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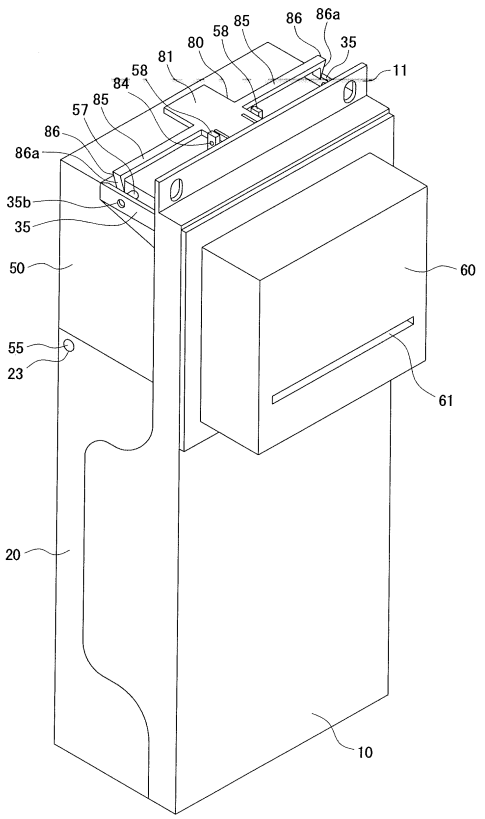
(54) Bill validator

(57) A cassette plate (72) has a vertical dimension that is equal to or slightly larger than a vertical dimension of a bill (PM), and the cassette plate (72) is arranged so that the upper end thereof coincides with or is slightly higher than the upper end of a stored bill (PM) . A whole of the cassette plate (72) is transparent, and a viewer can check a presence of the stored bill (PM) from the outside by looking into a bill storage cassette (70) through an inspection window (IW) and seeing through via the transparent cassette plate (72) .

Fig. 1



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Description

[0001] The present invention relates to a bill validator used for vending machines and the like.

Description of the related art

[0002] A bill validator used for vending machines and the like includes a bill transfer mechanism for transferring a bill inserted into a bill insertion slot along a bill passage, a transfer driving means for giving power to the bill transfer mechanism, a bill storage mechanism for storing a bill transferred to a bill storage position by pushing it into a bill storage cassette, and a storage driving means for giving power to the bill storage mechanism.

[0003] The bill storage cassette generally has a box shape having a top opening and a front opening, and the bill storage cassette is attached to the bill validator so as to be capable of being opened and closed by a turning around a pivot location. The bill storage cassette has vertical-long rails provided along the right and left edges of the front opening thereof, a cassette plate having a vertical-long rectangular shape the lateral width of which is slightly greater than the lateral space of the rails and which is arranged on the rear side of the rails, and a spring such as a coil spring that urges the cassette plate to the front. A bill is stored in the state in which both of the side parts in the width direction thereof are held between the cassette plate and the right and left rails.

[0004] In the rear surface of the bill storage cassette, there is provided an inspection window for checking the presence of a stored bill by direct sight (means sighting the bill itself directly with nothing being interposed between the viewer's eye and the bill) . In order for the viewer to directly sight the stored bill through the inspection window, the cassette plate is configured so that the vertical dimension thereof is smaller than the vertical dimension of the bill, and the cassette plate is arranged so that the upper end thereof is lower than the upper end of the stored bill, thereby the upper part of the stored bill is exposed on the upper side of the cassette plate.

[0005] A worker who collects bills checks the presence of the stored bill from the outside by directly sighting the upper exposed part of the stored bill through the inspection window. After checking that the bill has been stored, the worker opens the bill storage cassette to take out the bill stored in the state of being held between the right and left rails and the cassette plate.

[0006] In the conventional bill validator, since the cassette plate is configured so that the vertical dimension thereof is smaller than the vertical dimension of the bill, and the cassette plate is arranged so that the upper end thereof is lower than the upper end of the stored bill to expose the upper part of stored bill on the upper side of the cassette plate. Therefore, the bill holding area produced by the cassette plate and the right and left rails is small, so that the bill may be stored in an unstable state, for example, in the state in which the upper exposed part thereof is curved.

[0007] An object of the present invention is to provide a bill validator that can store bills in a stable state, and can allow a viewer to easily check a presence of bills from the outside.

[0008] To achieve the above object, the present invention provides a bill validator having a bill storage cassette capable of being opened and closed by a turning around a pivot location, wherein the bill storage cassette has a box shape having a top opening and a front opening, and the bill storage cassette includes vertical-long rails provided along the right and left edges of the front opening, a cassette plate having a vertical-long rectangular shape the lateral width of which is slightly greater than the lateral space of the rails and which is arranged on the rear side of the rails, and a spring that urges the cassette plate to the front; the cassette plate has a vertical dimension that is equal to or slightly larger than a vertical dimension of a bill, and the cassette plate is arranged so that the upper end thereof coincides with or is slightly higher than the upper end of a stored bill; and the cassette plate has a transparent part in at least a region that is seen when a viewer looks into the bill storage cassette through an inspection window provided in the rear surface of the bill storage cassette, so that the viewer can check a presence of the stored bill from the outside by looking into the bill storage cassette through the inspection window and seeing through via the transparent part of the cassette plate.

[0009] According to the above-described bill validator, since the bill validator is constituted so that the viewer can check the presence of the stored bill from the outside by looking into the bill storage cassette through the inspection window and seeing through via the transparent part of the cassette plate. Therefore, as with the conventional bill validator, the upper part of the stored bill need not be exposed on the upper side of the cassette plate to check the presence of the stored bill by direct sight.

[0010] In effect, the cassette plate having the vertical dimension equal to or slightly larger than the vertical dimension of the bill can be used, so that the holding area of the bill produced by the right and left rails and the cassette plate is increased. Therefore, the bill can be stored in a stable state, and the presence of the stored bill can be checked easily from the outside by seeing through via the transparent part of the cassette plate.

[0011] The above-mentioned object, other objects, features, and advantages of the present invention will become apparent from the explanation below and the attached drawings.

FIG. 1 is a perspective view viewing from the front side of a bill validator showing one embodiment of the present invention;

FIG. 2 is a perspective view viewing from the rear side of the bill validator shown in FIG. 1;

FIG. 3 is a rear surface view of the bill validator shown in FIGS. 1 and 2;

FIG. 4 is a top surface view of the bill validator shown in FIGS. 1 and 2;

FIG. 5 is a sectional view taken along a line a-a of FIG. 3; and

FIG. 6 is a rear surface view showing a modification of a cassette plate, the view corresponding to FIG. 3.

