

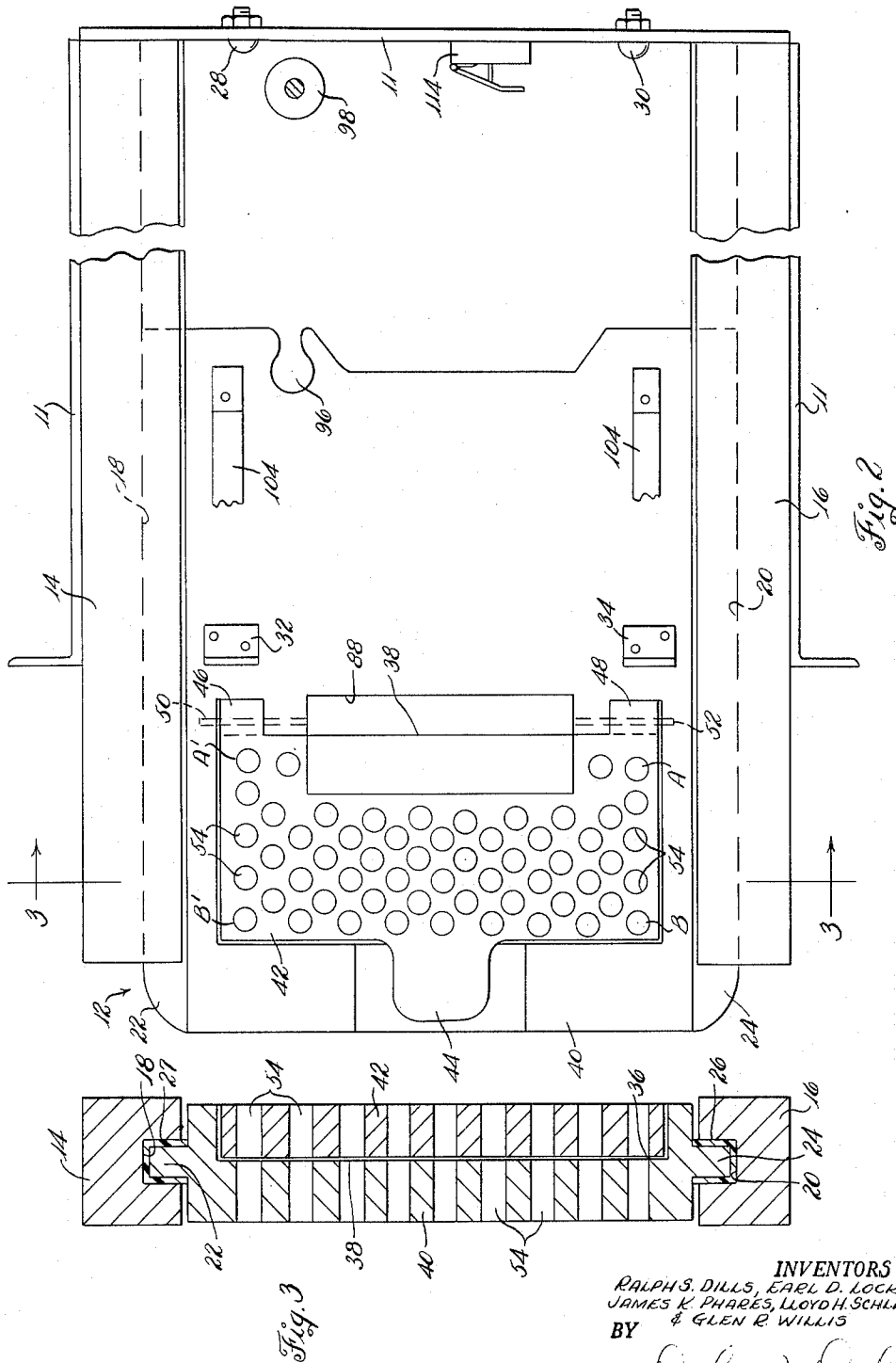
Oct. 12, 1965

R. S. DILLS ETAL
APPARATUS FOR AUTHENTICATING DOCUMENTS
AND PERFORMING VENDING FUNCTIONS

3,211,268

Filed Aug. 17, 1962

4 Sheets-Sheet 2



