United States Patent

[11] **3,590,833**

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[54] **COIN-HANDLING APPARATUS**
29 Claims, 25 Drawing Figs.

[52] **U.S. Cl.** **133/2, 133/4**
[51] **Int. Cl.** **G07d 1/06**
[50] **Field of Search** 133/3, 4, 5, 2; 221/237, 258, 259, 266, 277, 129; 194/10

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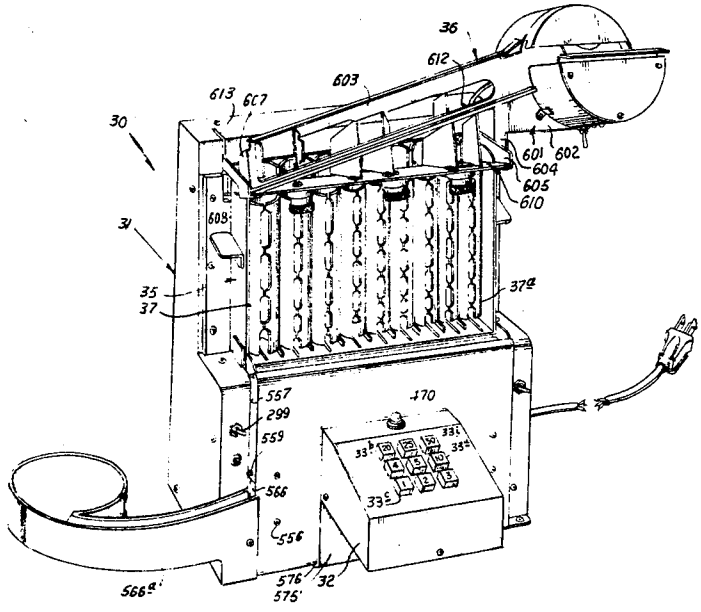
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Primary Examiner—Samuel F. Coleman
Attorneys—E. Hastings Ackley and Walter J. Jagmin

ABSTRACT: Coin sorting and dispensing apparatus which includes a coin magazine having a plurality of coin storage tubes in which coins of different denominations are receivable, each tube having individual coin-dispensing means for moving coins from its lower end and electrically controlled means for individually controlling the operation of the dispensing means. A coin sorter is also mounted above the magazine into which a mixture of coins of different denominations may be deposited which then moves coins of predetermined denominations to the upper ends of appropriate tubes of the magazine.



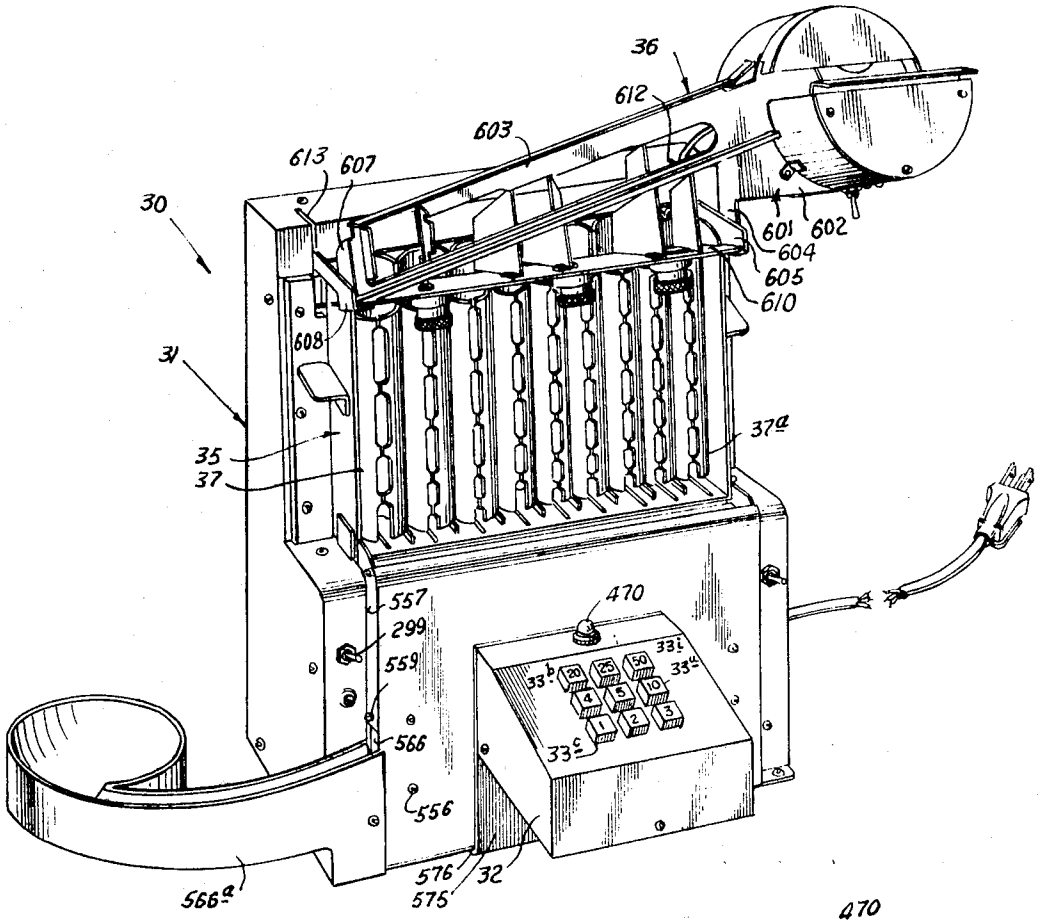


Fig. 1

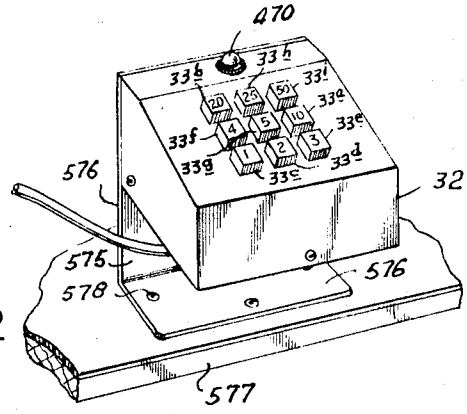


Fig. 2

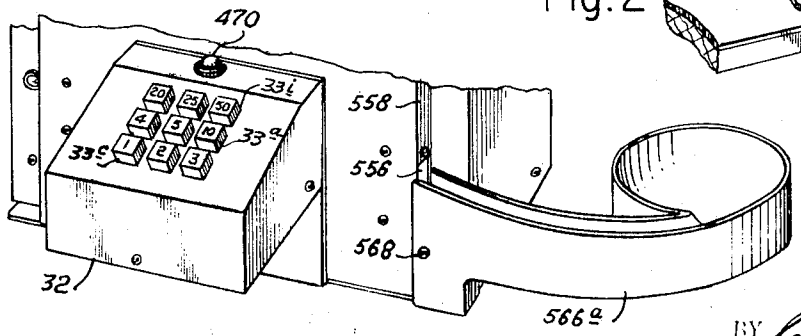
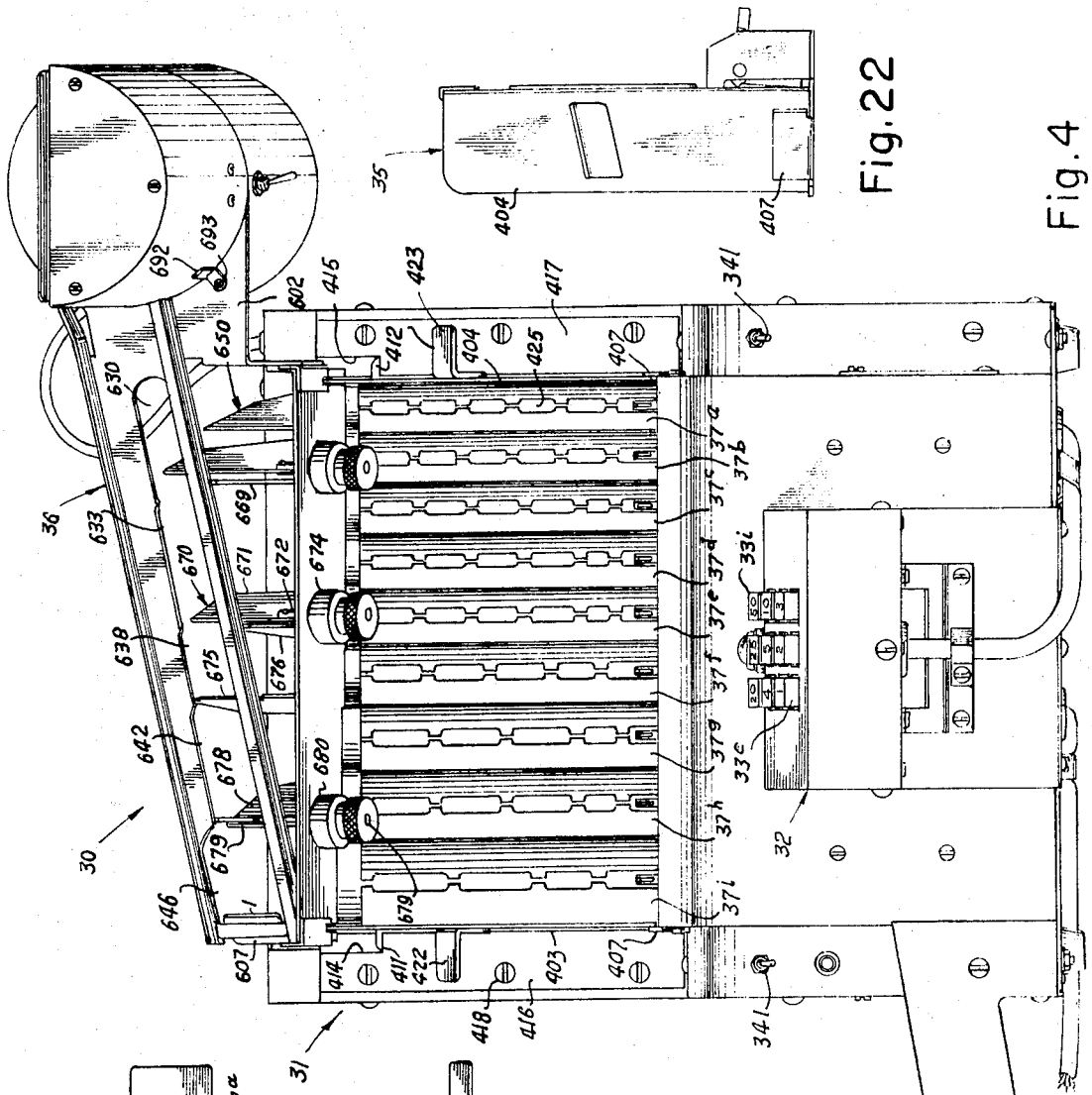
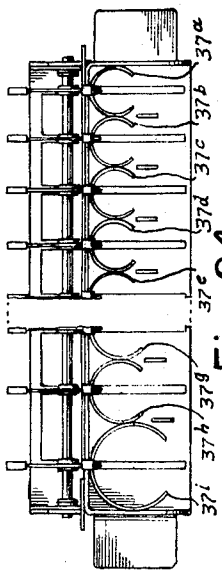


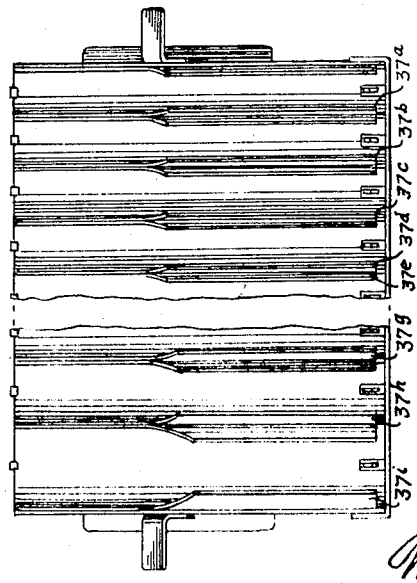
Fig. 3

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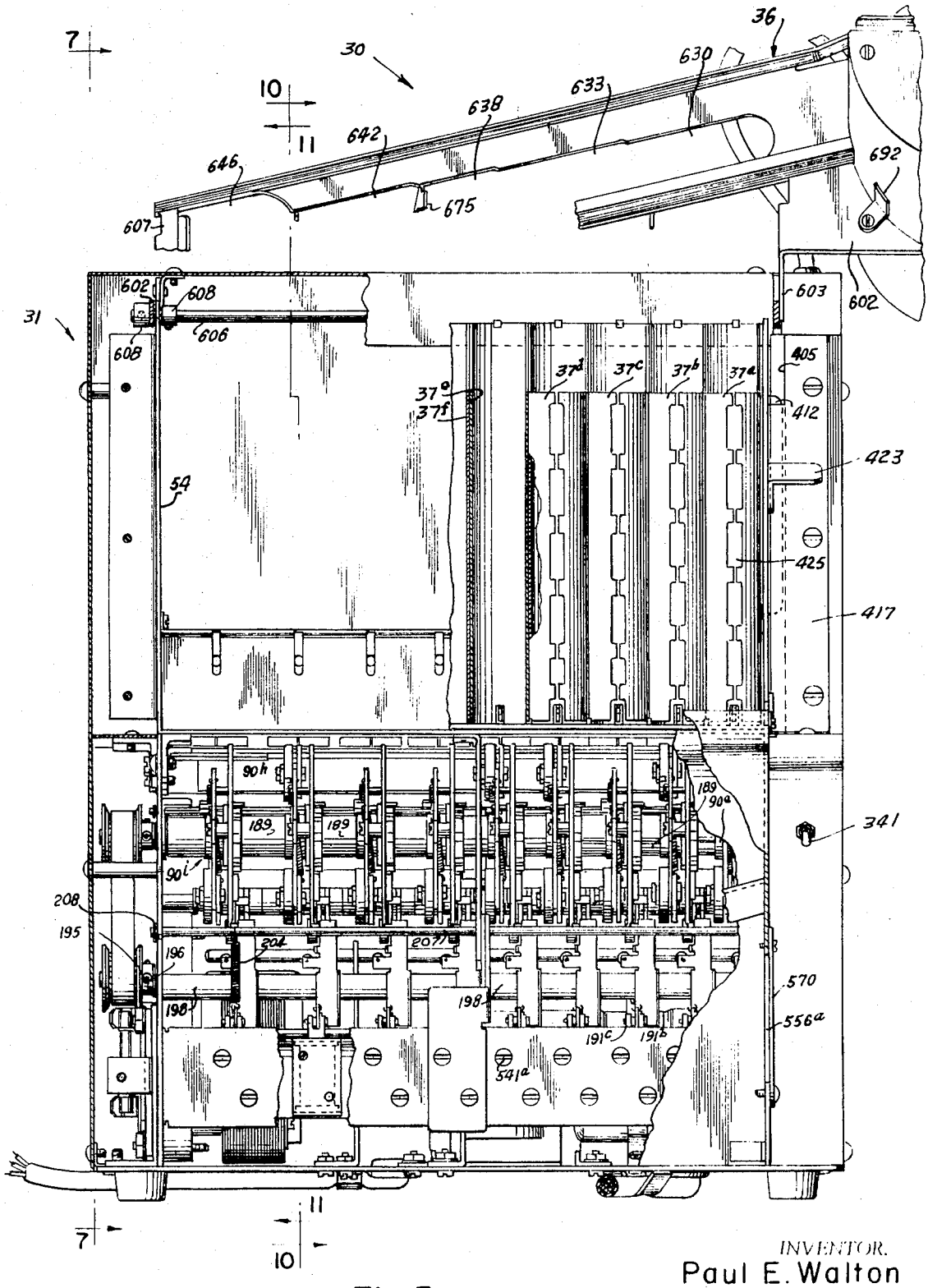


