additional coins in the machine for setting up credit.

A motor M for driving a cam A is connected to bus B2 and is connectible to bus B1 through any one of contacts K31-1, K40-1 . . . K60-2 and contacts K22-1 and K22-2. The cam A which is driven by motor M periodically operates the switch SW221 which connects one side of the primary of transformer T201 to the bus B1 along with the motor M, and the other side of the transformer primary is connected to bus B2. The indicator lights 49-53 (showing on the control panel) are connected to one side of the transformer secondary and are connectible to the other side of the transformer secondary by contacts K06-1, K60-3 . . . K40-4.

The unlatching coils K36UL and K37UL and K38UL of relays K36, and K38 respectively are connected to bus B4 and are connectible to bus B5 through contacts K36-2, K37-2 and K38-2 respectively and contact K33-1.

In Fig. 9 the resetting circuit which prepares the circuits, at the end of a transaction for a subsequent trans-

action, includes the relay coil K06UL of relay K06 which is connected to bus B5 and which is connectible to bus B4 through contacts K17-3 and K17-4 when operated, K08-2, K39-2 and K39-3, K21-1 and K21-2, and K19-2 when operated, or release coil K06UL is alternately connected to bus B4 through contact K62-2. Relay K22 (Fig. 8) which initiates the automatic resetting is connected to bus B4 and is connectible to bus B3 through contacts K19-1 when operated, and K06-6. The resetting relays K61 and K62 are connected to bus B4 and are connectible to bus B3 through either of contacts K05-3 or K22-3. Manually initiated resetting is initiated by closing of manual switch SW102 (Fig. 8) to connect relay K05 to bus B2. Relay K05 is also connected to bus B1; and when relay K05 is operated, the connection to bus B2 is maintained through contact K05-1 and K17-1 and K17-2.

Credit mechanism

The credit mechanism (Fig. 7) is energized by buses B8 and B10 which are continuously energized and B7 which is normally energized by bus B3 through contact K06-6 but which may also be energized through contact K62-1. A condenser C204 shunts the contacts K06-6 and K62-1.

Bus B8 is connected to all of the hold relay latching and release coils K44L and K44UL to K52L and K52UL and relays K53 and K54. Bus B8 is also connected to all of the five cent or nickel register credit relay latching and release coils K55L and K55UL to K58L and K58UL and relay K59; and bus B10 is connected to all of the one cent or penny register credit relay latching or release coils K63L and K63UL to K67L and K67UL.

Substantially all of the register credit and holding relays are latching type relays and the moving of the contacts of any register credit or hold relay is indicative of a predetermined value of credit existing. Each of the hold relays K44 to K47 and each of the register credit relays K55 to K58 have been assigned credit values which differ from each other in five cent increments. For instance, relay K44 is indicative of twenty cents credit, and relay K45 is indicative of fifteen cents credit; and similarly register credit relay K55 is indicative of twenty cents credit and relay K56 is indicative of fifteen cents credit. Similarly the remainder of the hold and register credit relays are indicative of values which differ from each other by five and one cent increments. Relay K07 serves as the twenty-five cent relay.

Total credit existing is determined by adding the credit indications of the relays which have been operated. For instance, if ten cents credit exists, relays K46 (ten cents) and K52 (zero pennies) will have been operated to shift the contacts thereof; and likewise register credit relays K57 (ten cents) and K67 (zero pennies) will have been operated. As another example, if seven cents credit exists and is indicated, the contacts will have been shifted of hold relays K47 (five cents) and K50 (two cents) and register credit relays K58 (five cents) and K65 (two cents).

The operation of the credit mechanism substantially centers around the operation of contact K33-2 which sequentially energizes bus B9 and then bus B11. When any amount of credit exists, both the hold relays and the register credit relays indicate that amount of credit. Contact K33-2 is operated substantially simultaneously with the dispensing of a stamp and bus B9 is thereby energized to cause a quantity of credit, equal to the value of the stamp dispensed, to be subtracted from the register credit relays. Operation of these register credit relays prepares for the subsequent operation of the corresponding hold relays which operate when contact K33-2 returns to its normal position and energizes bus B11. The hold relays operate to prepare the register credit relays for a subsequent subtraction.

Release coil K07UL is connected to bus B11 through

contact K08-4. Release coil K08UL is connectible to bus B9 through contact K08-3. The twenty cent hold relay latching and releasing coils K44L and K44UL are alternately connectible to bus B11 through contact K55-6; fifteen cent hold relay latching and releasing coils K45L and K45UL are alternately connectible to bus B11 through contact K56-5. Similarly, latching and release coils K46L and K46UL (ten cents), and K47L and K47UL (five cents), K48L and K48UL (four cents), K49L and K49UL (three cents), K50L and K50UL (two cents), K51L and K51UL (one cent), and K52L and K52UL (zero cents) are alternately connectible to bus B11 through contacts K57-4, K58-4, K63-4, K64-4, K65-6, K66-5, K67-3 respectively. Relays K53 and K54 are connected in shunting relation with latching coils K48L and K49L respectively; and discharging resistors R220 and R221 are also connected in shunt relation with respect to relays K53 and K54. Discharging resistor R219 is connected between buses B11 and B8 and condenser C201 is connected between buses B11 and B7.

Bus B27 is connectible to bus B9 under several different conditions so as to cause the subtraction of a five cent increment of credit. The bus B27 is connectible to bus B9 through either of contacts K38-6 when operated (which indicates that dial 48 is being operated to dispense a six, seven or eight cent stamp), or contact K52-3 (which indicates no one cent increments of credit existing). Bus B27 is also connectible to bus B9 through contact K37-6 and through multi-position selector switch SW219-5, or through switch SW219-4 and contact K49-5, or switch SW219-3 and contacts K50-4 or K51-4. The bus B27 is thereby energized when dial 47 is operated (for three cent stamps) and when two or one cent credit exists. Bus B27 is also connectible to bus B9 through contact K36-6 and multi-position selector switch SW218-3 and contact K51-5, or switch SW218-4, and contact K50-5.

The register credit relays which indicate credit in five cent increments are connectible to bus B27. Latching coil K55L (twenty cents) is connectible to bus B27 through contact K43-1 and contact K07-4 when operated. Latching coil K56L (fifteen cents) is connectible to bus B27 through either contact K43-2 and K44-2 when operated, or contact K43-1, when operated, and contact K07-4 when operated. Latching coil K57L (ten cents) is connectible to bus B27 through either contacts K43-3 and K45-2 when operated, or contact K43-2 when operated and contact K44-2 when operated; and relay coil K57L is also connectible to bus B7 through contact K03-4. Latching coil K58L (five cents) is connectible to bus B27 through either contacts K43-4 and K46-2 when operated, or contacts K43-3 and K45-2 when operated; and latching coil K58L is also connectible to bus B7 through contact K02-4 when operated. Relay K59 (zero nickels) is connectible to bus B27 through either contact K47-3 when operated or through contacts K43-4 and K46-2 when operated; and relay K59 is also connectible to bus B7 through contact K62-4.

The nickel register credit relay release coils K55UL, K56UL, K57UL and K58UL are connectible to bus B7 through contacts K59-1, K59-2, K59-3 and K59-4 respectively when operated; and said release coils are also connectible to bus B27 through said contacts in their normal positions and through contacts K44-2, K45-2 and K46-2 respectively when operated.

The means for subtracting a double five cent increment of credit, or ten cents, includes relay K43 which is connected to bus B8 and is connectible to bus B7 when such credit exists that a six, seven or eight cent stamp reduces the credit through two nickel increments (such as when twenty cents credit exists, purchase of a six cent stamp reduces the nickel credit increments by two steps—to ten cents, and of course four cents are also

indicated to produce a remainder of fourteen cents credit). Relay K43 is connectible to bus B7 through contact K28-3, and contact K52-2, or switch SW220-3 and contact K51-3, or switch SW220-4 and K50-3.

The buses B17, B19, B21, B23 and B25 are connectible to bus B9 through contacts K52-4, K51-6, K50-6, K49-6 and K48-5 respectively and either of contact K26-3 or multi-position selector switch SW219-6. Releasing coils K63UL to K67UL of the register credit relays are connected directly to buses B25, B23, B21, B19 and B17 respectively. Release coils K63UL to K66UL are also connectible to bus B7 through contacts K61-1 to K61-4 respectively.

The register credit relay latching coils K63L to K67L, which when operated produce credit indications in one cent increments are energized through buses B29, B31, B33, B35 and B37 respectively. The buses B29 to B37 are connectible to the buses B17 to B25 in various arrangements by means of the contacts K27-1 . . . K28-4 and selector switches SW220-5 . . . SW220-9, or through contacts K25-1 . . . K26-4 and switch SW219-7, . . . SW219-11, or through contacts K23-1 . . . K24-4 and switch SW218-5 . . . SW218-9. Only one of the buses B17 to B25 will be energized at any one time to indicate a predetermined one cent increment of credit in existence, and only one series of the three series of contacts K27-1 . . . K28-4, or K25-1 . . . K26-4, or K23-1 . . . K24-4 will be operated or closed at any one time, to identify the dispenser which is operated and therefore indicate the amount of credit which is to be subtracted. For instance, if seven cents credit exists, bus B21 is connected through contact K50-6 to bus B9 to indicate a two cent credit increment existing, and if the dial 47 is operated to dispense a three cent stamp, selector relays K25 and K26 are operated to close the contacts K25-1 . . . K26-4, so as to connect bus B29 and latching coil K63L to bus B21 and bus B9. Subtraction of three cents credit (for the stamp) from the pre-existing seven cents credit must necessitate an indication of four cents credit remaining and the relay K63 produces this indication. Of course if four cent stamps were contained in dispenser 112 then the selector switch SW219 would be readjusted so that bus B31 and coil K64L would be connected to bus B9 so that a four cent increment would be subtracted.

Operation

The description of the operation will be started with the assumption that the machine contains the necessary stamps and the necessary coins, and furthermore it is assumed that the machine has previously been operated so that the circuits are reset to facilitate the reception of another coin. In this condition, the switch SW101 is closed and the buses B1, B3, B2, B4, B6, B8 and B10 are energized. In the assumed reset condition of the circuit, the contacts of latching relays K67 and K52 are latched in shifted condition. In addition, when the circuit is in the assumed reset condition, the coin return solenoid SOL101 is energized from bus B2 and bus B1 to allow coins to pass through the chutes 56, 57 and 58.

The machine is then in condition to receive a coin and to dispense stamps in return for the coin. As hereinbefore pointed out, the machine is adapted to receive a quarter, a dime or a nickel, and in the condition of the machine shown in the circuit, stamps in the denominations of two cents, three cents and six cents are available. In general, the circuit records the amount of money inserted by operation of combinations of certain relays, and as stamps are dispensed these relays are operated again so as to revise the amount of credit existing in the circuit. When a coin is inserted, certain of the register credit relays, K55 to K58 and K63 to K67 are operated and then corresponding hold relays K44 to K52 are operated. When stamps are dispensed, the hold relays momentarily retain their positions corresponding

to the existing credit, and the register credit relays are operated to assume a new condition, indicating the credit remaining after dispensing of the stamp, then the hold relays are operated so as to record credit identical to the credit indicated by the register credit relays. To draw an analogy, the process is similar to the solving of a simple subtraction problem. The hold relays record the minuend, and the pulse delivered with dispensing of a stamp might be considered as the subtrahend, and then the remainder is indicated at the register credit relays. Then the hold relays immediately assume the condition of the register credit relays so as to establish a new minuend for a subsequent simple subtraction.

