United States Patent [19]

Guidi et al.

[11] **3,773,223**

[45] **Nov. 20, 1973**

[54] **CURRENCY DISPENSER**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 92,824, Nov. 25, 1970, Pat. No. 3,710,976.

[52] **U.S. Cl.** **222/67**

[51] **Int. Cl.** **B65g 59/00**

[58] **Field of Search** 221/67

[56] **References Cited**

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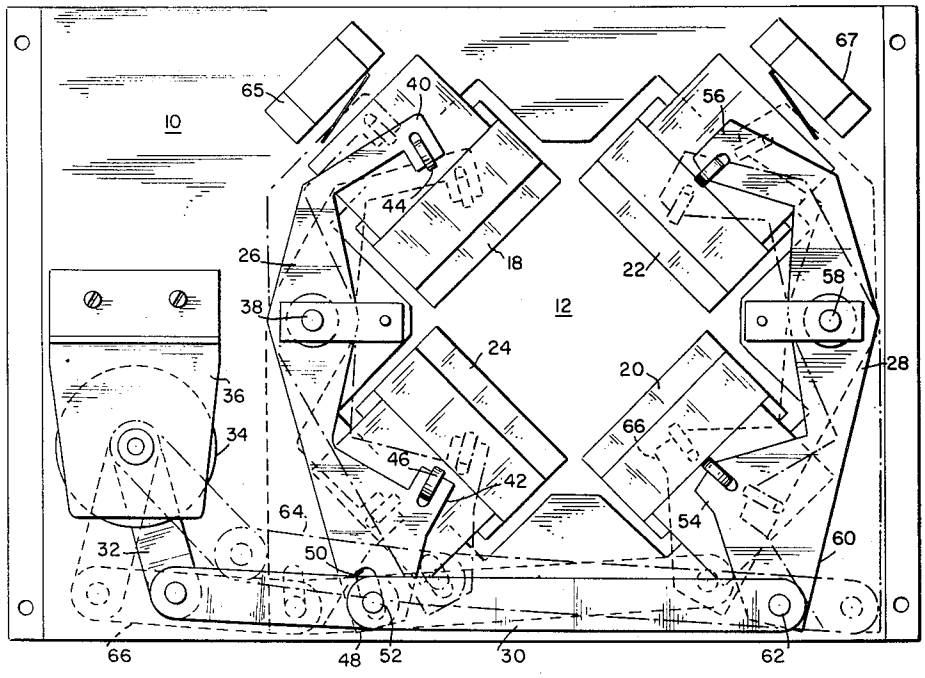
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Assistant Examiner—Joseph J. Rolla
Attorney—James J. Burke, II

[57] **ABSTRACT**

A unit for storing bills in a currency dispensing system. An upright cannister stores a stack of bills, with successive bills in the stack oriented at right angles to each other. A support has a cruciform opening corresponding to the bill orientations, and into which the cannister fits. Two sets of opposed pairs of doors in the opening are normally closed by two pivot arms, preventing bills from being dispensed. A drive lever and drive shaft connect the pivot arms to a double-winding stepping motor. Actuating this motor in the forward direction moves the pivot arms so as to allow one set of doors to open and thus form a passage for bills, while maintaining the second set positively blocked. The reverse is true when the motor is actuated in the reverse direction.