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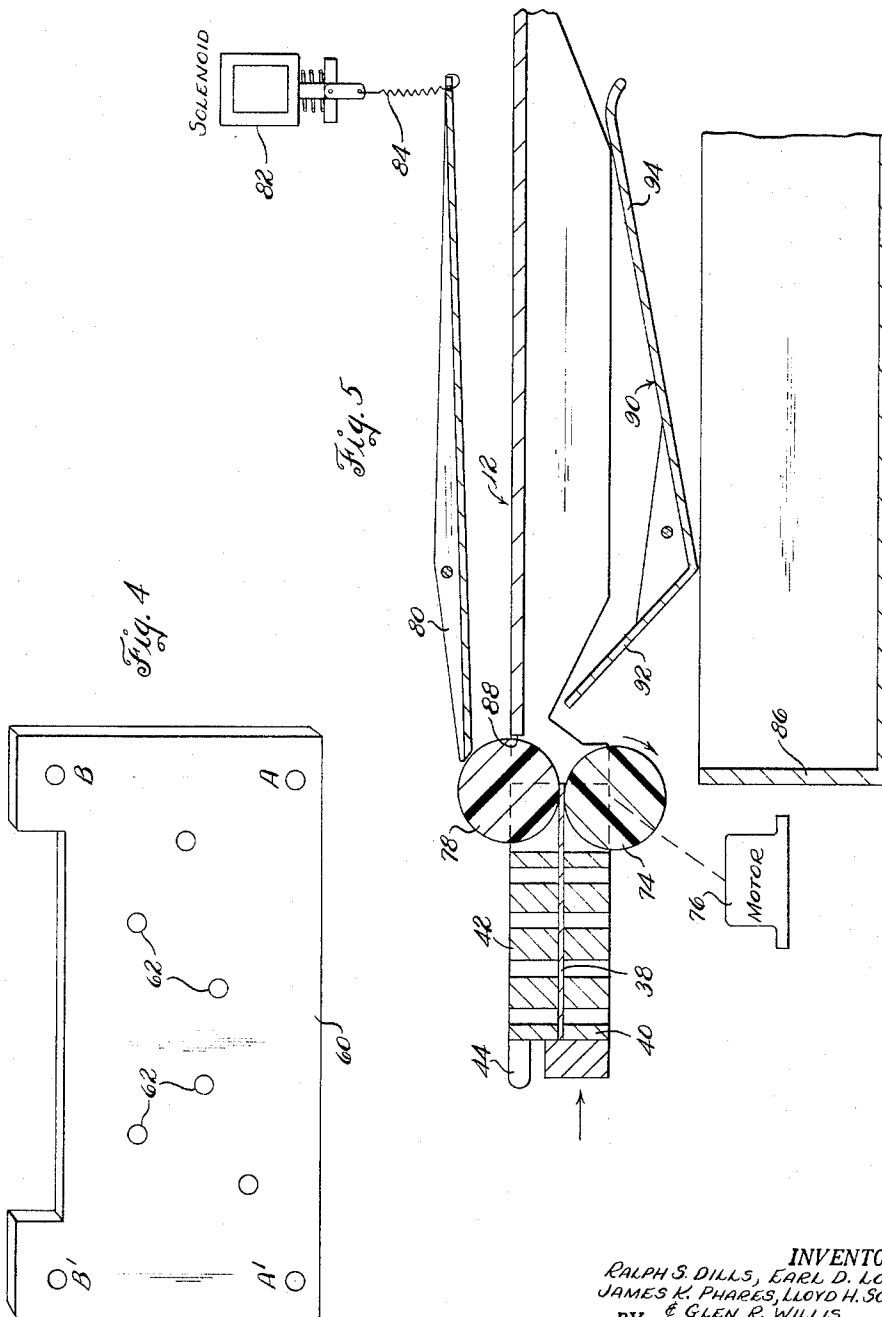
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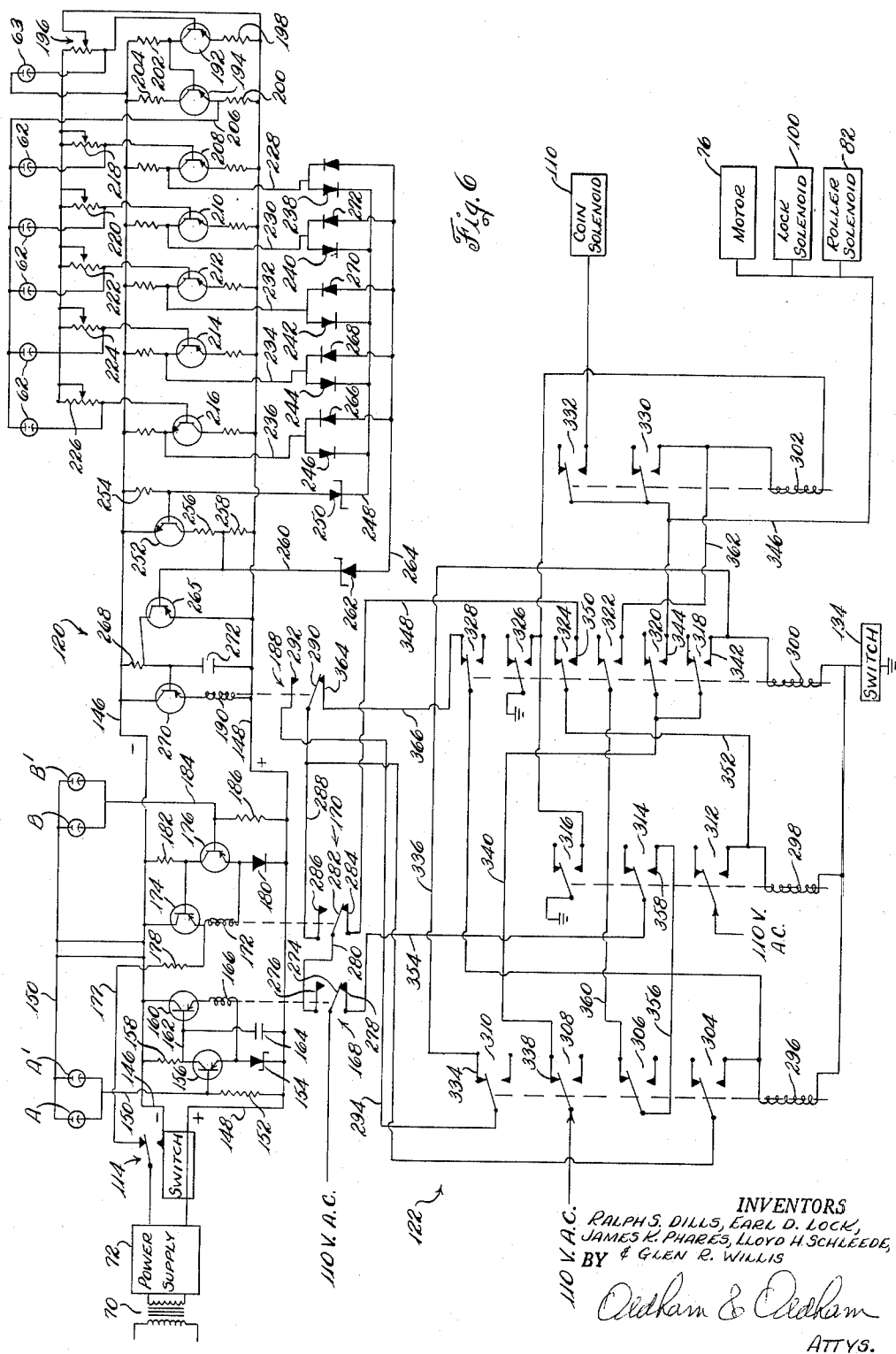
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4 Sheets-Sheet 4



