June 13, 1961 A. R. BUCHHOLZ 2,988,093

REMOTE CONTROL FOR COIN DISPENSING MACHINE

Filed May 13, 1959

4 Sheets-Sheet 1

Fig. 2.

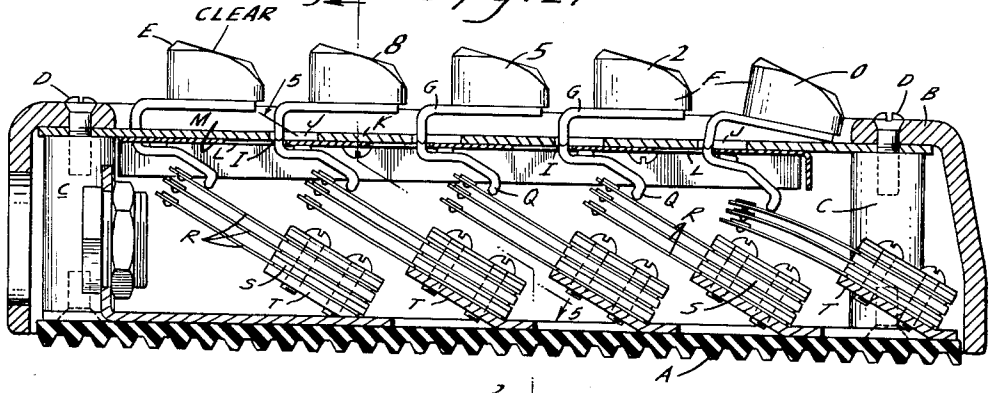



Fig. 4.

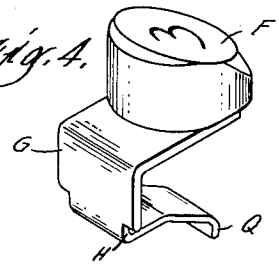



Fig. 1.

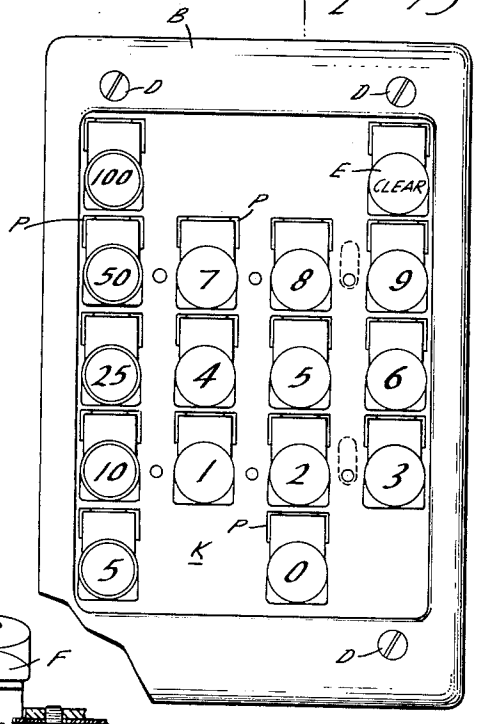



Fig. 5.

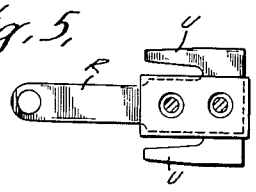
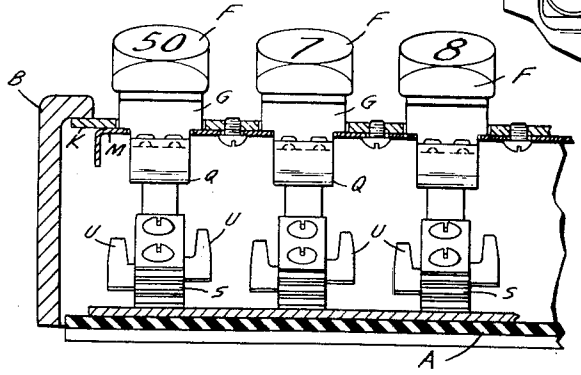



Fig. 3.

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REMOTE CONTROL FOR COIN DISPENSING MACHINE

Filed May 13, 1959

4 Sheets-Sheet 2

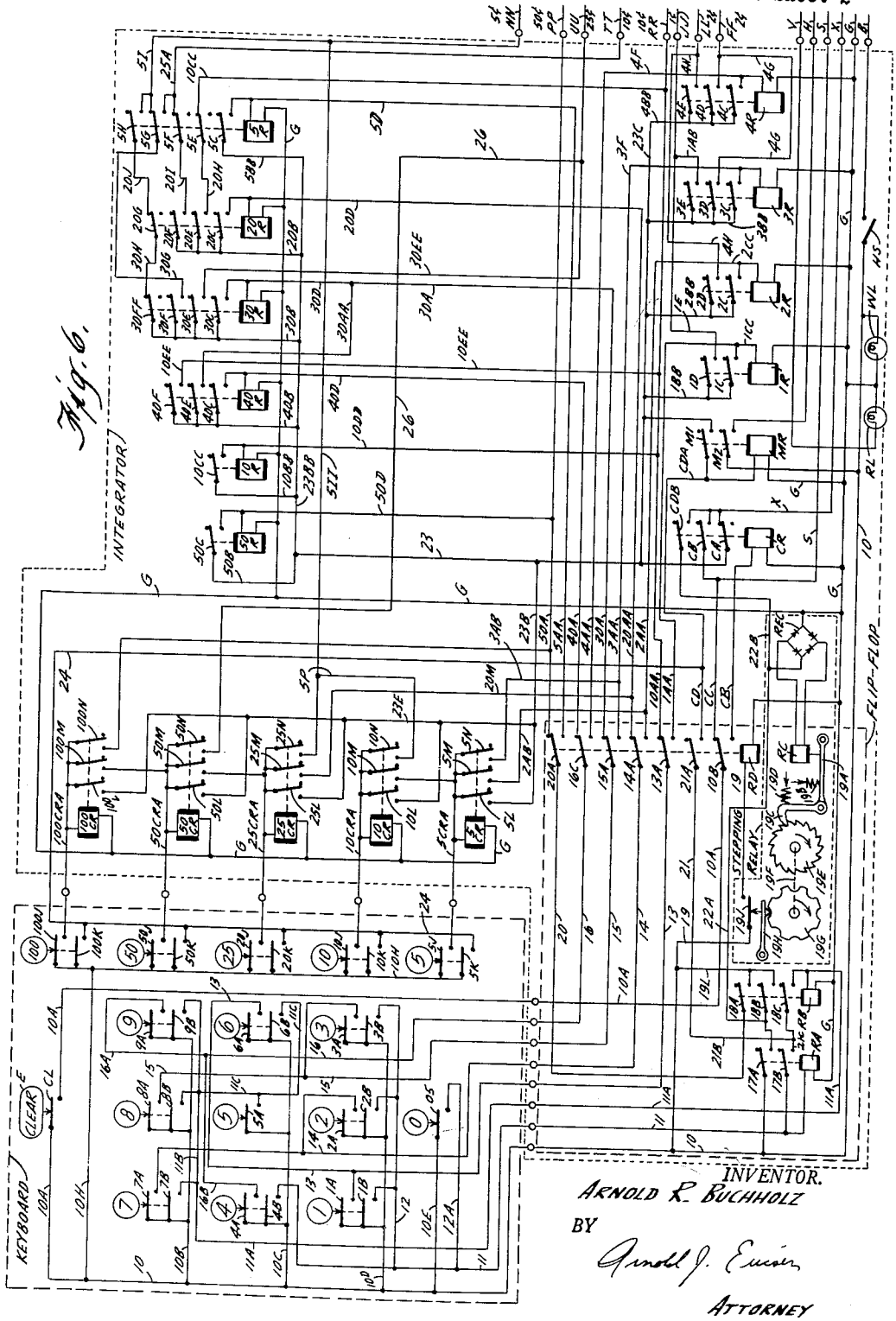


Fig. 6.