11 Claims, 3 Drawing Figures



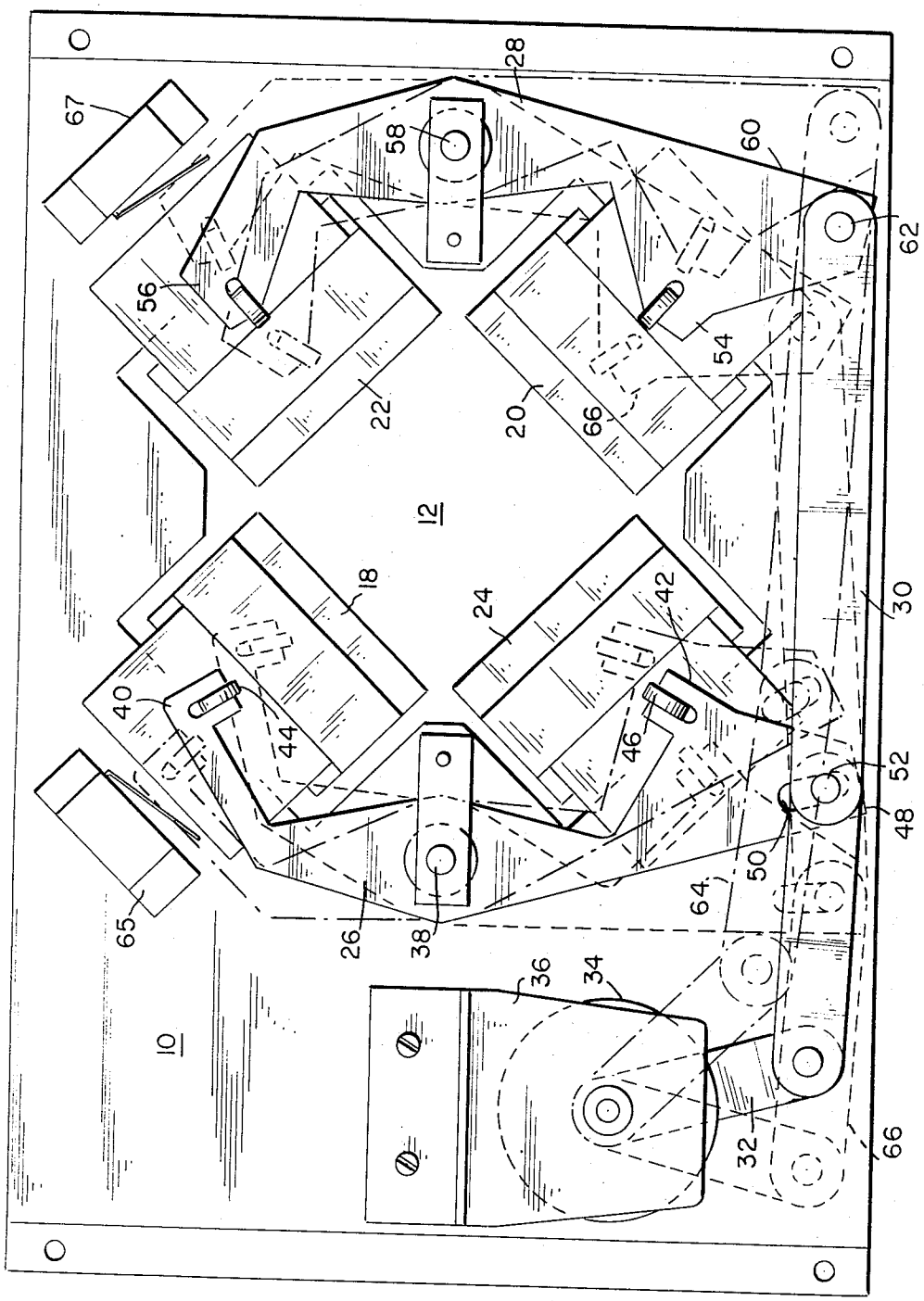
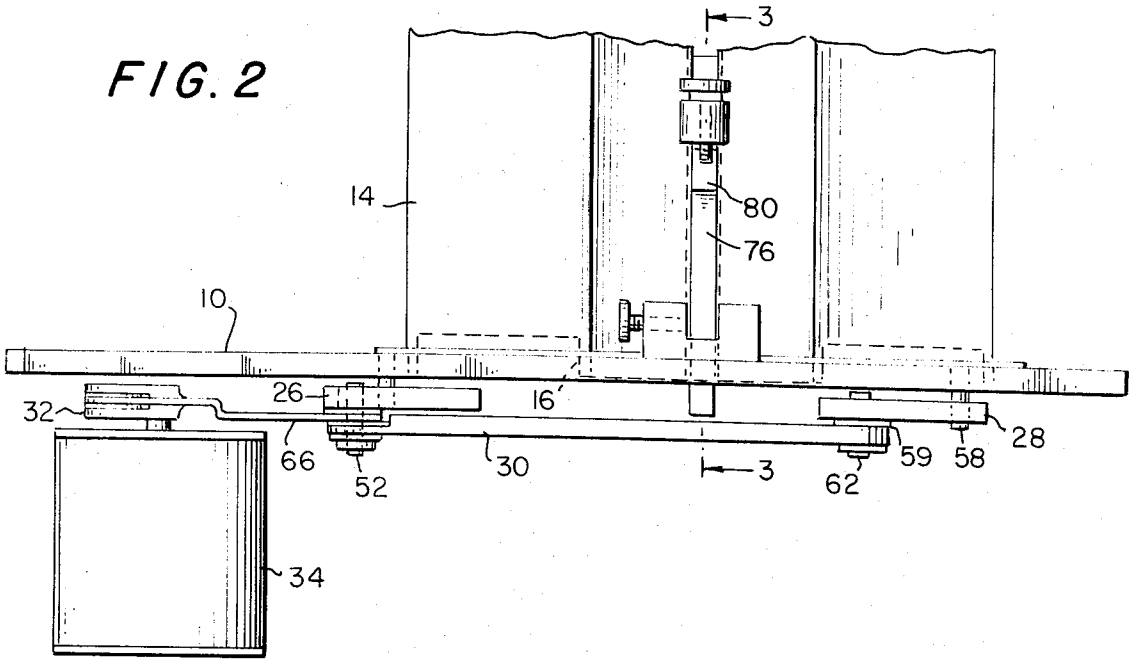

