March 3, 1964 D. D. CALL ETAL 3,123,082

CURRENCY DISPENSER

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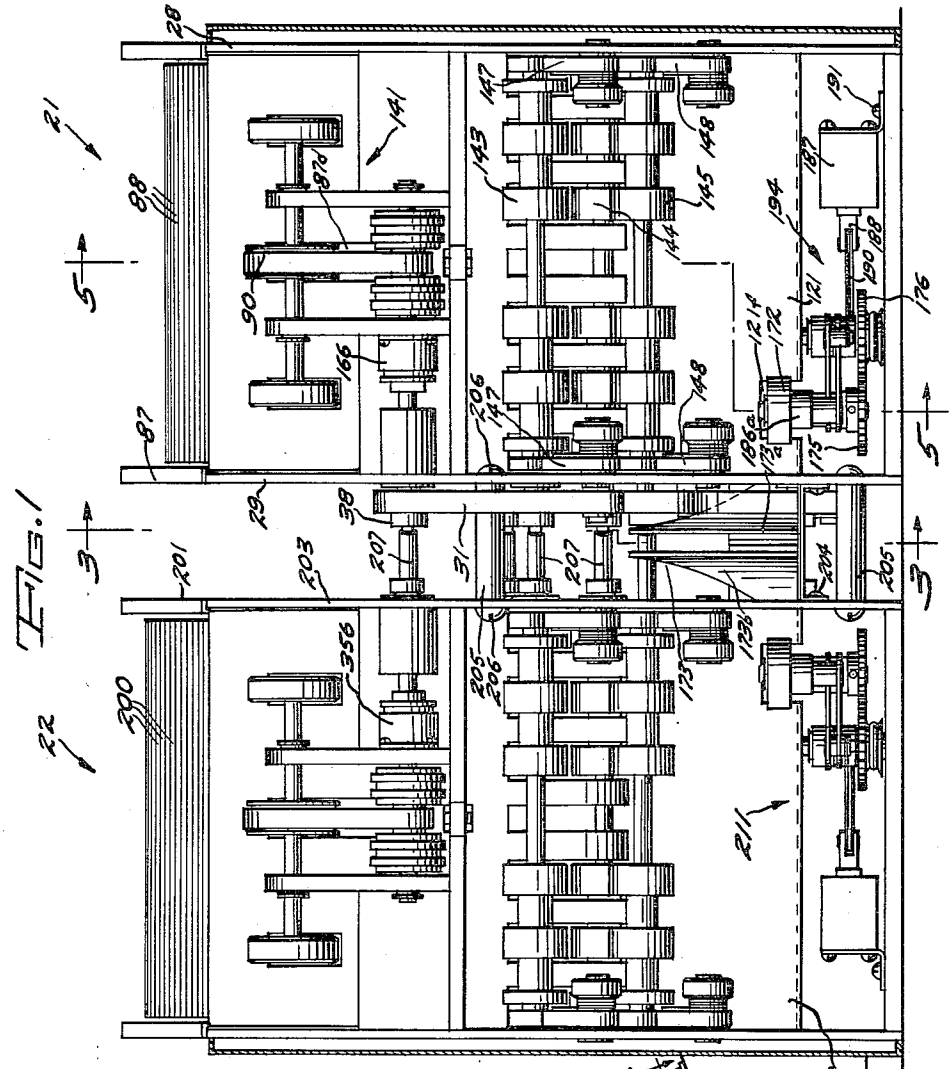


FIG. 1

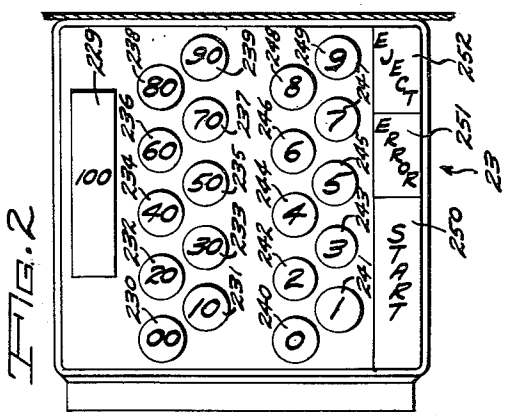


FIG. 2

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CURRENCY DISPENSER

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FIG. 3

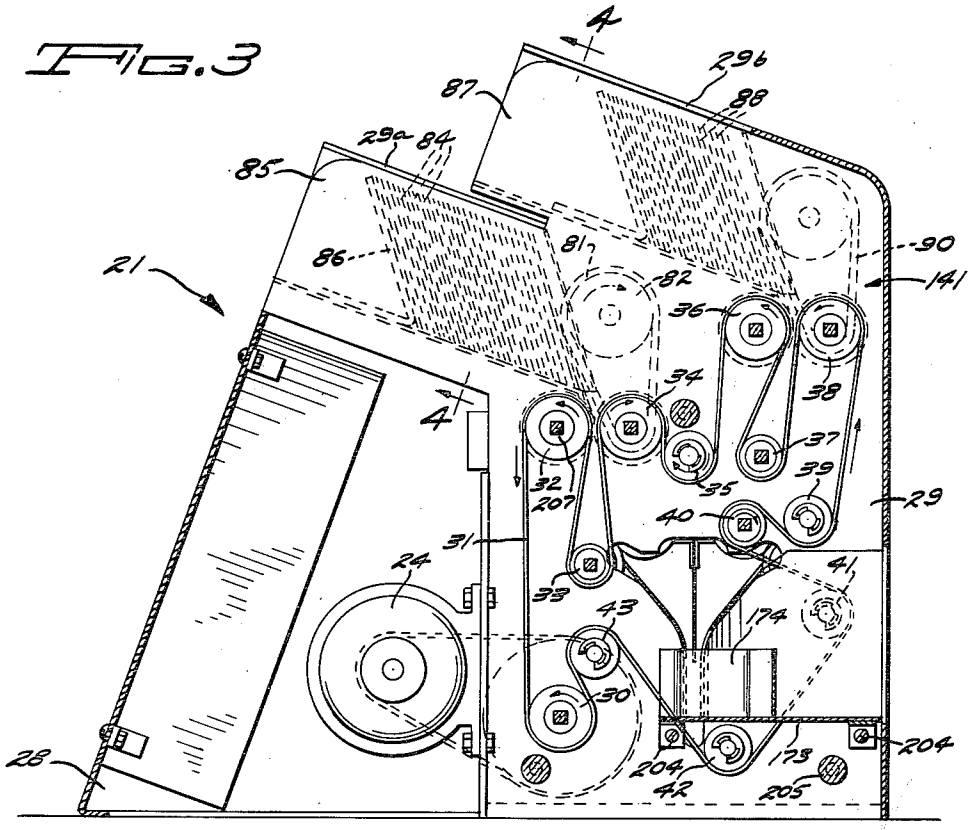
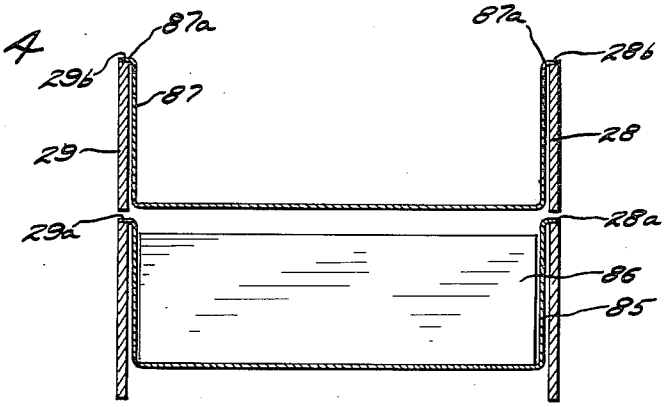


FIG. 4



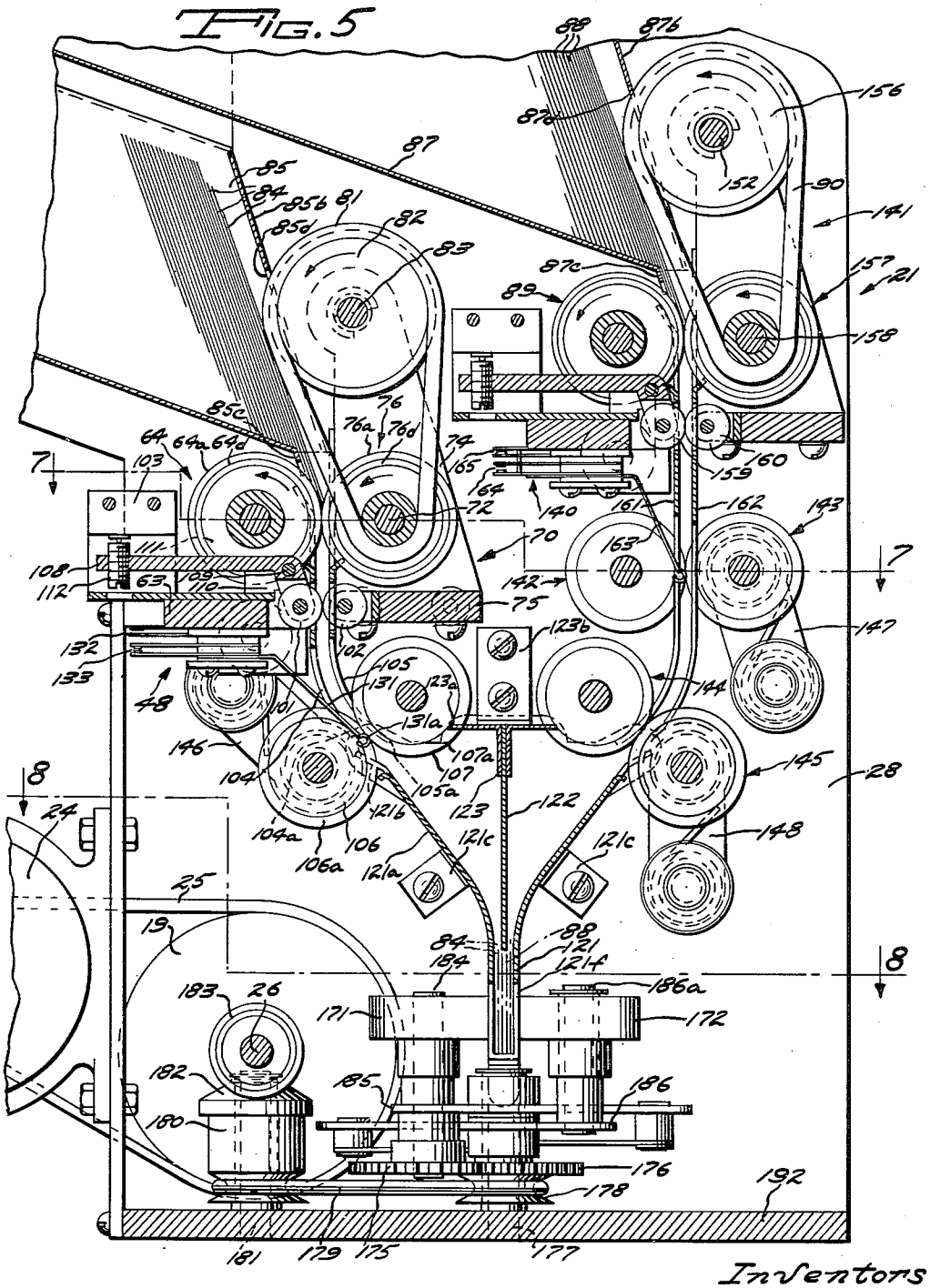
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CURRENCY DISPENSER

