

[54] **FARE BOX WITH BELT CONVEYOR AND COIN SIZE DETECTOR**

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[58] Field of Search.....232/7, 9, 10, 13, 14; 133/3, 133/8; 194/102; 235/92 SB; 200/1 A

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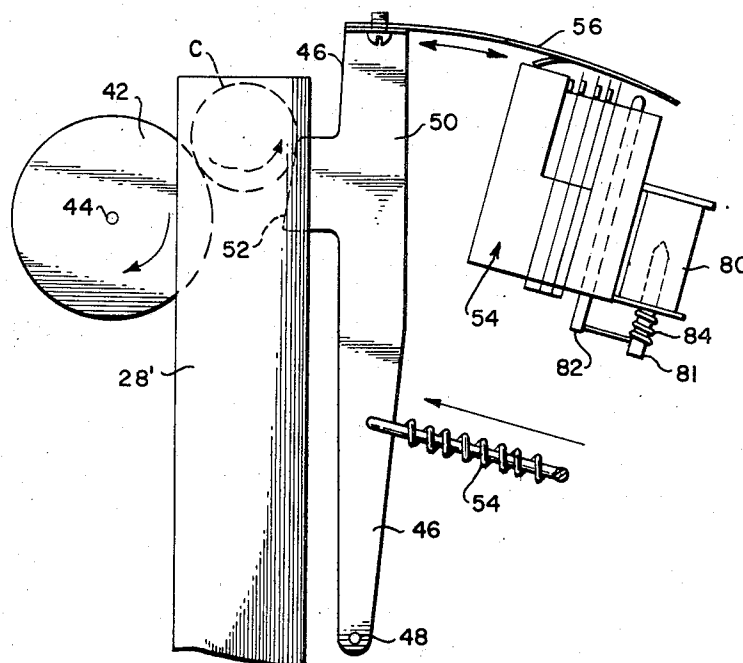
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[57] **ABSTRACT**

Fare box in which belt conveyors transport coins and dollar bills past an inspection window to a vault. The coins are sized, indicated audibly, and registered. Both sides of dollar bills may be inspected by transillumination or by automatic reversal of the bills in transit. The coin size detector comprises a multiple-contact switch employing an actuator arm driven in a first direction by the coins and in the opposite direction by a spring, the length of the stroke of the actuator arm in the first direction determining which contacts are transferred when the arm moves in the reverse direction.

36 Claims, 14 Drawing Figures



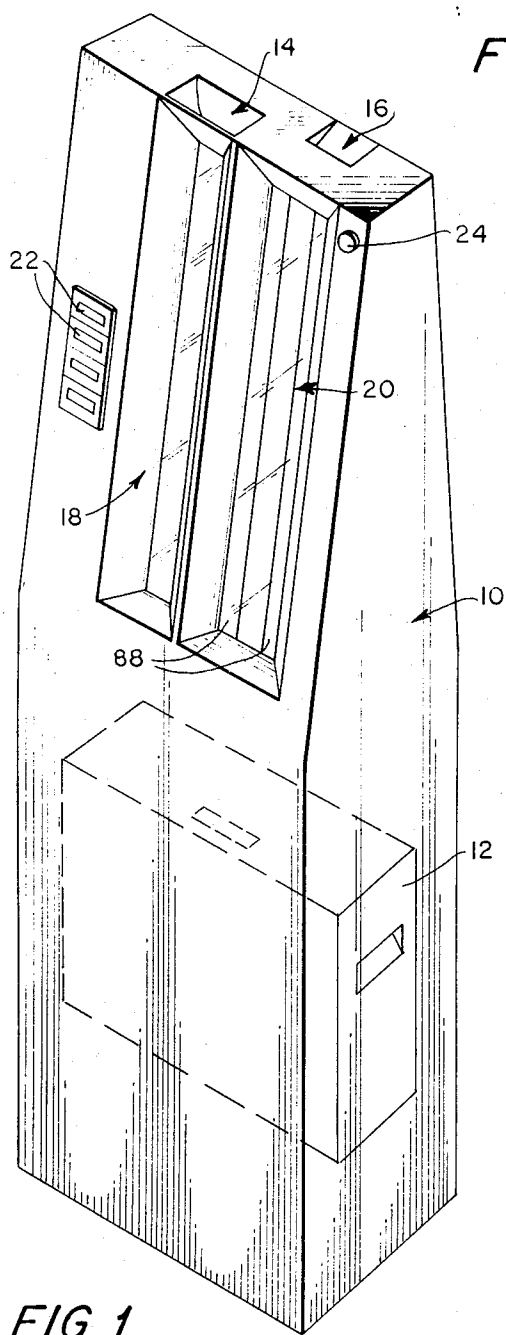


FIG. 2

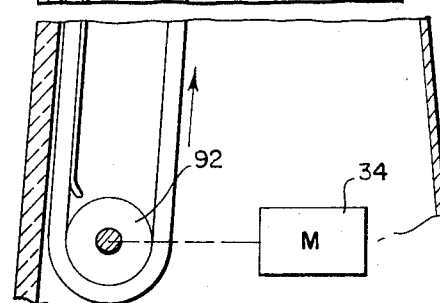
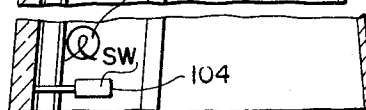
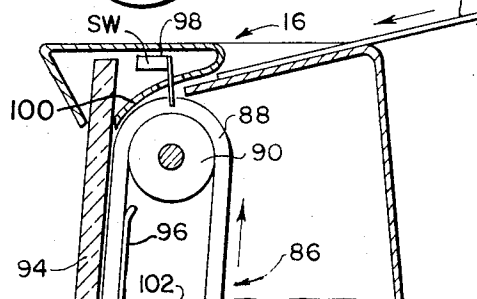
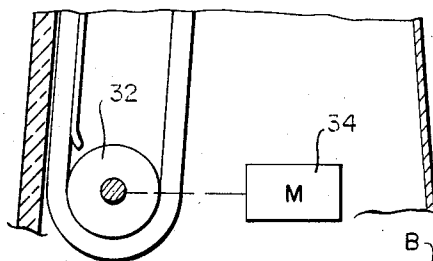
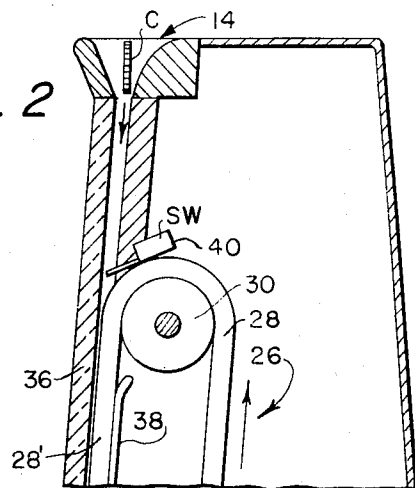