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FIG. 1

FIG. 2


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16
32
66
52
30
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62
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34

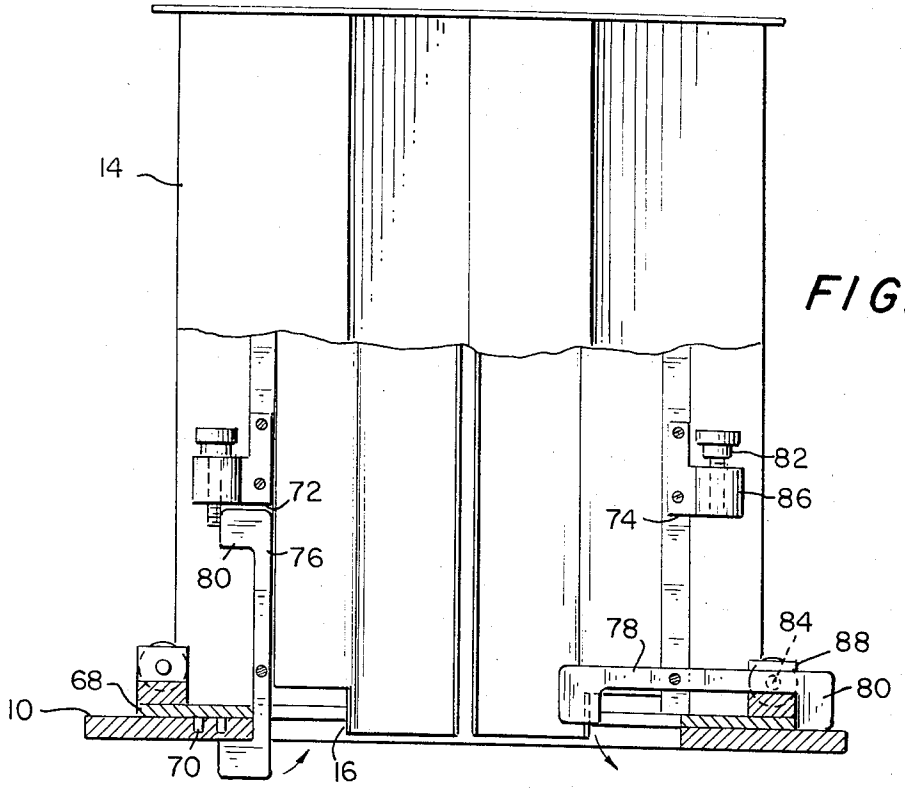

14
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82
86
74
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88
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68
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16

FIG. 3

CURRENCY DISPENSER

RELATED APPLICATIONS

This application is a continuation-in-part of U.S. application Ser. No. 92,824, now U. S. Pat. No. 3,710,976 issued Jan. 16, 1973. A currency dispensing system in which the present invention may advantageously be employed is described in U. S. Pat. No. 3,675,816, issued July 11, 1972, and assigned to the same assignee as the instant application.

BACKGROUND OF THE INVENTION

This invention relates in general to currency dispensing systems and, more particularly, it relates to the storage of paper currency (hereafter "bills") within such systems and means for dispensing such bills one at a time.