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FIG. 5



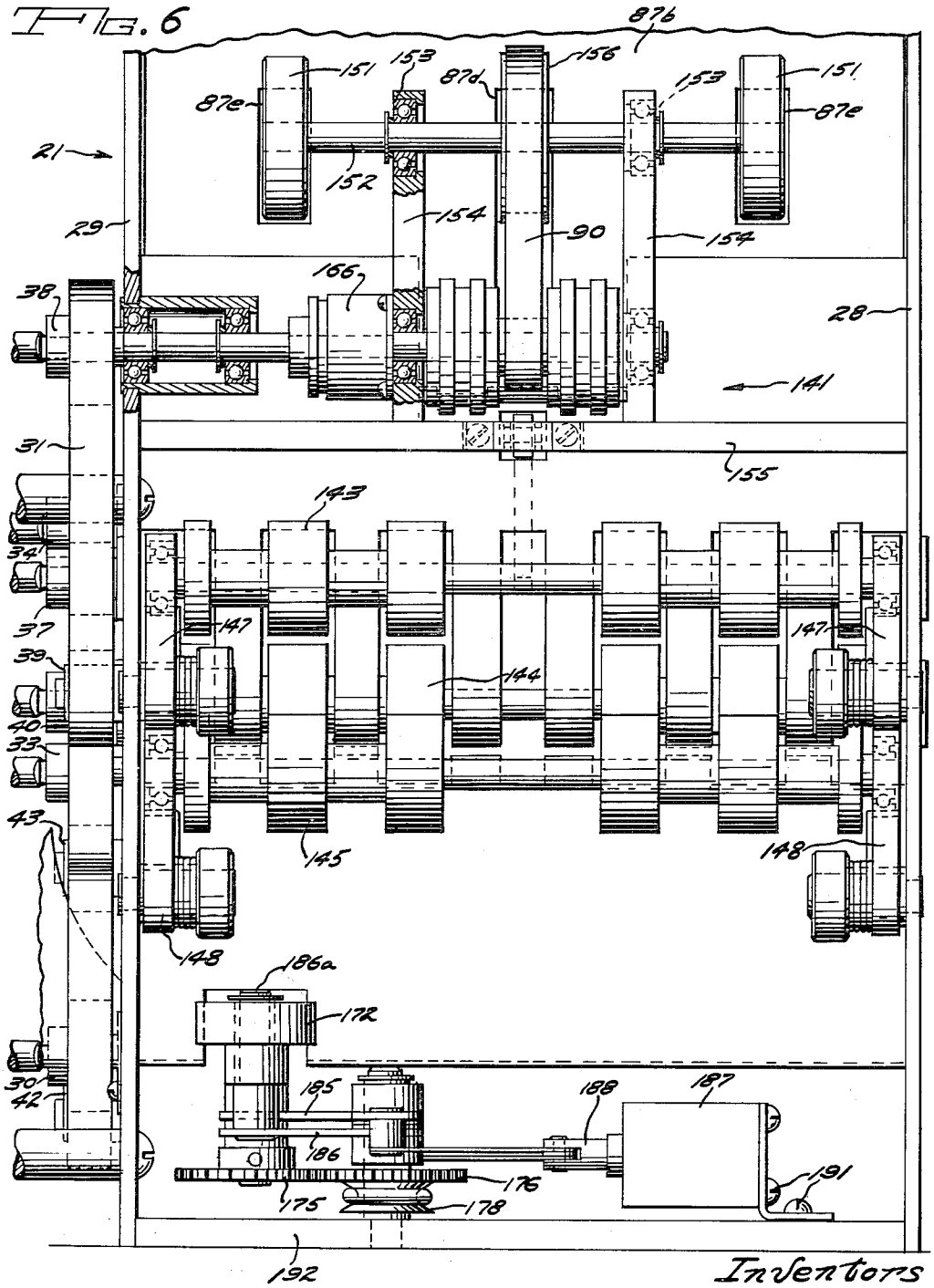
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CURRENCY DISPENSER

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FIG. 6



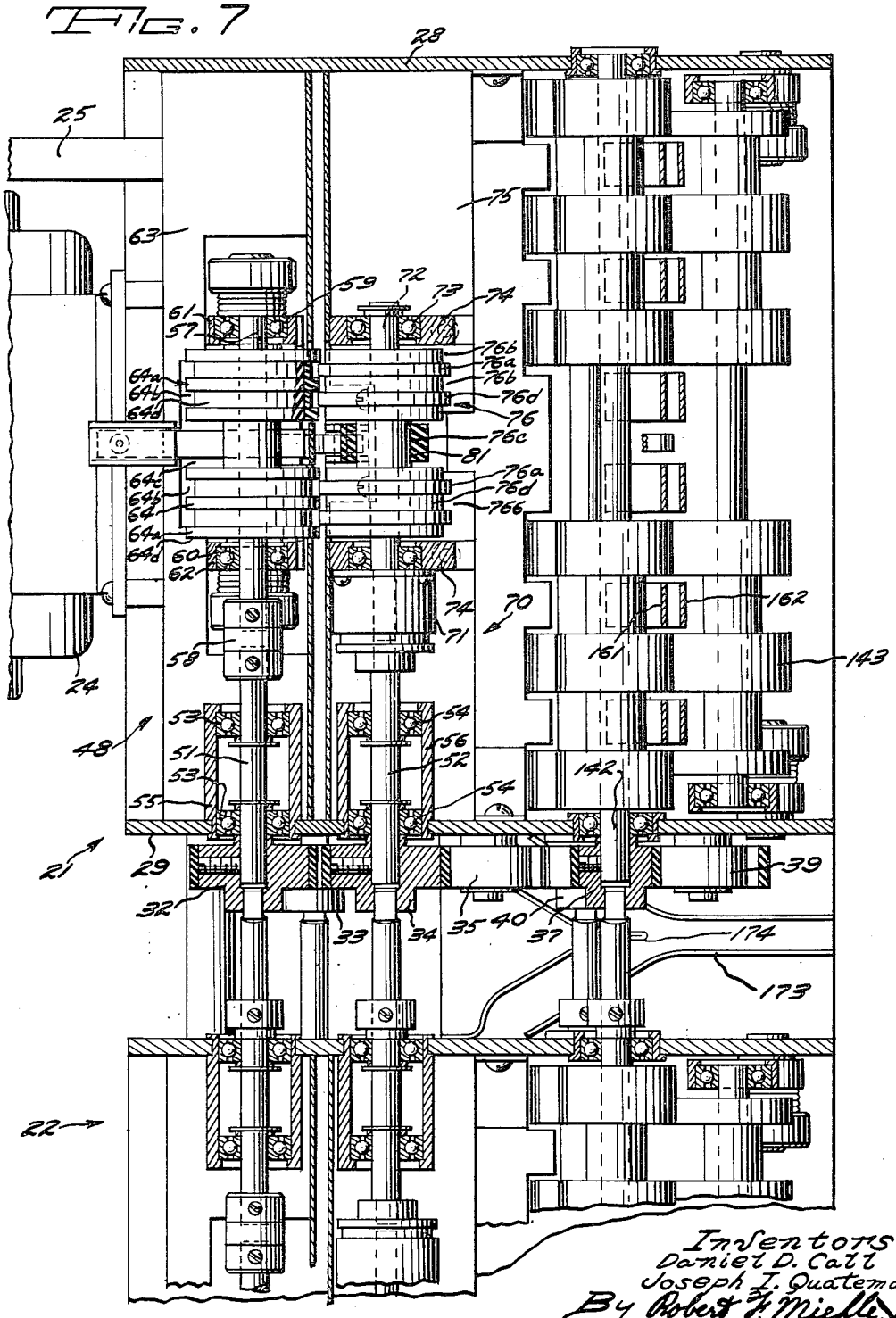
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FIG. 7



