July 20, 1965 A. R. BUCHHOLZ ETAL 3,196,257

COIN VALUE TOTALIZER

Filed July 16, 1962 6 Sheets-Sheet 1

Fig. 1

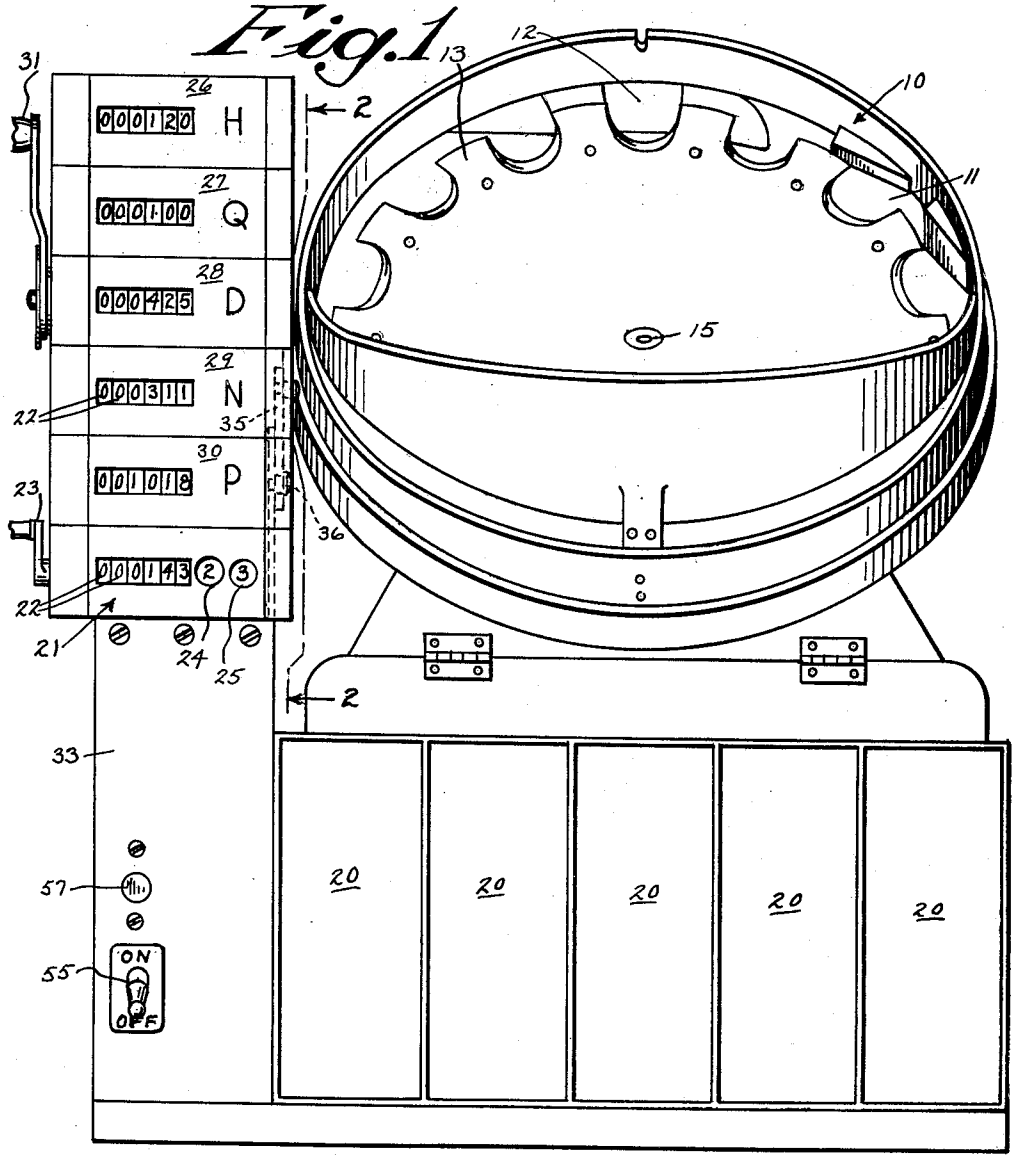
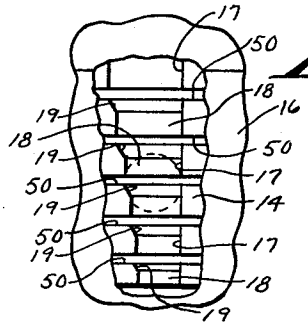


Fig. 3



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COIN VALUE TOTALIZER

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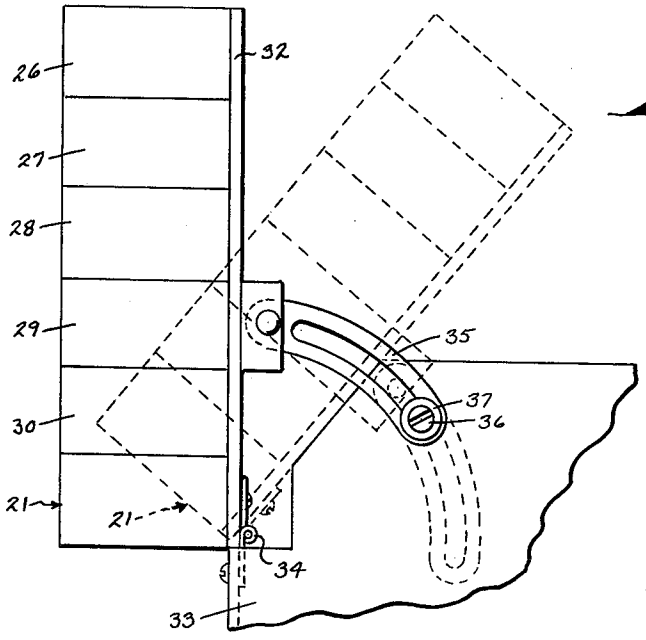

Fig. 2

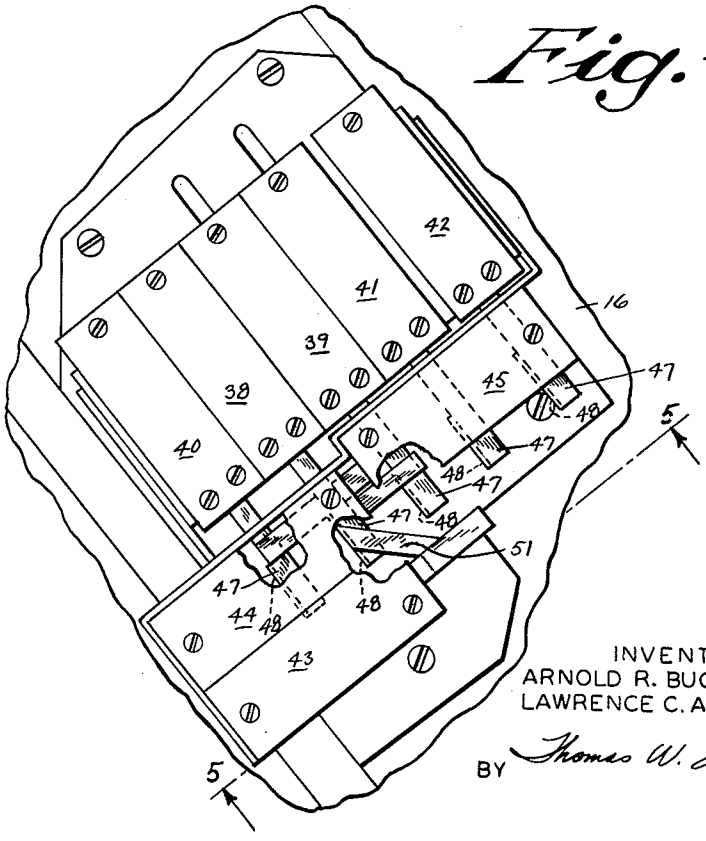

Fig. 4

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COIN VALUE TOTALIZER

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Fig. 5

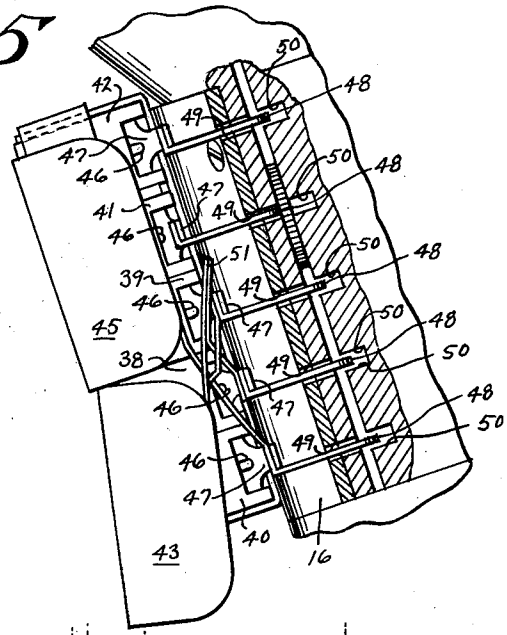
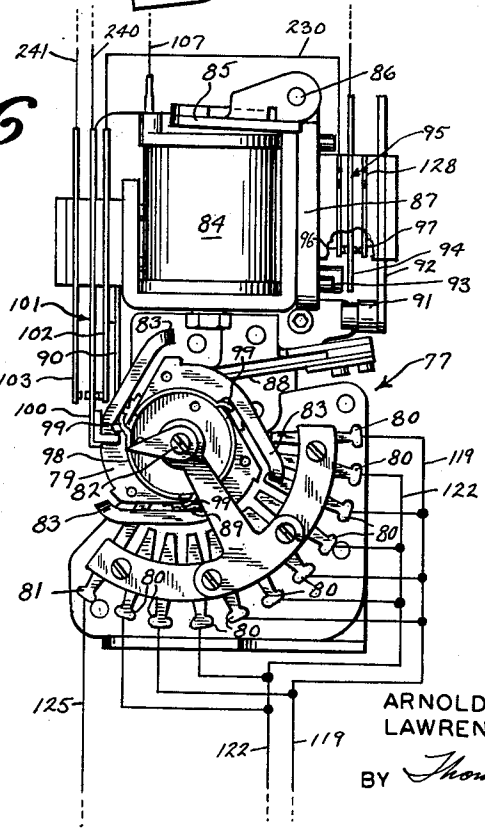


Fig. 6



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COIN VALUE TOTALIZER

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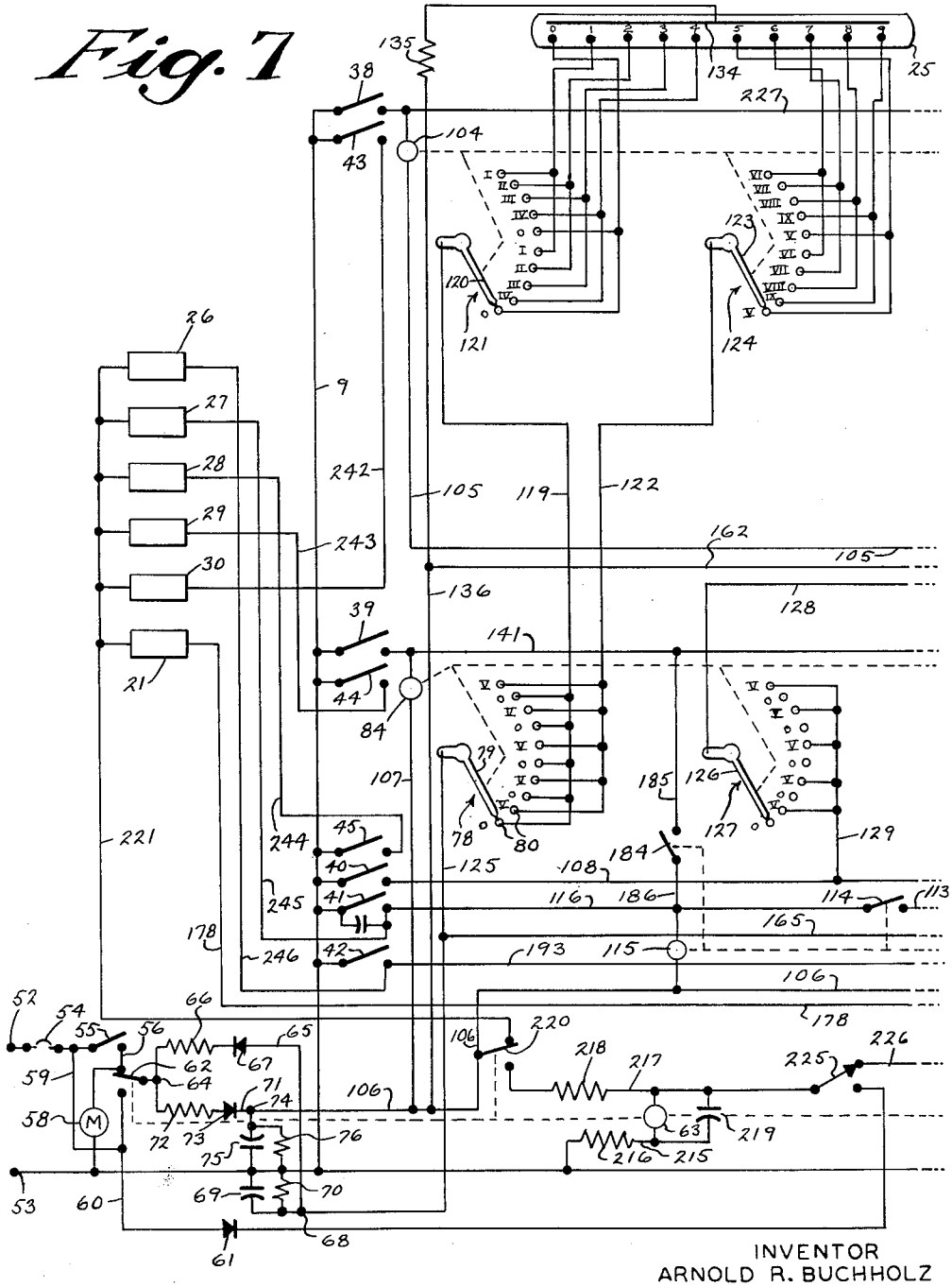
Fig. 7