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REMOTE CONTROL FOR COIN DISPENSING MACHINE

Filed May 13, 1959 4 Sheets-Sheet 3

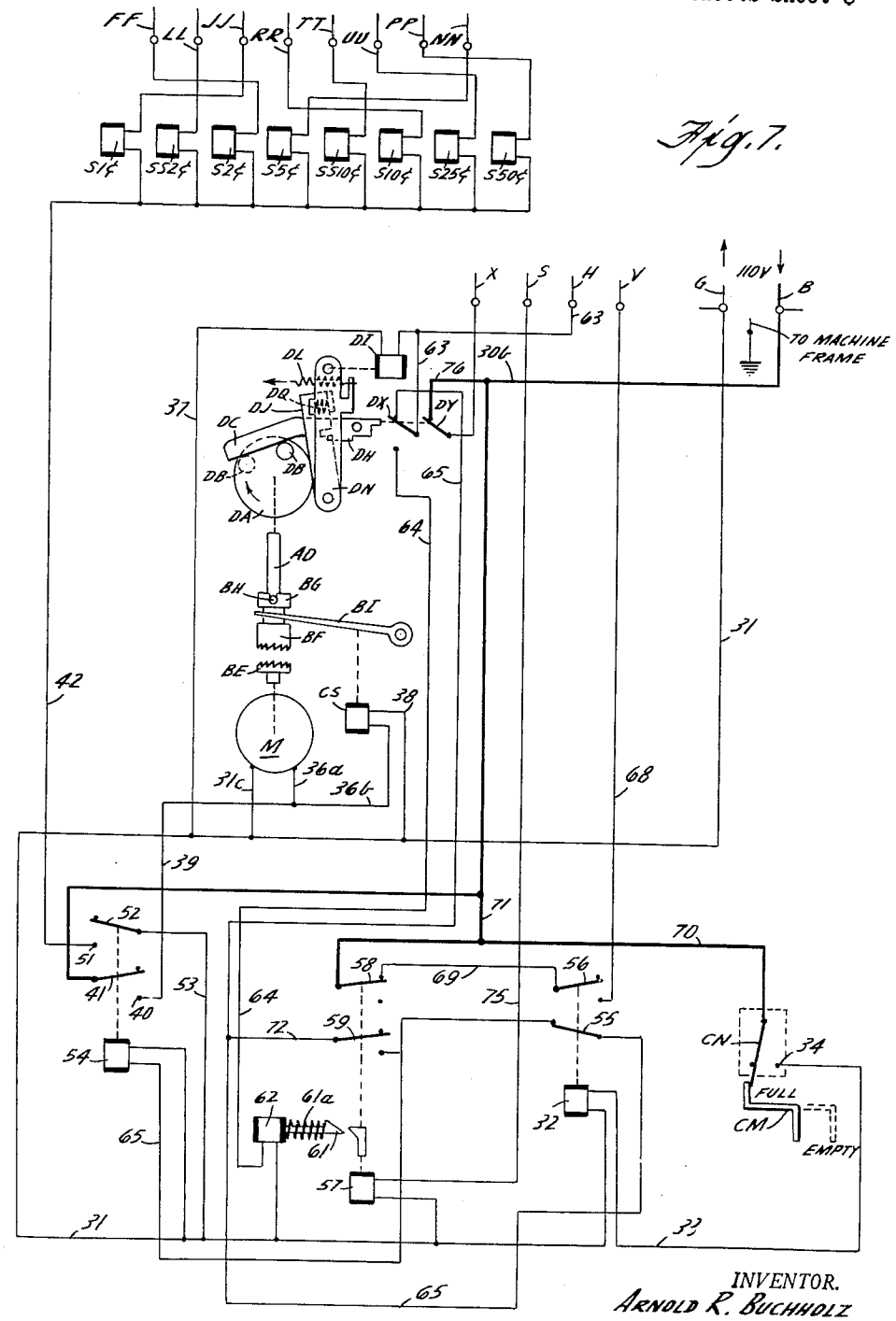


Fig. 7.

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REMOTE CONTROL FOR COIN DISPENSING MACHINE

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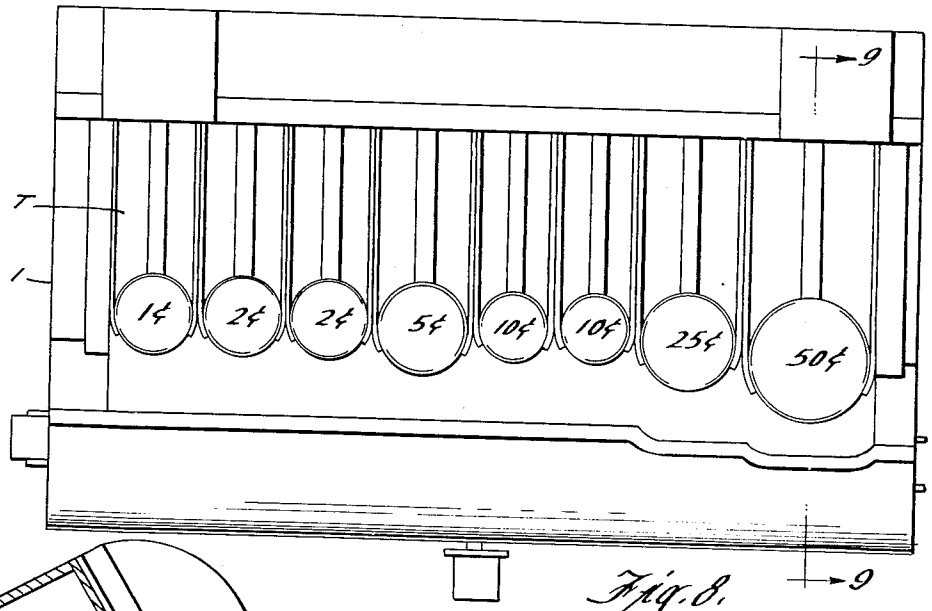


Fig. 8.

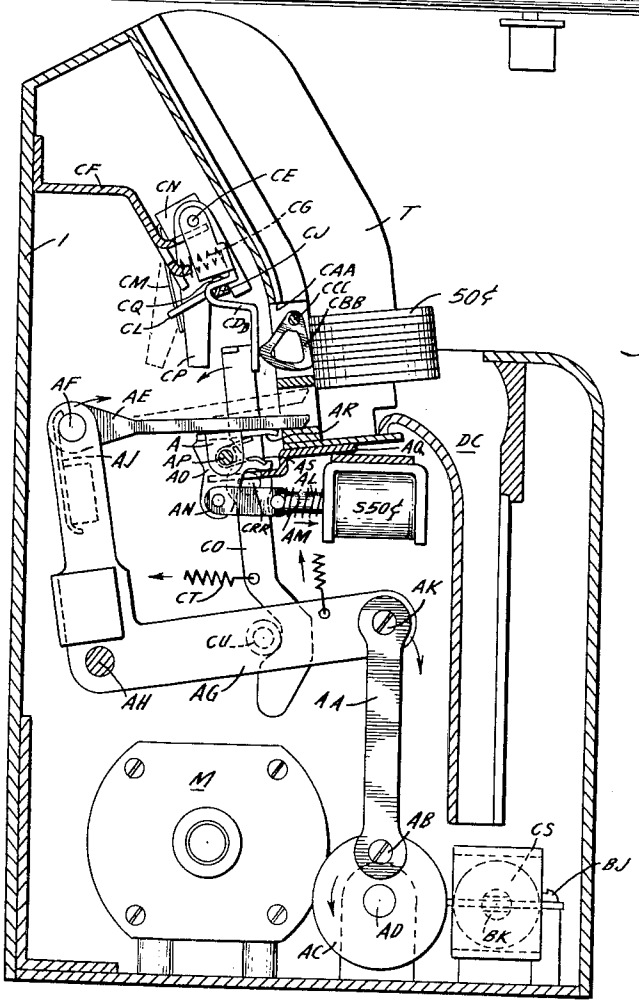


Fig. 9.

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United States Patent Office 2,988,093
Patented June 13, 1961



# 2,988,093
# REMOTE CONTROL FOR COIN DISPENSING MACHINE

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Filed May 13, 1959, Ser. No. 812,993
12 Claims. (Cl. 133—4)

The invention relates to coin dispensing apparatus and more particularly to those of the remote keyboard electrically controlled type.

One object of the invention is to provide an apparatus embodying an operator controlled keyboard provided with ten keys and a clearance key that is small enough to fit into a cash drawer, and preferably into one of the usual bill compartments provided in such drawers, the keyboard being adapted to control an integrator, which may be mounted in any convenient location as under a counter and adapted for connection with a coin dispensing unit located at or adjacent to the cashier's window.

With an apparatus of the type described the parts forming the units may be simplified to reduce over-all manufacturing costs and the great advantage obtained in the use of a keyboard which controls all dispensing transactions of the machine except for supplying "split change" when desired, by the use of but ten keys only two of which are operated for a transaction, there also being a clearance button for resetting the machine in case of a mistake and which also acts as a lock release in case a depletion of coins in any one of the coin channels has occurred, so that an additional operation of the machine may be effected before replenishing the depleted coin channel.

A further object of the invention is to provide a control apparatus for a coin dispensing unit which may be readily connected to known forms of "Read Out" devices either of the signal light or printing type.

Still another object of the invention is to provide a 15 key unit permitting all of the transactions of the ten key keyboard with the additional feature of permitting $1.00, 50¢, 25¢, 10¢ and 5¢ to be divided into "split change" by the single manipulation of an appropriately identified key pertaining thereto.

A still further object of the invention is to provide an improved key and key mounting arrangement for the keyboard of the control unit for a coin dispensing apparatus.

The invention further consists in the several features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings:

FIG. 1 is a plan view of a keyboard embodying the invention;

FIG. 2 is a vertical sectional view taken on line 2—2 of FIG. 1;

FIG. 3 is a fragmentary, vertical sectional view taken on the broken line 3—3 of FIG. 2;

FIG. 4 is a perspective view of a single key of the improved control unit;

FIG. 5 is a sectional view of the key-operated contact taken on the lines 5—5 of FIG. 2;

FIG. 6 is a diagrammatic view of the keyboard and integrator units and circuits and control devices controlled thereby;

FIG. 7 is a simplified diagrammatic view of the electrical circuit of a typical coin dispensing apparatus to be controlled by the present keyboard and integrator units;

FIG. 8 is a plan view of a simplified form of coin dispensing apparatus; and



FIG. 9 is a vertical sectional view through one of the coin channels of said apparatus taken in the line 7—7 of FIG. 6.

Referring to FIGS. 1–4, the keyboard comprises a two part housing having a base A and a cover B detachably secured to pedestals C mounted on the base by screws D. There are nine dispensor keys 1 to 9 and zero and a clearance key E, and where desired, five split-change keys, 100, 50, 25, 10 and 5, each pivotally mounted on the cover B. As shown in FIGS. 3–5, each key has a finger pad F mounted on a U-shaped metal member G whose transverse portion H near its lower leg, is fulcrumed in a slot I formed between a slot J in an upper plate K and a slot L in a lower plate M. Both of the plates K and M are secured to the underside of the top portion of the cover B, which is slotted at P in the region of each key. The lower leg of each member G is bent down and flanged to provide a finger Q adapted to engage in the case of keys 1 to 9, and split-change keys 100, 50, 25, 10 and 5, the upper contact member of a bank of three resilient spring arm type of switch contacts R and through this upper contact actuate all the switches. The resilient characteristic of the switches R also aids in normally biasing the keys upwardly of the cover B. Each bank of switches R is mounted on terminal blocks S and suitably insulated from each other. Each of the blocks S is mounted on an upwardly inclined pressed out portion T of the base A as indicated in the section of FIG. 2. For the zero key and the clearance key E only a single switch is engaged. Each switch member of the respective switch banks R is provided with opposed tongue portions U for electrical connection with appropriate leads or conductors as hereinafter described. The housing is of a size which may be conveniently placed in any cash drawer, bill stall or space.

Referring to FIG. 6, the keys of the keyboard are designated 1 to 9 and zero and clear and may also preferably include split-change keys 100, 50, 25, 10 and 5. Each of the keys 1 to 9 controls two circuits while the zero and clear keys control single circuits. For any dispensing operation it is always necessary to press any one of the keys 1 to 9 first and then the zero key for ten cents or more and to press the zero key first and then one of the keys 1 to 9 for one to nine cents. The split change keys need only be depressed once for operation thereof. The principle of integration used is that for digits of 1 to 4 a base number of "zero" is added and for 5, 6, 7, 8 and 9 the digit of 0, 1, 2, 3 and 4 is added to a base number "5." This arrangement allows the use of a minimum number of conductors between the keyboard and integrator hereinafter described as well as the minimum number of relays within the integrator.