Establishment of five cents credit

Assuming that a nickel is inserted into the coin slot, five cents credit is set up in the following manner. The final result after the circuit is operated, is that the contacts of the five cent hold and register credit relays K47 and K58 are shifted and latched, the contacts of the zero cent hold and register credit relays K52 and K67 remain latched. In addition, the dials 46 and 47 and their circuits are armed so that either of these may be subsequently operated to dispense a stamp. In addition, a circuit is operated to require the purchase of a stamp before change may be had from the coin tubes.

When a nickel is deposited, switch SW104 is momentarily shifted and is returned by its spring to normal position. When switch SW104 is shifted, the coin relay K02 is immediately energized from bus B2 and from bus B1 through switches SW104, SW105, SW106, contacts K67-2 . . . and K22-1. The contacts of relay K02 shift and contact K02-1 provides a holding circuit for relay K02. Contact K02-4 closes to prepare the five cent register credit relay coil K58L for operation as soon as bus B7 is energized. Contact K02-3 closes to prepare relays K14 and K13 for operation as soon as bus B13 is energized. Contact K02-2 closes to energize bus B15, and immediately relays K08L and K09 are operated. The rotary cam of relay K09 is revolved through one step and the contacts K09-1 and K09-2 will be opened or closed depending upon the position of the cams so as to cause or prevent subsequent operation of relays K10, K11 and K12.

When relay K08L is energized, the contacts thereof are shifted. The most important contact is K08-2 which opens to prevent operation of relay K34 for dispensing of coins until relay K08 is subsequently released. Contact K08-3 prepares the release coil K08UL for operation when bus B9 is energized, after which change may be had. Contact K08-1 closes to energize relay coil K06L and the contacts of relay K06 are shifted.

Contact K06-1 prepares indicator light 50 for subsequent operation. Contact K06-2 closes to energize bus B5 which prepares the dials and pulsing circuits for operation. Contact K06-3 opens to deenergize solenoid SOL101 which allows the fingers 60, 61 and 62 to divert all subsequent coins from chutes 56, 57 and 58. Contacts K06-4 and K06-5 close to energize bus B13, which energizes bus B13a through contact K02-3, and relay K19 which operates when condenser C207 is charged. Contact K19-2 closes to prepare relays K32 and K33 for operation. Bus B13a energizes relays K13 and K14 and time delay relay K18, which, if it remains energized for more than five seconds, is operated to energize relay K17. Normally relay K18 will not operate. Relay K14 is immediately operated with no present effect, and relay K13 operates when condenser C05 is charged. When relay K13 is operated, relay K14 is deenergized and the contacts thereof return to normal, and bus B13b is energized through contacts K13-1 and K13-2 which causes energization of relay K16 which operates with no effect, and relay K15 which operates when condenser C06 is charged to energize relay K17. Contacts K17-1 and K17-2 open to deenergize relay K02. However, before

relay K17 operates, the short time delay provided by the delays in operation of K13 and then K15, allows credit to be established in the hold relays K44 to K52 and register credit relays K55 to K58 and K63 to K67. Contact K06-6 closes to energize buses B7 and B11. When bus B7 is energized, the five cent register credit relay K58L is energized through contact K02-4. Contact K58-4 closes to prepare five cent hold relay K47L for subsequent operation. Contact K58-3 closes to energize relay K30 from bus B5.

When relay K17 deenergizes relay K02, the contacts thereof return to normal to deenergize buses B15 and B13a and to deenergize relay coil K58L, but the contacts of relay K58 remain in shifted condition. The contacts of relays K06 and K08 remain latched in shifted condition.

When contacts K02-1 return to normal, the relay coil K02 is disconnected from bus B1, and bus B5 is energized from bus B1. When bus B5 is energized, relay K30 is energized through contact K58-3.

Operation of relay K30 has two effects, the first being energization of relay K31 through contacts K30-1 and K30-2; and the second being the supplying of power to the dial interrupter switch D2 of dial 47 through contact K30-3 and K34-4. Because the dial 47 will dispense three cent stamps, the five cent credit is sufficient to put dial 47 into condition for operation. When relay K31 operates, contact K31-4 closes to supply power to the dial interrupter switch D1 of dial 46 (for two cent stamps) through contacts K34-4; contact K31-3 opens in the automatic change circuit to prevent relay K34 from automatically operating until the level of credit in the machine has decreased to below the two cent limit; and contact K31-1 closes to energize motor M and light 50 which flashes on and off. It should be pointed out that because only five cents credit exists in the machine, the relay K29 has not operated and therefore the dial 43 (six cent stamps) may not operate.

The machine is now in condition for dispensing of stamps by operation of the dials 46 or 47. In review, it will be noted that the five cent credit is recorded in the machine by the contacts of relays K47 and K58 which remain latched; and the contacts of relays K52 and K67 which remain shifted in latched condition (which show that no odd pennies are presently recorded in the credit circuit). The change circuit and particularly relay K34 is precluded from operating until at least one stamp has been purchased and this is so because the contacts of relay K08 remain in shifted and latched condition. The contacts of relay K06, most of which control power buses, remain in latched and shifted condition until the entire transaction is complete, that is, until stamps have been purchased and change has been returned and until the machine resets itself in preparation for another transaction. In addition, relay K19 remains energized which is subsequently operative to assist in controlling the length of pulses from the dials.

Establishment of ten cents credit

The establishment of ten cents credit in the machine as a result of insertion of a dime is quite similar to the establishment of five cents credit as previously described. The primary difference is that the register credit relay coil K57L is operated instead of relay coil K58L, and the ten cent hold relay coil K46L is operated instead of relay coil K47L. In addition, relay K29 is operated through contact K57-3, and contacts K29-1 and K29-2 energize relay K30, and contact K29-3 closes to supply power to dial interrupter switch D3. All of the interrupter switches are supplied with power to permit any of the dials to be operated.

Establishment of twenty-five cents credit

The establishment of twenty-five cents credit as a result of the insertion of a quarter into the machine is similar

in most respects to the establishment of five cents credit, with, of course, the exception that relay K04 instead of relay K02 is energized, through the coin detector switch SW106. When bus B15 is energized through contact K04-2, relays K06, K08 and K09 are energized as previously described, and in addition, relay K07 is energized through contact K04-3. It should be pointed out that it has not been necessary to provide a hold relay or register credit relay for the twenty-five cent credit, and as a result only the contacts of relay K07 remain latched in shifted condition along with the contacts of zero cents hold relay K52 and the zero cents register credit relay K67. As described in connection with the establishment of ten cents credit all of the relays K29, K30 and K31 are energized so as to prepare all of the dials 46, 47 and 48 for operation.

Purchase of stamps

It will be assumed that a dime has been inserted into the machine and therefore ten cents credit exists. Stamps of any denomination may be purchased. Assuming that it is desired to purchase a three cent stamp, dial 47 will be operated. The customer, of course, places his finger in the number one hole of the dial 47 and rotates the dial until his finger engages the stop, and will then remove his finger so as to allow the dial to return by its own power to the rest condition. When the dial is manually turned in a clockwise direction, several circuits are operated to prepare for dispensing stamps and subtracting of credit. Another important function is accomplished when the dial is manually turned and this is to preclude any possibility of the other dials 46 and 48 from operating to dispense stamps. When the dial 47 is released to rotate counter-clockwise, the counter-clockwise rotation causes the dispensing of stamps, and furthermore, if the dial operation is the first after insertion of a coin, the change dispensing mechanisms are prepared for operation, and of course the amount of credit remaining in the machine is changed in accordance with the denomination of the stamp dispensed.

When the dial 47 is moved from its rest position, the switch D2a of the dial mechanism is closed and will remain closed until the dial again returns to rest condition. Closing of switch D2a causes energization of relay K37L through contacts K36-4 and K38-5. Contact K37-4 and K37-5 open to preclude energization of relay coils K36L, and K38L respectively. As a result, the relays K24 and K28, which control the two cent and six cent stamp dispensing solenoids SOL110 and SOL112 respectively, are precluded from operating. Contact K37-3 closes to prepare relay K39 for subsequent operation. Contact K37-2 closes to prepare release coil K37UL for subsequent operation. Contact K37-6 closes to connect bus B27 to bus B9. Contact K37-1 closes to energize relays K25 and K26 and contact K26-1 closes to prepare the three cent stamp dispensing solenoid SOL111 for operation. Contact K26-2 opens to prevent operation of the change relay K34 until the dial 47 is returned to rest condition. Contacts K25-1, . . . K26-4 are closed to connect the register credit relay coils K63L, . . . K67L to buses B21, B19, B17, B25 and B23 respectively through the sections or banks of switch SW219.

It will be seen that as a result of the manual clockwise turning of dial 47, the other dials are prevented from operating, the three cent stamp dispensing solenoid SOL111 is prepared for operation, and the five cent register credit relay K58 is prepared for operation through contacts K43-4, K46-2 (closed), bus B27 and contact K52-3 as soon as bus B9 is energized by operation of contact K33-2. Furthermore, the release coil K57UL is prepared for operation along with K58L through contact K59-3, K46-2 and bus B27. It will further be noted that the two cent register credit relay coil K65L is connected for operation upon energization of bus B9, through contact K25-3, switch SW219-9, bus B17, contact K52-4,

and switch SW219-6; and the release coil K67UL is also prepared for operation along with K65L through bus B17.

When the dial 47 is released, the interrupter switch D2 is momentarily closed and then reopened. Because only one stamp was dialed, the interrupter switch D2 will close only once and will reopen and remain open as the dial goes to rest condition. It should be understood that if more stamps had been dialed the dial interrupter switch D2 would close once for each stamp dialed. When the dial interrupter switch D2 closes, slave relay K39 is energized and the contacts of relay K39 follow the operation of the dial interrupter switch D2. Contact K39-4 closes to maintain relay K39 energized as long as the interrupter switch D2 is closed, and to avoid any shortening of the operation of relay K39 due to the possible reopening of contact K52-1. Contacts K39-2 and K39-3 operate in parallel to trigger operation of the impulse producing circuits and particularly relay K32.

The operation of the pulsing circuits will be temporarily bypassed, and it will be assumed that relay K33 is energized for a predetermined length of time and is then de-energized. If more than one stamp had been dialed, relay K33 would have been periodically energized for predetermined durations and would have been de-energized during predetermined intervals. When relay K33 is energized, the contacts K33-1 which are shifted to connect relay K35 to bus B5. The contacts K35-1 and K35-2 close to energize the three cent stamp dispensing solenoid SOL111, for dispensing one three cent stamp. When contact K33-1 returns to normal, relay K35 is de-energized and solenoid SOL111 is also de-energized.

