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Dykehouse et al.

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[54] BILL AND COIN CHANGER

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[51] Int. Cl.G07d 1/06

[58] Field of Search.....133/1, 2, 4, 5; 194/DIG. 14

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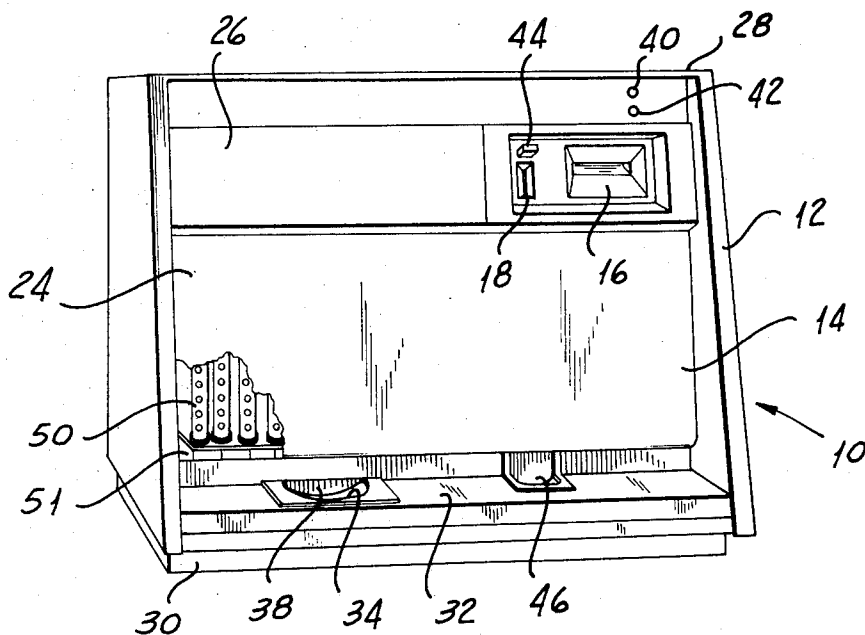
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[57]

ABSTRACT

A machine for changing currency such as bills or coins of larger denomination for change in the form of coins of a lower denomination. When a bill is to be changed, a settable group of coin ejectors is operated. When a coin is to be exchanged, for example a 50-cent piece, other groupings of coin ejectors are operated in combinations which can be varied at the option of the machine service personnel.