[0012] FIGS. 1 to 5 show one embodiment of the present invention. FIG. 1 is a perspective view viewing from the front side of a bill validator, FIG. 2 is a perspective view viewing from the rear side of the bill validator, FIG. 3 is a rear surface view of the bill validator shown in FIGS. 1 and 2, FIG. 4 is a top surface view of the bill validator shown in FIGS. 1 and 2, and FIG. 5 is a sectional view taken along a line a-a of FIG. 3.

[0013] The bill validator shown in FIGS. 1 to 5 includes a main frame 10, a base box 20, a front-side chute 30, a bill transfer unit 40, a rear-side chute 50, a mask 60, a bill storage cassette 70, an unlocking lever 80 for the rear-side chute, and a locking lever 90 for the bill storage cassette.

[0014] First, the mechanism of the bill validator shown in FIGS. 1 to 5 is explained.

[0015] The base box 20 has a box shape having a front opening and a top opening, and the front surface thereof is fixed to the lower part of the rear surface of the main frame 10. The base box 20 includes a bill storage plate 21 having a vertical-long rectangular shape for storing a bill PM by pushing it into the bill storage cassette 70, a link mechanism 22 for moving the bill storage plate 21 to the front and rear in a parallel mode, a storage driving source (not shown) having a motor, a speed reducing gear, and a driving lever, holes 23 for supporting a shaft for the rear-side chute, which are provided at the right and left on the rear side of the upper part so that the centerline thereof is directed toward the right and left direction, and holes (reference numeral not applied) for supporting a shaft for the bill storage cassette, which are provided at the right and left on the rear side of the lower part so that the centerline thereof is directed toward the right and left direction.

[0016] The link mechanism 22 has a pair of right and left upper links 22a the upper ends of which are rotatably connected to the bill storage plate 21 and the lower ends of which are rotatably connected to the base box 20, a pair of right and left lower links 22b the upper ends of which are rotatably connected to the base box 20 and the lower ends of which are rotatably connected to the bill storage plate 21, and an operation shaft 22c common to the upper link 22a and the lower link 22b. The driving lever of the storage driving source engages with the operation shaft 22c so that the link mechanism 22 changes its form along with the front and rear movement of the driving lever to move the bill storage plate 21 to the front and rear in the parallel mode.

[0017] The front-side chute 30 has a substantially rectangular shape as a whole, and the front surface thereof is fixed to the upper part of the rear surface of the main frame 10. The front-side chute 30 includes an upper curved part 31 projecting to the rear side, a lower curved part 32 projecting to the front side, a total of four rollers 33 provided rotatably with spaces being provided in the vertical and lateral directions so that a part of each of the rollers is exposed on the rear side, a bill transfer unit attaching part (not shown), and an insertion detecting sensor 34 provided so that a part thereof is exposed on the rear side.

[0018] One of the insertion detecting sensor 34 and an insertion detecting sensor 44 described later, is constituted by a plurality of light emitting elements each consisting of a light emitting diode or the like, and the other thereof is constituted by a plurality of light receiving elements each consisting of a photodiode, phototransistor, or the like. A signal relating to the intensity change of light detected by the light receiving side of the insertion detecting sensors 34 and 44 is sent to a controller (not shown) having an insertion judgment function.

[0019] Of the four rollers 33, two rollers 33 on the right-hand side correspond to the upper and lower positions on the front side of an endless belt 43 on right-hand side of the bill transfer unit 40 and the exposed parts thereof are in contact with the endless belt 43, and two rollers 33 on the left-hand side correspond to the upper and lower positions on the front side of an endless belt 43 on left-hand side of the bill transfer unit 40 and the exposed parts thereof are in contact with the endless belt 43.

[0020] The front-side chute 30 has locking pieces 35 having a lateral-long rectangular shape that are provided on both sides of the upper part thereof so as to project toward the rear direction. Each of the locking pieces 35 can be deformed in the right and left direction by elasticity. Each of the locking pieces 35 is provided with an inclined surface 35a on the inside at the rear end thereof, and is also provided with a locking hole 35b, the centerline of which is directed toward the right and left direction, at a substantially middle position in the front and rear direction. The lateral space of the outer surfaces of both the locking pieces 35 substantially coincides with the lateral dimension of the rear-side chute 50.

[0021] The bill transfer unit 40 has a substantially rectangular parallelepiped shape as a whole, and is detachably attached to the bill transfer unit attaching part of the front-side chute 30. The bill transfer unit 40 includes a unit body 41, pulleys 42 provided rotatably at the right and left in the upper part of the unit body 41, pulleys 42 provided rotatably through a common rotating shaft at the right and left in the lower part of the unit body 41, the two endless belts 43 each wound around the two pulleys 42 on the right-hand side and the two pulleys 42 on the left-hand side so as to face to both side parts in the width direction of the bill PM, a driven gear (not shown) connected coaxially to the lower pulley 42 on the left-hand side, the insertion detecting sensor 44 provided in the unit body 41 so that a part thereof is exposed on the front side and faces to the insertion detecting sensor 34, and an authenticity discriminating sensor 47 provided in the

unit body 41 so that a part thereof is exposed on the rear side.

[0022] One of the authenticity discriminating sensor 47 and an authenticity discriminating sensor 53 described later, is constituted by a plurality of light emitting elements each consisting of a light emitting diode or the like, and the other thereof is constituted by a plurality of light receiving elements each consisting of a photodiode, phototransistor, or the like. A signal relating to the intensity change of light detected by the light receiving side of the authenticity discriminating sensors 47 and 53 is sent to a controller having an authenticity judgment function.

[0023] The rear-side chute 50 has a substantially rectangular parallelepiped shape as a whole. The rear-side chute 50 includes a curved part 51 projecting to the front side, a total of four rollers 52 provided rotatably with spaces being provided in the vertical and lateral directions so that a part of each of the rollers is exposed on the front side, the authenticity discriminating sensor 53 provided so that a part thereof is exposed on the front side and faces to the authenticity discriminating sensor 47, a transfer driving source (not shown) having a motor, a speed reducing gear, and a driving gear, support pieces 54 provided at the right and left on the rear side on the lower surface, shaft parts 55 provided in the support pieces 54 so that the centerline thereof is directed toward the right and left direction, and concave parts (not shown) which are provided at the right and left on the lower surface and in which the upper projecting parts of right and left engagement protrusions 93 of the locking lever 90 are inserted. The rear-side chute 50 is attached to the base box 20, so as to be capable of being opened and closed by being turned with the pivot location being a supporting point, by the right and left shaft parts 55 inserted rotatably in the shaft supporting holes 23 at the right and left in the upper part of the base box 20.