Fig.5

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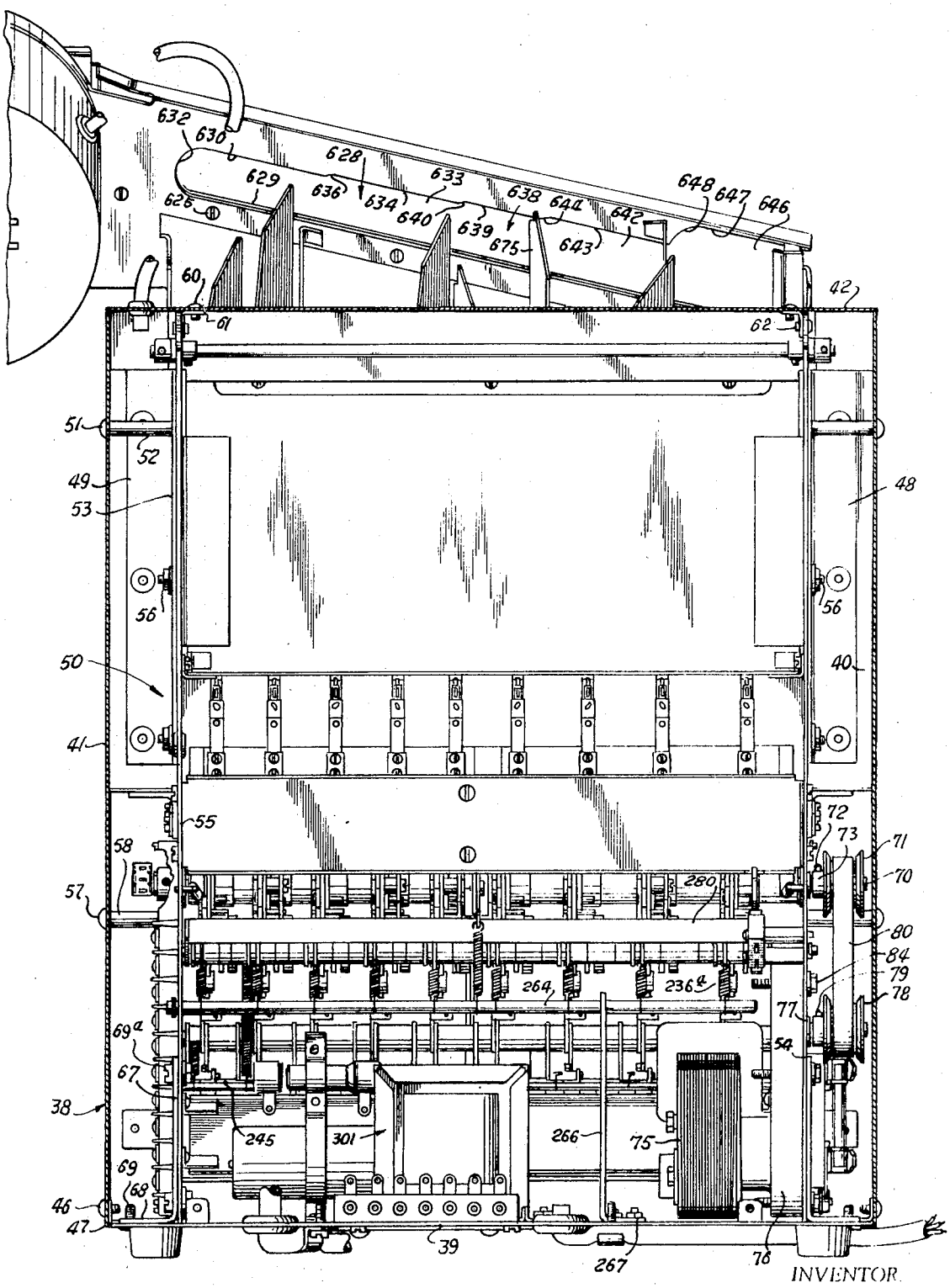


Fig.6

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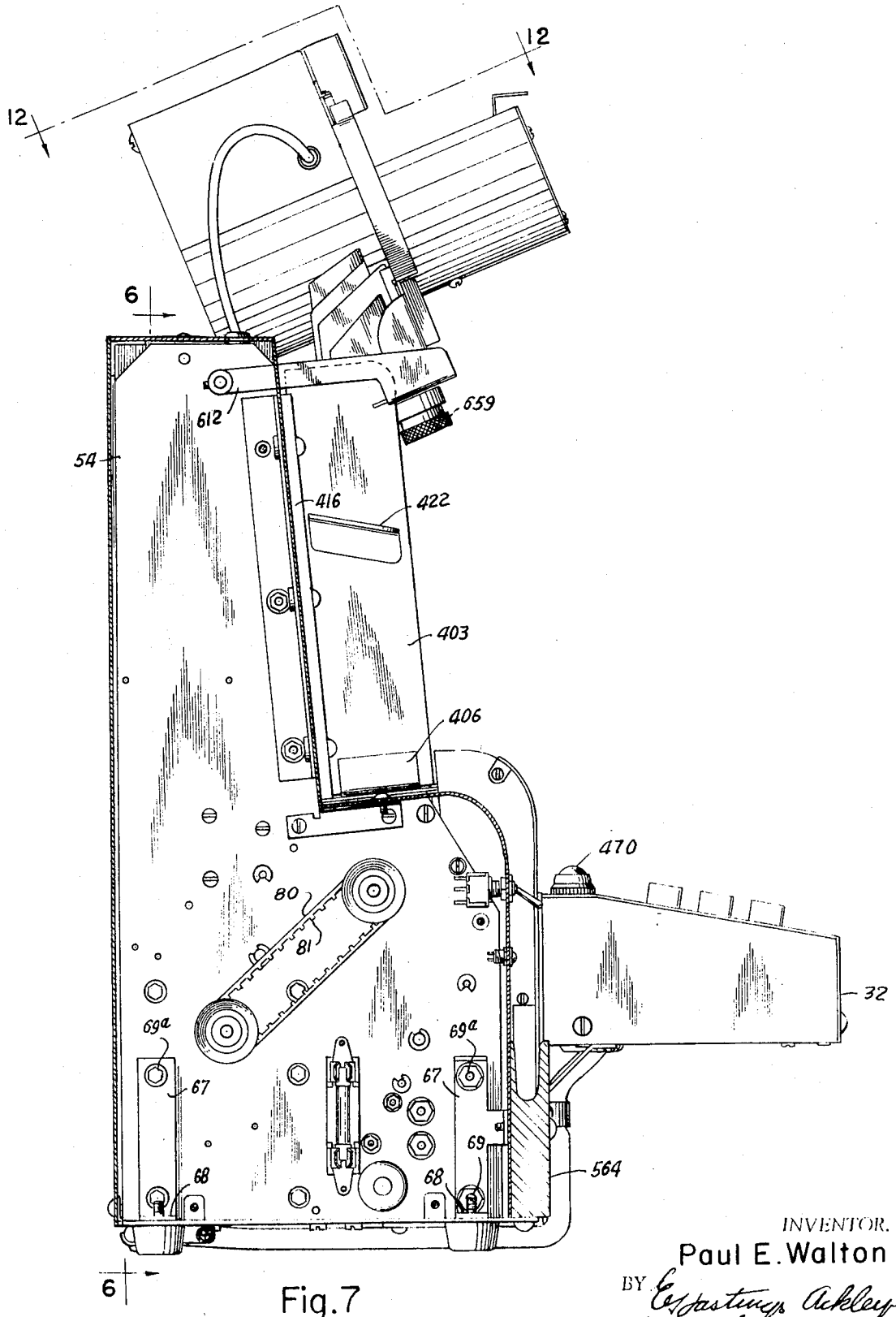


Fig.7

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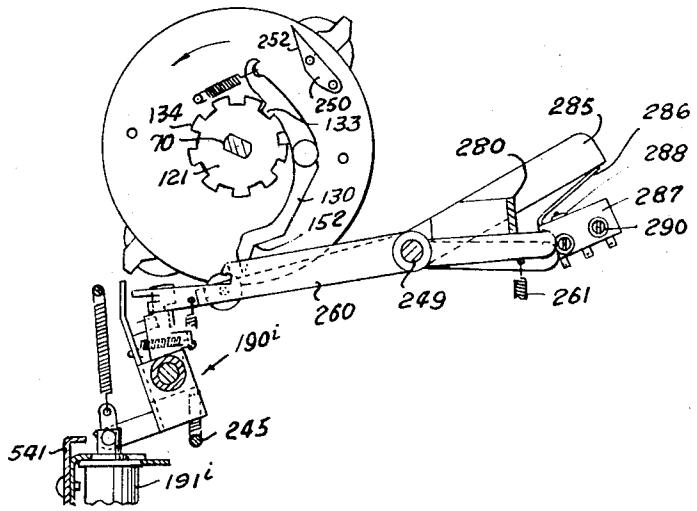


Fig. 8

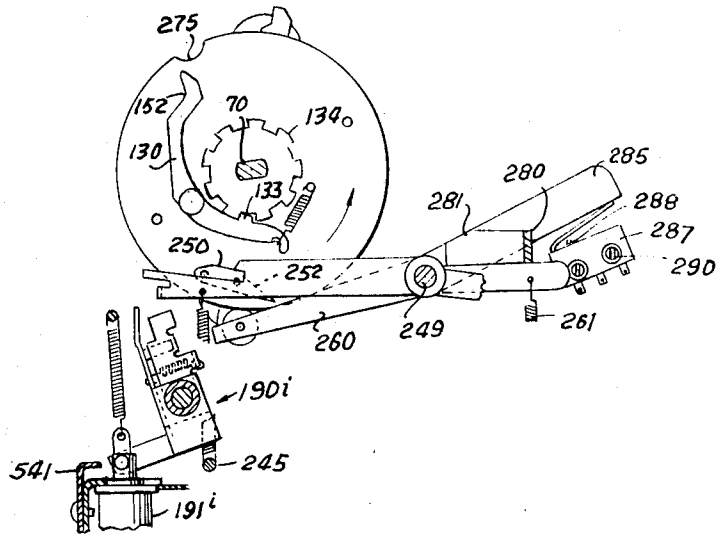


Fig. 9

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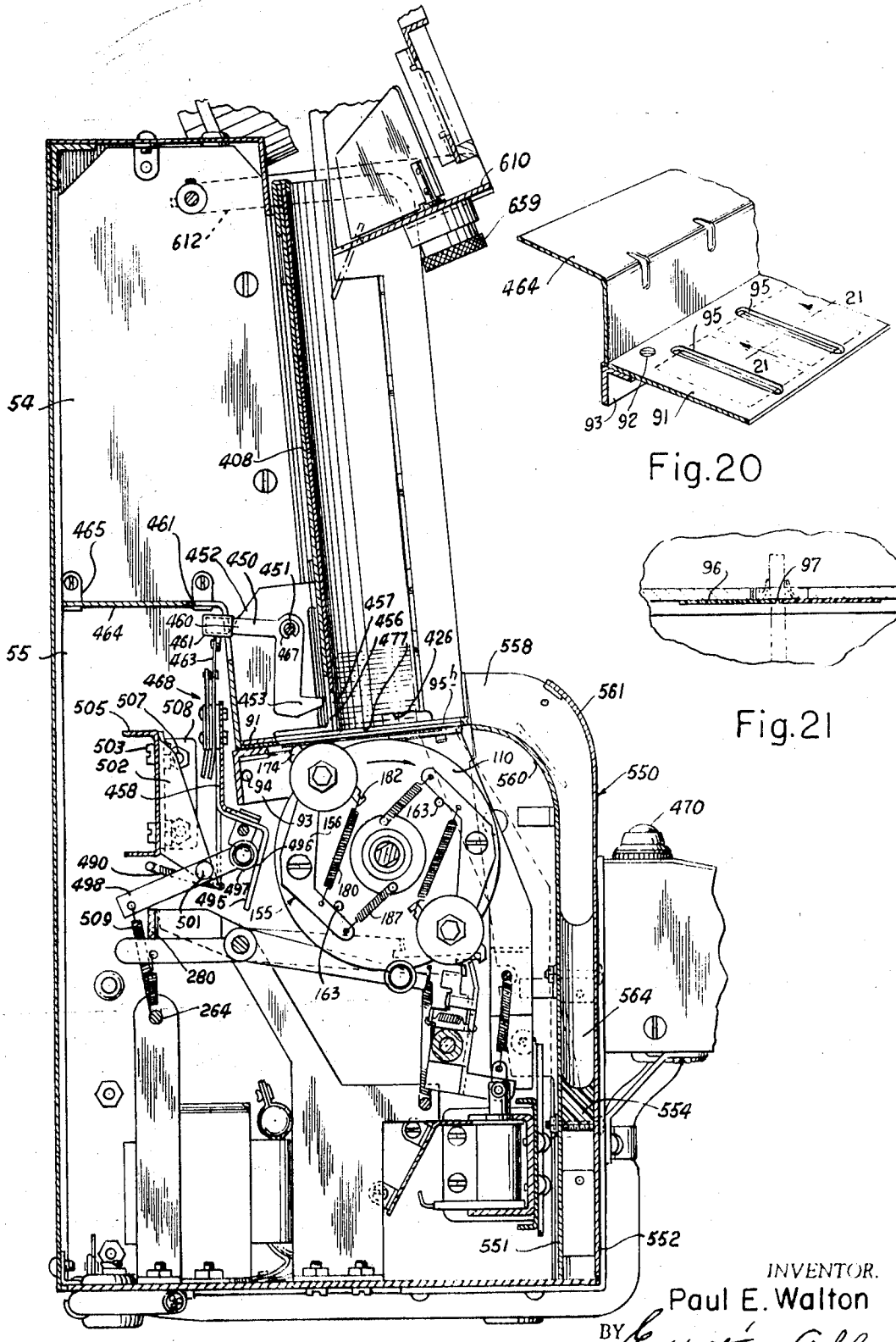