2 Claims, 8 Drawing Figures



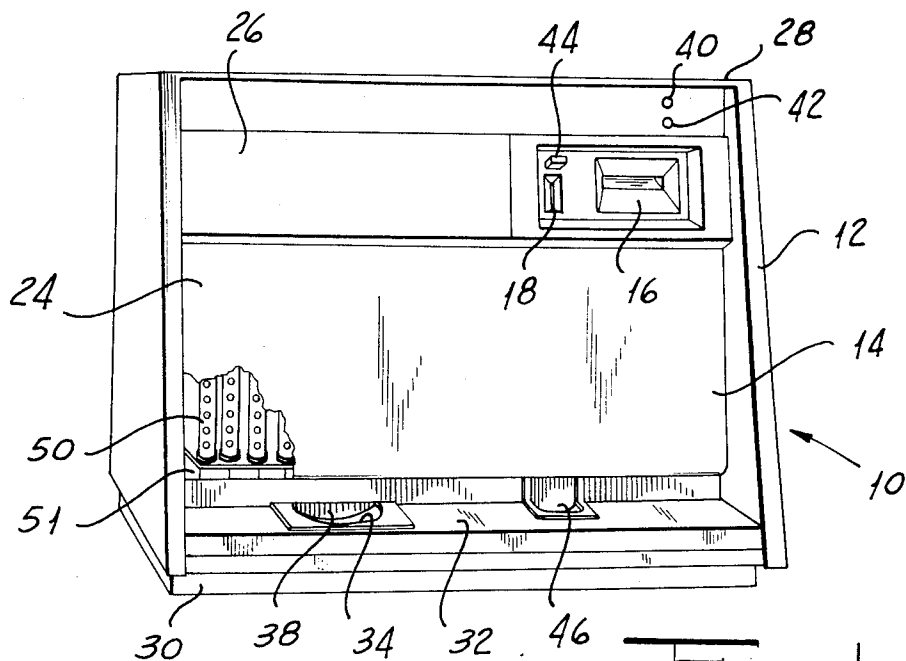


Fig 1

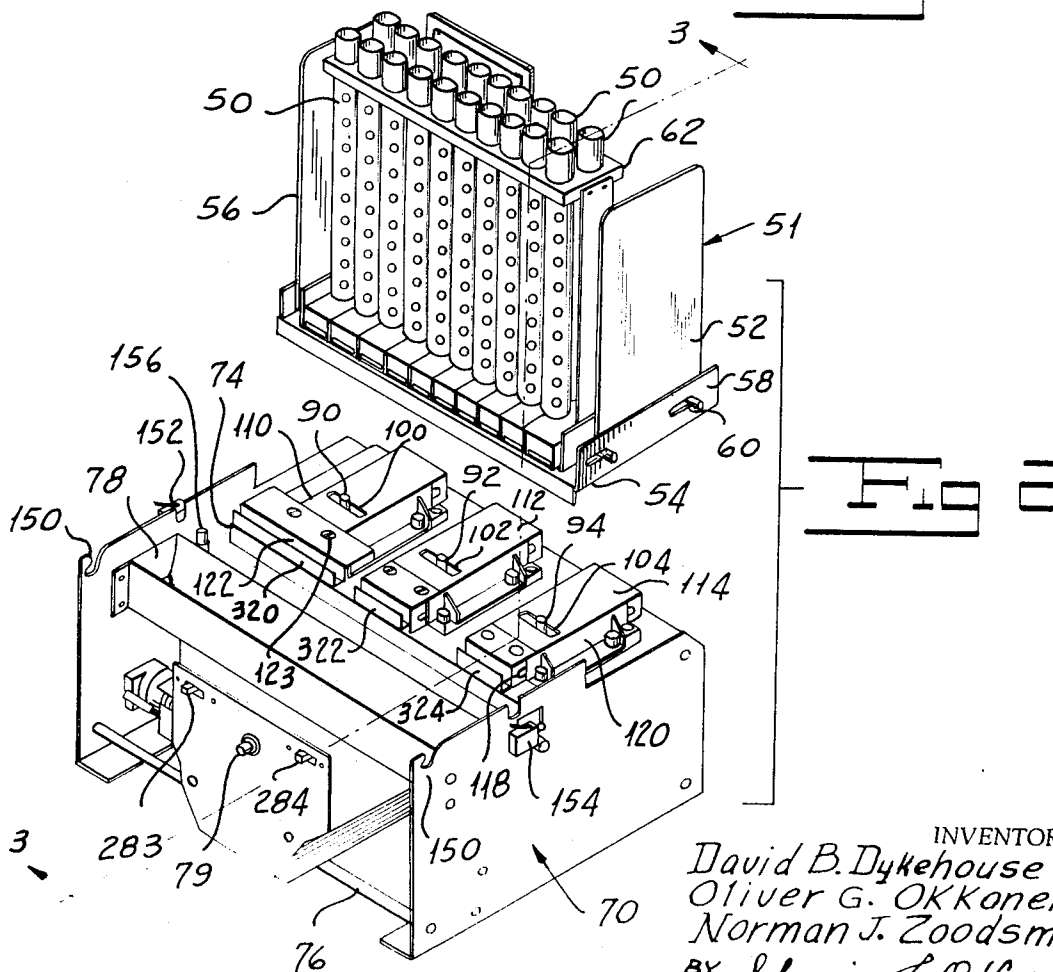
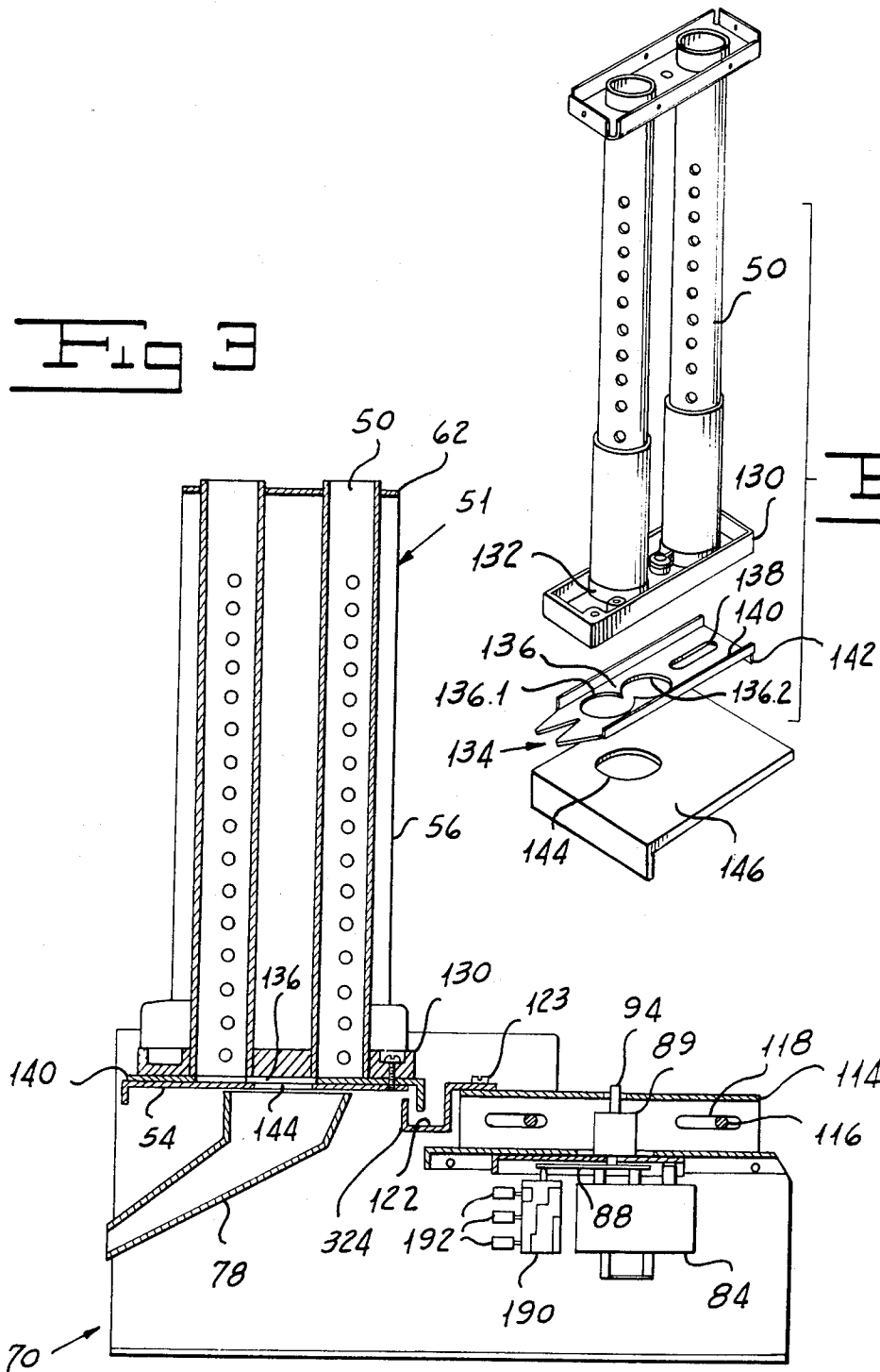