[0024] Of the four rollers 52, two rollers 52 on the right-hand side correspond to the upper and lower positions on the rear side of the endless belt 43 on right-hand side of the bill transfer unit 40 and the exposed parts thereof are in contact with the endless belt 43, and two rollers 52 on the left-hand side correspond to the upper and lower positions on the rear side of the endless belt 43 on left-hand side of the bill transfer unit 40 and the exposed parts thereof are in contact with the endless belt 43.

[0025] The driving gear of the transfer driving source meshes with the driven gear of the bill transfer unit 40 in the state in which the rear-side chute 50 is closed. That is to say, the endless belts 43 of the bill transfer unit 40 rotate in a predetermined direction on the basis of the rotational force transmitted from the driving gear (not shown) of the transfer driving source to the driven gear (not shown) .

[0026] The rear-side chute 50 has concave parts 56 provided on both sides in the upper part thereof, and engagement pins 57 provided on the side surfaces on the inside of the concave parts 56. The centerline of each of the engagement pins 57 is directed toward the right and left direction. The diameter of each of the engagement pins 57 is slightly smaller than that of the locking hole 35b of the locking piece 35, and the length thereof is preferably shorter than the lateral space of the concave parts 56.

[0027] Further, the rear-side chute 50 has a pair of right and left support walls 58 for the unlocking lever on the upper surface thereof. Each of the support walls 58 has a shaft supporting hole (reference numeral not applied) for the unlocking lever, which is provided so that the centerline thereof is directed toward the right and left direction.

[0028] The mask 60 has a box shape having a rear opening, and the rear surface is fixed to the front surface of the main frame 10. The mask 60 includes a lateral-long bill insertion slot 61 extending from the front surface to the rear surface, and a curved part 62 projecting from the lower part at the rear end of the bill insertion slot 61 to the rear side.

[0029] The bill storage cassette 70 has a box shape having a top opening and a front opening. The bill storage cassette 70 includes vertical-long rails 71 provided along the right and left edges of the front opening, a cassette plate 72 having a vertical-long rectangular shape the lateral width of which is slightly greater than the lateral space of the rails 71 and which is arranged on the rear side of the rails 71, a circular truncated cone-shaped coil spring 73 that urges the cassette plate 72 to the front, a substantially U-shaped opening 74 provided in the upper part on the rear surface thereof, shaft parts 75 provided in the lower part on the right and left surfaces so that the centerline thereof is directed toward the right and left direction, an L-shaped support part 76 that is provided on the inside of the rear surface to support an elastic ring 94 of the locking lever 90, and insertion holes 77 that are provided in the top surface with a space being provided in the right and left direction to allow the right and left engagement protrusions 93 of the locking lever 90 to project upward. The bill storage cassette 70 is attached to the base box 20, so as to be capable of being opened and closed by a turning around a pivot location, by the right and left shaft parts 75 inserted rotatably in the shaft supporting holes at the right and left in the lower part of the base box 20.

[0030] The cassette plate 72 consists of a transparent plastic plate or a transparent glass plate, and the whole thereof is transparent, so that the stored bill PM positioned on the front side of the cassette plate 72 can be seen through from the rear of the cassette plate 72. Also, the cassette plate 72 has a vertical dimension that is equal to or slightly larger than the vertical dimension of the bill PM, and is arranged so that the upper end thereof coincides with or is slightly higher than the upper end of the stored bill PM.

[0031] The unlocking lever 80 includes a rectangular pressing part 81, a posture control part 82 having an L-shaped vertical section, which extends from the rear end of the pressing part 81 to the front, elastic pieces 83 pro-

vided on both sides at the right and left of the posture control part 82, shaft parts 84 provided on the elastic pieces 83 so that the centerline thereof is directed toward the right and left direction, rod-shaped parts 85 that are provided on both sides at the right and left of the pressing part 81 and extend in the right and left direction, and operating parts 86 provided at the tip ends of the rod-shaped parts 85. The unlocking lever 80 is attached to the top surface of the rear-side chute 50 by deflecting the elastic pieces 83 inward and by inserting the shaft parts 84 into shaft supporting holes in the right and left support walls 58 of the rear-side chute 50 so that tilting operation can be performed with the pivot location being a supporting point. Also, the configuration is made so that in this attachment state, the posture control part 82 is close to an upper projecting part 11 of the main frame 10, so that an angle at the time when the pressing part 81 tilts so as to float can be restricted by the contact of the posture control part 82 with the upper projecting part 11.

[0032] Each of the operating parts 86 has a substantially triangular vertical section, and the outer surface thereof forms an inclined surface 86a tilting toward the inside. The lateral space of the lower ends of the operating parts 86 is slightly narrower than the lateral space of the inner surfaces of the right and left locking pieces 35 of the front-side chute 30.

[0033] The locking lever 90 includes a body 91 substantially having a U shape as a whole, a U-shaped pressing part 92 provided so as to project from the U-shaped upper edge of the body 91 toward the rear direction, the engagement protrusions 93 provided on the upper side at the right and left of the body 91, and the elastic ring 94 provided under the body 91. The locking lever 90 is attached to the inside of the rear surface of the bill storage cassette 70 so as to be movable up and down by inserting the lower part of the elastic ring 94 into the support part 76 of the bill storage cassette 70 and by inserting the right and left engagement protrusions 93 into the insertion holes 77 of the bill storage cassette 70.

[0034] The U-shaped pressing part 92 of the locking lever 90 is positioned in the opening 74 of the bill storage cassette 70. However, since the U-shaped pressing part 92 itself has a U shape, it does not close the opening 74 in the closed state described later, so that a U-shaped gap formed on the upper side of the U-shaped pressing part 92 plays a role of an inspection window IW used when the presence of the stored bill PM is checked by seeing through via the transparent cassette plate 72.

[0035] Since the presence of the stored bill PM is checked from the outside by looking into the bill storage cassette 70 through the inspection window IW to see through via the transparent cassette plate 72, the height position of the inspection window IW is set at a position at which the inspection window IW faces to the cassette plate 72, specifically, at a position at which the inspection window IW faces to the upper center of the cassette plate 72. Also, since when the bill storage cassette 70 is opened, an operation of inserting a fingertip into the inspection window IW to push the U-shaped pressing part 92 of the locking lever 90 downward to a position at which the lower end of the U-shaped pressing part 92 comes into contact with the lower end of the opening 74 is performed, the inspection window IW has a size that allows the fingertip to be inserted.