In the aforementioned U. S. Pat. No. 3,675,816, a currency dispensing system is disclosed. Broadly, this system includes means for ascertaining an amount to be dispensed and confirming the identity of the recipient, means for dispensing the correct number of bills onto a transporter, a counter which verifies that the correct number of bills has been dispensed, a receptacle to receive the bills from the transporter and coins directly from a coin dispenser. When the number of bills dispensed is correct, a door to the receptacle is unlocked and the recipient claims his cash.

In one embodiment, the recipient presents a check and an identification card having appropriate information encoded thereon in a machine-readable format. The machine will ascertain that the check and card belong to the same individual. The machine may also have an associated memory wherein it can compare the amount of the check with the encoded payroll data. If the presented information is in order, the check is accepted, the card returned, and the machine calculates the number of bills of each denomination to be dispensed. Dispensing signals are issued to the appropriate bill storage areas, and dispensing proceeds as described hereinabove. Of course, many variations are possible: for example, the system can be programmed to accept winning tickets on horse races or the like and pay the appropriate amount. As a further example, the system can be programmed for use with a keyboard to select the amount to be disbursed.

In the above-noted U. S. Pat. No. 3,710,976, there is disclosed several bill storage and dispensing devices for use in such a currency dispensing system. Bills are stored flat in a vertical stack within a cannister, with alternate bills or groups of bills being oriented at a 90° angle to each other. Means are provided for closing the bottom of the cannister when it is not installed in the machine. In one embodiment, the cannister is supported on a plate having a cruciform opening therein corresponding to both orientations of the bills in the stack. This opening is normally closed by two pairs of doors held in position by a set of cams. More specifically, two rotatable rings are mounted below the opening, each having an inwardly extending cam surface underlying a door or doors in the opening. Each ring is connected to a rotary solenoid by suitable linkages. When one solenoid is actuated, the attached ring is rotated and one pair of doors is allowed to open, forming a passage for bills of that orinetation, while the other passage is positively blocked. When the other solenoid is actuated, the doors covering the other passage are

opened but the first remains blocked. The cam surfaces are designed so that as one cam moves to allow one pair of doors to open, the cam also blocks the other pair, so if both solenoids were actuated by accident, all doors would remain blocked and no bills would be dispensed.

While the currency dispenser just described functions very well, one that functions just as well but is easier and more economic to construct would be desireable, and such is the general object of the present invention. Various other objects and advantages of the invention will become clear from the following description of a preferred embodiment thereof, and the novel features will be particularly pointed out in connection with the appended claims.

THE DRAWINGS

References will hereinafter be made to the accompanying drawings, wherein:

FIG. 1 is a plan view showing the dispensing mechanism as viewed from below;

FIG. 2 is an elevation view of the FIG. 1 embodiment with a cannister in place; and

FIG. 3 is a partial cross-sectional elevation of a preferred cannister for use with the dispensing mechanism.

DESCRIPTION OF PREFERRED EMBODIMENT

In essence, the present invention provides a simple lever arrangement powered by a double-winding stepping motor which actuates a pair of pivotal arms in concert. In the neutral position these arms block all four doors in the cruciform opening beneath the cannister. When actuated in either direction one pair of doors is opened to form a passage for bills of that orientation, while the other pair is positively blocked.

With reference to the drawings, a support plate **10** is adopted for mounting in a currency dispensing system (not shown) and will normally have a plurality of cruciform openings **12** therein (one shown) so that a similar number of bill-containing cannisters **14** (FIG. 2) can be mounted thereon. It is noted that opening **12** is, in each dimension, slightly larger than a bill to be dispensed, to allow room for the lower extensions or lips **16** of cannister **14** to actually extend into or even through opening **12.** This eliminates the possibility of a bill getting stuck at the interface of cannister **14** and support plate **10.**

As in the above-noted U.S. Pat. No. 3,710,976 the cruciform opening **12** has, at each of its four extremities, a hinged door. Doors **18, 20** block one passage and form a first coacting pair, and doors **22, 24** block the other passage and form the second coacting pair. It is to be noted that because of the cam action of the dispenser in the referenced patent, the doors were hinged on the long side of the passage, whereas in the instant invention they are hinged on the short side of the passage, i.e. under the respective ends of the overlying bill rather than along its sides. This is advantageous in that, as the doors swing down, the bill will bow in the center and start sliding downwardly; this makes for a faster and more positive release of the bill.

