July 13, 1965 J. RABINOW 3,194,946

POSTAGE METER SET BY CARDS

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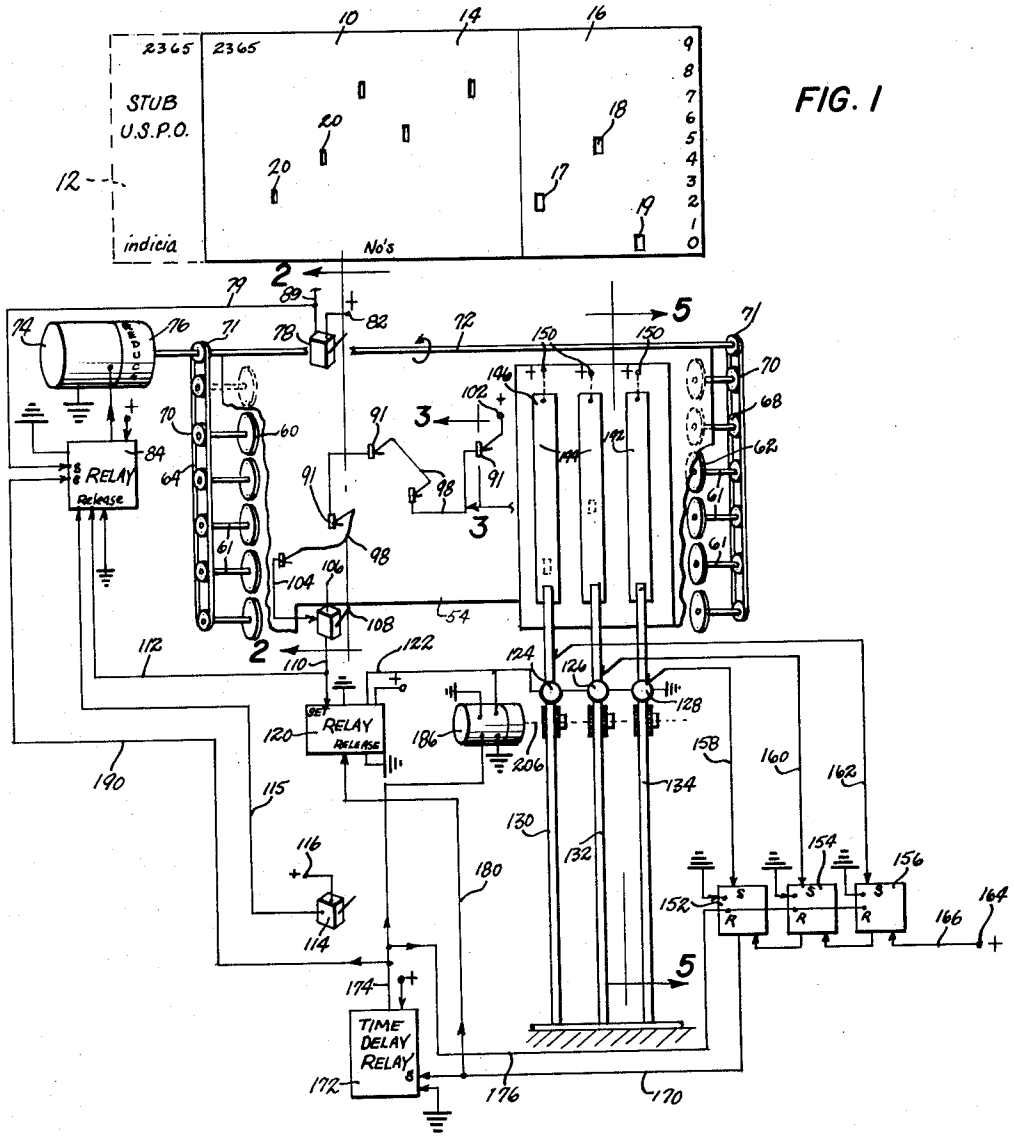


FIG. 1

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POSTAGE METER SET BY CARDS

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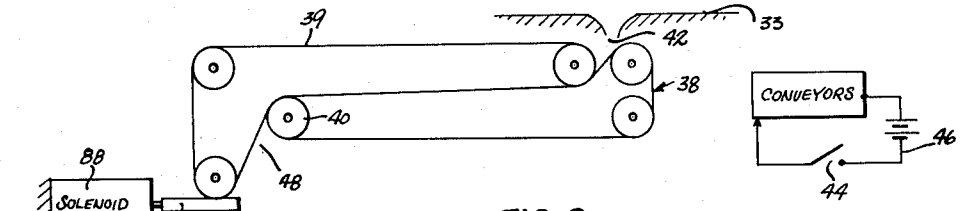


