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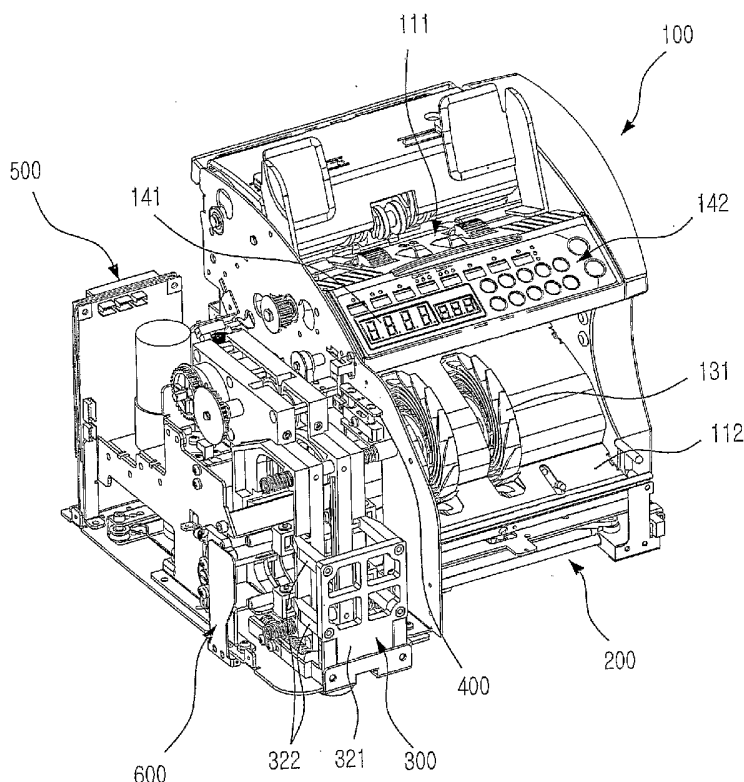
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(54) Title: PAPER MONEY CALCULATING APPARATUS HAVING AN AUTO STRAPPING-FUNCTION



(57) Abstract: Disclosed is a paper money calculating apparatus having an auto strapping-function. Particularly, the present invention is contrived to provide a paper money calculating apparatus having an auto strapping-function capable of automatically performing steps of calculating predetermined amounts of paper money and strapping the calculated paper money to thereby shorten a business processing time and improve applicability and functionality of the paper money calculating apparatus. The paper money calculating apparatus provided with the auto strapping-function includes: a calculating device for calculating predetermined amounts of paper money by a command, displaying the calculation and discharging the calculated paper money; a transporting device for transporting a wad of the discharged paper money; a strapping device configured in one side of the calculating device for strapping the transported wad of paper money; an arranging device for arranging the transported wad of paper money; and a central controlling device for controlling configuration devices.

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PAPER MONEY CALCULATING APPARATUS HAVING AN AUTO
STRAPPING-FUNCTION

Technical Field

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The present invention relates to a paper money calculating apparatus; and, more particularly, to a paper money calculating apparatus having an auto strapping-function capable of automatically performing sequential steps of calculating predetermined amounts of paper money and strapping the calculated paper money to thereby obtain a rapid business processing time by eliminating a need of using an additional strapping apparatus or a strapping operation and improve functionality of the paper money calculating apparatus.

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Background Art

Generally, an automatic paper money calculating apparatus for rapidly and accurately calculating amounts of money is used in business places dealing with large amounts of money, for instance, financial institutions.

The paper money calculating apparatus for calculating amounts of money in paper types such as paper money and cheques starts to operate automatically when a user puts predetermined amounts of paper money on a receiving unit. That is, the paper money calculating apparatus calculates the predetermined amounts of paper money put on the receiving unit. Then, the paper money calculating apparatus discharges the calculated paper money to a designated outer part and displays the calculated amount on a display unit.

When it is necessary to separate wads of the calculated paper money into each predetermined amount and to easily carry the wads of paper money, a user

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additionally employs a paper money strapping apparatus to strap the calculated wad of paper money.

However, the conventional paper money calculating apparatus has a mere function of calculating a desired amount of paper money, and thus, the above mentioned paper money strapping apparatus is additionally used to strap the desired amount of the calculated paper money. For this reason, a user has to manually perform the calculating operation and the strapping operation since these two operations cannot be automatically performed. As a result of this manual operation, there are disadvantages of inconvenience and delayed business processing time.