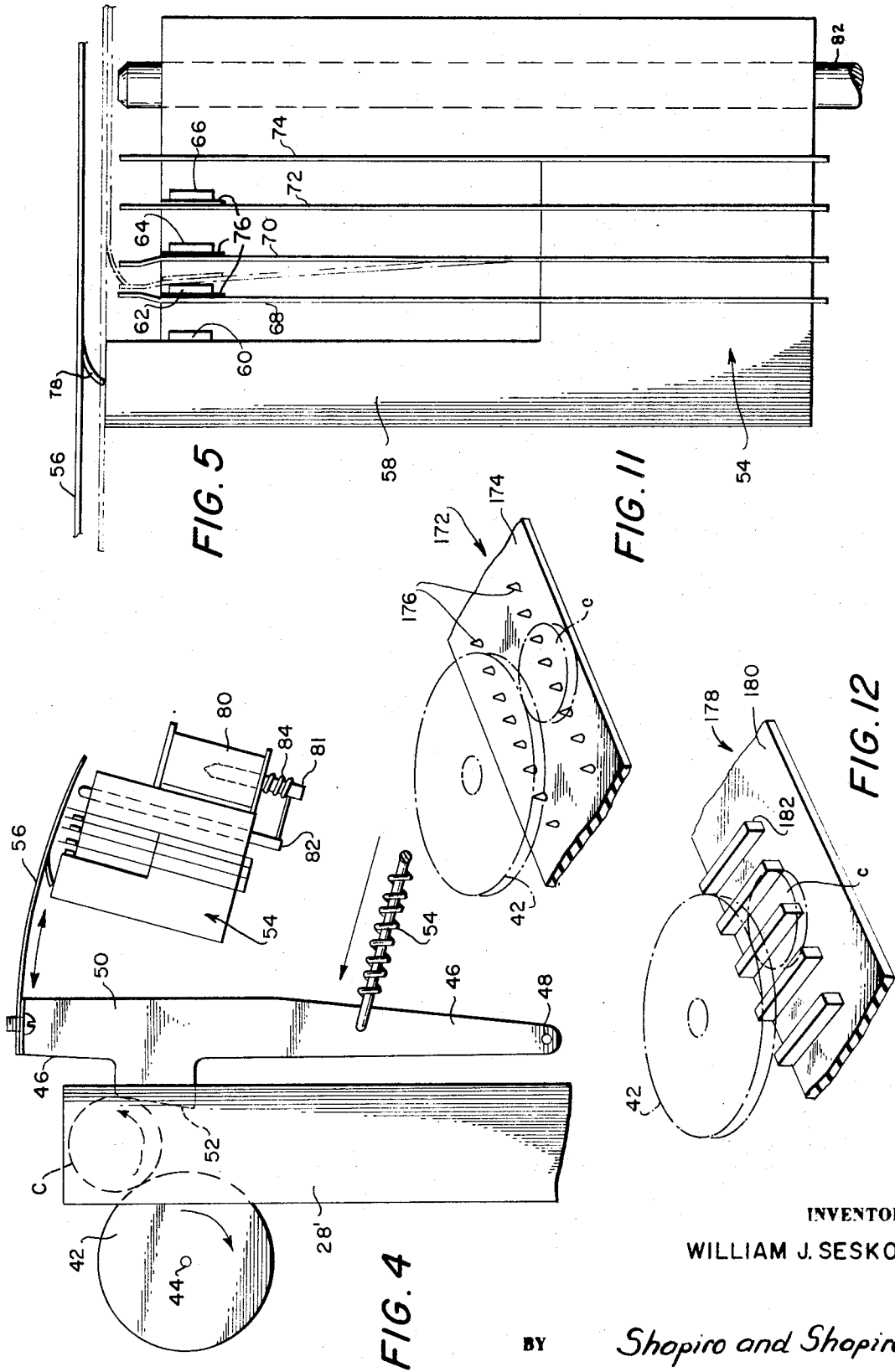
FIG. 3

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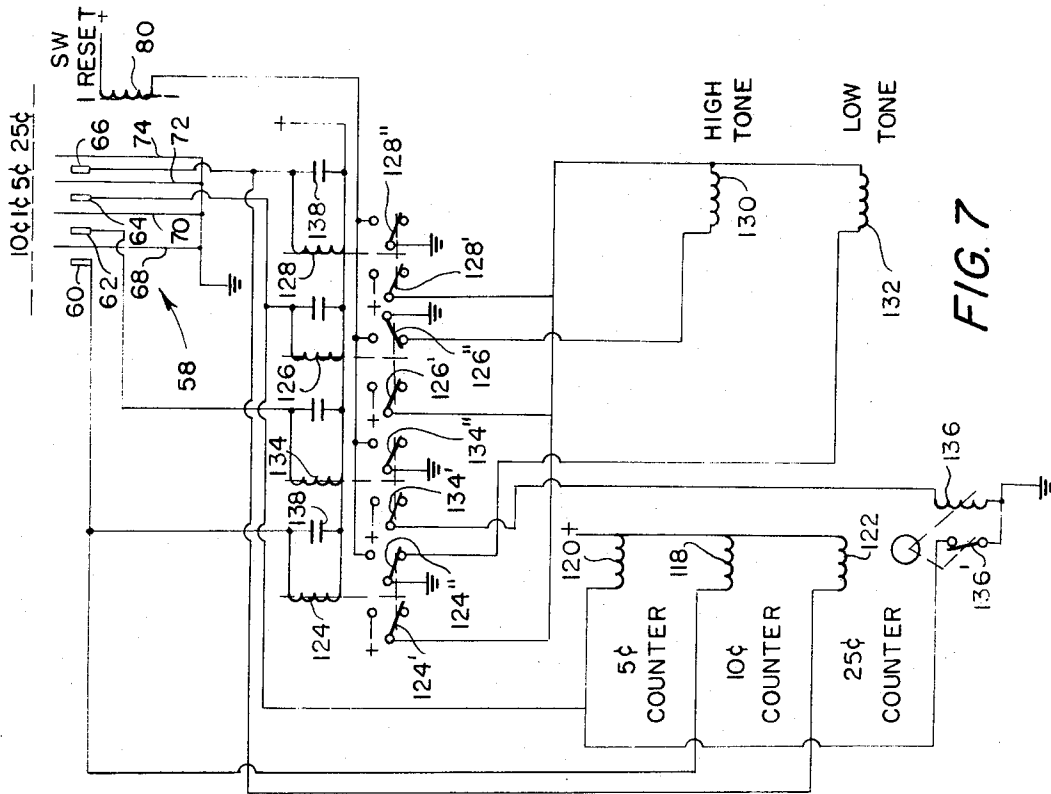