For diagrammatic purposes each of the keys 1—4 and 6—9, and each of the split-change keys in the keyboard is adapted to operate two switches. The 5 key and zero key each operate one switch. The circuitry of the 10-key arrangement involving keys 1 to 9 and the zero and clear key E will be first described, as the split-change key circuits may, for present purposes, be considered an auxiliary feature arranged to be readily incorporated in the general circuitry when desired by merely additional contacts on already required relays of the 10 key circuit. A hot wire 10 has branch conductors 10A, 10B, 10C, 10D and 10E. The "Clear" switch "CL" is in branch conductor 10A. Switches 7A and 7B operated by key 7 have one side conducted to conductor 10B. Similarly switches 8A and 8B, and switches 9A and 9B have one side connected to conductor 10B. Switches 4A and 4B, 5A and 6A and 6B have one side connected to conductor 10C. Switches 1A and 1B, 2A and 2B and 3A and 3B have one side connected to conductor 10D. Switch "zero" 05,

connected at one side with conductor 10E, is in branch conductor 12A of conductor 11.

A conductor 11A has a branch conductor 11B. The switches 7B, 8B and 9B when shifted by their respective keys are adapted to connect with branch conductor 11B. The switches 5A and 6B when shifted by their respective keys are adapted to connect with branch conductor 11B, which in turn, connects with branch conductor 11A.

The switches 1B, 2B and 3B, when shifted by their respective keys, are adapted to connect with a conductor 12, a branch of conductor 11, and switch 0S of the zero key is arranged to connect branch 10E from the conductor 10 to conductor 11 through branch 12A, whereas switch 4B is arranged for direction closure of the circuit to conductor 11.

The switches 1A and 6A when shifted by their respective keys are adapted to connect with a conductor 13.

The switches 2A and 7A when shifted are adapted to connect with a conductor 14.

The switches 3A and 8A when shifted are adapted to connect with a conductor 15.

A conductor 16 has branch conductors 16A and 16B that respectively connect with switches 4A and 9A when such switches are shifted.

Conductors 10, 10A, 11, 11A, 13, 14, 15 and 16 lead from the keyboard to a box here called a "flip-flop," which includes relays RA, RB, RC and RD.

The hot side of the coil of relay RA connects with conductor 11 and the hot side of the coil of relay RB connects with conductor 11A.

Relay RA controls switch 17A, 17B and relay RB controls switches 18A, 18B and 18C.

Relay RC actuates a lever 19A against the action of a power spring 19B, lever 19A having a pawl 19C pivotally mounted thereon and urged by a spring 19D into engagement with a ratchet or toothed wheel 19E. Wheel 19E is on a shaft 19F carrying a notched or toothed wheel 19G having one-half as many teeth as wheel 19E. A flexible switch actuator 19H is reciprocated by its movement into and out of the teeth of the wheel 19G to actuate a switch 19J which is in a conductor 19 connecting conductor 10 with relay RD. Relay RC with its associated parts is a timing relay to control the closing of switch 19J to control relay RD.

One side of each of the switches 18A and 18B is adapted to connect with conductor 19 through branch 19L.

In its other position, switch 18A connects conductor 19 with a conductor 20 including a switch 20A.

A conductor 21 including switch 21A has a branch conductor 21B connected with one side of switch 18C and a conductor 21C connected with one side of switch 17B. Switch 17B is arranged on closure to complete the circuit from conductor 11 to conductor 21B.

Relay RC is connected in circuit by means of a rectifier REC. Power is fed to the rectifier REC from conductor G, which is preferably a return connection and conductor comprising branches 22A and 22B. Branch conductor 22A connects with one side of switch 18B of relay RB and branch 22B connects with one side of a switch CDB of a "clear" relay CR. In its other position switch 18B connects conductor 22A with conductor 19 through branch 19L. Switch 18C of relay RB upon closure is adapted to connect branch conductor 21B of conductor 21 with conductor 11A.

The switches 20A, 16C, 15A, 14A, 13A, 21A and 10B are all adapted to shift from the position shown in FIG. 6 to their other positions when relay RD is energized.

Switch 20A is adapted to connect conductor 20 with either conductor 50A or 5AA. Conductor 50A includes the coil of relay 50R and conductor 5AA includes the coil of relay 5R.

Switch 16C is adapted to connect conductor 16 with either conductor 40A or 4AA. Conductor 40D, a branch of conductor 40A, includes the coil of relay 40R and conductor 4AA includes the coil of relay 4R.



Switch 15A is adapted to connect conductor 15 with either conductor 30A or 3AA. Conductor 30A includes the coil of relay 30R, whereas conductor 3AA includes the coil of relay 3R.

Switch 14A is adapted to connect conductor 14 with either conductor 20AA or 2AA. Conductor 20D, a branch of conductor 20AA, includes the coil of relay 20R and conductor 2AA includes the coil of relay 2R.

Switch 13A is adapted to connect conductor 13 with either conductor 10AA or 1AA. Conductor 10AA includes the coil of relay 10R and conductor 1AA includes the coil of relay 1R.

All of the relays 1R, 2R, 3R, 4R, 5R, 10R, 20R, 30R, 40R and 50R are of the "lock-in" type, and for this purpose have branches 1BB, 2BB, 3BB, 4BB, 5BB, 10BB, 20B, 30B, 40B and 50B, respectively. The said "lock-in" branches are each connected with conductor 23 from either of the respective branches 23BB or 23C.

Conductor 50B has the lock-in switch 50C therein and connects beyond this switch by a conductor 50D with conductor 50A. Conductor 50A also connects with terminal conductor PP.

Conductor 10BB has the lock-in switch 10CC therein and connects beyond this switch by a conductor 10DD with conductor 10AA.

Conductor 40B has the lock-in switch 40C therein and connects beyond this switch by the branch conductor 40D with conductor 40A.

Conductor 30B has a lock-in switch 30C therein and connects beyond this switch by a conductor 30D with conductor 30A.

Conductor 20B has a lock-in switch 20C therein and connects beyond this switch by a conductor 20D with conductor 20AA.

Conductor 5BB has a lock-in switch 5C therein and connects beyond this switch by a conductor 5D with conductor 5AA.

Conductor 40B also connects with switches 40E and 40F. Switch 40E connects conductor 40B with conductor 30A through branch 30AA. Switch 40F connects conductor 40B with a conductor 10EE that is a branch of conductor 10AA.

Conductor 30B also connects with switches 30E and 30F and switch 30FF. Switch 30E may connect conductor 30B with conductor 30EE, a branch of terminal conductor UU. Switch 30F connects conductor 30B with a conductor 30G and switch 30FF connects conductor 30B with a conductor 30H.

Conductor 20B also connects with switches 20E, 20F and 20G. Switch 20E connects conductor 20B with conductor 20H that is connected by a switch 5E that may connect with conductor 10CC that is a branch of conductor 10AA, from which terminal conductor RR also extends. Switch 20F connects conductor 20B with a conductor 20I that is normally connected by a switch 5F with a conductor 25A, a branch of terminal conductor TT. Switch 20G connects conductor 30H with a conductor 20J that may be connected by a switch 5G with a conductor 5I, a branch of terminal conductor NN.

Conductor 30I connects with the switch 5H that also may connect with conductor 5I.

Conductor 4BB, a branch of conductor 23C, connects with switches 4C, 4D and 4E of relay 4R, wherein 4C is a lock-in switch connecting conductor 4BB with a conductor 4F that connects with conductor 4AA. Switch 4D connects conductor 4BB with a conductor 4G, a branch of terminal conductor FF. Switch 4E connects conductor 4BB with a conductor 4H that is a branch of a terminal conductor LL.

Conductor 3BB connects with switches 3C, 3D and 3E of relay 3R. Switch 3C is a lock-in switch connecting conductor 3BB with a conductor 3F that connects with conductor 3AA. Switch 3D connects conductor 3BB with conductor 4G, and in turn with terminal conductor FF.

Switch 3E connects conductor 3BB with a conductor 1AB that is a branch of conductor 1E.

Conductor 2BB connects with a lock-in switch 2C and a switch 2D of relay 2R. Lock-in switch 2C is connected by a conductor 2CC with conductor 2AA. Switch 2D connects conductor 2BB with branch conductor 4H.

Conductor 1BB, a branch of conductor 23, connects with a lock-in switch 1C, which is connected by a conductor 1CC with conductor 1AA. Switch 1D of relay 1R connects conductor 1BB with conductor 1E, a branch of terminal conductor JJ.

As stated previously, relay CR is a "clear" relay, and controls switches CA and CB and CDB. Conductor 10A may connect through switch 10B, on operation of "Flip-Flop" relay RC, with a conductor CB including the coil of relay CR. Switch CA normally connects the conductor 23 with terminal conductor X. Switch CB may connect conductor X with conductor CC. Switch CDB, on operation of relay CR will also connect conductor 22B with power conductor X.

If the dispenser connected with the integrator unit as will later be described, has any of its coin channels depleted to the point where its channel lock mechanism functions, voltage will then be available at terminal V, which lights pilot light RL connected thereto.

Switch 21A, when shifted, connects conductor 21 with conductor CD in the coil of actuator control relay MR, and switch 10B may connect either with conductor CC or conductor CB, the latter leading from the coil of "clear" relay CR.

A.C. current from supply lines B and G under the control of a hand switch HS supplies current to a white light WL and also to conductor 10.

One side of the rectifier REC and arc terminal of the coils of the relays previously referred to are connected to conductor G.

On the despression of any one of the keys 7, 8 or 9 their "B" switches connect conductor 10B with conductor 11A through branch 11B, and similarly on depression of either key 5 or 6, contact 5A or contact 6B will respectively connect conductor 10C with conductor 11C, and as these conductors connect with conductor 11A, which includes the coil of relay RB, this relay is energized. Energization of relay RB moves switch 18B into contact with conductor 22A so that current from hot line 10 passes on conductor 19 from branch 19L, switch 18B, conductor 22A to energize the coil of relay RC through rectifier REC.