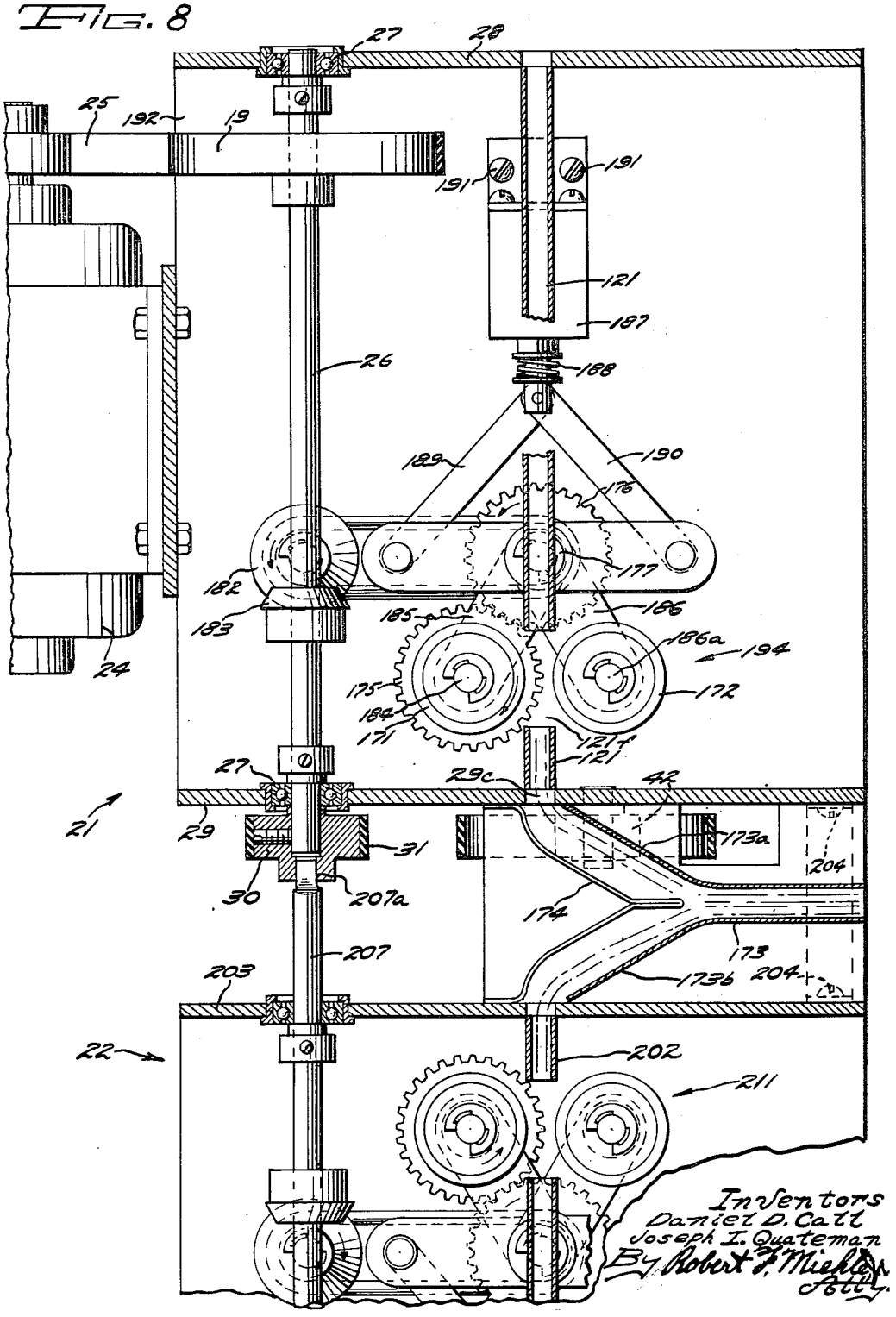
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FIG. 8



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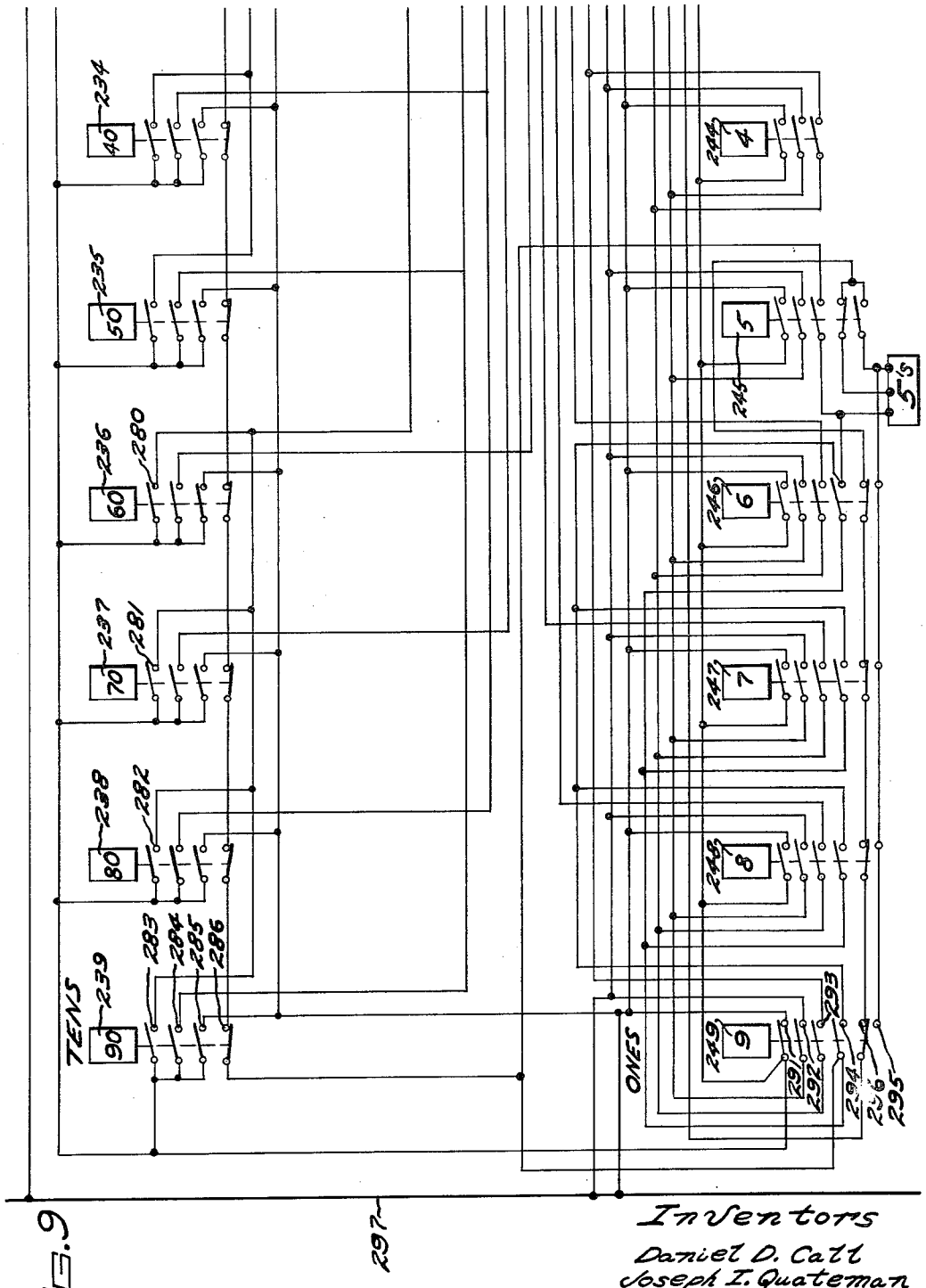


FIG. 9

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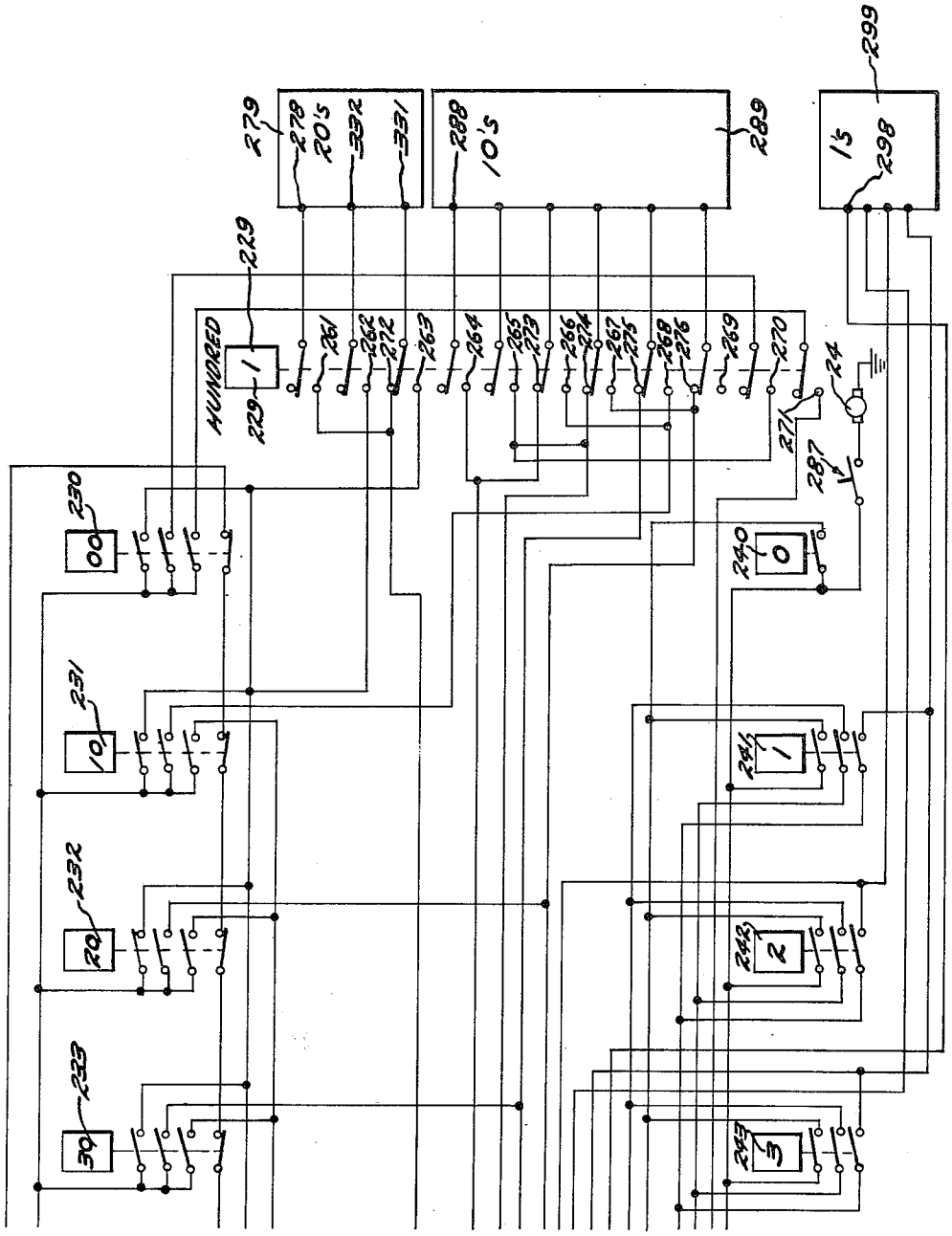


