

SHEET HANDLING APPARATUS

Background of the Invention

The present invention relates to a sheet handling apparatus to be arranged in a financial institution such as a bank to handle a sheet such as a
5 paper money.

As an example of a sheet handling apparatus for taking the sheet in and out, a paper money taking in and out apparatus to be arranged at an attendant wicket in the financial institution is known. When the
10 attendant receives the paper money from a customer and puts the paper money on the paper money taking in and out apparatus, a discriminating part included by the paper money taking in and out apparatus judges the paper money as to whether or not the paper money is
15 normal on a plurality of points such as falseness of the paper money and so forth. When the paper money is judged to be not false and to be normal so that the paper money is allowed to be handled, the paper money is stored in the paper money taking in and out
20 apparatus.

The attendant puts the paper money on a money receiving and discharging port of the paper money taking in and out apparatus, and takes the paper money to be rejected or paid out of the paper money taking in
25 and out apparatus. Therefore, the paper money taking

in and out apparatus to be used by the attendant does not include generally, for an operability of the attendant, a shutter mechanism opened and closed automatically similarly to an automatic teller machine
5 or the like, but includes a split-curtain type simple stopper mechanism for preventing the paper money to be discharged from flying out of the apparatus.
Alternatively, as disclosed by JP-A-55-119775, the apparatus may include the shutter automatically opening
10 and closing only the money receiving and discharging port, or all of the money receiving and discharging port and a money receiving port.

Brief Summary of the Invention

As described above, in many cases, the paper
15 money taking in and out apparatus to arranged at the attendant wicket does not include, for the operability of the attendant, the shutter mechanism opened and closed automatically similarly to an automatic teller machine or the like, but includes the curtain type
20 stopper mechanism driven by a spring to be closed. The curtain type stopper mechanism prevents the paper money to be discharged from flying out of the apparatus. The stopper mechanism acts as a door, and is pulled by the paper moneys grasped through a notch of the door,
25 toward the attendant to take the paper moneys out of the apparatus.

However, since the door as the curtain type

stopper mechanism is directly pulled by the paper
moneys, there is a problem of that the paper moneys of
low rigidity are brought into buckling or sticking in
front of the curtain to be prevented from moving
5 outward the curtain or that the paper moneys are
damaged by the curtain when being taken out through the
curtain.

An object of the present invention is to
provide a sheet handling apparatus enabling the sheet
10 to be taken out with an improvement of the operability
of the attendant.

According to the invention for the above
object, a returning port for storing the paper moneys
to be returned in accordance with a result of
15 discriminating the paper moneys taken into the
apparatus, has a door, and the door includes a handle
to be pressed to open the door, and a notch opening in
the vicinity of the handle.

According to the invention, a sheet handling
20 apparatus from which a sheet discharged into a
returning port is capable of being taken out without
decrease in operability of an attendant, is provided.

Brief Description of the Several Views of the Drawings

25 Fig. 1 is a schematic cross sectional view of
a paper money receiving and discharging apparatus as an
embodiment of the invention.

Fig. 2 is an oblique projection view showing

a receiving port of the paper money receiving and discharging apparatus.

Fig. 3 is an oblique projection view showing a door of a returning port.

5 Fig. 4 is an oblique projection view showing a torsion coil spring and a damper of the door of the returning port.

Fig. 5 is an oblique projection view showing a magnet and a pulled plate of the door of the
10 returning port.

Figs. 6a and 6b are schematic cross sectional views showing respectively the door closed to store the paper money in the returning port and the door opened to take the paper money out from the returning port.

15 Fig. 7 is an oblique projection view showing an opening arranged on a bottom of the door or returning port.

Detailed Description of the Invention

Hereafter, an embodiment of the invention
20 will be described in detail with making reference to the drawings.

Fig. 1 shows an inner structure of a paper money receiving and discharging apparatus 1 as an embodiment of the invention. The paper money receiving
25 and discharging apparatus 1 is arranged in the vicinity of an attendant wicket of a financial institution. The paper money receiving and discharging apparatus 1 has a

function of receiving a paper money S to be stored in one of inner cassettes C1-C4 selected in accordance with a kind of the paper money S, and a function of discharging the paper moneys S from the cassettes C1-C4
5 in accordance with ordered kind(s) and total number of the paper moneys.

The paper money receiving and discharging apparatus 1 has a body 2, a receiving port 3 for receiving the paper money S, a returning port 4 for
10 returning the paper money S, and a discharging port 5 for discharging the paper money S.

The receiving port 3 is capable of receiving and feeding out the paper money S whose longitudinal direction is directed horizontally. An elastic roller
15 for feeding not shown feeds out the paper money S with keeping its longitudinal direction horizontal.