On the depression of any one of the keys, 1, 2 or 3 their respective "B" switches connect conductor 10D with conductor 12, and on depression of key 4, its "B" switch connects conductor 10C with conductor 11. Upon the depression of the zero key, switch 05 connects conductor 10E with conductor 12A, and since conductor 12A includes the coil of relay RA, this relay is energized. Energization of relay RA moves switch 17A into contact with conductor 22A so that current from line 10 passes through switch 17A, conductor 22A and rectifier REC to energize the coil of relay RC.

Thus, when any one of the keys 1 to 9 and zero is depressed the coil of relay RC is energized to move lever 19A to energize spring 19B and move the pawl 19C a tooth space on the wheel 19E to a "locked" position. Then, when the respective depressed key is released, current to the relay RC is broken so that the spring 19B can swing lever 19A back to its original position and in doing so move the pawls 19C to advance the wheel 19E one tooth, and accordingly, advance the wheel 19G a half step so as to raise actuator 19H up or outwardly to close switch 19J, permitting current from the line 10 to pass through conductor 19 to energize "Flip-Flop" relay RD to shift switches 20A, 16C, 15A, 14A, 13A, 21A and 10B to their other positions. This establishes new circuits from those that have been initially established by the depression of one of the keys above mentioned. Then



when any one of the keys 1 to 9 or zero is again depressed, relay RC will again be energized in the same way as first described to advance wheel 19E another tooth and wheel 19G another half step, to permit actuator 19H to engage in one of the switches or teeth in this wheel and permit switch 19J to open and de-energize relay RD. Thus, the timing relay RC is operated twice during each dispensing operation to open and close the switches which connect with the circuits of the integrator and it is always necessary to operate either one of the keys twice or two of the keys once to complete the dispensing of the coin or coins from the dispensing unit, hereinafter described. Depending upon which of the keys 1 to 9 is depressed will depend the establishment of circuits to either of the relays R50, R10, R40, R30, R20 in a first depression and the establishment of the circuit to either of the relays R5, R4, R3, R2 and R1 on a second depression.

Attention is next directed to the split-channel keys 100, 50, 25, 10 and 5 and their respective cooperating control contacts, relays and circuits. It will be apparent from the following description that the split-change portions may be readily adapted into the previously described keyboard and integrator unit for functioning by remote control with a conventional coin dispensing unit.

Power conductor, or hot wire 10, by means of its branch conductor 10H, supplies current to one side of a series switches arranged for separate and undivided operation by a respective split change key; i.e., key 100 actuates switches 100J and 100K; key 50 actuates switches 50J and 50K; key 25 actuates switches 20J and 20K; key 10 actuates switches 10J and 10K and split change key 5 actuates switches 5J and 5K.

Operation of any one of the split change keys operates its respective switches to connect with branch conductor 24 emanating from conductor CD and with the coil of a respective relay. That is, the "K" switch of each key will connect conductor 10H with conductor 24, whereas the "J" switch is arranged to connect conductors 10H with the appropriate relay branch conductor; i.e., switch 100J will connect with conductor 100CRA connecting with the coil of relay 100CR and with one side of relay switches 100L, 100M and 100N, as will also be true of the remaining split change "J" switches. The opposite lead of each CR relay coil is connected to conductor G.

Switch 100L is arranged to connect conductor 100CRA with conductor 23E, a branch of conductor 23. Switch 100M may connect conductor 100CRA with conductor 50CRA supplying the coil of relay 50CR. Switch 100N is arranged to connect conductor 100CRA with conductor 50A. As stated previously, conductor 50A supplies the coil of relay 50R; and terminates into terminal conductor PP.

Switch 50L is arranged to connect conductor 50CRA with conductor 23 through branch 23B, whereas switch 50M may connect conductor 50CRA with conductor 25CRA connected with the coil of relay 25CR, and switch 50N may connect conductor 50CRA with conductor 26, a branch of terminal conductor UU.

Switch 25L is arranged to connect conductor 25CRA with branch conductor 23B, switch 25M may connect conductor 25CRA with branch conductor 20M, a branch of conductor 20AA supplying the coil of relay 20R. Relay switch 25N is arranged to connect conductor 25CRA with conductor 5II, a branch of conductor 5I, also terminating in terminal conductor NN.

Switch 10L of relay 10CR may connect conductor 10CRA with branch conductor 23E, switch 10M may connect conductor 10CRA with conductor 5CRA supplying the coil of relay 5CR, and switch 10N may connect conductor 10CRA with conductor 5II through branch conductor 5P.

Relay switch 5L is arranged to connect conductor 5CRA with conductor 23 through branch 23B, switch 5M may connect conductor 5CRA with branch conductor

2AB and switch 5N may connect conductor 5CRA with conductor 3AA through branch conductor 3AB. Conductor 2AB is connected to conductor 2AA supplying the coil of relay 2R and conductor 3AA supplies the coil of relay 3R.

The "clear" button E serves serves two functions. If the dispenser unit has a channel which is depleted to the point that its channel lock operates, further payments can only be made by either first depressing the clear button, or by refilling the depleted channel. The "clear" button E also serves the function of clearing the machine if the operator makes an error on the first depression. If the operator should make an error on the second depression, the machine will clear as it makes the payment.

*Payment operations*

On any key depression from zero through 4, the relay RA is energized while the key is depressed. Likewise, for any key depression 5 through 9, relay RB is energized. Thus, for every key depression of the zero through 9 keys, either relay RA or RB will be energized. Both of these relays when energized have a set of switches and corresponding contacts which energizes a stepping relay coil RC. First depression, relay RC is energized by operation of either of the relays RA or RB. As soon as the key is released, the power is released from relay RC and its steps to the next position where its contacts are closed, energizing a "flip-flop" relay RD and preparing it for the second key depression. On the second key depression relay RC will again be energized by the switches of either relays RA or RB. At the time the second depression is made, relay RD is energized and power is fed through one set of normally open switch contacts to the motor relay MR. Energizing relay MR provides a motor signal back to the dispenser and completes the payment. When a key is released after the second depression, relay RC is de-energized by operation of the returning switch contacts of relays RA or RB. Upon being de-energized relay RC steps to its next position, opening its switch contacts, which in turn de-energizes the relay RD. At this time the control is ready for the next key depression.

As an example, to make a payment of 11¢ the number 1 key is depressed twice. The first depression through the connection of conductors 10 and 10D with conductor 12 by the operation of switch 1B, we have seen, cocks the timing or stepping relay RC, and the closing of switch 1A establishes current flow from conductors 10 and 10D to conductor 13, switch 13A, conductor 10AA through the coil of relay 10R to ground line G. The relay 10R is thereby energized to close switch 10CC so that current from conductor 10DD and the coil of relay 10R will maintain this relay energized and keep conductor 10BB. The timing or stepping relay RC will have advanced one step, and "flip-flop" relay RD will then be energized to shift the "flip-flop" switches to their respective other positions, so that switch 13A is shifted to connect conductor 13 to conductor 1AA. Then, upon a second depression of key 1 and simultaneous closure of switch 1A, current will flow from conductors 10, 10D, switch 1A, conductor 13, switch 13A, conductor 1AA through coil of relay 1R to energize this relay. On this second depression the closure of switch 1B again through conductor 12 energizes relay RA to move switch 17B to its other position to connect conductor 11 with conductors 21B and 21, so that with switch 21A then connected with conductor CD current will pass to energize the coil of actuator control relay MR. Energization of relay MR shifts switch M1 and M2 to their closed positions establishing connection between conductor CD and 23, and between supply conductor B and conductor H, respectively, and also establishing a back feed through conductor CD, switch 21A, conductor 21 and 21B to the coil of relay AR to lock in this relay. The purpose of locking in relay RA is to sustain a voltage on relay RC to prevent this relay from stopping until the coin delivery transaction is complete and to prevent a possible drop in signal through conductor 11 when a depression of very short duration is made.

If we consider next the payment of 16¢, this will involve a "unit's" digit greater than five and will illustrate the sequential operation of the various circuit components upon depressing the six "units" key. As in the description relating to the payment of 11¢, this payment will also require two key depressions. Two depressions are required in all cases for payment, other than split change payment. The first key depression should be key number 1, the ten's digit. The second key depression should be key number 6, the unit's digit. When the number 1 key is depressed, voltage is applied to conductors 12 and 13 by the media of switches 1B and 1A, respectively. Tracing the conductor 13 through the normally closed switch 13A of the "flip-flop" relay RD, voltage is applied to the relay 10R and also to the output terminal conductor RR arranged for connection with the 10¢ channel of the dispenser unit. As the other side of the relay coil 10R is connected to conductor G, it is energized by full line voltage present at the terminals B and G. Upon energizing, relay 10R locks itself in through its switch 10CC to the conductor G. As stated previously, branch conductor 12, through conductor 11, is connected with the relay RA, which will be energized so long as the number 1 key is depressed. Switch 17B of relay RA will apply power to the rectifier REC, which in turn applies a D.C. voltage to the stepping relay RC. Upon releasing the depressed number 1 switch, relay RA is de-energized, and in turn de-energizes the relay RC. When relay RC is de-energized, it steps one position to close its switch contacts, which energize the "flip-flop" relay RD. When RD becomes energized, its normally open switch contacts are closed and ready for the second or unit's digit key depression.

When the number 6 key is depressed, voltage is applied to conductors 13 and 11C. The conductor 13 applies voltage to the switch 13A, which is now closed, as the "flip-flop" relay RD is energized. From this point, voltage is applied to relay 1R, which is energized by and locks itself into conductor 1AA through branch conductor 1CC and relay switch 1C. Relay switch 1D applies voltage from conductor 1AA to the 1¢ channel of the dispenser unit, from the terminal conductor JJ.