Fig. 9a

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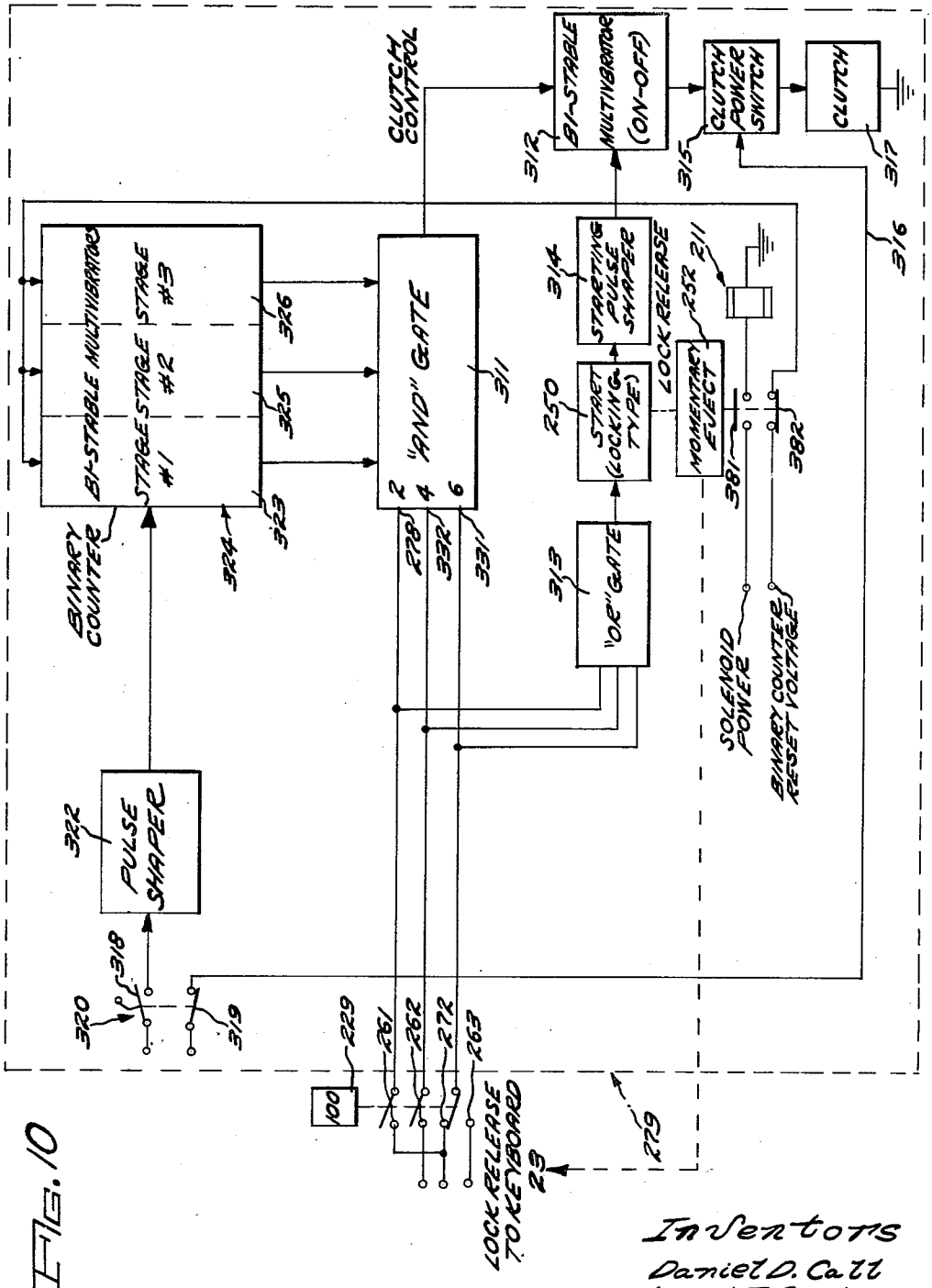


FIG. 10

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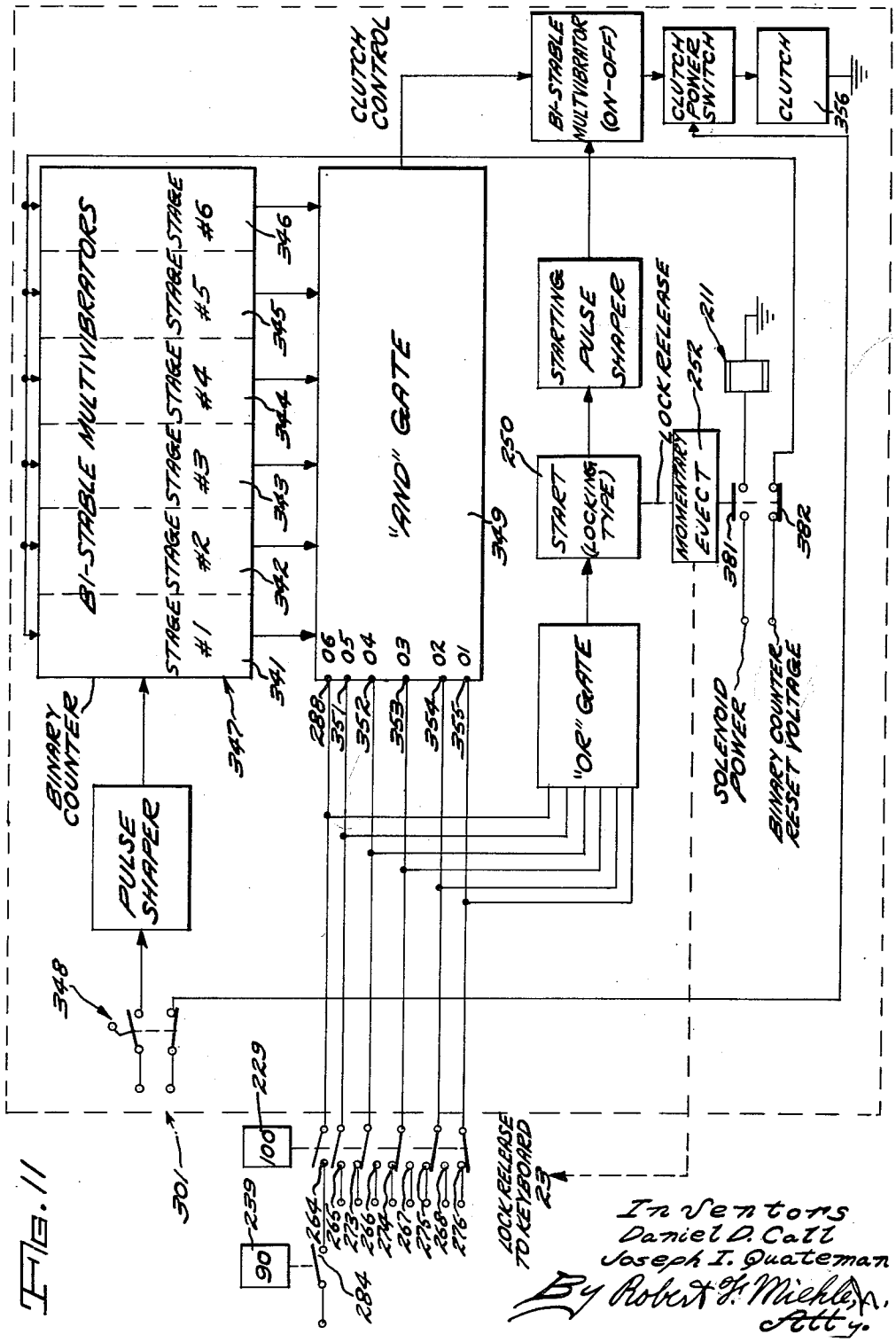