FIG. 2

FIG. 2a

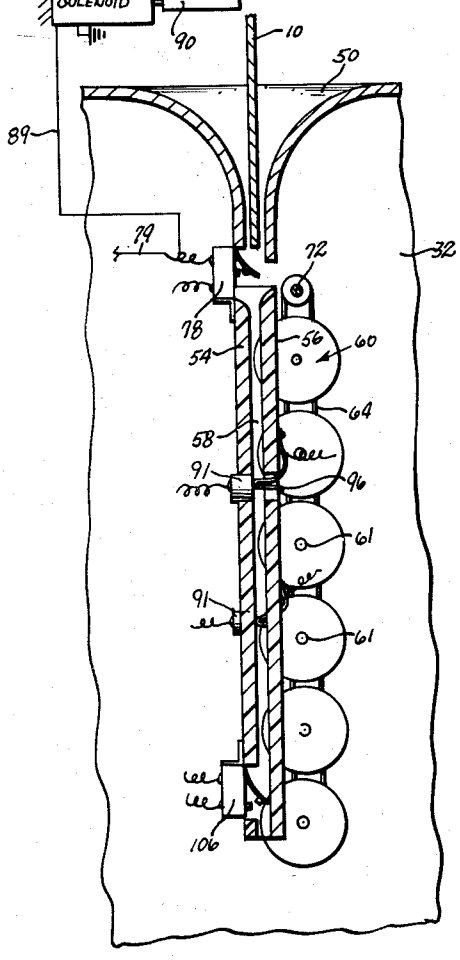


FIG. 3

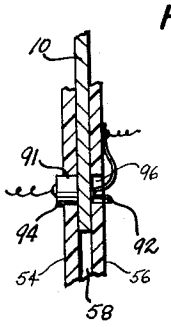
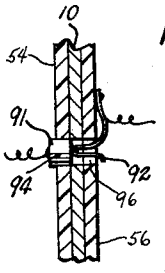


FIG. 4



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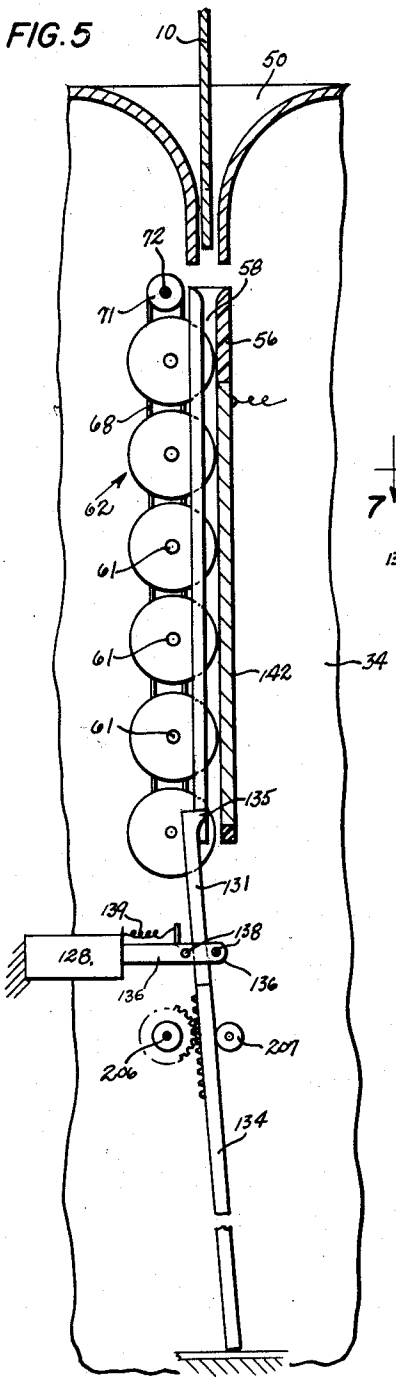
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FIG. 5