FIG. 7

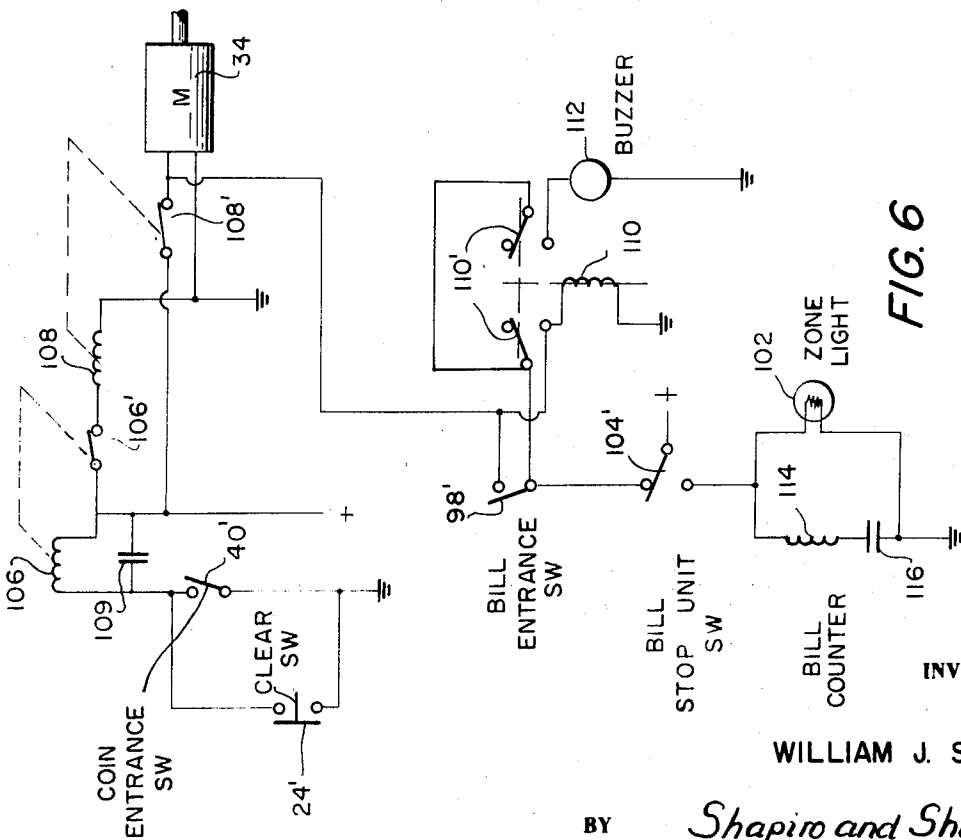


FIG. 6

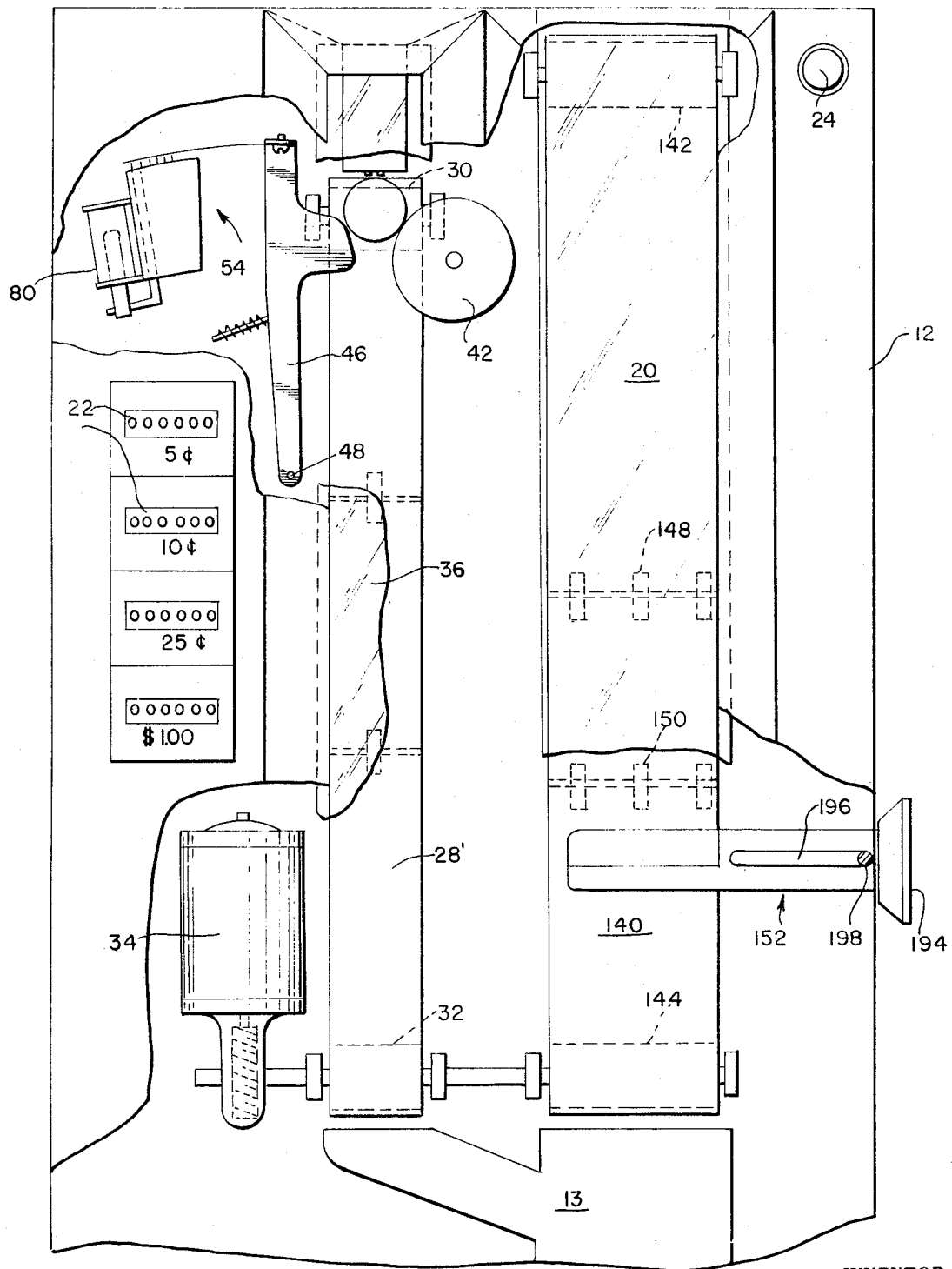
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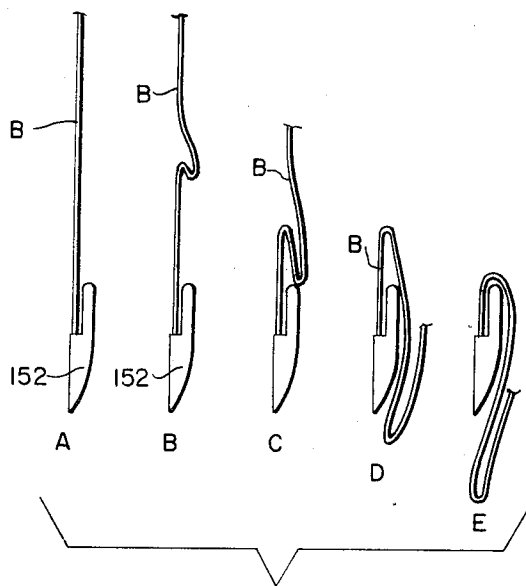
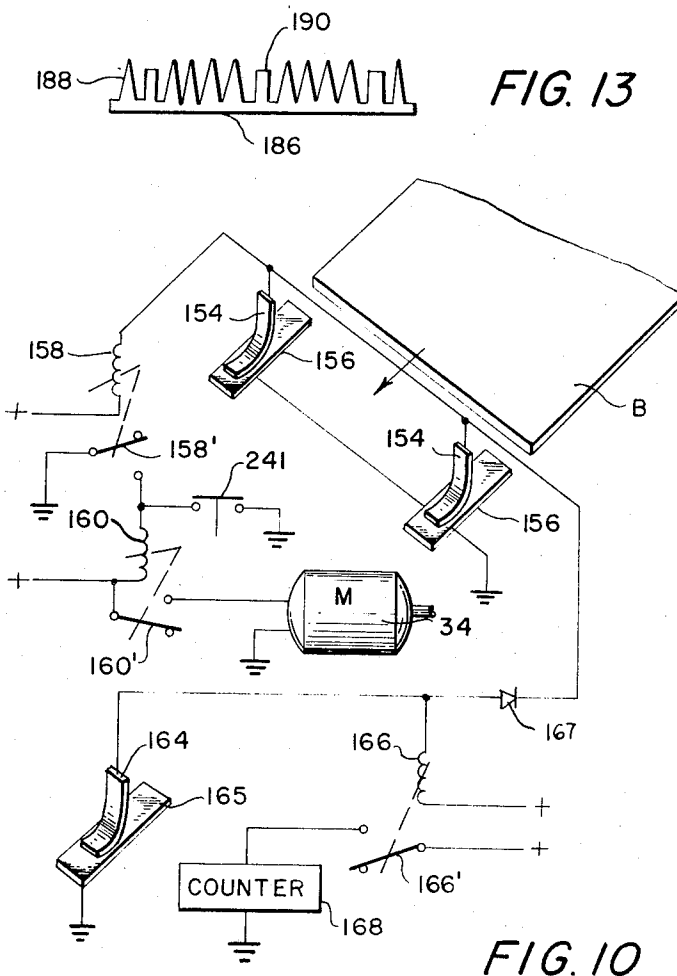
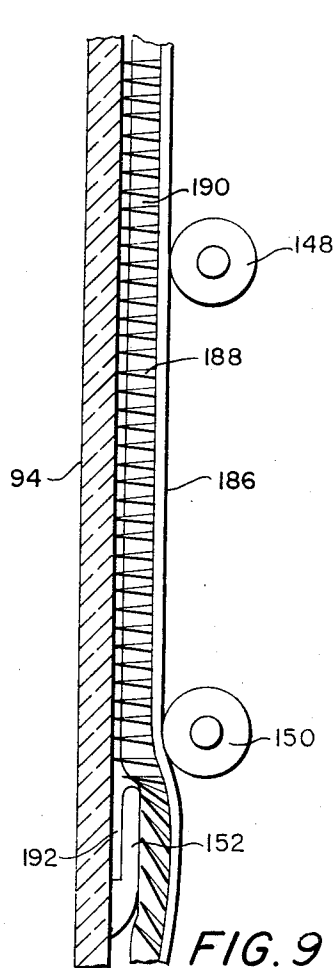
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FARE BOX WITH BELT CONVEYOR AND COIN SIZE DETECTOR

BACKGROUND OF THE INVENTION

This invention relates to money handling apparatus of the type known as fare boxes and is more particularly concerned with unique apparatus for conveying money, exposing money to visual inspection, and sizing coins.

Prior fare boxes have employed complex apparatus for transporting, sizing, and registering coins and have lacked the ability to handle dollar bills. As a result, such fare boxes have been expensive and have required an unduly large number of highly specialized parts which are subject to deterioration and breakdown.