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COIN VALUE TOTALIZER

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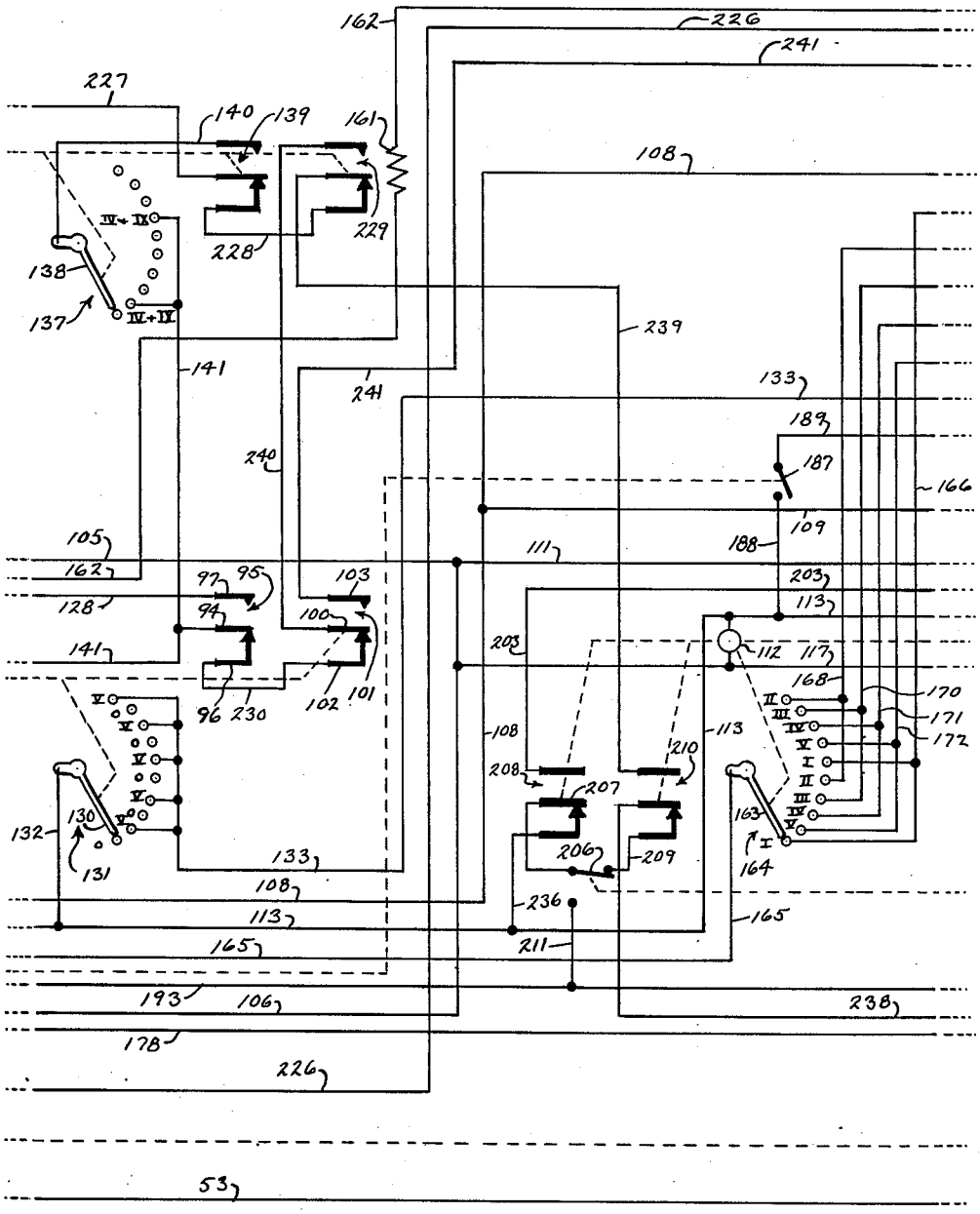

Fig. 7a

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COIN VALUE TOTALIZER

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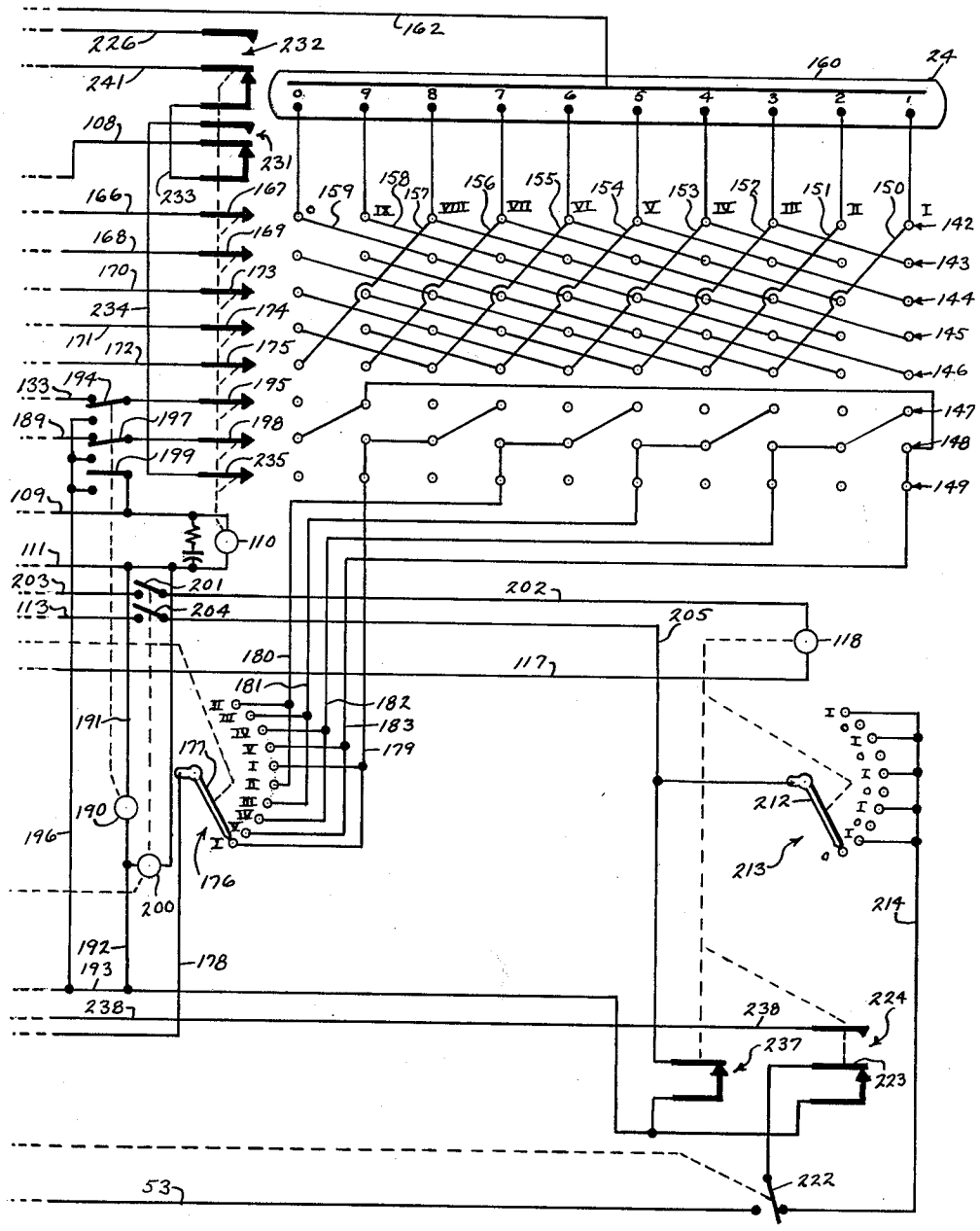

Fig. 7b

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United States Patent Office 3,196,257 Patented July 20, 1965

3,196,257

COIN VALUE TOTALIZER

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Filed July 16, 1962, Ser. No. 210,074
12 Claims. (Cl. 235—92)

This invention relates to a coin value totalizer, and particularly to a totalizer for association with a coin handling machine, such as a coin sorter, which accommodates coins of different denominations, the totalizer being responsive to the coins handled to indicate the total value thereof in dollars and cents.

It is one object of this invention to provide a coin controlled totalizer which registers the individual values of coins of different denominations and gives a continuous visual indication of the total value thereof in dollars and cents.

It is another object of this invention to provide a coin controlled totalizer which is electrically operated and which utilizes a minimum number of dependable electromechanical devices to register the values of coins of different denominations.

It is also an object of this invention to provide such a coin controlled totalizer in which numerical display tubes are employed together with a dollar counter as visual indicators of the cents component of the total dollars and cents value whereby ease of reading is achieved.

It is a further object of this invention to provide novel means for mounting the total value indicators upon the associated coin handling machine to permit adjustment of the position of the indicators relative to the position of an operator.

It is another object of this invention to provide a novel means for resetting the totalizer to zero as desired.

The foregoing and other objects of this invention will appear in the description to follow. In the description, reference is made to the accompanying drawings which form a part hereof and in which there is shown by way of illustration a specific form in which this invention may be practiced. This form will be described in detail to enable those skilled in the art to practice this invention but it is to be understood that other embodiments of the invention may be used and that structural changes in the embodiment described may be made by those skilled in the art without departing from the true scope of the present invention. Consequently, the following detailed description is not to be taken in a limiting sense and the scope of the present invention is best defined by the appended claims.

In the drawings:

FIG. 1 is a front view in elevation of a coin sorter equipped with the totalizer of this invention;

FIG. 2 is a side view in elevation of a bank of coin denomination counters and totalizer counter as viewed in the plane represented by the line 2—2 of FIG. 1;

FIG. 3 is a detailed view in elevation of a portion of the sorting drum of the coin sorter;

FIG. 4 is a detailed view in elevation of coin actuated switches which operate the totalizer;

FIG. 5 is a view in section of the coin actuated switches taken in the plane of the line 5—5 of FIG. 4;

FIG. 6 is a view in elevation of a typical stepping switch employed in the totalizer of this invention; and

FIGS. 7, 7*a* and 7*b* are diagrammatic views of the electrical circuit of the totalizer, with FIG. 7*a* forming a right side continuation of FIG. 7 and FIG. 7*b* forming a right side continuation of FIG. 7*a*.

Referring to the drawings and particularly to FIGS. 1–5, the invention is shown applied to a coin sorting machine of known construction and only so much of this machine as is necessary for an understanding of the totalizer hereinafter described has been shown. The coin sorter includes a hopper **10** having an annular bottom plate **11** provided with an outlet opening **12**. A scalloped disc **13** is rotatably mounted over the bottom plate **11** upon a sorting drum or core **14**. The sorting drum **14** is in turn mounted upon a centrally disposed shaft **15** and rotates within a fixed enclosing shell **16**. The hopper **10** is supported at an angle so that coins to be sorted may be carried upwardly by the scalloped disc **13** and allowed to drop through the outlet opening **12** into a series of coin sorting slots **17** formed on the periphery of the sorting drum or core **14**. Rotation of the shaft **15** and, therefore, of the drum **14** and scalloped disc **13** is accomplished by an electrical motor (not shown).

The coin sorter is of the type in which the coin sorting slots **17** form a series of radially disposed channels **18** whose width decreases from top to bottom, one side of these channels at spaced intervals having inclined shelf or ledge portions **19** forming a series of graduated stops for arresting coins of different denominations. Thus, in FIG. 3, in which a portion of the drum **14** is shown through an opening in the shell **16**, the top shelf **19** arrests a half dollar, the next a quarter dollar, the next a five cent piece (one of which is shown in dotted lines), the next a cent, and the next or lowest slot a dime. As the drum **14** is revolved, one coin at a time from the hopper **10** finds its way into one of these slots **17**, and as it drops down into such slot **17**, it is caught by one or the other of the shelves **19** depending upon the denomination of the coin. The coin is then carried around by the drum **14** past circuit closures hereinafter described and then deposited through chutes (not shown) in known manner into separate removable receptacles **20** for each denomination.

The present invention deals with mechanism for registering in dollars and cents the total amount of coins sorted, and for this purpose includes a total count assembly **21** and a mechanism controlled by the sorted coins to actuate this count assembly **21**. The assembly **21** includes an electromechanical counter of known construction for registering the total value in dollars and which includes a plurality of numbered drums **22** viewable through the opening in the housing of the total count assembly **21**. The dollar counter includes a solenoid which advances a suitable numbered drum **22** one step for each electrical pulse signal transmitted thereto and may be set back to zero by turning a reset handle **23** which rotates a zero setting shaft upon which the handle **23** is mounted. Also associated in the assembly **21** are tens and digit coin value indicators preferably in the form of a pair of numerical display tubes **24** and **25** for the registering of the cent count. The numerical display tubes **24** and **25** are known in the art and include separate filaments having configurations conforming to each number from zero through nine. The ten filaments are arranged in superimposed relation within a gas filled, cold cathode tube, and each filament has a cathode terminal and the ten filaments have a common anode terminal. Thus, when a circuit is completed to the cathode terminal of a particular filament, the filament will light giving a visual indication of the value which has been counted herein. Reset of the numerical display tubes **24** and **25** is accomplished through the zero setting shaft of the dollar counter, as will hereinafter be described.

