

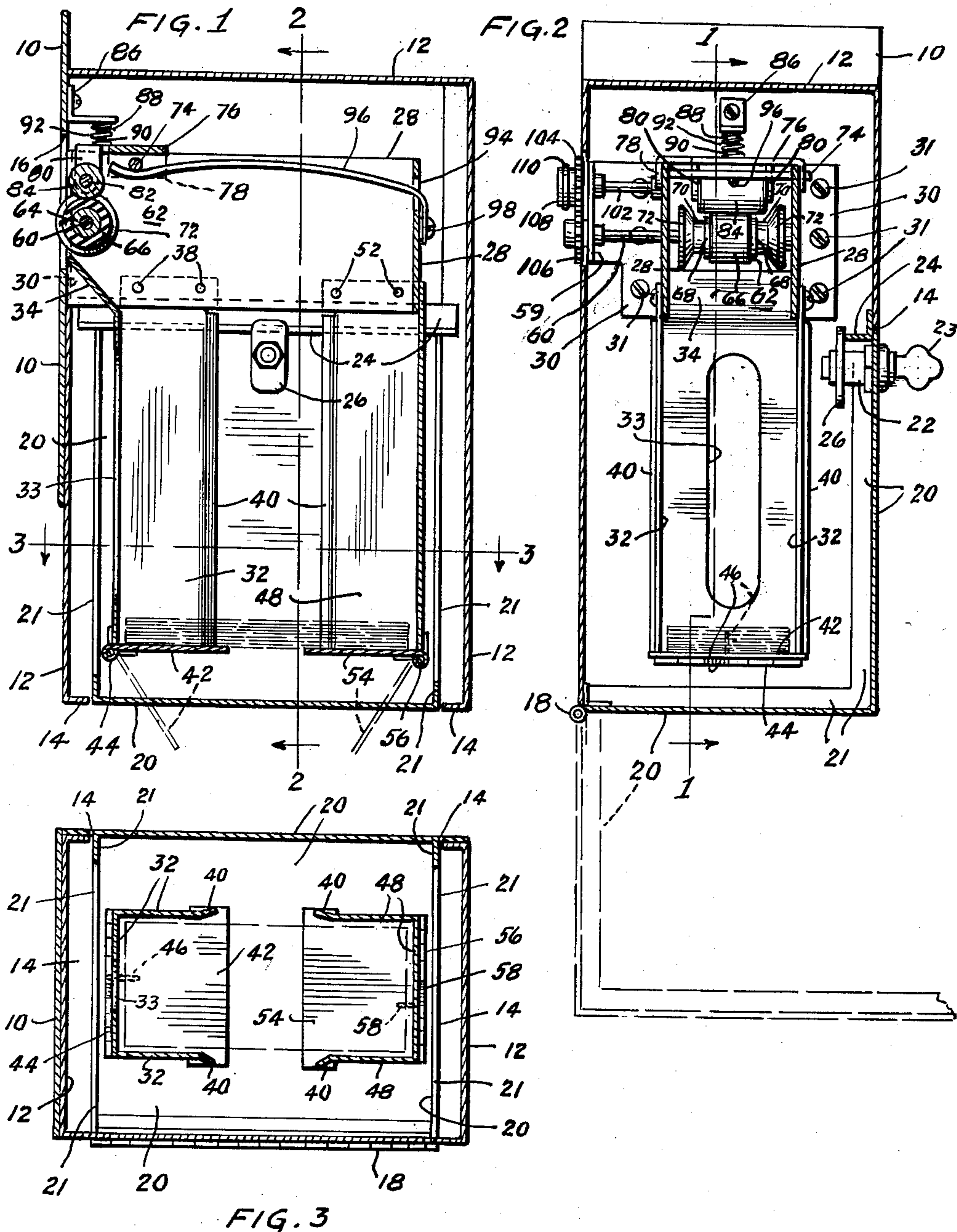
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BILL-RECEIVING CASH BOXES

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## BILL-RECEIVING CASH BOXES

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This invention relates to improvements in bill-receiving cash boxes. More particularly, this invention relates to improvements in cash boxes that can receive bills from currency detectors and that can hold those bills in readily-accessible, stacked array.