Fig 2

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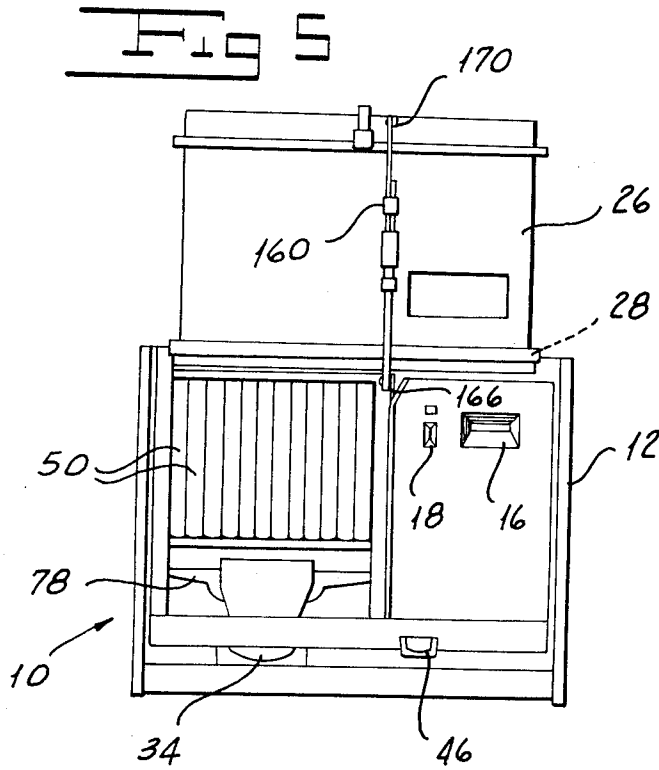
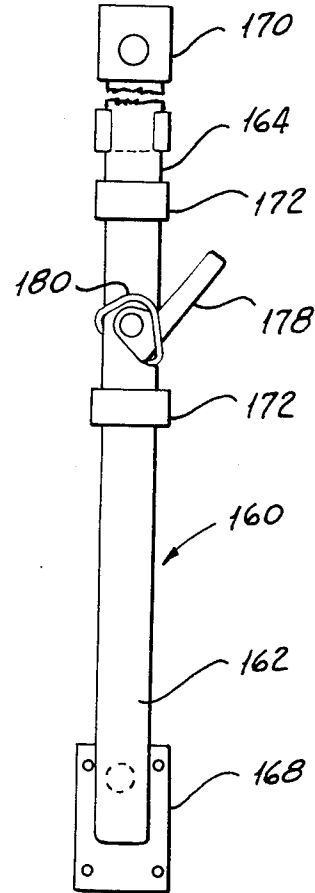
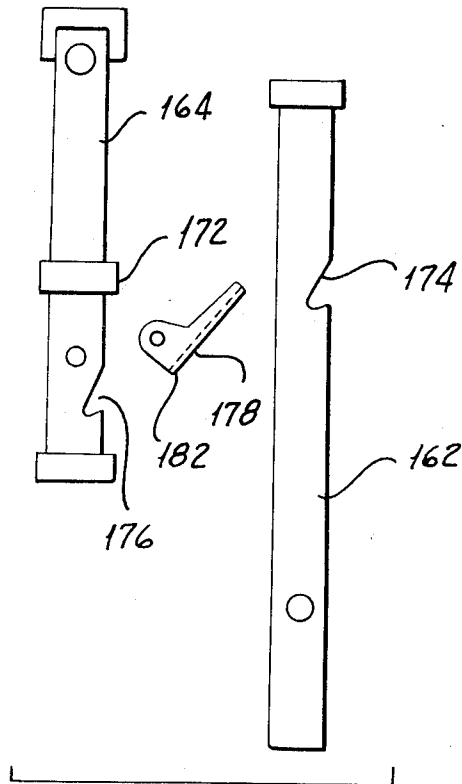
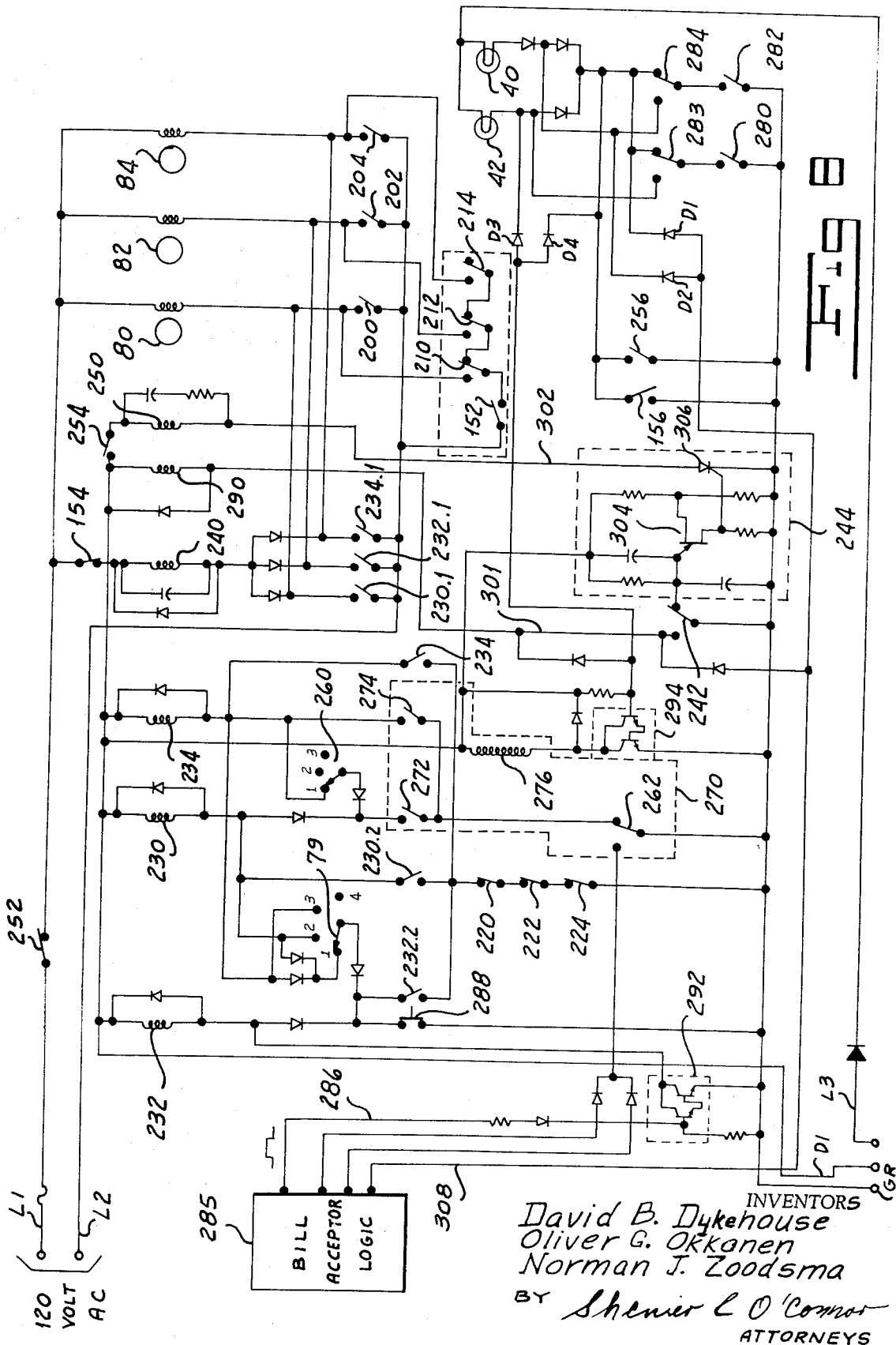