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3,211,268

APPARATUS FOR AUTHENTICATING DOCUMENTS AND PERFORMING VENDING FUNCTIONS

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Filed Aug. 17, 1962, Ser. No. 217,585
7 Claims. (Cl. 194-4)

This invention relates to a method and apparatus for authentication of documents and for performing vending functions, and, more particularly, to a method and apparatus for receiving and identifying as genuine a piece of paper money, followed by the performance of a vending function, such as making coin change for the paper money, the vending of merchandising or service, or the vending of a merchandise or service plus the making of change.

It is the general object of the invention to provide a relatively simple, compact, easily operated, self-contained automatic apparatus for quickly and accurately determining the authenticity of paper money and performing a vending function if the paper money is genuine.

Another object of the invention is to provide an apparatus for identifying paper money that automatically compensates for variations in the age and color of the money, and that is adjustable for different kinds of paper money.

Another object of the invention is to provide an accurate method of converting paper money into a control signal which includes the step of determining the authenticity thereof prior to the generation of the control signal.

The foregoing and other objects and advantages of the invention will be made more apparent as the specification proceeds.

Reference now should be had to the accompanying drawing, wherein:

FIG. 1 is a diagrammatic view partly in section showing the apparatus and control circuits of the invention.

FIG. 2 is a plan view of the bill slide and guide rails therefor of the apparatus of FIG. 1.

FIG. 3 is a section view of the bill slide and guide rails of FIG. 2 taken along the line 3-3.

FIG. 4 is a plan view of the light sensitive cell circuit board showing a sample location of the light sensitive cells thereon.

FIG. 5 is an elevation view in section showing the anti-pilfer plate and bill slide.

FIG. 6 is a diagram of the control circuits of apparatus of the invention.

The term "paper money" has been largely used heretofore in referring to the article or articles to be identified by our testing apparatus, and this term is intended to include paper currency of all sizes, denominations, and countries or origin, and, in addition, to include bonds, documents, or other paper, textile, or colored articles which might be subjected to test for genuineness, weave, composition, color and pattern, or the like, by equipment of the character herein described and claimed. However, the apparatus of our invention is primarily designed for the determination of genuineness of United States paper money in lower denominations, for example, one-dollar, five-dollar, and ten-dollar bills. In order to shorten the

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designation of the article being tested, it has been designated in the drawings as a bill and will be so described in the specification.

Referring to the drawings, as shown in FIGS. 1 to 3, a bill changing apparatus 10 supported by a packaging frame 11 is shown. A pair of substantially parallel guide rails 14 and 16 secured to the frame guide the bill slide 12 to an "in" and "out" position. To provide clearance for the movable bill slide 12, the dimension of the slide 10 in the direction normal to its movement is slightly less than the height of the guide rails. The guide rails are formed with facing longitudinally extending grooves 18 and 20. Longitudinally extending ribs 22 and 24 of the slide are covered with U-shaped anti-friction bearing material 26 and 27, such as nylon or Teflon, and extend into the longitudinally extending grooves thereby permitting the slide to freely ride in the grooves of the guide rails.