The coin sorter is also provided with a bank of denomination counters **26**, **27**, **28**, **29** and **30** which are also of the electromechanical type in which numbered drums are advanced one step for each energization of a solenoid in-

cluded within each counter. That is, the numbered drums of each counter 26 through 30 are advanced sequentially one step for each electrical pulse fed thereto and the denomination counters record the number of coins of each denomination which are sorted. The counter 26 registers the number of half dollars sorted, the counter 27 the number of quarter dollars, the counter 28 the number of dimes, the counter 29 the number of five cent pieces and the counter 30 the number of cents. Reset of all of the counters 26 through 30 is accomplished by a zero reset handle 31 operative upon each of the denomination counters. The denomination counters 26 through 30 are mounted on a common mounting plate 32 together with the total count assembly 21, and the mounting plate 32 is swingably connected to an upper edge of a totalizer assembly housing 33 by a hinge 34. A slotted arcuate bar 35 is pivotally mounted normal to the plate 32, and a pin 36 extends from a side of the housing 33 through the slot in the bar 35 and mounts a spring tension washer 37 which biases against the bar 35. The housing 33 is cut away at an angle so that the plate 32 and its attached counters 26 to 30 and assembly 21 may be swung through an angle and will be held in place at any desired angle by the force of the washer 37 acting upon the slotted bar 35. Thus, the bank of counters may be manually set at any desired angle without the need of loosening and tightening fasteners. This novel mounting permits a direct line of sight to the bank of counters regardless of the position of the operator, whether sitting or standing relative to the coin sorter.

Referring specifically to FIGS. 4 and 5, circuit closures in the form of switches 38, 39, 40, 41, 42, 43, 44 and 45 are employed to indicate the passage of sorted coins. The switches 38 through 45 may be of the type having a button actuator 46 and a resilient actuating arm 47 to which a counting lever 48 is attached. The switches 38, 39, 40, 41 and 42 are mounted on the shell 16 in such a position that the free ends of the counting levers 48 of the switches are received through slots 49 provided in the shell 16 and annular slots 50 provided in the drum 14. As the drum 14 carries coins past the interfering levers 48 within the sorting slots 17, the levers 48 will engage the coins and be moved to cause the arms 47 to press inwardly on the buttons 46 to close the switches controlled thereby. The switch 38 is actuated by the passage beneath it of a cent, the switch 39 is actuated by the passage of a five cent piece, the switch 40 reacts to the passage of a dime, the switch 41 to the passage of a quarter dollar, and the switch 42 to the passage of a half dollar. The switch 43 has its arm 47 connected to the arm 47 of the 1¢ switch 38 by a member 51 so that inward movement of the arm of the 1¢ switch 38 as a cent passes beneath it will also cause the switch 43 to close. Similarly, the arm 47 of the switch 44 is connected to the arm 47 of the 5¢ switch 39 so that the passage of a five cent piece will close both the 5¢ switch 39 and the switch 44, and the arm 47 of the switch 45 is connected to the arm 47 of 10¢ switch 40 so that both switches 40 and 45 will be closed by the passage of a dime.

The switches 38 through 44 are employed to close circuits to a totalizer circuit hereinafter described and shown in FIGS. 7, 7*a* and 7*b* taken together, and the switches 43, 44 and 45 are employed solely to close circuits to respective denomination counters. The elements comprising the circuit of FIGS. 7, 7*a* and 7*b* are, generally, mounted within the housing 33 affixed to a side of the coin sorting machine.

The power supply for the totalizer circuit comprises two half wave rectifier circuits using capacitive filtering, one circuit providing a positive D.C. voltage and the other a negative D.C. voltage with the neutral side of the power line forming a common connection. A pair of power input lines 52 and 53 are connected to a source of alternating current with one power line 53 being neutral or grounded. The other power line 52 is connected

through a thermostatic controlled circuit breaker 54 to one side of a main power switch 55, and a conductor 56 leads from the other side of the power switch 55. A reset button 57 for the circuit breaker 54 is mounted on the exterior of the housing 33 as is the main switch 55. The coin sorter motor 58 is connected across the conductor 56 and the neutral power line 53. A bridging conductor 59 connects the power line 52 to a conductor 60 which includes a diode 61. A double throw relay switch 62 of a reset relay 63 has a normal position connecting the power line 52 through the main switch 55 and conductor 56 to a junction 64 of two half wave rectifier circuits, and has an alternate position connecting the junction 64 to the same power line 52 through the conductor 60 and bridging conductor 59.

One half wave rectifier circuit is comprised of a conductor 65 connecting a resistor 66 and a first diode 67 in series between the junction 64 and a second junction 68. A capacitor 69 and a resistor 70 are connected in parallel across the junction 68 and the neutral power line 53. A second half wave rectifier circuit is comprised of a conductor 71 which connects a resistor 72 and a second diode 73 in series between the junction 64 and a third junction 74. A capacitor 75 and a resistor 76 are also connected in parallel across the junction 74 and the neutral power line 53. When the common junction 64 is connected to the power line 52, the rectifier circuit including the first diode 67 provides a filtered negative D.C. potential at the junction 68, and the rectifier circuit including the second diode 73 provides a filtered positive D.C. potential at the junction 74. The neutral power line 53 is the common connection between the positive and negative D.C. supplies. Hereafter the power supply will be discussed in terms of the negative and positive D.C. voltages at the junctions 68 and 74, respectively.

The totalizer includes solenoid operated cent and ten cent stepping switches and five, twenty and forty cent valve accumulators or register switches, which also preferably take the form of solenoid operated stepping switches, which are controlled by the coin actuated switches 38 through 42 to accomplish necessary count registering and carry functions, as will appear hereafter. The various stepping switches are operated with positive D.C. voltage applied to one side of their respective solenoids with the coin actuated switches, when closed, connecting the other side of the respective solenoid to the neutral power line 53. The stepping switches employed in the preferred embodiment of the totalizer are of known construction and therefore, a 5¢ stepping switch will be described in detail as illustrative of all stepping switches employed. Referring to FIG. 6, the 5¢ stepping switch 77 includes three levels each having a wiper and a plurality of stationary contacts arranged in a radial pattern and which are engaged sequentially by the wiper as the stepping switch steps. In FIG. 6 only a first level 78 including a wiper 79 and contacts 80 may be seen and the wiper and contacts of the remaining two levels are arranged directly below the first level wiper 79 and contacts 80 and are insulated therefrom and from each other. The first level 78, as well as the remaining two levels, is provided with ten stationary contacts 80 together with a bridging contact 81. The first level wiper 79, as well as the wipers of the remaining levels, is mounted for rotation about a shaft 82 and includes three tangentially extending arms 83 spaced 120° from each other. The wiper 79 is caused to rotate about the shaft 82 one step at a time, so that the wiper arms 83 will move from one contact to the next, by a solenoid assembly.

The solenoid assembly includes a coil 84 and an actuator mechanism having a plate 85 pivotally mounted about a shaft 86 and which plate 85 is attracted to the coil 84 when the same is energized. The actuator mechanism also includes an arm 87 formed as a continuation of the plate 85 and provided at its end with a spring steel pawl 88 which operates upon a ratchet wheel 89 also

mounted for rotation upon the shaft 82 and secured to the wipers of the three levels. A holding pawl 90 prevents return of the ratchet wheel 89 and, therefore, the wiper 79 after advancement by the pawl 83. The arm 87 of the actuator mechanism is provided with an insulated button 91 which bears against a leaf spring 92, and a second actuating button 93 is likewise mounted upon the arm 87. The button 93 is adapted to move an arm 94 of a single pole self-interrupted switch 95 having a normal position in contact with a first leaf 96 and an alternative position in contact with a second leaf 97. A drum 98 is mounted upon the shaft 82 for rotation with the wipers and is provided with extending portions 99 radially spaced 120° apart. The extending portions 99 are adapted to contact an arm 100 of a single pole sequence interrupted switch 101 having a normal position in contact with a first leaf 102 and an alternate position in contact with a second leaf 103.

The operation of the 5¢ stepping switch 77 is as follows: a circuit is provided to the wiper 79 through the bridging contact 81. A circuit may then be completed through the bridging contact 81, the first level wiper 79, and the fixed contacts 80. A fixed contact 80 through which a circuit will be completed is determined by the step advancement of the wiper 79 upon the array of fixed contacts 80. The wiper 79 will advance from one contact to the next succeeding contact upon each energization of the coil 84. Energization of the coil 84 draws the plate 85 of the actuator mechanism towards the coil 84 thereby causing the arm 87 to be moved outwardly, as viewed in FIG. 6, and the pawl 88 will advance to the next tooth of the ratchet wheel 89. When the coil 84 is deenergized the leaf spring 92 bearing against the button 91 will return the arm 87 to its normal position thereby causing the pawl 88 to move the ratchet wheel 89 forward a distance equal to one tooth. Advancement of the ratchet wheel 89 one tooth causes the arm 83 of the wiper 79 to move to the next succeeding fixed contact 80. Thus, there is a one step advancement for each electrical pulse fed to the coil 84. Each time the coil 84 is energized, thereby causing the arm 87 to move outwardly, the button 93 moves the arm 94 of the self-interrupted switch 95 to its alternate position in contact with the second leaf 97.

When the wiper 79 has been rotated in steps to a point where one wiper arm 83 is in contact with the last fixed contact and the trailing wiper arm 83 is in contact with the bridging contact 81 the extending portions 99 of the drum 98 will move the arm 100 of the sequence interrupted switch 101 to its alternate position contacting the second leaf 103.

Referring again to FIGS. 7, 7*a*, and 7*b*, a common conductor 9 connects one side of each of the coin actuated 1¢ switches 38 and 43, the 5¢ switches 39 and 44, the 10¢ switches 40 and 45, the 25¢ switch 41 and the 50¢ switch 42 to the neutral power line 53. The second side of the 1¢ coin actuated switch 38 is connected to a side of the coil 104 of a 1¢ stepping switch and a second side of the coil 104 is connected through a conductor 105 and a conductor 106 to the positive D.C. supply. Similarly, the solenoids of the remaining stepping switches are connected to the positive D.C. supply. Thus, the second side of the 5¢ coin actuated switch 39 is connected to one side of the coil 84 of the 5¢ stepping switch 77, the second side of which is connected through a conductor 107 to the conductor 106 which is connected to the positive D.C. supply. Also, the second side of the 10¢ coin actuated switch 40 is connected to a conductor 108 in turn connected to a conductor 109 which is connected to one side of a coil 110 of a 10¢ stepping switch. The other side of the coil 110 is connected through a conductor 111 which connects to the conductor 106 connected to the positive D.C. supply. One side of a coil 112 of a 20¢ stepping switch is connected through a conductor 113 to one side of a normally open first relay switch 114 of a first carry relay 115 and the second side of the first relay switch 114 is connected to the other side of the 25¢ coin actuated switch 41 through a conductor 116. The other side of the 20¢ stepping switch coil 112 is connected to the positive D.C. supply through a conductor 117 and conductor 106. The coil of the first carry relay 115 is connected across the conductors 116 and 106. The coil 118 of a 40¢ stepping switch is also connected to the postive D.C. supply through the conductors 117 and 106. The connection of the coil 118 to the other side of the 50¢ coin actuated switch 42 will appear hereafter.

The fixed contacts 80 of the first level 78 of the 5¢ stepping switch 77 may be designated alternately by Roman numeral V and 0 depending upon the multiples of five cents which a circuit through the respective fixed contact represents. That is, the fixed contacts V indicate odd multiples of five cents and the contacts 0 indicate even multiples of five cents. Each of fixed contacts 0 of the first level 78 are connected through a common conductor 119 to a wiper 120 of a first level 121 of the 1¢ stepping switch. Each of the fixed contacts V of the first level 78 of the 5¢ stepping switch 77 are connected through a common conductor 122 to a wiper 123 of a second level 124 of the 1¢ stepper switch. The first level wiper 79 of the 5¢ stepping switch is connected through a conductor 125 to the negative D.C. supply.

The 5¢ stepping switch is also provided with second and third levels. The wiper 126 of a second level 127 of the 5¢ switch is connected through a conductor 128 to the second leaf 97 of the self-interrupted switch 95. The fixed contacts of such second level 127 may also be designated alternatively as V and 0, as shown in FIG. 7, and the alternate fixed contacts V are connected in common through a conductor 129 to the conductor 108 which is connected to the second side of the 10¢ coin actuated switch 40. The alternate fixed contacts 0 are not connected.

The wiper 130 of a third level 131 of the 5¢ stepping switch is connected by a conductor 132 to the conductor 113 which may be ultimately connected to the second side of the 25¢ coin actuated switch 41. Again, the fixed contacts of such third level 131 may be designated alternately as V and 0 with the alternate fixed contacts V connected by a common conductor 133. As with the second level 127, the fixed contacts 0 of the third level 131 are unconnected.

The 1¢ stepping switch functions to register cent coin values and controls the digit tube 25. The 1¢ stepping switch includes three levels. Generally, the contacts of the first level 121 are connected in sequence with the filaments 0 through 4 of the digit tube 25 and the contacts of the second level 124 are connected in sequence with the filaments 5 through 9 of the digit tube 25.

Specifically, the fixed contacts of the first level 121 of the 1¢ stepping switch may be considered as two series of contacts designated by 0 and Roman numerals I through IV in relation to the count of pennies which such fixed contacts represent. The fixed contacts of the second level 124 of the 1¢ stepping switch may be considered as two series of contacts designated by Roman numerals V through IX. The fixed contacts of the first level 121 and of the second level 124 of the 1¢ stepping switch are connected to respective cathode terminals of the filaments of the digit numerical display tube 25 corresponding with the level of count represented by the fixed contact. For example, the contacts 0 of the first level 121 are connected in common to the cathode terminal for the zero filament of the tube 25, the contacts I of the first level 121 are connected in common to the cathode terminal for the number one filament of the digit tube 25; and the contacts II for the first level 121 are connected in common with the cathode terminal for the number two filament of the tube 25. Similarly, the remaining pairs of fixed contacts are connected in common to the respective cathode terminals of the digit tube 25, as shown in FIG. 7.

A common anode terminal 134 for the filaments of the digit tube 25 is connected through a resistor 135 to a conductor 136 which is connected to the positive D.C. supply through the conductor 106.

A third level 137 of the 1¢ stepping switch has its wiper 138 connected to one leaf of a self-interrupted switch 139 of the 1¢ stepping switch through a conductor 140. The fixed contacts of the third level 137 of the 1¢ stepping switch which corresponds with the fixed contacts IV of the first level 121 and the contacts IX of the second level 124 are connected in common to a conductor 141 which is connected to the second side of the 5¢ coin actuated switch 39.