When relay K33 is operated, the other contact K33-2 is also shifted to energize bus B9, and as a result the register credit relay coil previously prepared for operation, K58L, K57UL, K65L and K67UL. Operation of K57UL causes the contacts of the ten cent register credit relay K57 to return to normal positions, and the operation of five cent register credit relay K58L causes shifting of the contacts thereof. Operation of relay K67UL causes the contacts of K67 to return to normal, and of course the contacts of the two cent register credit relay K65 are shifted and latched. Therefore, by virtue of the momentary operation of relay K33, the register credit relays now register seven cents credit (five cents plus two cents). Relay K29, which had previously been energized through contact K57-3, remains energized through contact K58-2, switch 220-1 and K65-3. As a result, all of the dials 46, 47 and 48 remain in operative condition. Contact K58-1 closes to shunt contact K57-1 which opens in the nickel dispensing solenoid circuit. Contact K57-2 opens in the five cent coin dispensing solenoid circuit to prevent subsequent dispensing of more than one nickel. Contact K57-4 returns to normal to connect release coil K46UL to bus B11, and contact K58-4 shifts to connect the five cent hold relay coil K47L to bus B11 so as to subsequently establish five cents credit in the hold relays. Contact K67-3 returns to normal to connect coil K52UL to bus B11, and contact K65-6 shifts to connect the two cent hold relay K50L to bus B11 so as to also establish two cents credit in the hold relays.

In addition, when bus B9 is energized, the release coil K08UL is energized through the contact K08-3. The contacts of relays K08 are then returned to normal and the primary result is the closing of contact K08-2 which prepares the change circuit and specifically relay K34 for subsequent operation when either switch SW103 or contact K31-3 is closed. Contact K08-3 is immediately reopened to de-energize coil K08UL.

When the relay W33 is de-energized, the contact K33-2 returns to normal and again connects bus B11 to bus B7, whereupon release coil K46UL, relay coil K47L, relay coil K50L, and release coil K52UL are energized from the bus B11 to shift and release the contacts thereof. When the contacts of relay K46 return to normal, and

the contacts of relays K47 and K50 shift, latch contact K46-1 is opened, but is immediately shunted through contacts K47-1, K58-2, switch SW220-1 and contacts K50-1 and K65-3 to maintain relay K29 energized. The other contact K46-2 reopens to de-energize coil K58L and release coil K57UL. Contact K52-3 opens, but is shunted by contact K50-4, switch SW219-3, and contact K37-6 to maintain bus B27 in connection with bus B9. Contact K50-6 closes to connect bus B21 to bus B9 through switch SW219-6.

The contacts of relay K52 return to normal, and contact K52-4 reopens to disconnect bus B17 from bus B9. When the contact of relay K65, contact K65-3 closes to shunt contact K50-1 in maintaining relay K29 energized and contact K65-5 closes to maintain a circuit to the relay K39.

It will be noted that after the relay K33 has operated, and returned to normal, the hold relays and register credit relays continue to record the information that seven cents credit remains in the machine. During the time that relay K33 has been operating to cause dispensing of a stamp and to operate the hold and register credit relays to change the amount of credit remaining in the machine, the dial 47 has been returning to its rest position. The momentary closure of interrupter switch D2 has terminated and due to the opening of switch D2, the relay K39 has de-energized. When the dial 47 has reached its rest position, the off normal switch D2a is reopened and as a result, the relay coil K37L is de-energized to allow the release coil K37UL to return the contacts to normal position. The reclosing of contacts K37-4 and K37-5 remove the "lockout" previously applied to dials 46 and 48 so that if these dials are subsequently operated, their associated circuits will function. Reopening of contact K37-2 de-energizes the release coil K37UL. Reopening of contact K37-1 de-energizes the relays K25 and K26.

Now that the dial 47 is in its rest position, and seven cents credit remains in the machine, the customer has the choice to do one of several things: he may take seven cents change from the machine; or he may purchase one stamp of any denomination or may purchase several two or three cent stamps.

Assume that the customer of the machine elects to purchase as many two cent stamps as he can, which will be three in quantity. We will place his finger in the No. 3 hole of dial 46, move the dial until his finger engages the stop and then release the dial. Rotation of the dial in a clockwise direction will close switch SWD1a to operate relay coil K36L and cause the contacts thereof to shift the other dials 47 and 48 to be "locked out," that is, will cause their circuits to be rendered inoperative. Such movement of the dial will also prepare the circuits of the register credit relays for operation, and the stamp dispensing solenoid SOL110 will be prepared for operation.

When the dial 46 is released and allowed to return to rest position, the dial interrupter switch D1 will periodically close and reopen to provide three regularly spaced pulses of current flow, each of which triggers operation of the pulsing circuit and causes periodic operation of relay K33, and in the present case the relay K33 will operate three times. As previously mentioned, operation of relay K33 has the effect of the first, simultaneously dispensing of a stamp and subtracting credit from the register credit relay circuit, and second, to revise the credit recorded in the hold relay circuit which in turn prepares the register credit always for another subtraction, and then as relay K33 is subsequently operated again, these functions reoccur and will reoccur again when the third stamp is dispensed. It should be noted that each time the quantity of credit recorded by the register credit always is revised, the combination of closed contacts in the circuits for the change dispensing solenoids SOL102 to SOL109 are changed so that the coin dispensers could not possibly be operated to return more change than the credit remaining in the machine at any instant (and in

reality the coin dispensers cannot be operated while one or more of the dials is not in rest position). In addition, as the register credit and hold relays are operated when the credit in the machine is revised, the contacts maintaining the denomination limit relays K29, K30 and K31 in operation are continuously changed so that when credit no longer exists in the machine to permit the purchase of a stamp of predetermined denomination, this information is effectively transmitted to the pulsing circuits of the dials so as to preclude any further operation of the relay K39 which effects triggering of the pulse circuits.

More specifically, it will be recalled that the contacts of register credit relays K65 and K58 and of hold relays K47 and K50 are in shifted condition, and K31 are energized and their contacts are in shifted condition. Power is therefore available in bus B5a through contact K34-4 for each of the dial interrupter switches D1, D2 and D3 through the closed contacts K31-4, K30-3 and K29-3 respectively. We thereby set that at least one stamp of any denomination may be purchased. The relay K39 is connected through contact K65-5 to the contact K36-3 which will be closed as soon as the dial 46 is moved off its rest position and thereby be prepared for operation.

When the dial 46 is moved from its rest position the relay K39 is prepared for operation, contact K36-6 is closed, but no connection is effected between buses B9 and B27 because contacts K51-5 and K50-5 remain open, and because no operation of the register credit relays K55 to K58 is necessary to effect the two cent subtraction of credit during the purchase of the first two cent stamp. Contact K36-2 is closed to energize the release coil K36UL which will be ineffective as long as the relay coil K36L remains energized, relays K23 and K24 are energized through contact K36-1. Contact K24-1 closes to prepare the two cent stamp dispensing solenoid SOL110 for operation, and the contacts K24-2 and K24-3 open to preclude any possibility of operation of the change relay K34 while the dial 46 is away from its rest position. Contacts K23-1 . . . K24-4 close to connect the relay coils K63L . . . K67L, through banks 5 . . . 9 of switch SW218 to the buses B19, B17, B25, B23 and B21 respectively. It should be noted here that only bus B21 is connected through contact K50-6 and contact K26-3 to bus B9 and therefore it will be seen that only relay K67L of the register credit relays will be operated when bus B9 is energized. In addition, release coil K65UL will be energized with bus B9.

When the dial 46 is released, and allowed to revolve counterclockwise, the dial interrupter switch D1 momentarily closes and then reopens. The momentary closure of switch D1 causes energization of relay K39 which operates and the contact K39-4 effects a shunt around contact K65-5 to maintain relay K39 energized as long as switch D1 is closed. As indicated previously the relay K39 causes triggering of the pulse circuit, the operation of which is temporarily bypassed and will be assumed that relay K33 substantially follows the closure and reopening of interrupter switch D1. During the return of dial 46 to rest position, relay K33 is energized three times and is de-energized three times in substantial accordance with the periodic closure and opening of interrupter switch D1 and the subsequent operation of relay K39.

Each time the relay K33 operates, a two cent stamp is dispensed and substantially simultaneously two cents credit is subtracted from the register credit relay circuits and the hold circuits. When relay K33 is operated, the contact K33-1 shifts to energize relay K35, and the contacts K35-1 and K35-2 close to operate the two cent stamp dispensing solenoid SOL110 to dispense a two cent stamp.

Simultaneously with the operation of contact K33-1 and the dispensing of a stamp, contact K33-2 shifts to energize buses B9. When the bus B21 is energized, the

release coil K65UL and relay coil K67L are energized. It will therefore be seen that the two cent register credit relay K65 is dropped out and the zero cent credit relay K67 is picked up to effectively subtract two cents credit in the register credit relays.

This result is then transmitted to the hold relay circuit, the change dispensing solenoids circuits and the denomination limit relay circuits. Contact K65-6 returns to normal to prepare the release coil K50UL for energization and contact K67-3 shifts to prepare relay coil K52L for energization with bus B11.

When the relay K33 is deenergized, the contact K33-1 returns to normal to energize release coil K36UL and also deenergizes relay K35, the contacts of which open to deenergize solenoid SOL110. Deenergization of relay K33 also returns contact K33-2 to normal which deenergizes bus B9 and energizes bus B11 and causes energization of release coil K50UL through contact K65-6 and energization of relay coil K52L through contact K67-3. The contacts of relay K50 are thereby returned to normal and the contacts of relay K52 are shifted.

After relay K33 has deenergized, the denomination limit relay K29 is deenergized due to the opening of contacts K65-3 and K50-1. Although at this instant, because dial 46 is away from its rest position, it would be impossible to operate dial 48 to cause dispensing of a six cent stamp, the circuit for dial 48 is deenergized due to the opening of contact K29-3 to prevent any future operation of dial 48 because the credit level in the machine has now receded to a level below the six cent credit necessary to allow purchase of a six cent stamp. For the remainder of the transaction dial 48 is "locked out" of the circuit to preclude any operation thereof.

Denomination limit relay K30 remains energized through contact K58-3, and the denomination limit relay K31 remains energized through contacts K30-1 and K30-2 to thereby maintain the circuits of dials 46 and 47 in operative condition. When contact K33-2 returns to normal, bus B9 is deenergized, but is connected to bus B27 through contact K52-3, and also to relay K59 through contact K47-3, to prepare the relay K59 for subsequent operation. In addition bus B21 is disconnected from bus B9 by reopening of contact K50-6 and bus B17 is connected to bus B9 through contact K52-4. Register credit relay K64L which is connected to bus B17 through contact K23-2 and switch SW218-6, is prepared for operation along with release coil K67UL which is also connected to bus B17.

As the dial 46 proceeds toward its rest position, the second momentary closure of interrupter switch D1 results in momentary energization of relay K33, and in a fashion similar to that previously described, contact K33-1 shifts to energize relay K35 from bus B5 to operate the two cent stamp dispensing solenoid SOL110. Contact K33-2 shifts to energize bus B9 which energizes relay K59, bus B17, register credit relay K64L, and releases coil K67UL, which were previously prepared for energization.

