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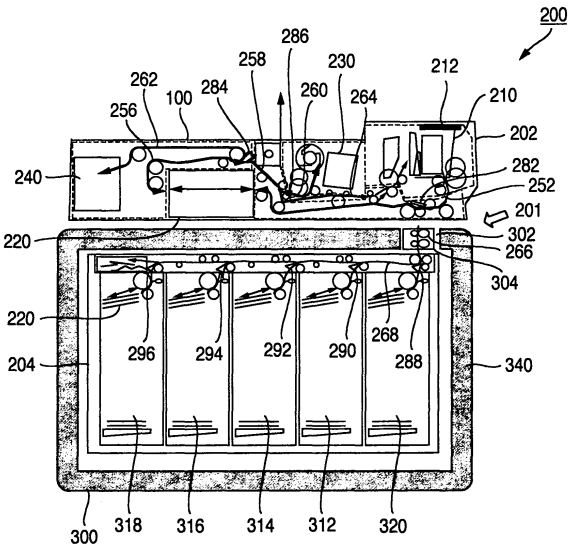
(54) Bank bill handling apparatus

(57) The invention provides a paper sheet handling apparatus which can easily remove a residual paper sheet staying behind a delivery carrier path (266) by drawing out to an external portion without being damaged, by drawing out a unit (202) from an apparatus main body, at a time of removing the residual paper sheet. A delivery carrier path (266) is constructed so as to be provided with a drive side rotating body to which a carrier driving force from a drive transmission portion provided in an inner portion of the apparatus main body is transmitted, and a driven side rotating body coming into contact with the drive side rotating body so as to turn in an interlocking manner, and a paper sheet handling apparatus is constructed so as to be provided with a drive coupling disconnecting means (502) coupling the drive transmission portion provided in the inner portion of the apparatus main body, and the drive transmission portion of the drive side rotating body, at a time when a unit is internally constructed in the apparatus main body, and disconnecting the coupling at a time when the unit is drawn out of the apparatus main body.

FIG.3



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Description

Background of the Invention

(1) Field of the Invention

[0001] The present invention relates to a paper sheet handling apparatus such as to be internally constructed in an automated cash transaction apparatus, for example, installed in a financial institution, and more particularly to a paper sheet handling apparatus which enhances a performance for removing the paper sheet staying behind an internal delivery carrier path.

(2) Description of Related Art

[0002] As one example of a paper sheet handling apparatus handling a paper sheet such as a bank bill, an itemized statement sheet, a paper or the like, a description will be given below by exemplifying a bank bill handling apparatus which is internally constructed in an automated cash transaction apparatus handling the bank bill.

[0003] Generally, the bank bill handling apparatus has in its internal portion a bank bill input and output mechanism for discharging an output bank bill to a user or delivering the cast-in input bank bill one by one, a bank bill discriminating portion discriminating the input bank bill or the output bank bill, a temporary storage portion temporarily storing the input bank bill, a reject box storing a reject bank bill which does not reach a predetermined reference in the bank bill discriminating portion, a recycle box storing and keeping the input bank bill and delivering as the output bank bill or the like, and a bank bill carrier path connecting each of the portions mentioned above.

[0004] Particularly, with regard to the handling of the bank bill, a lot of money kinds and a large capacity have been promoted in recent years, and it becomes general to arrange the recycle boxes side by side and arrange the other portions in an upper portion concentrically. Further, the recycle box is stored within a safe for enhancing a security of the bank bill.

[0005] Accordingly, the structure is made such that the delivery of the bank bill is carried out by arranging the bank bill input and output mechanisms than the recycle box, and the mechanism portion having the bank bill discriminating portion and the like as an upper unit on the safe, storing a plurality of bank bill units and the carrier path connecting them as a lower unit within the safe, and setting a delivery carrier path connecting the upper unit and the lower unit in an opening portion on the safe. The upper unit and the lower unit are internally structured such as to be capable of being drawn out from an apparatus main body. In the case that the bank bill stays behind a carrier path connecting portion between the upper unit or the lower unit and the delivery carrier path, the bank bill is removed by temporarily stopping the driving of the apparatus main body and drawing the upper unit or the lower unit by a clerk in charge.

[0006] However, there is a case that the residual bank bill remains at the delivery carrier path, even if the upper unit or the lower unit is drawn out of the apparatus main body. The bank bill staying behind the upper unit or the lower unit can be removed in an outer side of the apparatus main body, by drawing the unit out of the apparatus main body, however, in the case that the bank bill remains at the delivery carrier path in the inner portion of the apparatus main body, the bank bill remains within the apparatus main body, and there is a problem that it becomes hard to remove the bank bill.

[0007] Accordingly, in patent document 1 (JP-A-2002-163704), there has been know a structure in which a bank bill is prevented from collapsing or breaking in a portion of the delivery carrier path, by opening a pair of opening and closing guides arranged in the carrier path connecting portion of the delivery carrier path (a coupled carrier path) in accordance with the drawing operation of the unit (the term within parentheses indicates the name described in the patent document 1).

[0008] However, only by setting the opening and closing guide mentioned above, one end and the other end of the bank bill are in a state of being pinched by the separate carrier paths in the case that the bank bill stays between the carrier path and the delivery carrier path of the unit. As a result, if the unit is drawn out in this state, there is a risk that the residual bank bill is pulled from both sides so as to collapse, and there is a problem that it becomes hard to easily remove the residual bank bill in the delivery carrier path.

Brief Summary of the Invention

[0009] Accordingly, an object of the present invention is to provide a paper sheet handling apparatus which can easily remove a residual paper sheet staying behind a delivery carrier path without being damaged, at a time of removing the residual paper sheet.

[0010] In accordance with the present invention, there is provided a paper sheet handling apparatus comprising:

a unit having a carrier path carrying a paper sheet while pinching between rotating bodies opposing in both sides; and

an apparatus main body internally constructed such as to freely draw the unit, pinching the paper sheet between the drive side rotating body and the driven side rotating body which are opposed in both sides, and having a delivery carrier path connected to the carrier path of the unit for delivering the paper sheet,

wherein the delivery carrier path comprises:

the drive side rotating body to which a carrier driving force from a drive transmission portion provided in an inner portion of the apparatus main body is transmitted;

the driven side rotating body coming into contact with the drive side rotating body so as to turn in an interlocking manner; and

a drive coupling disconnecting means coupling a drive transmission portion provided in the inner portion of the apparatus main body, and the drive transmission portion of the drive side rotating body, at a time when the unit is internally constructed in the apparatus main body, and disconnecting the coupling at a time when the unit is drawn out of the apparatus main body.

[0011] In the present invention, it is preferable that the unit is set to a first unit, and the apparatus is provided with a second unit which is provided in the inner portion of the apparatus main body, and has a carrier path carrying while pinching the paper sheet between the rotating bodies opposing in both sides, and the drive transmission portion, the first unit is arranged in one side of the apparatus main body, the second unit is arranged in the other side of the apparatus main body, and the both units are connected therebetween by the delivery carrier path.

[0012] In the present invention, it is preferable that the drive coupling disconnecting means disconnects the coupling at a time when the unit is drawn out of the apparatus main body, thereby making a paper sheet pinching force of the delivery carrier path weaker than a paper sheet pinching force of the unit.

[0013] In the present invention, it is preferable that the delivery carrier path is provided with guide members guiding the delivery of the paper sheet in an opposing manner in both sides with respect to the delivery carrier path, and a delivery disconnecting means allowing a displacement of the guide member at least in the unit drawing direction side from a delivery guide position to a unit drawing direction.

[0014] In accordance with the present invention, there is provided an automated cash transaction apparatus having the paper sheet handling apparatus having the structure mentioned above.

[0015] In accordance with this invention, if the unit is drawn out of the apparatus main body to an external portion, the paper sheet staying behind the delivery carrier path in accordance with the delivery of the unit is drawn out together with the unit. Accordingly, the paper bill does not stay behind the delivery carrier path, and it is possible to easily remove the paper sheet staying behind the connection portion between the unit and the delivery carrier path from the outer side of the apparatus main body.

Brief Description of the Several Views of the Drawing

[0016]

Fig. 1 is an outer appearance perspective view showing an automated cash transaction apparatus;

Fig. 2 is a control block diagram showing a control relation of the automated cash transaction apparatus;

Fig. 3 is a side elevational view showing an internal structure of a bank bill handling apparatus;

Fig. 4 is a control block diagram showing a control relation of the bank bill handling apparatus;

Fig. 5 is a perspective view showing a delivery carrier path as seen from a direction of an arrow in Fig. 3 while omitting partly;

Fig. 6 is a vertical cross sectional view of a substantial part showing a bank bill carrier state of the delivery carrier path;

Fig. 7 is a vertical cross sectional view of a substantial part showing an initial drawing state of an upper bank bill mechanism at a time when a residual bank bill is generated;

Fig. 8 is a vertical cross sectional view of a substantial part showing a drawing partway state of the upper bank bill mechanism at a time when the residual bank bill is generated;

Fig. 9 is a vertical cross sectional view of a substantial part showing a drawing finish state of the residual bank bill by the upper bank bill mechanism;

Fig. 10 is a schematic side elevational view showing the drawing finish state of the upper bank bill mechanism at a time when the residual bank bill is generated;

Fig. 11 is a vertical cross sectional view of a substantial part showing an initial drawing state of a lower bank bill mechanism at a time when a residual bank bill is generated;

Fig. 12 is a vertical cross sectional view of a substantial part showing a drawing partway state of the lower bank bill mechanism at a time when the residual bank bill is generated; and

Fig. 13 is a vertical cross sectional view of a substantial part showing a drawing finish state of the residual bank bill by the lower bank bill mechanism.

Detailed Description of the Invention

[0017] A description will be given below of an embodiment in accordance with the present invention on the basis of the accompanying drawings.

[0018] Fig. 1 is an outer appearance perspective view showing an automated cash transaction apparatus in accordance with the present embodiment. The automated cash transaction apparatus 100 carries out such handlings as deposit, payment, funds transfer and the like with respect to a user via a card, a paper sheet, a passbook and the like. In this case, the bank bill and the itemized statement sheet are handled as the paper sheet, and a description will be given of a case that the bank bill is handled.

[0019] The automated cash transaction apparatus 100 is constructed by a card and itemized statement sheet processing apparatus 110, a customer operating portion 120, and a bank bill handling apparatus 200.

[0020] The card and itemized statement sheet

processing apparatus 110 is arranged in an upper portion side of an internal space of the automated cash transaction apparatus 100, and is provided further with a document insertion port 111 and a card slot 112. For example, in the case that the card of the user is inserted to the card slop 112, the data is read from the card, and a transaction data is printed on the passbook and the transaction itemized statement sheet.