BRIEF DESCRIPTION OF THE INVENTION

It is accordingly a principal object of the present invention to provide improved apparatus for handling money, and more specifically, to provide an improved fare box.

A further object of the invention is to provide improved conveyors for bills and coins and the like.

Still another object of the invention is to provide unique apparatus for sizing coins and the like.

An additional object of the invention is to provide improved apparatus for permitting the inspection of money being conveyed and for permitting the observation of both sides of a bill.

Briefly stated, a typical embodiment of the present invention may receive coins or dollar bills or both, separate continuous-loop belt conveyors being employed for coins and bills. In each instance the money is conveyed past an inspection window juxtaposed with one side of the conveyor belt. Both sides of bills may be made visible by trans-illumination or by automatic reversal of the bill during transit. Coin sizing is achieved by a unique sizing apparatus employing a unique multiple contact switch selectively actuated by the coins.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be further described in conjunction with the accompanying drawings, which illustrate preferred and exemplary embodiments, and wherein:

FIG. 1 is a perspective view illustrating a fare box in accordance with the invention for accommodating both coins and dollar bills;

FIG. 2 is a fragmentary, somewhat diagrammatic vertical section view illustrating a coin conveyor in accordance with the invention;

FIG. 3 is a similar view of a dollar bill conveyor in accordance with the invention;

FIG. 4 is a rear elevation view of a coin sizing apparatus employed in conjunction with the coin conveyor;

FIG. 5 is an enlarged elevation view of a switch employed in the coin size detector;

FIG. 6 is a schematic diagram of a first circuit employed in the invention;

FIG. 7 is a schematic diagram of another circuit employed in the invention;

FIG. 8 is a front elevation view, partly broken away, of a fare box employing a modified bill transport;

FIG. 9 is a vertical sectional view of a portion of the modified bill transport;

FIG. 10 is a schematic diagram of a circuit employed in the modified transport;

FIGS. 11 and 12 are fragmentary perspective views of belt variations;

FIG. 13 is a transverse sectional view of another belt variation, also shown in FIG. 9; and

FIG. 14 is a diagram illustrating bill reversal in accordance with the invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings, and initially to FIG. 1 thereof, a fare box 10 of the invention may comprise an elongated hous-

ing 12 which includes in the lower portion thereof a secure vault or safe 13 for storing money. The vault may be removable from the housing, as is well known in the art, and may include conventional safety measures or interlocks to minimize the possibility of theft. In the form of the invention shown in FIG. 1, the upper portion of the housing 12 is provided with a pair of belt conveyors (which will be described more fully hereinafter) for transporting coins and bills inserted at inlets 14 and 16, respectively. The transported coins and bills pass vertical inspection windows 18 and 20, respectively. The individual totals of nickels (five pennies are registered as one nickel), dimes, quarters, and dollar bills received by the fare box are indicated in corresponding windows 22 at the front of the fare box, there being a separate indicator for each of the foregoing denominations (except pennies). A "clear" button is provided at 24 so that the operator may manually advance money along the conveyors to the vault.

Referring to FIG. 2, the inlet 14 for coins C forms a funnel or hopper for channeling the coins to the input of a continuous-loop belt conveyor 26. This conveyor comprises a continuous flexible belt 28 (examples to be described later) which is trained around rollers 30 and 32 at opposite ends of the conveyor. Roller 30 may be an idler roller, while roller 32 is driven by a motor 34 indicated diagrammatically connected to the roller. The forward flight 28' of the belt is juxtaposed with a transparent glass or plastic window panel 36. One or more backing plates 38 may be provided at the opposite side of flight 28' to back up or support the belt. Alternatively, one or more additional idler rollers may be provided between rollers 30 and 32. A coin C dropped into the inlet 14 actuates a proximity switch 40 adjacent to the top of the belt conveyor to start the motor 34, as will be set forth more fully hereinafter. The proximity switch may be a microswitch or other type of switch for sensing the presence of a coin. Upon actuation of switch 40 by a coin C and the starting of motor 34, flight 28' of the belt moves downwardly along the transparent panel 36 and carries the coin with it along the window. The resilient pressure exerted between the belt and the window is sufficient to hold the coin in place upon the belt but yet to permit the coin to be transported along the window. As will be seen hereinafter, the motor 34 is energized for a predetermined short period, advancing the coin a short distance along the window panel 36 and then stopping the conveyor. Before the conveyor stops, the coin is sized in a manner which will now be described.

FIG. 4 illustrates the flight 28' of belt as seen from the rear (the side opposite to the window panel 36). The belt rollers and backing plate have been removed for clarity of illustration. A coin C is shown being transported along the front side of the belt, where it engages a pair of cooperating abutments of the sizing mechanism. The first abutment is constituted by a wheel or disc 42 (e.g., one-sixteenth inch thick) which is located adjacent and parallel to the inspection window so that a portion of the wheel projects between the front side of flight 28' and the back side of the window panel 36. The wheel is rotatably mounted in the housing at 44. The other abutment is constituted by a portion of a lever 46 which extends between the front side of the flight 28' of belt and the mating rear side of the window panel 36 opposite to the wheel 42. Lever 46 is pivotally mounted at 48 within the housing adjacent and parallel to the window. The abutment 50 of the lever has a sloping edge 52 which cooperates with an opposing edge of wheel 42 to receive the coin therebetween. The abutment 50 is urged to the position illustrated in FIG. 4 by a compression spring 54.

When a coin is moved by the belt to the position illustrated in FIG. 4, lever 46 is urged to turn (clockwise) away from the coin. Wheel 42 is driven by its contact with the front side of belt flight 28' and turns clockwise. A counterclockwise rotation is imparted to the coin by the wheel, and thus a rolling contact is established between the coin and the sloping edge 52 of the abutment 50. This greatly facilitates the movement of the coin past the size detecting mechanism.

Supported in the housing adjacent to the lever 46 is a coin sizing switch 54 having multiple contacts adapted to be transferred by a resilient leaf actuator arm 56 mounted on the end of lever 46 opposite to pivot 48. As shown in FIG. 5, switch 54 comprises an insulating block 58 on which are mounted spaced fixed contacts 60, 62, 64, and 66. These fixed contacts are adapted to be engaged by movable contacts in the form of resilient switch leaves 68, 70, 72, and 74, respectively. The leaves are supported upon block 58 at their lower ends and have free, salient upper ends. The rest position of the switch leaves is illustrated in FIG. 5, each leaf using the fixed contact of the adjacent switch as a stop and being separated therefrom by insulating shims 76 mounted on the fixed contacts.