Operation of relay K59 which always releases all or any of the nickel register credit relays, closes contact K59-4 to energize the release coil K58UL which causes the contacts of relay K58 to return to normal. It should be noted that although only relay K58 is released in this instance, the operation of relay K59 will effect energization of all of the release coils K55UL, K56UL and K57UL through the contacts K59-1, K59-2 and K59-3. This function is particularly useful in resetting the machine.

When the contacts of relay K67 return to normal, release coil K52UL is connected to bus B11 by contact K67-3. Shifting of the contacts of relay K64 causes contact K64-4 to connect the relay coil K49L and relay K54 to bus B11. Return of the contacts of relay K58

to normal causes release coil K47UL to be connected to bus B11 through contact K58-4.

When relay K33 is again deenergized, contact K33-1 returns to normal to again energize release coil K36UL, and to deenergize relay K35 which results in deenergization of solenoid SOL110. Return of contact K33-2 to normal causes deenergization of bus B9 and corresponding de-energization of relay K59, and the contacts thereof return to normal. Contact K33-2 also energizes bus B11 which energizes the release coil K52UL, relay coil K49L, and relay K54. After the contact K33-2 has returned to normal, denomination limit relay K30 remains energized through contacts K49-2, K64-2, switch SW219-2. Denomination limit relay K31 remains energized through contacts K30-1 and K30-2. The circuits of dials 46 and 47 remain in operable condition except that dial 47 is "locked out" because contact K36-4 remains open.

Opening of contact K52-4 has disconnected bus B17 from bus B9. Closing of contact K49-6 has connected bus B23 to bus G9 through contact K26-3. Register credit relay K66L, which is connected to bus B23 through contact K23-4 and switch SW218-8, and release coil K64UL which is also connected to bus B23, are both prepared for operation with subsequent energization of bus B9.

It should be remembered that after having dialed for three two cent stamps on dial 46, the dial has been returning to rest position and at present the dial interrupter switch D1 has closed twice and relay K33 has operated twice to deliver two two cent stamps and to cause two two cent subtractions from the credit circuits. Three cents credit remains in the machine as is recorded by the register credit relay K64 and hold relay K49, the contacts of both of which are in shifted condition.

The dial 46 is still progressing toward its rest position and during the last pulse it will be recognized that a third two cent stamp is dispensed and credit is reduced by another two cent quantity to the one cent level. Because with the adjustment of the machine as is shown, it is impossible to make a purchase with one cent credit, the existence of only a one cent credit in the machine causes the remainder of the dial circuits to be rendered inoperative. When the dials are rendered inoperative, the change mechanism commences operation to deliver the remaining one cent credit to the operator of the machine, in other words, a penny is dispensed.

Substantially simultaneously with the third momentary closure of interrupter switch D1, relay K33 is operated again. Contact K33-1 again effects operation of relay K35 which operates the two cent stamp dispensing solenoid SOL110. Operation of contact K33-2 energizes bus B23 through bus B9, and release coil K64UL and relay coil K66L are thereby energized. The contacts of relay K64 return to normal, and the contacts of relay K66 are shifted. When contact K64-4 returns to normal release coil K49UL is connected to bus B11. When contact K66-5 is shifted, relay coil K51L is connected to bus B11.

When the relay K33 is deenergized, the contacts thereof return to normal and contact K33-1 again causes energization of release coil K36UL and causes deenergization of coil 35, the contacts of which reopen to disconnect solenoid SOL110 from bus B5. When the contact K33-2 returns to normal bus B11 is energized and the release coil K49UL is energized to cause the contacts of relay K49 to return to normal; and relay coil K51L is energized through contacts K66-5, to shift the contacts of relay K51.

Bus B23 is disconnected from bus B9 when contact K49-6 reopens, and bus B19 is connected to bus B9 when contact K51-6 closes; and release coil K66UL is thereby prepared for subsequent operation when bus B9 is energized.

After contact K33-2 has returned to normal, the de-

nomination limit relay K30 is deenergized by opening of contacts K49-2 and K64-2; and denomination limit relay K31 is substantially simultaneously deenergized by reopening of contacts K30-1, K30-2, K49-3 and K64-3. When denomination limit relays K30 and K31 are deenergized, contacts K30-3 and K31-4 reopen to disconnect the dial interrupter switches D1 and D2 respectively from bus B5 to preclude any further operation of these dials.

It should be noted that the penny dispensing solenoid SOL102 is now prepared for operation through contacts K11-1, K10-1 and K66-1 when contacts K14-1 and K14-2 and K34-2 and K34-3 are subsequently shifted.

Automatic dispensing of change

Contact K31-3 recloses to prepare for energization of the change relay K34. It should be understood that when relay K31 is deenergized the dial 46 is returning to rest position. When dial 46 returns to rest position, the switch D1a reopens to deenergize relay coil K36L. The release coil K36UL which has been energized since contact K33-1 returned to normal, now assumes control of the contacts of relay K36 and returns the same to normal. Contacts K36-4 and K36-5 reclose to prepare relay coils K37L and K38L for subsequent energization when the remainder of the circuits of the corresponding dials 47 and 48 are rendered operative. Contacts K36-2 reopens to deenergize the release coil K36UL. Contact K36-1 reopens to deenergize selector relays K23 and K24, the contacts of which reopen to isolate solenoid SOL110 and to disconnect relay coils K63L to K67L from buses B17, B19, B21, B23 and B25.

Contacts K24-2 and K24-3 reclose to energize the change relay K34. Relay K34 is thereby connected to bus B5, and is connected to bus B4 through contacts K08-2, K39-2 and K39-3, K21-1 and K21-2 and K19-2. When the change relay K34 is energized, the hold circuit is provided for relay K34 through contact K34-4, which also deenergizes bus B5a. The contacts of relay K34 also cause operation of the coin dispensing solenoids and set off a short time delay to restrict the nickel solenoids from operating until after the penny solenoids have finished operating to prevent too heavy a load on the relay contacts.

Contacts K34-2 and K34-3 close and K34-1 closes to energize bus B13a. Relay K14 operates immediately to energize penny dispensing solenoid SOL102 which causes a penny to be ejected. After condenser CO5 charges, relay K13 operates and contacts K13-1 and K13-2 shift to deenergize relay K14 and to energize bus B13b. Relay K16 operates immediately in an attempt to cause ejection of a nickel, but all of the contacts K55-1 . . . K55-4 are open. After condenser CO6 charges, relay K15 operates to deenergize relay K16 and energize relay K17.

After the short time delay effected by relay K13 and condenser CO5, and the short time delay effected by relay K15 and the condenser CO6, which are to make sure that the coin dispensing solenoids have had sufficient time in which to operate, the relay K17 initiates shutting down and resetting of the entire mechanism. This operation will be temporarily bypassed.

Another typical example of a transaction will be explained to bring out the function and mode of operation of other portions of the circuit. It will be assumed that twenty-five cents credit exists in the machine. The means by which twenty-five cents credit is established has already been discussed, and it will be recalled that after twenty-five cents credit has been established, the contacts of relays K06, K07, K08, K52 and K67, remain latched in shifted condition. In addition, relays K19, K29, K30 and K31 remain energized and the contacts thereof remain in shifted condition.

It will be assumed that the purchaser desires to receive one stamp of each denomination and that he will purchase

a two cent stamp, a three-cent stamp and a six-cent stamp in that order. When the dial 46 is moved from rest position in dialing for one stamp, the circuits for the other dials, 47 and 48 are rendered inoperative and these dials may be said to be "locked out." In addition, the two-cent stamp dispensing solenoid is prepared for operation and the register credit relays are also prepared for operation. When the dial 46 is released a two-cent stamp is dispensed, and twenty-three cents credit is established in the register credit relays and subsequently twenty-three cents credit is established in the hold relays. In addition, the change circuit is put into condition so that it may be subsequently operated and the coin dispensing solenoids are put into condition to dispense four nickels and three pennies if subsequently operated.

At this time credit of twenty-three cents remains in the machine as is indicated by the contacts of relays K44, K49, K64 and K55 which remain in shifted condition. The option now exists as to whether to take the change or purchase additional stamps.

If a three-cent stamp is purchased three cents credit is subtracted and a remainder of twenty cents credit remains. In this condition, the contacts of relays K44, K55, K52, and K67 remain in latched and shifted condition.

At this time the customer against has a choice as to whether to take his change or purchase additional stamps. We will assume that a six-cent stamp is to be purchased. At present there is twenty cents credit remaining in the machine. When six cents is subtracted, fourteen cents credit will remain. Whereas normally in subtraction of credit, the nickel register credit relays will normally operate in step-by-step sequence so as to progressively subtract five-cent units of credit, but in the present instance (and in several other instances in subtracting credit) the nickel register credit relays must make a double jump or must operate out of sequence. It will be recognized that whereas at present the contacts of relay K55 are in shifted condition, the contacts of relay K57 will be in shifted condition after the purchase of a six-cent stamp and the corresponding subtraction of six cents credit. Operation of the intermediate fifteen-cent register credit relay K56 is omitted. This ten-cent jump in the nickel register credit relays is accomplished by relay K43 in the manner to be described. Of course, when the six-cent purchase has been made, the contacts of register credit relay K63 will also be in shifted position to record the other four cents of the fourteen cents credit remaining.

When the dial 48 is moved from its rest position, the switch D3a is closed to energize relay coil K38L. The contacts K38-4 and K38-5 open to preclude operation of the circuits of dials 46 and 47. Contact K38-2 closes to energize release coil K38UL; contact K38-1 closes to energize relays K27 and K28; and contact K38-6 closes to connect bus B27 with bus B9. When relays K27 and K28 operate the contacts thereof shift and contact K28-1 closes to prepare the six-cent stamp dispensing solenoid SOL112 for subsequent operation. Contacts K27-1 . . . K28-4 close to connect the penny register credit relays K63L to K67L to buses B17, B25, B23, B21 and B19 respectively, and it should be noted that only bus B17 is connected to bus B9 through contacts K52-4 to prepare the relay coil K63L and release coil K67UL for subsequent operation.

Contact K28-3 closes to energize the relay K43 through contact K52-2. When relay K43 is energized, the contacts thereof shift and as a result relay coil K57L is prepared for subsequent operation through contacts K43-2, and K44-2. It will be noted that release coil K55UL is also prepared for subsequent operation through contact K59-1, K44-2 and bus B27.

When the dial 48 is released, the counter-clockwise rotation thereof produces momentary closure of interrupter switch D3 which results in the momentary energization of relay K39, which triggers the operation of relay K33.

When relay K33 operates, the contact K33-1 shifts to

energize relay K35, and the contacts of which close to energize the six cent stamp dispensing solenoid SOL112. When contact K33-2 shifts, bus B9 is energized, and bus B27 is energized through contact K38-6, which causes energization of relay coil K57L through contacts K44-2 and K43-2. Bus B27 also energizes release coil K55UL through contacts K44-2 and K59-1. Bus B9 also energizes bus B17, register credit relay coil K63L through contact K27-1 and switch SW220-5, and release coil K67UL is energized to return the contacts of relay K67 to normal.