[0021] The customer operating portion 120 is provided with a display portion displaying a transaction content with the customer, and an input portion accepting the operation from the customer. The bank bill handling apparatus 200, for example, discriminates and stores the bank bill cast from the user, and outputs the bank bill to the user. Further, the bank bill handling apparatus 200 is provided with a shutter 212 opening and closing at a time of inputting and outputting the money.

[0022] Fig. 2 is a control block diagram showing a control relation of the automated cash transaction apparatus 100. The automated cash transaction apparatus 100 is provided with a main body control portion 130, an external interface portion 140, a clerk operating portion 150, an external memory apparatus 160, and a power supply portion 170. The main body control portion 130, the card and itemized statement sheet processing apparatus 110, the customer operating portion 120, the bank bill handling apparatus 200, the external interface portion 140, the clerk operating portion 150, and the external memory apparatus 160 are connected, for example, by a bus.

[0023] The main body control portion 130 carries out a whole control of the automated cash transaction apparatus 100. The external interface portion 140 exchanges data with respect to an external computer (not shown). The clerk operating portion 150 is input a processing information of a maintenance by the clerk in charge, for example, at a time of a maintenance. The external memory apparatus 160 stores the data processed by the main body control portion 130. The power supply portion 170 feeds an electric power to the card and itemized statement sheet processing apparatus 110, the customer operating portion 120, the main body control portion 130, the external interface portion 140, the clerk operating portion 150, the external memory apparatus 160, and the bank bill handling apparatus 200.

[0024] Next, a description will be given of the bank bill handling apparatus 200. Fig. 3 is a side elevational view showing an internal structure of the bank bill handling apparatus 200. In Fig. 3, a right side of the drawing corresponds to a front face side of the automated cash transaction apparatus 100, and a left side of the drawing corresponds to a rear side thereof.

[0025] The bank bill handling apparatus 200 is formed as a rectangular box shape, and a casing is provided as an apparatus main body. Further, an upper bank bill mechanism 202 and a lower bank bill mechanism 204 are internally constructed in an internal portion thereof. The upper bank bill mechanism 202 serves as a first unit which is provided in an outer portion of the bank bill handling apparatus 200 so as to be freely drawn, and the lower bank bill mechanism 204 serves as a second unit which is provided in the outer portion of the bank bill handling apparatus 200 in the same manner so as to be freely drawn.

[0026] The upper bank bill mechanism 202 is provided with a bank bill input and output portion 210, a bank bill discriminating portion 220, a bank bill temporary storage box 230, and a bank bill loading and recovering box 240.

[0027] In this embodiment, the bank bill input and output portion 210 is arranged in a foremost portion of the upper bank bill mechanism 202, the bank bill temporary storage box 230 is arranged in a rear portion of the bank bill input and output portion 210, the bank bill discriminating portion 220 is arranged in a rear portion of the bank bill temporary storage box 230, and the bank bill loading and recovering box 240 is arranged in a rear portion of the bank bill discriminating portion 220.

[0028] For example, the user casts the bank bill to the bank bill input and output portion 210 at a time of the money input and the funds transfer, and picks up the bank bill from the bank bill input and output portion 210 at a time of the money output. The shutter 212 mentioned above is arranged in the bank bill input and output portion 210. The shutter 212 opens at a time of casting and picking up the bank bill. The bank bill discriminating portion 220 discriminates truth and face amount of the bank bill. The bank bill temporary storage box 230 temporarily stores the input bank bill until the transaction is established. The bank bill loading and recovering box 240 is used at a time of loading the bank bill to the storage box of the lower bank bill mechanism 204, or recovering the bank bill from the storage box of the lower bank bill mechanism 204.

[0029] The bank bill input and output portion 210 and the bank bill discriminating portion 220 are connected by a carrier path 252 and a carrier path 254. A bank bill sorting gate 282 for sorting the bank bill to the lower bank bill mechanism 204 is provided at the midpoint of the carrier path 252 and the carrier path 254. The bank bill discriminating portion 220 and the bank bill temporary storage box 230 are connected by carrier paths 256, 258 and 260. A bank bill sorting gate 284 for sorting the bank bill to the bank bill loading and recovering box 240 via a carrier path 262 is provided at the midpoint of the carrier path 256 and the carrier path 258. A bank bill sorting gate 286 for sorting the bank bill to the bank bill input and output portion 210 via a carrier path 264 is provided at the midpoint of the carrier path 258 and the carrier path 260. A delivery carrier path 266 for delivering the bank bill with respect to the lower bank bill mechanism 204 is provided in a lower portion of the bank bill sorting gate 282. At least the carrier paths 254, 256, 258, 260, 262 and 264 are two-way carrier paths which can carry the bank bill in both forward and backward directions.

[0030] The lower bank bill mechanism 204 is provided with recycle boxes 312, 314, 316 and 318, and a reject box 320. The recycle boxes 312, 314, 316 and 318 store

the bank bill by money kinds. The bank bills stored in the recycle boxes 312, 314, 316 and 318 are provided for outputting. The reject box 320 stores the bank bill which is input but is not provided for outputting. Whether or not the bank bill is provided for outputting is based on a face amount of the bank bill and a degree of breakage of the bank bill.

[0031] The lower bank bill mechanism 204 is surrounded by a safe 300. One side wall of the safe 300 is provided with a side face door 340 for drawing the lower bank bill mechanism 204 from the safe 300 to an external portion. Further, an opening portion 302 passing through in a vertical direction is formed in one side of an upper portion of the safe 300. A coupling portion 304 is arranged in the opening portion 302. The delivery carrier path 266 mentioned above passes within the coupling portion 304. The delivery carrier path 266 is connected to the recycle boxes 312, 314, 316 and 318 and the reject box 320 via the carrier path 268. Bank bill sorting gates 288, 290, 292, 294 and 296 are arranged on the carrier path 268, and sort the bank bill to the recycle boxes 312, 314, 316 and 318 and the reject box 320. The delivery carrier path 266 and the carrier path 268 for sorting in its subsequent stage are two-way carrier paths which can carry the bank bill in both forward and backward directions.

[0032] Next, a description will be given of a control of the bank bill handling apparatus 200. Fig. 4 is a control block diagram showing a control relation of the bank bill handling apparatus 200. The bank bill handling apparatus 200 is provided with a bank bill handling apparatus control portion 330. The bank bill handling apparatus control portion 330 is connected to the main body control portion 130, and controls a motion from the bank bill input and output portion 210, the bank bill discriminating portion 220, the bank bill temporary storage box 230 and the carrier path 252 to the carrier path 268, the bank bill sorting gates 288, 290, 292, 294 and 296, the recycle boxes 312, 314, 316 and 318 and the reject box 320 on the basis of a command from the main body control portion 130.

[0033] Next, a description will be given of a motion at a time of the input transaction process of the bank bill handling apparatus 200.

[0034] If the bank bill is inserted to the bank bill input and output portion 210, the bank bill handling apparatus control portion 330 carries the bank bill to the bank bill discriminating portion 220 by the carrier paths 252 and 254. Further, the bank bill handling apparatus control portion 330 discriminates the truth, the face amount and the damage state of the bank bill by a sensor (not shown) mounted to the bank bill discriminating portion 220, and transmits result of discrimination to the main body control portion 130. Further, the bank bill handling apparatus control portion 330 carries the bank bill to a branch position of the bank bill sorting gate 284 via the carrier path 256 from a rear portion of the bank bill discriminating portion 220. Further, the bank bill handling apparatus control portion 330 sorts the bank bill by the bank bill sorting gate 284 on the basis of the result of the bank bill discriminating portion 220. Further, the bank bill handling apparatus control portion 330 carries the bank bill which is determined to be acceptable to the bank bill temporary storage box 230 by using the carrier paths 258 and 260, and carries back the bank bill which is determined to be incapable of being discriminated to the bank bill input and output portion 210 by using the carrier path 264.

[0035] The main body control portion 130 makes the customer operating portion 120 display a total amount of the input bank bill. If the bank bill handling apparatus control portion 330 receives the decided input of the money input transaction from the user through the customer operating portion 120, the bank bill handling apparatus control portion 330 receives the command from the main body control portion 130, delivers the bank bill which is temporarily stored in the bank bill temporary storage box 230 in a reverse direction in accordance with a reverse order to the order at a time of storing, and makes the bank bill pass through the bank bill discriminating portion 220. Further, the bank bill handling apparatus control portion 330 changes the carrier direction of the bank bill to the direction of the delivery carrier path 266 by using the bank bill sorting gate 282. Thereafter, the bank bill handling apparatus control portion 330 stores the bank bill to any one of the recycle boxes 312, 314, 316 and 318 and the reject box 320, by carrying out the sorting operation of the carrier path 268 and the bank bill sorting gates 288, 290, 292, 294 and 296. Accordingly, the money input transaction process is finished.

[0036] Next, a description will be given of a motion at a time of the money output transaction process of the bank bill handling apparatus 200.

[0037] If the main body control portion 130 receives the command of outputting a predetermined amount of money from the user, the main body control portion 130 instructs the bank bill handling apparatus control portion 330 to carry the bank bill to the bank bill input and output portion 210. The bank bill handling apparatus control portion 330 makes the recycle boxes 312, 314, 316 and 318 deliver a predetermined number of bank bills, changes the carrier direction of the bank bill introduced by the carrier path 268 to the direction of the delivery carrier path 266 by using the bank bill sorting gate 288, and thereafter carries to the bank bill discriminating portion 220 by using the carrier path 254.

[0038] The bank bill handling apparatus control portion 330 discriminates the truth, the face amount and the damage state of the bank bill by using the bank bill discriminating portion 220. The bank bill handling apparatus control portion 330 sorts the bank bill which is determined to be capable of being output by using the bank bill sorting gates 284 and 286 so as to carry to the bank bill input and output portion 210, and sorts the bank bill which is determined to be incapable of being output to the direction of the carrier path 262 by using the bank bill sorting gate 284 so as to store in the bank bill loading and recovering box 240. If the carrier motion of the bank bill is

finished, the main body control portion 130 opens the shutter 212, whereby the user can pick up the bank bill. Therefore, the money output transaction process is finished.

[0039] A description will be given of the delivery carrier path 266 constructed in the coupling portion 304 by using Figs. 5 and 6. Fig. 5 is a perspective view showing the delivery carrier path 266 as seen from a direction of an arrow 201 in Fig. 3 in a partly omitting manner. Fig. 6 is a vertical cross sectional view of a substantial part of the delivery carrier path 266 as seen from a direction of an arrow 507 in Fig. 5.

[0040] The upper bank bill mechanism 202 is provided with a pair of left and right bank bill guide members 500 and 501, a projection portion 502, and a pair of left and right rollers 515 at positions connecting and corresponding to an upper face side of the delivery carrier path 266.