The returning port 4 and discharging port 5 is capable of storing the paper money S whose longitudinal direction is directed horizontally. Each
20 of elastic rollers for storing not shown stores the paper money S with keeping its longitudinal direction horizontal.

A temporary holding part 6 holds temporarily until a treatment for the received paper money S is
25 determined. An elastic roller for storing and feeding out not shown stores and feeds out the paper money S with keeping its longitudinal direction horizontal.

The receiving port 3, returning port 4 and

discharging port 5 are arranged on a front upper part of the body 2, and the temporary holding part 6 is arranged in the body 2.

The paper money receiving and discharging apparatus 1 has a discriminating part 7 for judging the paper money to be received or discharged as to whether or not it is normal on a plurality of discriminating points. The discriminating points include falseness and kind of the paper money.

10 The first-fourth cassettes C1-C4 store respective kinds of the paper moneys S. In the embodiment, the first cassette C1 stores paper moneys of 1000 yens, the second cassette C2 stores paper moneys of 1000 yens, the third cassette C3 stores paper
15 moneys of 5000 yens, and the fourth cassette C4 stores paper moneys of 10000 yens. A cassette C5 is a rejecting cassette for receiving abnormal one(s) of the paper moneys damaged or the like and discharged from the first-fourth cassettes C1-C4 to prevent the
20 abnormal one(s) from being discharged from the apparatus. The paper money receiving and discharging apparatus 1 takes the paper money S into and out of the cassettes C1-C5 to receive and discharge the paper money.

25 An upper transfer line L1 connects the receiving port 3 to each of the returning port 4 and the discharging port 5 through the discriminating part 7 to form a loop for transferring the paper money S. A

diverging transfer line L2 diverges from the upper transfer line L1 to be connected through the temporary holding part 6 to the upper transfer line L1 to transfer the paper money S. A lower transfer line L3 connects the discriminating part 7 to each of the cassettes C1-C5 to form a loop for transferring the paper money S. In fig. 1, a driving mechanism including motors, rollers or the like for driving the transfer lines L1, L2 and L3 are eliminated.

10 The paper money receiving and discharging apparatus 1 has an operation part 8 on an upper surface of the body 2. The operation part 8 includes a display for showing a total amount of the paper moneys, an operating condition of the apparatus or the like, a
15 monitoring key switch to be operated to achieve various maintenances on the apparatus, a money receiving determination button to be operated to allow the paper money to be taken in from the temporary holding part 6, a money receiving prevention button to be operated to
20 prevent the paper money from being taken in from the temporary holding part 6, a counting button to be operated to count the total amount of the paper moneys S received by the receiving port 3, a reset button for resetting the condition of the apparatus, and so forth.
25 These switches and buttons may be separated from the display, or may be included by the display displaying the switches and buttons to form a touch panel display.

When the paper money is received the paper

money receiving and discharging apparatus 1, the attendant puts the paper moneys S into the receiving port 3 and operates the counting button to order the counting of the paper moneys so that each of the paper
5 moneys S is taken out of the receiving port 3 to be transferred to the discriminating part 7 along the upper transfer line L1. The paper money is examined on examination points such as its falseness, kind and so forth by the discriminating part 7 to determine as to
10 whether or not the paper money is normal on the basis of a result of the examination. During the examination on the kind of the paper money, it is determined whether or not the kind of the paper money S transferred from the receiving port 3 is acceptable for
15 the paper money receiving and discharging apparatus 1, and the acceptable paper money is capable of being received by one of the cassettes C1-C4 while the non-acceptable paper money is not capable of being received by one of the cassettes C1-C4. The paper money judged
20 by the discriminating part 7 normal satisfies all of the examination points, and the paper money judged by the discriminating part 7 abnormal does not satisfy at least one of the examination points. The paper money judged abnormal is, for example, the false paper money,
25 the paper money which cannot be handled by the paper money receiving and discharging apparatus 1, the paper money damaged by previous use thereof to be judged false, or the like.

The paper money S judged normal by the discriminating part 7 judging the paper money not-false and capable of being handled, is transferred from the upper transfer line L1 through the diverging transfer
5 line L2 to the temporary holding part 6 to be temporarily held thereon. The paper money S judged false or not-capable of being handled to be abnormal is transferred along the upper transfer line L1 to the returning port 4 to be stored therein. After the paper
10 money is transferred to the temporary holding part 6 or the returning port 4, next one of the paper money is transferred from the receiving port 3 to the discriminating part 7, and subsequently transferred to one of the temporary holding part 6 and the returning
15 port 4 selected in accordance with the examination result of the discriminating part 7. After all of the paper moneys received by the receiving port 3 are transferred to the discriminating part 7, the attendant returns to the receiving port 3 the paper money stored
20 in the returning port 4, or orders the operation of the paper money(s) S stored in the temporary holding part 6. When the attendant returns to the receiving port 3 the paper money stored in the returning port 4 and operates the counting button, each of the paper moneys
25 S is transferred from the receiving port 3 to the discriminating part 7 to be transferred to the temporary holding part 6 or the returning port 4.