Fig 7

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BILL AND COIN CHANGER**BACKGROUND OF THE INVENTION**

Machines for changing bills and coins as shown by the prior art generally provide fixed combinations of coin ejection tubes, with a full back and forth cycle necessary for each dispensing operation. Such machines have a low storage capacity and generally a slower operating cycle time.

A different approach to the dispensing of change is shown by U.S. Pat. No. 3,366,127, issued on Jan. 30, 1968, to Charles T. Breitenstein et al. In the Breitenstein patent, a high storage capacity changer is provided in which one-fourth of a complete slide reciprocatory cycle only is required for each dispensing operation. Each coin dispensing slide remains in the position to which it has moved during the last operation. Certain dispensing slides may be operated simultaneously to provide a multiplicity of different output conditions in the dispensing of change.

SUMMARY OF THE INVENTION

The present invention provides a machine for exchanging coins for currency such as bills or coins, and whose dispensing system has a number of improvements over the dispensing mechanism shown by the Breitenstein patent. The present machine utilizes in its dispensing operations a dual bank of coin tubes providing large capacity storage. The bank of coin tubes may readily be dropped into place for operation and may be readily removed as a unit. Removal of the unit is sensed to inactivate acceptance of further currency.

It is therefore an object of our invention to provide a new and an improved bill and coin changer.

It is another object of the invention to provide an improved currency changer which allows the output of coins for various currency inputs to be changed readily.

It is a further object of our invention to provide a currency changer which permits ready removal and replacement of the coin tubes.

It is a still further object of the invention to provide a currency changer which responds to malfunction and in response thereto renders itself inoperative.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view in perspective of a machine embodying our invention, one corner of the cabinet being broken away to show the interior thereof;

FIG. 2 is a front view in perspective of the mechanism embodying the invention with a coin magazine shown separated from the dispensing mechanism;

FIG. 3 is a sectional view of the dispensing mechanism taken along line 3—3 of FIG. 2 with the components thereof operatively joined;

FIG. 4 is an exploded view of a sample pair of coin tubes and their slide and dispensing plate, the components being shown in exploded form below the tubes;

FIG. 5 is a perspective view of the machine with the front service door in the fully open position;

FIG. 6 is a side elevational view of the door check structure of FIG. 5;

FIG. 7 is a side view in exploded form of the major elements of the door check structure of FIG. 6;

FIG. 8 is a schematic circuit drawing of one form of electrical circuit which may be used with our bill and coin changing machine.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 there is shown the exterior of the coin and bill changer 10 embodying our invention. The changer 10 has an exterior cabinet 12 of rectangular configuration forming a decorative housing in addition to safeguarding the changer contents which may total \$500 to \$1,000 at any one time. The machine may be mounted in a number of ways, none of which has been shown. These include mounting on a pedestal or stand or, optionally, the cabinet may be wall mounted.

The front wall 14 of the cabinet 12 has an upper control area with a bill inlet opening 16 and a coin insert slot 18 to allow bills or larger denomination coins to be inserted and tested. The bill inlet opening 16 may feed a bill detector or acceptor of the type shown in co-pending U.S. Pat. application, Ser. No. 633,903, filed Apr. 26, 1967 by Donald Hooker, the bill acceptor being shown herein schematically in FIG. 8. The coin insert slot 18 may pass coins to a conventional multi-denominational coin testing and validating mechanism of any standard type known to the art, (not shown herein). Such accepting mechanisms are well known in the art, and as is generally known, provide an output in the form of a switch pulse designating the value of the coin accepted.