The salient upper ends of the switch leaves are adapted to be hooked by a depending projection 78 on the spring-leaf actuator arm 56. The rest position of the actuator arm is shown in FIGS. 4 and 5. The coin drives the actuator arm to the right in FIGS. 4 and 5, projection 78 dropping as shown in phantom lines in FIG. 5 but slipping freely over the salient upper ends of the switch leaves by virtue of the resiliency of the actuator arm. The length of the outward stroke (to the right in FIGS. 4 and 5) of the actuator arm is determined by the size of the coin. When the coin passes by the paired sizing abutments, the actuator arm 56 is released, and spring 54 urges the arm in the reverse direction (to the left in FIGS. 4 and 5). The first salient end of a switch leaf hooked by the projection 78 will be moved to the left as the actuator arm executes the return stroke, and will cause the associated switch contacts to transfer (to close, in the form shown). When this occurs, a solenoid 80 (FIG. 4) is energized (as will be described more fully hereinafter), drawing in its plunger 81 and raising a rod 82 fixed thereto (the rod reciprocating within the insulating body 58 of switch 54). The upper end of the rod then engages the resilient actuator arm 56 and lifts it sufficiently to ensure that the projection 78 clears the underlying switch leaves. The plunger of the solenoid remains drawn in for a sufficient length of time to ensure the full return of the actuator arm 56 to the rest position illustrated in FIGS. 4 and 5, the return stroke of the actuator arm thus being unaccompanied by any engagement of projection 78 with the switch leaves. Then the plunger 81 of the solenoid returns to its rest position under the influence of a spring 84, releasing the upward pressure on the actuator arm 56. Thus, the particular contacts of switch 54 which are closed momentarily are selected in accordance with the size of the coin. The coin denomination may therefore be registered as will be set forth hereinafter.

Coins progress to the bottom of the conveyor as other coins are inserted at the top. The coins at the bottom drop into the vault, which may receive both coins and dollar bills.

FIG. 3 illustrates the dollar bill conveyor 86, which may comprise a continuous-loop belt conveyor including a pair of parallel belts 88 spaced apart as shown in FIG. 1. At the top of the conveyor the belts pass around an idler roller 90, and at the bottom of the conveyor the belts pass around a drive roller 92, which may be driven by the same motor 34 driving the coin conveyor, or by a separate motor. The general arrangement of the dollar bill conveyor is similar to that for the coin conveyor, the front flight of belt being juxtaposed with the transparent window panel 94 and being backed by a backing plate 96 or suitable idler rollers. A bill B is inserted into a tapered inlet 16 and triggers a proximity switch 98 to start the motor 34. The front flight of belt is thus driven downwardly, gripping the leading edge of the bill between the belt and a mating wall 100 of the inlet and feeding the bill between the belt and the window panel 94. Eventually (as will be set forth later) the bill reaches an illuminating station, where the bill is illuminated from the rear (in the space between the belts 88 of the conveyor) by a lamp 102. The leading edge of the bill engages a proximity stop switch 104 for deenergizing the motor 34 in a manner to be described. Thus, the bill is transilluminated permitting observation of the indicia on both sides thereof for verification of the genuineness of the bill.

FIGS. 6 and 7 illustrate circuits which may be employed in the invention. Contacts 40' of the motor starting switch 40 (FIG. 2) complete an energization circuit for relay 106 from +DC to ground. Energization of this relay closes its contacts 106', completing an energization circuit for motor starter relay 108, and closing contacts 108' to complete a motor energization circuit from +DC to ground. When the coin passes and permits contacts 40' to open (they are normally open) the energization circuit from the DC supply to relay 106 is interrupted, but a capacitor 109 connected across the relay coil delays the drop out of the relay and maintains motor 34 energized a sufficient period of time to advance the coin through the sizing mechanism. Then the motor is deenergized. "Clear" switch contacts 24' may be closed manually to energize the motor 34 when desired. Switch contacts 98' of the bill entrance switch 98 also complete a motor energization circuit when closed. Simultaneously relay 110 is energized, transferring contacts 110', and completing a holding circuit for the relay. The transfer of contacts 110' completes an energization circuit for buzzer 112 to inform the attendant that a dollar bill has been received and keeps motor 34 energized. When the leading edge of the bill reaches the bill stop switch 104 (FIG. 3), contacts 104' are transferred, breaking the holding circuit for relay 110 and the energization circuit for motor 34. At the same time the transfer of contacts 104' completes an energization circuit for the inspection zone light 102 and for a bill counter solenoid 114 energized through a capacitor 116. The conveyor motor is then energized by manual closing of "clear" switch 24, and the inspected bill passes to the vault beneath the conveyors.

As shown in FIG. 7, the fixed contacts 60, 64, and 66 of the sizing switch 58 control the energization of the corresponding solenoids 118, 120, and 122 of conventional solenoid-operated nickel, dime, and quarter counters. Momentary closure of any pair of contacts associated with the solenoids advances the counters. The same switch contacts energize relays 124, 126, and 128, which transfer the contacts of associated switches 124'-124'', 126'-126'', and 128'-128'' to complete circuits from the DC supply to the reset solenoid 80 and to complete associated circuits from DC supply to solenoids 130 and 132 of conventional solenoid-operated tone generators. It will be noted that the insertion of a dime causes energization of the high tone solenoid 130 (and breaks the ground connection for the low tone solenoid 132). The insertion of a nickel completes an energization circuit for the low tone generator 132 (and breaks the ground connection for the high tone generator solenoid 130). The insertion of a quarter energizes both tone solenoids 130 and 132.

The insertion of a penny energizes relay 134, which transfers the contacts of its switches 134'-134'' to energize the reset solenoid 80 and to energize the solenoid 136 of a conventional solenoid-operated five-step stepping relay. After five pennies have been inserted, and solenoid 136 has been energized five times, contacts 136' close momentarily to complete an energization circuit for the solenoid 120 of the 5-cent counter. Thus pennies are totaled in terms of nickels. Capacitors 138 are connected across the relay coils 124, 134, 126, and 128 to delay the drop out of these relays.