Conductor 11C from the depressed number 6 key applies power to the relay RB through conductor 11A, which in turn energizes the RC relay by means of the rectifier REC, through the switch 18B of relay RB. Switch 18A of relay RB applies voltage through conductor 5AA from conductor 20 to switch 20A, which has been previously moved to its other position. Voltage through conductor 5AA is applied to the coil of the relay 5R. Relay 5R also locks itself into the voltage present at conductor G through its switch 5C. Switch 5H of relay 5R places voltage at the 5¢ channel of the dispenser unit through the medium of the terminal conductor NN. The circuit is completed to the terminal NN through the switch 5H of the relay 5R, and through switch 30FF of relay 30R to conductor G. At this point voltage is available at the coin channels of the dispenser from terminals RR (10¢), NN (5¢) and JJ (1¢) corresponding to the required payment of 16¢.

When relay RB was energized on the second key depression, in addition to the functions already detailed, it applied voltage through its switch 18C, through the switch 21A of relay RD to the motor relay MR. When MR is energized, it locks itself into line G through its switch M1. The closure of switch M2 of relay MR applies voltage from conductor B to the motor circuit of the dispenser through the conductor terminal H. This results in the dispenser ejecting the 16¢ payment called for by the voltages at the 10¢, 5¢ and 1¢ channels of the dispenser. After the coins have been ejected, a limit switch (hereinafter described) in the dispenser momentarily interrupts

the voltage applied to conductor G of the integrator unit and drops out all of the relays which have been locked into the voltage present at conductor G. When the depressed number 6 key is released, the relay RB is de-energized, and in turn de-energizes the RC relay. When the RC relay is de-energized, it steps to the next position and opens up the circuit to the RD relay. At this point the RD relay is de-energized, and the integrator is back to its starting point and ready for the next payment.

If, however, the number 6 key had been held depressed after the coins had been ejected, relays RB, RC and RD would remain energized. This would maintain relay MR energized through the switch **21A** of relay RD. As long as relay MR remains energized it maintains voltage at the H conductor terminal of the dispenser. The dispenser unit will remain locked out, preventing multiple payments from a single depression.

As stated previously, if the dispenser has any channel depleted to the point where the channel lock mechanism in the dispenser functions, voltage is available at conductor terminal V which lights the red pilot light RL. At this point, if the clear button is depressed, an additional payment can be made. Depressing the clear button E momentarily energizes the terminal conductor S from conductor CC through normally closed switch **10B** and conductor **10A**. The voltage at terminal S will energize a latching relay in the dispenser and allow one payment cycle, even though the channel lock is applied due to a depleted channel. This will be later described in connection with FIG. 7 illustrative of a typical dispenser unit, to which the present keyboard and integrator may be operatively connected.

Pressing the clear button E will also clear the machine if the operator has made an error on his first depression. In this case, the relay CR is energized through the conductor **10A** and switch **10B** of the "flip-flop" relay RD, which has been moved to the other position in contact with conductor CE. The relay CR then momentarily applies power to the stepping relay RC and advances it one step, dropping out the relay RD and readying it for a ten's digit depression. Switch CA of the relay CR momentarily opens up the circuit supplying power to conductor G and drops out all relays which have been selected by the first depression. Thus, the control is completely cleared from the first depression and the operator can start his next selection. If the operator should err on the second depression, the machine will clear itself as it makes the erroneous payment.

A payment of 61¢ will now be described in order to show the alternate operation of the various relays and other circuit components when the ten's digit is greater than five and the unit's digit less than five. The first key depression should be the number 6, the ten's digit, whereas the second key depression should be key number 1, the unit's digit.

When the numer 6 key is depressed, voltage is applied to conductors **13** and **11C**. Tracing conductor **13** through a normally closed switch **13A** of the "flip-flop" relay RD, it will be seen that voltage will be applied to the relay **10R** and to the terminal conductor RR arranged for connection with the 10¢ channel circuit of the dispenser. The other side of the relay coil **10R** is connected to conductor G, which is the other side of the line, is energized by full line voltage present at terminals G and B. Upon energizing, relay **10R** locks itself in through its switch **10CC** to line G.

Next tracing conductor **11C** it will be apparent that this branches into conductor **11A** supplying the coil of relay RB. The relay RB closes each of the normally open switches **18A**, **18B** and **18C**. Closure of switch **18A** immediately supplies voltage from conductor **19L** and hot wire **10** to the other side of switch **18A** connected to conductor **20** and thus to normally closed switch **20A** connected with conductor **50A**, supplying the coil of relay **50R**. This relay **50R** is locked in by means of its switch **50C** to the conductor G. In addition, conductor **50A** terminates in terminal conductor PP arranged to supply voltage to the 50¢ channel of the dispenser, as will hereinafter be described.

The relay RB continues to be energized so long as the number 6 key is depressed and its now closed switch **18B** will apply power to the rectifier REC, which in turn applies a D.C. voltage to the stepping relay RC. Upon releasing the depressed number 6 key, relay RB is de-energized and in turn de-energizes RC. When the relay RC is de-energized it steps one position and closes its contacts, which energizes the "flip-flop" relay RD. When relay RD becomes energized, its normally open contacts are closed and ready for the second or unit's digit key depression.

Thus, when the number 1 key is then depressed, voltage will be applied to the conductors **13** from switch **1A** and conductor **12** from switch **1B**. First tracing conductor **13**, it will be apparent that voltage will be applied to conductor **1AA** through now closed switch **13A**, as the "flip-flop" relay RD is energized. From this point, voltage will be applied to relay **1R**, which is energized and locks itself into line G through its switch **1C**. Switch **1D** of relay **1R** applies voltage from G to the 1¢ channel of the dispenser from terminal conductor JJ.

Energized conductor **12** leads to conductor **11** supplying power to the relay RA, which in turn applies voltage through switch **17B**, through conductor **21** and switch **21A** of relay RD to conductor CD, to the motor relay MR. When relay MR is energized it locks itself into line G, through its switch **M1**. The switch **M2** of motor relay MR applies voltage from line G to the motor circuit of the dispenser from terminal conductor H. This results in the dispenser ejecting the 61¢ payment called for by the voltages at the 50¢, 10¢ and 1¢ channels of the dispenser. After the coins have been ejected, a switch in the dispenser will momentarily interrupt the voltage applied to line G of the integrator and drop out all of the relays which have been locked into the voltage present at G. When the depressed number 1 key is released the relay RB is de-energized, and in turn de-energizes the RC relay. When the RC relay is de-energized, it steps to the next position and opens up the circuit to the "flip-flop" relay RD. At this point the relay RD is de-energized and the integrator is back to its starting point and ready for the next payment.

When a single unit payment, such as 3¢ or 7¢, respectively, is desired, it will be necessary to first depress the zero key to operate the ten's unit components. The circuit component operations may be traced in similar manner as the respective operational descriptions of the 11¢ payment (when the unit's digit is less than 5, such as in the case of 3¢) and the 16¢ payment (where the unit's digit is greater than 5 as in the case of 7¢).

*Split change operation*

If a split change payment is desired, the operator need only depress the desired split change button to obtain the payment. Only a single depression is necessary. If, for example, 10¢ split change (one nickel plus five pennies) is desired, the 10¢ split change key is pressed. This energizes the split change relay **10CR** through the switch **10J**. The relay **10CR** locks into the voltage at conductor G through its **10L** switch. Its switch **10M**, being connected at its opposite side to conductor 5CRA, energizes the relay **5CR**. The switch **10N** of the relay **10CR** applies voltage to the 5¢ channel of the dispenser, as signalled from terminal conductor NN, on closing the circuit to branch conductor **5P**, conductor **5II** and thence to conductor **5I**. The relay **5CR** energizes the 2¢ relay **2R** and the 3¢ relay **3R** through its switches **5M** and **5N**, respectively. The relays **2R** and **3R** respectively apply voltage to the two 2¢ channels (terminal conductors LL and FF) and the 1¢ channel (terminal conductors JJ). Thus, voltage will be available at the appropriate coin

channels of the dispenser. The lower switch 10K of the 10¢ split change switch applies voltage through conductor 24 and conductor CD to the motor relay MR, which initiates the required payment in the manner previously described.

*Typical dispenser unit and its operation*

As stated previously, the various terminal conductors NN, PP, etc., of the integrator unit are arranged for connection with a typical dispenser unit, and such unit is basically described in the copending application Serial No. 721,743, filed March 17, 1958 by Arnold R. Buchholz and Frank Haban, for "Electrically Controlled Coin Dispensing Machine." The copending application is assigned to the same assignee as is the present application.

With reference to FIG. 7, it will be apparent that the conductor NN is arranged to apply voltage to the coil of the coin ejection solenoid S5¢, the conductor PP is arranged to apply voltage to the solenoid S50¢, the conductor UU is arranged to apply voltage to the solenoid 25¢, the conductor TT is arranged to apply voltage to a first solenoid SS10¢, the conductor RR is arranged to apply voltage to a second solenoid S10¢, the conductor JJ is arranged to apply voltage to the coin ejection solenoid S1¢, the conductor LL is arranged to apply voltage to a first solenoid SS2¢ and the conductor FF is arranged to apply voltage to a second coin ejection solenoid S2¢.

Referring now to FIGS. 8 and 9, the dispensing unit includes a housing 1 having a coin receiving tray T mounted thereon and provided with coin receiving channels designated by the reference numerals 1¢, 2¢, 2¢, 5¢, 10¢, 10¢, 25¢ and 50¢. One cent coins are dispensed, one at a time, from the 1¢ channel. Two one cent coins, at a time, are dispensed from the two cent channels, respectively. One nickel, at a time, is dispensed from the 5¢ channel, and one dime at a time, is dispensed from each of the 10¢ channels. One quarter, at a time, is dispensed from the 25¢ channel, and one half-dollar at a time, is dispensed from the 50¢ channel.

A coin ejector mechanism is associated with each of the above channels, that for the 50¢ channel being selected as representative of any one of the channels, and is clearly indicated on the view of FIG. 9. Each ejector mechanism includes a coin ejector finger AE working through a slot in the coin tray and pivotally mounted on a transversely disposed shaft AF carried at its ends in the upper arms of a pair of oppositely disposed bell crank levers AG that are pivotally mounted intermediate their ends on a transversely disposed pivot shaft AH, said finger being normally urged downwardly by its own weight and guided in a slot by a spacer bar AJ on said lever. The lower arm of each lever AG is pivotally connected by a pin AK to one end of a link AA. The other end of each link AA is pivotally connected to a crank pin AB on a crank disc AC mounted on a motor driven shaft AD.