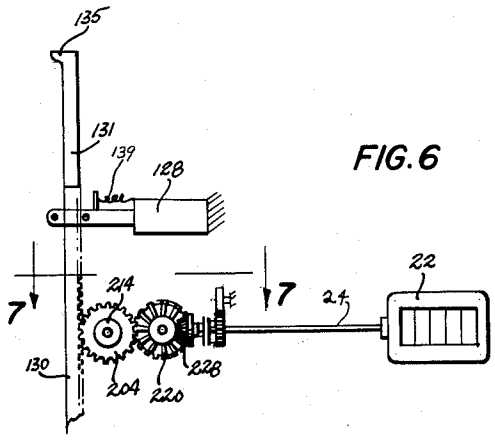
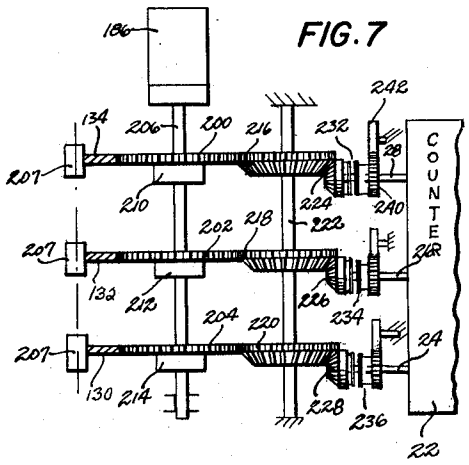


FIG. 6

FIG. 7



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United States Patent Office 3,194,946 Patented July 13, 1965

3,194,946

POSTAGE METER SET BY CARDS

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Filed June 20, 1961, Ser. No. 124,762
8 Claims. (Cl. 235—61.6)

This invention relates to card-controlled machines and particularly to a postage meter which is set by cards instead of the current practice of manually setting such meters.

Although the principles of my invention may be applied to various types of machines, my invention solves a special problem or at least a hardship, presently endured by U.S. postal officials and their customers who use postage meters. I refer to the postage meter machines which customers have on their premises for applying postage stamps to letters or packages. Currently available machines have a section which is periodically removed from the machine and carried to a U.S. post office either by the customer or a postal official. This section is heavy, and obviously, the postage meter is disabled during the period that this section is removed from the machine. Sometimes the whole meter, weighing some 80 pounds, may have to be carried to the post office. While at the post office, the customer purchases a quantity of postage, and a post office official adjusts the section to correspond to the purchase value of the postage. Thereafter, the section of the machine is locked and must be returned to the postage meter at the customer's premises. One of the features of such machines is that a counter keeps track of the number and/or value of postage remaining in the machine so that the customer knows when he should again have the section of the machine removed for a further purchase at the U.S. post office. This procedure is time consuming; disables the machine for a period of time; and in general is bothersome both for the customer and the U.S. post office.

An object of my invention is to greatly alleviate these difficulties by a system which enables the customer to purchase a voucher, preferably but not necessarily, in the form of a single card, a group or book of cards etc., from the U.S. post office, and then insert one or more cards into the postage meter so that the cards set the meter in accordance with the purchase value of the cards. The purchase value is preferably indicated by code on or in the card. Consequently, it is unnecessary to ever disable the postage meter; to remove a section of the machine; and/or to require physical transportation of the section to and from the post office.

I am aware of prior card-controlled machines. However, where the card is of considerable extrinsic value, security problems which do not ordinarily arise in other card-controlled machines, may arise. Therefore, my card has a machine-verification code and a dollar-value (or the equivalent) code. Thus, when a purchaser obtains the card from the post office or its agent, the card will be of no value to anyone except the possessor of the machine with which verification section matches. Problems of counterfeiting are automatically overcome by records kept at the post office, as for example, serial numbered stubs, and by the fact that the card is "captured" by the machine and can be removed only by the post office.

With regard to the machine-verification and dollar-value codes of the card I have means for investigating these codes to ascertain (a) that the card inserted in the machine has been purchased for that particular machine and (b) the value of the purchase. These functions may be accomplished purely mechanically or electro-mechanically. Since the electro-mechanical system is somewhat

more complex than the simpler mechanical equivalent thereto, the following discussion is restricted to an electro-mechanical system, it being understood that corresponding purely mechanical functions may be achieved. For instance, where I shall describe a motor to operate friction wheels to propel the card, it is obvious that the card may be simply dropped by gravity into a slot or a hand crank could be substituted for the motor.