FIG. 11

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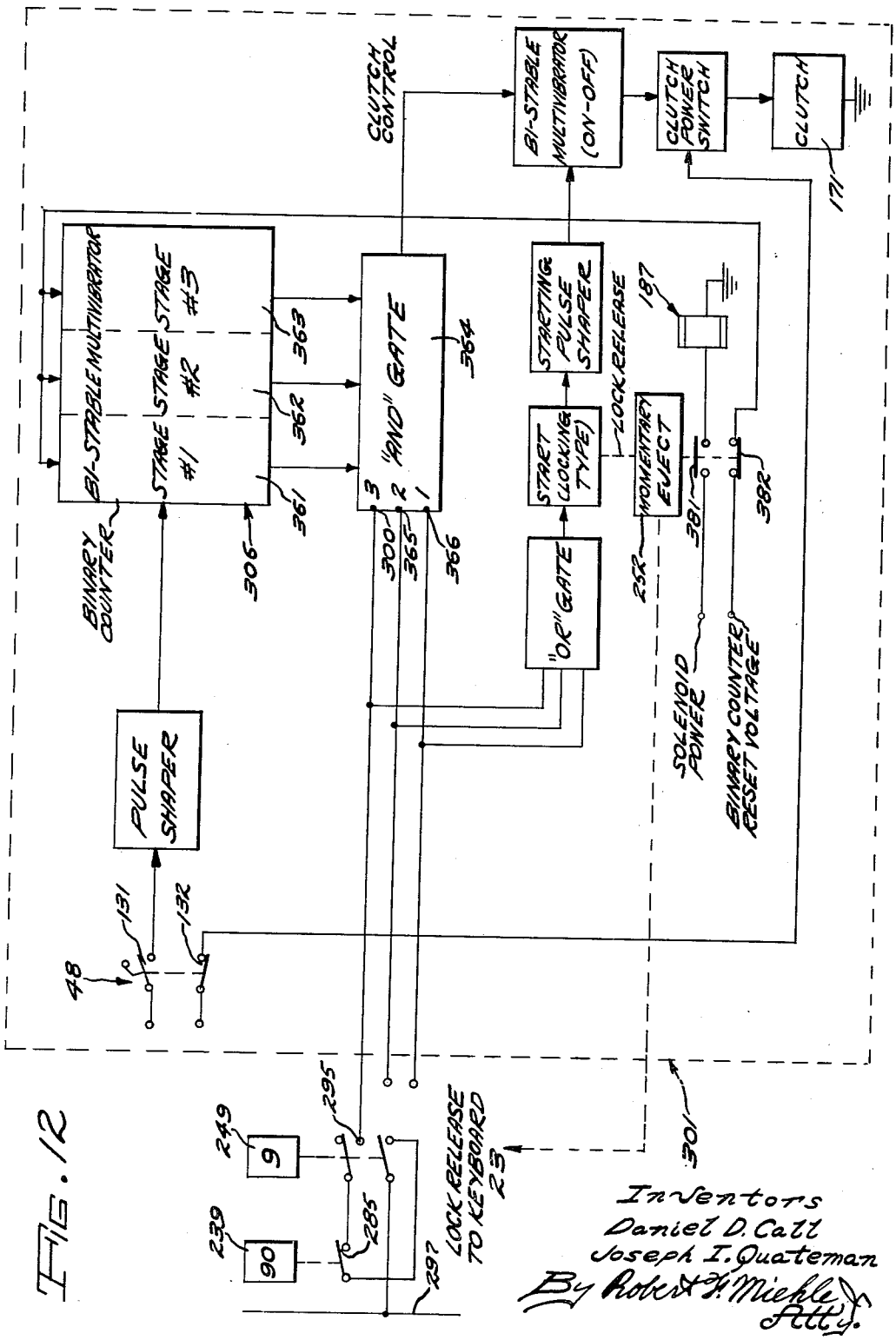


FIG. 12

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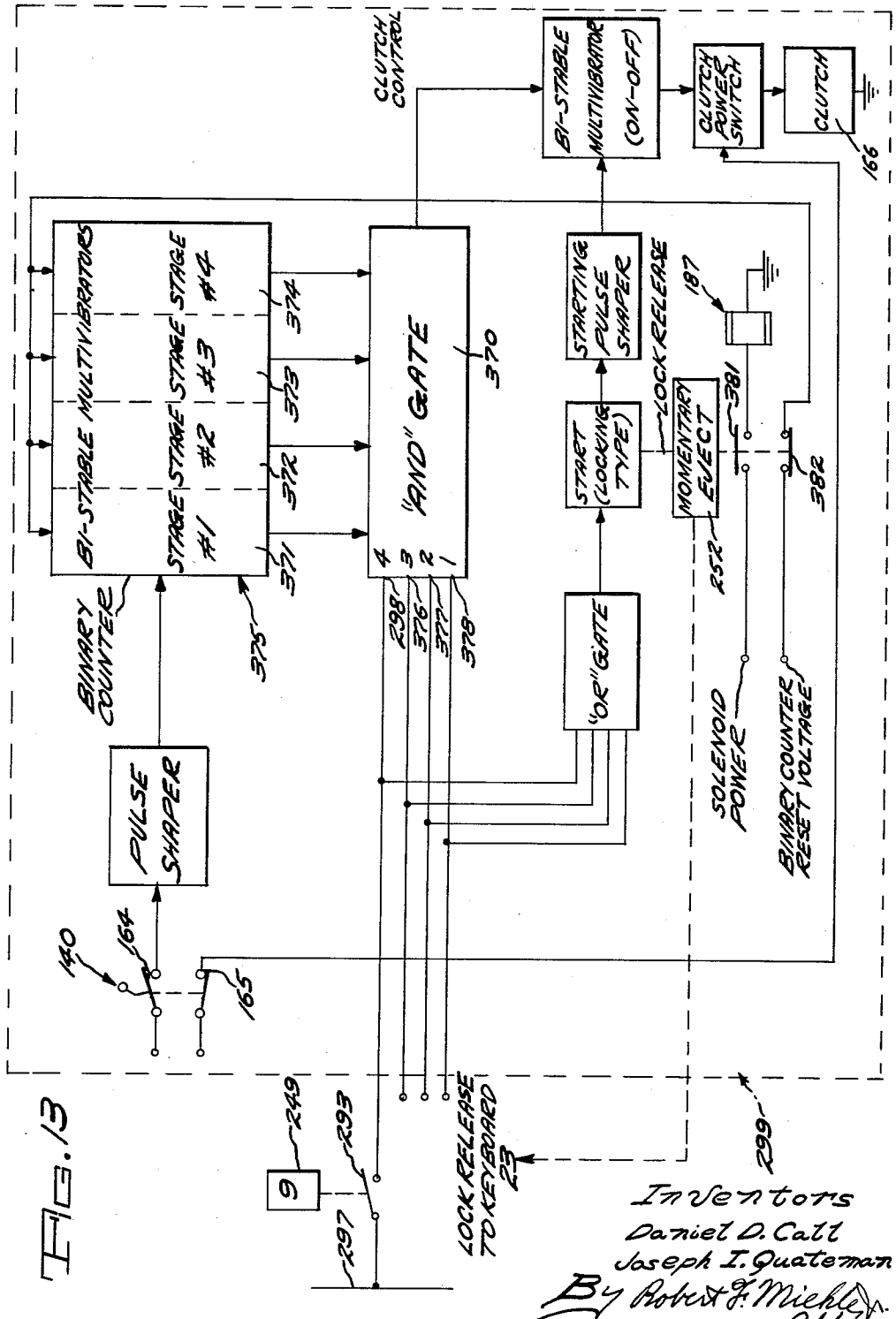


FIG. 13

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FIG. 14

TOTAL DOLLARS	DENOMINATIONS 20's	10's	5's	1's
195	6	6	3	
190	6	6	2	
185	6	5	3	
180	6	5	2	
175	6	4	3	
170	6	4	2	
165	6	3	3	
160	6	3	2	
155	4	6	3	
150	4	6	2	
145	4	5	3	
140	4	5	2	
135	4	4	3	
130	4	4	2	
125	4	3	3	
120	4	3	2	
115	4	2	3	
110	4	2	2	
105	2	5	3	
100	2	5	2	
95	2	4	3	
90	2	4	2	
85	2	3	3	
80	2	3	2	
75	2	2	3	
70	2	2	2	
65	2	1	3	
60	2	1	2	
55		4	3	
50		4	2	
45		3	3	
40		3	2	
35		2	3	
30		2	2	
25		1	3	
20		1	2	
15			3	
10			2	
5			1	

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United States Patent Office

3,123,082

Patented Mar. 3, 1964

3,123,082

CURRENCY DISPENSER

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Filed July 2, 1959, Ser. No. 824,567

9 Claims. (Cl. 133—4)

This invention relates to a currency dispenser, and more particularly to a device for dispensing a selected amount of currency.

An object of the invention is to provide a device for dispensing currency bills of different denominations.

Another object of the invention is to provide a currency dispenser for feeding selected numbers of bills from a plurality of stacks of bills of different denominations and combining the fed bills together.

Another object of the invention is to provide new and improved feed rollers for feeding currency bills and having staggered annular grooves.

Another object of the invention is to provide a currency dispenser for feeding predetermined numbers of bills of different denominations from stacks of such bills to provide a selected total amount of currency.

Another object of the invention is to provide a currency dispenser for withdrawing predetermined numbers of bills of different denominations from a plurality of stacks of bills of different denominations and combining the withdrawn bills into a single stack of a selected total amount of currency.

Another object of the invention is to provide a currency dispenser having a plurality of units which may be quickly secured together with quick-detachable connections between drive shafts of the units.

Another object of the invention is to provide a currency dispenser in which bills are fed and counted from stacks of several denominations, bills of pairs of different denominations are combined together and then the bills in pairs of different denominations are combined together to form a single stack.

Another object of the invention is to provide a currency dispenser having a frame along with a tray for holding a stack of bills detachably mounted on the frame and feeding means carried by the frame for removing bills from the stack.

Another object of the invention is to provide a currency dispenser which withdraws bills from stacks of different denominations, detects and regurgitates multiple thicknesses of bills, counts the bills fed from each stack, stops the feeding from the stacks after predetermined numbers of the bills have been fed from the stacks, combines the bills fed from pairs of the stacks, and combines the bills combined from the pairs of the stacks.