It is therefore an object of the present invention to provide an improved cash box that can receive bills from a currency detector and that can hold those bills in readily-accessible, stacked array.

In some currency detectors, inserted bills are moved parallel to their elongated axes and are discharged through openings in the rear plates of those currency detectors. If those bills are permitted to fall into large cash boxes, those bills will tend to fall in random fashion; and it is frequently awkward to remove such bills from such cash boxes. Furthermore, once the bills have been removed from those cash boxes, those bills should be stacked neatly for convenient handling. If the bills which are discharged through the rear plates of the currency detectors are to be permitted to fall into small cash boxes, bills that tend to skew or to bow as they enter those cash boxes could cause jams. It would be desirable to provide a device that could be associated with a currency detector and which could guide bills into a small cash box without permitting those bills to jam. The present invention provides such a device; and it is therefore an object of the present invention to provide a device which can be associated with a currency detector and which can guide bills into a small cash box without permitting those bills to jam.

The present invention is enabled to guide bills into a small cash box without any jamming of those bills because it bends the elongated edges of those bills upwardly at an abrupt angle, thereby materially reducing the total distance between those edges. Further, because those edges are bent upwardly at such an abrupt angle, those edges yield readily if the bills engage the sides of the cash box. The overall result is that the bills can readily enter a small cash box without jamming. It is therefore an object of the present invention to bend the elongated edges of bills upwardly at an abrupt angle as those bills are guided into a small cash box.

While it is desirable to bend the elongated edges of bills upwardly at an abrupt angle as those bills are guided into a small cash box, it would be desirable to keep the major portions of the areas of those bills substantially flat; because such large, substantially flat areas would strongly resist any tendencies of the bills to twist or bend as they were introduced into a small cash box. The present invention keeps the major portions of bills substantially flat while bending the elongated edges of those bills upwardly at an abrupt angle; and it is therefore an object of the present invention to keep the major portions of bills substantially flat while bending the elongated edges of those bills upwardly at an abrupt angle.

The present invention holds the major portions of bills substantially flat while bending the elongated edges of those bills upwardly at an abrupt angle by passing those bills between two rollers. One of those rollers has a substantially cylindrical central portion and two radially-extending, frusto-conical end portions; while the second roller is cylindrical and extends into the space between those frusto-conical end portions. The second roller is

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longer than one half of the width of a bill, and it coacts with the cylindrical portion of the first roller to keep the major portions of the bills substantially flat; and that second roller also coacts with the frusto-conical end portions of that first roller to bend the elongated edges of the bills upwardly at an abrupt angle. Further, the first roller has annular grooves immediately adjacent the inner faces of the frusto-conical end portions, and those grooves make it possible for the elongated edges of the bills to be bent upwardly at an abrupt angle without wrinkling or crumpling of those bills at the bend lines. It is therefore an object of the present invention to provide a roller which has a substantially cylindrical central portion, radially-extending frusto-conical end portions and intervening grooves and to provide a second roller that is cylindrical and that extends into the space between those frusto-conical end portions.

An elongated confining member is provided adjacent the two rollers, and that confining member will tend to keep bills, which are discharged from those rollers, from rising up and passing over the top of the cash box. That confining member extends through a slot in one wall of the cash box, and that confining member is secured to that cash box by a fastener which is located at the exterior of that cash box. This is desirable because it keeps the fastener for the confining member from interfering with the free movement of bills discharged by the rollers. It is therefore an object of the present invention to provide an elongated confining member which is adjacent the rollers that direct bills into a cash box and which extends through an opening in that cash box and is secured by a fastener located at the exterior of that cash box.