[0041] One bank bill guide member 500 and the other bank bill guide member 501 have a comb shape in their leading ends, are arranged in both sides sandwiching the carrier path therebetween so as to be spaced at a predetermined interval, and are formed as a pair so as to be connected to an upper end side of the delivery carrier path 266 mentioned above. The projection portion 502 is provided as a drive coupling disconnecting means and a delivery disconnecting means, and the projection portion 502 is a reverse L-shaped member protruding to the coupling portion 304 side from the upper bank bill mechanism 202.

[0042] The rollers 515 are a pair of carrier rollers which are arranged in right and left sides in an opposing manner, and carry the bank bill while sandwiching the bank bill from both right and left sides. At least one of the rollers 515 is coupled to a drive shaft (not shown), the rollers 515 are rotated on the basis of an application of a rotational driving force from the drive shaft, and the bank bill 521 is carried between the rollers 515. Further, the bank bill carried from the delivery carrier path 266 is received by the rollers 515 so as to take in the upper bank bill mechanism 202, and the bank bill is, on the contrary, delivered to the delivery carrier path 266 from the upper bank bill mechanism 202. Further, when the power is not transmitted to the drive shaft, the rollers 515 stop rotation and stand ready to carry the bank bill 521.

[0043] The delivery carrier path 266 is provided in an upper portion side with a pair of left and right guide members 503 and 504 guiding the bank bill 521 from both sides, and a pair of left and right springs 508 and 509, is provided in an intermediate portion with a pair of upper and lower pulleys 510 and 522 supporting the carrier belt 511, rollers 530 and 531 provided in an opposing manner in the carrier belt 511 while forming a pair, and a drive transmitting lever 516, and is provided in a lower portion side with a gear 518 provided in the drive transmitting lever 516, an energizing spring 534, a pair of left and right guide members 535 and 536, and a pair of left and right springs 537 and 538.

[0044] The one guide member 503 and the guide member 504 in the upper portion side have a comb shape in their leading ends, are arranged in both sides while sandwiching the carrier path so as to be spaced at a predetermined interval, and have a role carrying and guiding the bank bill 521 guided to the upper portion side of the delivery carrier path 266. Further, the guide members 503 and 504 have fixed holes (only a right hole 504a is shown in Fig. 5) for axially fitting, and rotating shafts 505 and 506 are inserted and fixed to the fixed holes. Accordingly, the guide members 503 and 504 are rotated in accordance with the rotating motions of the rotating shafts 505 and 506. Further, in the comb shape of the guide members 503 and 504, an upper comb shape and a lower comb shape are formed in upper and lower sides around the fixed hole. Further, the upper comb shape is interposed so as to alternately correspond to the bank bill guide members 500 and 501 corresponding to the comb shape close to the upper bank bill mechanism 202. Accordingly, it is possible to avoid a contact at a time when the upper bank bill mechanism 202 is taken out of the bank bill handling apparatus 200, and it is possible to take out the upper bank bill mechanism 202.

[0045] In Fig. 6, the spring 508 provided in the left side of the delivery carrier path 266 employs, for example, a torsion coil spring, and is arranged by pivoting a coil portion of the spring 508 to a support shaft 304b protruded to a passage wall 304a surrounding the delivery passage of the coupling portion 304, fixing one end thereof to the passage wall 304a, and bringing the other end into contact in an energizing manner with an outer surface side of the guide member 503 provided in a left side of the drawing. Accordingly, the spring 508 energizes the guide member 503 against the opposing guide member 504 side around the rotating shaft 505.

[0046] The right spring 509 employs the torsion coil spring in the same manner, and is arranged by pivoting a coil portion of the spring 509 to the rotating shaft 506, fixing one end thereof to the passage wall 304a, and bringing the other end into contact in an energizing manner with an outer surface side of the guide member 504 provided in a right side of the drawing. Accordingly, the spring 509 energizes the guide member 504 against the opposing guide member 503 side around the rotating shaft 506. In this case, in this embodiment, an elastic force of the left spring 508 is set stronger than an elastic force of the right spring 509. Further, in a state in which the upper bank bill mechanism 202 and the lower bank bill mechanism 204 are stored, the both side guide members 503 and 504 form the delivery carrier path 266 in a vertical direction in parallel.

[0047] The carrier belt 511 is provided as a drive side rotating body, and is provided in a tension manner between the pulleys 510 and 522 arranged up and down in a left side of Fig. 6. Among them, the lower pulley 522 is provided as a drive pulley. A power transmission to the lower pulley 522 is achieved by engaging with a gear (not shown) fixed onto the lower rotating shaft via several power transmission gears 518 from a drive gear 517 pro-

vided in the lower bank bill mechanism 204 mentioned below. Further, the rollers 530 and 531 serving as driven rotating bodies rotating in an interlocking manner for carrying come into contact with upper and lower positions in a right side opposing to the carrier belt 511. Accordingly, the structure is made such that bank bill 521 can be pinched and carried between the carrier belt 511 and the rollers 530 and 531, and the bank bills 521 guided here are carried while being pinched one by one.

[0048] The drive transmission lever 516 is provided as a drive coupling disconnecting means and a delivery disconnecting means, and is structured such as to rotate the motion of the drive transmitting lever 516 while working with a forward and backward motion with respect to a drawing direction of the projection portion 502 mentioned above. The drive transmitting lever 516 has an elbow shape, and a bent portion is rotatably pivoted to the rotating shaft 532 of the lower pulley 522, and arranged in a vertically long state. The projection portion 502 of the upper bank bill mechanism 202 comes into contact with the upper end portion 516a of the drive transmitting lever 516 from a right side in Fig. 6. Further, the gear 518 and the energizing spring 534 are provided in the lower end portion 516b of the drive transmitting lever 516.

[0049] The gear 518 is provided as a drive transmitting portion of the drive side rotating body, and the gear 518 is structured such that the upper end portion 516a of the drive transmitting lever 516 is pushed leftward in the drawing by the projection portion 502 and the lower end portion 516b of the drive transmitting lever 516 rotates rightward in the drawing around the rotating shaft 532 of the lower pulley 522. Further, the gear 518 is applied as the drive transmitting portion provided in the inner portion of the apparatus main body, and is engaged with the drive gear 517 of the lower bank bill mechanism 204. Accordingly, the rotational driving force from the lower bank bill mechanism 204 is generally transmitted to the drive side pulley 522 via the gears 517 and 518.

[0050] The energizing spring 534 energizes the lower end portion 516b of the drive transmitting lever 516 in a leftward direction in the drawing. In general, the upper bank bill mechanism 202 is attached to the bank bill handling apparatus 200 in a state in which the projection portion 502 pushes the drive transmitting lever 516 against the energizing force of the energizing spring 534, and both the gears 517 and 518 are in an engaged state. Accordingly, if the upper bank bill mechanism 202 is drawn out of the bank bill handling apparatus 200 and the projection portion 502 is evacuated, the drive transmitting lever 516 is canceled its position regulation at the coupled position, and comes to a free state, and the lower end 516b of the drive transmitting lever 516 is rotated leftward in the drawing around the rotating shaft 532 on the basis of the energization of the energizing spring 534. As a result the gear 518 pivoted to the lower end portion 516b of the drive transmitting lever 516 comes away from the drive gear 517 of the lower bank bill mechanism 204, and the drive transmission is disconnected. As mentioned above, there is provided the structure in which the power to the delivery carrier path 266 is coupled or disconnected while working with the forward and backward motion in the drawing direction of the projection portion 502.

[0051] In this case, a description will be given of a bank bill delivery interval between the delivery carrier path 266 and the upper bank bill mechanism 202. An interval for delivering the bank bill between the bank bill pinching position in a pair of rollers 515 of the upper bank bill mechanism 202, and the bank bill pinching position at which the carrier belt 511 of the delivery carrier path 266 and the roller 530 are opposed to each other is set shorter than the length in the carrier direction of the bank bill 521. Accordingly, it is possible to do away with the pinching separation of the bank bill between the upper bank bill mechanism 202 and the delivery carrier path 266, thereby securing the delivery and carrier of the bank bill, and the carrier of one bank bill does not stop in the process.

[0052] Further, an interval between the bank bill pinching portions separated from the delivery carrier path 266 at the upper pinching position of a pair of rollers 515 of the upper bank bill mechanism 202, and the lower pinching position of a pair of rollers 515a of the lower bank bill mechanism 204 is set longer than the length in the carrier direction of the bank bill 521. Accordingly, the upper bank bill mechanism 202 and the lower bank bill mechanism 204 do not simultaneously pinch the same bank bill 521. Accordingly, even if one of the upper bank bill mechanism 202 and the lower bank bill mechanism 204 is drawn in the case that the residual bank bill exists in the delivery carrier path 266, the bank bill does not collapse because both ends of the bank bill 521 are not gripped.

[0053] Further, a pair of left and right guide members 535 and 536 and a pair of left and right springs 537 and 538 provided in the lower portion side of the delivery carrier path 266 have the same structures as a pair of left and right guide members 503 and 504 and a pair of left and right springs 508 and 509 provided in the upper portion side mentioned above so as to be arranged in a symmetrical shape which is inverted up and down. Accordingly, since the same guiding motion is carried out while the vertical direction being only different, at a time of delivering the bank bill with respect to the lower bank bill mechanism 204 mentioned below, the same description will be omitted.

[0054] The lower bank bill mechanism 204 has the same structure as the upper bank bill mechanism 202 mentioned above and is arranged in a symmetrical shape in a lower portion side of the delivery carrier path 266 while being inverted up and down. Accordingly, the lower bank bill mechanism 204 has a pair of left and right bank bill guide members 539 and 540 and a pair of left and right rollers 517a in the same manner as the upper bank bill mechanism 202, and is provided with the drive gear 517 for transmitting the power. Accordingly, since the bank bill guide members 539 and 540 and the roller 517a

of the lower bank bill mechanism 204 have the same structures as the bank bill guide members 500 and 501 of the upper bank bill mechanism 202 so as to achieve the same motion, the same description thereof will be omitted.

[0055] The driven gear 517 is engaged with the gear 518 provided in the lower portion of the drive transmitting lever 516 of the delivery carrier path 266 so as to be coupled in a power transmittable manner, and the carrier belt 511 rotationally driven via the gear 518 and some gears is driven by driving the drive gear 517. When the drive gear 517 is not driven, the carrier belt 511 does not rotate.

[0056] Further, with regard to the bank bill delivery interval in the carrier direction between the delivery carrier path 266 and the lower bank bill mechanism 204, the interval delivering the bank bill between the bank bill pinching position by a pair of right and left rollers 517a of the lower bank bill mechanism 204, and the bank bill pinching position at which the carrier belt 511 of the delivery carrier path 266 and the roller 531 oppose to each other is set shorter than the length in the carrier direction of the bank bill 521, and the bank bill 521 is securely delivered and carried therebetween.