A complete understanding of the invention may be obtained from the following detailed description of a currency dispenser forming a specific embodiment thereof, when read in conjunction with the appended drawings, in which

FIG. 1 is a front elevation view of a currency dispenser forming one embodiment of the invention;

FIG. 2 is a top plan view of a control unit of the dispenser and taken along line 2—2 of FIG. 1;

FIG. 3 is a vertical sectional view taken along line 3—3 of FIG. 1;

FIG. 4 is an enlarged vertical sectional view showing the currency magazines and taken along line 4—4 of FIG. 3;

FIG. 5 is an enlarged vertical sectional view taken along line 5—5 of FIG. 1;

FIG. 6 is an enlarged front elevation view of one of two dispensing units of the dispenser shown in FIG. 1 with portions thereof shown in section;

FIGS. 7 and 8 are enlarged horizontal sectional views of the dispenser taken respectively along lines 7—7 and 8—8 of FIG. 5;

FIGS. 9 and 9*a* form a diagrammatic view of a control circuit of the dispenser shown in FIG. 1;

FIGS. 10, 11, 12 and 13 are a diagrammatic view of a counter circuits shown in block form in FIG. 9; and

FIG. 14 is a table showing the numbers of bills of each denomination for different quantities of currency to be dispensed.

The invention provides a currency dispenser which may be selectively set to dispense one or more bills totalling the selected amount of from one dollar to hundreds of dollars. The dispenser may include two dispensing units quickly detachable from one another, the first having one tray of a stack of one dollar bills on edge and a second tray of a stack of five dollar bills on edge and the second unit having one tray of a stack of ten dollar bills on edge and a second tray of a stack of twenty dollar bills on edge. Preferably there is a feed from each tray which moves the end bill to a pair of feed rollers with a double bill detecting feeler just beyond which reverses the drive of the feed rollers to regurgitate any plurality of bills being fed therethrough, and also a counting or sensing feeler beyond the detecting feeler actuated by each bill for actuating a selectively set control circuit. The bills fed from the two trays of the first unit are directed into a collecting guide with a separator guiding the bills edgewise into the guide, and the bills fed from the second unit are similarly collected in a stack on edge in a second collecting guide extending in the same direction as the first guide. Then the bills are fed endwise from the guides and are deflected into a receiving collector from which they may be removed by the operator. Preferably the feed rollers have staggered annular grooves with raised annular contacting portions having sharp corners to insure feed of each bill travelling between the rollers.

Referring now in detail to the drawings, the currency dispenser shown therein includes a first dispensing unit 21 (FIG. 1), a second dispensing unit 22 and a control unit 23. The units are quickly detachable from one another for substitution of other identical units for maintenance or the like, and the unit 21 includes a drive motor 24 (FIGS. 3, 7 and 8) which drives the unit 21 through a belt 25, pulley 19, drive shaft 26 mounted in bearings 27 in frame walls 28 and 29, pulley 30, belt 31 and pulleys 32 to 43. The drive unit 22 is driven by the pulleys 30 and 32 to 43 as is brought out below.

The pulleys 32 and 34 drive shafts 51 and 52 in the same direction, and the shafts 51 and 52 are journaled in pairs of bearings 53 and 54 mounted in pods 55 and 56 rigidly supported by the frame wall 29. The shaft 51 is connected and keyed to shaft 57 of a reversing roller subassembly 48 by a coupling 58, and the shaft 57 is journaled by radial-and-thrust bearings 59 and 60. The bearings 59 and 60 are supported in frame arms 61 and 62 rigid on horizontal frame member 63 of the subassembly 48 and rigidly secured to the walls 28 and 29. A regurgitating roller 64 rigid with the shaft 57 has an annular groove 64*c* and peripheral facings 64*d*. The facings 64*d* have lands or collars 64*a* in facings 64*d* separated by annular grooves 64*b* and 64*c*. The facings 64*d* are composed of a known plastic compounds such as, for example, that sold under the trade name "Plastisol" and the lands have a predetermined frictional coefficient. The facings 64*d* should have a durometer test of from 65 to 70 which gives the desired frictional coefficient. The roller 64 is driven continuously in a reverse feed or regurgitating direction, which is counter-clockwise, as viewed in FIG. 5.

The shaft 52 supplies driving power to an electromagnetical actuated clutch 71 (FIG. 7) of known con-

struction, and forming a part of a feed sub-assembly 70, and when the clutch is actuated drives a driven shaft 72 journaled by bearings 73 in upright frame members 74 rigidly supported by horizontal frame member 75 of the sub-assembly 70. A roller 76 keyed to the shaft 72 has a grooved pulley portion 76c and two friction facings 76d and 76e which have annular lands or collars 76a and annular grooves 76d. The facings 76d are of the same general type of material as that of the facings 64d but are substantially softer than the facings 64d so that the friction coefficient of the lands 76a is much higher than that of the lands 64a. The durometer characteristic of the facings 76d should be from about 40 to about 45 to provide the desired frictional qualities. The grooves 64b are staggered relative to the grooves 76b and are directly opposite to the lands 76a and are considerably wider than the lands 76a. Similarly the grooves 76b are directly opposite to the lands 64a and are wider than the lands 64a. The corners or edges of the lands 64a and 76a are relatively sharp, preferably being no greater than ninety degree angles.

A belt 81 is driven by the pulley portion 76c, and drives a pulley 82 (FIG. 5) keyed to shaft 83 journaled in the upright frame members 74. A stack of five dollar bills 84 on edge in a magazine or tray 85 is urged downwardly and to the right, as viewed in FIGS. 3 and 5, by an angular presser 86 slidable by gravity along the bottom of the tray to cause the right hand bill 84 to engage the belt 81 tangentially. When the clutch 71 (FIG. 7) is operative, the shaft 72 is driven counterclockwise, as viewed in FIG. 5, and the belt 81 moves the right hand bill 84 downwardly edgewise into the bite of the rollers 64 and 76. Since the facing 76d has a substantially higher coefficient of friction than the facing 64d, the rollers 64 and 76 move the bill downwardly therethrough even though the roller 64d is driven in the opposite direction. The tray 85 has flanges 85a resting on stepped upper edges 28a and 29a of the frame walls 28 and 29 from which the tray or magazine may be lifted and replaced by another tray identical therewith. Similarly, a tray or magazine 87 identical with the tray 85 and holding a stack of one dollar bills 88 has flanges 87a resting on upper steps 28b and 29b (FIG. 4) of the walls 28 and 29. The trays 85 and 87 have doors 85b and 87b hinged at their upper ends and forming discharge chutes with guide tongues 85c and 87c which project down to the roller 64 and a similar roller 89 associated with the tray 87. The doors have clearance slots 85d and 87d for the belt 81 and an identical belt 90.

The reverse rotation of the roller 64 tends to permit only the right hand bill 84 to enter the bite of rollers 64 and 76 and be advanced therethrough. However, if one or more bills stick to the right hand bill 84 and be carried into the bite of the rollers 64 and 76 and be advanced downwardly thereby, the multiple thickness of the bills as they enter between multiple thickness detector rollers 101 and 102 move the roller 101 to the left sufficiently to cause a lever 103 to actuate a switch 104. The switch 104 then de-energizes the clutch 71 (FIG. 7) to stop the drive of the roller 76 and belt 81. The roller 64a then regurgitates the left hand ones of multiple thickness bills back up beyond the bite of the rollers 64 and 76 and also tends to separate the bills to free the right hand bill. Then, the rollers 101 and 102 being freed of the multiple thickness permit the switch 103 to reclose to again make the clutch 71 operative and the left hand bill 84 is fed on through the rollers 101 and 102 and along slotted guides 104 and 105 to feed rollers 106 and 107, the feed roller 106 being driven by the belt 31 and the roller 107 rotating freely.

The roller 101 is mounted on a lever 108 pivoted on pin 109 carried by a bracket 110 fixed rigidly to the frame member 63. The lever 108 is urged in a counter-clockwise direction, as viewed in FIG. 5, by a wire spring 111 fixed to the bracket 110 at one end thereof. An adjustment screw 112 carried adjustably by the lever 108 serves to actuate the switch 103.

The guides 104 and 105 have tongues 104a and 105a projecting into annular grooves 106a and 107a in the rollers 106 and 107, and guide the bill 84 edgewise to the bite of the rollers 106 and 107 just before the bill leaves the bite of the rollers 64 and 76. The roller 106 then advances the bill on down along flared guide arm 121a of horizontal collecting guide or channel 121 to a deflector or separator 122 which deflects the forward edge of the bill downwardly into the collecting guide, where the bill rests on its lower edge with the upper edge extending above the bottom of the separator 122. The arm 121a has stripping fingers 121b projecting between the lands of the roller 106 and a bracket 123 supporting the vertical separator 122 has stripping fingers 123a projecting between the lands of the roller 107. Supporting bracket members 123b are secured to the frame walls 28 and 29 to mount the separator on the walls. Brackets 121c of the collecting guide 121 are fixed to the walls 28 and 29 to mount the guide 121 rigidly on the walls.

After each bill 84 enters the bite of the rolls 106 and 107 so that the feed of the bill by these rolls is started, the bill engages a rounded end 131a of a counting feeler or sensing arm 131 pivotally mounted on the frame member 63 and pivots the arm 131 clockwise to open clutch contacts 132 and close counting contacts 133 of the sub-assembly 48. Opening of contacts 132 de-actuates the clutch 71 (FIG. 7) to stop the feed of the following bill 84 until the bill engaging the counting feeler 131 moves out of engagement with the feeler 131, at which time the counting contacts 133 reopen and the clutch contacts 132 reclose to start the feed of the next bill.

The one dollar bills 88 are fed from the tray 87 toward the collecting guide 121 by a reversing or regurgitating sub-assembly 140 sub-assembly 48 and a feed sub-assembly 142 identical to the sub-assembly 70. Two pairs of grooved feed rollers 142 and 143 and 144 and 145, which are identical with but reversed relative to the rollers 106 and 107, are provided because of the longer path of the one dollar bills. Each of the rollers 106, 143 and 145 is mounted on a pair of spring-pressed arms 146, 147 and 148 which urge the rollers 106, 143 and 145 toward the rollers 107, 142 and 144.