For a general understanding of how a preferred embodiment of my invention operates, assume that a customer purchases a card having machine-verification code marks of one type or another and dollar-value code holes. The card is inserted into the machine and the machine-verification code is examined. If the verification code does not coincide with the machine, the card simply passes into a receptacle of the machine causing no other function. Thus, the card is maintained in the machine so that when the machine is periodically inspected by the post office, the fact that an improper card was attempted to be used will be evident.

If, upon investigation of the verification code by the machine, the card matches the machine, a second examination of the card takes place to ascertain the purchase value of the card. When this value has been determined by one of the features of my invention, there are a plurality of outputs which adjust the postage meter by an amount proportional to the purchase value of the card. This adjustment is of the conventional counter of a postage meter, i.e. the same counter which is ordinarily manually adjusted by a post office official when the usual postage meter is carried to the post office for a postage purchase.

An object of my invention is to provide a card-controlled postage machine.

Accordingly, a more specific object is to provide a card-controlled device for a postage meter, which has means to investigate a first code on the card to verify the card with the machine.

Another object of the invention is to provide means which become activated upon card-machine verification, for investigating a second code on the card to provide outputs to a utilization device of the postage meter.

When the card is a punched card, both investigations described above will be by ascertainment of the positions of the apertures in the card. A feature of my invention is in the procedure for determining the relative locations of the apertures of one of the codes. For instance, the code in question may be the value determinate of the card. I use a plurality of probes which move along the surface of the card until they engage the apertures defining the value code. The amount of movement of each of the probes is transmitted to the counter of the postage meter, and this sets the postage meter counter in accordance with the purchase price of the card.

Other objects and features of importance will become apparent in following the description of the illustrated form of the invention which is given by way of example only.

FIGURE 1 is a diagrammatic elevational view with parts shown in perspective, of a postage meter device in accordance with my invention.

FIGURE 2 is a sectional view taken on the line 2—2 of FIGURE 1 and showing additional features diagrammatically and on a different scale.

FIGURE 2*a* is a diagrammatic view of a control circuit for conveyor system of my device.

FIGURE 3 is an enlarged sectional view taken on line 3—3 of FIGURE 1 and showing a card as it passes into a slot to be interrogated by my device.

FIGURE 4 is a sectional view similar to FIGURE 3 but showing the card in place within the slot.

FIGURE 5 is an enlarged sectional view taken on line 5—5 of FIGURE 1.

FIGURE 6 is a fragmentary sectional view showing one of the probes of my device and its operative connection with the postage meter adjusting means.

FIGURE 7 is a sectional view taken on line 7—7 of FIGURE 6 and showing principally the means for coupling the probes with the conventional counter of the postage meter in order to operate the counter in proportion to the amount of mechanical movement of the probes in interrogating the value-code of the card.

In the accompanying drawings I have illustrated a card 10 which has been detached from a stub 12, as a means of adjusting a postage meter. The card contains two areas or sections 14 and 16, with the section 14 being a card-machine verification section and the section 16 containing a code corresponding to the purchase value of the card. The codes are established by the location of apertures, for instance, apertures 17, 18 and 19 in section 16 and the apertures 20 in section 14. The location of apertures 17, 18 and 19 respectively correspond to a purchase of $250 as is evident from the legend on the right side of section 16. In practice, the legend need not be applied to the card, but the card would contain serial numbers that match the stub 12 and any other security identification markings thought to be desirable.

The card-machine verification section 14 serves two principle purposes. It is a security measure for the customer since the cards which he purchases for his machine will not operate another machine and vice versa. Secondly, the card-machine verification section greatly discourages counterfeiting since a counterfeit card will suggest that the owner, custodian, etc., of the machine made the counterfeit (assuming that the machine is under the control of the customer only) and that no one else would have anything to gain by counterfeiting a card for a machine other than his own.

The only part of the postage meter which I have shown in the accompanying drawings is counter 22 (FIGURE 7) with its shafts 24, 26 and 28 since this is the only part of the postage machine which must be in some way altered by the addition of my invention. Even here, the alteration is minor in that I remove the knobs on the counter (which the post office agent would turn to set the counter when a stamp-purchase is made) and replace them with gearing. Thus, instead of turning the shafts of the counter manually with knobs, my setting device mechanically turns the shafts, for instance, by appropriate gearing shown in FIGURE 7 and described later.