FIG. 8 illustrates a modification of the dollar bill transport and also illustrates in greater detail the coin transport and sizing apparatus already described. In place of the twin belt dollar bill conveyor employed in the embodiment described above, the embodiment of FIG. 8 employs a single continuous-loop belt 140 trained about an idler roller 142 at the top and a drive roller 144 at the bottom. The dual drive of belt 140 and the coin conveyor belt 28 by motor 34 is clearly shown, as well as the vault 13 which receives bills and coins from both conveyors. Conveyor belt 140 is provided with two sets of idler rollers 148 and 150 spaced above a bill-reversing bar 152. The relationship between rollers 150 and 152, the window panel 94, the belt 140 and the bill reversing bar 152 is better seen by reference to FIG. 9. The cooperation of these parts will be described more fully hereinafter.

FIG. 10 illustrates a circuit for starting the motor 34 when the dollar bill conveyor of FIG. 8 is employed. The bill B upon entering the transport interrupts the engagement of pairs of leaf spring contacts 154 and 156 positioned in the path of the bill adjacent to opposite edges of the conveyor belt where the bill enters. When the bill passes between the contacts of both sets, a normally energized relay 158 is deenergized, transferring its contacts 158' and energizing motor starter relay 160, which transfers its contacts 160' to start the motor 34. The bill is advanced along the conveyor until the trailing edge clears contacts 154 and 156, permitting relay 158 to become energized again and breaking the energization circuit for the motor starter relay 160. The spacing of the pairs of contacts 154 and 156 requires the insertion of an article at least as wide as a dollar bill to start the motor 34.

FIG. 10 also illustrates the manner in which the bill actuates the bill counter in the embodiment of FIG. 8. A further pair of leaf spring contacts 164 and 165 normally completes a circuit for a relay 166. When the bill passes between these contacts, which are extended into the path of the bill between the conveyor belt and the window panel, the circuit for relay 166 through 164-165 is broken, and, provided that the circuit to ground through diode 167 and contacts 154 and 156 is also broken by the bill, relay 166 transfers its contacts 166', actuating the counter 168. Contacts 164-165 are, of course, spaced from contacts 154-156 slightly less than the length of a bill.

Before describing the manner in which the dollar bill reverser 152 operates, reference will be made to FIGS. 11, 12, and 13 which illustrate representative belt configurations which may be employed in the conveyors of the invention. The belt may comprise merely an elastic web of rubber material, for example. However, refinement of the belt construction is desirable to optimize the operation. It has been found that a belt of soft resilient plastic foam can be used both for coins and bills. The foam may be laminated with an underlying rubber layer, for example. Although such belts perform well, they may not have the desired longevity under certain conditions of operation. FIG. 11 illustrates a section of belt suitable for use in the coin transport. It will be noted that this belt, 172, comprises a layer 174 of rubber or plastic with a plurality of integral molded protuberances 176. The protuberances may be generally conical, a fraction of an inch in height, and arranged in two rows, a first row to drive the wheel 42 of the sizing mechanism and a second row to support and drive the coins. A further embodiment of the coin transport belt is illustrated in FIG. 12, wherein the belt 178 comprises a layer 180 of rubber or plastic supporting a row of integrally molded transverse ribs 182 which drive the wheel 42 and also support the coins. The ribs do not extend completely across the width of layer 180, to avoid interference with the coin sizing lever.

FIGS. 9 and 13 illustrate a belt embodiment for supporting and driving dollar bills, which may be employed for the conveyor belt 140. This belt comprises a layer 186 with a multiplicity of highly flexible conical protuberances 188 which may be molded integrally with layer 186. Integrally molded longitudinal ribs 190 are provided to stiffen the belt sufficiently to support the bills properly and prevent undesirable bill wrinkling.

Reference will now be made to FIGS. 8, 9, and 14, in conjunction with the following description of the operation of the bill-reverser. Referring to FIG. 9, it will be seen that the protuberances 188 carry the dollar bill along the inner surface of the window panel 94 until the leading portion of the bill enters a notch 192 formed in the bill-reverser bar 152 (see FIG. 14 at A). Continued driving movement of the conveyor belt causes the bill to buckle as shown in FIG. 14 at B, sufficient traction for driving the trailing end of the bill being ensured by the pressure rollers 148. The buckling process continues as illustrated in FIG. 14 at C, and the resultant loop is driven under the pressure rollers 150, causing the bill to become reversed as shown in FIG. 14 at D and E. Thus, both sides (ex-

cept for the loop) of the bill are exposed for inspection. If, for any reason, it is desired to clear the bar 152 from the path of the bills along the conveyor, an externally accessible handle 194 attached to the bar 152 (FIG. 8) may be pulled to slide the bar outwardly within the limits imposed by a slot 196 and a pin 198 projecting therein from the housing.

Although the invention has been described in a form especially adaptable for use in bus fare boxes, the principles of the invention are applicable to other types of environments, such as turnstiles. Accordingly, modifications can be made in the foregoing embodiments as will be appreciated by those skilled in the art.

The invention claimed is:

1. Apparatus for transporting money articles such as coins, and the like comprising a panel, a resilient belt having an exterior surface thereof at one side juxtaposed with a mating surface of said panel, means for admitting said articles between said belt and said panel at a first location, means for receiving said articles from between said belt and said panel at a second location spaced from the first, means for driving said belt in a direction to move said articles from said first location to said second location, and means located along said belt between said locations for sizing said articles, said sizing means comprising a pair of abutments located adjacent to opposite edges of said belt in the path of the articles carried by said belt, one of said abutments having means for moving it away from the other transversely of the belt in response to the admission of an article between said abutments as the article is transported by said belt.
2. Apparatus in accordance with claim 1, there being a lever carrying said one abutment, said lever being spring-biased toward the other abutment and carrying switch actuator means for selectively transferring switch contacts depending upon the size of the article.
3. Apparatus in accordance with claim 2, said switch actuator means comprising a resilient leaf carried by said lever adjacent to one end thereof, the other end of said lever being supported for pivotal movement.
4. Apparatus in accordance with claim 3, there being a group of fixed contacts adapted to engage corresponding contacts of a group of movable contacts selectively actuated by said actuator leaf, said movable contacts comprising resilient contact leaves, and said actuator leaf having a projection adapted to ride over free ends of said contact leaves in one direction and to pull a particular contact leaf into engagement with the corresponding fixed contact in the opposite direction.
5. Apparatus in accordance with claim 4, further comprising means for moving said actuator leaf out of engagement with the ends of said contact leaves upon said engagement.
6. Apparatus in accordance with claim 1, wherein the other abutment comprises a wheel adapted to be in rotary engagement with the articles.
7. Apparatus in accordance with claim 6, said wheel being driven by engagement with said belt.
8. Apparatus in accordance with claim 1, said means for driving said belt having a control switch actuated by articles admitted to said belt.
9. Apparatus for transporting money articles and exposing said articles for inspection, comprising a transparent panel, a resilient belt having an exterior surface thereof at one side juxtaposed with a mating surface of said panel, means for admitting said articles between said belt and said panel at a first location, means for receiving said articles from between said belt and said panel at a second location spaced from the first means for driving said belt in a direction to move said articles from said first location to said second location, and means for illuminating said articles for inspection through said panel, said articles being bills and said illuminating means comprising means for transmitting light through said bills from the side thereof remote from said panel, whereby indicia on both sides of said bills may be viewed.
10. Apparatus in accordance with claim 9, said means for driving said belt having a control switch located between said

locations and actuated by articles carried by the belt for interrupting the movement of said belt.

11. Apparatus in accordance with claim 1, further comprising means engaging said belt at the side thereof opposite to the first-mentioned side for supporting the belt.

12. Apparatus in accordance with claim 9, said belt having two parallel sections spaced apart and bridged by said articles.

13. Apparatus in accordance with claim 1, said belt comprising a layer having a plurality of protuberances extending outwardly therefrom.

14. Apparatus in accordance with claim 13, said protuberances being stiff and generally conical.

15. Apparatus in accordance with claim 9, said belt comprising a layer having a plurality of protuberances extending outwardly therefrom, there being a multiplicity of flexible protuberances.

16. Apparatus in accordance with claim 15, said belt having longitudinal stiffening ribs.

17. Apparatus in accordance with claim 13, said protuberances comprising transverse ribs.

18. Apparatus in accordance with claim 1, further comprising means for producing an audible indication of the size of articles transported by said belt.

19. Apparatus in accordance with claim 1, further comprising means for counting articles carried by said belt.

20. Apparatus for transporting money articles and exposing said articles for inspection, comprising a transparent panel, a resilient belt having an exterior surface thereof at one side juxtaposed with a mating surface of said panel, means for admitting said articles between said belt and said panel at a first location, means for receiving said articles from between said belt and said panel at a second location spaced from the first, means for driving said belt in a direction to move said articles from said first location to said second location, and means for reversing articles transported between said locations so that both sides of the articles may be viewed.

21. A apparatus for detecting the maximum excursion of a reciprocating actuator, comprising a switch having a plurality of contact elements with extremities arranged in a row, said actuator being disposed for reciprocating movement along said row of contact elements, and means for causing said actuator to slide upon said extremities of said contact elements while moving in one direction to any one of a plurality of excursions without actuating said contact elements and for thereafter actuating a selected contact element by movement in the reverse direction.

22. Apparatus in accordance with claim 21, wherein said actuator carries a member which slips past said contact elements while moving in said one direction but which engages an adjacent contact element when the direction of movement is reversed, whereupon said actuator is held against continued reverse movement.

23. Apparatus in accordance with claim 22, wherein said member is spring-biased toward said contact elements.

24. Apparatus in accordance with claim 22, further comprising means for disengaging said member from said contact elements in response to the actuation of the selected contact element, to permit reverse movement of said actuator, and wherein said actuator is spring-biased for movement in said

reverse direction when said member is disengaged.

25. Apparatus in accordance with claim 24, wherein the last-mentioned means is a solenoid.

26. Apparatus in accordance with claim 22, wherein said contact elements are associated in pairs, with one contact element of each pair being movable relative to the associated contact element thereof in said reverse direction by said member.

27. Apparatus in accordance with claim 26, wherein said movable contact elements are resilient leaves, said leaves being free to move in said reverse direction from a rest position but having means for preventing movement in said one direction from said position.

28. Apparatus in accordance with claim 21, wherein said actuator is carried by a lever normally biased in said opposite direction.

29. Apparatus in accordance with claim 28, wherein said lever has an article sizing abutment located in opposition to another sizing abutment, and further comprising means for carrying articles to be sized between said abutments to cause the abutment of said lever to move away from said other abutment.

30. Apparatus in accordance with claim 29, wherein said other abutment comprises a wheel.

31. Apparatus in accordance with claim 30, wherein the abutment of said lever has a sloping surface adapted to engage articles to be sized.

32. Apparatus in accordance with claim 29, wherein said article-carrying means comprises means for driving said wheel.

33. Apparatus for conveying and reversing a bill or the like, comprising a belt, a panel juxtaposed with said belt, means for admitting a bill between said belt and said panel at a first location, means for receiving said bill from said belt at a second location, and means intermediate said locations for reversing said bill end to end.

34. Apparatus in accordance with claim 33, said reversing means comprising means defining a notch in the path of a bill carried by said belt for receiving and holding the leading portion of the bill and for permitting the trailing portion of said bill to form a loop which overtakes the leading portion and then draws the leading portion from the slot to become the new trailing portion of the bill.

35. Apparatus in accordance with claim 34, wherein said notch-defining means comprises a bar extending transversely of the belt and having a portion thereof spaced from the panel to define said notch.

36. Apparatus for transporting bills and the like comprising a conveyor for moving said bills along a predetermined path, said conveyor having electric motor drive means, control means for said drive means including a pair of switches spaced apart laterally adjacent to the beginning of said path so as to be actuated by opposite edge portions of said bills, and both of which must be actuated concurrently to energize said drive means, a bill counter, and means including at least one of said switches and an additional switch spaced along said path from the first-mentioned switches a distance slightly less than the length of a bill for actuating said counter when a bill spans said distance.

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