The 10¢ stepping switch functions to register ten cent coin values and controls the tens tube 24. The 10¢ stepping switch includes eight levels 142 through 149 with the first through the fifth levels employed in totaling a count and the sixth through the eighth levels employed to perform carry operations to the dollar counter. Generally, the contacts of the first level 142 are connected in sequence to the filament 0 through 9 of the tens tube 24 and the contacts of the first through the fifth levels are each connected to the second succeeding contact of the preceding level.

Specifically, the ten fixed contacts at each level are designated, in FIG. 7*b*, by Roman numerals I through IX and by 0, and hereafter when a fixed contact of the 10¢ stepping switch is described it will be by reference to the position of the contact within its respective level; for example, fixed contact 142I, fixed contact 144IX or fixed contact 143 0.

Referring to FIG. 7*b*, a conductor 150 connects the contacts 142I, 143IX, 144VII, 145V and 146III. A conductor 151 connects the contacts 142II, 143 0, 144VIII, 145VI and 146IV. A conductor 152 connects the contacts 142III, 143I, 144IX, 145VII and 146V. The contacts 142IV, 143II, 144 0, 145VIII and 146VI are connected in common by a conductor 153. The contacts 142V, 143III, 144I, 145IX and 146VII are connected in common by a conductor 154. A conductor 155 connects the contacts 142VI, 143IV, 144II, 145 0 and 146VIII. A conductor 156 connects the contacts 142VII, 143V, 144III, 145I and 146IX. The contacts 142VIII, 143VI, 144IV, 145II and 146 0 are connected in common by a conductor 157. The contacts 142IX, 143VII, 144V, 145III and 146I are connected in common by a conductor 158. Finally, a conductor 159 connects the contact 142 0, 143VIII, 144VI, 145IV and 146II.

The fixed contacts 142I through 142IX and 142 0 are each connected to a respective cathode terminal for the filaments of the tens tube 24. That is, the contact 142I is connected to the cathode terminal of the number one filament, the contact 142II is connected to the cathode terminal of the number two filament, etc. A common anode terminal 160 for the ten filaments of the tens tube 24 is connected through a resistor 161 to a conductor 162 which is connected to the positive D.C. supply through the conductors 136 and 106. Advancing along any of the five levels 142 through 146 increases the count by ten cent increments, but when advancing across any two of the five levels 142 through 146 the count is increased by twenty cent increments.

The wiper 163 of a first level 164 of a two level 20¢ stepping switch is connected through a conductor 165 to the conductor 125 which is connected to the negative D.C. supply. The fixed contacts of such level 164 may again be considered as two series of contacts designated by Roman numerals I through V depending upon the number of twenty cent coin values which the contact represents. The pair of contacts I are connected together to a conductor 166 which is connected to the wiper 167 of the first level 142 of the 10¢ stepping switch. The pair of contacts II are connected in common by a conductor 168 which is connected to the wiper 169 for the second level 143 of the 10¢ stepping switch. Similarly, the pairs of contacts III, IV and V are connected to conductors 170, 171 and 172, respectively, which in turn are connected to the wipers 173, 174 and 175 for the third level 144, the fourth level 145 and the fifth level 146, respectively, of the 10¢ stepping switch.

A second level 176 of the 20¢ stepping switch has its wiper 177 connected through a conductor 178 to one side of the electromechanical dollar counter 21. The fixed contacts of such second level 176 may be designated in like manner to those of the first level 164, as shown in FIG. 7*b*. The second level 176 is employed in the count carry to the dollar counter. The pair of fixed contacts I of the second level 176 are connected in common by a conductor 179 which is connected to the fixed contacts 147VII, 148VIII, 148IX and 149IX of the 10¢ stepping switch. The pair of contacts II are connected by a conductor 180 to the contacts 147V, 148VI, 148VII and 149VII. The pair of contacts III of the second level 176 are connected by a conductor 181 to the contacts 147III, 148IV, 148V and 149V. A conductor 182 connects the pair of contacts IV of the second level 176 to the contacts 147I, 148II, 148III and 149III. Finally, the pair of contacts V are connected in common to a conductor 183 which in turn is connected to the contacts 147IX, 148 0, 148I and 149I of the 10¢ stepping switch.

The first count carry relay 115 has its coil connected across the conductor 106 and the conductor 116 connected to the second side of the 25¢ switch 41. The relay 115 includes three single pole, single throw relay switches. The first relay switch 114 when closed completes a connection between the conductors 116 and 113 to permit energization of the coil 112 of the 20¢ stepping switch. A second relay switch 184 when closed completes a connection between a conductor 185 connected to the conductor 141, and a conductor 186 connected to the conductor 116. A third relay switch 187 of the relay 115 when closed completes a connection between a conductor 188 connected to the conductor 113 and a conductor 189.

A second count carry relay 190 has its coil connected by conductors 191 and 192 across the conductor 111 and a conductor 193 connected to a second side of the 50¢ coin actuated switch 42. The second count carry relay 190 is provided with two single pole double throw relay switches and one single pole, single throw relay switch. A first relay switch 194 has a normal position connecting the wiper 195 for the sixth level 147 of the 10¢ stepping switch to the conductor 133 which leads from the third level 131 of the 5¢ stepping switch, and an alternate position when actuated by energizing of the relay 190 in which it connects such wiper 195 to a conductor 196 connected to the conductor 193. A second relay switch 197 of the second relay 190 has a normal position connecting the wiper 198 of the seventh level 148 of the 10¢ stepping switch to the conductor 189 and an alternate position connecting such wiper 198 to the conductor 196. Finally, a third relay switch 199 has a normally opened position and an alternate position connecting the conductor 109 to the conductor 196.

A third count carry relay 200 has its coil connected across the conductors 111 and 192 and includes two single pole, single throw relay switches and one single pole, double throw relay switch. A first relay switch 201 of the third relay 200 has a normally open position and when closed by energization of the third relay 200 connects a conductor 202 connected to a second side of the coil 118 for a 40¢ stepping switch to a conductor 203. A second normally opened relay switch 204 when closed connects the conductor 113 to a conductor 205. Lastly, a third double throw relay switch 206 has a normal position connecting the movable arm 207 of a self-interrupted switch 208 of the 20¢ stepping switch to a conductor 209 which leads to a sequence interrupted switch 210 of the 20¢ stepping switch. The alternate position of the third

relay switch 206 connects the arm 207 to a conductor 211 which is connected to the conductor 193.

A wiper 212 of a single level 213 of the 40¢ stepping switch is connected to the conductor 205. The fixed contacts of the single level 213 may be designated alternately as Roman numeral I and 0. The contacts I are connected in common to a conductor 214.

One side of the coil of the reset relay 63 is connected to the neutral power line 53 by a conductor 215 which includes a resistor 216. A second side of the coil of the reset relay 63 is connected to a conductor 217 which includes a resistor 218. A capacitor 219 is connected across the conductors 215 and 217 in parallel with the coil of the reset relay 63. A second single pole, double throw reset relay switch 220 of the reset relay 63 has a normal position in which it connects a conductor 221, connected to one side of each of the denomination counters 26 through 30 and one side of the dollar counter 21, to the positive D.C. supply through the conductor 106. The alternate position of the second reset relay switch 220 connects the conductor 217 to the positive D.C. supply. A third single pole, double throw reset relay switch 222 has a normal position connecting the movable arm 223 of a sequence interrupted switch 224 of the 40¢ stepping switch to the common conductor 214 for the contacts I of the 40¢ stepping switch and an alternate position connecting such arm 223 to the neutral power line 53.

A zero reset switch 225 has a normal position connecting the conductor 217 to a conductor 226 and an actuated position in which it connects the conductor 217 to the input line 52 through the conductors 60 and 59. The reset switch 225 is disposed within the electromechanical dollar counter and is actuated by turning the handle 23 of such counter.

The self-interrupted switch 139 of the 1¢ stepping switch has a normal position in which it connects a conductor 227, connected to a second side of the 1¢ switch 38, which leads to a sequence interrupted switch 229 of the 1¢ stepping switch. The self-interrupted switch 139 has an actuated position, upon energization of the coil 104 of the 1¢ stepping switch, in which it connects the conductor 227 to the third level wiper 138 of the 1¢ stepping switch.

The self-interrupted switch 95 of the 5¢ stepping switch has a normal position in which it connects a conductor 230 connected to the leaf 102 of the sequence interrupted switch 101 of the 5¢ stepping switch to the conductor 141. In its actuated position, the switch 95 connects the second level wiper 126 of the 5¢ stepping switch through the conductor 128 to the conductor 141.

A self-interrupted switch 231 of the 10¢ stepping switch has a normal position connecting the conductor 108 to a sequence interrupted switch 232 of the 10¢ stepping switch via a conductor 233. In its actuated position, the switch 231 connects the conductor 108 to a conductor 234 which leads to the wiper 235 of the eighth level 149 of the 10¢ stepping switch.

The self-interrupted switch 208 and the 20¢ stepping switch has a normal position connecting the third relay switch 206 of the third carry relay 200 to the conductor 113 through a conductor 236, and in its actuated position the switch 208 connects the relay switch 206 to the conductor 203.

Finally, a self-interrupted switch 237 of the 40¢ stepping switch has a normal position connecting the conductor 205 to the conductor 193 and, when actuated by the energization of the 40¢ stepping switch coil 118, the switch 237 opens.

The sequence interrupted switches of each of the five stepping switches are employed for reset of the totalizer. The sequence interrupted switch 224 of the 40¢ stepping switch has a normal position connecting the arm of the third reset relay switch 222 to the conductor 193 and an actuated position connecting such relay switch 222 to a conductor 238. The conductor 238 is connected to the movable arm of the sequence interrupted switch 210 of

the 20¢ stepping switch, and such switch 210 in its normal position connects the conductor 238 to the arm of the third relay switch 206 of the third carry relay 200. In its actuated position, the switch 210 connects the conductor 238 to a conductor 239 which is connected to the movable arm of the sequence interrupted switch 229 of the 1¢ stepping switch. The switch 229 has a normal position connecting the conductor 239 to the conductor 228 and an actuated position connecting the conductor 239 to a conductor 240. This conductor 240 is connected to the movable arm 100 of the sequence interrupted switch 101 of the 5¢ stepping switch and the switch 101 has a normal position connecting the conductor 240 to the conductor 230. In its actuated position, the switch 101 connects the conductor 240 to a conductor 241 connected to the movable arm of the sequence interrupted switch 232 of the 10¢ stepping switch. The switch 232 has a normal position connecting the conductor 241 to the conductor 233 and an actuated position connecting the conductor 241 to the conductor 226.

As indicated above, each of the denomination counters 26 through 30 is connected at one side to a conductor 221. Furthermore, each of the counters 26–30 is connected at its other side to a side of a respective coin actuated switch. Thus, the cent counter 30 is connected through a conductor 242 to the open side of the 1¢ switch 43, the five cent piece counter 29 is connected through a conductor 243 to the open side of the 5¢ switch 44, and the dime counter 28 is connected through a conductor 244 to the open side of the 10¢ switch 45. In addition, the quarter dollar counter 27 is connected to the open side of the sole 25¢ switch 41 through a conductor 245 and the half dollar counter 26 is connected to the open side of the sole 50¢ switch 42 through a conductor 246.

At the start of operation of the coin sorter, the zero reset switch 225 is in its normal position and all relay switches, self-interrupted switches and sequence interrupted switches are in their normal positions as shown in FIGS. 7, 7*a* and 7*b*. When the main power switch 55 is closed manually, the motor 58 is energized for driving of the drum 14 and the disc 13. In addition, closing of the power switch 55 completes the circuit to the two half wave rectifier circuits. As indicated previously, the coils of the stepping switches obtain their operating voltage from the positive supply, nominally 117 volts D.C., while the numerical display tubes 24 and 25 obtain their operating voltage from across both power supply circuits, nominally 234 volts D.C. The contacts of the stepping switches are connected between the negative supply and the cathode terminals of the tubes 24 and 25, while the anode terminals of the tubes 24 and 25 are connected to the positive supply through suitable resistors 135 and 161, respectively.

With the motor 13 energized, coins deposited in the hopper 10 are carried by the disc 13 upward until they fall singly through the opening 12. Coins falling through the opening 12 are deposited into a respective sorting slot 17 provided in the drum 14 and the coin will seek its level on a shelf 19 depending upon its denomination. As the drum 14 is rotated within the shell 16, the coin will be carried past the counting levers 48 to close those switches 38–45 which correspond to the denomination of the coin. The coin actuated switches 38 through 42 complete circuits through the respective coils of the five stepping switches across the positive D.C. supply and the neutral power line 53.

Generally, the coil 104 of the 1¢ stepping switch is connected across the positive D.C. supply and the neutral power line 53 when the 1¢ coin actuated switch 38 is closed through a circuit including the conductor 106, the conductor 105, the coil 104, the 1¢ switch 38, and the conductor 9 to the neutral power line 53. The coil 84 of the 5¢ stepping switch will be energized upon closing of the 5¢ coin actuated switch 39 by a circuit from the positive D.C. supply, through the conductor 106,

the conductor 107, the coil 84, the 5¢ switch 39, and the conductor 9 to the neutral power line 53. The coil 84 of the 5¢ stepping switch is also energized whenever the 1¢ switch 38 is closed and the third level wiper 138 of the 1¢ stepping switch is in contact with one of the pair of contacts IV and IX, and the coil 84 is also energized whenever the 25¢ switch 41 is closed, as will later be described.

The coil 110 of the 10¢ stepping switch is energized whenever the 10¢ coin actuated switch 40 is closed through a circuit which leads from the positive D.C. supply through the conductor 106, the conductor 111, the coil 110, the conductor 109, the conductor 108, the 10¢ switch 40, and the conductor 9 to the neutral power line 53. As will later appear, the coil 110 is also energized when the 5¢ switch 39 closes and the second level wiper 126 of the 5¢ stepping switch is in contact with a contact V, and also whenever the coil actuated switch 42 is closed.