The machine front wall 14 has below the control area and recessed therefrom a vertical panel 24, which with the control area, forms a service door 26 pivotal about a hinge axis 28 along the top front edge of the cabinet 12. Below service door 26 and spaced therefrom adjacent the cabinet base 30 is a convenience shelf 32. The shelf 32 has a recessed coin tray 34 partially covered by the panel 24 of the wall 14 and partially accessible from the exterior of the machine. Depending from panel 24 and covering the vertical extent of the opening provided by recessed tray 34 is a small semi-circular door 38 movable about a horizontal axis at its upper edge. The door 38 is pivotal such that its curved lower portion moves freely forward on being struck by coins dispensed from inside the machine and allows these coins to enter the tray 34. Blocking shoulders (not shown) are provided to the rear of door 38 to prevent inward movement of the door thereby deterring improper access to the cabinet interior. Various indicator lamps have been provided, a first lamp 40 to show that no further change is available for dollar bills and a second lamp 42 to indicate the unavailability of change for coins.

A coin return button 44 is provided adjacent the insert openings to allow an optional return of coins or the bill, if desired by the user. Naturally such button must be actuated prior to the acceptance of the inserted money in order to return the bill or coin, since the changing operation occurs automatically on acceptance. Coins returned in this manner or coins rejected by the coin validator pass through the coin return chute and tray 46 located below the coin insertion area.

In FIG. 1, there can be seen a bank of coin tubes 50 positioned within the coin tube assembly 51 located

generally above and behind the recessed coin tray 34. In FIG. 2, we show the bank of coin tubes 50 mounted in a carrying holder 52, the holder being of generally U-shaped configuration with base plate 54 and side uprights 56. Extending normally downwardly from the front of base 54 are flanges 58 and protruding normally outwardly from uprights 56 are mounting lugs 60. Top and side brackets 62 hold the tubes fixedly in alignment with one another with respect to carrying holder 52 to form the assembly 51.

The coin tube assembly 51 seats cooperatively on dispensing motor housing 70 (FIG. 2). Housing 70 is rigidly affixed to cabinet base 30 within the enclosure cabinet 12 as can be seen best in FIG. 5. Housing 70 is comprised of side housing walls 72 supported mutually in parallel relationship by transverse top bracing plate 74, transverse tie rod 76 and coin chute 78. Affixed suitably to the underside of bracing plate 74 (as seen best in FIG. 3), are three dispensing motors 80, 82 and 84 each disposed with its output shaft (not shown) extending upwardly. The output shaft of each motor is connected to provide the input to a speed reducing gear box 88 to reduce the rotary speed of each motor output. Each gear box 88 rotates an eccentric 89, each eccentric having its respective crank pin 90, 92, and 94 extending upwardly to protrude through laterally slotted openings 100, 102 and 104 in the respective reciprocating driving slides 110, 112 and 114. These driving slides are channel members with the channel web disposed downwardly. The driving slides are individually reciprocated by the eccentric movement of the respective crank pins 90, 92 and 94. The slides are restrained and guided within a forward to rear path by the mating of inwardly facing bosses 116 on the respective stationary bracing members 120 within horizontal slots 118 in each slide side wall. Bracing members 120 are stationarily secured to the top plate of motor housing 70 in a suitable fashion to provide structural guiding members for the respective slides.

Each slide has mounted on its front end a coupler, the couplers being numbered 320, 322 and 324. Each coupler has equally spaced apart holes for receiving screws 123 which are tightened into suitably threaded openings in the driving slides. Each coupler has an upwardly open, lateral channel 122 at its front end, the channels 122 being transmissive of the reciprocatory movement of the driving motors, as will be explained.

As can be seen in FIGS. 2 and 4, coin tubes 50 are aligned in pairs of tubes in a forward-to-rear sense, the tubes of a pair being of the same diameter for holding coins of the same denomination. Laterally there are ten pairs of tubes mounted in assembly 51. Each coin tube pair has an individual coin tube base 130 with two upstanding annuli 132, each annulus is of sufficient height to carry therein a tube of the pair. Each annulus is sized to receive a coin tube with the bottom of the annulus and tube open. Secured slideably to the underside of each coin tube base is a coin dispensing slide 134, the slide serving the two tubes in the front-to-rear lineup on base 130. Each coin slide 134 has extending through it two overlapping coin-sized openings 136 in its slide face and rearwardly thereof longitudinally elongate mounting slots 138. Mounting pins 139 in the coin tube base 130 ride within the slots 138 to join the slide 134 to the tube base. The slide face is formed with upstand-

ing flanged guide rails 140 along both sides and at its rear edge with a downwardly projecting coupling finger 142. Finger 142 of each coin tube pair rides in open channel 122 of the adjacent motor slide coupler when the coin tube assembly 51 is mounted on the motor housing 70 to thereby couple the coin dispensers to the coin tubes.

Each coin slide 134 rests between the coin tube base and assembly base 54 and, as mentioned, is slideable in a forward-to-rear horizontal plane. Within each assembly base 54 midway between the front and rear tubes, there is a single coin dispensing opening 144 for passing a coin therefrom to the output coin chute 78, the assembly base 54 thereby acting as a coin dispensing slide keeper 146.

The lateral width of the respective channels 122 of the coupler controls the number of dispensing slides which can be operated by each dispensing motor. Shown are coupler 320 on driving slide for four coin dispensing slides, coupler 322 on driving slide for three coin dispensing slides and coupler 324 on driving slide for three coin dispensing slides respectively. By replacing the couplers shown with couplers of different widths, other coin combinations are possible, as will be described. Such replacement can be effected by removing the mounting screws 123 and reaffixing couplers of the desired width to the respective slides. When a coin tube assembly 51 is placed on the dispensing motor housing, mounting lugs 60 mate within receiving cutouts 150 in housing side walls 72 and this mating alignment allows each mating finger 142 to mate with the respective channel 122 of its coupler. On side walls 72 adjacent cutouts 150, there are mounted miniature snap switches 152, 154 and 156 to sense the presence or absence of the coin tube assembly 51.