Disclosure of the Invention

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It is, therefore, an object of the present invention to provide a paper money calculating apparatus having an auto strapping-function for allowing an operation of calculating a predetermined amount of paper money and an operation of strapping the predetermined amount of the calculated paper money to be automatically performed to thereby provide convenience to a user by eliminating conventionally performed manual calculating and strapping operations and shorten a business processing time.

25 In accordance with one aspect of the present invention, there is provided a paper money calculating apparatus provided with an auto strapping-function, including: a calculating device for calculating predetermined amounts of paper money by an inputted command, displaying the calculation result and discharging the calculated paper money; a transporting device for transporting a wad of the discharged paper money into a predetermined place; a strapping device configured in one side of the calculating device for strapping the wad of the paper money transported by the transportation device; an

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arranging device for arranging the wad of the paper money transported by the transporting device; and a central controlling device for controlling configuration devices.

In accordance with another aspect of the present invention, the transporting device includes: a base frame; a paper money feeding inlet formed in an extending line of a paper money transportation direction of the transportation device; a roll paper for use in strapping supplied to strap a wad of paper money fed into the paper money feeding inlet; a roll paper supplying means supplying the roll paper and guiding the roll paper around the fed wad of paper money; a curling means being formed to be movable toward the roll paper supplying means and giving a predetermined curling state by pressing one surface of the fed wad of paper money; and a roll paper strapping means strapping the fed wad of paper money with the roll paper supplied by the roll paper supplying means and cutting the strapped roll paper.

In accordance with another aspect of the present invention, the strapping device includes: an arrangement driving motor; an arrangement base block making a sliding movement by receiving a driving force from the arrangement driving motor; a driving medium means for transmitting the driving force from the arrangement driving motor to the transportation base block; at least more than one guiding members guiding the arrangement base block; an arrangement means arranging a wad of paper money in upward and downward directions as moving together with the arrangement base block by being connected with the arrangement base block; and a controlling means controlling upward and downward movements of the arrangement base block.

In accordance with still another aspect of the present invention, the arranging device includes: an arrangement driving motor; an arrangement base block making a sliding movement by receiving a driving force from the

arrangement driving motor; a driving medium means for transmitting the driving force from the arrangement driving motor to the transportation base block; at least more than one guiding members guiding the arrangement base block; an
5 arrangement means arranging a wad of paper money in upward and downward directions and left and right directions as moving together with the arrangement base block by being connected with the arrangement base block; and a
controlling means controlling upward and downward movements
10 of the arrangement base block.

In accordance with further aspect of the present invention, the discharging device includes: a discharge driving bar moving by the transporting device; a plurality of restoring springs restoring the discharge driving bar
15 into an original position; at least more than one discharge guiding block guiding the discharge driving bar to move by passing through said at least more than one discharge guiding blocks; and a discharge member formed in the other end of the discharge driving bar and discharging a wad of
20 paper money strapped by the strapping device.

Brief Description of the Drawings

Other objects and aspects of the invention will become
25 better understood with respect to the following description of the preferred embodiments given in conjunction with the accompanying drawings, in which:

Fig. 1 is a frontal perspective view showing a paper money calculating apparatus provided with an auto
30 strapping-function in accordance with the present invention;

Fig. 2 is a rear perspective view showing the paper money calculating apparatus provided with the auto
35 strapping-function in accordance with the present invention;

Fig. 3 is an interior perspective view showing the paper money calculating apparatus provided with the auto strapping-function in accordance with the present invention;

5 Fig. 4 is a side cross-sectional view showing an internal structure of a calculating device unit configured in the paper money calculating apparatus provided with the auto strapping-function in accordance with the present invention;

10 Fig. 5 is a perspective view showing a transporting device unit configured in the paper money calculating apparatus provided with the auto strapping-function in accordance with the present invention;

15 Fig. 6 is a top view showing another type of a sensor plate configured in the transporting device unit of the paper money calculating apparatus in accordance with the present invention;

20 Fig. 7 is a perspective view showing a strapping device unit of the paper money calculating apparatus provided with the auto strapping-function in accordance with a preferred embodiment of the present invention;

25 Fig. 8 is a perspective view showing the configuration of the strapping device unit except for a roll paper guiding unit in the paper money calculating apparatus in accordance with the preferred embodiment of the present invention;