A pair of rubber stops 28 and 30 secured to the portion of the frame 11 limits the inward movement of the slide 20 and defines the slide "in" position. Stops 32 and 34 secured to the upper surface of the slide strike a portion of the frame or cabinet housing to limit the outward movement of the slide so that the outward edge of the slide extends a short distance beyond the outward end 25 of the rails 14 and 16. The stops 32 and 34 define the "out" position of the slide. The slight extension functions as an inherent guide to the operator of the bill changing apparatus to apply force to the slide rather than to the ends of the guide rails.

The slide contains a bill chamber 36 adapted to receive a bill 38. The chamber is formed by a bill support plate 40 and a bill cover plate 42. The cover plate 42 has an outwardly extending lip 44 which serves as a handle for the operator. The cover plate 42 has a pair of forwardly extending ears 46 and 48 which contain pivot pins 50 and 52 to mount the cover plate on the slide. When the cover plate 42 is open, the lower surface of the ears 46 and 48 function as guides to accurately position the bill 38 in the bill chamber 36.

The support and cover plates have a plurality of spaced concentric bores 54 which extend through the plates in a direction normal to the movement of the slide. The plates contain at least one bore in each corner portion thereof which are indicated in FIG. 2 as A-A' and B-B'. The number of bores provides the apparatus with inherent versatility since a large number of different portions of the bill can be comparatively tested to determine the authenticity thereof.

As shown in FIG. 1, the slide 12 is in the "in" position. In this position, the bores 54 are in alignment with matching bores 56 in a plate 58. The plate 58 is secured to and spans the lower portion of the guide rails 14 and 16. A circuit board 60 positions a selected number of light sensitive cells 62, such as photodiodes or photoresistors, in the bores 56. As shown in FIG. 4, the circuit board 60 positions at least one cell in each corner bore and six cells in selected bores over the surface of the bill. The number of cells, the electrical characteristics of the separate cells, and their relative locations can be varied in accordance with the unique requirements of the document being tested.

Movement of the slide to the "in" position trips the microswitch 64 to apply power to the lamps 66 supported in the housing 68 and to the transformer 70 of the power

supply 72. The housing 63 is positioned above the slide and in alignment with the bores of the plate 53. The light energy from the lamps 66 passes through the bill in the bill chamber 36 and then strikes the light sensitive cells 62. The resulting electrical characteristics of the individual cells is a function of the intensity and color of the light thereon.

To remove the bill from the bill chamber, a roller 74 driven by a motor 76 is journaled on the frame so that the upper portion of the roller extends slightly below the leading portion of the bill. An idler roller 78 journaled on a lever 80 pivoted to the frame is positioned above the leading edge of the bill slightly forward of the axis of the roller 74. A solenoid 82 connected to the free end of the lever 80 by a spring 84 moves the idler roll 78 into engagement with the leading or forward edge of the bill to pinch the bill between the rollers 74 and 78. The application of torque to the roller 74 by the motor 76 pulls the bill 38 from the bill chamber 36 into the bill box 86. The solenoid 82 reciprocates the lever 80 to move the idler roller 78 into and out of the opening 83 in the bill slide 12.

As shown in FIG. 5, the solenoid 82 is energized to force the idler roller 78 into engagement with the motor driven roller 74. An angularly shaped anti-pilfer plate 90 is pivoted to the frame and extends over the bill box 86. The pilfer plate has an outwardly and upwardly extending portion 92 and an upwardly and inwardly extending portion 94. These portions 92 and 94 engage the lower surface of the slide 12 to control the angular position of the plate 90. When the slide 12 is in the "in" position, the inward portion 94 engages the lower surface of the bill slide 12 to raise the outward portion 92 to provide an opening for the bill moved by the rollers. When the slide is in the "out" position, the outward portion 92 engages the lower surface of the bill holder to close the opening between the roller 74 and the bill box 86, thereby preventing the wrongful removal of the bill.

To lock the bill slide 12 in the "in" position, the slide is provided with a forward extending and vertically disposed keyhole slot 96. A vertically movable tapered plug 98 is insertable into the lower portion of the slot 96 by the action of a solenoid 100. The linkage 102 connecting the plug 98 with the solenoid 100 is vertically movable in the frame 11 and functions to guide the plug 98 to hold the slide in the "in" position.

A pair of extendable flat coil springs 104 having one end thereof secured to the slide 12 and the coil portion thereof secured to the frame 11 functions to return the slide to the "out" position.

A coin vending mechanism 106 contains a coin ejection knife 108 which is moved to an operative position by a solenoid 110 against the force of tension springs 112. Upon de-energization of the solenoid 110, the springs 112 function to eject the coins in front of the leading edge of the knife 108 into a vending trough accessible to the operator.

As shown in FIGURE 1, the control circuit power supply 72 is conductively connected to the switch 114 by means of the conductor 116. The switch 114 is operated by the movement of the bill slide 12 to the "in" position. Conductor means 118 connect the switch 114 with a censorator circuit 120. The censorator circuit 120 is connected to the light sensitive cells and to a relay circuit 122. The relay circuit 122 is electrically coupled to the motor 76, the lock solenoid 100, and the roller solenoid 82 by means of conductors 124, 126, and 128. When the bill has been properly removed from the bill chamber 36, the censorator circuit sends a payout signal through the conductor 130 to the relay circuit. The payout signal energizes one of the relays in the circuit 122 to supply a power payout signal to the coin solenoid 110 by means of the conductor 132. The normally closed switch 134 in the conductor to the coin solenoid 110 is open by a linkage 136 when the solenoid is fully energized. The switch

134 functions to de-energize the solenoid and reset the relays in the relay circuit 122.