The sub-assembly 141 includes outboard or balancing feed rollers 151 keyed to shaft 152 mounted rotatably in bearings 153 of upright frame members 154 supported by horizontal frame member 155 which is detachably secured to the frame walls 28 and 29. The rollers 151 project through slots 87e in the tray door 87b and engage the front bill 88 and advance it downwardly. The diameter of the rollers 151 is the same as that of the portion of the belt 90 on pulley 156. Roller 157 on shaft 158 co-acts with the regurgitating roller 89 to feed the one dollar bills 88 through multiple bill detector rollers 159 and 160, along slotted guides 161 and 162, to the feed rollers 142 and 143. The rollers 142 and 143 feed each bill past counter-feeler 163, which momentarily closes counting contacts 164 and momentarily opens clutch contacts 165, to the rollers 144 and 145. The clutch contacts 165 actuate clutch 166 (FIG. 6) to momentarily de-clutch the drive of the roller 157 (FIG. 5) and shaft 152 to space the next succeeding bill 88 back from the bill 88 being fed. The rollers 144 and 145 feed the bill edgewise along flared arm 121e of the collecting guide 121 and against the separator 122 which deflects the bill downwardly into the right hand portion of the guide 121. As illustrated in FIGS. 3, 5, 6 and 8, the roller 89, the shaft 158, and the rollers 142 and 144 are driven by the belt 31 through the pulleys 36, 38, 37 and 40, respectively.

As illustrated in FIGS. 5 and 8, the collecting channel or guide 121 extends from the frame wall 28 to the frame wall 29, which are identical with one another for convenience of manufacture. The wall 29 has an exit slot

29c aligned with the guide 21 to permit a counted stack of the bills 85 and 88 to be advanced endwise by ejecting rollers 171 and 172 into a collecting channel 173 having flared entrance walls 173a and 173b, a V-shaped deflector 174 deflecting the bills into the channel 173. The roller 171 is driven continuously by a gear 175 keyed thereto, a gear 176 rotatable on post 177, pulley 178, mounted on post 181, belt 179, pulley 180 keyed to pulley 180 of ejecting mechanism 194 and beveled friction clutch members 182 and 183 keyed to the pulley 18 and the shaft 26. A shaft 184 is mounted rotatably on bellcrack lever 185 and is keyed to both the gear 175 and the roller 171. The lever 185 is pivotally mounted on the post 177 and when pivoted swings the gear 175 around the gear 176. A second bellcrank lever 186 is mounted pivotally on the post 177 and carries the roller 172 on a pin 186a on one arm thereof. When a solenoid winding 187 extending parallel to the guide 121 is energized, it pulls an armature 188 thereof upwardly, as viewed in FIG. 8. The armature is connected to the levers 185 and 186 by links 189 and 190 and swings the levers 185 and 186 to move the rollers 171 and 172 into squeezing engagement with the stack of bills in the guideway 121 and the stack is ejected into the collecting channel 173. The armature 188 normally is spring-pressed toward the position thereof shown in FIG. 8 in which the rollers 171 and 172 are retracted away from the bills in the guideway 121, which has a notch or slot 121f to provide clearance for the rollers 171 and 172. The solenoid winding 187 is fixed by screws 191 to the base 192 of the frame.

The unit 22 is identical to the unit 21 but is reverse-handed relative to the unit 21 and does not include a drive motor. The unit 22 feeds counted numbers of ten dollar bills 200 and twenty dollar bills from a tray or magazine 201 (FIG. 1) to a collecting guide 202 and into the collecting channel 173, which along with the deflector 174, is detachably secured by screws 204 to the wall 29 and an identical wall 203 of the unit 22. Spacers 205 and screws 206 rigidly connect the units 21 and 22 together in positions in which shafts 207 having squared ends fit into complementary sockets in the pulleys 30, 32, 33, 34, 36, 37, 38 and 40 (FIG. 3), the shafts 207 serving to drive the feed mechanisms of the unit 22. The unit 22 also includes an ejecting mechanism 211 (FIG. 8) identical with but opposite handed relative to the ejecting mechanism 194 of the unit 21.

The control circuit for selectively determining the amount of currency to be dispensed is shown in FIGS. 9 and 10, and includes the keyboard 23 (FIG. 2). The keyboard includes a hundred dollar key 229 which may be set to cause one one-hundred dollars to be dispensed. The keyboard also includes decade or ten dollar keys 230 to 239, one of which may be set selectively to cause from ninety to zero dollars to be dispensed as a result of the actuation thereof. Unit or dollar keys 240 to 249 may be set selectively to cause from zero to nine dollars to be dispensed as a result of the actuation thereof. Thus, for example, by setting the keys 229, 239 and 249, the dispenser will be actuated, when momentary starting switch button 250 is depressed, to dispense one-hundred-ninety-nine dollars. The range of amounts dispensed is from one dollar to one-hundred-ninety-nine dollars with the circuit shown, and varies in one dollar increments. Each of the keys when punched or set remains in its set position until released either by pressing an "Error" key 251 or by pressing an "Eject" button 252 at the end of a dispensing operation. Also, only one of the keys 230 to 239 and only one of the keys 240 to 249 may be set for any given dispensing operation. The interlocking and release structure of the keys is well known and accordingly is not described in detail.

The chart of FIG. 14 illustrates the number of bills of each of the twenty, ten and five dollar denominations dispensed in increments of five dollars for sums of from five

to one-hundred-ninety-five dollars, the one dollar bills being dispensed selectively in numbers from zero to four simultaneously therewith. To dispense one-hundred-ninety-nine dollars, the keys 229, 239 and 249 are set. The key 230 closes contacts 261 to 271 and opens contacts 272 to 276. The contacts 261 set up a circuit to the "6" terminal 278 of a twenty dollar bill dispensing and counting circuit 279 from each of contacts 280 to 283 of keys 236 to 239, respectively. Setting of the key 239 closes contacts 283, 284 and 285 and opens contacts 286. Closing contacts 283 completes the circuit from one side of a power source through a motor starting switch 287 (assumed to have been closed manually) to the circuit 279. Closing of contacts 264 and 284 connects that side of the power source to the "6" terminal 288 of a ten dollar dispensing and counting circuit 289 to set up the circuit 289 to dispense six ten dollar bills. Setting of the key 249 closes contacts 291 to 295 and opens contacts 296. Closing of contacts 291 connects power-line conductor 297 to the motor starting switch 287. Closing contacts 293 connects the power-line conductor 297 to the "4" terminal 298 of a dispensing and counting circuit 299 to set up the circuit 299 to dispense four one dollar bills. Closing of contacts 295 set up a circuit through the switch 287, contacts 285 and 295 to number "3" terminal 300 of a five dollar bill dispensing and counting circuit 301 to dispense three five dollar bills.

The dispensing and counting circuits 279, 289, 299 and 301 are similar to one another and, for the sake of simplicity, only the circuit 279 will be described in detail. The circuit 279 (FIG. 10) may be set by the keyboard 23 to dispense selectively two, four or six twenty dollar bills. When the circuit to the "6" terminal 278 is set up as described above, an "and" type gating circuit 311 of a known type is set up. The circuit includes a known bistable multi-vibrator 312. The multi-vibrator 312, when the start key 250 is actuated, is actuated by a starting pulse from a gate 313 and a known pulse shaper 314. This turns the multi-vibrator 312 "on" to actuate a known relay circuit 315 to connect a power-line 316 to a clutch 317. The clutch 317 is in the twenty dollar bill dispensing mechanism of the unit 22, and is identical in construction and operation to the electro-magnetic clutch 71 (FIG. 7) and the clutch 165 (FIG. 6). Each time a twenty dollar bill is dispensed from the stack of twenty dollar bills, the bill being dispensed closes detector or sensing contacts 318 of sensing switch 320 (FIG. 10) corresponding to the contacts 133 (FIG. 5) and opens contacts 319 (FIG 10) corresponding to the contacts 132 (FIG. 5) and in the power-line 316 to the clutch 317. When the contacts 319 are opened, the clutch 317 is thrown out until the bill clears the sensing switch including the contacts 318 and 319, and stops the feed of the next succeeding twenty dollar bill until the bill actuating this switch clears the switch to re-open contacts 318 and re-close contacts 319. Each time a bill closes the contacts 318, a pulse is supplied to a known pulse shaping circuit 322, which shapes the pulse and applies it to a multi-vibrator stage 323 of a known cascaded counter circuit 324 which also includes multi-vibrator stages 325 and 326.

When the stage 323 has been pulsed twice by the dispensing of two twenty dollar bills, the stage 323 supplies a voltage to the circuit 311. However, since the "2" terminal 331 of the circuit 311 is not connected to power at this time by the keyboard 23, the circuit 324 is not actuated to disable the clutch 317. Similarly, when four pulses have been supplied to the stage 323 by the dispensing of four twenty dollar bills, the stage 323 pulses the stage 325 twice and the stage 325 pulses the stage 326 and the circuit 311. However, since the "4" terminal 332 is not connected to power by the setting of the keyboard 323, the circuit 311 is not actuated to de-energize the clutch 317. As the sixth dispensed twenty dollar bill is dispensed and actuates the switch 320, the stage 323

again pulses the stage 325 which pulses the stage 326 again and the stage 326 pulses the gating circuit 311. Since the "6" terminal of the circuit 311 is connected to power by the keyboard 23, the pulse from the stage 326 causes the circuit 311 to pulse the circuit 312 to cut power from the clutch 317 which stops the feed of the twenty dollar bills, the required six having been dispensed from the stack to the intermediate collecting member 333 (FIG. 1) of the unit 22 which corresponds to the collecting member 121 of the unit 21.