The shaft AD carries a bevel gear (not shown) meshing with an output shaft gear (also not shown) on the output shaft of a reduction geared electric motor M. With reference to the diagram of FIG. 7, the hub of the first mentioned bevel gear includes a clutch face BE adapted to mesh with a mating clutch face BF on a grooved collar BG slidably keyed to the shaft AD by a pin and slot connection BH, and engaged by the forked end of a lever BI which is pivoted on the machine frame and also pivotally connected intermediate its ends with the armature of a solenoid CS, said collar plunger being normally urged to a clutch release position by a spring (not shown) acting on lever BI. On energization of solenoid CS, the clutch faces BF and BE are engaged in the motor, through its aforestated bevel gears, rotates the shaft AD, which through the cranks and links as described in connection with FIG. 9, it reciprocates the respective links AA, and thereby oscillates the lever AG, which in turn reciprocates the fingers AE.

To render any one of the fingers AE effective to dispense coins from its associated coin channel, each finger is raised to a coin dispensing position by a solenoid operated means, which in FIG. 9 has been shown in detail in connection with the solenoid S50¢ whose plunger AL, normally moved to a return position by a spring AM, is operatively connected by a link AN with one arm of a lever AO suitably pivotally mounted on a pin AP on a shelf bracket AQ. A second lever AR, engaging the ejector finger AE, is also pivotally mounted on the pin AP and the spring AS is interposed between these levers AO and AR so that the lever AR is swung upwardly by pressure exerted through spring AS when the lever AO is swung counterclockwise on the energization of solenoid S50¢, connected to conductor PP of the integrator. This acts to swing the ejector finger AE from its full line to its dotted line position as shown in FIG. 9, so that on its forward stroke or movement toward the right it ejects a half-dollar from the coin channel.

Means are provided to prevent the operation of the machine in the event of a coin depletion in any one of the coin channels and then permit only one or more specially controlled operations before the depleted channel is refilled. Referring to FIG. 9, each coin channel has a slot CAA and a coin engaging lever or finger CBB is pivotally mounted at its upper end CCC to work in said slot. Each finger CBB is yieldingly held against a stack of coins in its associated channel by a lever CDD pivotally mounted at its upper end on a transversely extending shaft CE carried by a shelf CF and urged against the finger by a spring CG. Each of the levers CD has a notch formed therein and the transverse portion CJ of a U-shaped bar is seated in said natch, the legs of said bar being pivotally mounted on the shaft CE. The bar CJ carries on apertured bracket arm CL in which the outer end of an actuator CM, for a normally opened switch CN, is mounted. When a coin depletion in any one of the stacks occurs, the finger CBB of that stack is free to move outwardly into its associated coin channel and its lever CDD, under the action of its spring CG, is swung toward the right, as viewed in FIG. 9, to in turn swing the bar CJ counterclockwise so that its arm CL presses on the actuator CM to close the switch CN, and as will hereinafter be described, the closing of this switch acts to open the motor circuit to stop further action of the machine.

Further operations of the machine are permitted as heretofore described by the operation of the "clear" key E of the keyboard unit prior to the depressing of a dispensing key therein. In addition, as aforementioned, a depletion to the point where the channel mechanism functions, will permit voltage to be available at the terminal V (see FIG. 7) which lights the pilot light RL, as will later be described. Depressing the clear button E momentarily energizing the conductor terminal S which energizes a latching relay 57 to permit one payment cycle even though the channel lock is applied due to a depleted channel.

To permit the coins in the channels to feed down freely on each dispensing operation of the machine, pressures of the levers CDD (see FIG. 9) on the fingers is momentarily relieved by the engagement of a lever CO with a lever CP, on the shaft CE, which lever is notched at CQ to engage the bar portion CJ. The lever CO is operated in proper cyclic sequence with the levers AG, and for this purpose it is pivotally mounted intermediate its end on a pivot CRR and has a cam notch held by a spring CT against a roller CU carried by one of the levers AG so that as this lever AG swings down, the upper bent end of lever CO engages the lever CP to swing it clockwise and with it the bar portions CJ and the levers CDD engaged thereby to swing them away from their fingers CBB to relieve the pressure on said fingers.

Referring to FIG. 7, a current supply line B (also supplying the integrator unit as previously described) includes the manually operated switch HS (see FIG. 6). A current return line 31, connectable at terminal conductor G, connects with one terminal of the coil of relay 32

whose other terminal is connected by a conductor 33 with a switch terminal 34 for the switch CN. Branch conductors 36A and 36B lead respectively to one terminal of the motor M and to one terminal of the coil of the solenoid CS whose other terminal is connected by conductor 38 to the return 31, also connects with terminal conductor G. The other terminal of the motor M is connected by a conductor 31C with the return line 31. A branch conductor 39 also leads to a fixed contact 40 for a switch 41 whose other terminal is connected to conductor 30B connects with terminal B. Conductor 42 connects with terminal conductor G and to the coin channel solenoids S50¢, etc., and with a fixed contact 51 of a switch 52 whose other terminal is connected by a conductor 53 with a return 31. The switches 41 and 52 are relay operated switches controlled by the coil of a relay 54.

Relay 32 controls switches 55 and 56, and a latching type relay 57 controls switches 58 and 59. The latch 61 for relay 57 forms part of the plunger of the solenoid 62 and is spring pressed to a locked position by a spring 61A and released by the coil of this solenoid.

A conductor 63 connects a switch DX with conductor terminal H, and the conductor 37 includes the coil of solenoid DI. The switch DX is connected for tandem operation with a switch DY having one terminal connected with the conductor 76, a branch leading from power supply terminal B, and having its other side terminating at conductor terminal X and arranged to be normally closed for movement to open position along with the switch DX on its return after coin ejection has been completed as will later be described. The switch DX is adapted to connect conductor 63 with a conductor 64 or a conductor 65. Conductor 65 includes the switch 55 and the coil of relay 54 and is connected with return line 31. Circuit conductor 68 terminates in the terminal conductor V and leads to the fixed terminal of switch 56 which connects by a conductor 69 with one of the contacts of switch 58 that is connected by a conductor 70 with switch CN.

Portions of a conductor 65 may be connected together by a conductor 72 including switch 59. A conductor 75 connects the relay coil 57 with the terminal conductor S, the opposite connection of the coil of the relay 57 being connected with the return 31.

Upon closure of the hand switch HS, current passes to conductor 63 from terminal H of the integrator, switch DX, conductor 65, coil of relay 54, and including coil of relay DI to conductor 37 to return 31, and energizing this relay. Energization of relay 54 moves switches 41 and 52 to their other positions and energization of relay DI has no effect at this time.

Closure of switch 52 connects conductor 42 with conductor 53 and return line 31 so that when on energization of any of the various terminal conductors leading to the channel solenoids are closed, the solenoids, such as the solenoid S50¢, controlled by these circuits will be energized to position their associated ejectors in coin ejecting position.

On closure of switch 41, current from conductor 30B passes to conductor 39 and then through branch 36A to the motor M, conductor 31C to return 31 and through branch 36B to the coil of solenoids CS through conductor 38 to return 31 to operate the clutch BI, BF and BE to connect shaft AD with a motor M.

Now as the motor M turns the shaft AD the levers AG through the links AA are swung clockwise as viewed in FIG. 9 so that the solenoid position fingers act on the coins in their associated coin channels to eject them therefrom into a discharge chute DC from which through suitable chute structure (not shown) they are carried out of the machine. As the motor continues to operate, the crank pin DB contacts the lever DC to swing it to its other position to shift actuator DG and its switch DX to its other position to connect conductor 63 with conductor 64. Since solenoid DI is then energized as the rear end of lever DC swings up, the latching lever DN engages with the latching projection DH to hold the lever DC in this position before switch DX opens conductor 65.

Shifting of switch DX to its other position disconnects conductor 65 to de-energize relay 54 so that switches 41 and 52 move back to their initial positions, thereby opening the circuits to the motor M, the clutch, and any of the ejector positioning solenoids S1¢ to S50¢ previously referred to. Current is also interrupted in conductor X through switch DY and also now passes to conductor 64 to the return 31 energizing coil 62 to release latch 61, and then as the crank DB moves to its initial position and actuator DG, being a spring, moves lever DC back to its initial position.

In the event that the coins in any one of the channels become depleted, the fingers CB of the channel move upwardly into the channel to release the pressure of the springs CG on lever SD which is the actuator for switch CN so that switch CN may move into contact with terminal 34. Then current from conductor 70 will pass to conductor 33 and return line 31 energizing solenoid 32 to shift switches 56 and 55 to their other positions.

On shifting of switch 56 to its other position, current from conductor 68, leading to terminal V, passes through conductor 69, switch 58 and also lights the red light RL (see FIG. 6). Lighting the red light and shifting switch 55 opens the conductor 65 so that relay 54 cannot be operated to establish current flow to the motor M. Under these conditions one or more dispensing operations may be obtained by one or more depressions of the clear button K. Depressing the clear button K momentarily energizes terminal S at the dispenser unit to permit current flow to the latching relay 57 and allow one payment cycle even though the channel lock is applied due to a depleted channel.

Moving the switch 58 to its other position on energization of the latching relay 57 breaks the circuit previously described to the red light and movement of switch 59 to its other position allows current to pass through conductor 63, switch DX, conductor 65, conductor 72 to a part of conductor 65 beyond the switch 55 to return to energize relay 54. The machine will then operate as previously described to dispense coins, and on the completion of the cycle, the solenoid 62 is energized to release the latch 61 so that relay 57 returns to its initial position, returning switches 58 and 59 to their initial positions.

Thereafter, on the restoring of coins to the depleted stack or channel, the machine will again be ready for normal operation.