In the hold relay circuits, contact K55-6 connects release coil K44UL to bus B11; contact K57-4 connects relay coil K46L to bus B11; contact K63-4 connects relay coil K48L and relay K53 to bus B11; and contact K67-3 connects release coil K52UL to bus B11.

When relay K33 is deenergized and the contacts thereof returned to normal, contact K33-1 energizes release coil K38UL through contact K38-2; and contact K33-1 also deenergizes relay K35 to deenergize the solenoid SOL112. When contact K33-2 returns to normal bus B9 is deenergized and bus B11 is energized to cause energization of release coils K44UL and K52UL respectively to permit the contacts of the corresponding relays to return to normal. Energization of bus B11 also causes relay coils K46L and K48L and relay K53 to be energized so as to shift the contacts of these relays.

In the denomination limit relay K29 circuit, the contacts K55-5 and K44-1 will have opened, but will have been shunted by closing of contacts K46-1 and K57-3 to hold the relay K29 in closed condition.

As the dial 48 returns to rest position, the switch D3a will be opened to deenergize the relay coil K38L. The release coil K38UL which has been energized will cause the contacts of relay K38 to return to normal. Contacts K38-4 and K38-5 reclose to put the circuits for dials 46 and 47 back into operative condition; contact K38-2 reopens to deenergize release coil K38UL; and contact K38-1 reopens to deenergize relays K27 and K28. When the contacts of relays K27 and K28 return to normal, the solenoid SOL112 and the register credit relay coils K63L to K67L are all isolated. Reopening of contact K28-2 recloses the circuit for change relay K34 and prepares the same for subsequent operation if the change button is pressed to close switch SW103. Contact K28-3 reopens to deenergize relay K43 and the contacts thereof return to normal.

At this time the operator of the machine again has the option to purchase additional stamps because fourteen cents remains in the machine, or he may take his change. It will be assumed that at this time the operator of the machine will push the change button to receive the fourteen cents change in coins.

Change dispensing

When the change button is operated, switch SW103 closes at least momentarily. The relay K34 is energized through contacts K28-2, K26-2, K24-2, K24-3 and switch SW103. The relay K34 is connected to bus B4 through contacts K08-2, K39-2, K39-3, K21-1, K21-2, and K19-2. As soon as relay K34 is operated the contacts thereof shift.

It should be pointed out that, with fourteen cents credit existing, certain of the coin dispensing solenoids SOL102 to SOL109 are prepared for operation. Solenoid SOL102 is prepared for operation through contacts K11-1, K10-1 and K53-1; solenoid SOL103 is prepared for operation through contacts K11-2, K10-2 and K53-2; solenoid SOL104 is prepared for operation through contacts K11-3, K10-4 and K53-4; and solenoid SOL105 is prepared for operation through contacts K11-4, K10-3 and K53-3. Nickel ejecting solenoid SOL107 is prepared for operation through contacts K12-2 and K57-2; and solenoid SOL109 is prepared for operation through contacts K12-1 and K57-1. It will therefore be seen that the

several penny and nickel solenoids will operate sequentially when the contacts of relay K34 are operated and the contacts of relays K14 and K16 are sequentially operated.

5 Contact K34-4 shifts to provide a hold circuit for relay K34 and to remove power from all of the dial circuits. Contact K34-1 closes to energize bus B13a which causes relays K13 to K17 to operate as previously described. While contacts K34-2 and K34-3 remain closed, the contacts of relays K14 and K16 operate in sequence to energize the penny ejecting solenoids and the nickel ejecting solenoids in sequence.

When relay K17 is energized, the contacts K17-3 and K17-4 close to connect release coil K06UL to bus B4 15 through contacts K08-2, K39-2, K39-3, K21-1, K21-2 and K19-2 so as to return the contacts of relay K06 to normal and commence resetting of the machine for a subsequent complete transaction.

It should be noted that frequency, when the change 20 is dispensed, only one penny is returned, as in the situation where the change mechanism is automatically put into operation by the deenergization of relay K31 and the closing of contacts K31-3. If, in successive transactions the penny change were to be continuously drawn 25 from the same penny storage tube, that particular penny storage tube would become exhausted of pennies quite rapidly. In the present machine the relays K09 and K10 and K11 provide for alternating the operation of the penny coin-dispensing solenoids so that a substantially 30 equal number of pennies is drawn from each tube. Assume that at the ends of a number of stamp purchasing transactions, one cent credit remains in the machine. It will be remembered that in four successive transactions, the contact K09-1 will be closed during the first transaction, also closed during the second transaction, and will 35 be opened in the third and fourth transactions. In the same four transactions, contact K09-2 will be closed in the first transaction, opened in the second and third transactions and closed in the fourth transaction. Of course according to the condition of contacts K09-1 and 40 K09-2 relays K10, K11 and K12 will be energized from bus B13 or deenergized and the contacts thereof will be in the appropriate positions. In the first transaction previously mentioned, relays K10 and K11 are both deenergized and after the change button has been operated, power may be supplied through contacts K34-2 and 45 K34-3, K14-1, K14-2, K66-1, K10-1, K11-1 and to solenoid SOL102. During the second transaction when relay K10 remains deenergized, but relay K11 is energized and operated, power may be supplied to solenoid SOL105 through contact K11-1. During the third transaction, when relays K10 and K11 are both energized, power may be supplied to solenoid SOL104 through contacts K10-1 and K11-2, to solenoid SOL104. During 50 the fourth transaction, when relay K10 is energized and relay K11 is deenergized, power may be supplied to solenoid SOL103 through contacts K10-1 and K11-2. It will therefore be seen that in successive transactions, different penny dispensing solenoids will be operated in each transaction.

Similarly, if two cents credit remained in the machine, in said four transactions, the penny dispensing solenoids would also operate in different combinations. In the first transaction when neither relay K10 or K11 is energized, power may be supplied to solenoids SOL102 and SOL103. During the next transaction, wherein relay K11 is energized, power may be supplied to solenoids SOL105 and SOL104. It will be seen that during the first transaction, two of the penny dispensing solenoids are operated and during the next transaction, another pair of penny dispensing solenoids are operated.

The nickel dispensing solenoids are also operated in sequence with respect to each other during successive transactions. If five cents credit were to be returned in 75 each of the aforesaid four transactions, wherein relay

K12 is energized during the second and third transactions and is deenergized during the first and fourth transactions, solenoid SOL109 is energized in the first transaction through contacts K58-1 and K12-1, solenoid SOL106 is energized through contacts K58-1 and K12-1 during the second and third transactions. During the fourth transaction solenoid SOL109 would be operated again.

Because the relay K09 has an eight position cam associated therewith the sequence of operation of the change dispensing solenoids will be repeated during the next four transactions.

Impulse producing and timing

It has been explained that the dials, after having been momentarily manipulated, will return to their rest position and will cause periodic momentary closure of the dial interrupter switches, which produces periodic momentary energization and operation of relay K39, and it has been assumed that this results in a substantially similar periodic momentary energization and operation of relay K33 which controls the dispensing of stamps and the subtraction of credit.

The pulsing circuit, which includes relays K19, K20, K21 and K32 and their associated circuits, accomplishes several functions. First, the period of time is controlled during which relay K33 is energized; secondly the period of time is controlled during which relay K33 is deenergized; and thirdly the pulsing circuit requires that the operations of relay K33 be triggered by successive momentary closures of a dial interrupter switch. This results in the operation of the contacts of relay K33 at a predetermined rate; secondly, operation of the stamp dispensing and credit circuits is not materially affected by racing of the dial by manual manipulation back to its rest position; and thirdly, the operation of the stamp dispensing and credit circuits is not materially affected if a dial is stopped or moved extremely slowly back to its rest position.

It will be remembered that bus B13 is energized during the entire transaction of purchasing stamps and returning change until resetting commences. It will therefore be seen that normally relay K19 is energized from buses DC1, DC2, through contact K32-1. The contacts of relay K19 are therefore normally in shifted position, and contact K19-2 is normally closed to prepare relays K32 and K33 for subsequent energization. When one of the dial interrupter switches is closed, the relay K39 is operated. Contact K39-1 shifts to apply power to relay K21 and condenser C209 from bus DC2. Condenser C209 commences charging to provide a time delay before relay K21 operates. In normal operation of the dials, the relay K21 is deenergized before it operates.

Contacts K39-2 and K39-3 shift to energize relays K32 and K33 from bus B4 through contact K19-2. When relay K32 operates, the contacts shift and contacts K32-3 and K32-4 close to provide a holding circuit for relays K32 and K33 from bus B4. Simultaneously with the operation of relay K32, relay K33 operates to effect stamp dispensing and operation of the credit relays. It will be pointed out that, although operation of relay K33 is triggered by relay K39, relay K33 is deenergized after a predetermined time by relay K20.

Shifting of contact K32-1 causes deenergization of relay K19, and the contact K19-2 opens, but is shunted by contact K32-3. Contact K32-2 shifts to apply power to relay K20 and condenser C208. After charging of condenser C208, to allow one of the stamp dispensing solenoids to operate and dispense a stamp, relay K20 operates to shift the contacts thereof, and contacts K20-1 and K20-2 open to deenergize relays K32 and K33. When relay K33 is deenergized, the stamp dispensing solenoids will be deenergized and the hold relays will be operated and if the credit in the machine has fallen below predetermined levels the denomination limit relays K29, K30 and K31 may deenergize so as to prevent relay K39

from operating again even though one of the dial interrupter switches may be momentarily closed again.

When relay K32 is deenergized the contacts thereof return to normal. Contact K32-2 deenergizes relay K20 and contact K32-1 returns to normal to again apply power to relay K19 and condenser C207. After charging of condenser C207, which takes approximately fifty-five milliseconds, relay K19 operates again. Contacts K32-3 and K32-4 reopen before relay K19 operates. When relay K19 operates, the contact K19-2 closes to again put the circuit for relays K32 and K33 into condition for subsequent operation when relay K39 is again operated. It should be noted that the dial interrupter switch, which closed to trigger operation of the pulsing circuit, will open again just before relay K20 operates, and of course the relay K39 is deenergized and contact K39-1 returns to normal to deenergize relay K21. Contacts K39-2 and K39-3 also return to normal. It will therefore be seen that the time during which relay K33 is energized is controlled by the charging time of condenser C208; and the time during which relay K33 is deenergized is controlled by the charging time of condenser C207. The charging times of these condensers may be varied by adjusting the center tap of resistor R23.