The mechanism for actuating the dispenser by opening respective pairs of doors comprises a pair of pivot arms **26, 28** pivotally secured to support plate **10** at diametrically opposed positions with respect to opening **12,** a drive lever **30** connected at one end to drive shaft **32,** medially connected to arm **26** and at the other end connected to arm **28,** and a double-winding stepping

motor 34, the shaft 35 of which is secured to and rotates drive shaft 32. Motor 34 is mounted on support plate 10 by means of a suitable bracket 36.

It will be appreciated that pivot arms 26, 28 are essentially mirror images of each other, and only one need be described in detail. It will be seen that lever arm 26 is essentially C-shaped, with pivot 38 located on the back side centrally opposite the opening between the two legs 40, 42 of the "C". Each of the legs 40, 42 is equidistant from pivot 38, and is approximately arcuate with respect to a circle with pivot 38 as its center. Each of the arms 40,42 has a small roller 44,46 set in its distal edge to facilitate movement along the surfaces of doors 18, 24 and support plate 10. Rollers 44, 46 are positioned, as shown in FIG. 1, to underlie the approximate center of doors 18 and 24, respectively. In this position, obviously, both doors are positively blocked from opening. With rotation of pivot arm 26 in the clockwise direction, however, arm 40 will underlie more of door 18, keeping it blocked, while arm 42 will underlie less of door 24, eventually allowing it to open. An extension or tab 48 from the leg 42 side of pivot arm 26 (i.e. at about the bottom of the "C") has a slot 50 in which a pin 52 secured to drive lever 30 slides, thus connecting lever arm 26 into the drive train of the device.

Pivot arm 28 is similar but, as noted, is a mirror image of arm 26. Thus, arm 26 has legs 54, 56 underlying doors 20 and 22, respectively, and is pivoted at 58 (use of low-friction plastic washers 59 at all pivot and lever connection points is preferred). A tab 60 has a hole for a connecting pin or rivet 62 to make a link with drive lever 30; a slot is not necessary in this instance. The general relation of the arms 26, 28 could be characterized as two "C"'s facing each other.

The double winding stepping motor 34, through drive shaft 32, can move drive lever 30 to either of three positions. The position shown in FIG. 1 is the neutral position, wherein all of the doors are blocked. At a forward position, indicated in phantom at 64, both pivot arms 26, 28 pivot in the counterclockwise direction, allowing doors 18, 20 to open while keeping doors 22, 24 securely blocked. As noted herein above, doors 18, 20 form a passage allowing a bill to be dispensed. At the reverse position, indicated in phantom at 66, the arms 26, 28 pivot in the clockwise position from neutral, and doors 22, 24 are allowed to open while doors 18, 20 remain blocked. Doors 22, 24 also form a passage and allow a bill to be dispensed.

It will be appreciated that the slot 50 and pin 52 are necessary since drive lever 30 is connected at one end to rotating shaft 32 and at the other to tab 60 on pivot arm 28, and lever 30 will rise slightly as it moves in either direction away from neutral, because of the circular motion of shaft 32. Alternatively, lever 30 may be comprised of a pair of levers, one connecting shaft 32 with pin 52, and the second connecting pins 52 and 62. This has the advantage of allowing pivot arms 26, 28 to be exact mirror images of each other.

Circuitry for double-winding stepping motors is well known and need not be described herein. It will be obvious to those of skill in the art, that each dispensing command is followed by a command returning the mechanism to the neutral position, and that sequential dispensing commands are alternately to the forward and reverse positions, so that the passage opened is in registry with the next bill in the stack. Microswitches may be positioned so as to be closed by pivot arms 26, 28 at the extreme of each dispensing movement, the circuit completed thereby being utilized to require that the succeeding dispensing movement be in the opposite direction.