My card-operated device is preferably enclosed in a container, however, I have only shown fragments of the walls thereof diagrammatically, for example, walls 32, 33 and 34 in FIGURES 2 and 5 respectively, as is necessary to support the various components of my device. Other walls, supporting brackets and the equivalent are merely indicated by conventional symbollic ground references in order to greatly simplify the drawings and permit the components and operating principle to be better shown.

A conveyor system 38 is shown on reduced scale at the top of FIGURE 2. The conveyor system is composed of two conveyors 39 and 40 with adjacent flights between which a card 10 is adapted to be propelled. The conveyor system has an inlet 42 in registry with an inlet slot formed in the wall of the container of my device, and the purpose of the conveyor system is to prevent tampering. Once a card is inserted in the conveyor system 38, it leaves the control of the user and is conveyed to the discharge end of the conveyor system. The conveyor system may be manually operated, for instance by closing the switch 44 of electrical circuit 46 with which the motors (not shown) of the conveyor system are operatively connected. The conveyors can be automatically operated by having switch 44 closed by the card when it is initially inserted, in which case the circuit would have a timer in it to assure that the circuit 46 remains closed until the card is discharged from the end of the conveyor system. Of course, the conveyor system 38 could be manually operated for instance turning a crank connected with one of the shafts of the conveyor pulleys or rollers.

The discharge end 48 of the conveyor system is registered with the inlet throat 50 of an open ended slot 53 which is formed of two walls 54 and 56 supported adjacent to each other. The slot is slightly wider than the card thickness. There are means projecting into the slot 53 to propel the card positively into and through the open ended slot 53. These means may have a number of configurations, one of which is shown in FIGURES 1, 2 and 5. Specifically, I have shown two sets of friction wheels 60 and 62 respectively, with all wheels of each set operating simultaneously. Here again, the simultaneous motion may be obtained in many ways, one of which is to use a pair of chains or belts 64 and 66 on two sprockets or pulleys 70 which are attached to the same spindles 61 that support the friction wheels. Main drive pulleys 71 are attached to a single shaft 72, and this is rotated by motor 74 through a reducer 76.

The first procedure of my device when a card is inserted in slot throat 50, is to examine the verification section 14 to ascertain whether the card 10 is the proper card for the device and hence, the proper postage meter with which it is used. Consequently, I have a switch 78 so mounted on wall 54, for example, that card 10 (FIGURES 1 and 2) upon entering the slot 53, closes switch 78. One terminal of the switch 78 is connected to a source 82 of electrical potential, and the other terminal is connected to a relay 84 (FIGURE 1) to close the relay. All relays shown in the drawings are conventional latching relays. The entire electrical system is shown as a D.C. system to simplify the drawings, it being understood that an A.C. system is equivalent. When relay 84 is set by a signal over line 79 from switch 78, solenoid 88 (FIGURE 2) which is energized over line 89 from switch 78, becomes energized to project a stop 90 across the throat 50. Thus, when one card is in slot 53, another card may not enter, and tampering is made more difficult.

Assume that a card 10 is just entering slot 53 and it closes switch 78 by engaging the switch arm. Friction wheels 60 and 62 become operative as relay 84 operates motor 74 and the wheels propel the card downward into the slot 53. The two sets of rollers 60 and 62 grip the card near its side edges with the card sliding along the surface of wall 54. Apertures 20 in section 14 of the card are interrogated by a number of switches 91, each having spring fingers 92 which function as one contact (FIGURES 3 and 4). Stationary contacts 94 of switches 91 are secured to one wall, for instance wall 54 of slot 53, and the movable contacts 92 are secured to the opposite wall and have parts which project through apertures 96 in wall 56 and through slot 53. Thus, if there is no opening 20 in the card 10 at the position of a switch 91, that switch will remain open. Of course, a microswitch mounted on one wall, for instance wall 56, and having a switch arm projecting through opening 96 would be equivalent to the switches 91.