A thermal fuse 140 is positioned in the conductor to coin solenoid 100 to break the circuit to the solenoid 110 thereby resetting the relays in the relay circuit 122 prior to the ejection of the coins from the coin vending mechanism 106. The thermal fuse is operative when the duration that the motor 76 runs exceeds a predetermined time. The switch contains bimetal contacts 142, and a heater 144 in the conductor 124.

In the operation of the apparatus, the bill slide 12 is initially in the "out" position. A bill is placed face up with the top of the bill extending forwardly between the perforated bill positioning plates 40 and 42. The operator moves the bill slide towards the "in" position against the force of the springs 104. The bill slide 12 initially engages the microswitch 64 which is actuated to supply power to the lamps 66 and the transformer 70 of the power supply 72. When the bill slide 12 is in the "in" position, determined by the rubber stops 28 and 30, it actuates the switch 114 to connect the power supply with the censorator circuit 120.

The censorator circuit 120 first functions to sense the presence of a properly positioned and complete bill by using the cells adjacent each corner of the bill. If the bill does not have complete corner portions, it will be rejected. If the corner portions are complete and in the desired position, a "yes" signal will initiate the authentication test. The position of the bill and its completeness may be sensed by any selected combination of cells. Preferably the corner or edge portions are sensed to test for position and completeness.

The second function of the censorator circuit 120 is to perform the authentication test by converting the output of the sensors 62 to a single reference voltage. A voltage pass band is established so that a sufficient deviation from the established reference by any one of the detectors will result in a rejection signal. The censorator automatically compensates for any deterioration of the bill.

The acceptance signal from the censorator circuit 120 is fed into the relay circuit 122 to actuate solenoid operated relays. The relays simultaneously supply power to the motor 76 whereby rotating the roller 74 to the lock solenoid 100 thereby locking the bill slide in the "in" position, and to the roller solenoid 82 thereby lowering the idler roll 78 into firm engagement with the rotating roller 74.

The bill must be completely removed from the bill chamber before the coin solenoid 110 is energized thereby preventing payout before the bill is moved into the bill box. Before the payout signal is fed to the coin solenoid 110, the bill must be moved to first expose the cells A-A', and second to expose the cells B-B'. The cells must be exposed in pairs and in the proper sequence. The payout signal from the censorator circuit 120 is fed to the relay circuit 122 through the conductor 130 and operates a relay therein to send a signal to the coin ejection knife out from under the coins against the force of the tension springs 112. When the coin solenoid 110 is fully energized, the linkage 136 opens the switch 134. When the switch 134 is open, the solenoid 110 is de-energized and the relays in the relay circuit 122 are reset. The springs 112 move the coin ejection knife 108 to force the bottom coins into a coin ejection chute.

When the relays in the relay circuit 122 are reset, the solenoids 82 and 100 and the motor 76 are de-energized. The springs 104 move the bill slide to the "out" position. The microswitch 64 moves to the "off" position breaking the power circuit. The genuine bill is in the bill box, the coin is in the customer's pocket and the apparatus 10 is ready for another cycle of operation.

The circuit diagram of the apparatus shown in FIG. 6 includes the power supply 72, the censorator circuit 120, and the relay circuit 122. The power supply is a conventional component which includes a zener diode to pro-

vide it with voltage regulation independent of the load and applied voltages.

The output from the power supply is applied to the censorator circuit by means of the switch 114. The switch 114 is manually operated by movement of the bill slide 12 into the "in" position. The power supply provides a negative D.C. voltage to the conductor 146 and a positive D.C. voltage to the conductor 148.

A conductor 150 coupling a resistor 152 in series with the photocells A-A' is connected across the conductors 146 and 148. A zener diode 154, a transistor 156 and resistor 158 are coupled in series and extend across the conductors 146 and 148. The base of the transistor 156 is connected to the conductor 150 between the resistor 152 and cells A-A'. The zener diode 154 functions as a voltage regulator and is connected to the emitter of the transistor 156 and the conductor 148. The collector of the transistor 156 is connected to the resistor 158 and the base of a second transistor 160 by conductor 162. The collector of the transistor 160 is connected to the conductor 146. A capacitor 164 is connected across the conductors 148 and 162 and functions to control the supply current to the base of the transistor 160 for a short period of time. The solenoid 166 of a switch 168 is connected across the emitters of the transistors 156 and 160.

The intensity of the light on the light sensitive cells changes the resistance thereof to effect the current feed to the base of the transistor 156. When the intensity of the light is not diffused by a bill over the cells A-A', the conductivity of the cells increases and thus the current fed to the base of the transistor 156 increases. An increase of current fed to the base of the transistor 156 decreases the current feed to the base of the transistor 160.