[0036] In the above-described bill validator, when the rear-side chute 50 is in a closed state, the right and left engagement pins 57 of the rear-side chute 50 are inserted in the locking holes 35b of the right and left locking pieces 35 of the front-side chute 30. When the rear-side chute 50 in a closed state is opened, the insertion of the right and left engagement pins 57 in the right and left locking holes 35b is canceled by pressing the pressing part 81 of the unlocking lever 80 downward by a fingertip to push the inclined surfaces 86a of the right and left operating parts 86 on the inside of the right and left locking pieces 35, and thereby pushing the right and left locking pieces 35 to the outside. Also, in order to close the rear-side chute 50 in an open state, the rear-side chute 50 is returned to the closing position by being turned with the pivot location being a supporting point, and the right and left engagement pins 57 are inserted into the locking holes 35b of the right and left locking pieces 35 while the right and left locking pieces 35 of the front-side chute 30 are pushed out by the right and left engagement pins 57.

[0037] When the rear-side chute 50 is in a closed state, since the bill transfer unit 40 is held in the front and rear direction by the front-side chute 30 and the rear-side chute 50, and the upper curved part 31 and the curved part 51 are provided, an inverse U-shaped bill passage BP including an interface between the endless belts 43 and the rollers 33 and 52 is formed around the bill transfer unit 40. The lower end on the front side of the bill passage BP communicates with the rear end of the bill insertion slot 61 via the curved part 62 of the mask 60.

[0038] On the other hand, when the bill storage cassette 70 is in a closed state, the upper side of the body 91 of the locking lever 90 is brought into contact with the inside of the top surface of the bill storage cassette 70 by the urging force of the elastic ring 94 of the locking lever 90, so that the right and left engagement protrusions 93 project upward, and the upper projecting parts of the engagement protrusions 93 are inserted in the right and left concave parts in the lower surface of the rear-side chute 50. When opening the bill storage cassette 70 in a closed state, the right and left engagement protrusions 93 are drawn out of the right and left concave parts in the lower surface of the rear-side chute 50 by pushing the U-shaped pressing part 92 of the locking lever 90 downward by a fingertip to a position at which the lower end of the U-shaped pressing part 92 comes into contact with the lower end of the opening 74. Also, when closing the bill storage cassette 70 in an open state, the bill storage cassette 70 is returned to the closing position by a turning around the pivot location, and the U-shaped pressing part 92 of the locking lever 90 is pushed down-

ward by a fingertip to a position at which the lower end of the U-shaped pressing part 92 comes into contact with the lower end of the opening 74, and then the pushing is canceled to insert the right and left engagement protrusions 93 into the right and left concave parts in the lower surface of the rear-side chute 50 by means of the elastic restoring force of the elastic ring 94.

[0039] Next, the bill transfer operation and the bill collecting operation of the bill validator shown in FIGS. 1 to 5 are explained.

[0040] When the tip end part of a bill PM (1000-yen bill, 2000-yen bill, 5000-yen bill, 10,000-yen bill) inserted into the bill insertion slot 61 of the mask 60 arrives at the detection zone of the insertion detecting sensors 34 and 44, the insertion of bill is discriminated on the basis of signals sent from the insertion detecting sensors 34 and 44.

[0041] When the discrimination result is that a bill is inserted, the motor of the transfer driving source starts rotating, and the rotation of the endless belts 43 of the bill transfer unit 40 is started. Thereby, the transfer of the inserted bill PM is started.

[0042] During the transfer until the bill PM arrives at the bill storage position, the authenticity of the bill PM is discriminated on the basis of signals sent from the authenticity discriminating sensors 47 and 53. When the bill PM is genuine, the kind thereof (1000-yen bill, 2000-yen bill, 5000-yen bill, 10, 000-yen bill) is also discriminated.

[0043] When the discrimination result is that the bill is genuine, the bill transfer is continued to send the bill PM to a bill storage position (a position at which the bill PM comes to the front side of the bill storage plate 21, refer to the broken line in FIG. 5), and the bill transfer is stopped at this position. That is to say, when the bill PM inserted in the bill insertion slot 61 is genuine, the bill PM arrives at the bill storage position by one continuous transfer operation.

[0044] When the bill transfer is stopped, the motor of the storage driving source starts rotating, and thereby the form of the link mechanism 22 is changed. The bill storage plate 21 moves toward the rear direction in a parallel mode, and the bill PM located at the bill storage position moves toward the rear direction together with the bill storage plate 21. Thereby, the cassette plate 72 is pushed away against the urging force of the coil spring 73, and the bill PM is pushed into the bill storage cassette 70 over the right and left rails 71. After the bill PM has been pushed in, the motor of the storage driving source rotates further so that the link mechanism 22 and the bill storage plate 21 return to the original positions. Thereby, the bill PM is stored in the state in which both side parts in the width direction thereof are held between the right and left rails 71 and the cassette plate 72.

[0045] On the other hand, when the authenticity discrimination result is that the bill PM is not genuine (including impossibility of discrimination), the motor of the storage driving source rotates in the reverse direction, and the endless belts 43 of the bill transfer unit 40 turn in the reverse direction. Thereby, the bill PM is transferred toward the bill insertion slot 61 and is returned.

[0046] The above-described operation is repeated each time a bill PM is inserted into the bill insertion slot 61, and genuine bills PM are stored on the front surface of the cassette plate 72 in a stacked manner.

[0047] When a worker collects the bills PM in the bill storage cassette 70, the worker looks into the bill storage cassette 70 through the inspection window IW (U-shaped gap formed on the upper side of the U-shaped pressing part 92 of the locking lever 90) as indicated by the arrow mark in FIG. 5, and checks the presence of the stored bills PM from the outside by seeing through via the upper part of the transparent cassette plate 72.

[0048] After checking that the bills PM are stored, the worker inserts his/her fingertip into the inspection window IW, and pushes the U-shaped pressing part 92 of the locking lever 90 downward by the fingertip to a position at which the lower end of the U-shaped pressing part 92 comes into contact with the lower end of the opening 74 to draw the right and left engagement protrusions 93 out of the right and left concave parts in the lower surface of the rear-side chute 50. Then, the worker opens the bill storage cassette 70 by a turning around a pivot location (the right and left shaft parts 75), and takes out the bills PM stored in a state of being held between the right and left rails 71 and the cassette plate 72.

[0049] After the bills PM have been taken out, the bill storage cassette 70 is returned to the closing position by being turned with the pivot location (the right and left shaft parts 75) being a supporting point, and the U-shaped pressing part 92 of the locking lever 90 is pushed downward by the fingertip to a position at which the lower end of the U-shaped pressing part 92 comes into contact with the lower end of the opening 74, and then the pushing is canceled. Thereby, the right and left engagement protrusions 93 are inserted into the right and left concave parts in the lower surface of the rear-side chute 50 by the elastic restoring force of the elastic ring 94, by which the bill storage cassette 70 is restored to a closed state.