[0057] Next, a description will be given of a jam removing process in the case that the jam is generated in the carrier path connecting portion between the upper bank bill mechanism 202 and the delivery carrier path 266 with reference to Figs. 6 and 10.

[0058] Fig. 6 is a vertical cross sectional view of a substantial part showing a state (hereinafter, refer to as "reference position") before drawing the upper bank bill mechanism, Fig. 7 is a vertical cross sectional view of a substantial part showing a state of starting drawing the upper bank bill mechanism 202, Fig. 8 is a vertical cross sectional view of a substantial part showing a state in which the upper bank bill mechanism 202 is under being drawn, Fig. 9 is a vertical cross sectional view of a substantial part showing a drawing finish state of the residual bank bill by the upper bank bill mechanism 20, and Fig. 10 is a vertical cross sectional view of a substantial part showing a state in which the upper bank bill mechanism 202 is drawn to the outer portion of the automated cash transaction apparatus 100.

[0059] In the case that the jam is generated in the delivery carrier path 266, the position is detected by a detection sensor (not shown) or the like, and a recovery guide result is displayed and guided with respect to the clerk operating portion 150 such as the clerk panel or the like from the main body control portion 130 in correspondence to the jam generated position. The recovery guide result indicates whether or not the upper bank bill mechanism 202 is drawn and whether or not the lower bank bill mechanism 204 side is drawn. The clerk in charge executes a recovery process after seeing the result.

[0060] As shown in Fig. 6, in a state in which the bank bill stays between the upper bank bill mechanism 202 and the delivery carrier path 266, the residual bank bill 521 is pinched between a pair of rollers 515 and between the carrier belt 511 and the roller 530. At this time, since the roller 515 is in a state in which the roller 515 is coupled to the drive side of the upper bank bill mechanism 202, and the carrier belt 511 is in a state in which the carrier belt 511 is coupled to the drive side of the lower bank bill mechanism 204, the roller 515 and the carrier belt 511 do not rotate, but strongly pinch the residual bank bill 521, in a state in which they are not driven.

[0061] At a reference position shown in Fig. 6, the projection portion 502 of the upper bank bill mechanism 202 pushes the drive transmitting lever 516 in a leftward direction in Fig. 6. Accordingly, the carrier belt 511 is power transmitted via the drive gear 517, each of the gears 518, ... and the drive side pulley 522 from the lower bank bill mechanism 204, and is coupled in such a manner as to be transmittable the power so as to pinch and carry the bank bill between the carrier belt 511 and the rollers 530 and 531.

[0062] If the clerk in charge draws out the upper bank bill mechanism 202 in a direction of an arrow 513 (a rightward direction corresponds to a draw-out direction in Fig. 7) from the reference position as shown in Fig. 7 in such a manner as to restore the automated cash transaction apparatus 100 from the jam, the projection portion 502 of the upper bank bill mechanism 202 pushing the drive transmission lever 516 backs away from the drive transmission lever 516, the gear 518 and the drive gear 517 which are pivoted to the lower portion of the drive transmission lever 516 come away, and the coupling of the drive transmission portion with respect to the carrier belt 511 comes off.

[0063] Accordingly, the carrier belt 511 comes to an idle running state, and a contact pressure (a retaining force) of the bank bill between the opposing surfaces of the carrier belt 511 and the rollers 530 and 531 becomes weak. Therefore, the bank bill comes to a state in which the bank bill can freely move in the carrier direction. On the contrary, in the roller 515 close to the upper bank bill mechanism 202, since the drive gear of the drive coupling portion is not disconnected even by stopping a motor (not shown) close to the upper bank bill mechanism 202 transmitting the power thereto, a load resistance is great for rotating the roller 515 from the stop state, and the retaining force of the bank bill lies strong. If the upper bank bill mechanism 202 is drawn in the direction of the arrow 513 (the draw-out direction in Fig. 7) under this state, the lower end portion of the bank bill 521 is drawn out of the portion between the carrier belt 511 and the roller 530, and the upper end portion of the bank bill 521 is going to move in the draw-out direction together with the upper bank bill mechanism 202 while keeping the state of being pinched between the rollers 515.

[0064] At this time, the right guide member 504 comes into contact with the bank bill 521 which is drawn out while being tilted in the draw-out direction in Fig. 7, and the guide member 504 is pushed by the bank bill 521 so as to receive the force in a direction (a draw-out direction)

of an arrow 701, and is inclined in a direction (a clockwise direction) of an arrow 702 around the rotating shaft 506 corresponding to a supporting point. Accordingly, the guide member 504 does not prevent the bank bill 521 from moving in the draw-out direction, and it is possible to avoid the contact causing the break of the bank bill, for example, due to the strong contact of the bank bill with the corner portion of the guide member 504.

[0065] In this case, in Fig. 7, the magnitude of the elastic force of the left spring 508 is set such a magnitude that the guide member 504 is inclined in the case of receiving the force in the direction (the draw-out direction) of the arrow 701 from the bank bill 521 without breaking the bank bill 521. Further, the rotation of the guide member 504 in the draw-out direction is smoothened by making an energizing pressure of the right spring 509 weaker than an energizing force of the left spring 508.

[0066] Thereafter, as shown in Fig. 8, in the case that the upper bank bill mechanism 202 is further drawn out, the guide member 504 close to the draw-out direction is pushed by the inclined bank bill 521 so as to be exposed to the pressure force in the direction (the draw-out direction) of the arrow 701, and is inclined to a position coming into contact with the passage wall 304a of the coupling portion 304 at a maximum. Further, the lower end portion of the bank bill 521 is drawn out of the portion between the idle running carrier belt 511 and roller 530, and the upper end portion of the bank bill 521 is drawn out together with the upper bank bill mechanism 202 while keeping the state of being pinched between the roller 515. As a result, as shown in Fig. 9, the lower end portion of the bank bill 521 is completely drawn out of the delivery carrier path 266 of the coupling portion 304, and is held in a state of being vertically suspended by the upper bank bill mechanism 202. If the bunk bill 521 is completely drawn out, the energizing operations of the springs 508 and 509 work and the guide members 503 and 504 come back to the original positions.

[0067] Further, as shown in Fig. 10, since the bank bill 521 staying behind the delivery carrier path 266 of the bank bill handling apparatus 200 is drawn out of the automated cash transaction apparatus 100 together with the upper bank bill mechanism 202, it is possible to easily remove the bank bill 521. As mentioned above, it is possible to draw out the residual bank bill 521 to the external portion only by drawing out the upper bank bill mechanism 202 by the clerk in charge, and the removing performance of the jam of the bank bill 521 staying behind the delivery carrier path 266 is improved. Further, since the guide member 504 is inclined, it is possible to prevent the residual bank bill 521 and the guide member 504 from breaking while avoiding the strong contact at a time of drawing out the residual bank bill 521 and the guide member 504.

[0068] Particularly, the delivery carrier path 266 is structured such as to be driven by the application of the drive force from the lower bank bill mechanism 204 side. In the case that a part of the bank bill 521 is interposed and stays between the delivery carrier path 266 and the upper bank bill mechanism 202, the power transmission to the delivery carrier path 266 is interrupted at that timing even if the delivery carrier path 266 pulls out the upper bank bill mechanism 202 side which is not exposed to the power transmission, so that it is possible to draw out the bank bill 521 in the carrier direction while idle running in the delivery carrier path 266.

[0069] Next, a description will be given of a jam removing process in the case that the jam is generated in the carrier path connecting portion between the lower bank bill mechanism 204 and the delivery carrier path 266 with reference to Figs. 11 to 13.

[0070] Fig. 11 is a vertical cross sectional view of a substantial part showing a state of starting drawing out the lower bank bill mechanism 204, Fig. 12 is a vertical cross sectional view of a substantial part showing a state in which the lower bank bill mechanism 204 is under drawing, and Fig. 13 is a vertical cross sectional view of a substantial part showing a drawing finish state of the residual bank bill by the lower bank bill mechanism 204.

[0071] Since the residual bank bill is generated between the delivery carrier path 266 and the lower bank bill mechanism 204, the clerk in charge draws out the lower bank bill mechanism 204, as shown in Fig. 11, as the jam recovery process. In this case, the drive gear 517 comes away from the gear 518 in accordance with the draw-out of the lower bank bill mechanism 204, and the power transmission with respect to the delivery carrier path 266 is isolated. Accordingly, the carrier belt 511 of the delivery carrier path 266 comes to the idle running state, and the contact pressure (the retaining force) of the bank bill between the opposing surfaces of the carrier belt 511 and the rollers 530 and 531 becomes weak. Accordingly, the bank bill come to a state in which the bank bill can freely move in the carrier direction. On the contrary, in the roller 517a close to the lower bank bill mechanism 204, since the drive gear 517 of the drive coupling portion does not come off even by stopping the motor (not shown) close to the lower bank bill mechanism 204, a load resistance is enough great to rotate the roller 517a from the stop state, and the retaining force of the bank bill remains strong. If the lower bank bill mechanism 204 is drawn out in the draw-out direction (a rightward direction in Fig. 11) under this state, the upper end portion of the bank bill 521 is drawn out of the portion between the carrier belt 511 and the roller 531, and the lower end portion of the bank bill 521 is going to move in the draw-out direction together with the lower bank bill mechanism 204 while keeping the state of being pinched between the rollers 517a.

[0072] At this time, the right guide member 536 comes into contact with the bank bill 521 which is inclined and drawn out in the draw-out direction in Fig. 11, and the guide member 536 is pushed by the bank bill 521 so as to be exposed to the force in the draw-out direction, and is inclined in the counterclockwise direction around the rotating shaft 533 corresponding to the supporting point.

Accordingly, the guide member 536 does not prevent the bank bill 521 from moving in the draw-out direction, and it is possible to avoid the contact causing the break of the bank bill, for example, due to the strong contact of the bank bill with the corner portion of the guide member 536.

[0073] In this case, in Fig. 11, the magnitude of the elastic force of the left side spring 537 is set such a magnitude that the guide member 536 is inclined in the case of receiving the force in the draw-out direction from the bank bill 521 without breaking the bank bill 521. Further, the rotation of the guide member 536 in the draw-out direction is smoothened by making an energizing pressure of the right spring 538 weaker than an energizing force of the left spring 537.

[0074] Thereafter, as shown in Fig. 12, in the case that the lower bank bill mechanism 204 is further drawn out, the guide member 536 close to the draw-out direction is pushed by the inclined bank bill 521 so as to be exposed to the pressure force in the draw-out direction, and is inclined to a position coming into contact with the passage wall 304a of the coupling portion 304 at a maximum. Further, the upper end portion of the bank bill 521 is drawn out of the portion between the idle running carrier belt 511 and roller 531, and the lower end portion of the bank bill 521 is drawn out together with the lower bank bill mechanism 204 while keeping the state of being pinched between the roller 517a. As a result, as shown in Fig. 13, the upper end portion of the bank bill 521 is completely drawn out of the delivery carrier path 266 of the coupling portion 304, and is held by the lower bank bill mechanism 204. If the bunk bill 521 is completely drawn out, the energizing operations of the springs 537 and 538 work and the guide members 535 and 536 come back to the original positions.