A second relay 170 is operated by a solenoid 172. The current feed to the solenoid is controlled by a pair of transistors 174 and 176. The solenoid 172 is connected across the emitters of the transistors 174 and 176 and the base of the transistor 174 is connected to the collector of the transistor 176. The collector of the transistor 174 is connected to the conductor 146. A zener diode 180 functions as a voltage regulator and is connected to the emitter of the transistor 176 and the conductor 148. The collector of the transistor 176 is connected by a resistor 182 to the conductor 146. The base of the transistor 176 is connected to a conductor 184 which couples a resistor 186 in series with the light sensitive cells B-B' across the conductors 146 and 148. This circuit functions in response to the light intensity on the cells B-B' to energize and de-energize the solenoid 172.

The switch 114 in the normally open position is connected to the solenoid 172 by means of a conductor 177 and resistor 178. When the switch 64 is actuated (see FIG. 1), the power supply 72 functions to energize the solenoid 172. The relay 170 is thus always closed prior to the operation of the switch 114. This provides the system with the required sequencing of relays 168 and 170 to prevent a reject signal before the authentication test is completed.

A reference signal is formed by a reference light sensitive cell 63, and amplified by a pair of transistors 192 and 194. A manually adjustable potentiometer 196 regulates the current fed to the base of the transistor 192. The emitters of the transistors 192 and 194 are connected by resistors 198 and 200 to the conductor 148 and the collectors thereof are connected by the resistors 202 and 204 to the conductor 146. The base of the transistor 194 is conductively connected to the collector of the transistor 192. The base of the transistor 192 is connected to the conductor 148 by the potentiometer 196 and connected to the conductor 146 by the light sensitive cell 63. The current feed to the base of the transistor 192 is a function of the intensity of the light on the cell 63. An increased intensity of light on the cell 63 decreases the cells resistance thereby increasing the current supply to

the base of the transistor 192. An increase of current to the base of the transistor 192 allows more current to flow through the transistor. Thus the current fed to the base of the transistor 194 is increased allowing more current to flow through the transistor 194. The reference signal in the conductor 206 is reduced since the current flowing through the transistor 194 is a function of the current applied to its base. The reference signal is fed back to the light sensitive cells 62 by a conductor 206 connected to the emitter of the transistor 194. This circuit may be duplicated any number of times to provide an average reference signal.

Each light sensitive cell 62 is connected to the base of separate transistors 208, 210, 212, 214 and 216. Separate potentiometers 218, 220, 222, 224 and 226 connect the base of each transistor with the conductor 148 and provide a forward bias thereon. Resistors connect the collectors of the transistors 208-216 to the conductor 146 and connect the emitters thereof to the conductor 148. The output signal from each transistor is a function of the light intensity on the respective light sensitive cells and the reference signal.

Conductors 228, 230, 232, 234 and 236 connected to the collectors of the respective transistors 208-216 feed the output signal thereof to diodes 238, 240, 242, 244 and 246.

Each diode is connected to a common conductor 248. This conductor feeds the combined signals to a zener diode 250. The base of a transistor 252 is connected to the zener diode 250 and to the conductor 146 by a resistor 254. The zener diode 250 controls the negative current flow to the base of the transistor 252 as a function of the signal in the conductor 248. The emitter of the transistor 252 is connected to the conductor 146 and the collector thereof is connected to the conductor 148 by a pair of resistors 256 and 258.

A conductor 260 connected to the lead between the resistors 256 and 258 feeds a control signal from the transistor 252 to the base of the transistor 265.

A conductor 264 connects a zener diode 262 with separate diodes 266, 268, 270, 272, 274.

The zener diode 262 controls the positive current flow to the base of the transistor 265.

If the negative signal in the conductor 248 exceeds the breakdown characteristics of the zener diode 250, the current fed to the base of the transistor 252 is increased thereby saturating the transistor and increasing the supply of current to the transistor 265. This prevents the energization of the solenoid 190.

If the positive signal in the conductor 264 exceeds the breakdown characteristics of the zener diode 262, the current fed to the base of the transistor 265 increases to saturation. As before, this prevents the energization of the solenoid 190.

The breakdown characteristics of the zener diodes provides the censorator circuit with a voltage pass band which will accept the bill if the signals fall within their limits.

The emitter of the transistor 265 is connected to the conductor 148 and the collector to the conductor 146 by resistor 268 and to the base of the transistor 270. The emitter of the transistor 270 is connected to the conductor 148 by means of the solenoid coil 190 and the collector thereof is connected to the conductor 146. A capacitor 272 is connected to the base of the transistor 270 and the conductor 148. The capacitor 272 prevents a parasitic oscillation by shifting the electrical phase.

When the bill in the bill slide is in the proper position and passes the authentication test, the solenoids 166, 172 and 190 are energized. The arm 274 of the relay 168 is raised from the normally closed contact 276 to the normally open contact 278 thereby connecting the 110 v. power to the conductor 280. The conductor 280 is conductively coupled to the arm 282 of the relay 170. Energization of the solenoid 172 raises the arm 282 from the normally closed contact 284 into engagement with

the normally open contact 286 thereby connecting 110 v. power to the conductor 288. Energization of the solenoid 190 raises the arm 290 of the relay 183 into engagement with the normally open contact 292 to thereby connect the 110 v. power with the conductor 294. The conductor 294 feeds the 110 v. power to the relay circuit 122.