Fig.10

Fig.20

Fig.21

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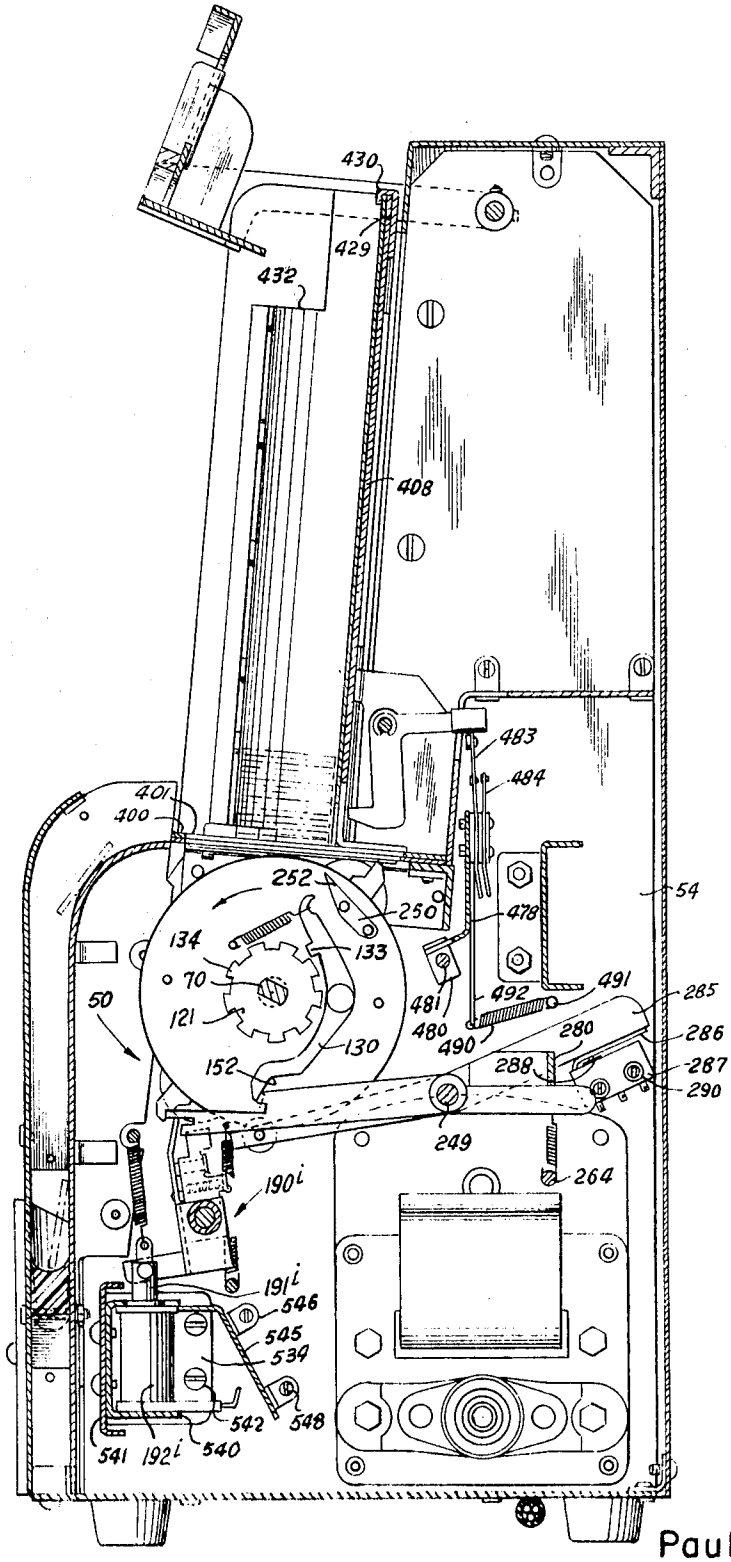


Fig. 11

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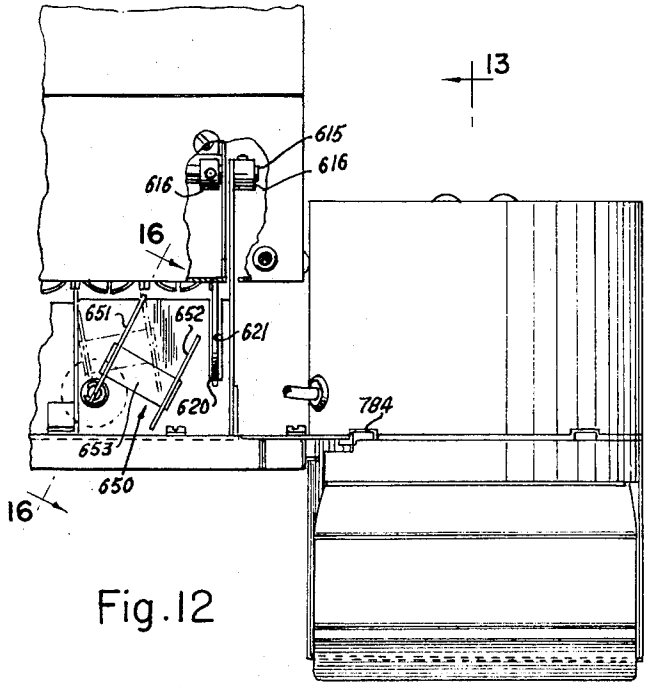


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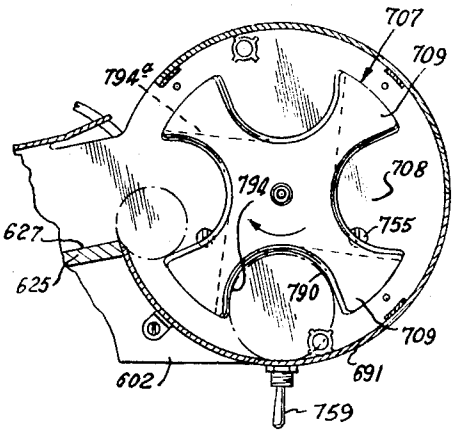


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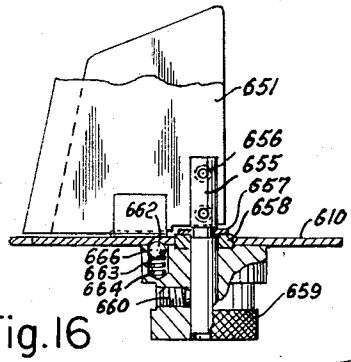


Fig.16

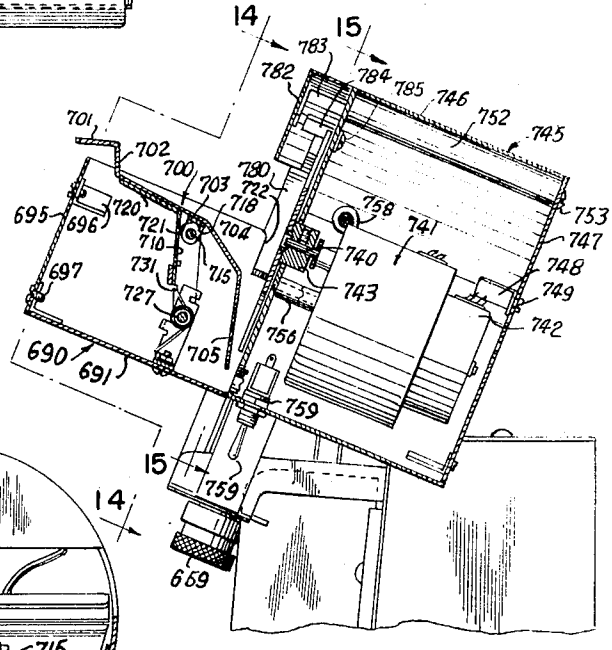


Fig.13

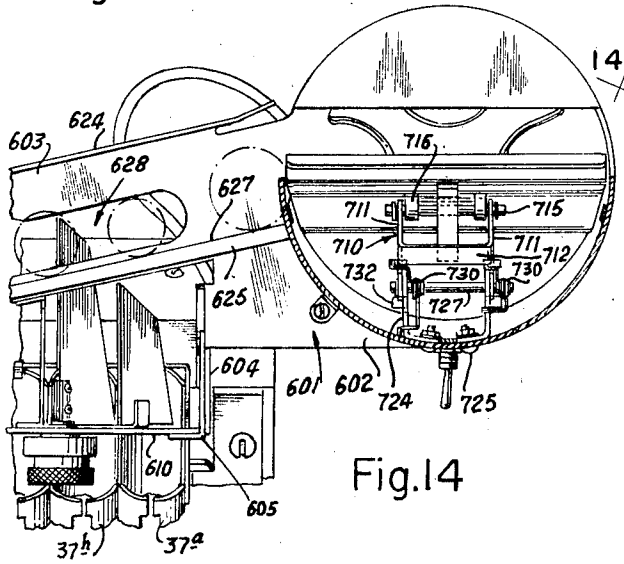


Fig.14

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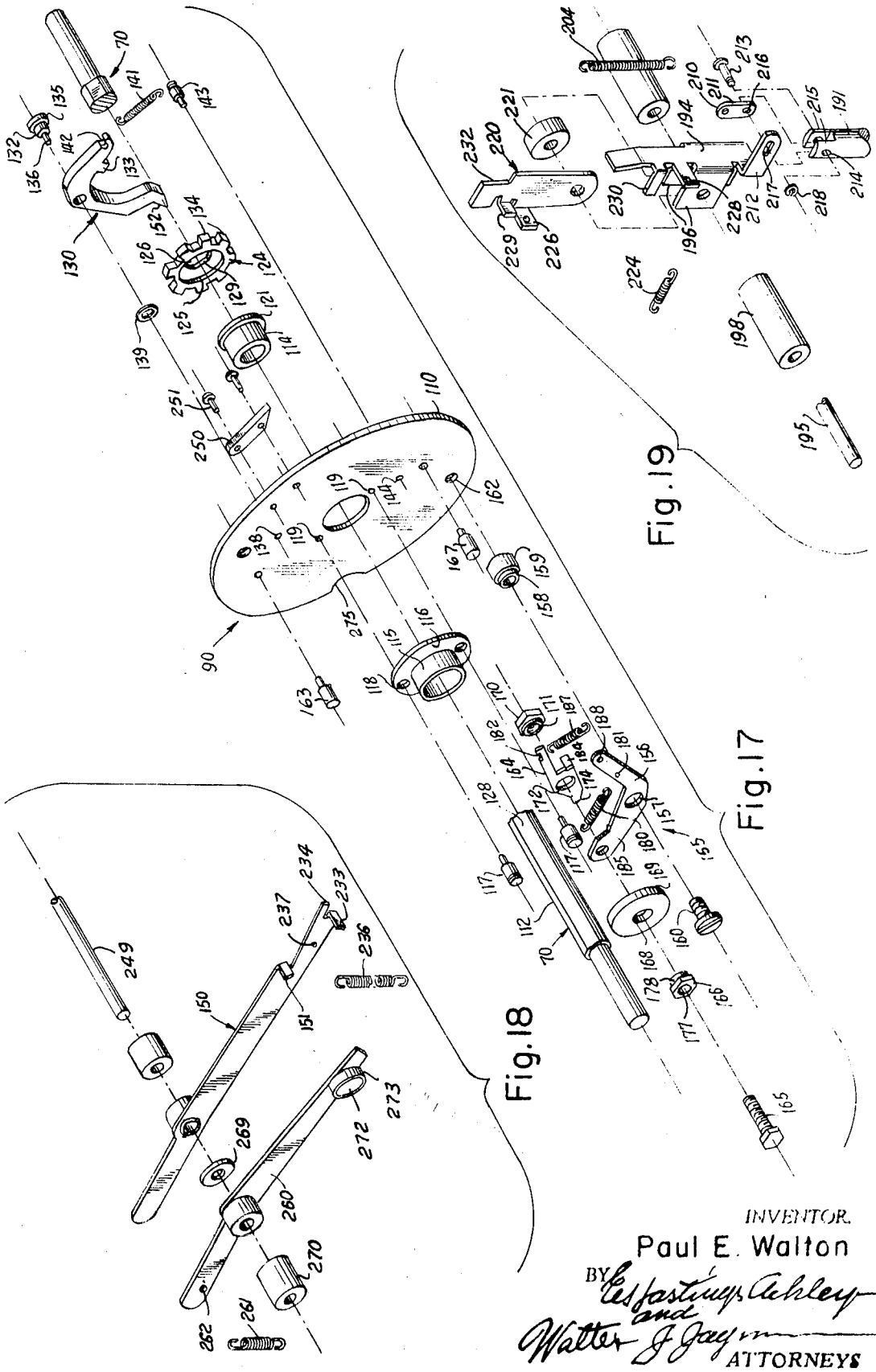