The time delay provided by the charging of condenser C209 must be sufficient to assure that relay K32 will operate before relay K21 operates so that the holding circuit provided by contacts K32-3 and K32-4 is established before relay K21 operates to open contacts K21-1 and K21-2; and the charging time of condenser C209 must be short enough to assure that relay K21 operates before relay K19 operates again or before the expiration of the sequential time delays provided by condensers C208 and C207. Thus dispensing of more than one stamp for each closure of the dial interrupter switch is prevented. For instance, if one of the dials were being operated and it was stopped to maintain the dial interrupter switch in closed condition, relay K39 would remain energized and the contacts K39-2 and K39-3 remain in shifted condition so as to maintain the circuit for relays K32 and K33 in condition for operation when contact K19-2 is closed again. But because contacts K21-1 and K21-2 open before contact K19-2 is closed again, relays K32 and K33 will not operate. The relay K39 must be deenergized to return the contact K39-1 back to normal condition in order to deenergize relay K21 and allow the contacts K21-1 and K21-2 to reclose, before relays K32 and K33 may be operated again. It will be seen therefore that even though the dial is operated slowly or actually stopped, the dispensers which are controlled by relay K33 will only dispense one stamp for each time the dial interrupter switch is closed.

When the dial is allowed to return toward rest position by itself, the interrupter switch will be reclosed for the second pulse shortly after relay K19 has been operated, so that the contacts of relay K39 will again shift to initiate another cycle of operation of the pulsing circuit. Relay K32 will operate substantially simultaneously with relay K39, at which time relay K33 also operates, and after a short time delay relay K20 operates to cause deenergization of relays K33 and K32. After another short time delay relay K19 will operate to permit a further operation of relay K39 to trigger the pulse circuit again.

Occasionally one of the dials will be manually rotated in a counterclockwise direction to materially accelerate the rate at which the dial interrupter switch closes and reopens. The operation of relay K33 is not materially affected by such racing of the dial. The first closure of the interrupter switch D2 initiates the operation of the pulsing circuit by energizing relays K32 and K33. The length of time that relay K33 is energized is controlled by relay K20 and the associated condenser C208, and after relay K33 has been initially energized, the contacts of relay K39 lose control. The length of time during which relay K33 is subsequently deenergized is

controlled by relay K19 and its associated condenser C207. If the dial interrupter switch is reclosed to cause operation of relay K39 and shifting of the contacts thereof before relay K19 operates, relays K32 and K33 will not be operated to start the pulsing circuit because contact K19-2 is still open. If relay K19 operates to close the contact K19-2 during the time when the dial interrupter switch is closed and the relay K39 is correspondingly operated, a second cycle of the pulsing circuit is immediately triggered. However, if the dial is raced so fast that after the first momentary closure of the dial interrupter switch, the dial interrupter switch closes for the second time and then again reopens before the pulsing circuit has completed its first cycle of operation, then the second momentary closure of the dial interrupter switch is ineffective to affect operation of the pulsing circuit, and the pulsing circuits, and specifically relays K32 and K33 will not again be energized until the relay K39 operates and shifts its contacts K39-2 and K39-3 in response to the third momentary closure of the dial interrupter switch.

It should be noted however, that even though the operator of the machine may race the dial so fast that three momentary closures of the dial interrupter switch only causes two stamps to be dispensed, the credit will remain in the machine for the stamp that he did not receive and he will be able to dial for that stamp again. Credit is subtracted only in relation to the stamps actually dispensed because dispensing of stamps and subtraction of credit are affected by operation of the contacts of relay K33.

Circuit resetting

It has been previously pointed out that after change has been dispensed, either automatically, due to the deenergization of denomination limit relay K31 and the closing of contact K31-3, or as a result of manual operation of the change button to close switch SW103, the relay K17 is ultimately operated to close the contacts K17-3 and K17-4 which cause energization of the release coil K06UL which initiates resetting due to the return of the contacts of relay K06 to normal position. Initiation of this automatic resetting may also be brought about by exhausting the credit in the machine due to the purchase of stamps. For instance if two cents credit in the machine existed and a two cent stamp is purchased, the credit is reduced to zero cents and in this case, the denomination limit relay K31 would also be deenergized by the opening of contacts K50-2 and K65-4. Relay K34 would operate in response to the reclosing of the contact K31-3 as previously described. When relay K34 operates, energization and operation of relays K13, K14, K15, K16 and K17 is effective. Of course the contacts of relays K14 and K16 close, but none of the penny dispensing or nickel dispensing solenoids SOL102 to SOL109 are operated because none of the contacts K53-1, K54-1, etc. in their circuits, is closed.

When the contacts of relay K06 return to normal, the entire circuit will be reset to such condition that another transaction may be commenced by the insertion of another coin into the machine so that credit may be set up and stamps may be purchased. Reopening of contact K06-2 deenergizes bus B5 which causes deenergization of the release coil K06UL and also causes deenergization of relay K34. Deenergization of bus B5 also causes deenergization of any of the denomination limit relays K29, K30 and K31, which remain in energized condition, due to the existence of a substantial amount of credit in the machine at the time the change button was pressed. Contacts K06-4 and K06-5 reopen to deenergize bus B13. Deenergization of bus B13 deenergizes relay K19 but it should be understood that the contacts of relay K19 do not instantaneously return to normal position because the condenser C207 will discharge through the relay coil and during this short time interval, the contacts of relay K19 remain in shifted condition, and particularly contact

K19-1. Contact K06-3 recloses to connect the coin return solenoid SOL101 to bus B2 through contacts K17-1 and K17-2. However, the solenoid SOL101 will not operate because contacts K22-1 and K22-2 open substantially simultaneously with the reclosing of contact K06-3 as will presently be described. Contact K06-6 returns to normal to energize the resetting relay K22 from bus B3 and through contact K19-1 which remains closed for a short length of time and then reopens to deenergize relay K22 again.

Contact K22-3 closes to energize reset relays K61 and K62 from bus B3. Contact K62-1 closes to hold bus B7 energized, and contacts K61-1, . . . K61-4 close to energize release coils K63UL, . . . K66UL which cause the contacts of the corresponding register credit relays to shift to normal positions. Contact K62-3 closes to energize the relay coil K67L and to thereby cause the contacts of relay K67 to be shifted and latched. Contact K62-4 closes to energize relay K59 from bus B7, and the contacts K59-1, . . . K59-4 shift to connect the release coils K55UL, . . . K58UL to bus B7 to thereby cause the contacts of the corresponding relays to return to normal.

This bus B11 will remain energized with bus B7 and the release coils K44UL to K51UL and relay coil K52L are energized from bus B11.

After the condenser C207 has discharged through relay K19, the contacts of relay K19 will return to normal and contact K19-1 opens to deenergize relay K22. Contact K22-3 reopens to deenergize relays K61 and K62, and contact K62-1 reopens to deenergize buses B7 and B11, which causes de-energization of all of the register credit relays and relay coils, and the holding relay, release and relay coils. The reclosing of contacts K22-1 and K22-2 connects bus B1 to the coin return solenoid SOL101 through contacts K40-1, K60-1, K67-1, switches SW106, SW105 and SW104, and the solenoid SOL101 is connected to bus B2 through contacts K06-3 and K17-1.

Therefore it will be seen that when the circuits are entirely reset to permit the initiation of another stamp purchasing transaction, the contacts of relays K52 and K67 remain latched in shifted condition, and coin return solenoid SOL101 remains energized so as to permit the reception of a coin.

Although resetting is ordinarily automatically initiated at the end of a stamp purchasing and change-receiving transaction, the resetting of the machine may be manually initiated to put the circuit into condition for a stamp purchasing transaction after certain portions of the circuits have been individually operated during testing procedures. When the circuits are to be manually reset, the manual switch SW102 is closed and relay K05 is energized between buses B1 and B2. Contact K05-1 closes to provide a holding circuit for relay K05 through contact K17-1 to bus B2; contact K05-2 closes to energize relays K13 and K14, the operation of which results in the energization of relays K15, K16 and K17, after a short time delay. Contact K05-3 closes to energize relays K61 and K62 from bus B3. As previously described, the contacts of relays K61 and K62 reset the register credit relays and hold relays in such condition that only the contacts of relays K67 and K52 remain latched in shifted condition. After the short time delays provided by relays K13 and K15 and their associated condensers C05 and C06, the relay K17 will operate and the contacts K17-1 and K17-2 open to deenergize relay K05. The contacts of relay K05 return to normal and contact K05-2 deenergizes relays K13, K15, K16, K17 and K18; contact K05-3 opens to deenergize relays K61 and K62 to deenergize the buses B7 and B11. When relay K17 is again deenergized, the contacts K17-1 and K17-2 reclose to again energize coin return solenoid SOL101 from bus B2.

Operation of auxiliary circuits

It is pointed out that during any one transaction, only

one coin will be taken from any coin tube and after the coins in any tube are exhausted the stamp purchasing transaction may not be initiated. If the supply of coins in any one tube is exhausted one of the switches SW107 to SW114 will close to energize the out-of-change relay K60 between buses B1 and B2. Contacts K60-1 and K60-2 shift to connect the flasher motor M and transformer T201 to bus B1. Contacts K60-3 and K60-4 close to connect the light 49 to the secondary of the transformer T201. When the motor operates the cam will periodically operate switch SW221 to flash the light 49 on and off. It will also be noted that contacts K60-1 and K60-2 also disconnect relays K02, K03 and K04 and coin return solenoid SOL101 from bus B1. The fingers connected with the coin return solenoid will cause any coins inserted to be returned.

When the supply of one type of stamps is exhausted, one of the switches SW115, SW116, SW117 will be shifted to energize the corresponding relay K40, K41 or K42 between buses B3 and B6. If the supply of two cent stamps is exhausted the relay K40 will operate to shift its contacts K40-1 and K40-2 which connect the flasher motor and transformer T201 with bus B1 through contacts K22-1 and K22-2. In addition, contacts K40-3 and K40-4 close to energize the light 51 from its transformer secondary. The flashing light will tell the customer that this supply of this particular denomination of stamps is exhausted, but he may insert a coin and purchase stamps of other denominations.

If all of the supplies of stamps are exhausted, all of the contacts K40-1, K40-2, K41-1, K41-2, K42-1, K42-2 are shifted, which disconnects the coin return solenoids SOL101 from bus B1 and the coin return mechanism will return to the purchaser, any coins he inserts. However, if the supply of all stamps is exhausted in the middle of a stamp purchasing transaction, the change may be received because in response to the pressing of the change button and closing of switch SW103, the buses B5, B4, B1, B13 and B2 will remain in energized condition.

Change of stamp denominations

As the circuit is adjusted in the form shown, stamps in the denominations two cent, three cent and six cent are dispensed, and when stamps are dispensed an amount of credit corresponding to the denomination of a stamp is subtracted from the credit remaining in the machine. It is to be noted that by adjusting switch SW218, stamps in the denomination of one cent or three cents might be dispensed in place of the two cent denomination. By adjusting switch SW219, stamps in the denomination of four cents or five cents might be dispensed in place of the three cent stamps. By adjustment of the switch SW220, stamps in the denominations seven cents or eight cents may be dispensed instead of six cents.

As an example of this adjustability, assume that stamps of four cent denomination are to be dispensed in place of the three cent stamps. The switch SW219 will be adjusted so that all of the rotors in each bank would engage the number four terminal.