[0075] Further, since the bank bill 521 staying behind the delivery carrier path 266 of the bank bill handling apparatus 200 is drawn out of the automated cash transaction apparatus 100 together with the lower bank bill mechanism 204, it is possible to easily remove the bank bill 521. As mentioned above, even in the lower bank bill mechanism 204 side, it is possible to draw out the residual bank bill 521 to the external portion only by drawing out the lower bank bill mechanism 204 by the clerk in charge, and the removing performance of the jam of the bank bill 521 staying behind the delivery carrier path 266 is improved. Further, since the guide member 536 is inclined, it is possible to prevent the residual bank bill 521 and the guide member 536 from breaking while avoiding the strong contact at a time of drawing out the residual bank bill 521 and the guide member 504.

[0076] In this case, since the engaging drive gear 517 and gear 518 come away from each other in the draw-out direction in accordance with the drawing operation, at a time of drawing out the lower bank bill mechanism 204, the power transmission from the lower bank bill mechanism 204 to the delivery carrier path 266 is isolated in a moment without through the drive transmitting lever 516.

[0077] In the embodiment mentioned above, there is shown the case that the upper bank bill mechanism 202 and the lower bank bill mechanism 204 are individually drawn out so as to remove the jam, at a time of carrying out the removing process of the jam, however, the structure is not limited to this, but the jam may be removed by simultaneously drawing out the upper bank bill mechanism 202 and the lower bank bill mechanism 204.

[0078] As mentioned above, the delivery carrier path is isolated its power transmission at a time of drawing out the upper bank bill mechanism or the lower bank bill mechanism, the bank bill runs idle in the delivery carrier path and is easily drawn out in the carrier direction, and the residual bank bill is drawn out to the external portion together with any one of the upper bank bill mechanism and the lower bank bill mechanism at a time of drawing out the upper bank bill mechanism or the lower bank bill mechanism. Accordingly, the residual bank bill can be easily removed by the clerk in charge from the external portion by being drawn out to the external portion of the automated cash transaction apparatus.

[0079] The present invention relates to the paper sheet handling apparatus, the copier, the printer and the other general devices handling the paper sheet.

Claims

1. A paper sheet handling apparatus comprising:

a unit (202) having a carrier path carrying a paper sheet while pinching between rotating bodies opposing in both sides; and

an apparatus main body internally constructed such as to freely draw said unit (202), pinching the paper sheet between the drive side rotating body and the driven side rotating body which are opposed in both sides, and having a delivery carrier path (266) connected to the carrier path of said unit for delivering the paper sheet,

wherein said delivery carrier path (266) comprises:

said drive side rotating body to which a carrier driving force from a drive transmission portion provided in an inner portion of said apparatus main body is transmitted;

said driven side rotating body coming into contact with said drive side rotating body so as to turn in an interlocking manner; and

a drive coupling disconnecting means (502) coupling a drive transmission portion provided in the inner portion of said apparatus main body, and the drive transmission portion of said drive side rotating body, at a time when said unit (202) is internally constructed in the apparatus main body, and disconnecting said coupling at a time

when said unit (202) is drawn out of the apparatus main body.

2. A paper sheet handling apparatus as claimed in claim 1, wherein said unit is set to a first unit (202), and the apparatus is provided with a second unit (204) which is provided in the inner portion of the apparatus main body, and has a carrier path carrying while pinching the paper sheet between the rotating bodies opposing in both sides, and said drive transmission portion, said first unit (202) is arranged in one side of the apparatus main body, said second unit (204) is arranged in the other side of the apparatus main body, and said both units (202, 204) are connected therebetween by said delivery carrier path (266).

3. A paper sheet handling apparatus as claimed in claim 1, wherein said drive coupling disconnecting means (502) disconnects said coupling at a time when said unit is drawn out of the apparatus main body, thereby making a paper sheet pinching force of said delivery carrier path (266) weaker than a paper sheet pinching force of the unit.

4. A paper sheet handling apparatus as claimed in claim 1, wherein said delivery carrier path (266) is provided with guide members (503, 504, 535, 536) guiding the delivery of the paper sheet in an opposing manner in both sides with respect to said delivery carrier path (266), and a delivery disconnecting means allowing a displacement of said guide member at least in the unit drawing direction side from a delivery guide position to a unit drawing direction.

5. An automated cash transaction apparatus comprising the paper sheet handling apparatus as claimed in claim 1.

FIG.1

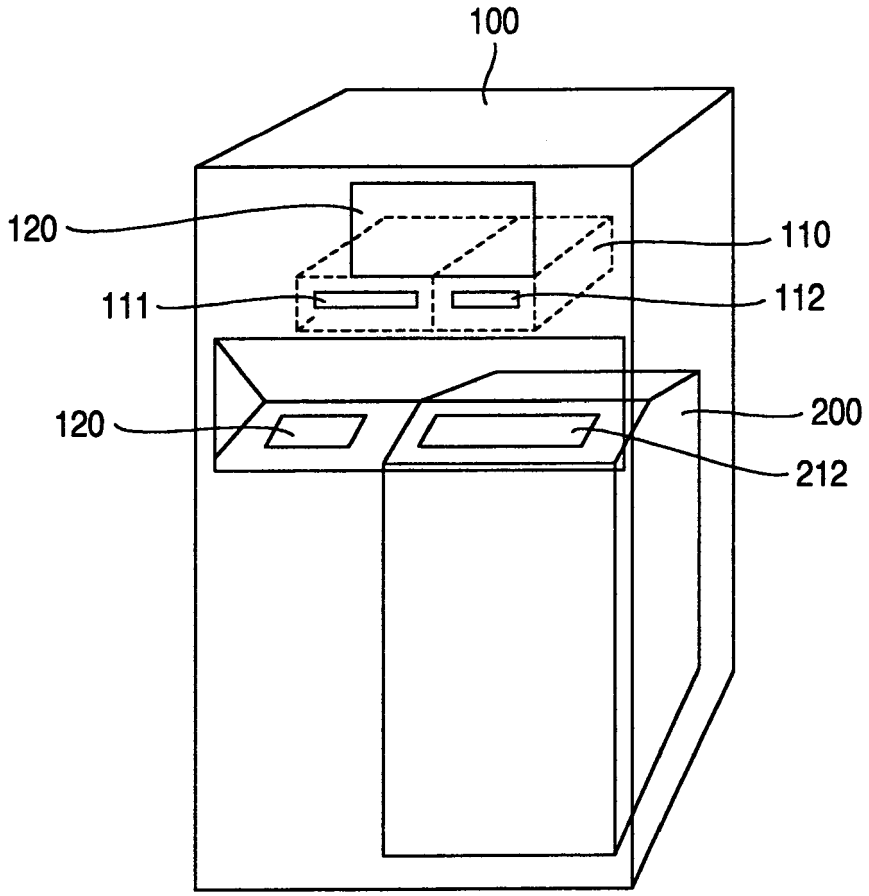
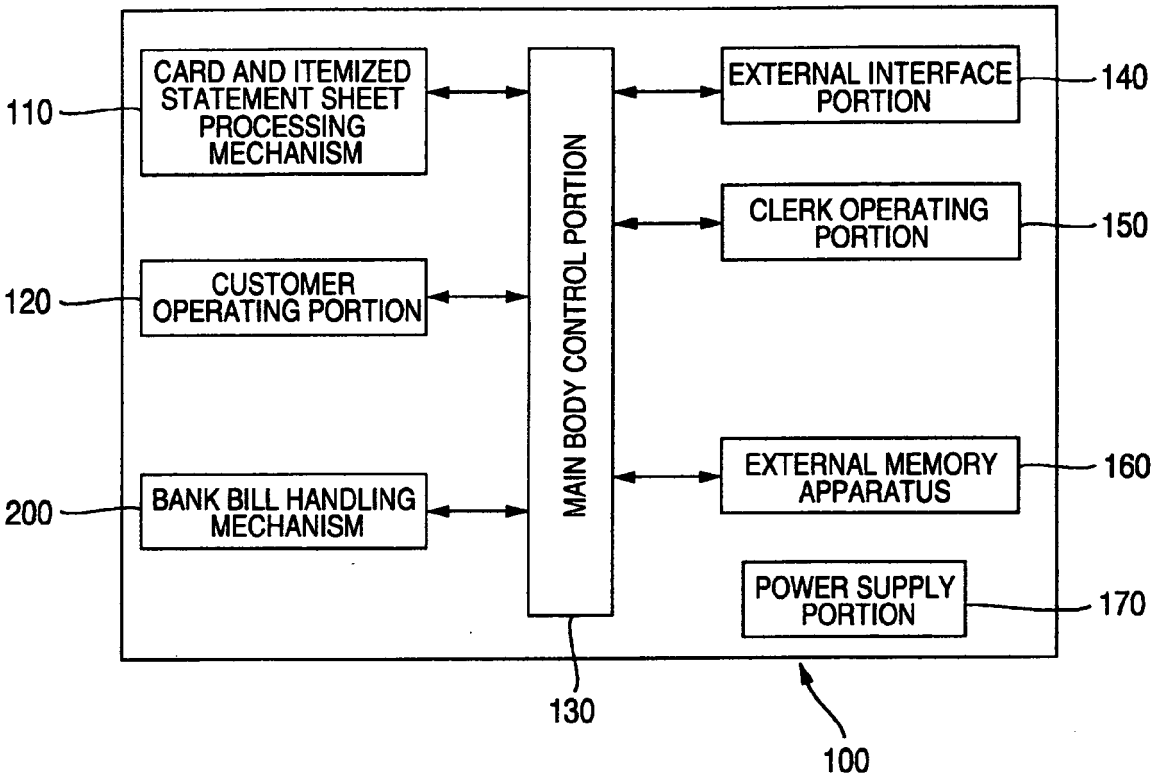