Fig. 17

Fig. 18

Fig. 19

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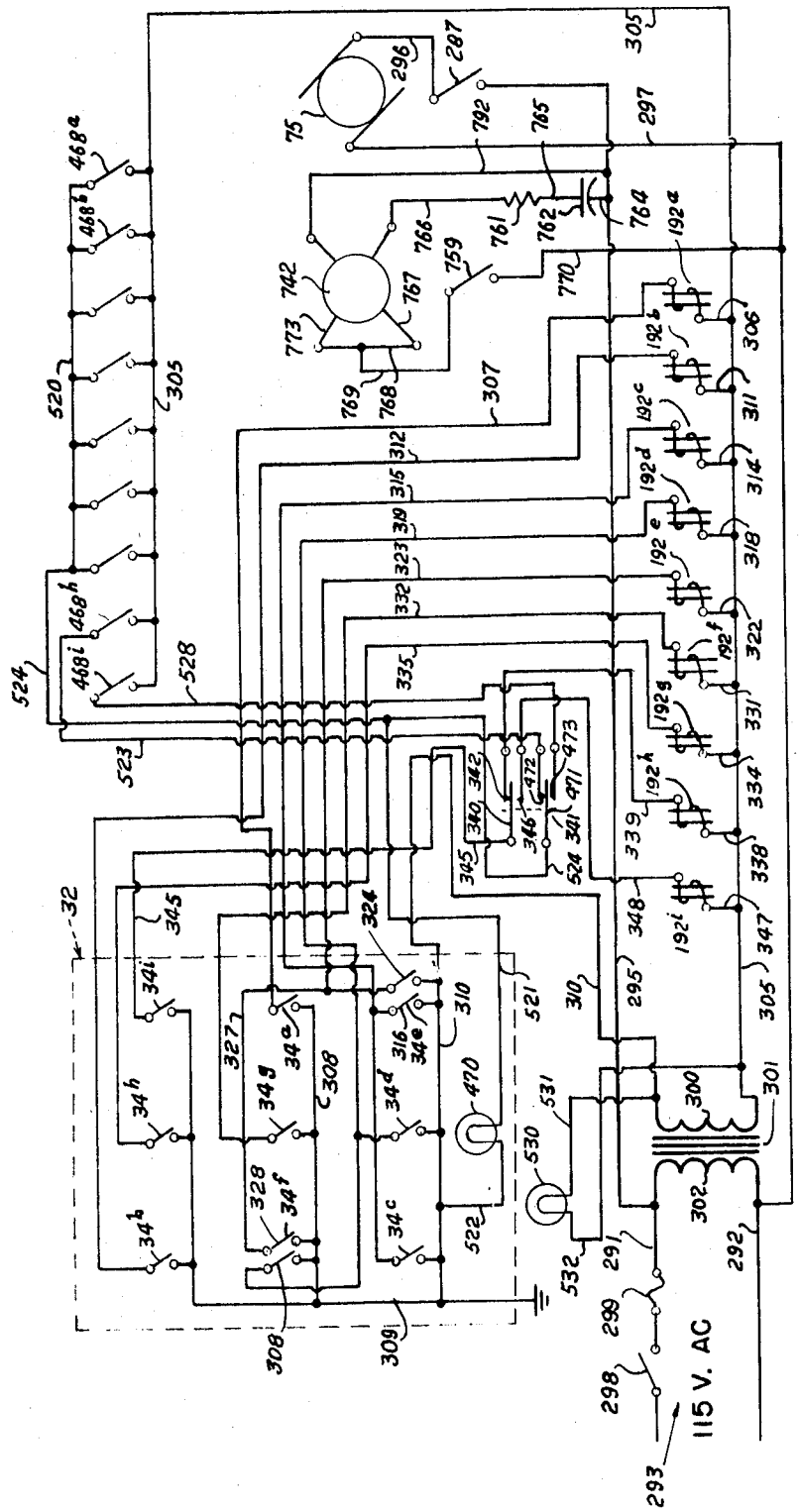


Fig. 25

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COIN-HANDLING APPARATUS

This invention relates to coin-handling apparatus and more particularly to the coin apparatus for selectively dispensing coins to make change.

An object of this invention is to provide a new and improved coin-handling apparatus having a plurality of vertical coin storage tubes and electrically controlled means for selectively dispensing coins from the lower ends of preselected coin storage tubes.

Still another object is to provide a coin-handling apparatus whose operation is controlled by a small number of switches and which dispense coins in any sum from 1 cents to 99 cents by the operation of only a maximum of four switches.

Still another object is to provide a coin-handling apparatus which has means for sorting and delivering coins of appropriate denominations to the upper ends of the coin storage tubes.

A further object is to provide a coin-handling apparatus having a plurality of dispensing assemblies each operatively associated with a coin storage tube for selectively dispensing predetermined numbers of coins from preselected coin storage tubes.

A still further object is to provide a coin-handling apparatus of the type described wherein the coin-dispensing assemblies are selectively connectable to a main rotatable shaft for operation thereby and which has electrically operable means for selectively connecting selected dispensing assemblies to the main shaft for operation thereby.

A still further object is to provide a coin-handling apparatus having latch means for permitting only a single cycle operation of each coin-dispensing assembly upon the closure of its control switch.

Another object is to provide a coin-sorting apparatus having a chute provided with a coil delivery slot and a motor driven means for individually delivering coins of different denominations from a receptacle to the chute, the chute having a slot of varying configuration through which coins of different denominations fall at different locations therealong.

Additional objects and advantages of the invention will be readily apparent from the reading of the following description of a device constructed in accordance with the invention, and reference to the accompanying drawings thereof, wherein:

FIG. 1 is a perspective view of a coin-handling apparatus embodying the invention;

FIG. 2 is a perspective view showing another manner of mounting a control assembly of the apparatus.

FIG. 3 is a fragmentary perspective view showing an alternate means for mounting the coin delivery receptacle of the apparatus;

FIG. 4 is a front view of the apparatus illustrated in FIG. 1;

FIG. 5 is a front view, with some parts broken away, of the coin handling apparatus;

FIG. 6 is a sectional view of the apparatus taken on line 6–6 of FIG. 7;

FIG. 7 is a sectional view taken on line 7–7 of FIG. 5; FIG. 8 is a fragmentary view of a drop latch and latch lever of a dispensing assembly of the apparatus showing the latch lever being held in its lower inoperative position;

FIG. 9 is a view similar to FIG. 8 and showing the latch lever locked in its upper operative position by the drop latch;

FIG. 10 is a sectional view taken on line 10–10 of FIG. 5;

FIG. 11 is a sectional view taken on line 11–11 of FIG. 5;

FIG. 12 is a view, with some parts broken away, taken on line 12–12 of FIG. 7;

FIG. 13 is a sectional view taken on line 13–13 of FIG. 12;

FIG. 14 is a sectional view taken on line 14–14 of FIG. 13;

FIG. 15 is a sectional view taken on line 15–15 of FIG. 13;

FIG. 16 is a fragmentary sectional view taken on line 16–16 of FIG. 12;

FIG. 17 is an exploded perspective view of a coin dispensing assembly of the apparatus;

FIG. 18 is an exploded perspective view of the latch lever and positioning lever assembly of a dispensing assembly of the apparatus;

FIG. 19 is an exploded perspective view of a latch assembly of the apparatus;

FIG. 20 is a fragmentary perspective view of the bottom plate on which the lower ends of the coin storage tubes rest;

FIG. 21 is an enlarged sectional view taken on line 21–21 of FIG. 20;

FIG. 22 is a side view of the coin magazine of the apparatus;

FIG. 23 is a front view of a modified form of the coin magazine;

FIG. 24 is a top view of the coin magazine illustrated in FIG. 23; and,

FIG. 25 is a diagrammatical illustration of the electric control circuit of the apparatus.

Referring now to the drawings, the coin-handling apparatus 30 embodying the invention includes a coin dispenser 31, a control assembly 32 secured to the coin dispenser at its front end having a plurality of operator or pushbuttons 33*a*—*i* of switches 34*a*—*i* whose actuation controls the selective dispensing of coins from a coin magazine 35, and a coin sorter 36 mounted on the coin dispenser 31 into which a mixture of coins of various denomination, for example, pennies, nickles, dimes, quarters and half dollars may be deposited and which then sorts the coins and delivers them to the top ends of the appropriate coin storage tubes 37*a*—*i* of the coin magazine.

The coin dispenser includes a housing 38 having a bottom wall 39, left and right sidewalls 40 and 41, and top or cover member 42. The sidewalls are secured to the bottom wall by means of screws 46 which extend into threaded bores of L-shaped brackets 47 secured, as by welding or the like, to the bottom plate or wall 39. The sidewalls are also secured to angle members 48 and 49 of a latch assembly 50 by means of screws 51 which extend into suitable internally threaded sleeves 52 whose inner ends are secured in any suitable manner, as by welding to the rearwardly extending flanges 53 of the angle members 48 and 49. The angle members 48 and 49 are secured to the sideplates 54 and 55 of the latch assembly 50 by bolts 56. The sidewalls are also secured to the sideplates by screws 57 which extend into sleeves 58 secured to the sideplates.

The cover member of the housing is secured to the sideplates 54 and 55 by screws 60 and L-shaped brackets 61, the brackets being secured to the sideplates by rivets 62.

The sideplates are rigidly secured to the bottom wall by means of brackets 67 whose legs 68 are rigidly secured, as by screws 69, to the bottom wall. The brackets are secured to the sideplates by bolts 69*a* which have suitable washers and nuts thereon.

The latch assembly includes a main drive shaft 70 whose opposite end portions are journaled by suitable bearings on the sideplates 54 and 55. A sprocket 71 is secured to the shaft by a setscrew 72 of the sprocket hub 73. The main drive shaft is rotated by an electric motor 75 whose drive shaft is connected to a suitable speed-reducing transmission 76 whose output shaft 77 has a sprocket 78 rigidly secured thereto by a setscrew 79. A belt 80 having internal teeth 81 extends about the sprockets.

The assembly of the electric motor and speed-reducing transmission is mounted on the sideplates 54 by means of bolts 84. The output shaft 78 of the speed-reducing transmission, of course, extends outwardly through a suitable aperture in the right side plate 54.

A plurality of coin dispensing assemblies 90*a*—*i* are mounted on the drive shaft below a slot plate 91 which is rigidly secured, as by screws 92, to a U-shaped support member 93 which extends between the sideplates and is secured thereto by means of screws 94. The slot plate 92 has a plurality of spaced slots 95*a*—*i* whose lower ends are closed by strips 96 of a resilient substance such as nylon, rubber, and the like, having slits 97 at the locations of the slots 95. The strips prevent dirt or dust from falling into the housing through the slots 95.

Each of the dispenser assemblies **90***a*—*i* includes a disc **110** rotatably mounted on the enlarged portion **112** of the main shaft **70** by means of a bushing **114** which extends inwardly into the bushing ring **115** whose flange **116** is adapted to abut one side of the disc **110** and be secured thereto by means of pins **117** whose reduced inner ends extend through the apertures **118** of the flange **116** into the diametrically opposed apertures **119** of the ring and may be press fitted therein. The bushing is provided with an external annular flange **121** which limits its inward movement in one direction relative to the disc **110**. A clutch gear **124** has an internal annular recess **125** in which the outer end of the bushing and its flange **121** are receivable and a central aperture **126** of the same configuration as the enlarged portion **112** of the shaft so that the clutch gear rotates with the shaft due to the provision of the diametrically opposed flat surfaces **128** of the shaft and correspondingly shaped flat surfaces **129** of the clutch gear. It will be apparent, therefore, that while the shaft **70** may rotate relative to the disc **110**, it can not rotate relative to the clutch gear **124**.

The disc **110** is caused to rotate with the shaft by the clutch lever or pawl **130** when it is pivoted in a counterclockwise direction, FIG. **11**, about the axis of its shaft **132** to the position wherein its tooth or lug **133** enters into a recess or slot between a pair of the teeth **134** of the clutch gear **124**. The shaft **132**, FIG. **17**, has an outer flange **135** which abuts the outer surface of the clutch lever to limit outward movement of the lever and a reduced end portion **136** which may be press fitted or threaded in an aperture **138** of the disc. A washer **139** is interposed between the lever and the disc.

The clutch lever is biased toward its operative position by a spring **141**, one of whose hooked end portions is received in the recess **142** of the clutch lever and whose other hooked end portion is received in an external annular groove of a retainer pin **143** whose reduced end portion is press fitted in the aperture **144** of the disc. As will be explained in greater detail below, the clutch lever is held in its inoperative position, illustrated in FIG. **11**, by latch lever **150** when it is in its operative position illustrated in FIG. **11**, wherein its inwardly extending lug **151** is in engagement with the end surface **152** of the clutch lever.

Each of the discs **110** of the dispenser assemblies **90** has at least one ejector assembly **155** mounted thereon, each ejector assembly including a lever **156** in whose intermediate aperture **157** is received the reduced end portion **158** of a spacer **159**. The lever is rotatable about the reduced portion **158**. The spacer and the lever are secured to the disc **110** by a screw **160** which extends through the spacer **159** into a threaded aperture **162** of the disc. Counterclockwise pivotal movement of the lever **156** is limited by a stop pin **163**. An ejector **164** is pivotably mounted on one end of the lever **156** by means of a screw **165** which extends through an eccentric **166**, the central aperture **168** of a nylon ring **169** and a nut **170** whose reduced cylindrical portion extends through the aperture of the ejector **164**. The eccentric **166** has a cylindrical portion **178** whose central axis is parallel to, but displaced from, the central axis of its aperture **177** and which is received in the aperture **168** of the ring **169**. It will be apparent that the rotation and the degree to which the peripheral edge portion of the nylon ring **169** can extend outwardly of the disc **110** will depend on its axial orientation relative to the eccentric **166**.

The ejector **164** is biased in a clockwise direction, FIG. **10**, about the axis of the screw **165** by a spring **180** one of whose hooked end portions is received in an aperture **181** of the lever **156** and whose other hooked end portion is received in the recess or slot **182** of the ejector. Clockwise rotation of the ejector relative to the lever is limited by the engagement of its stop lug **184** with the edge surface **185** of the lever. It will be apparent, therefore, that the ejector may pivot in a counterclockwise direction against the resistance of the spring **180** relative to the lever **156** should its ejector end portion **174** encounter an obstacle during the clockwise rotation of the disc **110**, FIG. **10**.

The lever **156** itself is biased in a counterclockwise direction about the axis of the screw **160** by a spring **187** one of whose hooked end portions is received in an aperture **188** of the lever and whose other hooked end portion is received in an external annular slot of one of the pins **117** of the dispensing assembly.

The dispensing assemblies **90***a*—*i* are held in properly spaced relationship on the main shaft in positions wherein their ejectors are properly vertically aligned with the slits **97** of the strips **96** and the slots **95** of the slot plate **90** by spacer collars **189**, which may be secured to the shaft by set screws.