In FIGS. 5 through 7 we show a door check mechanism 160 for positively retaining the service door 26 in the open position during servicing. As mentioned previously, service door 26 is opened upwardly about a conventional hinge on the axis 28 along the top of the door. It is therefore important that the door be kept open during servicing and prevented from inadvertent closure which could cause possible physical harm to the serviceman.

Door check mechanism 160 includes two telescoping slider bars 162 and 164. Lower bar 162 is affixed pivotally to a suitable cabinet bracket 166 by means of a mounting bracket 168. Upper bar 164 is pivotally secured to the door through a suitable mounting 170. The bars 162 and 164 are held adjacent one another by upper and lower clips 172, the clips allowing relative linear sliding movement of the bars with respect to one another. The bars have similarly shaped notches 174 and 176 which reach alignment with the door fully open. Pinned to upper bar 164 adjacent the notch 176 is a release latch 178 which nests in the aligned notches 174 and 176 with the notches aligned. A torsion spring 180 holds the latch 178 with its latch tip 182 in the aligned notches to hold the mechanism fully extended and thereby latch the service door in its open position. To release the latch 178, pressure is exerted on the outer finger 184 of the latch to pivot latch tip 182 out of the notches and to allow the slide bars to slideably telescope while the service door is being closed.

When the service door is being opened, the slide bars slide relative to another until the notches are in alignment at which time under the urging of spring 180, latch tip 182 falls into the aligned notches.

Turning to FIG. 3, there we show the respective dispensing motors 80, 82 and 84, each with its cam structure 190 and each with its cam operated switches generally indicated by numeral 192. Each full cycle of motor operation causes one half revolution of cam 190, each cycle causing either forward or backward movement of the slide between forward or alternate position and rear or home positions of the coin slides.

In FIG. 8 we show the circuitry to operate the changer. The circuit is powered by 120-volt AC leads L1 and L2 in the motor operating circuit and derived therefrom a 30-volt direct current from leads D1 and ground (G), and rectified DC on lead L3 for pulsing lamps 40 and 42. As previously mentioned, each dispensing motor 80, 82 and 84 has three cam switches generally indicated as 192 on FIG. 3. These cam switches include a first set of cam switches 200, 202, and 204, one on the structure of and sensing the cycling of each motor 80, 82 and 84. These switches perform the function of carrying the motors through one cycle (one half revolution of the cams 190) and opening the circuits to the respective motors at the end of the dispensing cycle of the motors. A second set of cam switches 210, 212 and 214 serves to perform an automatic homing function for their motor output mechanisms as controlled by homing switch 152. The latter cam switches close once for each full revolution of cams 190; hence, they close once for each two motor cycles of operation. The home position of these switches occurs when the respective motor slide is in the rear position of the two possible at-rest positions. The other respective motor cam switches 220, 222 and 224 are normally closed and are mutually in series such that when one opens, it releases the operating circuit to the control relays. The cam switches 220, 222 and 224 open near the end of each cycle of operation of their respective motors 80, 82 and 84.

To control the operation of the circuit, there are provided respective motor control relays 230, 232, and 234 for operating the respective dispensing motor 80, 82 and 84. Each relay has two normally open contact sets, one for holding the relay operated (230.2, 232.2 and 234.2) and a set of contacts (230.1, 232.1 and 234.1) for operating the respective dispensing motors. A timer relay 240 with one make-break contact set 242 acts in conjunction with a solid state timer circuit 244 to protect the machine against overlong machine operative cycles. A latch relay 250 is controlled by contact set 242. This relay 250 is electrically actuated and once actuated must be mechanically reset within the interior of the machine cabinet. The latch relay 250 controls three sets of contacts 252, 254 and 256. Contact set 252 is normally closed and on actuation of relay 250, the contact set opens to disconnect the 120 volt source current on AC source lead L1 from the circuit. A second contact set 254, normally closed, interrupts the circuit to latch relay set 250 when opened, resets the solid state timer 244 and the third contact set 256 closes to energize the trouble lamps 40 and 42.

To provide an option as to which motors are to be operated for different input amounts, there are pro-

vided the dollar select switch 79 and the 50-cent select switch 260. Switch 79 has three contacts, a first which is connected in parallel through rectifiers to motors 230 and 234 to permit operation of motors 80 and 84. Position 2 is connected through a rectifier to relay 230 alone, and position 3 is connected to relay 234 alone. Circuits through the contacts of switch 79 are in parallel to a circuit to relay 232, so that relay 232 will be operated on all dollar bill change dispensing cycles regardless of which combination of coin payouts is used. Thus, motor 82 and center slide 112 must be actuated for all dollar change dispensing cycles and the combination with other motor or motors 80 and 84 and their respective couplers 110 and 114 are dependent on the setting of switch 79.

Switch 260 provides an option as to whether relay 230 and its motor 80 alone shall be operated (switch position 2) or both 230 and 234 in parallel, the premise being that either a combination of the left and right motor 80 and 84 or only one motor 80 may be operated to provide change for a 50-cent piece at the option of the service personnel.

In addition, the circuit has a bill reject switch 262, operated in response to the coin reject button. The area designated in dashed lines as 270 schematically represents the coin testing mechanism and includes a 50-cent validating switch 272, a 25-cent validating switch 274, and a coin lockout solenoid 276. Coin empty switch 280 responds to an empty condition of the coin tubes to indicate that the coins stored are insufficient to provide change for coin insertions and switch 282 responds to an empty condition of tubes to indicate that insufficient change is available for dollar insertions. Each empty switch 280 and 282 has associated therewith a manual switch shown as 283 and 284, so that each empty switch may light both lamps or its own, as necessary. The dollar bill acceptor shown as box 285 provides an indication to the circuit in the form of an output pulse on lead 286. This pulse transmits information that a dollar bill has been tested, found valid, accepted and removed to storage so that one dollar's worth of change may safely be paid out. A conventional, manually actuatable test switch 288 is provided, as is a circuit operation counter 290. Two separate transistor amplifiers are provided, both two-stage networks. A first amplifier 292 amplifies the bill acceptance signal on lead 286 to trigger a machine cycle, while the second amplifier 294 amplifies a trouble signal or signal indicating empty coin tubes to actuate the coin mechanism lockout solenoid 276.