While the twenty dollar bills are being dispensed, selected numbers of ten, five and one dollar bills are dispensed from their respective stacks under control of circuits 289, 301 and 299. The circuit 289 is of a type like the circuit 279 except that the circuit 289 has six multi-vibrator stages 341 to 346 of a known binary counter 347 (FIG. 13) responsive to counting pulses of sensing or counting switch 348 of the ten dollar bill dispensing mechanism of the unit 22 and known "AND" gate 349 responsive selectively to pulses from the counter 347. Depending on which of terminals 288, 351, 352, 353, 354 or 355 is connected to power by the setting of the keyboard 23, the gate 349 will be responsive to pulses from the stages 346 to 341 of the counter 347, to de-energize clutch 356 of the ten dollar bill dispensing mechanism of the unit 22, the stage 341 pulsing the gate 349 when one ten dollar bill has been dispensed, the stage 342 pulsing the gate 349 when two ten dollar bills have been dispensed and so on until the stage 346 pulses the gate 349 when six ten dollar bills have been dispensed. Assuming only the "6" terminal 288 to be connected to power, the contacts 264 and 284 having been set closed, only the pulse from the "6" stage 346 goes through the gate 349 to cause de-clutching of the clutch 356. Thus, six and only six ten dollar bills are fed to the collecting member or chute 333. It is obvious from FIGS. 2, 9, 11 and 14 that the keyboard 23 also may be set to dispense selectively from one to five ten dollar bills.

While the twenty dollar bills and ten dollar bills are being dispensed, three five dollar bills 84 are dispensed to the member or intermediate collecting channel 121 under the control of the clutch 71 (FIG. 7) which is controlled by the counter 301 (FIGS. 9 and 12). The counter circuit 301 is the same as the counter circuits 279 and 289 except that known counter 360 has three stages 361 to 363 respectively operable by the first, second and third pulses from counting or sensing contacts 133 to pulse "AND" gate 364. The gate 364 is set by the keys 239 and 249 being set manually to connect only the "3" contact 300 to power, and gives an output pulse only upon being pulsed by the "3" stage 363 to de-clutch the clutch 171. When only "2" terminal 365 is connected by the keyboard 23 to power, the gate 364 is actuated on the second pulse so that only two five dollar bills are dispensed. Similarly, when only one five dollar bill is to be dispensed by a setting of the keyboard 23, only a circuit to the "1" terminal 366 is completed and the first pulse from stage 361 to the gate 364 terminates feed of the five dollar bills after only one has been dispensed.

The one-hundred-ninety-nine dollar setting of the keyboard 23 also requires four one dollar bills 83 to be dispensed. This is accomplished by the contacts 299 being closed by the "9" key 249 to connect the "4" terminal 298 of "AND" gate 370 (FIG. 13) to the power conductor 297. Known multi-vibrator stages 371 to 374 are provided in known binary counter 375 and are respectively operable to pulse the gate 370 on reception by the counter 375 of first, second, third and fourth pulses from the sensing contacts 164 of the sensing or counting switch 140. The circuit being completed to only the terminal 298 and not to "3," "2" and "1" terminals 376, 377 and 378, the gate 370 is actuated only by the pulse from the stage 374 to de-clutch clutch 166. The feed of the one dollar bills 83 from the stack thereof then is

stopped after the four one dollar bills have been fed to the channel 121. This brings the total to the channels 121 and 202 to one-hundred-ninety-nine dollars. Then, when momentary "Eject" key or button 252 is manually actuated to close contacts 381 and open contacts 382, the eject mechanisms move the forward ends of the bills in the collecting channels 121 and 202 to accessible positions in the chute or channel 173. The opening of contacts 382 resets the counter circuits 279, 289, 299 and 301, and also releases the keyboard 23 and the starting switch 250.

We claim:

1. In a currency dispenser, a first unit including a pair of vertical walls, means for supporting a stack of bills between the walls, first feed roller means journaled in the walls for feeding bills one at a time from the stack, and first collector means receiving bills from the feed roller means; a second unit including a second pair of vertical walls, second means for supporting a second stack of bills between the second pair of vertical walls, second feed roller means journaled in the second pair of vertical walls for feeding bills one at a time from the second stack, second collector means receiving bills from the second feed roller means; a dispensing channel, means for feeding bills from the first collector means into the channel, means for feeding bills from the second collector means into the channel, all of the bills in said channel having their faces parallel with each other, quick-detachable coupling means for connecting the first feed roller means to the second feed roller means; and quick-detachable means for connecting the adjacent walls of the units together.

2. In a currency dispenser, a first unit including a pair of vertical walls, means for supporting a stack of bills between the walls, first feed roller means journaled in the walls for feeding bills one at a time from the stack, and first collector means receiving bills from the feed roller means; a second unit including a second pair of vertical walls, second means for supporting a second stack of bills between the second pair of vertical walls, second feed roller means journaled in the second pair of vertical walls for feeding bills one at a time from the second stack, and second collector means receiving the bills from the second feed roller means; continuously operable drive means, clutch means in the first unit for connecting the drive means to the first roller means, and second clutch means in the second unit for connecting the drive means to the second roller means, quick-detachable coupling means for connecting the first feed roller means to the second feed roller means; quick-detachable means for connecting the adjacent walls of the units together; collecting means common to both of said units to which each of said first and second collector means lead; and means operable after said feed roller means for ejecting the stacks of bills from said collector means into a combined stack in said collecting means.

3. In a currency dispenser, a first unit including a pair of vertical walls, means for supporting a stack of bills between the walls, first feed roller means journaled in the walls for feeding bills one at a time from the stack, and first collector means receiving bills from the feed roller means; a second unit including a second pair of vertical walls, second means for supporting a second stack of bills between the second pair of vertical walls, second feed roller means journaled in the second pair of vertical walls for feeding bills one at a time from the second stack, and second collector means receiving the bills from the second feed roller means; continuously operable drive means; clutch means selectively operable in the first unit for connecting the drive means to the first roller means for feeding bills; second selectively operable clutch means in the second unit for connecting the drive means thereof to the second roller means for feeding bills; said units being disposed with certain of the vertical walls

thereof in spaced adjacency, collecting means common to both of said units located between said certain walls, each of said collector means discharging into said collecting means; and means associated with each of said collector means for ejecting the bills therefrom into a combined stack in said collecting means.

4. A currency dispenser as defined in claim 3 wherein said first and second collector means comprise upwardly opening channels into which the bills are fed by the respective feed roller means into on-edge stacked relationship, said collector means channels having ends which open through said spaced adjacent walls, said collecting means comprising a channel extending between said walls toward the front of the dispenser, and means connecting said collecting means channel with the wall ends of said collector means channels to divert stacks of bills from the collector means channels into the combined stack in the collecting means channel.

5. In a currency dispenser, means for supporting a plurality of separate stacks of bills with each stack having all bills of a selected denomination, separate means associated with each stack providing a downwardly directed bill guide means and means for selectively feeding individual bills from the respective stack downwardly through the guide means, said guide means being convergently related by respective groups to combine the bills fed downwardly therethrough, a respective collector disposed at the lower end of each of the groups of guide means to receive the combined stack of bills therefrom on edge, a dispensing collector, each of said group collectors leading to said dispensing collector, and means selectively operable to eject the stacks of on-edge bills from said group collectors into said dispensing collector into a combined stack in the dispensing collector.

6. A currency dispenser as defined in claim 5, wherein said dispensing collector has spaced parallel vertical walls supporting the combined stack of bills vertically on-edge.

7. In a currency dispenser, a first unit including a pair of vertical walls, means for supporting a stack of bills between the walls, first feed roller means journaled in the walls for feeding bills one at a time from the stack, and first collector means receiving bills from the feed roller means; a second unit including a second pair of vertical walls, second means for supporting a second stack of bills between the second pair of vertical walls, second feed roller means journaled in the second pair of vertical walls for feeding bills one at a time from the second stack, and second collector means receiving the bills from the second feed roller means; continuously operable drive means, clutch means in the first unit for connecting the drive means to the first roller means, and second clutch means in the second unit for connecting the drive means to the second roller means, quick-detachable coupling means for connecting the first feed roller means to the second feed roller means; quick-detachable means for connecting the adjacent walls of the units together; collecting means common to both of said units to which each of said first and second collector means lead; means operable after said feed roller means for ejecting the stacks of bills from said collector means into a combined stack in said collecting means; and sequentially operating electrical control means coordinating operation of said clutch means of both of the units and said ejecting means.

8. In a currency dispenser, means for supporting a plurality of stacks of bills of selected denominations, means for selectively feeding bills one at a time from the respective stacks downwardly, means for collecting the bills fed from the stacks, means for ejecting the bills from said collecting means, means for receiving the ejected bills in a combined stack, and electrical control means for sequentially operating said feeding means and said ejecting means including:

bill denomination and quantity selecting means,

means for activating said selecting means,

said feeding means coming to a halt when the selected number of each selected denomination has been fed,

and means operable to operate said ejecting means and reset said selecting means coincidentally.

9. In a currency dispenser, means defining stacked trays for separate stacks of respectively one dollar bills, five dollar bills, ten dollar bills and twenty dollar bills; respective means for feeding the bills one at a time from each of said stacks, means for collecting the bills fed from the stacks and combining the bills into a common stack and including:

means for collecting the bills from the one and five dollar stacks and separate means for collecting bills from the ten and twenty dollar stacks;

means for ejecting the stacks of bills from said respective collecting means,

and means for receiving all of the bills ejected from both of said collecting means in a common stack;

and electrical control means for coordinating operation of said feeding means and said ejecting means including:

a system of electrical circuits and control keys for effective selective operation of said feeding means to feed bills from said stacks in any selected combination of bills from one to one-hundred and ninety-nine dollars,

a start switch and start key integrated with said control keys and circuits to effect operation of the circuits after the control keys have been set for the selected amount of currency to be dispensed,

an error correction key and means to release the currency selecting control keys before the start key is actuated,

and an eject circuit and operating key operable after the selection and feeding of currency has been effected to operate said ejecting means and reset the circuits for repetition of the cycle.

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