The arrangement of switches 91 (FIGURE 2) is peculiar to a particular machine, and openings 20 in a card for that machine are arranged to match the arrangement of switches. All of the switches 91 are connected in series by jumper wires 98. The end of the serial line of switches 91 is connected to a source 102 of potential whereas the opposite end of the serial line of switches is connected by wire 104 with a normally open switch 106. The switch arm 108 thereof projects across slot 53 (FIGURE 2) so that when the lower edge of the card reaches a predetermined position in the slot, switch 106 is closed. If the apertures 20 match the pattern of interrogation switches 91, a circuit path will be completed to the source 102 to conduct current over lines 110, 112 to the "release"

terminal of relay 84. Thus, the friction wheels 60 and 62 no longer propel the card but hold it in place within the slot 58. If any one of the verification switches did not make contact i.e., if there were no aperture 20 at the proper place when switch 106 is closed, the card would continue on through the slot 58 until it reached the lowest switch 114 (FIGURE 1). The switch operator thereof would be engaged by the lower edge of the card thereby closing switch 114 and connecting potential source 116 (by way of line 115) with another release terminal of relay 84. Accordingly, the card will have been propelled completely through slot 58 before motor 74 is de-energized, and the card comes to rest in the container of my device.

On the other hand, assume that the code information of section 14 of card 10 matched the verification switch arrangement in FIGURE 1. Switch 106 would then release relay 84 allowing the rollers to hold the card in place within the slot, and switch 114 would not yet be operated. The conductor 110 from switch 106 is also connected to a relay 120 so that not only is relay 84 released when switches 91, 104 complete the verification circuit, but also relay 120 is set. The switch section (not shown) for relay 120 conducts current over line 122 to operate three push solenoids 124, 126 and 128 each of which has its field coil connected to ground. The purpose of the solenoids (FIGURE 5) is to swing three probes or mechanical members 130, 132 and 134 from their rest position (shown in FIGURE 5) toward the wall 56 of the slot 58 and thus against a face of card 10, against the yielding opposing force of solenoid-return springs 139. The mechanical connection between the solenoids may be made in a number of ways, one of which is to have the armature 136 (FIGURE 5) of typical push solenoid 128 bifurcated with the probe 134 passing between the sides thereof. A pair of transverse pins 138 in the sides of the bifurcated portion of the armature define a passageway through which the probe 134 extends. Therefore, when the solenoids are energized, the card 10 will have been in place in slot 58, and the upper probe fingers 135 of each of the probes will bear against a surface of the card. A gear system to raise the probes (to be described later) partially shown in FIGURE 5, forms a fulcrum about which each of the probes swing a small amount when one of the probe fingers detects a code opening 17, 18 or 19. Stops, guides, rollers 207 or the like (FIGURES 5 and 7) constrain the probes.

The probes 130, 132 and 134 have rack gear teeth along one edge in engagement with gears 200, 202 and 204 of the gear system (described later). Motor 186 (FIGURES 1 and 7) operates the gear system to drive the probes upwardly, the individual probes stopping when they engage openings 17, 18 and 19 of the card 10. The means for achieving those functions are described below.

When the card value section 16 is being interrogated by the probes, if there is any opening, for instance opening 19 as shown in FIGURE 1, representing "zero," the probe associated with the column containing that opening will simply pass through the opening to engage a contact bar behind the opening. Such a contact bar 142 is shown in FIGURES 1 and 5. There are three such contact bars 142, 144, and 146, i.e. one for each probe 134, 132 and 130. Each contact bar is connected with a source 150 of electrical potential, and the probes 130, 132 and 134 (having suitably conductive upper portions 131 etc. (FIGURE 6) insulated from the previously mentioned gearing system), connect the source 150 individually with relays 152, 154 and 156 over lines 158, 160 and 162. Source 164 of current is connected by wiring 166 with the switch sections of the three relays 152, 154 and 156 so that they are in series to function as a logical AND gate. In other words, when all relays 152, 154 and 156 are closed, current from source 164 may pass over line 166 through the switch sections of the relays and over line 170 to the "set" terminal of a time delay latching relay 172. The switch section (not shown) of this relay has an output wire 174 to which line 176 is connected to reset relays 154, 152 and 156. In addition, the signal on line 170 is conducted over line 180 to the release terminal of relay of 120. Thus, when all of the probes 132, 130 and 134 make contact with stationary contacts 142, 144 and 146, the probe operating motor 186 controlled by relay 120 no longer elevates the probes. The gearing for causing the probes to be moved is shown best in FIGURES 6 and 7 and will be described in detail later. At the present time, it is sufficient to note that when the motor 186 is energized the probes move upward seeking openings such as openings 17, 18 and 19. When the openings are found by the fingers 135 of the probes, they are pushed into the openings by solenoids 124, 126 and 128 and although the motor 186 continues operating the probes do not move vertically upward any farther due to slip clutches in the gearing that will be described later.