[0050] Thus, the above-described bill validator is constituted so that a viewer can check the presence of the stored bill PM from the outside by looking into the bill storage cassette 70 through the inspection window IW (U-shaped gap formed on the upper side of the U-shaped pressing part 92 of the locking lever 90) and seeing through via the upper part of the transparent cassette plate 72. Therefore, as with the conventional bill validator, the upper part of the stored bill PM need not be exposed on the upper side of the cassette plate to check the presence of the bill PM by direct sight.

[0051] In effect, the cassette plate 72 having the vertical dimension equal to or slightly larger than the vertical dimension of the bill PM can be used, so that the holding area of the bill PM produced by the right and left rails 71 and the cassette plate 72 is increased. Therefore, the bill PM can be stored in a stable state, and the presence of the stored bill PM can be checked easily from the outside

by seeing through via the transparent cassette plate 72.

[0052] In the above-described explanation, the cassette plate 72 the whole of which is transparent has been shown. However, the cassette plate 72 may be configured so that at least a region that is seen when the viewer looks into the bill storage cassette 70 through the inspection window IW, for example, only the upper part of the cassette plate 72 is transparent.

[0053] Also, in the above-described explanation, the cassette plate 72 having the vertical-long rectangular shape has been shown. However, as shown in FIG. 6, the cassette plate 72 may be configured so that a U-shaped notch 72a having a size smaller than that of the inspection window IW is formed in the center at the upper end of the cassette plate 72 so that the holding of the stored bill PM can be canceled compulsively along with the opening by pulling the cassette plate 72 to the rear by catching the U-shaped notch 72a with the fingertip inserted through the inspection window IW. In this case, the region in which the presence of the stored bill PM can be checked by the seeing through via the transparent cassette plate 72 is narrowed by the presence of the U-shaped notch 72a. However, since a part of the bill PM corresponding to the U-shaped notch 72a can be sighted directly through the U-shaped notch 72a, the presence of the stored bill PM can be checked easily by the direct sighting and the above-mentioned seeing through.

[0054] Further, in the above-described explanation, the configuration such that the U-shaped gap formed on the upper side of the U-shaped pressing part 92 of the locking lever 90 is utilized as the inspection window IW has been shown. However, in the case where the pressing part 92 of the locking lever 90 is formed into a non-U shape, and the opening 74 is closed by the pressing part 92, at least one inspection window IW exclusively used for peeping may be provided at another position in the rear surface of the bill storage cassette 70.

[0055] Still further, in the above-described explanation, the bill transfer mechanism including the inverse U-shaped bill passage has been shown. However, any bill transfer mechanism having a bill storage cassette which has the same configuration relating to bill storage as that of the above-described bill storage cassette can achieve the same operation and effects as described above by applying the present invention.

[0056] The embodiments described in this specification is exemplary and not restrictive. The scope of the present invention is shown in the claims, and all modifications in the meaning of the claims are included in the present invention.

Claims

1. A bill validator having a bill storage cassette (70) capable of being opened and closed by a turning around a pivot location (75), wherein
the bill storage cassette (70) has a box shape having a top opening and a front opening, and the bill storage cassette (70) includes vertical-long rails (71) provided along the right and left edges of the front opening, a cassette plate (72) having a vertical-long rectangular shape the lateral width of which is slightly greater than the lateral space of the rails (71) and which is arranged on the rear side of the rails (71), and a spring (73) that urges the cassette plate (72) to the front;
the cassette plate (72) has a vertical dimension that is equal to or slightly larger than a vertical dimension of a bill (PM), and the cassette plate (72) is arranged so that the upper end thereof coincides with or is slightly higher than the upper end of a stored bill (PM); and
the cassette plate (72) has a transparent part in at least a region that is seen when a viewer looks into the bill storage cassette (70) through an inspection window (IW) provided in the rear surface of the bill storage cassette (70), so that the viewer can check a presence of the stored bill (PM) from the outside by looking into the bill storage cassette (70) through the inspection window (IW) and seeing through via the transparent part of the cassette plate (72) .

2. The bill validator according to claim 1, wherein
the inspection window (IW) is provided at a position facing to the center in the upper part of the cassette plate (72), and
at least an upper part of the cassette plate (72) is transparent, and the transparent part consists of the upper part of the cassette plate (72) .

3. The bill validator according to claim 1, wherein
a whole of the cassette plate (72) is transparent.

4. The bill validator according to claim 2, wherein
a whole of the cassette plate (72) is transparent.

5. The bill validator according to claim 2, wherein
the inspection window (IW) has a predetermined size, and
a notch (72a) having a size smaller than that of the inspection window (IW) is provided at the upper end of the cassette plate (72) .

6. The bill validator according to claim 3, wherein
the inspection window (IW) has a predetermined size, and
a notch (72a) having a size smaller than that of the inspection window (IW) is provided at the upper end of the cassette plate (72) .

7. The bill validator according to claim 4, wherein
the inspection window (IW) has a predetermined size, and a notch (72a) having a size smaller than that of the inspection window (IW) is provided at the upper end of the cassette plate (72).