The relay circuit 122 has four solenoids 296, 298, 300, 302, each of which simultaneously operates a plurality of switches. A reject solenoid 296 is connected to the arms of the switches 304, 306, 308 and 310. A sequencing solenoid 298 is connected to the arms of the switches 312, 314 and 316. A solenoid 300 is connected to the arms of the switches 318, 320, 322, 324, 326 and 328. A payout solenoid 302 is connected to the switches 330 and 332.

The 110 v. power is fed by the conductor 294 to the arm of the switch 310. The arm engages the normally closed contact 334 to feed the power to the conductor 336 to energize the solenoid 300. Energization of the solenoid 300 moves the arms of the switches 318 to 328 into engagement with the normally open contacts thereof.

A 110 v. power signal is connected to the arm of the switch 308. The arm engages the normally closed contact 338. The power is fed by the conductor 340 to the arms of the switches 318 and 320. Since the arm of the switch 318 engages the normally open contact 342, the power is fed to the solenoid 300 for purposes of self-energization. The arm of the switch 320 in engagement with the normally open contact 344 feeds the power signal via the conductor 346 to the arms of the switches 330 and 332 and the motor 76, roller solenoid 82 and lock solenoid 100.

When the bill is removed from the bill chamber 36, the solenoid 172 is de-energized and the arm 282 of the switch 170 engages the normally closed contact 284. The capacitor 164 functions to delay the de-energization of the solenoid 166. The 110 v. power signal is thus fed via the conductor 348 to the normally open contact 350 of the switch 324. The conductor 352 connected to the arm of the switch 324 feeds the power signal to energize the solenoid 298. A 110 v. power signal connected to the arm of the switch 312 is supplied to the solenoid 298 for purposes of self-energization.

The subsequent de-energization of the coil 166 connects the arm 274 to the contact 278 thereby supplying the power signal via the conductor 354 to the arm of the switch 314. This power signal is supplied to the solenoid 302. A conductor 356 connects the normally open contact 358 of the switch 314 with the arm of the switch 306. A conductor 360 connects the switch 306 with the arm of the switch 322. From the switch 322 via the conductor 362, the power signal is sent to energize the solenoid 302. A 110 v. power signal obtained from the switch 320 via the conductor 346 is connected to the arm of the switch 330 and is sent to the solenoid 302 for purposes of self-energization and connected to the switch 332 to energize the coin solenoid 110.

When the coin solenoid 110 is fully energized, it trips the switch 134 to open position thereby de-energizing the solenoids 298 and 300, which open switches 316 and 326 de-energizing the payout solenoid 302.

In the event that the censorator circuit 120 rejects the bill, the solenoid 190 will not be energized. The 110 v. power signal in arm 290 of the switch 188 is fed via normally closed contact 364 and the conductor 366 to the switch 328. From the switch 328 this power signal is supplied to the solenoid 296 for initial energization thereof. The switch 304 directly connects a 110 v. power signal from the conductor 288 to the solenoid 296 for purposes of self-energization. When the solenoid 296 is energized, the power signal to the remainder of the switches and solenoids is cut off thereby preventing the supply of payout signals to the coin solenoid 110. The

solenoid 296 is de-energized when the switch 114 is opened by movement of the bill slide.

While there have been shown, described and pointed out the fundamental novel features of the invention as applied to the preferred embodiment, it will be understood that various omissions, substitutions, changes in form, and details of the invention illustrated may be made by those skilled in the art, without departing from the spirit of the invention. It is intended to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. An apparatus for authentication of documents and for performing vending functions comprising slide means having a pair of juxtaposed plates adapted to sandwich a document, said plates having a plurality of concentric bores including at least one bore in each corner portion of the plates, guide rails supporting the slide means for movement to an "in" and "out" position, means to lock the slide in the "in" position, means for projecting light energy to the portions of the document defined by the bores in the plates, first light sensitive cell means for sensing the light passing through portions of the document defined by the corner bores and producing signals which are a function of the sensed light, second light sensitive cell means for sensing the light passing through selected portions and at least one reference portion of the document defined by the bores and producing signals which are a function of the sensed light, first circuit means operatively connected to the first light sensitive cell means and responsive to the signals from said first cell means to produce a first output signal indicating a properly positioned and complete document, second circuit means rendering operative only upon receipt of said first output signal and responsive to the signals from the second light sensitive cell means to compare the signal from each selected portion with the reference portion to produce an output acceptance or rejection signal which is a function of the differences between each selected signal and the reference signal, the output acceptance or rejection signal being a rejection signal if it is not within a preselected range determined by signals obtained from a genuine document, means to remove the document from the slide means, and relay means responsive to a rejection signal to prevent the apparatus from performing its vending function, and responsive to an acceptance signal to operate the lock means to hold the slide in the "in" position and to operate the document removal means, and responsive to a second output signal from the first circuit means caused by the removal of the document from the slide means to create a vending signal.
2. An apparatus for authentication of documents and performing vending functions comprising slide means having a pair of juxtaposed plates adapted to sandwich a document, said plates having a plurality of concentric bores, guide rails supporting the slide means for movement to an "in" and "out" position, means to lock the slide in the "in" position, means for projecting light energy to the portions of the document defined by the bores in the plates, light sensitive cell means for sensing the light passing through selected portions and at least one reference portion of the document defined by the bores and producing signals which are a function of the sensed light, means adapted to receive the signals from said light sensitive cell means and compare the signal from