As explained previously, three dispensing motors are provided, 80, 82 and 84. Each motor on operation dispenses simultaneously through the dispensing slides certain of the bank of coin tubes 50. The number of coin dispensing slides actuated by each motor may be varied by changing the couplers to ones of desired width to dispense from the coin tubes to be operated by each motor.

To provide change for a quarter, half dollar or dollar using a storage medium of 10 coin tubes, the following tube operating combinations have been found to be quite acceptable.

In a first arrangement, one coin tube pair, the fourth from the left (D) is not used. The tubes have the following change:

A	B	C	D	E	F	G	H	I	J
5	10	10	0	25	25	5	10	5	5
cents cents cents			cents cents			cents cents		cents cents	

80

82

84

Using this pattern, all motors (80, 82 and 84) will be operated to dispense \$1.00 change in the form of two quarters, three dimes, and four nickels from the nine tubes in use. For 50 cents change, motors 80 and 84 may be operated to dispense three dimes and four nickels in change from tubes A, B, C, G, H, I and J. For 25 cents, an operation of motor 84 will pay out three nickels and one dime from tubes G, H, I, and J. To accomplish these combinations of coin tube dispensings, switches 79 (dollars) and 260 (50 cents) are each set to its No. 1 position, and indicator switches 283 and 284 are set to the right (the position shown in FIG. 8).

As an alternative, with all tubes in use, the following coin loading and slider combinations may be used:

A	B	C	D	E	F	G	H	I	J
5	10	10	25	25	25	5	10	5	5
cents cents cents cents				cents cents		cents cents cents			cents

80

82

84

Dollar payout in this instance will use only motors 80 and 82. Motor 80 will dispense a coin from each tube A-D and motor 82 from tubes E-F. This payout totals three quarters, two dimes and a nickel. For a 50-cent payout, motor 80 alone will be operated to dispense from tubes A-D one quarter, two dimes and one nickel. Quarter payout will cause operation of motor 84 and tubes G-J to emit one dime and three nickels. Switches 79 (dollar) and 260 (50 cents) are set to their No. 2 position to produce this combination, and indicator switches 283 and 284 are set to the left in FIG. 8.

Other combinations are possible as can readily be seen, it only being required by the wiring shown that center motor 82 be operated on responses to a dollar insertion and motor 84 for all quarter insertions.

Now, turning to the method of operation of the invention utilizing the circuit of FIG. 8, we assume the setting combination first described with switches 79 and 260 both at their No. 1 position, as shown in FIG. 8.

Insertion of a valid dollar bill into dollar inlet 16 will cause the bill to pass to the bill acceptor and be accepted by the bill acceptor 285. The bill will pass to a storage chamber (not shown herein) and will be stored there. Acceptor 285 will emit a positive pulse on lead 286, which will reach the base of the left transistor in the transistor amplifier 292. This amplifier will conduct, will cause the other transistor to conduct, and will cause relay 232 to be energized. Relay 232 on energization closed its contacts 232.1 and 232.2. At contacts 232.2, there is now closed an enabling path for relays 230 and 234, through closed motor cam switches 220, 222 and 224 to ground lead G. With switch 79 at its No. 1 position, relays 230 and 234 are energized through closed contacts of switch 79 and the previously described enabling path through contacts 232.2.

Relay contacts 230.1, 232.1 and 234.1 close and complete operating paths for motors 80, 82 and 84 between leads L1 and L2. At contacts 230.2, 232.2 and 234.4, self-holding paths for relays 230, 232 and 234

are closed through the previously described enabling path.

Closure of contacts 230.1, 232.1 and 234.1 close a path to relay 240 between leads L1 and L2. Relay 240 operates and switches its contacts 242. Contacts 242, on switching over, remove ground from the R-C timing network 244 to permit the network to start timing, and place ground on lead 301 to actuate counter 290 through a one-count cycle. Ground on conductor 301 causes amplifier 294 to stop conducting and cause normally operated solenoid 276 to release. This solenoid when released diverts inserted coins to coin return tray 46. Motors 80, 82 and 84 once operated enter into their operative cycles to dispense coins from each tube and close their respective cam switches 200, 202, and 204 to provide an alternate hold path for the motors and for relay 240, the hold paths being obvious paths between power leads L1 and L2.

The functional cycle of a motor begins with one coin slide opening of the connected double opening 136 beneath a coin tube and the other opening over the dispensing opening 144 of the coin slide keeper 146. For example, if a driving slide 110, 112 or 114 is in the forward position at the start of its cycle, the coin dispensing slides 134 coupled thereto have their forwardmost opening 136.1 under the front tube of the pair with the rear opening 136.2 positioned over dispensing opening 144. A coin within 136.1 will be pushed rearwardly during the motor operative cycle until forward opening 136.1 is over single opening 144, at which time the coin from 136.1 will fall into coin chute 78 and the rear opening 136.2 will then be below the rear coin tube of the tube pair. At this position, functionally the cycle has been completed. Simultaneously, each coin dispensing slide to which each driven motor is coupled has emitted its single coin. As the end of the dispensing cycle nears, cycle switches 220, 222 and 224 open to open the hold circuit to the operated relays 230, 232 and 234. These relays release and open their contacts 230.1, 232.1, 234.1, 230.2, 232.2 and 234.2. The original operating paths to both the relays 230, 232 and 234 and to the motors are opened. The motors continue through their cycles through their own alternate hold paths at contacts 200, 202 and 204.