*Read out adaptation*

If so desired, the integrator may be readily and very simply adapted for use with a "read out" unit (not shown). Such unit would include a series of conventional indicating elements forming a part of a cold cathode indicator tube having the indicator elements labeled or numbered from zero to nine, inclusive. In the case of a unit having split change keys, it is desirable to have three tubes, the first for the ten's digits, the second for the unit's digits and the third for the one dollar split change indication. Applying a D.C. voltage to any element of the tubes will cause a glow at that element to give a read out digit. The indicator tubes would be arranged so that the voltage is applied through the appropriate contacts of the selector relays 50R, 10R, 40R, etc., in the integrator unit to the elements of the tubes to give the desired read out. This would require the use of a relay with two additional contacts, one being normally open and one being normally closed. The split change relays would each require four additional contacts, two of them being normally open and two being normally closed. The read out unit, itself, would require three additional relays, the first of which would provide alternate nor-

mally open and normally closed positions to the indicator tube elements for selection of elements, one of unit's digit elements 1–9 and the second for alternate selection of ten's digits elements, 10, 20, 30, 40, 50, 60, 70, 80 and 90. On operation of the respective selector relays of the integrator the additional normally open read out contact will be moved to closed position for appropriate selection of the respective indicator element relating to the appropriate payment digit or digits.

It will be apparent that although the preferred embodiments of the keyboard and integrator units of the present invention have been specifically illustrated and described for use as a remote control unit, it is within the province of the present invention, as hereinbefore described and hereinafter claimed, to incorporate the operating components of each of the units together in one housing or into a single unit comprising portions of or an entire dispenser unit with either or both units.

As stated previously, the preferred embodiment, wherein the various units are individually separated from one another, permits a simplified keyboard small enough to fit into a bill compartment of a conventional cash drawer remote from both the integrator unit and the dispenser unit, and further permitting the integrator to be remotely mounted at a convenient, non-interfering location, as under a counter, for connection to the keyboard unit and to the dispenser unit by means of a simple electrical cable connected therewith.

It will be apparent that, although the keyboard and switch structures illustrated in FIGS. 1–5, inclusive, provide a very desirable embodiment for use in connection with the integrator unit, it is conceivable that electrical circuit connecting means other than the switches R may be used with equal effectiveness. For instance, it is within the scope of the present invention to provide a keyboard unit (not shown) wherein the manually operated keys of the keyboard are arranged to operate a spring biased apertured elongated member to permit registry of its apertures with selected normally blocked or masked apertures communicating with a light source adapted to energize a conventional photoelectric cell. Thus, depression or other actuation of the respective key would permit rays from the light source to reach the cell and to thereafter complete the appropriate circuit connections as in the case of the respective switches R.

Another conceivable "circuit connecting means" may take the form of a so-called "printed circuit" wherein the respective keys of the keyboard would be arranged to actuate a movable contact arranged to connect conductors printed at opposite sides of or upon a series of laminations of insulation (not shown). The printed circuits would lead in like manner as those of the presently illustrated keyboard to the respective integrator circuit components.

I desire it to be understood that this invention is not to be limited to any particular form or arrangement of parts except in so far as such limitations are included in the claims.

I claim:

1. A control unit for a coin dispenser having an electrical circuit, coin retaining channels, selector means and ejector means for said coin channels; said control unit being arranged for electrical interconnection with the operating electrical circuit of said dispenser and comprising a keyboard unit and an integrator unit having electrical circuit components; said keyboard including keys identified as keys numbered zero and 1 to 9, inclusive, electrical circuit connecting means controlled by said keys and arranged for connecting a power source with said integrator circuit components; the circuit components of said integrator unit comprising ten's digit and unit's digit contactor means arranged for connecting said power source with a respective coin channel selector; circuit selector means arranged to connect circuits from said key controlled electrical circuit connecting means alternatively to said ten's digit contactor means and to said unit's digit contactor means, and selective actuating means operatively associated with said circuit selector means and arranged to actuate said selector means responsive to a respective first and a second manual depression of a selected one of said keys.

2. A control unit for a coin dispenser having an electrical circuit, coin retaining channels, selector means and ejector means for said coin channels; said control unit being arranged for electrical interconnection with the operating electrical circuit of said dispenser and comprising a keyboard unit and an integrator unit having electrical circuit components; said keyboard including keys identified as keys numbered zero and 1 to 9, inclusive, electrical circuit connecting means controlled by said keys and arranged for connecting a power source with said integrator circuit components; the circuit components of said integrator unit comprising a plurality of ten's digit and unit's digit selector relays, each selector relay being arranged to maintain a signal from said power source to a respective coin channel selector; a flip-flop relay including a plurality of concurrently operated switches comprising a series of normally closed selector switches arranged to normally close circuits from said key operated switches to the said ten's digit selector relays, a series of normally open selector switches arranged to connect the circuit connecting means of a respective key with a respective unit's digit selector relay upon energization of said flip-flop relay responsive to a second manual depression of a selected one of said keyboard keys, said flip-flop relay further comprising a normally open ejector control switch; a pair of key signal relays, the first of which is energized on circuit closure of the circuit connecting means respectively controlled by numbered keys zero and 1–4, inclusive, and the second of which is energized on circuit closure of the circuit connecting means of numbered keys 5–9, inclusive, each of said signal relays including a normally open stepping relay contact; a stepping relay arranged to be alternatively energized on closure of a respective contact of either of said key signal relays; drive means arranged to be actuated on energization of said stepping relay and adapted to alternatively connect and to disconnect said flip-flop relay with said power source, being responsive first, to the manual depression of a selected ten's digit key and next, to the depression of a selected unit's digit key; an ejector control relay arranged to connect the said power source with the said ejector means of said dispenser unit on closure of said normally open flip-flop ejector control switch during energization of said flip-flop relay; said stepping relay being further arranged for connection with said power source for operation to reset position and de-energization of said flip-flop relay responsive to a power signal from the said dispenser circuit upon completion of a coin ejection cycle therein.

3. The control unit of claim 2, wherein the drive means comprises a ratchet toothed drive wheel and a driven wheel having a circumferentially notched cam surface, said wheels being arranged for concurrent rotation, the notches of said driven wheel being one-half in number as the teeth of said drive wheel; a ratchet pawl operated by said stepping relay and arranged for driving engagement with a tooth of said ratchet wheel upon energization of said stepping relay to advance the said notched wheel one-half step; a switch having a normally open movable contact having a cam follower engageable with the circumference of said notched driven wheel, and arranged to mechanically close said movable contact to alternatively connect and disconnect said flip-flop relay with said power source upon movement of said cam follower respectively out of and into engagement with said notches.

4. A control unit for a coin dispenser having an electrical circuit, coin retaining channels, selector means and ejector means for said coin channels; said control unit

being arranged for electrical interconnection with the operating electrical circuit of said dispenser and comprising a keyboard unit and an integrator unit having electrical circuit components; said keyboard including keys identified as keys numbered zero and 1 to 9, inclusive, electrical switches controlled by said keys and arranged for connection with and operation of said integrator circuit components; the circuit components of said integrator unit comprising a plurality of ten's digit and unit's digit selector relays, each selector relay being arranged to maintain a signal from a power source to a respective coin channel selector; a flip-flop relay including a plurality of concurrently operated switches comprising a series of normally closed selector switches arranged to normally close circuits from said key operated switches to the said ten's digit selector relays, a series of normally open selector switches arranged to connect a respective key operated switch with a respective unit's digit selector relay upon energization of said flip-flop relay responsive to a second manual depression of a selected one of said keyboard keys, said flip-flop relay further comprising a normally open ejector control switch; a pair of key signal relays, the first of which is energized on circuit closure of the switches respectively controlled by numbered keys zero and 1–4, inclusive, and the second of which is energized on circuit closure of numbered switches 5–9, inclusive, each of said signal relays including a normally open stepping relay contact; a stepping relay arranged to be alternatively energized on closure of a respective contact of either of said key signal relays; drive means arranged to be actuated on energization of said stepping relay and adapted to alternatively connect and to disconnect said flip-flop relay with said power source, being responsive first, to the manual depression of a selected ten's digit key and next, to the depression of a selected unit's digit key; an ejector control relay arranged to connect the said power source with said ejector means of said dispenser on closure of said normally open flip-flop ejector control switch during energization of said flip-flop relay; said stepping relay being further arranged for connection with said power source for operation to reset position and de-energization of said flip-flop relay responsive to a power signal from the said dispenser circuit upon completion of a coin ejection cycle therein.

5. A control unit for a coin dispenser having an electrical circuit, coin retaining channels, selector means and ejector means for said coin channels; said control unit being arranged for electrical interconnection with the operating electrical circuit of said dispenser and comprising a keyboard unit and an integrator unit having electrical circuit components; said keyboard including keys identified as keys numbered zero and 1 to 9, inclusive, electrical circuit connecting means controlled by said keys and arranged for connecting a power source with said integrator circuit components; the circuit components of said integrator unit comprising a plurality of ten's digit and unit's digit selector relays, each selector relay including a lock-in contact and being arranged to maintain a signal from said power source to a respective coin channel selector; a flip-flop relay including a plurality of concurrently operated switches comprising a series of normally closed selector switches arranged to normally close circuits from said key operated switches to the said ten's digit selector relays, a series of normally open selector switches arranged to connect the circuit connecting means of a respective key with a respective unit's digit selector relay upon energization of said flip-flop relay, responsive to a second manual depression of a selected one of said keyboard keys, said flip-flop relay further comprising a normally open ejector control switch; a pair of key signal relays, the first of which is energized on circuit closure of the circuit connecting means respectively controlled by numbered keys zero and 1–4, inclusive, and the second of which is energized on circuit closure of the circuit connecting means of numbered keys 5–9, inclusive, each of said signal relays including a normally open stepping relay contact; a stepping relay arranged to be alternatively energized on closure of a respective contact of either of said key signal relays; drive means arranged to be actuated on energization of said stepping relay and adapted to alternatively connect and to disconnect said flip-flop relay with said power source being responsive first to the manual depression of a selected ten's digit key and next to the depression of a selected unit's digit key; an ejector control relay arranged to connect the said power source with said ejector means of said dispenser on closure of said normally open flip-flop ejector control switch during energization of said flip-flop relay; said stepping relay being further arranged for connection with said power source for operation to reset position and de-energization of said flip-flop relay responsive to a power signal from the said dispenser circuit upon completion of a coin ejection cycle therein.