The cash box provided by the present invention has a movable bottom and has openings in the side and bottom thereof to enable a person to place his thumb on the uppermost bill of a stack of bills and to place a finger under the lowermost bill of that stack of bills and then move that stack of bills downwardly and out of the cash box. With such a cash box, the removal of the bills is simple and straightforward and permits the bills to remain in stacked array. It is therefore an object of the present invention to provide a cash box which has a movable bottom and which has openings in the side and bottom thereof that permit a person's thumb to be placed on the uppermost bill of a stack of bills and permits a person's finger to be placed beneath the lowermost bill of that stack of bills and which permits the stack of bills to be moved downwardly and out of that cash box while the bills are held in stacked array.

Other and further objects and advantages of the present invention should become apparent from an examination of the drawing and accompanying description.

In the drawing and accompanying description a preferred embodiment of the present invention is shown and described but it is to be understood that the drawing and accompanying description are for the purpose of illustration only and do not limit the invention and that the invention will be defined by the appended claims.

In the drawing:

FIG. 1 is a vertical section through one embodiment of bill-stacking device that is made in accordance with the principles and teachings of the present invention, and it is taken along the broken plane indicated by the line 1—1 in FIG. 2,

FIG. 2 is a sectional view through the bill-stacking device of FIG. 1, and it is taken along the plane indicated by the line 2—2 in FIG. 1, and

FIG. 3 is a sectional view through the bill-stacking device of FIG. 1, and it is taken along the plane indicated by the line 3—3 in FIG. 1.

Referring to the drawing in detail, the numeral 10



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denotes the rear plate of a currency detector. That rear plate could be the rear plate of any one of a number of different currency detectors.

The numeral 12 denotes a protective housing which is made of steel and which has walls that are thick enough to resist tampering. That housing has an opening 14 which is coextensive with substantially the entire bottom of that housing and which is coextensive with the greatest part of the right-hand side of that housing, as that housing is viewed in FIG. 2. As a result, the opening 14 can provide full and unobstructed access to the interior of the housing 12. An opening 16 is provided in the rear plate 10, and a corresponding opening is provided in the left-hand side of the housing 12, as that housing is viewed in FIG. 1. The rear plate 10 of the currency detector is solidly secured to the left-hand side of the housing 12 so the only access to the interior of that housing is from the currency detector via the opening 16 or from the exterior of that housing via the opening 14.

A piano-type hinge 18 is secured to the bottom edge of one wall of the housing 12, as shown by FIG. 2; and that piano-type hinge is also secured to an L-shaped door 20. That door also is made of steel, and it is made thick enough to withstand tampering. The side edges of the door 20 are provided with stiffening flanges 21; and those side edges closely abut the portions of the housing 12 which define the opening 14. As a result, it is impossible for anyone to insert an implement or tool between the edges of the door 20 and those portions of the housing 12 which define the opening 14 and effectively interfere with the contents of the housing 12.

The numeral 22 denotes a lock of standard design which is carried by the free end of the door 20; and that lock can be operated by a suitable key 23 of appropriate design. A latch 26 will rotate when the appropriate key is inserted in the lock 22, but that latch will normally be in locking engagement with an L-shaped bracket 24 which is secured to the inner face of a wall of the housing 12. The latch 26 is sturdy and the L-shaped bracket 24 is sturdy, and hence the door 20 will normally be capable of resisting the efforts of unauthorized persons to open it.