Fig. 1

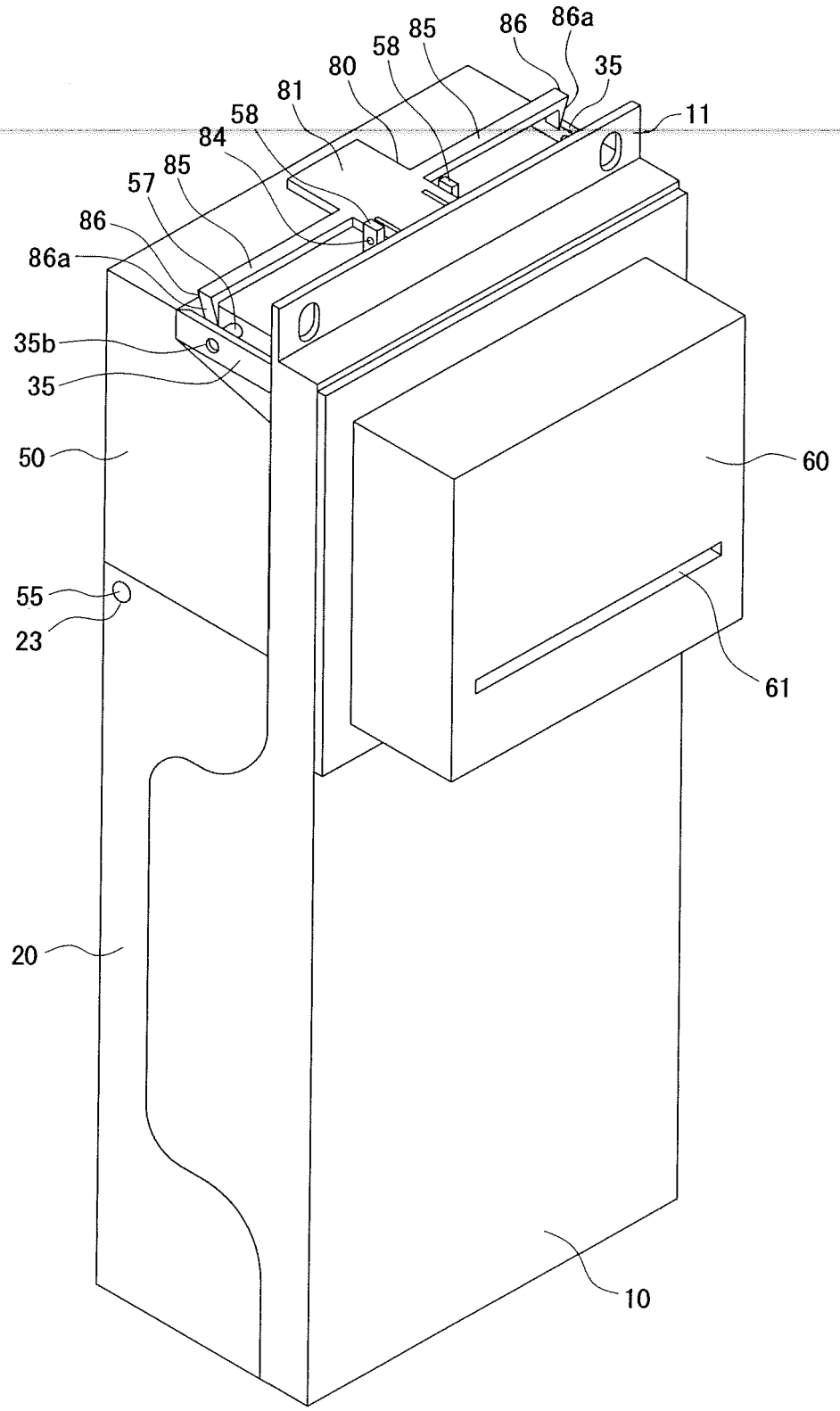
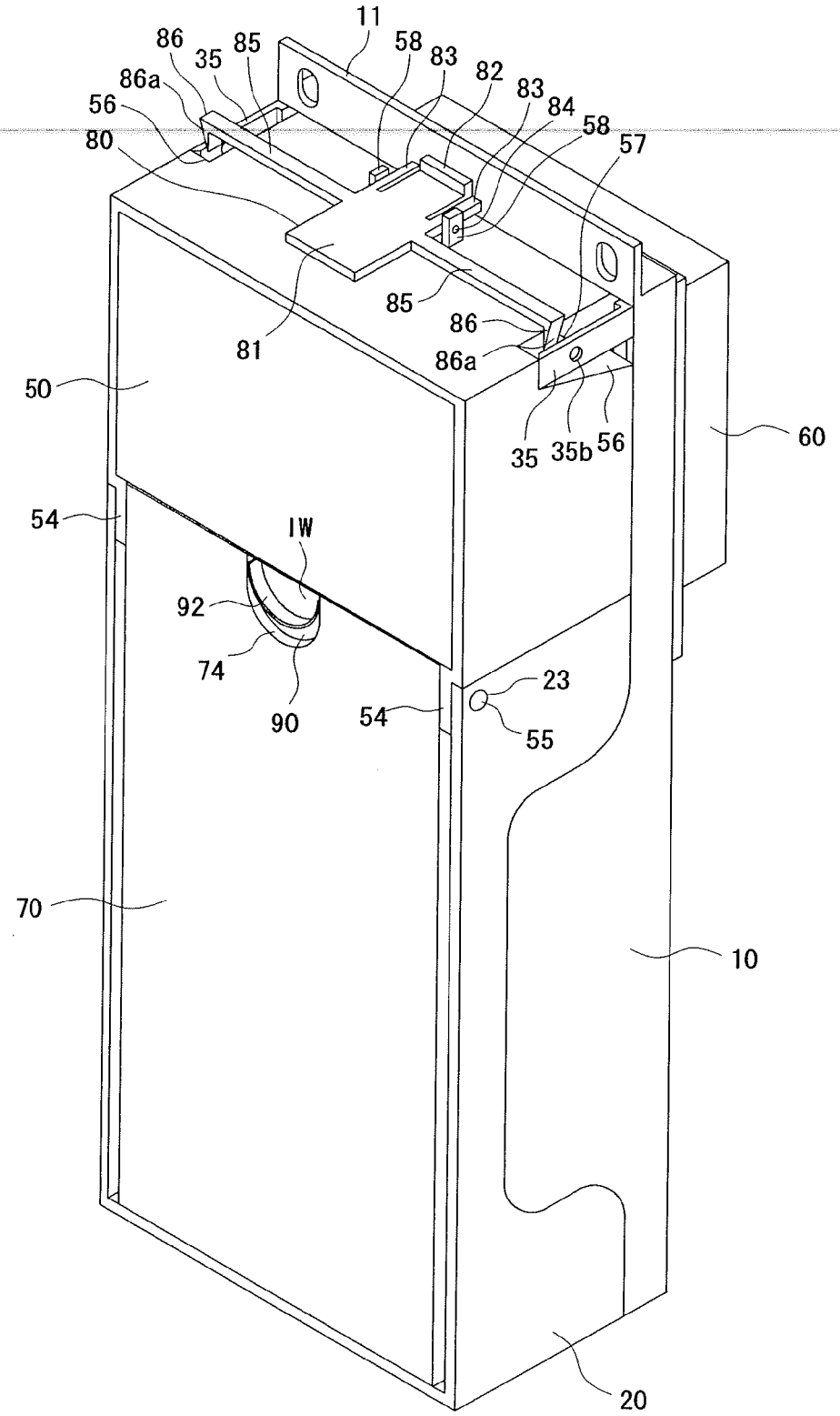


Fig. 2


11
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86a
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81
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86a
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35b
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IW
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Fig. 3