30 Fig. 9 is a perspective view showing a strapping device unit of a paper money calculating apparatus provided with an auto strapping-function in accordance with another preferred embodiment of the present invention;

35 Fig. 10 is a perspective view showing the configuration of the strapping device unit except for a roll paper guiding unit in the paper money calculating apparatus in accordance with said another preferred embodiment of the present invention;

Fig. 11 is a perspective view showing an arranging device unit of the paper money calculating apparatus provided with the auto strapping-function in accordance with the present invention;

5 Fig. 12 is a bottom-side perspective view showing a transporting device unit and a discharging device unit of the paper money calculating apparatus provided with the auto strapping-function in accordance with the present invention;

10 Fig. 13 is a configuration diagram showing a central controlling device unit of the paper money calculating apparatus provided with the auto strapping-function in accordance with the present invention; and

15 Figs. 14 and 15 are flowcharts for describing steps of a strapping operation in the paper money calculating apparatus provided with the auto strapping-function in accordance with the present invention.

Best Mode for Carrying out the Invention

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The above object, features and advantages of the present invention will become apparent from the following description of the preferred embodiments with reference to the accompanying drawings. Hereinafter, a paper money calculating apparatus having an auto strapping-function will be described in detail with reference to the accompanying drawings.

30 Fig. 1 is a frontal perspective view showing a paper money calculating apparatus provided with an auto strapping-function in accordance with the present invention. Fig. 2 is a rear perspective view showing the paper money calculating apparatus provided with the auto strapping-function, and Fig. 3 is an interior perspective view showing the paper money calculating apparatus provided
35 with the auto strapping-function.

As shown in the drawings, the paper money calculating apparatus provided with the auto strapping-function is configured as follows.

The paper money calculating apparatus includes: a calculating device 100 for calculating paper money and displaying the calculation result by an inputted command and for discharging the calculated paper money outside; a transporting device 200 for transporting a wad of the discharged paper money from the calculating device 100 to one designated place; a strapping device 300 for strapping the wad of the discharged paper money transported by the transporting device 200, the strapping device 300 being integrated in one side of the calculating device 100; an arranging device 400 for arranging the wad of paper money discharged from the calculating device 100 and transported by the transporting device 200; a central controlling device 500 for controlling each configuration elements; and a discharging device 600 for discharging the wad of paper money strapped at the strapping device 300.

More detailed description on configuration devices and device elements of the paper money calculating apparatus provided with the auto strapping-function will be provided in the following.

(1) Calculating Device 100

The calculating device 100 will be described with reference to Fig. 4. Fig. 4 is a side cross-sectional view showing an internal structure of a calculating device unit of the paper money calculating apparatus provided with the auto strapping-function in accordance with the present invention.

As shown in the drawing, the calculating device 100 includes: a base frame 110a; a paper money receiving unit 111 configuring an outer part of the calculating device 100 and having an upper part on which a wad of paper money to be calculated are placed; a case 110 having a discharge

unit 113 in which a stacker 112 which supports a wad of downwardly discharged paper money to be stacked is formed; a main motor 120 mounted on the base frame 110a disposed on an inner bottom part of the case 110; a first transporting roller 121 rolling by being connected to a driving shaft of the main motor 120 through the use of a pulley and a belt as media; a second transporting roller 122 rolling by being connected to the first transporting roller 121 through the use of a gear as a medium; a pick-up roller 123 rolling by being connected to the second transporting roller 122 through the use of a pulley and a belt as media; a discharge motor 124 mounted in a discharge unit side of the case 110; a discharge wheel 130 rotating as the discharge motor 124 actuates and having a plurality of spiral discharge wings 131 in an outer circumferential surface of the discharge wheel 130; a paper money transportation passage (not shown) in which pieces of paper money discharged from the paper money receiving unit 111 are transported towards the discharge unit 113 along an outer circumferential surface of the first transporting roller 121; a first detecting means for detecting the existence or absence of paper money and determines amounts of the paper money by being allocated in between the paper money receiving unit 111 and the paper money transportation passage; a display 141 for expressing the calculation result by an input signal from the detection unit and displaying a status of the paper money calculating apparatus; and a plurality of function keys 142 for inputting various commands, the plurality of function keys 142 being configured in an exterior side of the case 110.