The numeral 28 denotes a U-shaped bracket of stiff metal, and the free ends of the arms of that bracket have flanges 30 thereon. Those flanges extend outwardly from the free ends of those arms, as shown particularly by FIG. 2; and those flanges are suitably secured to the rear plate 10 of the currency detector by fasteners 31. The bracket 28 is sturdy, and it will provide a rigid support for downwardly-depending U-shaped members 32 and 48. The U-shaped member 32 has the web thereof confronting the left-hand wall of the housing 12, as that housing is viewed in FIG. 1; and the sides of that member extend toward the right-hand wall of that housing. The upper end 34 of the web of the U-shaped member 32 inclines upwardly and to the left in FIG. 1, and it extends to the rear plate 10 of the currency detector. In doing so, that inclined upper end 34 bridges the space between the web of the U-shaped member 32 and the rear plate 10. The upper ends of the sides of the U-shaped member 32 extend upwardly above the bottom edges of the arms of the U-shaped bracket 28; and those upper ends are rigidly secured to those arms by fasteners 38. The free edges of the sides of the U-shaped member 32 are bent outwardly, as indicated by the numeral 40; and hence any rough spots on those edges will be spaced outwardly of the planes defined by those sides.

The numeral 42 denotes a floor for the U-shaped member 32, and that floor is coextensive with the area defined by the U-shaped member 32. In fact, as shown by FIG. 3, the floor 42 actually extends outwardly to the right beyond the inclined edges 40 of the sides of the U-shaped member 32. The piano-type hinge 44 is secured to the web of the U-shaped member 32 and

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is also secured to the left-hand edge of the floor 42, as that floor is viewed in FIG. 1. A spring 46 is associated with the piano-type hinge 44, and that spring biases the floor 42 to the solid line position in FIG. 1. However, that spring can yield to permit the floor 42 to be moved downwardly to and through the dotted-line position shown by FIG. 1.

The U-shaped member 48 has the web thereof confronting the right-hand wall of the housing 12, as that housing is viewed in FIG. 1; and the sides of that U-shaped member extend toward the sides of the U-shaped member 32. The upper ends of the web and sides of the U-shaped member 48 extend upwardly above the bottom edges of the web and arms of the U-shaped bracket 28; and those upper ends are rigidly secured to that web and to those sides by fasteners 52. The U-shaped bracket 28 and the U-shaped members 32 and 48 constitute a cash box that is small and that defines an area which is just slightly larger than the areas of the bills which the bill-stacking device is intended to receive and to stack.

The free edges of the sides of the U-shaped member 48 are bent outwardly as indicated by the numeral 40. As a result, any rough spots on those edges will be spaced outwardly of the planes defined by those sides.

The numeral 54 denotes a floor for the U-shaped member 48, and that floor is similar to the floor 42 for the U-shaped member 32. A piano-type hinge 56 is secured to the bottom of the web of the U-shaped member 48, and it is also secured to the right-hand edge of the floor 54, as that floor is viewed in FIG. 1. A spring 58 is associated with the piano-type hinge 56, and that spring biases the door 54 to the solid line position shown in FIG. 1. However, that spring can yield to permit that floor to be moved downwardly to and through the dotted-line position shown in FIG. 1.

Because of the springs 46 and 58, the floors 42 and 54 will normally be horizontal, they will thus be able to underlie and support bills which are stacked within the cash box. However, those doors can be rotated downwardly to enable that stack of bills to be moved downwardly and out of the cash box.

It will be noted that the free edges of the corresponding sides of the U-shaped members 32 and 48 are spaced apart to define open spaces between them. Those open spaces are materially wider than the width of the thumb of even a very large man. Similarly, it will be noted that the free edges of the doors 42 and 58 are spaced apart to define an open space between them. That open space is materially wider than the width of the finger of even a very large man. As a result, even a very large man can insert his thumb between the free edges of the corresponding sides of the U-shaped member 32 and 48 and can place a finger between the free edges of the floors 42 and 58. That thumb can overlie the uppermost bill of a stack of bills held by the cash box and that finger can underlie the lowermost bill of that stack of bills. That thumb and finger can be used to grip that stack of bills and to move that stack of bills downwardly and out through the bottom of the cash box—the floors 42 and 54 rotating downwardly to permit such movement of that stack of bills.