The clutch levers **130** of the dispensing assemblies **90***a*—*i* are selectively held in and released from their operative and inoperative positions by the latch levers **150***a*—*i* and lock assemblies **190***a*—*i*, respectively, which are operable by the armatures **191***a*—*i* of the solenoids **192***a*—*i*. Each of the lock assemblies includes a lock bar **194** mounted on a horizontal rod **195** which extends through the aligned apertures in its parallel arms **196**. The rod **195** extends through suitable apertures in the sideplates **55** and **54** and is held against displacement by lock rings **196***a* received in appropriate annular recesses of the rod outwardly of the sideplates.

The lock assemblies **190***a*—*i* are held in properly spaced relationship to each other and in operative relationship to their associated dispensing assemblies **90***a*—*i*, respectively, by means of spacer sleeves or collars **198** mounted on the rod **195**. The top end surface **201** of the lock bar is adapted to engage an end portion **202** of the latch lever to hold the latch lever in its upper operative position illustrated in FIGS. **10** and **11**.

The lock bars of each lock assembly is biased in a clockwise direction, FIG. **11**, by a spring **204** whose upper hooked end portion is hooked about a rod **207** which extends between the end plates **54** and **55** and is held against lateral displacement by lock rings **208** which are received in suitable external annular recesses of the rod. The lower hooked end of the spring **204** is received in the aperture **210** of a strap **211** which is secured to a forwardly extending lug **212** of the lock bar **194** and to the solenoid armature **191** of its associated solenoid **192** by a pin **213** which extends through the apertures **214** in the top arms **215** of the armature **191** of its associated solenoid **192**, the aperture **216** of the strap **211** and the slot **217** of the lug **212**. The strap and the lug, of course, are received between the arms **215**. The pin is held against displacement by a lock ring **218** which is received in an external annular recess of the pin **213**.

Each lock assembly **190** includes a drop latch **220** pivotally mounted on the rod **195** between the arms **196** of the lock bar. A spacer ring **221** is also disposed on the rod between the drop latch and one of the lock bar arms **296** to limit longitudinal movement of the drop latch between the arms. The drop latch is biased in a counterclockwise direction (FIG. **11**) on the rod and toward the lock bar by a spring **224** one of whose hooked ends extends through an aperture in a lateral lug **226** of the drop latch and whose other end extends through an aperture of a lateral lug **228** of the lock bar. Clockwise pivotal movement of the drop latch relative to the lock bar is limited by the engagement of the lateral stop lugs **229** and **230** of the drop latch and lock bar, respectively.

Assuming now, that the solenoid **192**, FIG. **11**, is in its unenergized condition the armature is in its upper position by the spring **204** and the edge surface **232** of the drop latch is engaged by the lug **233** of its associated latch lever **150**. The lug **151** is now in position engaging the shoulder or surface **152** of the clutch lever **130**. If the solenoid **192** is now energized, its armature is moved downwardly causing the lock bar **194** to be pivoted in a counterclockwise direction. The top end of the lock bar moves out of engagement with a forward end portion **234** of the latch lever **150** permitting the latch lever to be pulled downwardly by a spring **236** whose upper hooked end portion extends through the aperture **237** of the latch lever and whose other hooked end portion extends about a rod **249** mounted on the sideplates **54** and **55**. The rod, of

course, extends through suitable aligned apertures in the sideplates.

As the lock bar thus pivots toward the position illustrated in FIG. **8** and the latch lever is pivoted in a counterclockwise direction about the shaft **249** on which it is mounted, its lug **151** moves out of engagement with the shoulder **152** of its associated clutch lever **130** which is then pivoted in a counterclockwise direction, FIG. **11**, by its spring **141** and its pawl **132** moves between a pair of the teeth **134** of the clutch gear. If the main shaft is now rotating in a counterclockwise direction the disc **110** rotates with the shaft. As the disc rotates through substantially 180°, a cam **250** secured to the disc **110** by rivets **251** moves to such position that its cam surface **252** engages the lug **151** of the latch lever and moves the latch lever upwardly against the resistance of the spring **236** to position wherein its lug **233** moves out of engagement with the drop latch. Once the cam moves out of engagement with the lug **151**, the latch lever will again be pivoted in a clockwise direction about the shaft **249** but even if the solenoid is still held energized the latch lever cannot pivot to a position wherein its lug **151** will not be in position to engage the shoulder **152** of the clutch lever **130** since its lug **233** will now engage the top surface of the drop latch. As the disc **110** completes a full 360° rotation with the main shaft and if the solenoid is deenergized, the latch lever lug **151** will again engage the shoulder **152** of the clutch lever and the clutch lever will be pivoted in a clockwise direction so that its pawl **132** will disengage from the clutch gear **121** and will not again remain in operative position until the solenoid is again energized. When the solenoid is deenergized the spring **204** is effective to pull up the solenoid and rotate the lock bar back to the position illustrated in FIG. **11** against the resistance of the spring **236** of the latch lever until the lug **233** of the latch lever rides over the top edge surface of the drop latch and it is then pivoted downwardly relative to the latch bar to the latch bar to the position illustrated in FIG. **11** whereupon the engagement of the forward end portion **234** of the latch lever with the top edge of the lock bar prevents further downward movement of the latch lever.

It will be apparent therefore that even should the solenoid be held energized after the disc has rotated through a full 360°, the drop latch will prevent operation of the clutch lever again until the solenoid is first deenergized.

The disc **110** of each dispensing assembly **90***a*—*i* has operatively associated therewith a brake lever **260** which is also rotatably mounted on the shaft **249** and which is biased for clockwise pivotal movement about the shaft by a spring **261** whose upper hooked end portion is received in an aperture **262** of the brake lever and whose lower end portion extends about a rod **264**. The rod **264** is mounted on the sideplate **54** and a bracket **266** whose bottom leg is secured to the bottom wall **39** of the housing by bolts **267**. The latch lever and brake lever associated with each disc **110** are separated by a washer **269** and from latch and brake levers of adjacent dispensing assemblies by spacer sleeves **270** mounted on the shaft **249**.

The brake lever is provided with a lateral pin **272** which may be provided with a resilient ring **273** of nylon or similar substance which is adapted to enter into the peripheral arcuate recess **275** of its associated disc **110**. The pin is adapted to enter into the recess and brake any further rotation of the disc **110** as the clutch lever disengages from the clutch ring of the disc upon the completion of a 260° rotation of the disc **110**.

A bail **280** whose end arms **281** are also pivotedly mounted on the shaft **249** extend above and rearwardly of the latch and brake levers of the dispensing assemblies **90***a*—*i* and is pivoted upwardly in a counterclockwise direction (FIG. **11**) about the axis of the shaft **249** by any one of the brake or latch levers when it is pivoted in a counterclockwise direction (FIG. **11**) about about the shaft **249** from its position illustrated in FIG. **11**. The bail has an arm **285** rigidly secured thereto which, when the bail is in its lowermost position illustrated in FIGS. **10** and **11**, presses the spring **286** of a switch **287** to cause its operator button **288** to be depressed. The switch is a normally closed switch when its button **288** is depressed, opens and when its button is free to move upwardly closes. The switch **287** controls the operation of the motor **75**. The switch **287** may be mounted by suitable studs **290** to the sideplate **55**.

Referring now to FIG. **25**, the motor **75** is connected across the main conductors **291** and **292** of an alternating-current input circuit **293** by means of a conductor **295**, the switch **287**, the conductor **296**, and a conductor **297**. The main conductor **291** may have a manual on and off switch **298** and a fuse **299** connected in series therein.

The normally open switches **34***a*—*i*, which are closable when their pushbuttons **33***a*—*i*, respectively, are depressed, control the energization of the lock assemblies **190***a*—*i* which control the operation respectively of the dispensing assemblies **90***a*—*i* to permit the dispensing of any preselected combination of coins in any denominational sum between 1 and 99 cents.

The ejector disc **110** of the dispensing assembly **90***a*, whose ejector disc **110** is provided with a single ejector **164**, dispenses a single 10-cent coin from the dime storage tube **37***a* during each cycle of its operation, the next coin-dispensing assembly **90***b* has two ejectors **164** and during each cycle of its operation dispenses two 10-cent coins from the dime coin storage tube **37***b*, the dispensing assembly **90***c* has a single ejector and dispenses a single penny from the penny storage tube **37***c*, the dispensing assembly **90***d* has two ejectors and dispenses 2 cents from penny coin storage tube **37***d*, the dispensing assembly **90***e* has two ejectors and dispenses 2 cents from the storage tube **37***e*, the dispensing assembly **90***f* has a single ejector and dispenses a single nickel coin from the nickel coin storage tube **37***f*, the dispensing assembly **90***g* has a single ejector and dispenses a single quarter coin from the quarter storage tube **37***g*, the dispensing assembly **90***h* has two ejectors and dispenses two quarter coins from the coin storage tube **37***h*, and finally, the coin dispensing assembly **90***i* has a single ejector and dispenses a single half-dollar coin from the coin storage tube **37***i*.

A switch **34***a*, each time it is closed, connects the solenoid **192***a* of the lock assembly **190***a* which controls the operation of the dispensing assembly **90***a* across the secondary winding **300** of a transformer **301**, whose primary winding **302** is connected across the main conductors **291** and **292**, by the conductors **305**, **306**, **308**, **309** and **310**, to cause a single cycle of operation of the dispensing assembly **90***a* and the dispensing of a single dime from the coin storage tube **37***a*.

The switch **34***b*, each time it is closed, connects the solenoid **192***b* of the lock assembly **190***b* across the secondary winding through the conductors **305**, **311**, **312**, **309** and **310**, to similarly cause the dispensing of two dimes from the coin storage tube **37***b* by the dispensing assembly **90***b*.

The solenoid winding **192***c* of the lock assembly **190***c* is connectable across the secondary winding by the conductors **305**, **314**, **315**, either the single contact switch **34***c* or the contact **316** of the double-contact switch **34***e*, and the conductor **310**. The solenoid **192***c* will be connected across the secondary winding when either the switch **34***c* or the switch **34***e* is closed and the dispensing assembly **90***c* will, therefore, in either case dispense a single penny coin from the coin storage tube **37***c*.

The solenoid **192***d* of the lock assembly **190***d* is connectable across the secondary winding through the conductors **305**, **318** and **319**, the switch **34***d* and the conductor **310**, and also through the conductors **305**, **318** and **319**, the contact **320** of the two-contact switch **34***f* and the conductors **308**, **309** and **310**. The dispensing assembly **90***d*, therefore, will dispense 2 cents from the penny coin storage tube **37***d* whenever either the switch **34***d* or the switch **34***f* is closed.

The solenoid **192***e* of the lock assembly **190***e* is connectable across the secondary winding through the conductors **305**, **322** and **323**, the other contact **324** of the switch **34***e* and the conductor **310**. It is also connectable across the secondary winding through the conductors **305**, **322**, **323** and **327**, the other contact **328** of the double contact switch **34***f* and the conductors **308**, **309**, and **310**. The dispensing assembly **90***e*,

therefore, will dispense 2 cents from the coin storage tube **37***e* whenever either the switch **34***e* or the switch **34***f* is closed.

The solenoid **192***f* of the lock assembly **190***i* is connectable across the secondary winding through the conductors **305**, **331** and **332**, the switch **34***g* and the conductors **308**, **309** and **310** so that the dispensing assembly **90***f* will dispense a single nickel coin from the nickel coin storage tube **37***f* when the switch **34***g* is closed.

The solenoid **192***g* of the lock assembly **190***g* is connectable across the secondary winding through the conductors **305**, **334** and **335**, the switch **34***h* and the conductors **309** and **310** and the dispensing assembly **90***g* will, therefore, dispense a single quarter coin from the quarter coin storage tube **37***g* each time the switch **34***h* is closed.

The solenoid **192***h* of the lock assembly **190***h* is connectable across the secondary winding through the conductors **305**, **338** and **339**, the contact **340** of a two-contact switch **341** when it is in its upper position in contact with the stationary contact **342**, the conductor **345**, the switch **34***i* and the conductors **309** and **310**. It will thus be apparent when the switch **341** is in the position illustrated in FIG. **25** and switch **34***i* is closed, the solenoid **192***h* will be energized and the dispensing assembly **90***h* will dispense two quarter coins from the quarter coin storage tube **37***h*. When the switch, however, is moved to its opposite position wherein its contact **340** is in its lower position engaging the stationary contact **346**, closure of the switch **34***i* will not cause energization of the solenoid **192***h* and, therefore, operation of the dispensing assembly **90***h*.

The solenoid **192***i* of the lock assembly **190***i* is connectable across the secondary winding, when the contact **340** of the switch **341** is in its lower position engaging the stationary contact **346**, by the conductors **305**, **347**, **348**, and **345**, the switch **34***i*, and the conductors **309** and **310**. It will thus be apparent that, when the contact **340** is engaged with the stationary contact **346**, closure of the switch **34***i* will cause the dispensing assembly **90***i* to dispense a single half-dollar coin from the half-dollar coin storage tube **34***i*. When the contact **340**, however, is in its upper position illustrated in FIG. **25**, closure of the switch **34***i* will not cause operation of the dispensing assembly **90***i*.

It will thus be apparent that if no quarter coins are present in the quarter coin storage tube **37***h* and the half-dollars are present in the half-dollar coin storage tube **37***i*, the switch **341** is moved to its lower position so that a half-dollar coin will be dispensed from the half-dollar coin storage tube **37***i* each time the switch **34***i* is closed and, alternatively, if half-dollars are not present in the coin storage tube **37***i* and quarters are present in the storage tube **37***h*, the switch **341** is moved to the position illustrated in FIG. **25** and closure of the switch **34***i* will then result in the dispensing of two quarters from the quarter storage tube **37***h*.

Since, as was explained above, the energization of the solenoid of any lock causes its associated latch lever **150** to pivot in a counterclockwise direction and the bail **280** also to be pivoted in a counterclockwise direction to permit the normally open motor switch **287** to close, any time any one of the switches **34***a*—*i* is closed, the switch **287** will also close as a latch lever pivots in a counterclockwise direction, FIG. **11**, and connects the motor **75** across the main conductors **291** and **292**. The motor **75** will thus start rotating the main shaft **70** and, as the clutch lever **130** of such dispensing assembly is also simultaneously released for movement in a clockwise direction about its shaft, FIG. **11**, to engage its clutch gear, the disc of such dispensing assembly will then be caused to rotate in a counterclockwise direction, FIG. **11**, with the shaft. This rotation of the disc immediately causes the brake lever **260** of such dispensing assembly to also pivot in a counterclockwise direction as it is moved out of the recess **275** of the disc **110** and the rear end of such brake lever will now hold the bail **280** in its upper position and prevent downward clockwise movement of the bail **280** so that the switch **287** will stay in its closed position until the disc **110** of such dispensing assembly has rotated through a full 360° and the pin **272** of its brake lever has again entered into the peripheral recess **275** allowing the bail to again move downwardly to its closed position.