FIG.2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BANK BILL HANDLING MECHANISM
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MAIN BODY CONTROL PORTION
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EXTERNAL INTERFACE PORTION
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CLERK OPERATING PORTION
150
EXTERNAL MEMORY APPARATUS
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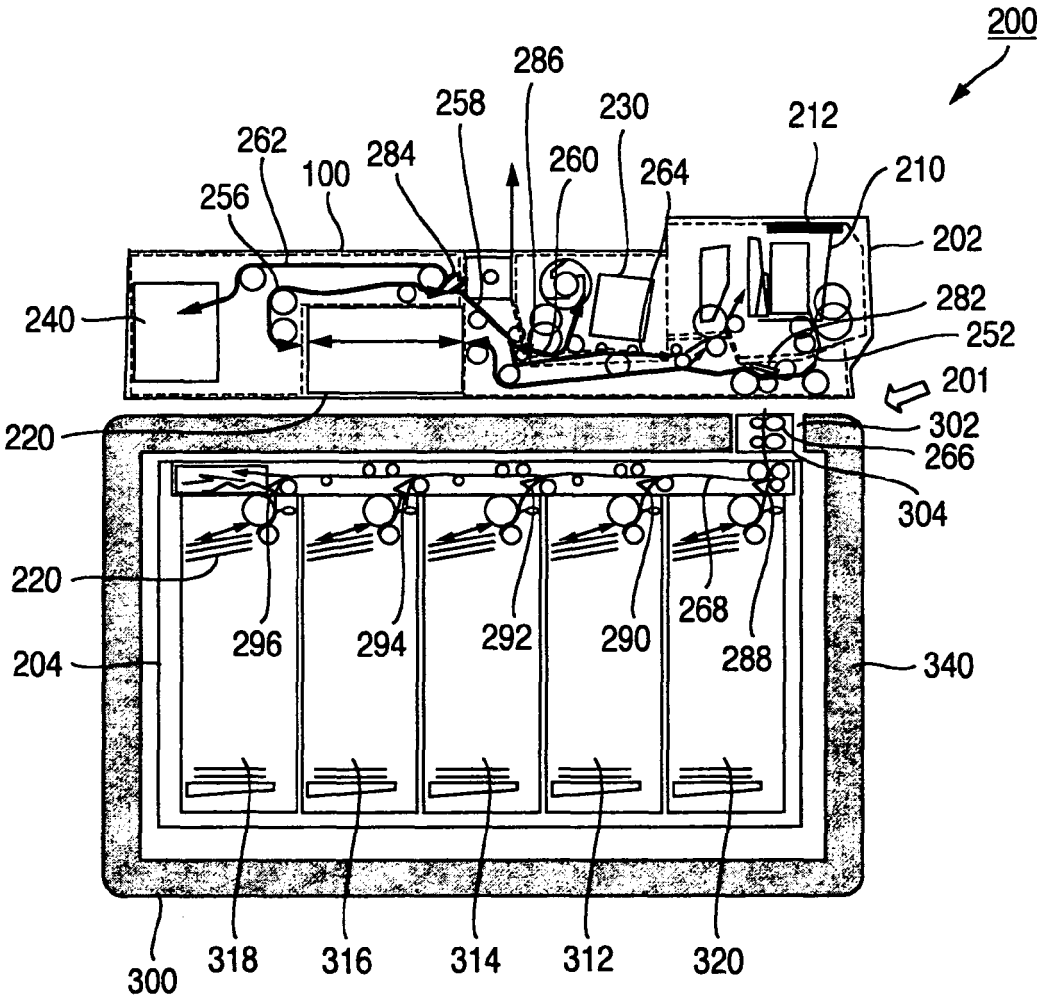
POWER SUPPLY PORTION
170
100

FIG.3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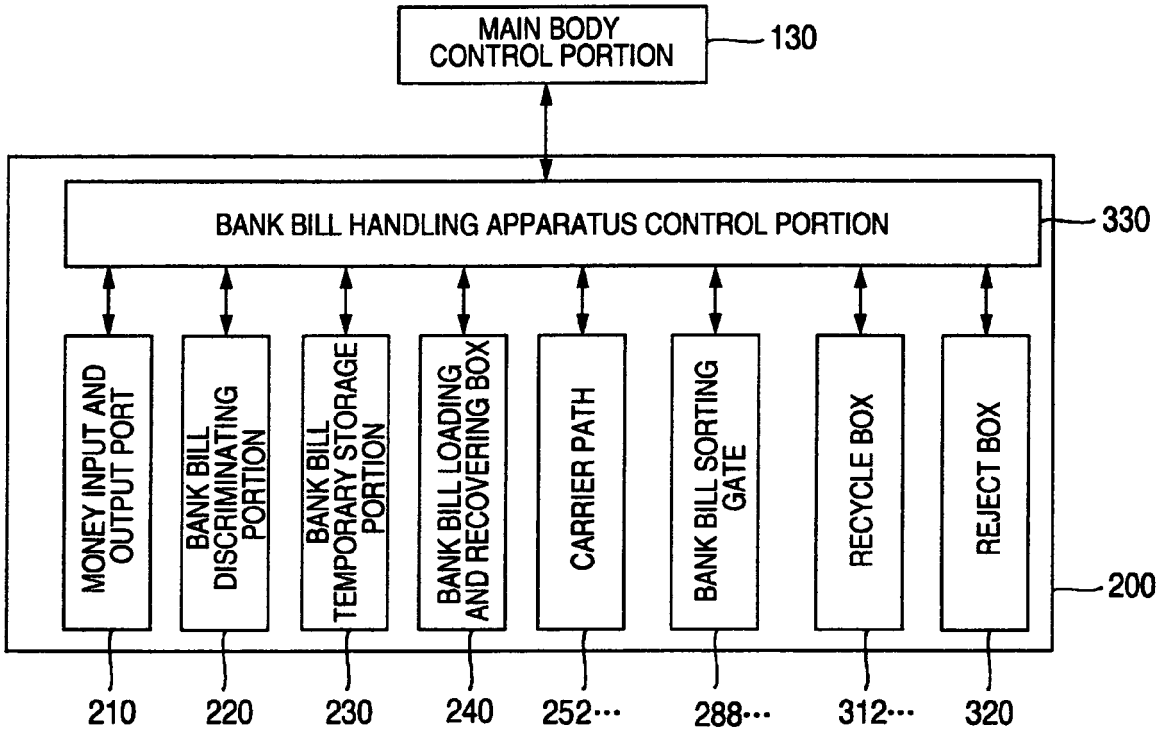
292
290
268
288
204
340
300
318
316
314
312
320

FIG.4


MAIN BODY CONTROL PORTION
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BANK BILL HANDLING APPARATUS CONTROL PORTION
330
MONEY INPUT AND OUTPUT PORT
BANK BILL DISCRIMINATING PORTION
BANK BILL TEMPORARY STORAGE PORTION
BANK BILL LOADING AND RECOVERING BOX
CARRIER PATH
BANK BILL SORTING GATE
RECYCLE BOX
REJECT BOX
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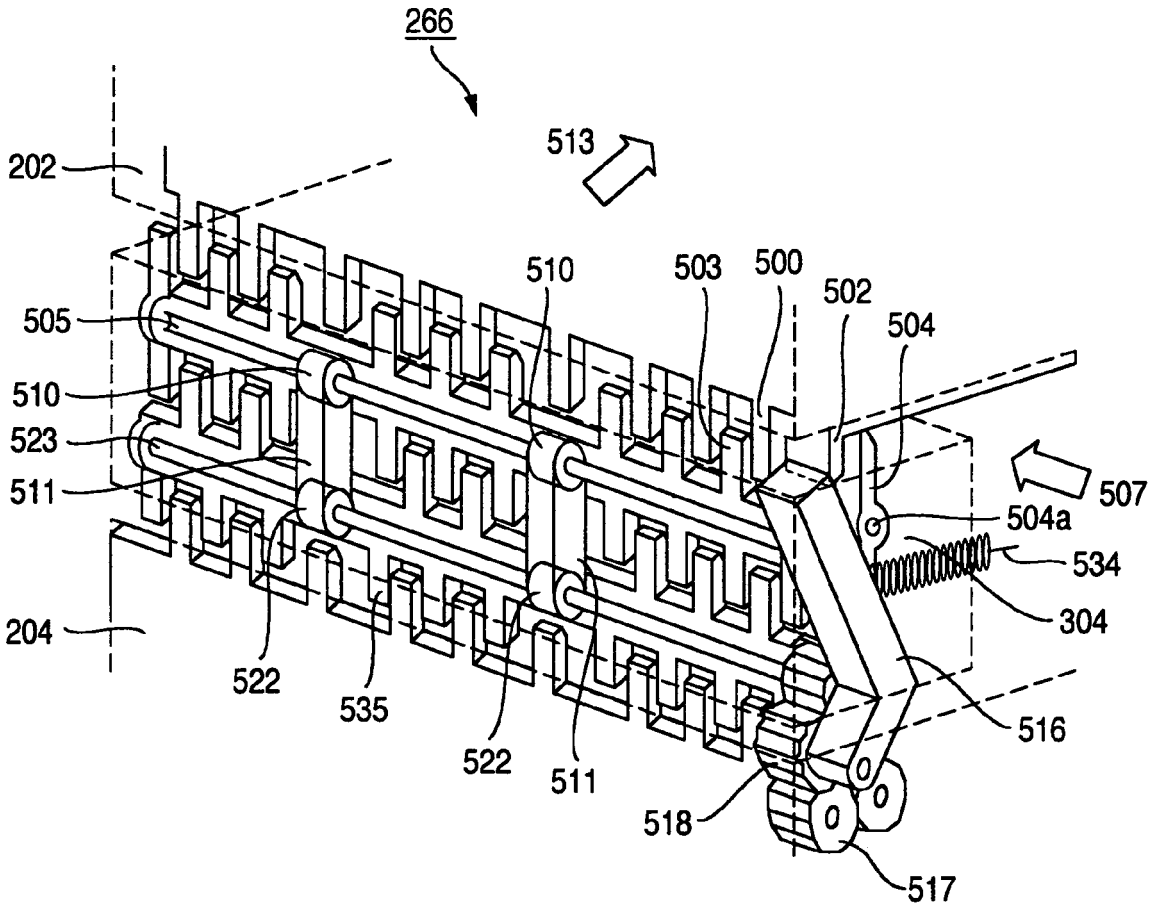
210
220
230
240
252···
288···
312···
320