A credit of twelve cents will be assumed to exist in the machine. Under this condition, buses B1, B2, B3, B5, B4, B6, B7, B11 and B8 are energized. The contacts of relays K46, K50, K57 and K65 are in shifted condition. In this condition bus B21 is connected to bus B9. The denomination limit relay K29 is energized from bus B5 through contacts K46-1 and K57-3; and the other denomination limit relays K30 and K31 are also energized.

It will be assumed that the purchase of one four cent stamp is to be made. Dial 47 is manually turned from its rest position and the relay coil K37L is energized when switch D2a is closed. When the interrupter switch D2 is closed, the operation of relay K33 is triggered, and a stamp is dispensed by operation of solenoid SOL111, and when the bus B9 is energized, bus B27 is energized through switch SW219-3 so as to energize relay coil

K53L and release coil K57UL. In addition, register credit relay coil K64L is energized through switch SW219-8, and release coil K65UL is energized. When bus B11 is subsequently energized, relay coils K47L and K49L and relay K54 are energized and release coils K46UL and K50UL are also energized. It will be seen that from the twelve cents credit initially existing, four cents credit has been subtracted to allow eight cents credit to remain.

It will be seen that we have provided in a dispensing machine of the class described, credit mechanism producing indications of credit existing by operation of relays which cooperate with each other in such a manner that the hold relays retain a credit indication comparable with the minuend in a simple subtraction problem, and indications from the hold relays along with a control indication originating from the dialing mechanisms cooperate to supply the subtrahend of the problem and the remainder is immediately indicated by the credit relays which instantly transmit this information to the hold relays for establishing a new minuend credit indication, and then the credit indication is utilized to immediately prevent additional stamps of certain denominations to be dispensed if the credit remaining is insufficient to allow purchase of such a stamp and the credit indication is also utilized to prepare the change-dispensing mechanism for dispensing coins equaling the value of credit remaining.

It will also be seen that we have provided in a vending machine of the class described, stamp-dispensing mechanism and credit mechanism which are time controlled in their operations, by electric impulses originating with the dialing mechanisms and which are time controlled in their operations so as to eliminate the effect or effects of tampering with or otherwise abnormally operating the dialing mechanisms so that the stamping-dispensing mechanisms and all of the mechanisms responsive to operation of the credit mechanism may completely operate so as to maintain accurate control over all portions of the vending machine regardless of tampering with the dialing mechanisms.

It will also be apparent from the foregoing description that we have provided in the vending machine, a credit mechanism which is adjustable, whereby the step-by-step subtractions of credit, corresponding to the value of the stamps which may be dispensed, may be readily and easily adjusted so as to permit dispensing of a variety of stamps, and in the particular form of the machine disclosed, stamps in any of the denominations one through eight cents may be dispensed.

It will, of course, be understood that various changes may be made in the form, detail, arrangement and proportion of the parts without departing from the scope of my invention which consists of the matter described herein and set forth in the appended claims.

What is claimed is:

1. In a vending machine for dispensing stamps of various denominations, the combination of a plurality of stamp dispensing mechanisms for stamps of various denominations, a coin-detecting and receiving mechanism operating to indicate the denomination of coin received, a credit mechanism establishing credit in response to operation of said coin detecting mechanism and including a plurality of hold relays and credit relays individually representative of various predetermined credit values and selectively operated when predetermined credit exists for producing indications of existing credit, said credit relays operating to prepare hold relays of corresponding credit values for subsequent operation, said hold relays operating to prepare credit relays representative of relatively less credit values for subsequent operation to effect subtraction of credit, a plurality of manually controlled dialing mechanisms each, when operated, preparing a respective dispensing mechanism for operation and preparing certain of the credit relays for operation for

subtracting credit in increments equal to the value of the stamps to be dispensed by the corresponding dispensing mechanism, and said dialing mechanism also producing electric control impulses, a plurality of energizing mechanisms each preparing, when operated, a respective dialing mechanism for operation, and said energizing mechanisms being selectively operable in response to credit indications of said credit to prepare the respective dialing mechanisms to operate only when the value of existing credit at least equals the value of stamps of the corresponding dispensing mechanism, and means responsive to each electric control impulse to operate a dispensing mechanism and to operate in sequence, certain of the credit relays for subtracting credit corresponding to the value of the stamp dispensed and then the corresponding hold relays to prepare other credit relays for subsequent operation in response to another impulse.

2. In a vending machine for dispensing stamps, the combination of a stamp dispensing mechanism, a coin-detecting and receiving mechanism operating to indicate the denomination of coin received, a manually operable mechanism producing, when operated, electric impulses in a number corresponding to the number of stamps to be purchased, a credit mechanism establishing credit in response to operation of the coin-detecting mechanism and indicating credit existing for purchase of stamps, said credit mechanism including a plurality of hold relays and credit relays, certain of said hold and credit relays being individually operable to indicate credit values which are differentiated from each other by first increments, and other of said hold and credit relays being individually operable to indicate credit values which are differentiated from each other by second increments, said credit relays, when operated, each preparing for operation of the hold relay which is indicative of the same credit value, said hold relays, when operated, preparing for operation of certain credit relays which, when operated, reduce the existing credit by the value of the stamp dispensed, means responsive to each electric control impulse for operating said dispensing mechanism to dispense a stamp and also for operating in sequence, the credit relays for subtracting credit equal to the value of a stamp and then the hold relays which prepare the credit relays for a subsequent subtraction.

3. In a vending machine for dispensing stamps, the combination of a stamp dispensing mechanism, a coin-detecting and receiving mechanism operating to indicate the denomination of coin received, a manually operable mechanism producing, when operated, electric impulses in a number corresponding to the number of stamps to be purchased, a credit mechanism establishing credit in response to operation of the coin-detecting mechanism and indicating credit existing for purchase of stamps, said credit mechanism including a plurality of hold relays and an identical number of credit relays, certain of said hold and credit relays being individually operable to indicate credit values which are differentiated from each other by first increments, and other of said hold and credit relays being individually operable to indicate credit values which are differentiated from each other by second increments, the second increments equalling the total number of first increments which may be indicated, and the number of first hold relays and credit relays respectively, each equaling the number of first increments representing a second increment, said credit relays, when operated, each preparing for operation of the corresponding hold relay which is indicative of the same credit value, said hold relays, when operated, preparing for operation of certain credit relays which, when operated, reduce the existing credit by the value of the stamp dispensed, means responsive to each electric control impulse for operating said dispensing mechanism to dispense a stamp and also for operating in sequence, the credit relays for subtracting credit equal to the value of a stamp

and then the hold relays which prepare the credit relays for a subsequent subtraction.

4. In a vending machine for dispensing stamps of various denominations, the combination of a plurality of dispensing mechanisms for stamps of different denominations, a coin receiving and detecting mechanism operating to indicate the denomination of coin received, a plurality of manually operable mechanisms each controlling dispensing of stamps from one of the dispensing mechanisms, and each producing, when operated, electric impulses in a number corresponding to the number of stamps to be purchased, a credit mechanism establishing credit in response to operation of the coin detecting mechanism and indicating credit existing for purchase of stamps, said credit mechanism including a plurality of hold relays and credit relays, certain of the hold and credit relays being individually operable to indicate credit values which are differentiated from each other by first increments, and other of said hold and credit relays being individually operable to indicate credit values which are differentiated from each other by said second increments, said credit relays, when operated, each preparing for operation of the hold relay which is indicative of the same credit value, said hold relays, when operated, preparing for operation of a number of credit relays, which when selectively operated reduce the existing credit by the respective values of the stamps which may be purchased, a plurality of selector means each responsive to the operation of a respective manually operable mechanism and preparing for operation of only those credit relays which, when operated, reduce the existing credit by the value of the stamps to be dispensed, and means responsive to each electric control impulse for operating said dispensing means for dispensing a stamp and also for operating in sequence, the credit relays for subtracting credit equal to the value of the stamp dispensed and then the hold relays which prepare the credit relays for a subsequent subtraction.

5. In a vending machine for dispensing stamps, the combination of a stamp dispensing mechanism, a coin-detecting and receiving mechanism operating to indicate the denomination of coin received, manually operable mechanism producing, when operated, electric impulses in a number corresponding to the number of stamps to be purchased, a credit mechanism establishing credit in response to operation of the coin-detecting mechanism and indicating credit existing for purchase of stamps, the credit mechanism including a plurality of hold relays certain of which are individually operable to indicate various credit values differentiated from each other by one cent increments, and other of said hold relays being individually operable to indicate various credit values differentiated from each other by multiple cent increments, said credit mechanisms also including a plurality of credit relays which are operable to indicate credit values corresponding to the credit values of respective hold relays, said credit relays when operated, each preparing for operation of the hold relay which is indicative of the same credit value, said hold relays when operated, preparing for operation of certain credit relays which when operated, reduce the existing credit in multiple-cent and one-cent increments by the value of the stamp to be dispensed, and means responsive to each electric control impulse for operating the dispensing mechanism to dispense a stamp, and also for operating in sequence the credit relays for subtracting credit equal to the value of the stamp dispensed and then the hold relays which prepare the credit relays for a subsequent subtraction.

6. In a vending machine for dispensing stamps of various denominations, the combination of a plurality of dispensing mechanisms for stamps of various denominations, a coin receiving and detecting mechanism operating to indicate the denomination of coin received, a credit mechanism establishing credit in response to operation of the coin detecting mechanism and including a plurality of hold relays to be operated, at least indi-

vidually, to indicate existence of various amounts of credit, the credit mechanism also including a plurality of credit relays to be operated, at least individually, to indicate existence of various amounts of credit, said credit relays, when operated, preparing for operation of hold relays indicating existence of corresponding credit values, said hold relays preparing for operation of, when operated, certain credit relays to be operated for subtraction of credit, a plurality of manually controlled dialing mechanisms each, when operated, preparing for operation of a respective dispensing mechanism and also preparing for operation of certain of the credit relays for subtraction of credit corresponding to the denomination of stamps to be dispensed, said dialing mechanism also producing electric control impulses, means responsive to each electric control impulse to operate the dispensing mechanisms and to operate in sequence, the credit relays to subtract credit corresponding to the value of the stamp dispensed and then the hold relays to prepare for subsequent subtraction, and means responsive to indications of the credit mechanism, preventing further operation of the dialing mechanisms when insufficient credit exists to equal the cost of a stamp in the denomination to be purchased.

7. In a vending machine for dispensing stamps, the combination of a stamp dispensing mechanism having a solenoid effecting dispensing of a stamp each time the solenoid is operated, a manually operated dialing mechanism producing, when operated, a series of electrical impulses, equal in number to the number of stamps to be purchased, operable and releasable control means operating the dispensing mechanism, said control means being triggered into operation in response to each of said impulses, time-controlled means responsive to each impulse, said time-controlled means holding said control means in operated condition for a predetermined period and then releasing said control means and holding the same in released condition for a predetermined period, whereby racing of the dialing mechanism is substantially ineffective to change the rate at which the dispensing mechanism is operated.