It will thus be seen that even if the operator who has closed a particular switch **34***a*—*i*, by depressing its associated button **33***a*—*i*, releases the button and causes opening of such switch **34** before the disc **110** has completed a full 360° rotation with the shaft **70**, the motor will continue to be energized and the disc **110** be held rigid with the shaft **70** until the disc has been rotated through a full 360° and the brake lever pin has again entered into the peripheral recess **275** of the disc thus causing the opening of the switch **287**. The weight of the bail is sufficient to overcome the resistance of the spring **286**. If desired, of course, suitable spring means may be used to bias the bail **280** downwardly in a clockwise direction.

The coin magazine **35** includes a bottom plate **400** which is adapted to rest on the slot plate **91** and which has a slot **401** at the lower end of each tube **37** and above and aligned with the slots **95** of the plate **91**, end plates **403** and **404** which are secured, as by welding, to the vertical upwardly extending end flanges **406** and **407** of the bottom plate, as by welding, and a backplate **408** which extends between the end plates rearwardly thereof and is secured to their rear edges, as by welding. The backplate has outwardly extending flanges or tongues **411** and **412** which extend laterally outwardly of the end walls and which are slidably receivable in the longitudinal slots **414** and **415**, respectively, of the magazine retainer members **416** and **417**, respectively, secured to the angle members **48** and **49** of the latch assembly **50** by screws **418**. The retainer members **416** and **417** are preferably formed of a suitable substance of a low coefficient of friction, such as nylon. Handles **422** and **423**, respectively, are secured to the end plates **403** and **404**, respectively, as by welding, so that the magazine may be easily mounted on the coin dispenser **31** merely by moving the magazine downwardly after its tongues or flanges **411** and **412** have been positioned above the upper open ends of the slots **414** and **415**, respectively, and is removed therefrom by merely lifting it upwardly.

The coin storage tubes **37** may have front vertical slots **425** through which the coins in the storage tubes are visible and have forwardly and downwardly opening discharge recesses **426** of approximately 180° of angular width, through which the coins may be slid off the bottom plate and outwardly from the bottom end of each coin respectively, The bottom semicircular edge surfaces **427** of the tubes rearwardly of the tube discharge slots thereof rest upon the bottom plate of the magazine. The rear surfaces of the coin storage tubes which abut the front surface of the backwall **408** of the coin magazine may be rigidly secured thereto, as by welding. In addition, a retainer bracket **429** has forwardly and downwardly extending hook portions **430** which extend into each coin storage tube. The retainer bracket **429** may, of course, be welded to the back plate if desired. The upper ends of the coin storage tubes have forwardly and upwardly opening recesses **432** to facilitate the insertion of the coins into their upper ends.

Coin sensor levers **450***a*—*i* are pivotedly mounted on a shaft **451** which extends rearwardly of the backplate **408** of the coin magazine. The opposite ends of the shaft are secured to suitable brackets **452** which extend rearwardly from the rear wall and are secured thereto. The lower noses **453** of the sensor levers are adapted to extend into the lower ends of the coin storage tubes through vertical slots **456** and **457** of the backplate and the tubes, respectively. The rear arms **460** of the levers extend rearwardly through the slots **461** of an L-shaped support plate **464** which extends between the sideplates **54** and **55** and is held against movement by brackets **465** secured to the end sideplates **54** and **55**. The bottom edge of the support plate may rest on the upper surface of the U-shaped bracket **93**. The rear edges of the brackets rest on the upwardly and rearwardly inclined lower front surface of the support plate. The outer end of each sensor lever **450** is provided with a weight **461** which tends to pivot it in a counterclockwise direction, FIG. **10**. The sensor levers are held in ap-

propriately spaced locations on the shaft **451** by suitable spacers or lock rings **467**.

The coin sensor levers **450***a*—*i* are adapted to close the switches **468***a*—*i* respectively. Each of the switches **468** is used to connect a signal lamp **470** across the secondary winding whenever coins in its associated tube drops below a predetermined number. The switch **468***h* will connect the lamp **470** across the secondary winding of the transformer only if the second contact **471** of the switch **341** is in its upper position engaging the stationary contact **472** and the switch **468***i* will cause connection of the lamp **470** across a secondary winding only if the contact **471** is in its lower position engaging the contact **473** in order that the lamp **470** not be lit in the event that 50 cents in change is being provided by two quarters if the half-dollar tube is empty (**37***i*), or if 50 cents in change is being dispensed from the tube **37***i* if the storage tube **37***h* is empty.

The switches **468** are mounted on a switchplate **478** which is pivotedly secured by brackets **480** on a shaft **481** whose opposite ends are secured to the sideplates **54** and **55**. Each of the switches includes a movable contact member **483** which is movable into engagement with a stationary contact **484**, if the movable contact is moved rearwardly relative to the stationary contact member.

The switchplate **478** is biased in a counterclockwise direction (FIG. **11**) about the axis of the shaft **487** by a spring **490** one of whose hooked ends is secured to a pin **491** secured to the sideplate **54** and whose other end is connected to a lever **492** rigidly secured to the switchplate, as by screws and the like. The switchplate also has a pivot lever **495** secured to the switchplate whose lower end **496** is engageable by a roller **497** mounted on a lever **498**. The lever **498** is pivotedly mounted, as by a pin **501**, on a bracket **502** secured, as by screws **503**, to a reinforcing and support channel member **505** whose opposite ends are secured by bolts **507** and end flanges **508** to the sideplates **54** and **55**. The lever **498** in turn is biased in a counterclockwise direction (FIG. **10**) by a spring **509** whose upper hooked end extends through a suitable aperture in the lever and whose lower end extends about the rod **264**.

The lever **498** is pivotable in a clockwise direction, FIG. **10**, about the axis of the pin **501** by the bail **280** each time its rear end is raised upwardly by a latch lever **150** and then is held in such pivoted position by the bail until the dispensing operation of a dispensing assembly is completed. Each time a latch lever **150** is pivoted upon the energization of its associated solenoid **192**, the clockwise pivotal motion of the lever **498** and the engagement of its roller **497** with the pivot lever **495** causes the switch plate to pivot in a counterclockwise manner and all the movable contact members of the switches **468** move rearwardly of the rear ends of their sensor levers. The sensor levers are thus freed to pivot in a counterclockwise manner and their noses **453** to move into the lower ends of the storage tubes if the storage tubes do not have sufficient coins at the level of the location of the sensor lever noses **453**. After the dispensing of a coin from a tube, if a number of coins to the level or above the level of the sensor lever nose **453** are still present in a sensor tube, counterclockwise pivotal movement of the sensor lever associated with the tube cannot take place and the rear ends of such sensor lever remains in the positions illustrated in the drawing. On the completion of a dispensing operation, therefore, the spring **490** will be effective to move the switchplate back to the position illustrated in FIG. **10**, the upper end of the contact member **483** of the switch **468** associated with such sensor lever will not engage the upper end of the sensor lever and the switches will remain open. If, however, as the coin or coins are dispensed from such tube the level of the remaining coins drops below the level of the sensor lever nose **453**, the sensor lever, due to its weight **461**, will pivot in a counterclockwise manner, FIG. **10**, immediately upon the movement of the coins from the lower end of the storage tube, and, when the dispensing operation is finished and the switch plate again pivots in a clockwise direction, the engagement of the weight **461** with the contact member **483** will cause its associated switch **468** to close and the lamp **470** to light.

Referring now to FIG. **25**, if any one of the switches **468***a*—*g* is in its closed position, it connects the lamp **470** across the secondary winding **300** through the conductors **305**, **520**, **521**, and **310**. If the contacts of switch **341** are in the position illustrated in FIG. **25**, the closure of the switch **468***h* will connect the lamp **470** across the secondary winding through the conductors **305**, **520** and **523**, the contacts **471** and **472**, and the conductors **524**, **521**, **522** and **310**. Closure of the switch **468***h* when the lower contact is not in engagement with the contact **472**, will not result in the connection of the lamp **470** across the secondary winding through the switch **468***h*. If the switch contact **371** is in its lowermost position, closure of the switch **468***i* will connect the lamp **470** across the secondary winding through the conductors **305** and **528**, the contacts **473** and **471** of the switch **341**, and the conductors **524**, **521**, **522** and **310**.

A second signal lamp **530** connected across the secondary winding **300** by the conductors **531** and **532** lights whenever the main switch **298** is closed to show that the coin-handling apparatus is operable.

The solenoids **192** are mounted in channel shaped mounts **540** which are secured by screws **541***a* to a channel member **541** which extends between the sideplates **54** and **55** and is secured thereto by means of bolts or screws **542** which extend through apertures in its end flanges **543** which abut the sideplates **53** and **54**. A retainer plate **545** has a forward edge engaging the upper ends of the solenoids to hold them against rearward movement from their channel mounts also extends between the sideplates **54** and **55** and is secured thereto by brackets **546** and bolts or screws **548**.

The coin dispenser **31** also includes a chute assembly **550** having inner and outer walls **551** and **552**, respectively, between which is secured a plastic slide member **554** by means of screws **556**. The outer wall has side sections **558** which extend outwardly of the sideplates **54** and **55** and are secured thereto by means of screws or bolts **559**. The upper portion **560** of the inner chute wall **551** curves upwardly and terminates just below the front edge of the bottom plate of the coin magazine while the upper portion **561** of the outer chute plate wall **552** similarly curves upwardly but terminates short of the magazine. The top accurately curved surface **564** of the chute member slopes downwardly to the aperture **566** provided in the sidewall **557** and slides outwardly therefrom to an open top delivery receptacle **566** securable to the front wall **552** in any suitable manner as by screws **568** which may extend into suitable lugs of the front wall. The wall **558** is also provided with an aperture **566***a* so that upon reversal of the position of the chute member **554** the dispensed coins may be caused to slide or roll to a receptacle **556***a* secured to the coin dispenser at its right side. The aperture **566***a* is closed by suitable cover plate **570** if the receptacle **556** is employed. Similarly a cover plate is used to cover the aperture **556** in the event the receptacle **566***a* is connected to the dispensing device **31**.

The control assembly **32** in which the switches **34***a*—*i*, are mounted and which are operable by the pushbuttons **33***a*—*i*, may be secured to the coin dispenser by means of the angle bracket **575** whose bottom horizontal leg may be secured by screws to the bottom wall of the housing. Alternatively, the control assembly may be connected to the bracket **576** in the manner illustrated in FIG. **2** at a location spaced from the coin dispenser in which case its horizontal leg **576** is connected to a support, such as a counter top **577**, by screws **578**.

Assuming now that each of the coin storage tubes of the magazine **35** is filled to a substantial height with coins of appropriate denominations and that each of the sensor levers **450** is now in the position illustrated in FIGS. **10** and **11** wherein it does not hold the switches **468** closed, and it is now desired to dispense or make change of one penny, the pushbutton **33***c* is depressed, the switch **34** is closed and causes energization of the solenoid **192***c* of the lock assembly **190***c*.

Energization of the solenoid **192***c* causes the latch lever of the lock assembly **190***c* to be rotated in a counterclockwise direction, FIGS. **8**, **9** and **11**, from the position illustrated in FIG. **11** to the position illustrated in FIG. **8**. The latch lever pivots the bail **280** upwardly and the switch **287** closes causing the main shaft **70** to rotate in a counterclockwise direction. During this counterclockwise pivotal movement of the latch lever, its lug **151** moves out of engagement with the clutch lever **130** and the force of its spring **131** causes the latch lever to pivot in a counterclockwise direction and its pawl **133** to move between a pair of the teeth of the clutch gear **124**. The disc **110** of the dispensing assembly **90***c* then rotates with the shaft and since it has only one ejector **164** mounted thereon, the ejector end portion **174** moves upwardly through the slit **97** of the resilient strip **96**, the slot **95** of the slot plate **91**, and the slot **427** of the bottom plate of the coin magazine into and upwardly and forwardly through the lower end of the storage tube **37***c*. The nylon ring **169** of this dispensing assembly **90***c* is so oriented on the eccentric **166** that the ejector end portion **174** projects upwardly into the coin register a distance sufficient to engage the rear edge of only the bottommost penny in the storage tube **37***c*. The engagement of the peripheral surface of the nylon ring with the resilient strip **96** or the bottom of the slot plate **91**, causes the lever **156** to pivot against the resistance of the spring **180** to permit the nylon ring to move past the slot plate **91** and then move forwardly and downwardly. The lowermost penny is thus moved forwardly through the discharge slot **426** at the bottom end of the storage tube **37***c* and is moved into the upper end of the chute assembly **550** and then rolls or slides down the arcuate surface of the chute member **554** to the receptacle **556**. During the rotation of the disc **110** of the dispensing assembly **90***c*, the cam member **250** of the disc lifts the latch lever, as shown in FIG. **9**, to its operative position wherein the latch lever lug **151** will again be in position to engage the stop surface **132** of the clutch lever **130**, as illustrated in FIG. **9**, and the drop latch **220** will then prevent counterclockwise movement of the latch lever from this operative position even if the operator holds the pushbutton **33***c* depressed, and the solenoid **192***c* energized. Once the operator releases the pushbutton **33***c*, the switch **34***c* will close, solenoid **192***c* will become deenergized, and the latch lever will again assume the position illustrated in FIG. **10**. The bail **280**, however, will remain held in its upper position until the brake lever **260** of the locking assembly **190***c* pivots back to its normal locking position as its pin **272** enter the peripheral recess **275** of the disc **110** of the dispensing assembly **90***c*. If no other clutch, latch lever, or brake lever is now being held in its actuated position due to the energization of some other solenoid **192**, the motor will become deenergized as the disc **110** completes its full revolution of 360° and its brake lever pivots again in a counterclockwise direction and opens the switch **287**.