The coil 112 of the 20¢ stepping switch is connected across the positive D.C. supply and the neutral power line 53 when the 25¢ coin actuated switch 41 closes through the following circuit: the conductor 106, the conductor 117, the coil 112, the conductor 113, the closed relay switch 114, the conductor 116, the 25¢ switch 41, and the conductor 9. As will appear later, the coil 112 is also energized when the 50¢ switch 42 is closed, and the coil 118 of the 40¢ stepping switch is energized when the 50¢ switch 42 is closed through circuits, later described, which are completed by the 20¢ stepping switch.

The three count carry relays 115, 190 and 200 are also energized by circuits completed by the closure of coin actuated switches. The first carry relay 115 is energized only by a closing of the 25¢ switch 41 through a circuit which leads from the positive D.C. supply, the conductor 106, the coil of the relay 115, the conductor 116, the 25¢ switch 41, and the conductor 9 to the neutral power line 53. The second carry relay 190 is energized only when the 50¢ switch 42 is closed and through the following circuit: the positive D.C. supply, the conductor 106, the conductor 111, the conductor 191, the coil of the relay 190, the conductor 192, the conductor 193, the 50¢ switch 42, the conductor 9 and the neutral power line 53. Since the third carry relay 200 is connected across the conductors 111 and 192, the relay 200 is also energized upon closing of the 50¢ switch 42. The reset relay 63 is not energized until the reset switch 225 is actuated.

As each coin actuated switch 42, 41, 45, 44 and 43 is closed by the passage of a coin of the proper denomination, a circuit is completed to the denomination counters 26 through 30, respectively. For example, closing of the 1¢ switch 43 completes a circuit from the positive D.C. supply through conductor 106, reset relay switch 220, the conductor 221, the cent denomination counter 30, the conductor 242, the 1¢ switch 43, and the conductor 9 to the neutral power line 53. The counter 30 is thereby advanced one step to indicate that an additional cent has been sorted.

Various combinations of coins will hereinafter be assumed to be sorted to assist in describing the specific operation of the totalizer. First, let it be assumed that a cent has been deposited in the opening 12 and that this cent is the first coin to be counted. The cent will be received in a slot 17 and rest at the second lowest level within such slot 17. The cent will be carried as the drum 14 rotates within the shell 16 past the array of coin actuated switches. The cent will contact the counting lever 48 affixed to the arm 47 of the 1¢ switch 38 thereby closing the switch 38 as well as the second 1¢ switch 43. Closure of the 1¢ switch 43 will cause the counter 30 to register the passage of one cent and closure of the 1¢ switch 38 completes a circuit through the coil 104 of the 1¢ stepping switch, as previously set forth. The coil 104 is thereby energized until the cent has passed the position of the counting lever 48 of the switch 38 at which time the 1¢ switches 38 and 43 will open. The deenergization of the coil 104 causes the wipers 120, 123 and 138 of the 1¢ stepping switch to advance one step. It should be noted at this time that the wipers of each of the stepping switches are shown in FIGS. 7, 7*a* and 7*b* as being in their initial position corresponding to the position of the totalizer after reset to zero. Then, the first energization and deenergization of the coil of the respective stepping switch will cause a removal of an arm from the fixed contact illustrated and a connection of the next succeeding arm with the first fixed contact of the array. Specifically, the energization and deenergization of the coil 104 of the 1¢ stepping switch will cause one arm of the wiper 120 to be removed from the contact 0 and a connection of the next arm of the wiper 120 with the first fixed contact I. The same is true of the second and third levels of the 1¢ stepping switch and of the levels of the 5¢ 10¢, 20¢ and 40¢ stepping switches. The wipers, then, sweep the array of fixed contacts in a clockwise direction as viewed in FIGS. 7, 7*a* and 7*b*.

Thus, after the passage of the first cent has energized the coil 104 and advanced the wipers 120, 123 and 138 one step, the wiper 120 will be in contact with the contact I of the first level 121, the wiper 123 will be in contact with the contact VI of the second level 124, and the wiper 138 will be at a position corresponding to contacts I and VI in the third level 137. Under the assumed conditions, the wipers of the 5¢ stepping switch will be in contact with the lowest fixed contact designated in each level as 0, the wipers of the 20¢ stepping switch will be in contact with a fixed contact designated I, the wipers of the 10¢ stepping switch will be in contact with the fixed contacts 0, and the wipers of the 40¢ stepping switch will be connected to the lowest fixed contact designated 0. In this position, a circuit is completed from the negative D.C. supply to the cathode terminal of the number one filament of the digit tube 25 through the conductor 125, the first level wiper 79 of the 5¢ stepping switch, the conductor 119, and the first level wiper 120, and the fixed contact I of the 1¢ stepping switch. Since the anode terminal of the digit tube 25 is connected to the positive D.C. supply, the number one filament of the digit tube 25 will light giving a visual indication of a count of one. At the same time, a circuit is completed from the negative D.C. supply to the cathode terminal of the zero filament of the tens tube 24 through a circuit including the conductor 125, the conductor 165, the first level wiper 163 of the 20¢ stepping switch, the conductor 166, the first level wiper 167 of the 10¢ stepping switch and the fixed contact 138 0. The anode terminal of the tens tube 24 is connected to the positive D.C. source and, therefore, the number zero filament of the tens tube 24 will light giving a combined visual indication of a count of one cent.

Assuming now that the sorter has successively deposited three cents into the slots 17 in the drum 14 and that they have been carried past the coin actuated switches. The wipers of the 1¢ stepping switch will have advanced one step for each cent counted. Assume further that a fourth cent is the next coin sorted. Such cent will close the 1¢ switch 38 thereby energizing the coil 104 until the 1¢ switch 38 is opened after the passage of the cent. At this point the first level wiper 120 of the 1¢ stepping switch will advance to the contact IV, the second level wiper 123 will advance to the contact IX, and the third level wiper 138 will be in contact with the fixed contact corresponding to the contacts IV and IX. The first level wiper 79 of the 5¢ stepping switch will remain in contact with a contact 0 and a circuit is completed through the cathode terminal of the number four filament of the digit tube 25 and the circuit, previously established, remains completed to the zero filament of the tens tube 24.

If a cent piece is the next coin sorted and counted, the passage of the coin will energize the coil 104 thereby causing the arm of the self-interrupted switch 139 of the 1¢ stepping switch to be moved to its alternate position connecting the third level wiper 138 of the 1¢ stepping switch to the conductor 227 and a circuit is completed through the coil 84 of the 5¢ stepping switch. The completed circuit leads from the positive D.C. supply through the conductor 106, the conductor 107, the coil 84, the conductor 141, the third level wiper 138, the conductor 140, the self-interrupted switch 139, the conductor 227, the 1¢ switch 38, and the conductor 9 to the neutral power line 53. Thus, both coils 104 and 84 are energized and when the 1¢ switch 38 opens, the 1¢ stepping switch and the 5¢ stepping switch will both advance one step. Under such conditions the first level wiper 120 of the 1¢ stepping switch will be connected to a contact 0, the second level wiper 123 will be connected to a contact V, and the third level wiper 138 will be connected through a fixed contact corresponding to the 0 and V positions. Also, the first level wiper 79 of the 5¢ stepping switch will be connected to the first fixed contact designated V, and the second level wiper 126 and the third level wiper 130 will be connected to similarly positioned fixed contacts. A circuit is then completed from the negative D.C. supply to the cathode terminal of the number five filament of the digit tube 25, and the circuit includes the conductor 125, the first level wiper 79 of the 5¢ stepping switch, the conductor 122, and the second level wiper 123 of the 1¢ stepping switch. Thus, the number five filament of the digit tube 25 will light.

Assuming that cent pieces continue to be sorted by the coin sorter, the passage of the ninth cent piece will close the 1¢ switch 38 thereby energizing the coil 104 of the 1¢ stepping switch until the switch 38 opens. The wiper contacts of the 1¢ stepping switch will advance one position so that the first level wiper 120 will be connected to the contact IV, the second level wiper 123 will be connected to the contact IX, and the third level wiper 138 will be connected to the contact which corresponds with the positions IV and IX. Thus, a circuit is completed to the cathode terminal of the number nine filament of the digit tube 25.

If a cent is the next coin counted, the 1¢ switch 38 will close thereby energizing the coil 104 and at the same time causing the arm of the self-interrupted switch 139 of the 1¢ stepping switch to connect the third level wiper 138 with the conductor 227 whereby the coil 84 of the 5¢ stepping switch is energized. When the 1¢ switch 38 opens both the 1¢ stepping switch and the 5¢ stepping switch will advance one position. Closure of the 1¢ switch 38 by the passage of the tenth cent also energizes the coil 110 of the 10¢ stepping switch by completing a circuit from the positive D.C. supply. The completed circuit for the coil 110 is as follows: the positive D.C. supply, the conductor 106, the conductor 111, the coil 110, the conductor 109, the conductor 108, the conductor 129, the second level wiper 126 of the 5¢ stepping switch, the conductor 128, the self-interrupted switch 95 of the 5¢ stepping switch, the conductor 141, the third level wiper 138 of the 1¢ stepping switch, the conductor 140, the self-interrupted switch 139 of the 1¢ stepping switch, the conductor 227, the 1¢ switch 38, the conductor 9, and the neutral power line 53.

Thus, when 1¢ switch 38 opens, thereby also deenergizing the coil 110, the wipers of the 10¢ stepping switch advance one position upon the contacts whereby they will be connected to the contacts I of the eight levels. A circuit is then completed from the negative D.C. supply to the cathode terminal of the number one filament of the tens tube 24 and such circuit includes the conductor 125, the conductor 165, the first level wiper 163 of the 20¢ stepping switch which will be in contact with a contact I, the conductor 166, the first level wiper 167 of the 10¢ stepping switch and the contact 1421. When this has been

accomplished the wipers of the 1¢ stepping switch will be in the following positions: the first level wiper 120 is connected to the contact 0, the second level wiper 123 is connected to the contact V, and the third level wiper 138 is connected to the contact corresponding to the 0 and V positions. Simultaneously, the first level wiper 79 of the 5¢ stepping switch will have advanced to a position where it is in contact with a contact 0 and, therefore, a circuit is completed to the cathode terminal of the zero filament of the digit tube 25. Therefore, it will be seen that when ten cent pieces have been counted the number one filament of the tens tube 24 and the zero filament of the digit tube 25 will light indicating a total count of ten.

If the coin sorter would continue to sort only cent pieces and deliver them past the 1¢ switch 38, the totalization would continue as indicated above with the only difference being that the wipers of the 10¢ stepping switch would advance one step for each ten cents counted and thereby lighting the proper filament of the tens tube 24 to indicate the total count.

Assume now that only five cent pieces are sorted and delivered by the coin sorter and that the count begins at zero. As the first five cent piece is carried past the 5¢ coin actuated switch 39, thereby closing the both of the 5¢ switches 39 and 44, the coil 84 of the 5¢ stepping switch is energized and the denomination counter 29 advances. When the 5¢ switch 39 reopens after the five cent piece has passed, the wipers of the 5¢ stepping switch will advance one position so that they will each be connected to the first contacts designated V. Under these assumed conditions the first level wiper 120 and the second level wiper 123 of the 1¢ stepping switch will be connected to the contacts 0 and V, respectively, and the wiper contacts of the 10¢ stepping switch will be connected to the contacts 0. Thus, a circuit is completed to the number five filament of the digit tube 25 through the contact V, the second level wiper 123 of the 1¢ stepping switch, the conductor 122, the first level wiper 79 of the 5¢ stepping switch and the conductor 125 to the negative D.C. supply. A circuit is also completed to the zero filament of the tens tube 24.

If a five cent piece is the next coin sorted and counted, the 5¢ switch 39 will again close thereby energizing the coil 84 of the 5¢ stepping switch. When the coil 84 is deenergized with the opening of the 5¢ switch 39, the 5¢ stepping switch wipers will advance one step and will be connected to the contacts 0 of their respective levels. The wipers of the 1¢ stepping switch, the 20¢ stepping switch and the 40¢ stepping switch will remain in their initial positions. Also upon the closing of the 5¢ switch 39 by the passage of the second five cent piece, the coil 110 of the 10¢ stepping switch will be energized through a circuit which leads from the positive D.C. supply through the conductor 106, the conductor 111, the coil 110, the conductor 109, the conductor 108, the conductor 129, the second level wiper 126 of the 5¢ stepping switch, the conductor 128, the self-interrupted switch 95 of the 5¢ stepping switch, the conductor 141, the 5¢ switch 39, and the conductor 9 to the neutral power line 53. When the 5¢ switch 39 opens, the wipers of the 10¢ stepping switch will advance one step whereby they are connected to the contacts I of their respective levels. Therefore, it will be seen that circuits from the negative D.C. supply are completed to the cathode terminal of the zero filament of the digit tube 25 and to the cathode terminal of the number one filament of the tens tube 24 thereby lighting the same and indicating a total count of ten. Further counting of the five cent pieces and the totalization of such count is accomplished in a similar manner with the wipers of the 10¢ stepping switch advancing one step for each two five cent pieces counted.

Assuming now that the count is at zero and that only dimes are sorted and counted by the apparatus. The passage of the first dime past the 10¢ coin actuated switch 40 closes the 10¢ switches 40 and 45 thereby energiz-

ing the coil 110 of the 10¢ stepping switch and advancing the count of the dime counter 23. Deenergization of the coil 110 upon opening of the 10¢ switch 40 will cause the wipers of the 10¢ stepping switch to advance one step where they will be in contact with the contacts I of their respective levels. Thus, a circuit is completed to the cathode terminal of the number one filament of the tens tube 24. At the same time, a circuit has been completed to the zero filament of the digit tube 25. In a similar manner, additional dimes passing the 10¢ switch 40 will energize the coil 110 and result in the advancement of the wipers of the 10¢ stepping switch one step for each dime so counted. Circuits are, therefore, completed to the appropriate number filament of the tens tube 24 to give a visual indication of the count.