When the attendant operates the money

receiving determination button to allow the paper money to be taken in from the temporary holding part 6, each of the paper moneys S is transferred from the temporary holding part 6 through the upper transfer line L1 to the discriminating part 7. The kind of the paper money is again determined by the discriminating part 7, and the paper money is transferred to and stored in one of the cassettes C1-C4 selected in accordance with the kind thereof through the lower transfer line L3.

Subsequently, next one of the paper moneys S is transferred from the temporary holding part 6 through the upper transfer line L1 to the discriminating part 7, and is transferred to and stored in one of the cassettes C1-C4 selected in accordance with the kind thereof determined by the discriminating part 7. When all of the paper moneys stored in the temporary holding part 6 are transferred to and stored in the cassettes C1-C4, the handling of the paper moneys is finished.

When the attendant operates the money receiving prevention button other than the money receiving determination button to prevent the paper money from being taken in from the temporary holding part 6, each of the paper moneys is transferred from the temporary holding part 6 through the upper transfer line L1 to the returning port 4 to be stored therein. When all of the paper moneys stored in the temporary holding part 6 are transferred to and stored in the returning port 4, the handling of the paper moneys is finished.

When the paper money S is taken out from the paper money receiving and discharging apparatus 1, the attendant orders through ten-key or the like the total amount and kinds of the paper moneys to be taken out so
5 that the paper moneys S are discharged from ones of the cassettes C1-C4 corresponding to the ordered kinds of the money to be transferred to the discriminating part 7 through the lower transfer line L3. The discriminating part 7 examines the kinds and so forth
10 of the money to decide as to whether or not the paper moneys are normal. The paper moneys are examined regarding their kinds to confirm that the kinds of the examined moneys are equal to the ordered kinds of the moneys. The paper moneys S deemed to be normal by
15 confirming that the kinds of the examined paper moneys are equal to the ordered kinds of the moneys, are transferred to the discharging port 5 through the upper transfer line L1 to be allowed to be taken out from the discharging port 5. One(s) of the paper moneys S
20 deemed to be abnormal by confirming that the kind of the one(s) of the examined paper moneys is not equal to the ordered kind of the money(s), is transferred to the rejecting cassette C5 through the lower transfer line L3 to be collected.

25 The structure of the ports is described in detail with making reference to figs. 2-7. Fig. 2 is a schematic view showing the ports (receiving port 3, returning port 4 and discharging port 5) of the paper

money receiving and discharging apparatus 1, fig. 3 is a schematic view showing the door operable as a stopper arranged at the returning port, fig. 4 is a schematic view showing a torsion coil spring and a damper
5 arranged on the returning port, fig. 5 is a schematic view showing a magnet and a pulled plate arranged on the returning port, fig. 6a is a side cross sectional view showing the closed door, and fig. 6b is a side cross sectional view showing the opened door. Fig. 7
10 is a schematic view showing an opening on a supporting bottom surface of the returning port.

The discharging port 5 of the paper money receiving and discharging apparatus 1 includes a shutter 51 (shown in fig. 2) automatically opened and
15 closed by an actuator (not shown) to automatically opened to enable the paper moneys to be taken out by the attendant after the paper moneys to be discharged are transferred to and stored in the discharging port 5. The shutter 51 automatically opened and closed are
20 arranged at the discharging port 5 to indicate clearly at which the handled paper moneys is included, outside of the apparatus or inside thereof. For example, when a trouble occurs to stop the operation of the apparatus during transferring the paper moneys to be stored into
25 the discharging port 5, the shutter 51 is kept closed to prevent the attendant from understanding that all of the paper moneys to be discharged have been stored in the discharging port 5 and taking a part of the paper

moneys to be discharged to a client from the discharging port 5.

The returning port 4 of the paper money receiving and discharging apparatus 1 includes the door 41 (shown in fig. 2) operable as the stopper for the paper moneys to be stored in the returning port 4. The door 41 as the stopper includes a handle 42 (shown in fig. 3) for opening and closing the door, a protrusion 47 (shown in figs. 6a and 6b) for moving upward the stored paper money, a torsion coil spring 43 (shown in fig. 4) urging the door 41 as the stopper to close the returning port 4, a damper 44 (shown in fig. 4) for decreasing a velocity of the door 41 as the stopper when opening and closing the returning port 4, a magnet 45 fixed to the returning port 4, and a pulled plate 46 (shown in fig. 5) capable of being pressed against the magnet 45 (shown in fig. 5) when the returning port 4 is closed by the door 41 as the stopper. An opening 48 (shown in fig. 7) is arranged on a part of a supporting bottom surface positioned to correspond to the handle 42.