Returning to the electrical circuit, for the purpose of explanation, assume that motor 186 is a reversible motor. Line 174 from the time delay relay 172 is connected to a terminal of motor 186, for instance the terminal which will cause the motor to operate clockwise thereby lowering the probes. The probes can be lowered easily because when relay 120 becomes released, the solenoids 124, 126 and 128 are also de-energized thereby allowing springs 139 to retract the solenoid armatures and thus remove the probe fingers 135 from the openings 17, 18 and 19 by simply swinging the probes a very short distance away from the face of the card i.e., to the left position as shown in FIGURE 5. Now, with the motor 186 energized to operate clockwise, the probes will be lowered through the gearings shown in FIGURES 6 and 7. Virtually simultaneously, relay 84 becomes again set by the signal on line 190 which is connected with the output wire 174 from time delay relay 172. The setting of relay 84 will cause the motor 74 to be operated and thereby move the card downwardly out of slot 58. When the card engages the operator of switch 114, there is an output signal on line 115 to release relay 84 thereby discontinuing the operation of motor 74 and preparing the device for reception of another card 10.

Motor 186 which drives the probes up to interrogate the value section 16 of card 10 also returns the probes. The amount of adjustment of counter 22 is proportional to the amount of vertical upward movement of the three probes. Thus, motor 186 drives gears 200, 202 and 204 on its shaft 206 by way of slip clutches 210, 212 and 214. For instance, the slip clutches may be friction clutches of conventional design. It is now seen how the probes 130, 132 and 134 are elevated until the fingers 135 of the probes engage one of the openings 17, 18 and 19 and the motor 186 can continue to operate without lifting the probes any farther. The clutches 210, 212, and 214 will then slip. Gears 200, 202, and 204 are engaged with gears 216, 218 and 220 which are mounted for free rotation on a spindle 222. Miter gearing 224, 226 and 228, or the equivalent, drivingly connects the three gears 216, 218 and 220 with the counter operating shafts 23, 26 and 24 by way of one-way clutches 232, 234 and 236 which are diagrammatically shown as friction clutches and ratchets. For example, typical slip clutch 232 couples the miter gear, which is free-turning on counter shaft 28, with a ratchet wheel 240, the latter being fixed to the counter shaft 28. The ratchet pawl 242 is in contact with the ratchet wheel 240 allowing the ratchet wheel and counter shaft 28 to turn one direction. However, when the miter gear of gearing 224 endeavors to turn the shaft 28 of the counter in the opposite direction (when probe 134 is being lowered) the friction clutch 232 slips so that the probe 134 is lowered, but shaft 28 of the counter does not turn.

Summarizing the operation, when a card 10 enters the slot 58, the first control switch 78 energizes motor 74 so that the friction wheels 60 and 62 move the card downward into the slot. If the verification code matches the

arrangement of verification switches (FIGURES 3 and 4) of the machine, when switch 106 is closed, the friction wheels 60 discontinue turning. If the verification codes did not match, the switch 106 will not discontinue the rollers, and the card will simply pass through the slot 58.

When the verifications codes match, control switch 106 causes the solenoids 128 to operate thereby tilting the three probes so that the fingers thereof 135 bear against a surface of the code card at the value section. Also, motor 136 is operated, causing probes to be elevated until they reach a code opening, i.e. openings 17, 18 and 19. If the purchase value is less than a three digit figure, e.g. $50, the code openings 17, 18 and 19 would be at the zero, five and zero stations respectively. In other words, if one or more of the shafts of counter 22 should not be moved, the zero code hole is punched because the probe will then move directly into such a hole when the solenoids 128 are actuated. There will be no upward movement of the probes for a zero code hole.

The amount of upward movement of the probes is transmitted to the counter 22 in order to set it, after which the probes become lowered to their rest position, and the now used card is discharged into my device.

It is understood that various changes, modifications, etc., may be made without departing from the protection of the following claims.

I claim:

1. In combination with the counters of a postage meter, a device to adjust said counters of the meter by a card having code information thereon, said device including means defining a card reading station, inlet means communicating with said station and having further means to convey the card to said station, a portion of the coded information bearing a verification relationship to the device, verifying means at said station adapted to investigate said portion of said code information, a second part of said code information being a decimal code identifying the purchase value of the card as it corresponds to the postage, means to interrogate said second part of the card and readout the decimal code information, said readout means including a plurality of mechanical members, means to substantially rectilinearly move said mechanical members from a rest position to positions corresponding to the positional information of said second section of said card, means responsive to the movement of said members to adjust the counters of the postage meter, means responsive to each member achieving its position corresponding to the portion of the decimal code associated therewith for providing an electrical signal, and coincidence means for said signals to return said members to said rest position.