The numeral 59 denotes an ear which projects rearwardly from the flange 30 on the free end of the left-hand arm of the U-shaped bracket 28. A bushing carried by that ear and a bushing carried by the right-hand arm of that bracket rotatably support a shaft 60. A roller, which is generally denoted by the numeral 62, is fixedly secured to and rotates with that shaft. That roller has a reduced-diameter cylindrical, central portion 64, and it has a sleeve-like portion 66 which is telescoped over that central portion. The portion 66 preferably is made from a material such as rubber, elastomeric plastic or the like which has a high coefficient of friction. Shoulders 68 are provided on the roller 62, and those shoulders abut the ends of the sleeve-like portion 66 and



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hold that portion against axial movement. Those shoulders will have diameters that are slightly smaller than the diameter of the sleeve-like portion 66. Annular grooves 70 are formed in the roller 62, immediately outwardly of the shoulder 68; and frusto-conical, radially-extending end portions 72 are provided on the roller 62, immediately outwardly of the groove 70. The roller 62 will be made as a number of different parts; but when those parts are assembled with the shaft 60, that roller and that shaft will rotate as a unit.

The numeral 74 denotes an elongated pivot which extends between, and projects outwardly beyond, the sides of the U-shaped bracket 28. The outer ends of that pivot extend through openings in downwardly-directed ears 78 on a plate 76 which overlies the left-hand ends of the arms of the U-shaped bracket 28. That plate also has a pair of downwardly-directed ears 80, and those ears support a pivot 82. A roller 84 is rotatably mounted on the pivot 82, and the roller extends into the space between the frusto-conical end portions 72 of the roller 62. The roller 84 is in register with, and normally abuts, the sleeve-like portion 66 of the roller 62. The length of the roller 84 is greater than one-half of the widths of the bills which are intended to be held within the cash box of the present invention.

The plate 76 can rotate about the pivot 74, and can thus move the roller 84 upwardly or downwardly relative to the roller 62. An L-shaped bracket 86 is secured to the rear plate 10 of the currency detector, and the horizontal portion of that bracket overlies the free end of the plate 76. A short stud 88 is secured to the L-shaped bracket 86 and extends downwardly toward the plate 76, and a short stud 90 is secured to the top of the plate 76 and extends upwardly toward the stud 88. Those studs extend into the turns of, and serve to position, a helical compression spring 92. That spring normally holds the plate 76 in the lowered position shown by FIGS. 1 and 2, but it can yield to permit the plate 76 to move upwardly and thereby permit the roller 84 to move upwardly relative to the roller 62. Ordinarily the plate 76 will move upwardly just far enough to permit a bill to pass between the rollers 62 and 84.

The numeral 94 denotes a vertically-directed slot in the web of the U-shaped bracket 28; and while that slot is adjacent the upper end of that web, that slot does not extend to the top edge of that web. An elongated, wire-like confining member 96 extends through the slot 94 and is secured to the web of the bracket 28 by a fastener 98 at the outer face of that web. The other end of that confining member extends parallel to the arms of the U-shaped bracket 28 and underlies the pivot 74. The confining member 96 will keep bills, that issue from the rollers 84 and 62, from inclining upwardly and jamming against the pivot 74 or rising upwardly above the top edge of the U-shaped bracket 28. The fact that the confining member 96 extends through the slot 94 and is secured to the exterior of the web of the bracket 28 is desirable because it keeps that confining member and the fastener 98 from catching and jamming bills issuing from the rollers 62 and 84.

The numeral 102 denotes a short shaft which is rotatably held by a bushing in the ear 59 and by a bushing in the left-hand arm of the bracket 28. A gear 104 is fixedly secured to the shaft 102, and that gear meshes with a gear 106 which is fixedly secured to the shaft 60. A pulley 108 also is secured to the shaft 102, and a belt 110 drives that pulley. That belt can be driven by the motor of the currency detector, or it can be driven by a separate motor, as desired. The shaft 102 will rotate the shaft 60 in the clockwise direction in FIG. 1, and the engagement between the rollers 62 and 84 will cause the roller 84 to rotate in the counter clockwise direction.