If it is desired to dispense 2 cents in change the pushbutton **33***d* is depressed, the switch **34***d* is closed and the solenoid **192***d* of the lock assembly **90***d* is energized causing rotation of the disc **110** of the dispensing assembly **90***d* with the shaft **70**, and since the disc **110** of the lock assembly of the dispensing assembly **90***d* has two ejectors **164** mounted thereon, during the 360° rotation of the disc **110** of the lock assembly **90***d*, first one penny and then another penny are moved forwardly through the discharge opening of the storage tube **37***d* and into the chute assembly **550**.

If 3 cents in change are to be dispensed or delivered, the pushbutton **33***e* is depressed, the two contacts of the switch **34***e* are closed and the solenoid windings **192***c* and **192***e* are energized so that the dispensing assemblies **90***c* and **90***e* are caused to operate through a full cycle with a single coin being dispensed from the storage tube **37***c* and two pennies from the storage tube **37***e*. If four cents are to be dispensed, the pushbutton **33***f* is depressed, the two contacts of the switch **34***f* are moved to their closed positions the solenoids **192***d* and **192***e* are energized and during the cycles of operation of the dispensing assemblies **90***d* and **90***e*, the two pennies are disposed from each of the storage tubes **37***d* and **37***e*.

If a 5 cent coin is to be dispensed, the pushbutton **33***g* is depressed thus closing the switch **34***g* and causing energization of the solenoid winding **192***f* so that the dispensing assembly **90***f* moves the lowermost nickel from the coin storage tube **37***f* to the chute assembly.

If a single 25-cent piece is to be dispensed, the operator pushes the button **33***h*, closes the switch **34***h*, the solenoid winding **192***g* is energized and the dispensing assembly **90***g* now dispenses a single quarter from the storage tube **37***g*.

If the two contacts of the switch **341** are in the upper positions illustrated in FIG. **25**, and it is desired to dispense 50 cents in change, the pushbutton **33***i* is depressed closing the switch **34***i*, the solenoid winding **192***h* is energized and two quarters are dispensed from the tube **37***h*. If the contacts of the switch **341** are in their lower positions, closure of the switch **34***i* and the energization of the solenoid **192***i*, thus causing the dispensing of a 50-cent piece from the storage tube **37***i* by the dispensing assembly **90***i*.

If the operator wishes to dispense a single dime, he presses pushbutton **33***a*, the switch **34***a* is closed, the solenoid **192***a* is energized and the dispensing assembly **90***a* moves a single dime from the storage tube **37***a*.

If 20 cents in change are to be dispensed, the operator depresses the button **33***b*, the switch **34***b* is closed, the solenoid winding **192***b* is energized and the dispensing assembly **190***b* moves two dimes from the storage tube **37***b* into the chute.

It will be apparent, of course, that during each operation of any one of the dispensing assemblies, the switch plate **478** is pivoted in a counterclockwise manner, FIG. **10**, to allow all sensor levers **450** to be free to pivot in a counterclockwise direction, FIG. **10**, to allow their lower noses **453** to enter into the tubes if the dispensing of the coin from any one of the storage tubes causes the top coin in such tube to be at such low level that the coins no longer prevent such counterclockwise pivotal movement of the sensor lever. When the dispensing operation is completed and the switchplate pivots back in a counterclockwise manner, of any such sensor lever associated with a tube in which the number of coins has dropped to such level the nose of its associated sensor lever enters into the tube, the weight **461** engages the contact member **483** of the switch **468** associated therewith thus causing the lamp **470** to light up and the operator will now perceive that a storage tube should be refilled with coins. The operator, of course, does not know merely from the lighting of the lamp **470** which storage tube needs to be refilled, but the operator can easily ascertain which tube it is by glancing at the vertical slots of the tubes.

The operator, of course, can make change in any manner, for example, if he wishes to make change of 73 cents he may push the buttons **33***i*, **33***d*, and **33***e*. If the pushbutton **33***i* is pushed first it will, of course, complete its cycle of operation before the dispensing assemblies **90***d* and **33***e* do so, but the motor will continue to be energized until the completion of the full cycle of operation of the dispensing assembly **90***e* since its cycle of operation was initiated last.

The coin sorter **36** includes a base plate **601** having an enlarged right-hand mount section **602** and elongate slot section **603** which extends downwardly and to the left and which also slopes downwardly and forwardly from the upper portion of the mount section, the dependent leg **604** which extends downwardly from the inner edge of the main portion and to which an angle bracket **605** is welded, and a rearwardly extending flange **607** at the left end of the slide section **603** to which an angle bracket **608** is welded. A support bar **610** extends between the brackets **605** and **608** and is welded to their horizontal flanges on which its opposite portions rest. The rear end portions of the brackets **605** and **608** extend inwardly into the upper end of the housing through slots **612** and **613** of the housing and are pivotedly mounted on a rod **615** which extends through aligned apertures in the sideplates **54** and **55** and the brackets **605** and **608**. The rod **615** is retained in place by two pairs of collars **616** disposed on opposite sides of the sideplates and the brackets and rigidly secured to the shaft by setscrews.

Downward and forward pivotal movement of the coin sorter relative to the coin magazine is limited by the engagement of the edge surfaces **620** defining the inner ends of the longitudinal slots **621** of the support bar **610**, with the forward edges of the coin magazine end plates **603** and **604** which are adapted to be received in the slot **621**. The coin sorter is pivotable upwardly about the axis of the shaft **615** to a position where it is spaced rearwardly of the coin magazine to permit removal or installation of the coin magazine on the coin dispenser.

The slide section **603** of the base plate **602** has a top forwardly extending flange **624** integral therewith and a roll strip **625** is secured by screws **626** on the front surface of the slide section **603**. The top surface **627** of the strip supports the coins as they roll downwardly therealong while the rear surfaces of the coins slide upon the downwardly and forwardly inclined front surface of the slide section **603**. The slide section has a longitudinal slot **628** therein whose lower end is defined by its edge surface **629** which extends parallel to and is spaced above the top surface of the roll strip **625** a distance so short that the center of gravity of the coins rolling on the roll strip and sliding on the slide section will be above the edge surface **629**. The extreme right end portion **630** of the slot **628** which is defined by the top edge surface **630** is of narrowest width so that the upper edge of a dime coin rolling on the roll strip **625** will be located below the top edge **629** and such dime will fall downwardly and rearwardly through the reduced portion as soon as its rear edge passes the arcuate surface **632** of a slide section defining the right end of the slot **628**.

The next portion **633** of the slot whose upper end is defined by the edge surface **634** is of such size that the upper edge of a penny rolling along the roll strip **625** will be spaced below the edge **634** so that when the rear edge portion of the penny moves downwardly past the surface **636** which extends between the surfaces **630** and **634**, it will fall rearwardly and downwardly through the slot portion **633**.

The next further enlarged portion **638** of the slot defined by the edge surface **639** is of such width that the upper edge of a nickel rolling on the roll strip will be located below the edge surface **639** so that the nickel will fall downwardly and rearwardly therethrough when the rear edge of the nickel moves past the surface **640** extending between the ends of the surfaces **634** and **639**.

The next lower portion **642** of the slot defined by the edge surface **643** is of such width that the upper edge of a quarter rolling along the roll strip **625** will be spaced downwardly thereof so that when it passes the edge surface **644** extending between the adjacent ends of the surfaces **639** and **643**, it will fall downwardly and rearwardly through the slot.

Finally, the bottom portion **646** of the slot defined by the edge surface **647** is of such width that a half-dollar coin rolling along the roll strip **625** will have its upper edge spaced below the surface **647** and the half-dollar coin will fall downwardly through the portion **646** of the slot when the rear edge of the half-dollar move downwardly and to the left of the surface **648** extending between the adjacent ends of the surfaces **643** and **647**.

The dime coins falling rearwardly through the extreme right-hand portion **629** are directed selectively into the upper end of either the tube **37***a* or **37***b* by a guide **650** which includes a pair of vertical plates **651** and **652** connected by a U-shaped bracket **563** to which the vertical plates are welded. The front portion of the plate **651** extends into an upwardly opening slot of the shaft **655** and is secured thereto by rivets or pins **656**. The shaft extends downwardly through a washer **657** and a bushing **658** disposed in a suitable aperture of the support bar **610** and has a handle **659** secured to its lower end portion by a setscrew **660**. The guide **650** is releasably held in either the full line or the broken line positions illustrated in FIG. **12** by a ball detent **662** biased upwardly in an upwardly opening bore **663** of the handle **659** by a spring **664**. The bottom surface is provided with a pair of downwardly opening recesses or indentations **666** in one of which the upper portion of the ball detent is received when the guide is in the position illustrated in full lines in FIG. **12** and wherein the guide directs the dimes falling downwardly through the right end portion **629** of the slot into the upper end of the coin storage tube **37***a* and is received in the other of these indentations when the guide is moved to the position in broken lines in FIG. **12** and wherein the guide directs the dimes falling through the right-hand position **629** of the slot **27** into the upper end of the storage tube **37***b*.

The pennies falling downwardly and rearwardly through the portion **633** of the slot are selectively directed into the upper ends of the tubes **37** by rigid guide plate **669** secured to and extending between the support bar and the slide section **670** and a movable guide which includes a single plate **671**, mounted on a shaft **672** in the same manner as the plate **651** is mounted on a shaft **672** in the same manner as the plate **651** is mounted on the shaft **655**, which is movable between three positions by a handle **674** connected to the bottom of the shaft. The handle **674**, of course, has a detent of the same type as the handle **659** which is receivable in any one of three radially spaced downwardly opening recesses or indentations in the support bar **610**. The guide **670**, when it is pivoted in a counterclockwise manner, FIG. **4**, to its extreme forward position, directs the pennies falling through the section **633** of the slot into the top end of the storage tube **37***c*, when it is pivoted rearwardly to an intermediate position it directs the pennies into the upper end of the tube **37***b*, and when rotated to its extreme rearward position it directs the pennies to the top end of the tube **37***e*.

The nickels falling downwardly and rearwardly through the section **638** of the slot are directed into the upper end of the tube **37***f* by the rigid guide plates **675** and **676** which extend between the support bar **610**, the slide section of the base plate and are rigidly secured thereto in any suitable manner, as by welding.

The quarters which fall rearwardly and downwardly through the portion **642** are directed to either the tube **37***g* or **37***h* by the rigid guide **675** and guide **678** mounted on a shaft **679** whose handle **680** is provided with a detent of the same type as the handle **659** and which is received in two spaced indentations or recesses in the bottom surface of the support bar **610** to releasably hold the guide **678** in either a position where it directs the quarters falling through the portion **642** into the upper end of the tube **37***g* or in its other position into the top of the tube **37***h*.

Finally, half-dollars which fall downwardly and rearwardly through the portion **646** of the slideplate are directed into the top end of the tube **37***i* by the rearwardly curved flange **607** of the base plate **601** and the rigid guide which extends between the support bar and the slideplate. The sideplate may preferably also have a forwardly extending stop flange **680**.

A mixture of coins of various denominations which is to be sorted by the coin sorter and delivered to the top ends of appropriate coin storage tubes includes a receptacle **690** having a semicylindrical wall **691** whose inner edge abuts the top surface of the section **602** of the base plate **601** and which is secured thereto by means of one or more brackets **692** welded to the semicylindrical wall whose leg abuts the top surface of the base plate section **602** and is rigidly secured thereto by a screw **693**. The receptacle **690** also includes semicircular wall **695** which is secured to the semicylindrical wall by brackets **696** welded to the semicylindrical wall whose legs abut the semicircular wall and are secured thereto by screws **697**.

The coins to be sorted are deposited on a receptor plate **700** which has an outer stiffener flange **701**, a downwardly and rearwardly sloping section **702**, a central section **703**, a downwardly and rearwardly extending slide portion **704**, and a bottom presser portion **705**. The receptor plate directs the coins deposited thereon downwardly into the rear end of the receptacle **690** defined by the top surface of the base plate section **602** in substantially vertical positions and its bottom presser portion biases them toward the section **602** in position to be received in the recesses **708** of a rotatable coin mover **707** defined by its four arms **709**. The recesses are of sufficient

depth to receive therein the upper portion of a 50-cent coin whose edge is rolling along the inner surface of the semicylindrical wall.

The receptor plate **700** is pivotally mounted on a lever **710**, which includes a pair of bars **711** connected intermediate their ends by a bar **712**, by means of a shaft **715** which extends through aligned apertures in the upper ends of the bars **711** and the downturned arms **716** of a bracket **718** welded or otherwise secured to the lower end of the section **703** of the receptor plate. Counterclockwise pivotal movement of the receptor plate about the axis of the shaft **715**, FIG. **13**, is limited by the engagement of the bottom surface of the receptor plate section **703** with the top portion **720** of a bar **721** whose lower end is rigidly secured, as by welding, to the bar **712** of the lever **710**.

The lever **710** is pivotally mounted on the upper ends of a pair of brackets **724**, whose leg portions are secured to the semicylindrical wall by bolts **725**, by means of a shaft **727** which extends through aligned apertures in the upper ends of the bracket **724** and the bars **711**. The lever **710** is biased in a clockwise direction, FIG. **13**, about the axis of the shaft **727** by a pair of springs **730**. Each of the springs **730** has one end received in a recess **731** of an arm **711** and its other end bears against the rear surface of the adjacent bracket **724**. Clockwise pivotal movement of the lever **710** is limited by the engagement of the lower rear surface of one of the bars **711** with a laterally projecting lug **732** of one of the brackets **724**.

The center of gravity of the receptor plate **700** is located forwardly or outwardly of the axis of the shaft **715** so that the receptor plate is biased by gravity in a counterclockwise direction about its shaft **715** and held in the position illustrated in FIG. **13** by the stop **710**.

The coin mover **707** is rigidly secured to the output shaft **740** of a speed reducing transmission **741**, driven by an electric motor **742**, by means of its hub **743** which extends rearwardly through a suitable aperture of the base plate section **602** into the motor housing **745**. The motor housing **745** includes an annular wall **746** to which a circular end wall **747** is secured by brackets **748** and screws **749**. The motor housing is secured to the rear of the base plate section **602** by a pair of posts **752** whose forward ends are rigidly secured, by any suitable means, to the base plate section and screws **753** which extend through suitable apertures in the wall **747** into threaded bores of the posts. The speed-reducing transmission and electric motor, which are available commercially as a unit, are securable to the base plate section **602** by screws **755** which extend through suitable apertures in the base plate section **602** into threaded posts **756** rigid with the speed-reducing transmission and electric motor housing.