As the motors 80, 82 and 84 reach the end of their operative cycles, cam switches 200, 202 and 204 open to terminate the cycle and release relay 240 and counter 290. The timer 244 is restored by release of contact set 242 of relay 240 and the changer is then in condition to accept other bills or coins for changing.

In the circuit, as described, for normal operation, operated motors, of course, restore after each cycle. If for some reason the motor cycle does not end within a predetermined time period, (approximately 1.3 to 1.5 times the normal cycle period), timer 244 will emit an output signal. Timer 244 is a conventional timing circuit utilizing a unijunction transistor 304 to respond to the R-C timing to trigger SCR 306 and thereby energize relay 250. Energization of relay 250 opens contacts 252, 254 and closes contacts 256. Contacts 252 on opening open conductor L1 and remove 120 volt power from the dispensing motors 80, 82 and 84 and relay 240. Opening of contacts 254 open the circuit to relay 250. Contacts 256 on closure connect ground to trouble lights 40 and 42 whose circuit is completed to

lead L3, a rectified low voltage AC source causing these lamps to flicker. A ground pulse through contact 256 passes through diode D4 to end conduction of transistor combination 294, thereby deenergizing solenoid 276 and causing rejection of coins inserted. This ground is also closed through diode D1 to conductor 308 to reject all bills inserted.

Relay 240 on being deenergized restores its contacts 242 to reset the timer 244 and discontinue timing.

Relay 250 is of the type which, once electrically pulsed, operates mechanically, latches itself operated, and must be manually reset by personnel having access to the machine interior, personnel such as machine servicemen.

In response to the normal insertion and acceptance of a valid 50-cent piece, coin switch 272 closes. With switch 260 in its No. 1 position, a circuit is completed from ground on lead G, closed contacts 262 and 272 to relays 230 and 234 and lead D1. Relays 230 and 234 are energized, closing their contacts 230.1, 230.2 and 234.1 and 234.2. Closure of these contacts initiates a cycle similar to the cycle previously described for \$1.00 payout, except that motor 82 is not energized. The payout from motors 80 and 84 dispenses three dimes and four nickels. The timing circuit functions as described previously in that the operative cycle length for the dispensing motors does not differ.

Similarly when a quarter is inserted into the machine, tested, validated and accepted, switch 274 closes to complete a circuit to relay 234. This relay controls the operation of motor 84 to pay out a dime and three nickels during a machine operation cycle.

A number of added safeguards have been provided including the functioning of tube assembly controlled switches 152, 154 and 156. Switch 154 is normally closed, and switches 152 and 156 are normally open, the normal condition being with the coin tube assembly 51 in place on the dispensing motor housing 70.

When the coin tube assembly is removed, switch 154 opens to deenergize the timer relay 240 so that no trouble timing can occur. Switch 156 closes to connect ground from lead G to empty lamps 40 and 42. These lamps are connected to lead L3 which provides a 9 volt AC supply. In this way, lamps 40 and 42 are pulsed with a flickering pulsation which, it has been found, is more noticeable than steadily lighted lamps. Ground through switch 156 and Diode D1 is closed to lead 308 to inactivate the bill acceptor 285. Ground through switch 156 is transmitted to the base of the right transistor of combination 294 to shut off conduction of the transistor combination and to deenergize solenoid 276. Deenergization of solenoid 276 rejects all inserted coins.

When switch 152 closes its contacts, it causes any dispensing motor 80, 82 or 84 which is not in the rear slide position to sequence itself home. With a motor in its forward position, its contacts 210, 212, or 214 will

be closed. If it is assumed that only motors 80 and 84 are in the forward position, a circuit will be closed from lead L2 through switch 152, and closed contacts 210 to motor 80. Motor 80 will cycle itself until contacts 210 open at which time the motor operating path is opened. This path through contacts 210, switch 152 and the then open contacts 212 (motor 82 being assumed to be at home) is closed to contacts 214 and motor 84. Motor 84 will cycle itself to its home position at which time contacts 214 open to render closed contacts 152 ineffective.

This homing feature assures that all motors will be aligned in their home position, such that a coin tube assembly can be placed on the motor housing without the need for any adjustments or manipulation of the motors or coin tube assemblies.

It can further be seen that closure of either or both empty switches 280 and 282 will in the manner previously mentioned connect ground lead G to one or both of these lamps 40 and 42 to flicker. Further, the ground will also be connected to diodes D1 and/or D2, D3 and/or D4 to disable coin solenoid 276 and the bill insertion over conductor 308.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of our claims. It is further obvious that various changes may be made in details within the scope of our claims without departing from the spirit of our invention. It is, therefore, to be understood that our invention is not to be limited to the specific details shown and described.

Having thus described our invention, what we claim is:

1. In a change dispensing machine, a plurality of coin dispensing tubes, a plurality of individually operable coin dispensing means cooperative with said tubes to dispense coins therefrom, motive means operable through a dispensing cycle, means for operatively coupling said dispensing means to said motive means, said coupling means operatively bi-stable between a home position and a second position on successive cycles of said motive means to dispense coins on movement from either position, and means responsive to the severance of the coupling between said coin tubes and said motive means for automatically sequentially restoring all displaced coupling means to their respective home positions.

2. A machine as in claim 1 in which said plurality of tubes comprises a first set of tubes and a second set of tubes complementary to said first set and in which the coupling means in said home position disposes said dispensing means in cooperation with said first set to release coins therefrom, and said coupling means in said second position disposes said dispensing means into cooperation with said second set to release coins therefrom.

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