FIG.5


266
513
202
505
510
523
511
204
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502
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504a
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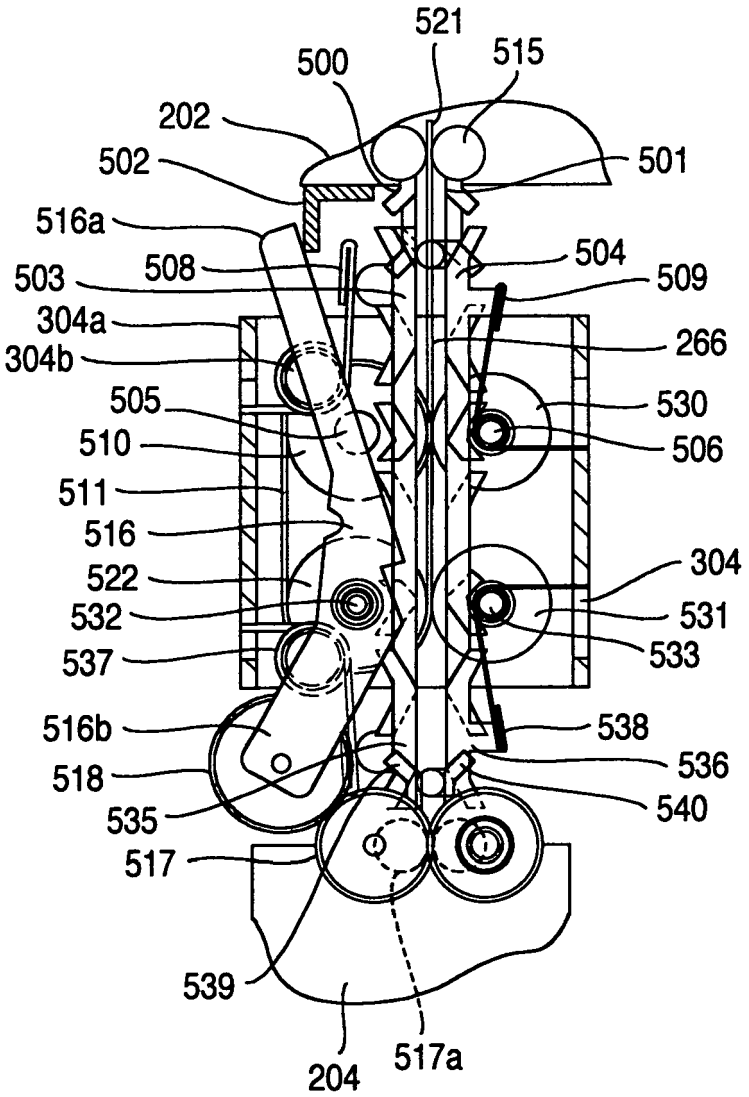
534
304
516
518
517

FIG.6


521
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502
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503
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266
304b
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516b
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540
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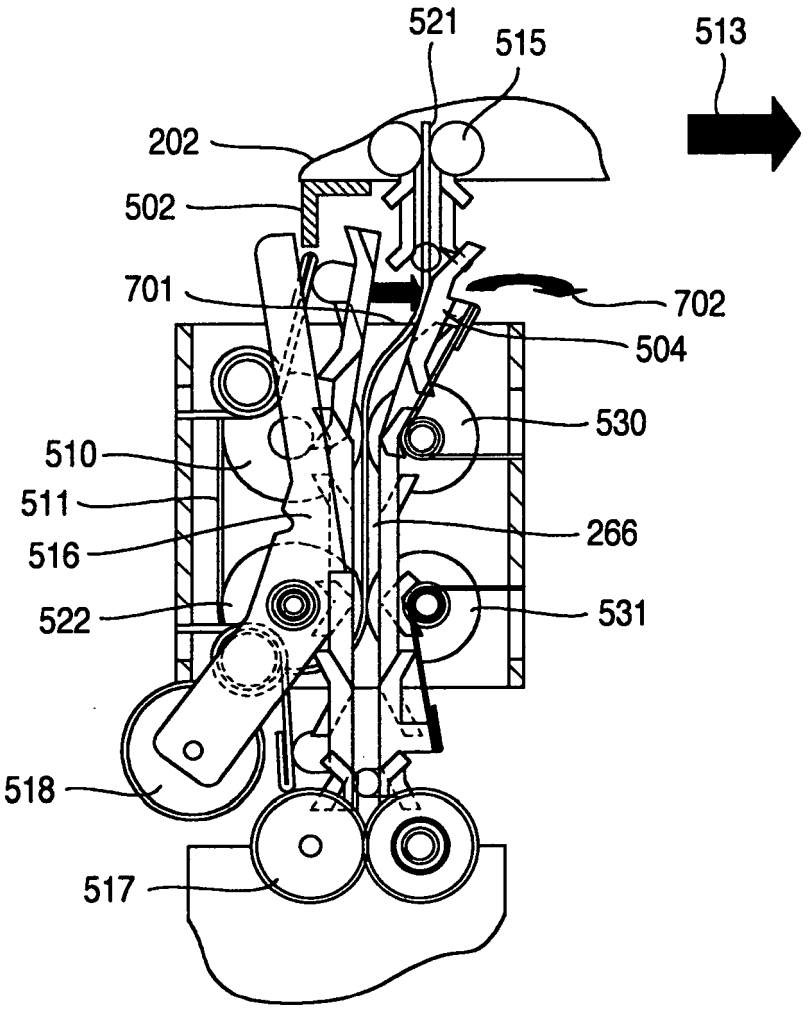
517
539
204
517a

FIG.7


521
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266
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531
518
517