An electric cable having the electrical conductors for connecting the motor to a source of current extends into the housing through a suitable aperture in the annular wall **746** and a grommet **758**. The switch **759** for controlling the operation of electric motor **742** is also mounted on the annular wall **746** and its operator handle **759** extends outwardly of the housing.

The motor **742**, FIG. **25**, may be of any suitable single-phase self-starting motor, such as a capacitor start motor whose starter winding, not shown, is connected in series with a current-limiting resistance **761** and a capacitor **762** across the main conductors **291** and **292** by means of the conductors **295**, **764**, **765**, **766**, **767**, **768**, **769**, **770** and **297**. The running winding of the motor **742** is also connectable across the main conductors **291** and **292** by the conductors **295**, **297**, **772**, **773**, **768** and **769**, the switch **759**, and the conductors **770** and **297**. It will therefore be apparent that each time the main switch **298** is closed and the switch **759** is closed, the motor **742** will be energized and will rotate the coin mover **709**.

A shield for the upper portion of the coin mover above the receptacle **690** is provided by an extension **780** and the semicylindrical wall **691** and a plate **782** secured to the upper portion of the extension by a bracket **783**. One or more brackets **784** which are secured to the base plate section **602** by screws **785** project forwardly therefrom and engage the extension **780** to help support the coin receptacle on the base plate section **602**.

When a number of coins of different denominations are to be sorted, the operator moves the guides **678**, **670** and **650** as required to direct the quarters, pennies and dimes to appropriate tubes of the coin magazine which have the least number of such coins therein. The switches **298** and **759** are closed, the motor **742** is energized and rotates the coin mover **709**, and the coins are deposited on the receptor plate **700**. Since the portions **703**, **704** and **705** thereof are inclined downwardly at progressively greater angles, as the coins slide downwardly thereover they are moved into substantially vertical positions and then tilt rearwardly as their lower edges engage the semicylindrical wall and move into parallel relationship against an arm of the coin mover on the base plate section **602**. The receptor plate pivots against the force of gravity in a clockwise direction about the axis of the shaft **715** as required by the number of coins. The lever **710** itself may also pivot in a counterclockwise direction about the axis of the shaft **727** against the resistance of the springs **730** depending on the number of coins which are deposited on the receptor plate. The coins are held in such positions parallel to the base plate section **602** by the pressor portion **705**.

As the coin mover rotates, a coin nearest the section **602** moves into a recess **708** between a pair of arms **709** and moves further rearwardly and into sliding contact with the base plate section **602**, and then is moved by the forwardly moving edge **790** of such arm upwardly towards the discharge slot **792** of the annular semicylindrical wall **691** which is in alignment with the roll strip **625**. The coin, of course, slides on the section **602** of the base plate and rolls along the semicylindrical wall **691** until it is moved upwardly through the discharge opening **792** and onto the roll strip **725**. The arms are of sufficient radius that at the time of the movement of the smallest coin onto the upper end of the roll strip, the edge of the smallest coin, and therefore also the largest coin, is engaged by the arm at a location between its central axis and the periphery thereof engaging the roll strip **625**. As seen in FIG. **15**, if the coin mover is rotated in a clockwise direction, the coins are moved upwardly and to the left along the semicylindrical wall **691**. If desired, the direction of rotation of the coin mover may be reversed and the coins would then be moved upwardly and to the right and would roll off the outer edges **794** of the arms as such edges move downwardly and incline towards the roll strip **625**. If desired, such trailing edges of the arms may be given the configuration **794*a*** to cause the coins to roll off the arms with greater velocity onto the roll strip **625**. The thickness of the opposite edges of the arms of the coin mover which engage the edges of the coins, are equal to or less than the thickness of the smallest coin, in this case a dime, to be sorted in order that each arm move only a single coin. If the coin mover is rotated in a counterclockwise direction, there is less likelihood of a coin which may be struck to a second coin in a recess between the arms of the coin mover moving with such second coin and being discharged onto the roll strip since it is moved a greater distance therewith and subjected to greater gravitational forces.

Due to the mounting of the receptor plate **700** for movement about two different spaced axes, the position of the receptor plate will adjust to any reasonable number of coins which may be deposited thereon without causing any jamming thereof. The coin mover **707** thus moves the coins sequentially, one by one, from the receptacle **690** onto the upper edge of the roll strip **625** and these coins then move down the strip and fall through the slot of the slide section into appropriate storage tubes.

Referring now particularly to FIGS. **23** and **24** of the drawing, the coin magazine **35*a*** may be used in place of the coin magazine **35** and installations where it is not necessary to use a coin sorter as, for example, where the operator receives the coins to be dispensed in the usual paper rolls. The coin magazine **35*a*** being similar to the coin magazine **35**, its elements have been provided with the same reference numerals,

to which subscript 'a' has been added, as the corresponding elements of the coin magazine **35**. The coin magazine **35***a* differs from the coin magazine **35** in that a fairly large portion of the tubes **35***a—i* have been cut away as at **800** in order to permit the paper rolls of coins to be inserted therein. In all other respects the magazine **35***a* is identical to the magazine **35**.

It will now be seen that a new and improved coin-handling apparatus has been illustrated and described which has dispensing assemblies **90***a—i* each of which, when operated, dispenses one or two coins from its associated coin storage means or tube and that the dispensing assemblies have lock means **190***a—i* operatively associated therewith for permitting only a single cycle of operation of its associated dispensing assembly upon each actuation of the switch which controls the operation of such lock means.

It will further be seen that the control means for the lock means comprises only nine switches **34***a—i*, which permits selective operation of the lock means **190***a—i* to cause the dispensing means to dispense predetermined numbers of coins in predetermined total sum from the storage tubes.

It will further be seen that the coin-handling apparatus has means for dispensing either two quarters from a quarter storage tube or a 50-cent piece from a half-dollar storage tube upon the actuation of the 50-cent pushbutton **33***i* of the switch **34***i* and that the selection of the operation of the dispensing of either of a single half-dollar or two quarters is easily performed by the operation of the switch **341**.

It will also be seen that the coin-handling apparatus includes a coin sorter into whose receptacle a mixture of different coins of different denominations may be deposited which sequentially moves the coins from the receptacle onto a chute or slide which causes coins of different dominations to fall into preselected coin storage tubes.

It will further be seen that the coin sorter includes means for directing coins of predetermined denominations into a selected one of two coin storage tubes for coins of a predetermined denomination.

It will now be seen that the coin handling apparatus, which is used for making change, is of relatively simple construction the coin magazine being easily removable and installable thereon and that a coin sorter may be mounted above the coin storage tubes to direct the coins thereinto.

It will further be seen that due to the pivotal, yieldable mounting of the ejectors **164** on the levers **156**, which themselves are yieldably pivotally mounted on the discs **110**, if a bent coin or the like is lodged in a coin storage tube and cannot pass through its discharge opening, the ejector, and the lever **156** on which it is mounted, may pivot against the resistances of the springs **180** and **187** to permit the movement of the ejector past such coins without causing any damage to the apparatus.

The foregoing description of the invention is explanatory only, and changes in the details of the construction illustrated may be made by those skilled in the art, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim and desire to be secured by Letters Patent is:

1. A coin-handling apparatus including: a plurality of coin storage tubes; stop means at the bottom ends of said tubes limiting downward movement of coins in said tubes, each of said coin storage tubes having a discharge aperture at its lower end above said stop means through which the lowermost coin in the tube may be ejected; a plurality of dispensing means each operatively associated with an associated tube and having means movable through the bottom end of a tube for individually and selectively engaging and ejecting the lowermost coin from the tube through said discharge opening; drive means for operating said dispensing means; and a plurality of lock means each operatively associated with an associated dispensing means for causing connection of its associated dispensing means selectively to said drive means and causing a single cycle of operation of its associated dispensing means on each actuation of said lock means, each of said lock means including latch means having electrically operable operator means and a plurality of switch means for selectively energizing said operator means, said drive means including a drive shaft, said dispensing means being mounted on said drive shaft and including clutch means for connecting said dispensing means to said drive shaft to cause rotation of said dispensing means with said drive shaft, each of said lock means including a latch lever for the clutch means of its associated dispensing means having operative position wherein it holds the clutch means of its associated dispensing means in inoperative position and latch means for holding said latch lever in its operative position.

2. The coin-handling apparatus of claim **1**, wherein said operator means are operatively associated with said latch means and cause said latch means to free said latch lever for movement from its operative position upon energization of said operator means.

3. The coin-handling apparatus of claim **2**, wherein each of said operator means comprises a solenoid.

4. The coin-handling apparatus of claim **3**, wherein each of said latch means includes means for preventing movement of its associated latch lever to its operative position until the associated solenoid has been deenergized.

5. The coin-handling apparatus of claim **4**, wherein each of said lock means includes means for moving said latch lever out of engagement with said latch means when said clutch lever is in its inoperative position and into operative position upon rotation of the dispensing means with said drive means through a predetermined angle.

6. The coin-handling apparatus of claim **5**, wherein said drive means includes an electric motor for rotating said drive shaft, and motor switch means operatively associated with said dispensing means for energizing said motor whenever the latch lever of any one of said lock means is in its inoperative position and during a cycle of operation of any of said dispensing means.

7. The coin-handling apparatus of claim **6**, and individual brake means cooperable with each of said dispensing means for stopping said dispensing means in predetermined position relative to said drive shaft upon completion of each cycle of operation of the dispensing means.

8. The coin-handling apparatus of claim **7**, and means cooperable with said latch levers and brake means of said dispensing means and with said motor switch means for causing said switch means to connect said motor across an input circuit whenever any latch lever and brake means is in its inoperative position.

9. The coin-handling apparatus of claim **8**, wherein each of said dispensing means includes a main member rotatably mounted on said drive shaft and connectable to said drive shaft for rotation therewith by said clutch means; an ejector lever pivotally mounted on said lever; and an ejector pivotally mounted on said lever and having an ejector end portion extending outwardly of said main member; and individual means biasing said ejector lever and said ejector to position wherein said ejector will move into and through the bottom end of a tube when said rotatable member is rotated by said shaft.

10. The coin-handling apparatus of claim **9**, wherein said coin storage tubes comprise a magazine removably positionable over said dispensing means.

11. The coin-handling apparatus of claim **10**, and a coin sorter disposed over the top ends of said tubes and having an inclined chute means provided with a longitudinal slot of downwardly and incrementally increasing height through which coins of predetermined denominations moving on the chute means fall into predetermined tubes.

12. The coin-handling apparatus of claim **11**, wherein said coin sorter includes a receptacle at the upper end of said chute means and coin moving means in said receptacle for moving coins individually from said receptacles to the upper ends of said chute means.

13. The coin-handling apparatus of claim **12**, wherein said coin moving means comprises a rotatable member having a

plurality of arms providing radially outwardly opening recesses in which the coins in the receptacle are receivable and engageable at their edges by said arms.

14. The coin-handling apparatus of claim **13**, and a positioning plate in said receptacle on which coins are depositable and over which the coins slide toward said rotatable member and into substantially parallel relation therewith.

15. The coin-handling apparatus of claim **14**, wherein said plate has portions of progressively greater angular inclination from the horizontal and toward said moving means.

16. The coin-handling apparatus of claim **15**, wherein the plate is biased toward said moving means.

17. The coin-handling apparatus of claim **16**, and drive means for rotating said moving member.

18. The coin-handling apparatus of claim **1**, and a coin sorter disposed over the top ends of said tubes and having an inclined chute means provided with a longitudinal slot of downwardly and incrementally increasing height through which coins of predetermined denominations moving on the chute means fall into predetermined tubes.

19. The coin-handling apparatus of claim **18**, wherein said coin sorter includes a receptacle at the upper end of said chute means and coin-moving means in said receptacle for moving coins individually from said receptacles to the upper ends of said chute means.

20. The coin-handling apparatus of claim **19**, wherein said coin-moving means comprises a rotatable member having a plurality of arms providing radially outwardly opening recesses in which the coins in the receptacle are receivable and engageable at their edges by said arms.

21. The coin-handling apparatus of claim **24**, and a positioning plate in said receptacle on which coins are depositable and over which the coins slide toward said rotatable member and into substantially parallel relation therewith.

22. The coin-handling apparatus of claim **21**, wherein said plate has portions of progressively greater angular inclination from the horizontal and toward said moving means.

23. The coin-handling apparatus of claim **22**, wherein the plate is biased toward said moving means.

24. The coin-handling apparatus of claim **23**, and drive means for rotating said moving member.

25. In a coin-handling apparatus, a dispensing means for ejecting the lowermost coin from a coin storage tube through a discharge aperture of said tube, said dispensing means including: a drive shaft; a base member rotatably mounted on said rotatable drive shaft; clutch means on said shaft and said base member for connecting said base member to said drive shaft for rotation therewith; and ejector means mounted on said base member and movable through the bottom end of a coin storage tube for engaging the lowermost coin in the tube and moving it out of the tube through said discharge aperture, said ejector means including a lever pivotally mounted on said base member; and an ejector pivotally mounted on said lever and having an end portion movable through the lower end of a coin storage tube.

26. The dispensing means of claim **25**, and biasing means for biasing said lever relative to said base member in a direction opposite to the direction of rotation of said shaft, and means biasing said ejector relative to said lever in the direction of rotation of said shaft.

27. The dispensing apparatus of claim **26**, wherein the axes of pivotal movement of said ejector and said lever are spaced from one another and parallel to the axis of rotation of said shaft.

28. The dispensing apparatus of claim **27**, adjustably mounted on said lever for varying the length of said end portion extending outwardly of the periphery of said disc.

29. In a coin sorter: a receptacle positionable at the upper end of an inclined chute means to which coins from the receptacle are movable; coin-moving means in said receptacle for moving coins individually from said receptacle to the upper end of said chute means, said coin-moving means comprising a rotatable member having a plurality of arms providing outwardly opening recesses in which the coins in the receptacle are receivable and engageable at their edges by said arms; and a positioning plate in said receptacle on which coins are depositable and on which the coins slide toward said rotatable member and into substantially parallel relationship therewith, said plate having portions of progressively greater inclination from the horizontal and inclined toward said moving means, said plate having a lowermost portion extending at a slight angle relative to the plane of rotation of said moving means, means biasing said plate to a position wherein said lowermost portion is near said moving means; and drive means for rotating said moving member.