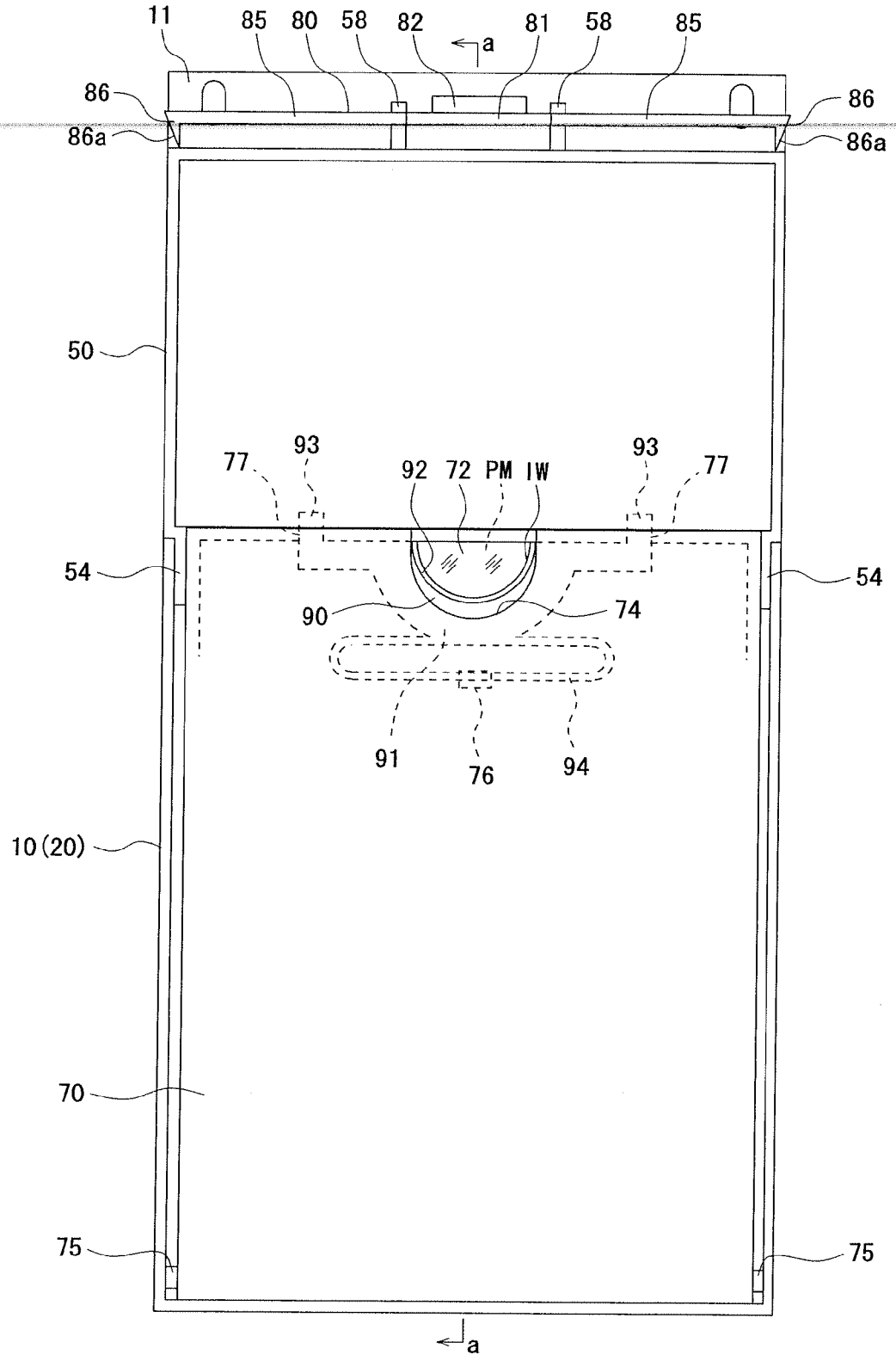
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Fig. 4