Assuming now that a quarter dollar is the first coin counted and sorted. Such quarter dollar is counted as twenty cents plus five cents. That is, closure of the 25¢ coin actuated switch 41 increases the count of the quarter dollar counter 27 by one and completes a circuit to energize the coil of the first carry relay 115. When the first carry relay 115 is energized, its first relay switch 114 will close thereby completing a circuit to energize the coil 112 of the 20¢ stepping switch. The second relay switch 184 will also close thereby completing a circuit through the coil 84 of the 5¢ stepping switch to energize the same. Upon reopening of the 25¢ switch 41, the wipers 163 and 177 of the 20¢ stepping switch are advanced to the II positions, and the wipers of the 5¢ stepping switch will advance to the first contact V in each level. Therefore, a circuit is completed to the cathode terminal of the number five filament of the digit tube 25 from the negative D.C. supply through the conductor 125, the first level wiper 79 of the 5¢ stepping switch, the conductor 122, the second level wiper 123 of the 1¢ stepping switch and the contact V of the second level 124. Also, a circuit is closed to the number two filament of the tens tube 24 through the conductor 125, the conductor 165, the first level wiper 163 of the 20¢ stepping switch, the conductor 168, the second level wiper 169 of the 10¢ stepping switch which is in contact with contact 143 0, the conductor 151, and the fixed contact 142II. Therefore, the number two filament of the tens tube 24 and the number five filament of the digit tube 25 light giving a visual indication that the count is twenty-five cents.

If a quarter dollar is the next coin sorted and counted, closure of the 25¢ switch 41 will cause the coil 112 of the 20¢ stepping switch and the coil 84 of the 5¢ stepping switch to be energized, as indicated above. In addition, a circuit is completed to the coil 110 of the 10¢ stepping switch through the second level 127 of the 5¢ stepping switch. The circuit to the coil 110 is as follows: the positive D.C. supply, the conductor 106, the conductor 111, the coil 110, the conductor 109, the conductor 108, the conductor 129, the second level wiper 126 of the 5¢ stepping switch, the conductor 128, the self-interrupted switch 95 of the 5¢ stepping switch, the conductor 141, the conductor 185, the closed relay switch 184, the conductor 186, the conductor 116, the 25¢ switch 41, the conductor 9, and the neutral power line 53. Thus, when the 25c switch 41 opens, the wipers of the 5¢ stepping switch, the 20¢ stepping switch, and the 10¢ stepping switch advance one step. A circuit is then completed to the cathode terminal of the zero filament of the digit tube 25 through the conductor 119. Also, a circuit is completed from the negative D.C. supply to the cathode terminal of the number five filament of the tens tube 24 through a circuit including the conductor 125, the conductor 165, the first level wiper 163 of the 20¢ stepping switch, the conductor 170, the third level wiper 173 of the 10¢ stepping switch which is at position 144I, the conductor 154 and the contact 142V.

The count of additional quarter dollars continues in a similar manner with the 10¢ stepping switch being energized once for every two quarter dollars counted.

A half dollar is accepted as two twenty cent components and one ten cent component. Assuming that a half dollar is the first coin sorted and counted, closure of the 50¢ switch 42 will advance the count of the denomination counter 26 by one and will further energize the coils of the second and third count carry relays 190 and 200, respectively. Energization of the third carry relay 200 will close the relay switches 201 and 204 and will move the third relay switch 206 to its alternate position. Closure of the second relay switch 204 completes a circuit to energize the coil 112 of the 20¢ stepping switch. The energization of the coil 112 is provided through the following circuit: the positive D.C. supply, the conductor 106, the conductor 117, the coil 112, the conductor 113, the closed relay switch 204, the conductor 205, the self-interrupted switch 237 of the 40¢ stepping switch, the conductor 193, the closed 50¢ switch 42, the conductor 9, and the neutral power line 53. The coil 118 of the 40¢ stepping switch is not energized until the coil 112 of the 20¢ stepping switch is energized. When the coil 112 is energized, the self-interrupted switch 207 of the 20¢ stepping switch is moved to its alternate position and a circuit is completed from the positive D.C. supply through the coil 118 of the 40¢ stepping switch. Such circuit comprises the conductor 105, the conductor 117, the coil 118, the conductor 202, the closed relay switch 201, the conductor 203, the self-interrupted switch 207 of the 20¢ stepping switch, the actuated relay switch 206, the conductor 211, the conductor 193, the closed 50¢ switch 42, the conductor 9, and the neutral power line 53.

As soon as the coil 118 of the 40¢ stepping switch is energized, the self-interrupted switch 237 of the 40¢ stepping switch opens and disrupts the circuit through the coil 112 of the 20¢ stepping switch. This deenergizes the coil 112 and the wipers of both levels of the 20¢ stepping switch advance one step. However, deenergization of the coil 112 of the 20¢ stepping switch also results in return of the self-interrupted switch 207 of the 20¢ stepping switch to its normal position which disrupts the circuit to the coil 118 of the 40¢ stepping switch thereby deenergizing such coil 118 and permitting the sole level wiper 212 to advance one position. When the coil 118 of the 40¢ stepping switch is deenergized, the self-interrupted switch 237 of the 40¢ stepping switch returns to its closed position thereby reestablishing the closed circuit to reenergize the the coil 112 of the 20¢ stepping switch. Reenergization of the coil 112 of the 20¢ stepping switch moves the self-interrupted switch 207 of the 20¢ stepping switch to its alternate position thereby reestablishing the closed circuit to reenergize the coil 118 of the 40¢ stepping switch. Reenergization of such coil 118 will not, however, cause an interruption of the closed circuit to the coil 112 of the 20¢ stepping switch since a closed circuit remains to the coil 112 of the 20¢ stepping switch even though the self-interrupted switch 237 opens. Such circuit includes the positive D.C. supply, the conductor 106, the conductor 117, the coil 112, the conductor 113, the closed relay switch 204, the conductor 205, the sole level wiper 212 of the 40¢ stepping switch which is at position I, the conductor 214, the reset relay switch 222, the sequence interrupted switch 224 of the 40¢ stepping switch, the conductor 193, the closed 50¢ switch 42, the conductor 9, and the neutral power line 53.

When the 50¢ switch 42 is closed, the coil 110 of the 10¢ stepping switch is also energized once through a circuit that leads from the positive D.C. supply through the conductor 106, the conductor 111, the coil 110, the conductor 109, the closed relay switch 199 of the energized second count carry relay 190, the conductor 196, the conductor 193, the closed 50¢ switch 42, and the conductor 9 to the neutral power line 53.

When the 50¢ switch 42 reopens, the wipers of the 20¢ stepping switch and of the 40¢ stepping switch will advance an additional one step and the wipers of the 10¢ stepping switch will advance one step. At this time, the

first level wiper **163** and the second level wiper **177** of the 20¢ stepping switch will be at position III, the sole level wiper **212** of the 40¢ stepping switch will be at position **0**, and the wipers of the eight levels of the 10¢ stepping switch will be at the position I. The wipers of the 1¢ stepping switch and of the 5¢ stepping switch will remain at their respective initial positions. Thus, a circuit is completed from the negative D.C. supply to the cathode terminal of the number five filament of the tens tube **24** through the conductor **125**, the conductor **165**, the first level wiper **163** of the 20¢ stepping switch, the conductor **170**, the third level wiper **173** of the 10¢ stepping switch, the conductor **154**, and the fixed contact **142V**. Also, a circuit is completed to the cathode terminal of the zero filament of the digit tube **25**, as hereinbefore set forth. Counting of additional half dollars occurs in a similar manner.

Three distinct possibilities exist for carries from the 10¢ stepping switch to the dollar counter. First, a carry must occur for any dime or any carry from the 1¢ stepping switch when the 10¢ stepping switch indicates ninety cents. This carry is accomplished through the eighth level **149** of the 10¢ stepping switch. Secondly, a carry must occur for any quarter dollar when the 10¢ stepping switch indicates eighty or ninety cents. This is also true when the quarter dollar is the second energization of the 20¢ stepping switch by the counting of a half dollar. This carry is accomplished by using the contact of the seventh level **148** of the 10¢ stepping switch. Finally, a carry must occur for any quarter dollar when the 10¢ stepping switch indicates seventy cents and the 5¢ stepping switch indicates five cents. This also applies to a half dollar as with the second carry possibility. This carry is accomplished through the sixth level **147** of the 10¢ stepping switch.

Each of the three distinct carry possibilities to the dollar counter will now be illustrated, together with possible combinations of count which will yield the carries. Assuming first that the count is ninety-nine cents, the wipers of each of the eight levels of the 10¢ stepping switch may have been advanced to position IX. Of necessity, the wipers of the 5¢ stepping switch will be at a position V and the first level wiper **120**, the second level wiper **123** and the third level wiper **138** of the 1¢ stepping switch will be at positions IV, IX, and IV and IX, respectively. If a cent is the next coin counted, closing of the 1¢ switch **38** by the passage of such coin will complete a circuit to energize the coil **104** of the 1¢ stepping switch. Also, the coil **110** of the 10¢ stepping switch is energized by a completed circuit which includes the second level **127** of the 5¢ stepping switch, and the coil **84** of the 5¢ stepping switch will likewise be energized, all as previously set forth.

Energization of the coil **110** of the 10¢ stepping switch moves its self-interrupted switch **231** to its alternate position to thereby complete a circuit through the dollar counter which has the effect of causing the dollar counter to register a count of one. The completed circuit leads from the positive D.C. supply through the conductor **106**, the reset relay switch **220**, the conductor **221**, the dollar counter, the conductor **178**, the second level wiper **177** of the 20¢ stepping switch which is at position I, the conductor **179**, the eighth level wiper **235** of the 10¢ stepping switch which is at position IX, the conductor **234**, the self-interrupted switch **231** of the 10¢ stepping switch, the conductor **108**, the conductor **129**, the second level wiper **126** of the 5¢ stepping switch, the conductor **128**, the self-interrupted switch **95** of the 5¢ stepping switch, the conductor **141**, the third level wiper **138** of the 1¢ stepping switch, the conductor **140**, the self-interrupted switch **139** of the 1¢ stepping switch, the conductor **227**, the closed 1¢ switch **38**, and the conductor **9** to the neutral power line **53**.

Reopening of the 1¢ switch **38** permits advancement of the wipers of the 1¢, 5¢ and 10¢ stepping switches and circuits are then completed to the zero filament of the tens tube **24** and to the zero filament of the digit tube **25**.

A similar carry operation is performed if the count is ninety-five cents and a five cent piece is the next coin counted or if the count is ninety cents and a dime is the next coin counted.

Assuming now that the count is eighty cents and that a quarter dollar is the next coin to be counted. Under this condition, the wipers of the eight levels of the 10¢ stepping switch may be at position VIII with the wipers of the remaining stepping switches at their initial positions. Closure of the 25¢ switch **41** by the passage of the quarter dollar will energize the coil of the first carry relay **115** thereby closing a circuit to energize the coil **112** of the 20¢ stepping switch and a second circuit is completed to energize the coil **84** of the 5¢ stepping switch. Closure of the 25¢ switch **41** to energize the first carry relay **115** also closes the third relay switch **187** of the first carry relay thereby completing a circuit through the dollar counter. The completed circuit is as follows: the positive D.C. supply, the conductor **106**, the reset relay switch **220**, the conductor **221**, the dollar counter, the conductor **178**, the second level wiper **177** of the 20¢ stepping switch, the conductor **179**, the seventh level wiper **198** of the 10¢ stepping switch which is at position VIII, the relay switch **197** in its normal position, the conductor **189**, the closed third relay switch **187**, the conductor **188**, the conductor **113**, the closed first relay switch **114**, the conductor **116**, the closed 25¢ switch **41**, the conductor **9**, and the neutral power line **53**.

When the 25¢ switch **41** reopens, the wipers of the 5¢, 10¢ and 20¢ stepping switches will advance one position and circuits will be established to the cathode terminals of the zero filament of the tens tube **24** and to the number five filament of the digit tube **25** to indicate a total count of one dollar and five cents.

Assuming now that the count is sixty cents and that a half dollar is the next coin counted, the positions of the wipers of the various stepping switches may be as follows: the first level wiper **120** and the second level wiper **123** of the 1¢ stepping switch at positions **0** and V, respectively; the wipers of the three levels of the 5¢ stepping switch at a position **0**; the wipers of the two levels of the 20¢ stepping switch at position II indicating that a quarter dollar has contributed to the count of sixty cents; the wipers of the eight levels of the 10¢ stepping switch at position IV; and the wiper of the 40¢ stepping switch at its initial position **0**. Closure of the 50¢ switch **42** energizes the coils of the second carry relay **190** and of the third carry relay **200** as previously described. Energization of these carry relays **190** and **200** completes a circuit to energize the coil **112** of the 20¢ stepping switch which, when energized, completes a circuit to energize the coil **118** of the 40¢ stepping switch. Energization of the coil **118** of the 40¢ stepping switch results in deenergization of the coil **112** of the 20¢ stepping switch which causes its wipers **163** and **177** to advance to position III. Deenergization of the coil **112** of the 20¢ stepping switch deenergizes the coil **118** of the 40¢ stepping switch thereby advancing the sole wiper **212** to position I and further causing a second energization of the coil **112** of the 20¢ stepping switch which in turn causes reenergization of the coil **118** of the 40¢ stepping switch. Energization of the second carry relay **190** also completes a previously described circuit to the coil **110** of the 10¢ stepping switch.

At this time, with the 50¢ switch **42** remaining closed, a circuit is completed through the dollar counter and such circuit leads from the positive D.C. supply through the conductor **106**, the reset relay switch **220**, the conductor **221**, the dollar counter, the conductor **178**, the second level wiper **177** of the 20¢ stepping switch, the conductor **181**, the seventh level wiper **198** of the 10¢ stepping switch, the non-actuated relay switch **197**, the conductor

196, the conductor 193, the closed 50¢ switch 42, and the conductor 105 to the neutral power line 53.

When the 50¢ switch 42 reopens thereby permitting advancement of the wipers of the 10¢, 20¢ and 40¢ stepping switches, a circuit is complete to the zero filament of the digit tube 25 and a circuit is also completed to the cathode terminal of the number one filament of the tens tube 24. The circuit of the number one filament of the tens tube 24 is as follows: the negative D.C. supply, the conductor 125, the conductor 165, the first level wiper 163 of the 20¢ stepping switch, the conductor 171, the fourth level wiper 174 of the 10¢ stepping switch at position V, the conductor 150, and the fixed contact 142I.