The roller 62 and the roller 84 will receive the leading edge of any bill that issues through the opening 16 in the rear plate 10 of the currency detector; and the high coefficient of friction of the material of the sleeve-like

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portion 66 of the roller 62 will prevent slipping of that bill relative to that roller. The roller 84 will coact with the sleeve-like portion 66 of the roller 62 to hold the greatest part of the area of each bill substantially flat, and the roller 84 will coact with the frusto-conical end portions 72 of the roller 62 to force the elongated edges of each bill to bend upwardly at an abrupt angle. The angles of generation of the frusto-conical portions 72 of the roller 62 are at least ninety degrees, and hence the elongated sides of the bill are bent upwardly at an angle of at least forty-five degrees. This abrupt upward bending of the elongated edges of the bill stiffens the bill and also enables those elongated sides to yield readily if those edges engages the arms of the U-shaped bracket 28. Further, the abrupt upward bending the elongated sides of each bill reduces the overall distance between those edges and reduces the likelihood of those edges jamming against the arms of the U-shaped bracket 28 or against the sides of the U-shaped members 32 and 48.

As each bill issues from the rollers 62 and 84, it will move into the position indicated by dotted lines in FIG. 3 and will then drop downwardly and come to rest on the floors 42 or 54 or upon bills already resting on the floors 42 and 54. As each bill passes between the rollers 62 and 84, the plate 76 will rotate slightly in the clockwise direction in FIG. 1—the spring 92 yielding to permit such rotation. After that bill has passed from between the rollers, the spring 92 will again urge the roller 84 down into engagement with the sleeve-like portion 66 of the roller 62.

The bills that are stacked within the cash box will be protected against removal by unauthorized persons by the sturdy housing 12. However, when an authorized person desires to remove those bills, he need only insert a key 23 in the lock 22, rotate that key to rotate the latch 26 out of register with the L-shaped bracket 24, and then pull downwardly and to the right in FIG. 2. The door 20 will then move to the position shown by dotted lines in FIG. 2 and will thereby open substantially all of the bottom of the housing 12 and the greatest part of the right-hand side of that housing, as that housing is viewed in FIG. 2. That authorized person can then place his thumb atop the uppermost bill of the stack of bills and can place a finger under the lowermost bill of that stack of bills and move the entire stack of bills downwardly. The springs 46 and 58 will yield to permit the floors 42 and 54 to move downwardly to and through the floors 42 and 54 to move downwardly to and through the dotted-line position shown in FIG. 1; thereby permitting the stack of bills to be moved down below the level of the bottom of the housing 12. As the stack of bills is moved downwardly beyond the free edges of the floors 42 and 54, the springs 46 and 58, respectively, will restore those floors to the normal positions shown by solid-lines in FIG. 1. Thereafter, the authorized person can rotate the door 20 to the solid-line position shown in FIG. 2, and can rotate the latch 26 into holding engagement with the L-shaped bracket 24. At such time the cash box will again be safely enclosed by the protective housing 12.

As the leading edges of bills move further and further from the rollers 62 and 84, gravity will tend to pull those leading edges downwardly below the levels of the trailing edges of those bills—those trailing edges being then held against downward movement by those rollers. The leading edges of some bills do, of course, tend to curl or to incline upwardly, and the abrupt upward bending of the elongated sides of all bills tends to hold the leading edges of all bills at the same levels as the trailing edges of those bills; but most of the bills will have their leading edges below the levels of the trailing edges thereof as those bills start to fall downwardly toward the floor of the cash box. Those trailing edges will tend to coact with the U-shaped member 32 to trap air; and any such entrapment of air would be objectionable because it would tend to increase the difference between the levels of the



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leading and trailing edges of the bills. The present invention avoids any entrapment of air by the trailing edges of the bills by providing an elongated vertically-directed slot 33 in the web of the U-shaped member 32—that slot permitting free egress of any air underlying the trailing edges of the bills. The spaces between the free edges of the U-shaped members 32 and 48 also permit free egress of air from beneath bills falling toward the floor of the cash box.