6. A control unit for a coin dispenser having an electrical circuit, coin retaining channels, selector means and ejector means for said coin channels; said control unit being arranged for electrical interconnection with the operating electrical circuit of said dispenser and comprising a keyboard unit and an integrator unit having electrical circuit components; said keyboard including keys identified as keys numbered zero and 1 to 9, inclusive, and a plurality of selected split-change keys, electrical circuit connecting means controlled by said keyboard keys and arranged for connecting a power source with said integrator circuit components, and split change relays arranged for connection with said power source by the respective switches controlled by said split change keys; the circuit components of said integrator unit comprising a plurality of ten's digit and unit's digit selector relays, each selector relay being arranged to maintain a signal from said power source to a respective coin channel selector; a flip-flop relay including a plurality of concurrently operated switches comprising a series of normally closed selector switches arranged to normally close circuits from said key operated switches to the said ten's digit selector relays, a series of normally open selector switches arranged to connect the circuit connecting means of a respective key with a respective unit's digit selector relay upon energization of said flip-flop relay, responsive to a second manual depression of a selected one of said keyboard keys, said flip-flop relay further comprising a normally open ejector control switch; a pair of key signal relays, the first of which is energized on circuit closure of the circuit connecting means respectively controlled by numbered keys zero and 1–4, inclusive, and the second of which is energized on circuit closure of the circuit connecting means of numbered keys 5–9, inclusive, each of said signal relays including a normally open stepping relay contact; a stepping relay arranged to be alternatively energized on closure of a respective contact of either of said key signal relays; drive means arranged to be actuated on energization of said stepping relay and adapted to alternatively connect and to disconnect said flip-flop relay with said power source, being responsive first, to the manual depression of a selected ten's digit key and next, to the depression of a selected unit's digit key; said split change relays including a normally open contact arranged to connect said power source with respective predetermined selector relays and with selected ones of said split change relays associated with split change keys of lesser change value; an ejector control relay arranged to connect the said common power source with said ejector means of said dispenser on closure of said normally open flip-flop ejector control switch during energization of said flip-flop relay; said stepping relay being further arranged for connection with said power source for operation to reset position and de-energization of said flip-flop relay responsive to a power signal from the said dispenser circuit upon completion of a coin ejection cycle therein.

7. The control unit of claim 6, wherein the drive means comprises a ratchet toothed drive wheel and a driven wheel having a circumferentially notched cam surface, said wheels being arranged for concurrent rotation, the notches of said driven wheel being one-half in number as the teeth of said drive wheel; a ratchet pawl operated by said stepping relay and arranged for driving engagement with a tooth of said ratchet wheel upon energization of said stepping relay to advance the said notched wheel one-half step; a switch having a normally open movable contact having a cam follower engageable with the circumference of said notched driven wheel, and arranged to mechanically close said movable contact to alternatively connect and disconnect said flip-flop relay with said power source upon movement of said cam follower respectively out of and into engagement with said notches.

8. The control unit of claim 6, wherein the said split change keys are numbered in denominations of $1.00, 50¢, 25¢, 10¢ and 5¢ and are arranged, upon manual depression of a selected one thereof, to energize the said integrator unit circuit components to connect the said power source with the appropriate dispenser coin channel solenoids for ejection of one half-dollar, one quarter, two dimes, and one nickel on depression of the $1.00 key; one quarter, two dimes and one nickel on depression of the 50¢ key; two dimes and one nickel on depression of the 25¢ key; one nickel and five pennies on the depression of the 10¢ key and five pennies on depression of the 5¢ key.

9. The control unit of claim 6 wherein the said split change keys are numbered in denominations of $1.00, 50¢, 25¢, 10¢ and 5¢ and wherein the split change relays are arranged in cascade fashion to provide a pair of contacts of the $1.00 split change relay arranged on closure thereof to respectively connect said power source with the relays of said 50¢ key and said 25¢ key and with the selector relay connected at one side of the flip-flop relay switch associated with the number 5 key; a pair of contacts of the 50¢ split change relay arranged on closure thereof to respectively connect said power source with the relay of said 25¢ key and with the selector controlling a dispenser 25¢ coin channel; a pair of contacts of the 25¢ split change relay arranged on closure thereof to respectively connect said power source with the selector relay connected at one side of the flip-flop relay switch associated with the number 2 key, and with the selector controlling a dispenser 5¢ coin channel; a pair of contacts of the 10¢ split change relay arranged on closure thereof to respectively connect said power source with the relay of said 5¢ key and with the selector controlling a dispenser 5¢ coin channel; and a pair of contacts of the 5¢ split change relay arranged on closure thereof to respectively connect said power source with the selector relays connected to the selector relays connected at one side of the flip-flop relay switches associated with the number 3 key and the number 2 key, respectively.

10. A control unit for a coin dispensing machine having an electrical circuit, solenoid controlled coin channels and a motor arranged to operate a coin ejecting mechanism connected to said circuit, said control unit being arranged for electrical connection with the operating electrical circuit of said dispenser and comprising a keyboard unit and an integrator unit having electrical circuit components; a common power source for said units; said keyboard including keys identified as keys numbered zero and 1 to 9, inclusive, and a clearing key, electrical circuit connecting means controlled by said keys and arranged for connecting said common power source with said integrator circuit components; the circuit components of said integrator unit comprising a plurality of ten's digit and unit's digit selector relays, each selector relay being arranged to maintain a signal from said power source to a respective dispenser coin channel solenoid; a solenoid controlled flip-flop relay including a plurality of concurrently operated switches comprising a series of normally closed selector switches arranged to normally close circuits from said key operated switches to the said ten's digit selector relays, a series of normally open selector switches arranged to connect the circuit connecting means of a respective key with a respective unit's digit selector relay upon energization of said flip-flop relay solenoid, responsive to a second manual depression of a selected one of said keyboard keys, said flip-flop relay further comprising a normally open relay clearing switch and a normally open motor control switch; a pair of key signal relays, the first of which is energized on circuit closure of the circuit connecting means respectively controlled by numbered keys zero and 1–4, inclusive, and the second of which is energized on circuit closure of the circuit connecting means of numbered keys 5–9, inclusive, each of said signal relays including a normally open stepping relay contact; a stepping relay arranged to be alternatively energized on closure of a respective contact of either of said key signal relays; drive means arranged to be actuated on energization of said stepping relay and adapted to alternatively connect and to disconnect said flip-flop relay with said common power source, being responsive first to the manual depression of a selected ten's digit key and next, to the depression of a selected unit's digit key; a clearing relay arranged for connection with the normally open switch contact of said keyboard clearing key upon closure of said normally open clearing switch during energization of said flip-flop relay, and being further arranged to interrupt the power connection to both the flip-flop relay and the stepping relay upon manual depression of the clearing key; a motor control relay arranged to connect the said common power source with the motor of said dispensing unit on closure of said normally open flip-flop motor control switch during energization of said flip-flop relay; said stepping relay being further arranged for connection with said power source for operation to reset position and de-energization of said flip-flop relay responsive to a power signal from the said dispenser circuit upon completion of a coin ejection cycle therein.

11. A control unit for a coin dispensing machine having an electrical circuit, solenoid controlled coin channels and a motor arranged to operate a coin ejecting mechanism connected to said circuit, said control unit being arranged for electrical connection with the operating electrical circuit of said dispenser and comprising a keyboard unit and an integrator unit having electrical circuit components; a common A.C. power source for said units; said keyboard including keys identified as keys numbered zero and 1 to 9, inclusive, and a clearing key, the keys numbered 1–4 and 6–9, inclusive, respectively controlling double pole electrical switches, and keys numbered 5 and zero and said clearing key respectively controlling single pole electrical switches, said switches being arranged for connection with and operation of said integrator circuit components; the circuit components of said integrator unit comprising a plurality of ten's digit and unit's digit selector relays, each selector relay including a lock-in contact and being arranged to maintain a signal from said A.C. power source to a respective dispenser coin channel solenoid; a solenoid controlled flip-flop relay including a plurality of concurrently operated switches comprising a series of normally closed selector switches arranged to normally close circuits from said key operated switches to the said ten's digit selector relays, a series of normally open selector switches arranged to connect a respective key operated switch with a respective unit's digit selector relay upon energization of said flip-flop relay solenoid responsive to a second manual depression of a selected one of said keyboard keys, said flip-flop relay further comprising a normally open relay clearing switch and a normally open motor control switch; a pair of key signal relays, the first of which is energized on circuit closure of the switches respectively controlled by num-

bered keys zero and 1–4, inclusive, and the second of which is energized on circuit closure of numbered key switches 5–9, inclusive, each of said signal relays including a normally open stepping relay contact, and a rectifier connected in said A.C. power source and arranged to be energized on closure of said respective stepping relay contacts of said signal relays; a stepping relay in connection with said rectifier and arranged to be alternatively energized through said rectifier on closure of a respective contact of either of said key signal relays; one-half step drive means arranged to be actuated on energization of said stepping relay and adapted to alternatively connect and to disconnect said flip-flop relay with said common power source, being responsive first to the manual depression of a selected ten's digit key and next, to the depression of a selected unit's digit key; a clearing relay arranged for connection with the normally open switch contact of said keyboard clearing key upon closure of said normally open clearing switch during energization of said flip-flop relay, and being further arranged to interrupt the power connection to both the flip-flop relay and the stepping relay upon manual depression of the clearing key; a motor control relay arranged to connect the said common power source with the motor of said dispensing unit on closure of said normally open flip-flop motor control switch during energization of said flip-flop relay; said stepping relay being further arranged for connection with said power source for one-half step operation to reset position and



de-energization of soaid flip-flop relay responsive to a power signal from the said dispenser circuit upon completion of a coin ejection cycle therein.

12. The control unit of claim 11, wherein the one-half step drive means comprises a ratchet toothed drive wheel and a driven wheel having a circumferentially notched cam surface, said wheels being arranged for concurrent rotation, the notches of said driven wheel being one-half in number as the teeth of sid drive wheel; a ratchet pawl operated by said stepping relay and arranged for driving engagement with a tooth of said ratchet wheel upon energization of said stepping relay to advance the said notched wheel one-half step; a switch having a normally open movable contact having a cam follower engagable with the circumference of said notched driven wheel, and arranged to mechanically close said movable contact to alternatively connect and disconnect said flip-flop relay with said power source upon movement of said cam follower respectively out of and into engagement with said notches.

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