Finally, let it be assumed that the count is seventy-five cents and that a quarter dollar is the next coin to be counted. The wipers of the eight levels of the 10¢ stepping switch may be at position VII, the wipers of the three levels of the 20¢ stepping switch may be at a position V, and the wipers of the remaining stepping switch may be at their respective initial positions. Closing of the 25¢ switch 41 by the passage of the coin will energize the coil of the first carry relay 115 thereby completing circuits to energize both the coil 112 of the 20¢ stepping switch and the coil 84 of the 5¢ stepping switch. Energization of the coil 84 of the 5¢ stepping switch moves the self-interrupted switch 95 of the 5¢ stepping switch to close a circuit to energize the coil 110 of the 10¢ stepping switch. At this time, a circuit is completed through the dollar counter to affect the carry. The circuit leads from the positive D.C. supply through the conductor 106, the reset relay switch 220, the conductor 221, the dollar counter, the conductor 178, the second level wiper 177 of the 20¢ stepping switch, the conductor 179, the sixth level wiper 195 of the 10¢ stepping switch which is at position VII, the relay switch 194, the conductor 133, the third level wiper 130 of the 5¢ stepping switch, the conductor 132, the conductor 113, the closed relay switch 114, the conductor 116, the closed 25¢ switch 41, and the conductor 9 to the neutral power line 53.

When the 25¢ switch 41 reopens, the wipers of the 5¢, 10¢ and 20¢ stepping switches advance one position and circuits are completed to the zero filaments of both the tens tube 24 and the digit tube 25.

After the count of coins has been completed, the totalizer of this invention may be reset to zero, and such reset is accomplished through the use of the sequence interrupted switches of the various stepping switches. Reset is initiated by moving of the reset switch 225 to its alternate position in which it connects the coil of the reset relay 63 across the power lines 53 and 54. Movement of the reset switch 225 is accomplished by mechanical reset of the dollar counter. The circuit through the coil of the relay 63 is as follows: the power line 52, the conductor 59, the conductor 60 including the diode 61, the reset switch 225, the conductor 217, the coil of the reset relay 63, the conductor 215 including the resistor 216, and the neutral power line 53. The diode 61 rectifies the A.C. from the power lines 52 and 53 and the coil of the reset relay 63 is thereby provided with a D.C. voltage which is filtered by the capacitor 219. Energization of the reset relay 63 causes the reset relay switches 62, 220 and 222 to be moved to their alternate position. Movement of the first reset relay switch 62 to its alternate position connects the common junction 64 to the power line 52 thereby by-passing the main power switch 55. Thus, reset may be accomplished with the main switch 55 open. Movement of the second reset relay switch 220 to its alternate position connects the conductor 217 to the positive D.C. supply thereby providing an alternate circuit for energization of the coil of the reset relay 63 and the reset switch 225 may, and should, return to its normal position.

Movement of the third reset relay switch 222 to its alternate position connects the arm 223 of the sequence interrupted switch 224 of the 40¢ stepping switch to the neutral power line 53 and thus permits recycling of the stepping switches. Specifically, a circuit is established through the third carry relay 200 to energize the same, and such circuit leads from the positive D.C. supply through the conductor 106, the conductor 111, the coil of the third carry relay 200, the conductor 192, the conductor 193, the sequence interrupted switch 224 of the 40¢ stepping switch, and the third reset relay switch 222 to the neutral power line 53. Energization of the third carry relay 200 closes its relay switches 201 and 204 and closure of the relay switch 204 completes a circuit to energize the coil 112 of the 20¢ stepping switch. Such circuit includes the following: the positive D.C. supply, the conductor 106, the conductor 117, the coil 112, the conductor 113, the closed relay switch 204, the conductor 205, the self-interrupted switch 237 of the 40¢ stepping switch, the sequence interrupted switch 224 of the 40¢ stepping switch, the reset relay switch 222 and the neutral power line 53. When the coil 112 of the 20¢ stepping switch is energized, the attendant movement of the self-interrupted switch 207 of the 20¢ stepping switch completes a circuit to energize the coil 118 of the 40¢ stepping switch. However, energization of the coil 118 of the 40¢ stepping switch opens the self-interrupted switch 237 of the 40¢ stepping switch thereby disrupting the circuit to the coil 112 of the 20¢ stepping switch, the deenergization of which also results in a deenergization of the coil 118 of the 40¢ stepping switch.

This continues until both the 20¢ and 40¢ stepping switches have recycled. Should the 40¢ stepping switch complete its recycle before the 20¢ stepping switch has recycled, the coil 112 of the 20¢ stepping switch will continue to be energized. That is, when the 40¢ stepping switch completes its recycle, the sequence interrupted switch 224 of the 40¢ stepping switch will move to its alternate position which prevents the further energization of the coil 118 of the 40¢ stepping switch by removing the connection between the conductor 193 and the neutral power line 53 and thereby disrupting the circuits to the coil of the third carry relay 200 which is then deenergized. However, a completed circuit is now established to continue the energization of the coil 112 of the 20¢ stepping switch and such circuit includes the following: the positive D.C. supply, the conductor 106, the conductor 117, the coil 112, the conductor 113, the conductor 236, the self-interrupted switch 207 of the 20¢ stepping switch, the relay switch 206 in its normal position, the conductor 209, the sequence interrupted switch 210 of the 20¢ stepping switch, the conductor 238, the sequence interrupted switch 224 of the 40¢ stepping switch, the reset relay switch 222 and the neutral power line 53. The self-interrupted switch 207 of the 20¢ stepping switch will continuously break and reestablish such circuit until the 20¢ stepping switch has completely recycled at which time the sequence interrupted switch 210 of the 20¢ stepping switch will move to its alternate position thereby disrupting the alternate circuit through the coil 112 of the 20¢ stepping switch.

If the 20¢ stepping switch should complete its recycle before the 40¢ stepping switch has finished recycling, the 20¢ stepping switch will travel past home and come in again. By this time the 40¢ stepping switch will have completed recycling and the conditions described above will control.

After the 20¢ and 40¢ stepping switches have completed their recycling, the 1¢ stepping switch is recycled. The coil 120 of the 1¢ stepping switch is energized by a circuit which leads from the positive D.C supply through the conductor 106, the conductor 105, the coil 120, the conductor 227, the self-interrupted switch 139 of the 1¢ stepping switch, the conductor 228, the sequence interrupted switch 229 of the 1¢ stepping switch, the conductor 239, the sequence interrupted switch 210 of the 20¢ stepping switch, the conductor 238, the sequence interrupted switch 224 of the 40¢ stepping switch, and the

reset relay switch 222 to the neutral power line 53. When the coil 120 is energized, the above circuit is disrupted by the self-interrupted switch 139 of the 1¢ stepping switch and reestablished after disruption by the return of the switch 139 to its normal position. This continues until the 1¢ stepping switch has completed recycling at which time the sequence interrupted switch 229 of the 1¢ stepping switch moves to its alternate position and prevents further energization of the coil 120.

The 5¢ stepping switch is the next switch to be recycled and this is accomplished in a similar manner through a circuit which includes the sequence interrupted switches of each of the 5¢, 1¢, 20¢ and 40¢ stepping switches in that order, as well as the self-interrupted switch 95 of the 5¢ stepping switch. When recycling of the 5¢ stepping switch is completed, the sequence interrupted switch 101 of the 5¢ stepping switch moves to its alternate position thereby permitting energization of the coil 110 for recycling of the 10¢ stepping switch which is last to recycle.

When the 10¢ stepping switch has completely recycled, the sequence interrupted switch 232 of the 10¢ stepping switch will move to its alternate position thereby applying a neutral ground to the positive side of the reset relay 63 which will deenergize the same and place all components in their original state and position.

From the foregoing description of one embodiment of this invention it will be seen that the 1¢ stepping switch registers one cent counts and controls the digit count value indicators, which in the preferred construction is a numerical display tube. Similarly, the 10¢ stepping switch registers ten cent value counts and controls the tens count value indicators. A five cent value register or accumulator, preferably also in the form of a stepping switch, registers five cent values from five cent piece and quarter dollar counts and functions to alternately connect the two levels of the 1¢ stepping switch to the source of electric current depending upon whether the value accumulated is an odd or even multiple of five. A twenty cent value register or accumulator registers the twenty cent components of a count of a quarter or half dollar and selectively connects levels of the 10¢ stepping switch to the source in accordance with the number of twenty cent increments counted. The 40¢ stepping switch functions to actuate the twenty cent value register or accumulator twice and the 10¢ stepping switch once for each half dollar counted. In this manner, a minimum number of dependable and rugged electro-mechanical devices are employed. That is, one such device is employed for each coin which must be accommodated.

We claim:

1. A coin value totalizer for a varied denomination coin handling machine, comprising: digit coin value indicators 0 through 9; a cent stepping switch for controlling said digit indicators and operable upon the count of a cent, said cent stepping switch having levels each provided with a wiper and a plurality of contracts engaged sequentially by said wiper as the cent switch steps, the contacts of a first level being connected in sequence to the digit indicators 0 through 4 and the contacts of a second level being connected in sequence to the digit indicators 5 through 9; a five cent value accumulator operable upon the count of a five cent piece, upon the count of a quarter dollar, and when the count registered in said cent stepping switch increases to a multiple of five, said five cent value accumulator connecting the wiper of said first level of said cent stepping switch to a source of electric current when the value accumulated is an even multiple of five and connecting the wiper of said second level of said cent stepping switch to said source when the value accumulated is an odd multiple of five; tens coin value indicators 0 through 9; a ten cent stepping switch for controlling said tens indicators and operable upon the count of a dime, upon the count of a half dollar, and when the value accumulated in said five cent value accumulator increases to an even multiple of five, said ten cent stepping switch having levels each provided with a wiper and a plurality of contacts engaged sequentially by said wiper as the ten cent switch steps, the contacts of a first level being connected in sequence to the tens indicators 0 through 9 and each of the contacts of second, third, fourth and fifth levels being connected to the second succeeding contact of the preceding level; and a twenty cent value accumulator operable upon the count of a quarter dollar and operable twice upon the count of a half dollar, said twenty cent value accumulator initially connecting the wiper of said first level of said ten cent stepping switch to said source and connecting a wiper of a next succeeding level of said ten cent stepping switch to said source for each twenty cent value accumulated therein.

2. A coin value totalizer for a varied denomination coin handling machine, comprising: digit coin value indicators 0 through 9; tens coin value indicators 0 through 9; a current pulse operated cent stepping switch for controlling said digit indicators and having levels each provided with a wiper and a plurality of contacts engaged sequentially by said wiper as the cent switch steps, the contacts of a first level being connected in sequence to the digit indicators 0 through 4 and the contacts of a second level being connected in sequence to the digit indicators 5 through 9; a current pulse operated five cent value accumulator connecting the wipers of said first level of said cent stepping switch to a source of electric current when the value accumulated is an even multiple of five and connecting the wiper of said second level of said cent stepping switch to said source when the value accumulated is an odd multiple of five; a current pulse operated ten cent stepping switch for controlling said tens indicators and having levels each provided with a wiper and a plurality of contacts engaged sequentially by the said wiper as said ten cent switch steps, the contacts of a first level being connected in sequence to the tens indicators 0 through 9 and each of the contacts of second, third, fourth and fifth levels being connected to the second succeeding contact of the preceding level; a current pulse operated twenty cent value accumulator initially connecting the wiper of said first level of said ten cent switch to said source and upon operation connecting a wiper of a succeeding level of said ten cent stepping switch to said source in relation to the number of twenty cent values accumulated; coin controlled means responsive to the count of a cent, a five cent piece, and a dime to feed a pulse of electric current to said cent stepping switch, said five cent value accumulator, and said ten cent stepping switch, respectively; means including said cent stepping switch to feed a pulse of electric current to said five cent value accumulator when the count registered in said cent stepping switch increases to a multiple of five; means including said five cent value accumulator to feed a pulse of electrical current to said ten cent stepping switch when the value accumulated therein increases to an even multiple of five; coin controlled means responsive to the count of a quarter dollar to feed a pulse of electric current to said twenty cent value accumulator and to feed a pulse of electric current to said five cent value accumulator; and coin controlled means responsive to the count of a half dollar to feed two pulses of electric current to said twenty cent value accumulator and to feed a pulse of electric current to said ten cent stepping switch.

3. A coin value totalizer for a varied denomination coin handling machine, comprising: a solenoid operated dollar counter; digit coin value indicators 0 through 9; a cent stepping switch for controlling said digit indicators and operable upon the count of a cent, said cent stepping switch having levels each provided with a wiper and a plurality of contacts engaged sequentially by said wiper

as the cent switch steps, the contacts of a first level being connected in sequence to the digit indicators 0 through 4 and the contacts of a second level being connected in sequence to the digit indicators 5 through 9; a five cent value accumulator operable upon the count of a five cent piece, upon the count of a quarter dollar, and when the count registered in said cent stepping switch increases to a multiple of five, said five cent value accumulator connecting the wiper of said first level of said cent stepping switch to a source of electric current when the value accumulated is an even multiple of five and connecting the wiper of said second level of said cent stepping switch to said source when the value accumulated is an odd multiple of five; tens coin value indicators 0 through 9; a ten cent stepping switch for controlling said tens indicators and operable upon the count of a dime, upon the count of a half dollar, and when the value accumulated in said five cent value accumulator increases to an even multiple of five, said ten cent stepping switch having levels each provided with a wiper and a plurality of contacts engaged sequentially by said wiper as the ten cent switch steps, the contacts of a first level being connected in sequence to the tens indicators 0 through 9 and each of the contacts of second, third, fourth and fifth levels being connected to the second succeeding contact of the preceding level; a twenty cent value accumulator operable upon the count of a quarter dollar and operable twice upon the count of a half dollar, said twenty cent value accumulator initially connecting the wiper of said first level of said ten cent stepping switch to said source and upon operation connecting a wiper of a succeeding level of said ten cent stepping switch to said source in relation to the number of twenty cent values accumulated; and dollar count carry means responsive to the position of the wipers of said ten cent stepping switch to energize the solenoid of said dollar counter when the count has reached ninety cents and above and the ten cent stepping switch is operated and further adapted to energize the solenoid of said dollar counter when the count has reached seventy-five cents and above and the twenty cent value accumulator is operated.