The first detecting means includes: a supplied paper money detecting sensor for detecting whether a piece of paper money is disposed on a designated place by being placed in one side of the paper money receiving unit 111 where the piece of paper money is disposed; a discharged

paper money detecting sensor for detecting a piece of paper money discharged to the discharge unit 113 by being placed in lateral sides where the stacker 112 faces inwardly; and a transported paper money detecting sensor for detecting each piece of paper money being transported along the paper money transportation passage by being placed in the paper money transportation passage.

A rubber 123A for increasing a frictional force with surfaces of paper money is disposed in an outer circumferential portion of the pick-up roller 123.

(2) Transporting Device 200

With reference to Fig. 5, the transporting device 200 will be described in more detail. The transporting device 200 plays a role in transporting a wad of paper money calculated and then discharged from the calculating device 100 to the strapping device 300. Also, the transporting device 200 is located beneath the stacker 112 of the calculating device 100. Fig. 5 is a perspective view of a transporting device unit configured in the paper money calculating apparatus provided with an auto strapping-function in accordance with the present invention.

As shown in the drawing, the transporting device 200 is formed in an interior side of the calculating device 100. The transporting device 200 includes: a transportation driving motor 210 for generating a driving force; a driving pulley 220 rotating by the transportation driving motor 210 and having a rotation plate 222 with a plurality of detecting apertures opened with a predetermined distance along a rim of the rotation plate 222; a plurality of transportation bell metal pulleys 241 to 243 rotating when receiving a driving force of the driving pulley 220 using a transportation driving belt 230 as a medium; a transportation base block 250 fixed in one portion of the transportation driving belt 230 and moving as the transportation driving belt 230 moves; at least more

than one guiding members 260 for guiding the movement of the transportation base block 250;- a moving bar 270 extending from the transportation base block 250 and moving a wad of paper money stacked in the stacker 112 as the transportation base block 250 moves; and a controlling means for controlling operation of the transportation base block 250.

The transportation driving belt 230 has a predetermined path that connects the driving pulley 220 with the plurality of transportation bell metal pulleys 241 to 243.

Said at least more than one guiding members 260 are preferably formed in a bar shape to allow said at least more than one guiding members to pass through the transportation block 250, so that the transportation base block 250 can make a sliding movement along said at least more than one guiding members 260. At this time, said at least more than one guiding members 260 are preferably configured by a pair of guiding bars for stably supporting and moving the transportation base block 250.

Also, a slide bearing (not shown) can be formed inside of the transportation base block 250 through which said at least one guiding members pass in order for the transportation base block 250 to make smooth left and right sliding movements on said at least more than one guiding members 260.

The controlling means includes: a transportation encoder sensor 280 for controlling forward and reverse rotations of the transportation driving motor 210 to control left and right movement operations of the transportation base block 250; and a grooved transportation sensor 290 being mounted on a portion of the transportation base block 250 and serving roles in checking an initial position (a starting point) of the transportation base block 250 and initializing the position of the

transportation driving motor 210 when in error.

Herein, the transportation encoder sensor 280 is a photo-sensor, and a sensing unit of the transportation encoder sensor 280 faces to the detecting apertures 221 of the rotation plate 222 of the driving pulley 220. Therefore, as the driving pulley 220 rotates, a detecting operation is carried out where the detecting apertures 221 are not formed and, in contrast, the detecting operation stops where the detecting apertures 221 are formed. As a result of this selective detecting operation, the transportation encoder sensor 280 can detect the number of forward or reverse rotations made by the transportation driving motor 210.

Also, the driving pulley 220, the transportation bell metal pulleys 241 to 243 and transportation driving belt 230 are media for driving the transportation base block 250 by receiving a driving force generated by the transportation driving motor 210. Also, it is well known that any configuration is allowable as long as the driving force provided from the transportation driving motor 210 can be delivered to the transportation base block 250.

Furthermore, as shown in Fig. 6, the rotation plate 222 can include: a circular plate; and a plurality of protrusions protruded outwardly from an outer rim of the circular plate with a predetermined distance. Hence, each predetermined distance between the protrusions serves as the detecting apertures 221 of the rotation plate 222.

(2) Strapping Device 300

With reference to Figs. 7 and 8, the strapping device 300 being disposed in one side of the calculating device 100 and serving a role in strapping a wad of paper money transported by the transporting device 200 will be described in detail. Especially, Fig. 7 is a perspective view showing the configuration of a strapping device unit of the paper money calculating apparatus provided with the

auto strapping-function in accordance with the present invention. Fig. 8 is a perspective view showing the configuration of the strapping device unit except for a roll paper guiding means in accordance with the present
5 invention.