8. In a vending machine for dispensing stamps, the combination of a stamp dispensing mechanism having a solenoid effecting dispensing of a stamp each time the solenoid is operated, a manually operated dialing mechanism producing, when operated, a series of electrical impulses, equal in number to the number of stamps to be purchased, operable and releasable control means operating the dispensing mechanism, said control means being triggered into operation in response to each of said impulses, time-controlled means responsive to each impulse, said time-controlled means holding said control means in operated condition for a predetermined period and then releasing said control means and holding the same in released condition for a predetermined period, indication-producing credit mechanism responsive to operation of the control means and subtracting credit each time the control means is operated, and energizing mechanism responsive to the indications of the credit mechanism and preparing the dialing mechanism for triggering the control means when sufficient credit exists to permit purchase of a stamp whereby the time-controlled means provides the necessary time for the stamp dispensing mechanism, credit mechanism and energizing mechanism to operate regardless of manual racing of the dialing mechanism.

9. In a vending machine for dispensing stamps, the combination of a stamp dispensing mechanism having a solenoid effecting dispensing of a stamp each time the solenoid is operated, a manually operated mechanism producing, when operated, a series of electrical impulses, equal in number to the number of stamps to be purchased, operable and releasable control means operating the dispensing mechanism, said control means being triggered into operation in response to each of said impulses, time-controlled means responsive to each impulse

and holding said control means in operated condition and said time-controlled means operating after a predetermined period for releasing said control means, a second time-controlled means responsive to releasing of said control means and holding said control means in released condition, said second time-controlled means operating, after a predetermined period, to prepare the control means for operation again, whereby to limit the frequency with which the dispensing mechanism will be operated.

10. The invention set forth in claim 9 wherein the manually operated mechanism normally produces impulses at a rate whereby successive pulses will operate the control means.

11. In a vending machine for dispensing stamps, the combination of a stamp dispensing mechanism having a solenoid effecting dispensing of a stamp each time the solenoid is operated, a manually operated dialing mechanism producing, when operated, a series of electrical impulses equal in number to the number of stamps to be purchased, operable and releasable control means operating and releasing the dispensing mechanism, said control means being triggered into operation in response to each of said impulses, time-controlled means responsive to each impulse and holding the control means in operated condition and operating after a predetermined period for releasing said control means, a second time-controlled means responsive to releasing of said control means and holding said control means in released condition, said second time-controlled means, after a predetermined period, preparing the control means for operation again, credit mechanism responsive to operation and releasing of the control means for subtracting credit and for preparing for the next subtraction, energizing mechanism responsive to credit indications of the credit mechanism and preparing the dialing mechanism for triggering the control means when sufficient credit exists to allow the purchase of a stamp.

12. In a vending machine for dispensing stamps, the combination of a stamp dispensing mechanism having a solenoid effecting dispensing of a stamp each time the solenoid is operated, a manually operated dialing mechanism producing, when operated, a series of electrical impulses equal in number to the number of stamps to be purchased, operable and releasable control means operating the dispensing mechanism, said control means being triggered into operation in response to each of said impulses, a first time-controlled means responsive to each impulse and holding the control means in operated condition and operating after a predetermined period for releasing said control means, a second time-controlled means responsive to releasing of said control means and holding the control means in released condition and operating after a predetermined period to prepare the control means for operation again, a third time-controlled means responsive to each impulse and operating, after a predetermined period, to prevent operation of the control means, said third time-controlled means being responsive to the termination of each impulse to prepare for operation of the control means again, the period of said third time-controlled means being less than the combined, successive periods of the first and second time-controlled means, whereby the control means is operated only once in response to each impulse produced by the dialing mechanism regardless of the length of the impulse.

13. In a vending machine for dispensing stamps, the combination of a stamp dispensing mechanism, a coin-detecting and receiving mechanism operating to indicate the denomination of coin received, a manually operable mechanism producing, when operated, electrical impulses in a number corresponding to the number of stamps to be purchased, a credit mechanism establishing credit in response to operation of the coin-detecting mechanism and indicating credit existing for purchase of stamps, said credit mechanism including a plurality of hold relays and

credit relays, certain of said hold and credit relays being individually operable to indicate credit values which are differentiated from each other by first increments, and other of said hold and credit relays being individually operable to indicate credit values which are differentiated from each other by second increments, said credit relays, when operated, each preparing for operation of the corresponding hold relay which is indicative of the same credit value, said hold relays, when operated, preparing for operation of said credit relays, which, when operated, reduce the existing credit by the value of the stamp dispensed, adjustable means changing, in accordance with the value of stamps to be dispensed, the selection of credit relays prepared for operation in response to operation of the hold relays, means responsive to each electric control impulse for operating said dispensing mechanism to dispense a stamp and also for operating in sequence, the credit relays for subtracting credit equal to the value of a stamp and then the hold relays which prepare the credit relays for a subsequent subtraction, whereby to facilitate changing of the denominations of stamps to be dispensed.

14. In a vending machine for dispensing stamps of various denominations, the combination of a plurality of dispensing mechanisms for stamps of various denominations, a coin receiving and detecting mechanism operating to indicate the denomination of coin received, a credit mechanism establishing credit in response to operation of the coin detecting mechanism and including a plurality of hold relays to be operated, at least individually, to indicate existence of various credit values, the credit mechanism also including a plurality of credit relays to be operated, at least individually to indicate existence of various credit values, said credit relays, when operated, preparing for operation of hold relays indicating existence of corresponding credit value, the hold relays, when operated, preparing for operation of a plurality of selections of credit relays for subtraction of credit, a plurality of manually operated mechanisms each, when operated, preparing for operation of a respective dispensing mechanism and also producing electric control impulses, a plurality of selector means each responsive to operation of a respective manually operated mechanism and permitting operation of a predetermined selection of credit relays which, when operated, reduce existing credit by the value of the stamp to be purchased, means responsive to each electric control impulse to operate the dispensing mechanisms and to operate in sequence, the credit relays to subtract credit corresponding to the value of the stamp dispensed and then the hold relays to prepare for subsequent subtraction, and means responsive to the credit mechanism preventing further operation of the dialing mechanisms when insufficient credit exists to equal the cost of a stamp in the denomination to be purchased.

15. In a vending machine for dispensing articles, the combination of an article dispensing mechanism, a coin-detecting and receiving mechanism operating to indicate the denomination of coin received, a manually and variably operable mechanism, producing, when operated, electric impulses for operating the dispensing mechanism and causing dispensing of articles in various numbers, a credit mechanism establishing credit in response to operation of the coin-detecting mechanism and indicating credit existing for purchase of articles, said credit mechanism also being responsive to the electric impulses for subtracting of credit equal to the value of each article dispensed, change-dispensing mechanism including a plurality of individually operable coin storage tubes and dispensers in different series, one series handling coins of one denomination and another series handling coins of another denomination, the credit mechanism operating to prepare certain of the coin dispensers for operation to dispense coins equaling the credit indicated, control means for operating the change dispensing mechanism, and means controlling one series of coin dispensers and alternating, in successive dispensing operations, the dispensers in

said series which may be individually operated, whereby to cause coins to be dispensed from the several tubes at approximately equal rates.

16. In a vending machine for dispensing articles, the combination of a plurality of article dispensing mechanisms for dispensing the various articles of various values, a coin-detecting and receiving mechanism operating to indicate the denomination of coin received, manually operable mechanism for selecting the dispensing mechanism to be operated and producing electric impulses for operating the dispensing mechanism and causing an article to be dispensed, a credit mechanism establishing credit in response to operation of the coin-detecting mechanism and indicating credit existing for purchase of articles, said credit mechanism also being responsive to the electric impulses for subtracting credit equal to the value of the articles dispensed, change dispensing mechanism including a plurality of individually operable coin storage tubes and dispensers each constructed to handle coins of a particular denomination, the credit mechanism operating to prepare certain of the coin dispensers for operation to dispense coins equaling the credit indicated, control means for operating the change dispensing mechanism, and means controlling the coin dispensers and alternating, in successive dispensing operations, the dispensers which may be individually operated whereby to cause the coins to be dispensed from the several tubes at approximately equal rates.

17. In a vending machine for dispensing articles, the combination of an article dispensing mechanism, a coin-detecting and receiving mechanism operating to indicate the denomination of coin received, a manually operable mechanism producing, when operated, electric impulses for operating the dispensing mechanism and causing dispensing of articles, a credit mechanism establishing credit in response to operation of the coin-detecting mechanism and indicating credit existing for purchase of articles, said credit mechanism also being responsive to the electric impulses for subtracting credit equal to the value of each article dispensed, change-dispensing mechanism including a plurality of individually operable coin storage tubes and dispensers, the credit mechanism operating to prepare certain of the coin dispensers for operation to dispense coins equaling the credit indicated, means responsive to a predetermined credit indication of the credit mechanism for operating the change-dispensing mechanism, said predetermined indication being indicative of a credit value insufficient to allow purchase of an article, and means controlling the coin dispensers and alternating, in successive dispensing operations, the dispensers which may be individually operated, whereby when the coin dispensers are successively operated in response to said predetermined credit indication, the supplies of coins in the several tubes are exhausted at substantially equal rates.

18. In a vending machine for dispensing articles of various values, the combination of a plurality of article-dispensing mechanisms, a coin-detecting and receiving mechanism operating to indicate the denomination of coin received, a credit mechanism establishing credit in response to the operation of the coin-detecting mechanism and including a plurality of hold relays and credit relays individually representative of various predetermined credit values and selectively operated when predetermined credit exists, to produce indications of existing credit, said credit relays operating to prepare hold relays of corresponding credit values for subsequent operation and said hold relays operating to prepare credit relays representative of relatively less credit values for subsequent operation to effect subtraction of credit, a plurality of manually controlled dialing mechanisms, each, when operated, preparing a respective dispensing mechanism for operation and preparing certain of the credit relays for operation and said dialing mechanism also producing electrical control impulses, and means

responsive to each electric control impulse to operate the dispensing mechanisms and to operate in sequence, certain of the credit relays for subtracting credit and then the corresponding hold relays to prepare for subsequent operation of other credit relays in response to another impulse along with the dispensing of another article.

19. In a vending machine for dispensing articles of various values, the combination of a plurality of article-dispensing mechanisms, a coin-receiving and detecting mechanism operating to indicate the denomination of coin received, a credit mechanism establishing credit in response to the operation of the coin-detecting mechanism and including a plurality of hold switch devices and credit switch devices individually representative of various predetermined credit values and selectively operated when predetermined credit exists, to produce indications of existing credit, said credit switch devices operating to prepare the hold switch devices of corresponding credit values for subsequent operation and said hold switch devices operating to prepare credit switch devices repre-

sentative of relatively less credit values for subsequent operation to effect subtraction of credit, a plurality of manually controlled mechanisms each, when operated, preparing a respective dispensing mechanism for operation and preparing certain of the credit switch devices for operation and said manually controlled mechanisms also producing electrical control impulses, and means responsive to each electric control impulse to operate the dispensing mechanisms and to operate in sequence, certain of the credit switch devices for subtracting credit and then the corresponding hold switch devices to prepare for subsequent operation of other credit switch devices in response to another impulse along with the dispensing of another article.

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