When the attendant takes out the rejected one(s) of the paper moneys S from the returning port 4, the attendant moves his or her hand vertically downward as shown by A to press the handle 42 vertically downward so that the door 41 as the stopper is opened (as shown in figs. 6a and 6b). While keeping the door 41 as the stopper opened, the hand is inserted into the

returning port 4 to hold the paper money S whose front end is raised by the protrusion 47 to be removed in a direction B (as shown in fig. 6b). After the paper money S is removed from the returning port 4, the door 41 as the stopper is automatically closed by the torsion coil spring 43. Since the closing velocity of the door 41 as the stopper is decreased by the damper 44, the attendant is not prevented by the door 41 as the stopper from removing the paper money S from the returning port 4. As described above, the attendant can remove securely and easily all of the paper moneys stored in the apparatus with one action of his or her one hand.

Further as shown in fig. 3, the door 41 as the stopper includes a connecting part for a rotational shaft and the handle 42 arranged at a central lower part of the door 41. A width of the handle 42 is capable of receiving some fingers of the attendant (adult person). Since the handle 42 is arranged as the lower part of the door 41, the handle 42 is easily moved vertically downward by the some fingers of the attendant. By this arrangement, the attendant is prevented from moving erroneously the handle 42 vertically upward with his or her fingers.

The door 41 includes a space (notch) 400 in the handle 42 as shown in fig. 3. This arrangement is effective for pressing the end of the handle vertically downward with a palm or back of his or her hand as well

as the fingers. There is a provability of that the finger(s) contacts the door before the palm or back of his or her hand contacts the door when the attendant wants to move the door with the palm or back. In such
5 case, the finger(s) presses the upper portion of the door (whose width is narrower than that of the handle) to need a force greater than a force to be applied through the handle so that an operability for opening the door is decreased. In other words, the handle for
10 easy opening of the door is not used effectively (when the finger(s) contacts the door before the palm or back of his or her hand contacts the door). Further, the door without the space (notch) 400 in the handle requires the attendant to press the handle while
15 preventing contacting the other part of the door (taking care to the other part of the door) so that the operability is decreased. Therefore, the door includes the space (notch) 400 in the handle to improve the operability for opening the door (pressing the handle)
20 to easily open the door.

When the door 41 as the stopper is closed, the magnet 45 and the plate 46 are pressed against each other (as shown in fig. 5) to keep a force for holding the stacked paper moneys to be returned, so that the
25 door 41 is prevented from being opened by a moving power of the paper moneys to be stacked, and the paper moneys are prevented from flying out of the returning port. Further, the magnet is effective for preventing

the torsion coil spring 43 from generating significantly great force for keeping the door 41 closed, so that an operating force for opening the door 41 as the stopper is limited to a preferable degree.

5 As described above, the paper money handling apparatus operated by the attendant to handle the paper money, provides a sheet outlet from which the paper money can be securely taken out with single hand of the attendant without decreasing the operability and
10 operating speed of the paper money to be handled and preventing the paper money to be discharged from being damaged, even when a rigidity of the sheet or the like is low.

 Further, the hand of the attendant proceeding
15 to the outlet port to take out the stacked paper moneys moves the door as the stopper for holding the paper moneys to take out the paper money smoothly without assist of the other hand. Further, the paper moneys can be taken out while the paper moneys are prevented
20 from pressing directly the door, so that a buckling of the paper moneys of low rigidity is prevented and the paper moneys are prevented from being damaged by the door.

CLAIMS:

1. A sheet handling apparatus for handling a sheet, comprising,

 a receiving port for receiving the sheet to be taken into the apparatus,

 a transfer part for transferring the sheet,

 a discriminating part for examining the sheet,

 a plurality of containers for containing the sheet which is deemed by the discriminating part to be contained by the apparatus, and

 a returning port for holding therein the sheet which is deemed by the discriminating part to be returned from the apparatus,

 wherein the returning port includes a door, the door has a handle to be moved to rotate the door to be opened, and the door has a notch in the vicinity of the handle.
2. The sheet handling apparatus according to claim 1, wherein a bottom surface of the returning port includes an opening at a position corresponding to the handle, and the door has a protrusion below the bottom surface of the returning port so that the protrusion contacts the sheet at the opening when the door is rotated.
3. The sheet handling apparatus according to claim 1, wherein the door has a spring to urge the door to be closed.

4. The sheet handling apparatus according to claim 3, wherein the door has a damper for absorbing a moving energy applied by the spring to the door.

5. The sheet handling apparatus according to claim 1, wherein the door has a pulling mechanism for keeping the door closed.