2. In a postage meter which has a plurality of counters adapted to be set in accordance with the purchase cost of postage, the improvement comprising a device connected with the meter and responsive to the arrangement of code holes in a card for setting said counters so that the card can be purchased at one location and used at another and thereby making it unnecessary to carry a part of the postage meter to the postage purchasing location, said device including means defining a card passage, means to propel the card through said passage, means to stop the card at a predetermined part of said passage to enable the code to be read while the card is at rest, code reading means having a plurality of probes with contacts at the outer ends thereof, pressing means to move the probes in a manner that the contacts engage the surface of the card, driving means to move the probes in a manner that the contacts slide over the surface of the card, said probes continuing to move until the contacts thereof engage said code holes, slip means drivingly connecting said probes to said counters thereby adjusting the counters until said contacts engage said code holes at which said driving means continue to operate but said counters fail to further adjust due to said slip means, contact members for each probe contact, said contact members and probe contacts opposing each other across said passage so that contact-engagement is made through said code holes, coincidence means connected with said probes contacts and said contact members to provide a coincidence signal when all of said probes contacts engage a code hole, means responsive to said coincidence signal for discontinuing said pressing means so that said probe contacts are withdrawn from said code holes, means responsive to said coincidence signal for discontinuing said probe driving means to return said probes to a rest position, and means responsive to said coincidence signal for continuing the movement of said card through said passage.

3. In a postage meter having adjustable counters, a card controlled device to adjust said counters directly at said meter, the card for said device having code openings, said device including means to retain the card in a predetermined position, a plurality of probes to engage and scan the surface of said card while the card is in said position, means to constrain the motion of said probes, means for pressing the probes against the surface of the retained card during the scanning thereof so that when the data openings are detected during the constrained movement of said probes parts of the probes enter said openings, electrical signal producing means operative to produce a control signal when all of the probes have entered card-openings, means responsive to said control signal for discontinuing said probes pressing means, and means drivingly connecting said probes to said counters to adjust the counters in accordance with the scan motion distances traveled in one direction by said probes.

4. The subject matter of claim 3 and means also responsive to said control signal for returning said probes to a rest position.

5. In combination with counters of a postage meter, a card controlled device to adjust said counters where the card contains data signifying the amount of adjustment of said counters, said card controlled device including card handling means, means to examine said card and read said data to adjust said counters in accordance therewith, said examining means including a plurality of probes, means for moving said probes over the surface of the card, means to provide an electrical signal in response to code data detection by said probes, means responsive to said electrical signal for disabling said probe moving means, and means including unidirectional motion transmitting means for coupling said probes to said counters.

6. Improvements in the adjustment of postage meters of the type which require counters to be set upon the purchase of postage, said improvements enabling said adjustments to be made in accordance with a record code so that the record can be purchased and brought to the postage meter, and said improvements embodied in a device operative with the meter by connection with said counters, said device having a record handling structure which moves the record to a reading station where the record is temporarily retained for reading the code, a plurality of mechanical probes to examine said record for the code, means for moving said probes across the record until each detects a portion of the code, means responsive to the amount of motion of each probe for adjusting the postage meter counters, and electrically operative coincidence means responsive as a result of each probe detecting a portion of the code for returning said probes to a rest position.

7. In combination with the counters of a postage meter, a device to adjust said counters in accordance with the code of a card which can be purchased at one place and used to adjust the postage meter at another place thereby eliminating the necessity of transporting the postage meter for adjustment of its counters, said device comprising a passageway for the card, means to propel the card through said passageway, sensing means

operative in said passageway to sense the card code and provide an electrical signal indicating that the code has been sensed, said sensing means including mechanical members, means for moving said members from a rest position to positions at which said members detect the code at which said electrical signal is given, mechanical drive means coupling said mechanical members to said counters thereby adjusting the counters of the postage meter as said members move, and means responsive to said signal for returning said mechanical members to a rest position.

8. The subject matter of claim 7 wherein the card has verification data, and said device has means responsive to said data to provide a verification signal, and

means responsive to said verification signal to enable said code sensing means.

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