With the exception of extensions or lips 16, the canisters 14 may be of the same type described in U.S. Pat. No. 3,710,976. They are cruciform in shape, or at least have means for retaining successive bills in the desired angular relation. A bottom plate 68 rests on support plate 10 and may have suitable holes for indexing with pins 70, to insure a proper orientation. The provision of covers, transportation plates (to block the lower end when the cannister is removed from the machine) and the like may all be as described in the noted patent. However, it is preferred to employ a cannister with a novel locking lever arrangement rather than use a transportation plate, and attention is directed to FIG. 3. The cruciform cannister body 14 is attached to bottom plate 68, which in turn rests on base 10, all as previously described. At diametically opposed apices of the cruciform bill storage area, a pair of vertical slots 72, 74 are provided, just above bottom plate 68. Pivoted within slots 72, 74 are lock levers 76, 78. As shown in FIG. 3, lever 76 is in the vertical or dispensing position, while lever 78 is in the horizontal or transportation position. Each lever has a tab 80 at its upper end drilled to accommodate an Allen head set screw 82, 84 or other locking means for either position. Screws 82, 84 are mounted in bosses 86, 88 so that the levers can be securely fastened in either position. As can be seen from lever 76 in the drawing, when both levers are vertical they are completely clear of the bill storage area and will not impede the flow of bills of any orientation. With both levers in the horizontal position, as lever 78 is shown, bills of any orientation are held within the cannister.

Various changes in the details, steps, materials and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as defined in the appended claims.

What is claimed is:

1. A unit for storing and dispensing bills in a currency dispensing system comprising:

means holding a stack of bills along an axis with the bills being transverse to the axis and with successive bills or groups of bills oriented at different angles around the axis, said holding means being open at one end thereof;

support means for said holding means disposed across said one end including means for forming passages which are coextensive with the bills;

sets of opposed pairs of doors in each of said passages;

pivot arm means underlying said doors and normally holding all said doors in a closed position thereby blocking said passages;

drive means connected to said pivot arm means, whereby said pivot arm means are moved and one set of said doors is allowed to open, forming a passage for bills to be dispensed, while all other sets of doors remain blocked by said pivot arm means.

2. The storing and dispensing unit as claimed in claim 1, wherein said holding means holds bills in two orientations at right angles and said support means includes

a cruciform opening for forming said passages, a set of opposed pairs of doors being located in each of the two passages.

3. The storing and dispensing unit as claimed in claim **2,** wherein said pivot arm means comprises two pivot arms, each said arm having a pair of legs, and each said leg underlying one said door.

4. The storing and dispensing unit, as claimed in claim **3,** wherein said drive means comprises:

a stepping motor having forward, reverse and neutral positions;

lever means connecting said motor and said pivot arms;

said pivot arms maintaining all said doors closed at said neutral position and pivoting to open one set of said doors at the forward position and the other set of said doors at the reverse position.

5. The storing and dispensing unit as claimed in claim **1,** wherein said holding means includes a bottom plate adapted to rest on said support means, and a lip extending downwardly from said bottom plate around the opening forming said passages.

6. The storing and dispensing unit as claimed in claim **5,** and additionally comprising lever means moveable to a closed position adjacent said one end whereby bills may be prevented from passing out of said one end.

7. A unit for dispensing bills in a currency dispensing system wherein successive bills or groups of bills are vertically stacked at right angles above said unit, said unit comprising:

a support plate having a cruciform opening therein forming two passages coextensive with bills in said stack;

a pair of doors in each of said passages;

a pair of pivot arms pivotally attached to said support plate, each said arm having a pair of legs, each said leg underlying one said door and normally maintaining said doors in the closed position;

drive means including motor means and lever means connected to said pivot arms, and actuatable to a first position where said arms pivot to allow one pair of doors to open while the other pair remains closed, and a second position where the other pair of doors opens and said one pair remains closed.

8. The dispensing unit as claimed in claim **7,** wherein said motor means is a double-winding stepping motor.

9. The dispensing unit as claimed in claim **7,** wherein said doors are hinged to said support plate at the ends of the passages in said cruciform opening.

10. A unit for storing bills in a currency dispensing system comprising:

cannister means open at one end and adapted to hold a vertical stack of bills, successive bills or groups of bills being oriented at right angles to each other;

bottom plate means at said one end adapted to support said cannister means within said system;

a lip extending below said bottom plate around the opening in said one end; and

lever means moveable to a closed position adjacent said one end whereby bills may be prevented from passing out of said one end.

11. The storing unit as claimed in claim **10,** wherein said opening is in cruciform shape, and said lever means comprises a pair of diametrically opposed levers at the apices of said opening, each said lever having associated locking means for locking same in the closed and open positions.

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