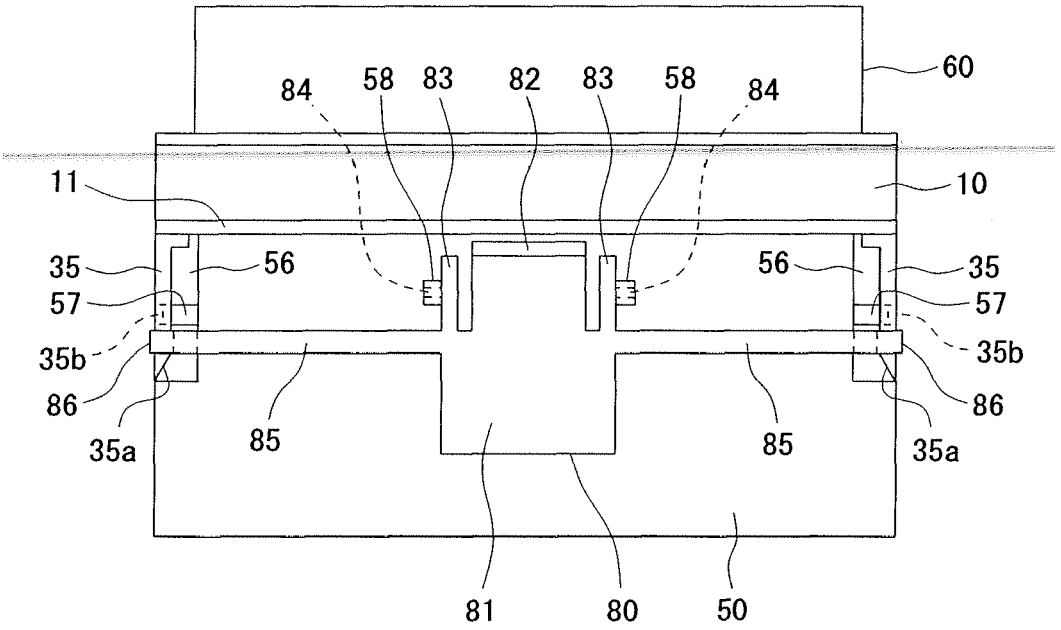
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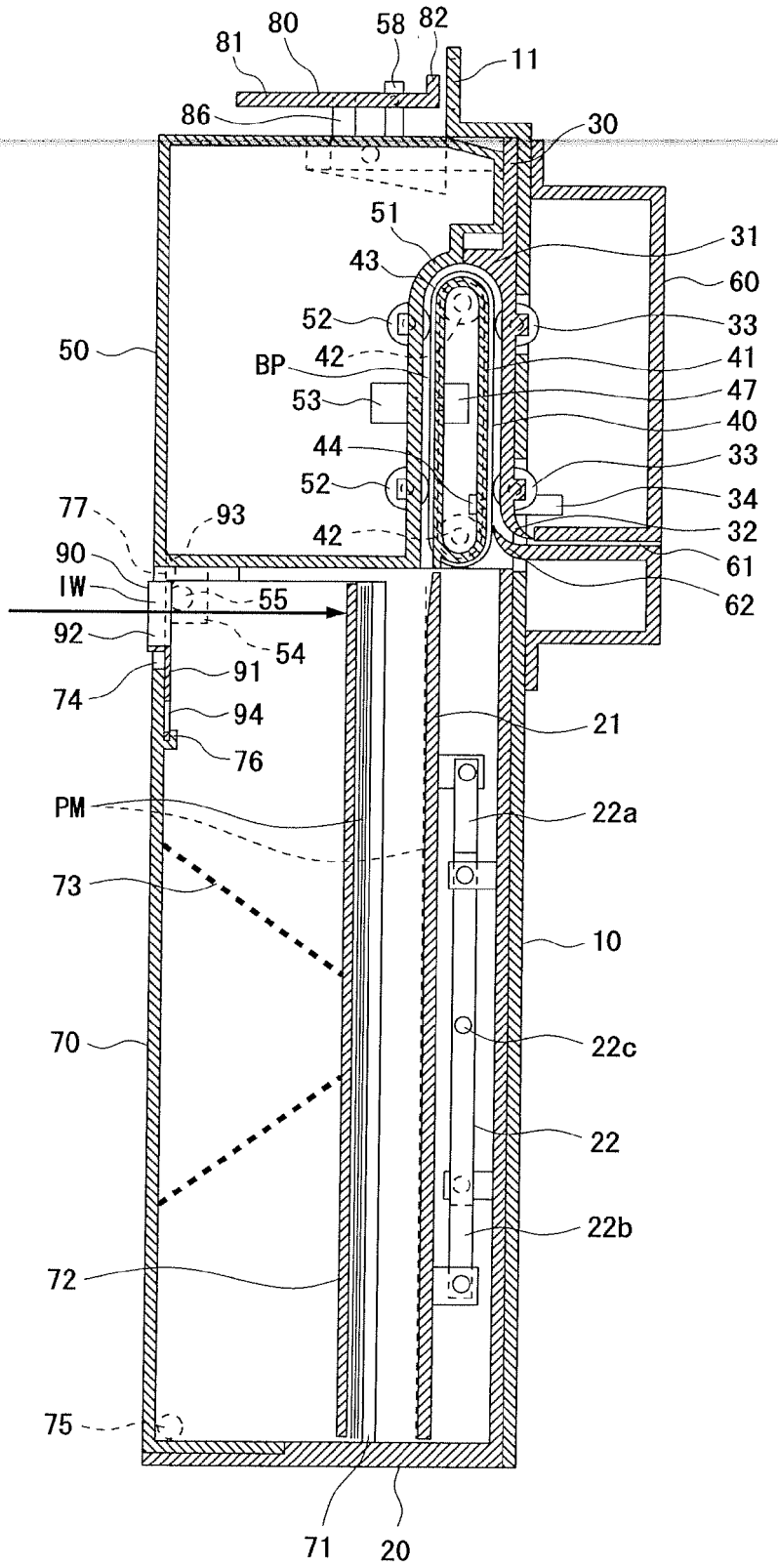
Fig. 5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34
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32
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61
IW
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PM
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70
22c
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22b
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71
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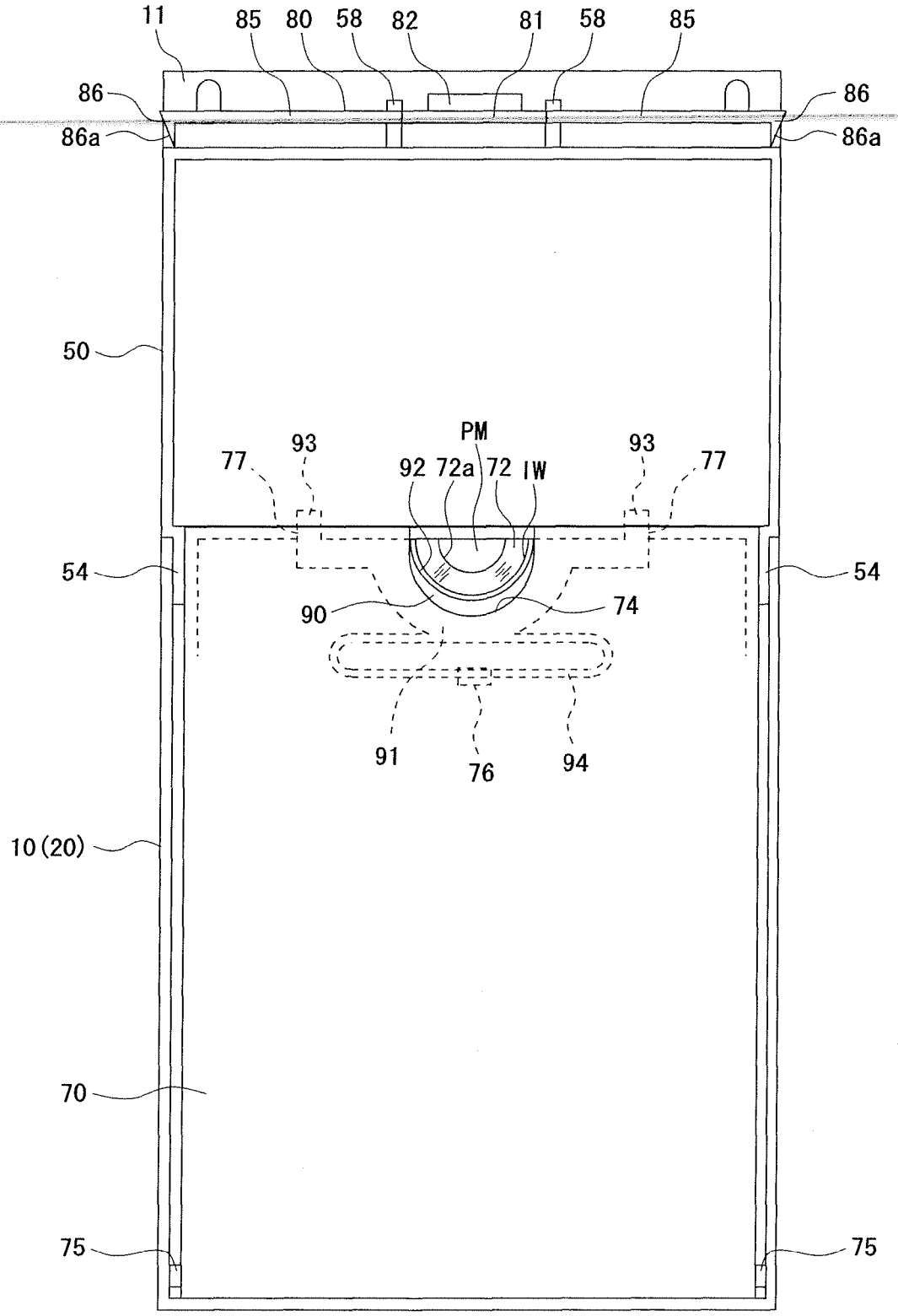
Fig. 6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