each selected portion with the reference portion to produce an output acceptance or rejection signal which is a function of the summation of the differences between each selected signal and the reference signal, the output signal being a rejection signal if it is not within a preselected range determined by signals obtained from a genuine document, means to remove the document from the slide means, and relay means responsive to a rejection signal to prevent the apparatus from performing its vending function, and responsive to an acceptance signal to operate the lock means to hold the slide in the "in" position and to operate the document removal means, and to create a vending signal.

3. An apparatus for authentication of documents and performing vending functions comprising slide means having a pair of juxtaposed plates adapted to sandwich a document, said plates having a plurality of concentric bores, guide rails supporting the slide means for movement to an "in" and "out" position, means for projecting light energy to the portions of the document defined by the bores in the plates, light sensitive cell means for sensing the light passing through selected portions and at least one reference portion of the document defined by the bores and producing signals which are a function of the sensed light, circuit means adapted to receive the signals from said light sensitive cell means and compare the signal from each selected portion with the reference portion to produce an output acceptance or rejection signal which is a function of the differences between each selected signal and the reference signal, the output signal being a rejection signal if it is not within a preselected range determined by signals obtained from a genuine document, means to remove the document from the slide means, and relay means responsive to a rejection signal to prevent the apparatus from performing its vending function, and responsive to an acceptance signal to operate the document removal means, and to create a vending signal.

4. An apparatus for authentication of documents and performing vending functions comprising slide means for holding a document, guide rails supporting the slide means for movement to an "in" and "out" position, means for projecting light energy to selected portions of the document, light sensitive cell means for sensing the light passing through the selected portions of the document and producing signals which are a function of the sensed light, first circuit means generating a reference signal from the document being tested, second circuit means adapted to receive the signals from said light sensitive cell means and the reference signal and compare the signal from each selected portion with the reference signal to produce an output acceptance or rejection signal which is a function of the differences between each selected signal and the reference signal, the output signal being a rejection signal if it is not within a preselected range determined by signals obtained from a genuine document, means to remove the document from the slide means, and relay means responsive to a rejection signal to prevent the apparatus from performing its vending function, and responsive to an acceptance signal to operate the document removal means, and to create a vending signal.

5. In an apparatus for authentication of documents, slide means for moving the document to an "in" and "out" position, means for directing light to selected portions of the surface of the document when the slide means is in the "in" position, means for sensing the light passing through the selected portions of the document and producing signals which are a function of the sensed light, and censorator circuit means adapted to receive said signals and compare any number of said signals with a selected reference signal determined from the document being tested to produce an output acceptance or rejection signal which is a function of the differences between each selected signal and the reference signal, the output signal being an acceptance signal if it is within a preselected range determined by signals obtained from a genuine document.

6. An apparatus for authentication of documents which comprises slide means for moving the document to an "in" and "out" position, means for directing light to selected portions of the surface of the document when the slide means is in the "in" position, first circuit means for sensing the light passing through selected portions of the document and producing signals which are a function of said light, said first circuit means including two groups of light sensitive cell means positioned to sense the light passing through selected portions of the document, transistor means conductively connected to each group of cell means and operable to produce output signals only when the light is passing through all the selected portions of the document, a pair of solenoid operated relays operable in response to the output signals from the transistor means to provide a power signal, second circuit means having a plurality of light sensitive cells for sensing the light passing through selected portions and at least one reference portion of the document, said second circuit means being operative to compare the signal from each selected portion with the signal from the reference portion and produce an output acceptance or rejection signal which is a function of the differences between the compared signals, said second circuit means having transistor means and zener diodes coupled to a solenoid operated relay to energize the relay if the signal is within a preselected range determined by the zener diodes.

7. In an apparatus for authentication of documents the combination of slide means for moving the documents to an "in" and "out" position, means for directing light to corner portions, selected portions, and a reference portion of the surface of the document when the slide means is in the "in" position, first circuit means for sensing the light passing through all corner portions of the document and producing an output signal only when proper signals are received from all corner portions of the document, second circuit means responsive only to the output signal of said first circuit means for sensing the light passing through said selected portions and said reference portion of the document, said second circuit comprising photo cells to provide a signal output as a measure of the amount of light passed through said selected portions and reference portion of the document, means to selectively provide a forward bias on the

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signal output of the photocells measuring the light passed through said selected portions as determined by the signal output from the photo cells measuring the reference portion of the document, and
5 zener diode means operatively driven by the biased signal output from the photo cells measuring the light passed through said selected portions of the document determining whether said biased signal output falls within a pre-selected signal range to derive an output acceptance or rejection signal.

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