FIG.8

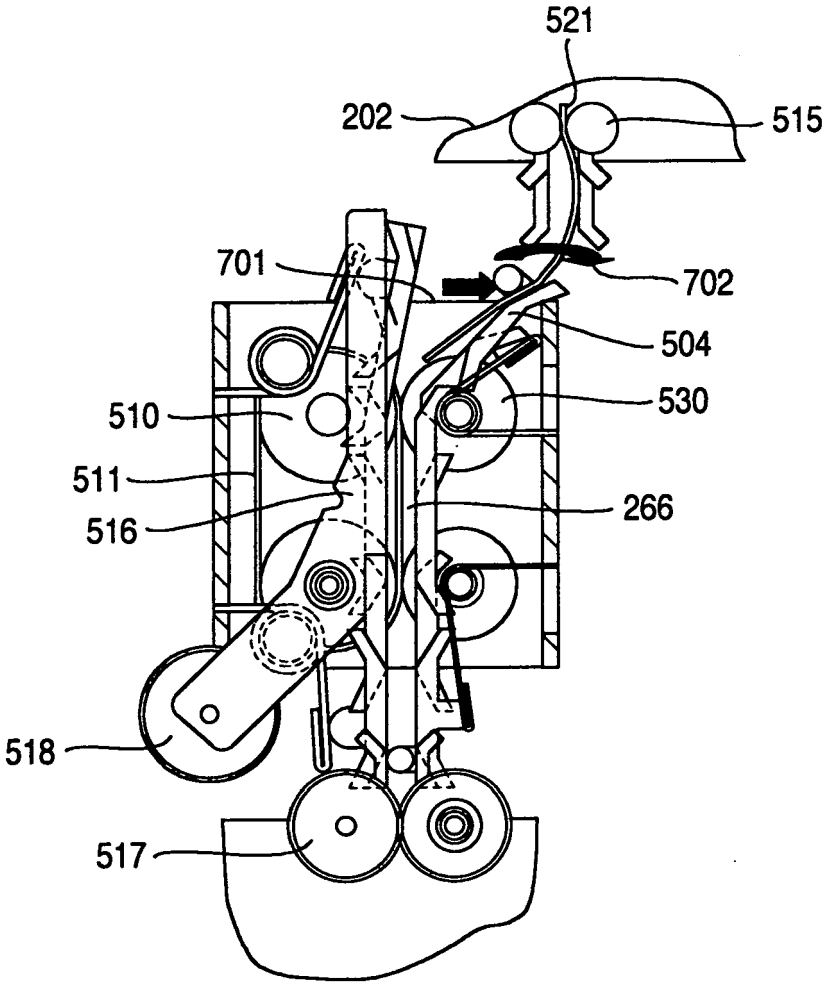


FIG.9

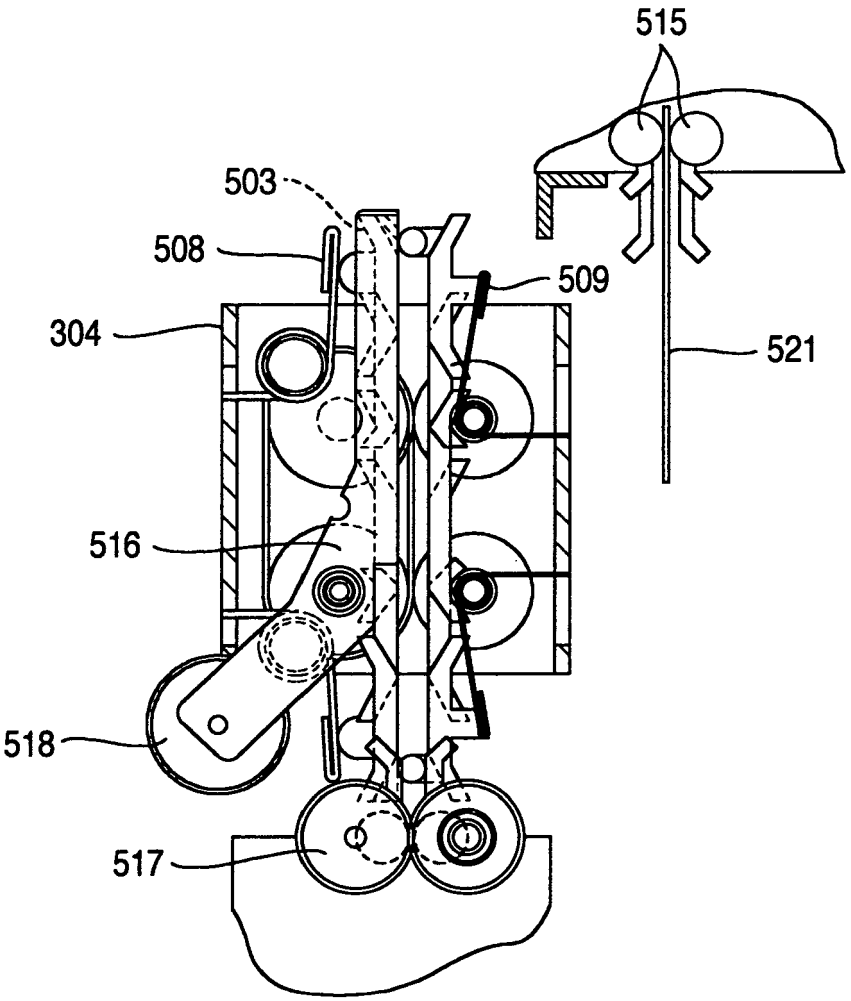


FIG.10

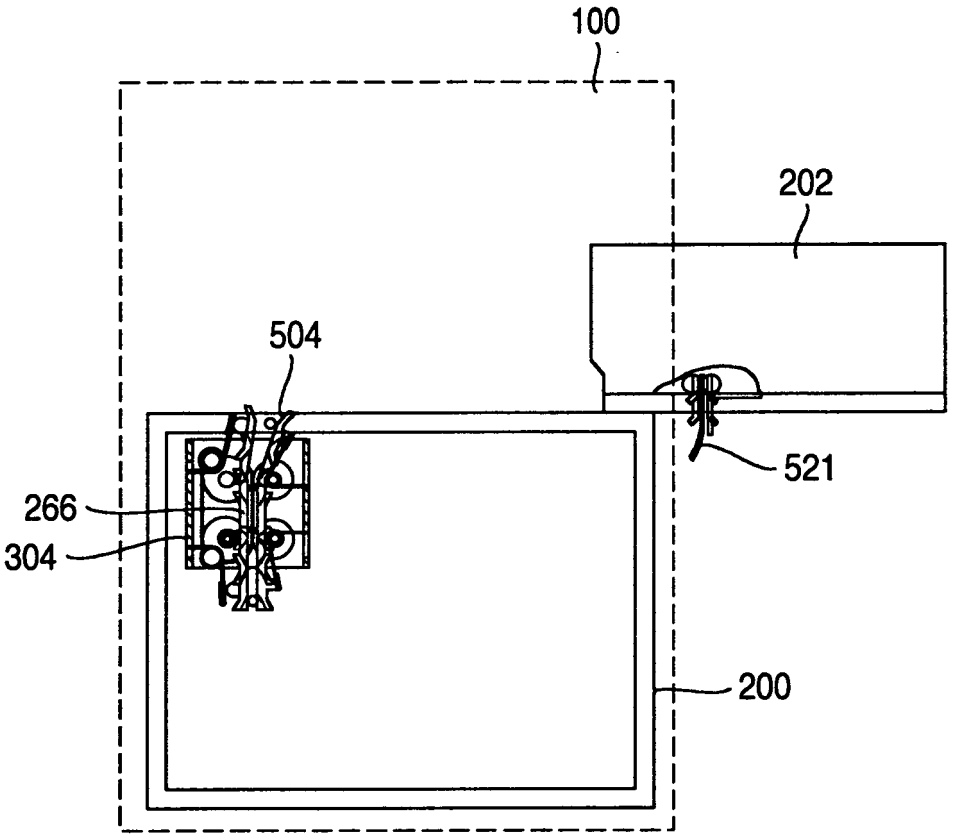


FIG.11

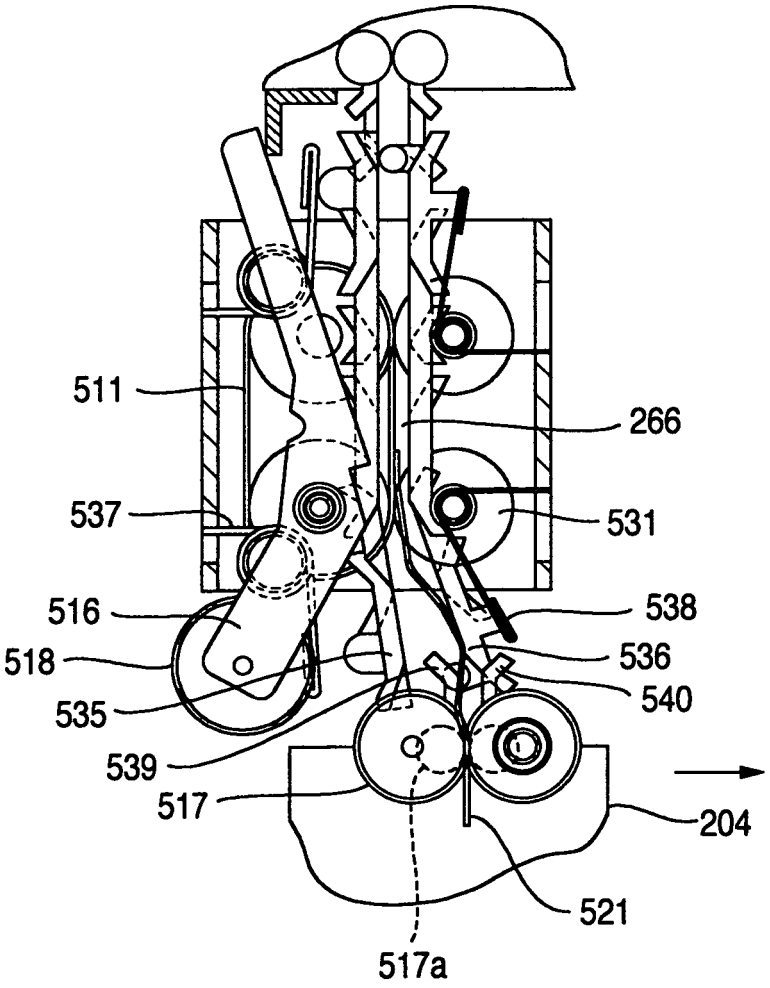


FIG.12

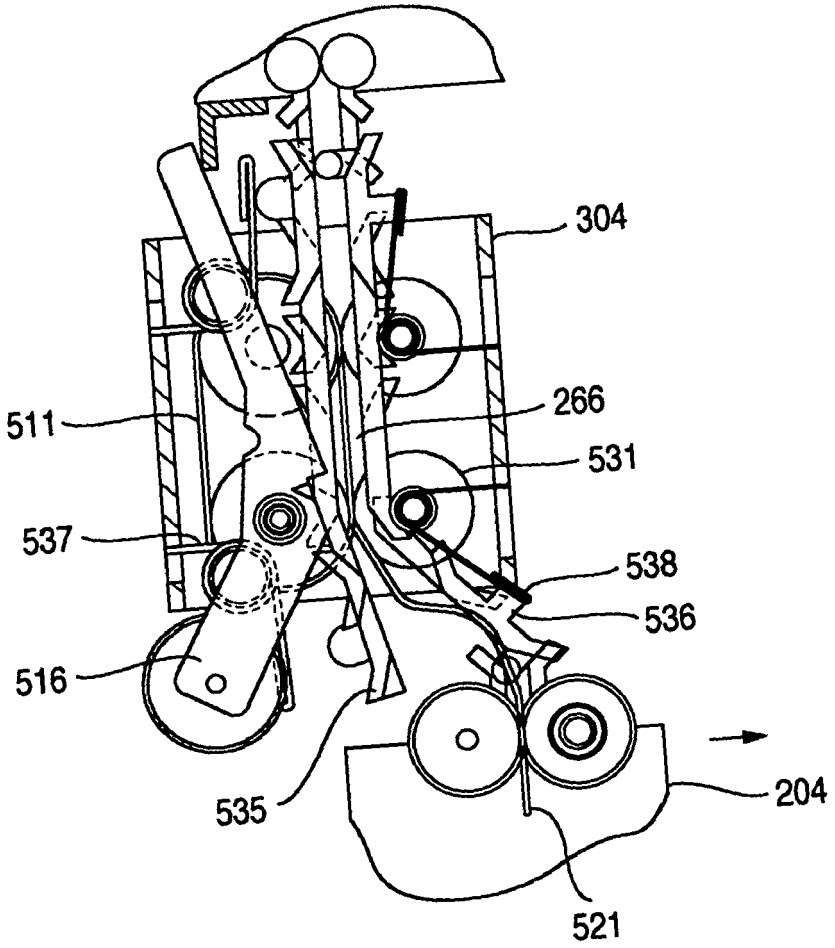
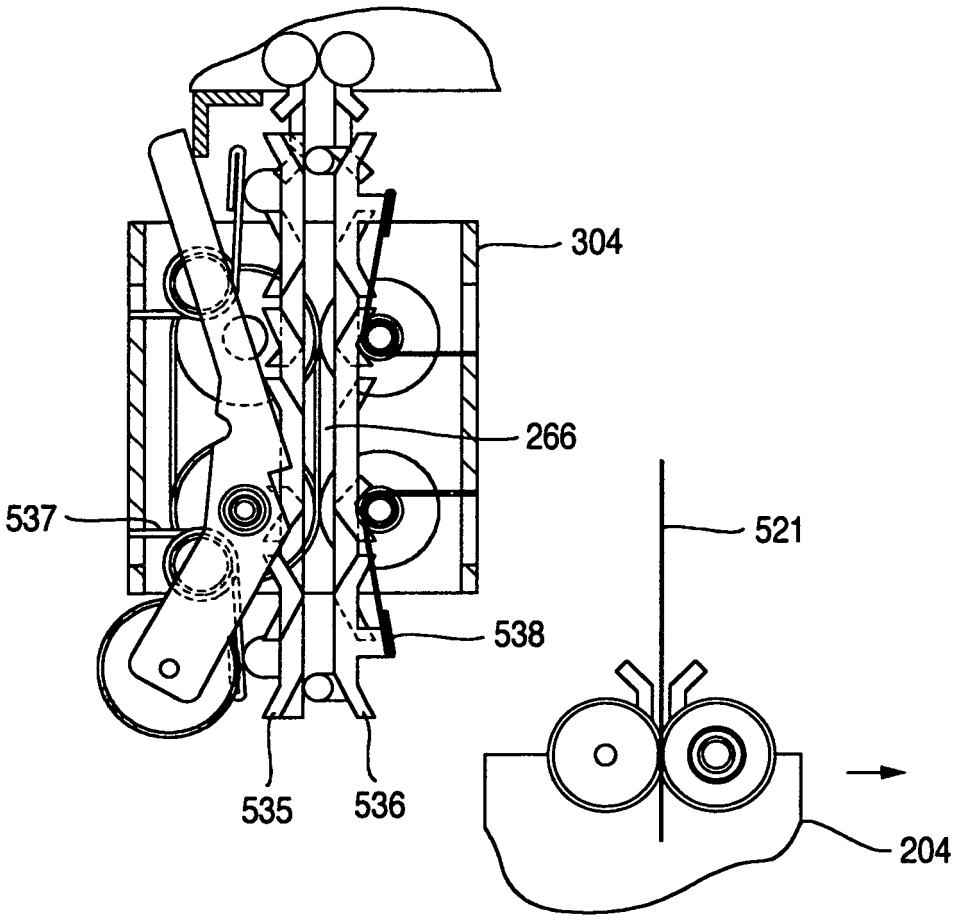


FIG.13



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EUROPEAN SEARCH REPORT

Application Number
EP 09 00 8070

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 209 633 A (HITACHI LTD [JP] HITACHI OMRON TERMINAL SOLU [JP]) 29 May 2002 (2002-05-29) * paragraphs [0004] - [0008] * * paragraphs [0020] - [0025] * * paragraphs [0033] - [0055] * * figures 1,3,6A-8 * -----	1-5	INV. G07D11/00
A	WO 2007/057471 A (CTS CASHPRO S P A [IT]; CURINA MAURIZIO [IT]; GIACONE FELICE [IT]) 24 May 2007 (2007-05-24) * page 3, line 32 - page 5, line 4 * * page 6, lines 4-9 * * figure 1 * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC) G07D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	4 November 2009	Espuela, Vicente

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
L : document cited for other reasons

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1

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 00 8070

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04-11-2009

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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