Where bills have been in circulation for long periods of time, those bills can become quite limp; and such bills can tend to bend at their midpoints as they fall toward the floor of the cash box. If the bending of any of those bills is excessive, and if any of those bills tends to skew as it falls, one of the corners of that bill could tend to engage the free edge of one of the sides of the U-shaped members 32 or 48. The outward inclination of those free edges, as indicated by the numeral 40, will enable those free edges to provide a funnel-like action which will ease the bill back into registry with the cash box rather than tend to encourage the bill to fold over.

Whereas the drawing and accompanying description have shown and described a preferred embodiment of the present invention it should be apparent to those skilled in the art that various changes may be made in the form of the invention without affecting the scope thereof.

What I claim is:

1. In a device that can receive and stack bills, a pair of rollers that discharge bills, and a cash box that receives said bills, one of said rollers having a cylindrical central portion and a pair of radially-extending frusto-conical end portions and grooves intermediate said central portion and said end portions, the other of said rollers being cylindrical and extending into the space between said frusto-conical end portions of said one roller, said other roller having a portion that is coextensive with said cylindrical central portion of said one roller and that can engage one face of a bill while said cylindrical central portion engages the opposite face of said bill, said other roller having a length greater than one-half of the width of the bills to be accommodated by said cash box and having the ends thereof immediately adjacent said frusto-conical end portions of said one roller to bend the elongated edges of bills passing between said rollers upwardly at abrupt angles.

2. In a device that can receive and stack bills, a pair of rollers that discharge bills, and a cash box that receives said bills, one of said rollers having a cylindrical central portion and a pair of radially-extending frusto-conical end portions, the other of said rollers being cylindrical and extending into the space between said frusto-conical end portions of said one roller, said other roller having a portion that is coextensive with said cylindrical central portion of said one roller and that can engage one face of a bill while said cylindrical central portion engages the opposite face of said bill and having the ends thereof immediately adjacent said frusto-conical end portions of said one roller to bend the elongated edges of

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bills passing between said rollers upwardly at abrupt angles.

3. In a device that can receive and stack bills, a cash box that receives bills, said cash box having a vertically-directed U-shaped member that confines one of the ends of said bills and having a second vertically-directed U-shaped member that confines the other ends of said bills, a floor that is pivotally secured to the bottom of the first said U-shaped member, a second floor that is pivotally secured to the bottom of said second U-shaped member, springs that bias said floors into billholding position but that can yield to permit a stack of bills to be moved bodily downwardly past said floors for removal from said cash box, said U-shaped members being spaced apart to permit the insertion of a person's thumb into engagement with the uppermost bill of a stack of bills held in said cash box, said floors being spaced apart to permit said person's finger to be moved into engagement with the lowermost bill of said stack of bills.

4. A cash box that can hold bills in readily-accessible, stacked array and that comprises vertically-directed walls that can confine bills, introduced into said cash box, in the form of a stack, a partial floor pivotally secured to one of said walls, a second partial floor pivotally secured to another of said walls, at least one of said walls defining an open space to permit a person's thumb to be placed atop the uppermost bill of a stack of bills, said partial floors defining an open space to permit said person's finger to be placed underneath the lowermost bill of said stack of bills, whereby said person can grip the uppermost bill and the lowermost bill of said stack of bills while said stack of bills is held by said cash box.

5. In a device that can receive and stack bills, a pair of rollers that discharge bills, a cash box that receives said bills, a confining member that extends from said rollers into position above said cash box to keep bills from rising upwardly and passing over the top of said cash box, one end of said confining member extending through a slot in a wall of said cash box and being secured to the exterior of said wall whereby said end of said confining member can not catch and jam bills introduced into said cash box.

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