4. The totalizer mechanism of claim 3 together with a reset mechanism comprising: a zero setting lever for said dollar counter, a reset switch actuated by said zero setting lever, energization circuits completed by the actuation of said reset switch to continuously operate said cent and ten cent stepping switches and said five cent value and twenty cent value accumulators, and switch means for each of said stepping switches and value accumulators operable thereby when the respective stepping switch and accumulator has cycled to its zero position to interrupt the energization circuit to said respective stepping switch and accumulaor.

5. A coin value totalizer for a varied denomination coin handling machine, comprising: a current pulse operated dollar counter; digit coin value indicators 0 through 9; tens coin value indicators 0 through 9; a current pulse operated cent stepping switch for controlling said digit indicators and having levels each provided with a wiper and a plurality of contacts engaged sequentially by said wiper as the cent switch steps, the contacts of a first level being connected in sequence to the digit indicators 0 through 4 and the contacts of a second level being connected in sequence to the digit indicators 5 through 9; a current pulse operated five cent value accumulator connecting the wipers of said first level of said cent stepping switch to a source of electric current when the value accumulated is an even multiple of five and connecting the wiper of said second level of said cent stepping switch to said source when the value accumulated is an odd multiple of five; a current pulse operated ten cent stepping switch for controlling said tens indicators and having levels each provided with a wiper and a plurality of contacts engaged sequentially by said wiper as said ten cent switch steps, the contacts of a first level being connected in sequence to the tens indicators 0 through 9 and each of the contacts of second, third, fourth and fifth levels being connected to the second succeeding contact of the preceding level; a current pulse operated twenty cent value accumulator initially connecting the wiper of said first level of said ten cent switch to said source and connecting a wiper of a next succeeding level of said ten cent stepping switch for each twenty cent value accumulated therein; coin controlled means responsive to the count of a cent, a five cent piece, and a dime to feed a pulse of electrical current to said cent stepping switch, said five cent value accumulator, and said ten cent stepping switch, respectively; means including said cent stepping switch to feed a pulse of electric current to said five cent value accumulator when the count registered in said cent stepping switch increases to a multiple of five; means including said five cent value accumulator to feed a pulse of electric current to said ten cent stepping switch when the value accumulated increases to an even multiple of five; coin controlled means responsive to the count of a quarter dollar to feed a pulse of electric current to said twenty cent value accumulator and to feed a pulse of electric current to said five cent value accumulator; coin controlled means responsive to the count of a half dollar to feed two pulses of electric current to said twenty cent value accumulator and to feed a pulse of electric current to said ten cent stepping switch; and dollar count carry means responsive to the position of the wipers of said ten cent stepping switch to feed a pulse of electric current to said dollar counter when the count has reached ninety cents and above and the ten cent stepping switch is operated and further to feed a pulse of electric current to said dollar counter when the count has reached seventy-five cents and above and the twenty cent value accumulator is operated.

6. A totalizer for registering the value of the coins of different denomination handled by a coin handling machine, comprising: digit count value indicators 0 through 9; a solenoid operated cent stepping switch for controlling said digit indicators and having levels each provided with a wiper and a plurality of contacts engaged sequentially by the wiper as the cent stepping switch steps, the contacts of a first level being connected in sequence to the digit indicators 0 through 4 and the contacts of a second level being connected in sequence to the digit indicators 5 through 9; tens count value indicators 0 through 9; a solenoid operated ten cent stepping switch for controlling said tens indicators and having levels each provided with a wiper and a plurality of contacts engaged sequentially by the wiper as the ten cent stepping steps, the contacts of a first level being connected in sequence to the tens indicators 0 through 9 and the contacts of second, third, fourth and fifth levels being connected to the second succeding contact of the preceding level; a solenoid operated five cent register switch for accumulating five cent values and connecting the wiper of the first level of said cent stepping switch to a source of electric current when the values accumulated are even multiples of five and connecting the wiper of the second level of said cent stepping switch to said source when the values accumulated are odd multiples of five; a solenoid operated twenty cent register switch connecting the wipers of the first through fifth levels of said ten cent stepping switch to said source in accordance with the number of twenty cent values accumulated; circuits supplied by said source to energize the solenoids of said stepping switches and said five and twenty cent register switches; a circuit closure for each coin denomination in said circuits determining which of said solenoids are energized; means including a half dollar circuit closure adapted to energize the solenoid of said twenty cent register switch twice and to energize the solenoid of said ten cent stepping switch once during each actuation of said half dollar circuit closure; means associated with said cent stepping switch to energize the solenoid of said five cent register switch when the count registered in

said cent stepping switch advances to a multiple of five; means associated with said five cent register switch to energize the solenoid of said ten cent stepping switch when the value accumulated in said five cent register switch increases to an even multiple of five; and means adapted to energize the solenoid of said five cent register switch and to energize the solenoid of said twenty cent register switch when the quarter dollar circuit closure is actuated.

7. A totalizer for registering the total value in dollars and cents of the coins of different denomination handled by a coin handling machine, comprising: a solenoid operated dollar counter having a zero setting shaft; digit count value indicators 0 through 9; a solenoid operated cent stepping switch for controlling said digit indicators and having levels each provided with a wiper and a plurality of contacts engaged sequentially by the wiper as the cent stepping switch steps, the contacts of a first level being connected in sequence to the digit indicators 0 through 4 and the contacts of a second level being connected in sequence to the digit indicators 5 through 9; tens count value indicators 0 through 9; a solenoid operated ten cent stepping switch for controlling said tens indicators and having levels each provided with a wiper and a plurality of contacts engaged sequentially by the wiper as the ten cent stepping switch steps, the contacts of a first level being connected in sequence to the tens indicators 0 through 9 and the contacts of second, third, fourth and fifth levels being connected to the second succeeding contact of the preceding level; a solenoid operated five cent register switch for accumulating five cent values and connecting the wiper of the first level of said cent stepping switch to a source of electric current when the values accumulated are even multiples of five and connecting the wiper of the second level of said cent stepping switch to said source when the values accumulated are odd multiples of five; a solenoid operated twenty cent register switch connecting the wipers of the first through fifth levels of said ten cent stepping switch to said source in accordance with the number of twenty cent values accumulated; circuits supplied by said source to energize the solenoids of said stepping switches and said five and twenty cent register switches; a circuit closure for each coin denomination said circuits determining which of said solenoids are energized; means including a half dollar circuit closure adapted to energize the solenoid of said twenty cent register switch twice and to energize the solenoid of said ten cent stepping switch once during each actuation of said half dollar circuit closure; means associated with said cent stepping switch to energize the solenoid of said five cent register switch when the count registered in said cent stepping switch advances to a multiple of five; means associated with said five cent register switch to energize the solenoid of said ten cent stepping switch when the value accumulated in said five cent register switch increases to an even multiple of five; means adapted to energize the solenoid of said five cent register switch and to energize the solenoid of said twenty cent register switch when the quarter dollar circuit closure is actuated; dollar count carry means responsive to the position of the wipers of said ten cent stepping switch to energize the solenoid of said dollar counter when the count has reached ninety cents and above and the solenoid of said ten cent stepping switch is energized and further adapted to energize the solenoid of said dollar counter when the count has reached seventy-five cents and above and the solenoid of said twenty cent register switch is energized; a zero reset switch actuated by said zero setting shaft; a reset circuit supplied by said source and completed by the actuation of said zero reset switch to continously energize the solenoids of said stepping switches and register switches; a sequence interrupted switch for each of said twenty cent register switch, one cent stepping switch, five cent register switch and ten cent stepping switch actuated when the respective stepping switch and register switch has cycled to its zero count position, each sequence interrupted switch having a normal position connecting said reset circuit to the solenoid of said respective stepping switch and register switch and an actuated position extending said reset circuit to the next succeeding sequence interrupted switch; and a self-interrupted switch for each of said stepping switches and register switches actuated by the energization of the solenoid of the respective switch to repeatedly interrupt the reset circuit to such solenoid.

8. A totalizer for registering the total value in dollars and cents of the coins of different denomination handled by a coin sorting machine, comprising: a solenoid operated dollar counter adapted to register successive dollar counts for each energization of the solenoid; a tens numerical display tube and a units numerical display tube each having separate filaments 0 through 9 adapted to give visual indication of the count when a circuit is completed through a filament; a plurality of solenoid operated stepping switches having levels each provided with a wiper and a plurality of contacts engaged sequentially by said wiper as the switch steps, and including a cent stepping switch having a first level whose contacts are connected in sequence to the filaments 0 through 4 of said units tube and a second level whose contacts are connected in sequence to the filaments 5 through 9 of said units tube, a five cent stepping switch having a first level with the first contact thereof and each alternate contact thereafter being connected to the wiper of the first level of said cent stepping switch and the remaining contacts being connected to the wiper of the second level of said cent stepping switch, a ten cent stepping switch including a first level having its contacts connected in sequence to the filaments 0 through 9 of said tens tube and second, third, fourth and fifth levels each of the contacts of which are connected to the second succeeding contact of the preceding level, and a twenty cent stepping switch including a first level whose contacts are connected in sequence to the wipers of the first through fifth levels of said ten cent stepping switch; a circuit connecting the wiper of the first level of said five cent stepping switch and the wiper of the first level of said twenty cent stepping switch to a source of electric current; circuits supplied by said source to energize the solenoids of said stepping switches; coin controlled switches in said last mentioned circuits for each coin denomination determining which of said solenoids are energized; half dollar register means including a half dollar controlled switch adapted to energize the solenoid of said twenty cent stepping switch twice and to energize the solenoid of said ten cent stepping switch once during the count of a half dollar; five cent carry means associated with said cent stepping switch to energize the solenoid of said five cent stepping switch when the count registered in said one cent stepping switch advances to a multiple of five; ten cent carry means associated with said five cent stepping switch to energize the solenoid of said ten cent stepping switch when the count registered in said five cent stepping switch increases to an even multiple of five; means adapted to complete a circuit to energize the solenoid of said five cent stepping switch when the quarter dollar coin controlled switch is actuated; and dollar count carry means associated with said twenty cent stepping switch and responsive to the position of the wipers of said ten cent stepping switch to energize the solenoid of said dollar counter when the count has reached ninety cents and above and the solenoid of said ten cent stepping switch is energized and further adapted to energize the solenoid of said dollar counter when the count has reached seventy-five cents and above and the solenoid of said twenty cent stepping switch is energized.

9. The totalizer of claim 8 wherein the half dollar register means comprises: a forty cent solenoid operated

stepping switch having a wiper and a plurality of contacts engaged sequentially by said wiper as the forty cent stepping switch steps, the second and succeeding alternate contacts thereof being connected in common; a first circuit supplied by said source for energizing the solenoid of said twenty cent stepping switch upon the actuation of said half dollar controlled switch; a second circuit completed by the energization of the solenoid of said twenty cent stepping switch for energizing the solenoid of said forty cent stepping switch; switch means responsive to the energization of the solenoid of said forty cent stepping switch to interrupt said first circuit; an alternate circuit including the wiper and common connected contacts of said forty cent stepping switch for reenergizing the solenoid of said twenty cent stepping switch after deenergization thereof by said switch means; and a circuit supplied by said source for energizing the solenoid of said ten cent stepping switch upon the actuation of said half dollar controlled switch.

10. The totalizer of claim 8 wherein the five cent carry means comprises a third level of the cent stepping switch having its wiper connected to said source upon energization of the solenoid of the cent stepping switch and those contacts of said third level which positionally correspond with the contacts of the first and second levels which are connected to the digit indicators 4 and 9 being connected to the solenoid of said five cent stepping switch, whereby energization of the solenoid of the cent stepping switch upon the count of the fifth or tenth cent will energize the solenoid of the five cent stepping switch.

11. The totalizer of claim 8 wherein the ten cent carry means comprises a second level of said five cent stepping switch having its wiper connected to said source upon energization of the solenoid of said five cent stepping switch and having its second and each succeeding alternate contact connected to the solenoid of said ten cent stepping switch, whereby energization of the solenoid of said five cent stepping switch upon the accumulation of a count of an even multiple of five will complete a circuit to energize the solenoid of the ten cent stepping switch.

12. The totalizer of claim 8 wherein the dollar count carry means comprises: sixth, seventh and eighth levels of said ten cent stepping switch each having contacts indicative of successive counts of ten cent values, the wiper of the sixth level being connected to said source when the count registered in said five cent stepping switch is an odd multiple of five, the wiper of the seventh level being connected to said source when the solenoid of said twenty cent stepping switch is energized, and the wiper of said eighth level being connected to said source when the solenoid of said ten cent stepping switch is energized; and a second level if said twenty cent stepping switch having its wiper connected to the solenoid of said dollar counter for energization thereof and having contacts indicative of successive counts of twenty cent values, each contact of said second level being connected to the contact of the sixth level of said ten cent stepping switch indicative of a count which when added to the count indicated by the second level contact is seventy cents, each contact of said second level also being connected to the contacts of the seventh level indicative of counts which when added to the count indicated by the second level contact is eighty and ninety cents, and each contact of said second level being further connected to the contact of said eighth level indicative of a count which when added to the count indicated by the second level contact is ninety cents.

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LEO SMILOW, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,196,257 July 20, 1965

Arnold R. Buchholz et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 20, after "provide" insert -- such --; column 7, line 9, for "corresponds" read -- correspond --; line 30, for "1421" read -- 142I --; column 8, line 50, for "energizing" read -- energization --; column 11, line 18, for "coil" read -- coin --; column 13, line 75, for "1421" read -- 142I --; column 21, line 59, for "contracts" read -- contact --; column 24, line 50, after "stepping" insert -- switch --; column 28, line 14, for "if" read -- of --.

Signed and sealed this 18th day of January 1966.

(SEAL)

Attest:

ERNEST W. SWIDER
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