As shown, the strapping device 300 includes: a base frame 300a; a paper money feeding plate 301 formed in an extending line of a paper money transportation direction from the transporting device 200; a roll paper 302 (refer
10 to Fig. 2) supplied to strap a wad of paper money fed into the paper money feeding plate 301; a roll paper supplying means 310 being mounted on the base frame 300a and serving a role in supplying and guiding the roll paper 302 around the wad of paper money; a curling means 320 giving an
15 adequate curling to the wad of paper money by moving toward the roll paper supplying means 310; more particularly, by moving in a perpendicular direction to the wad of paper money; and a roll paper strapping means 330 strapping the wad of paper money in a predetermined curled state with the
20 roll paper 302 supplied from the roll paper supplying means 310 and then cutting the strapped roll paper 302.

Herein, in one side of the roll paper 302, hotmelt adhesives are coated and dried.

The roll paper supplying means 310 is configured such
25 that the roll paper 302 can be smoothly supplied to a place where the wad of paper money can be strapped. The roll paper supplying means 310 includes: a pair of left and right frames 311 and 312 having an approximate square shape, being arranged in parallel with a predetermined
30 spacing distance in one upper side of the base frame 300a and guiding the roll paper 302 to be smoothly supplied; a roll paper supplying motor 313 being disposed between the pair of the left and right frames 311 and 312 which support the roll paper supplying motor 313 and being capable of
35 making forward and reverse rotations; a roll paper

supplying gear 313a mounting on an exterior side of one of the left and the right frames 311 and 312, i.e., on the exterior side of the left frame 311, and rotating by the roll paper supplying motor 313; a reduction gear 313b
5 rotating by engaging with the roll paper supplying gear 313a; a roll paper feeding inlet 314 where the roll paper 302 is fed into, the roll paper feeding inlet 314 being opened in upper surfaces of the pair of left and right frames 311 and 312; a pair of roll paper feeding rollers
10 (not shown) formed between portions of the pair of left and right frames 311 and 312 where the roll paper feeding inlet 314 is formed and one of the pair of feeding rollers being connected to a rotation shaft of the reduction gear 313b to make the pair of roller paper feeding rollers rotate by
15 having a contact surface in an extending line of the roll paper feeding inlet 314 and thus to make the roll paper 302 fed into a space between the roll paper feeding rollers; a pair of roll paper guiding members 315 and 316 being disposed in parallel in a forth direction from the pair of
20 left and right frames 311 and 312 with a predetermined spacing distance, having a space for allowing the fed wad of paper money to be allocated inside, being specifically arranged such that the pair of the roll paper guiding members 315 and 316 is allowed to move in an opposite
25 direction from each other and guiding the roll paper 302 supplied through the pair of left and right frames 311 and 312 to circle around the fed wad of paper money by cooperating with the left and the right frames 311 and 312; and a plurality of elastic members 317 restoring the pair
30 of roll paper guiding members 315 and 316 to an original position.

Herein, on the inner side of a space between the pair of left and right frames 311 and 312 and the pair of roll paper guiding members 315 and 316, there is provided a roll
35 paper guiding passage (not shown) for guiding the roll

paper 302 to go around the space.

Also, there are roll paper guide driving rollers 318 for moving the pair of roll paper guiding members 315 and 316 in opposite direction, i.e., the direction making the pair of roll paper guiding members 315 and 316 apart from each other as curling bars 322 of the curling means 320 move inwardly with a predetermined distance and contact both sides of the pair of roll paper guiding members 315 and 316. That is, a plurality of supporting frame 318a having a shape of '□' are placed in upper and lower sides of outer walls of the roll paper guiding members 315 and 316, and the roll paper guide driving rollers 318 are arranged such that the roll paper guide driving rollers 318 rotate inside of each supporting frame 318a, but arranged with a predetermined distance from the outer walls of the roll paper guiding members 315 and 316.

Therefore, when the curling bars 322 move into respective interstitial spaces created between each outer wall of the roll paper guiding members 315 and 316 and each roll paper guide driving roller 318, the roll paper guide driving rollers 318 contact the curling bars 322 by rotating along the curling bars 322, respectively. As a result, the roll paper guiding members 315 and 316 are moved in opposite direction.

The curling means 320 for providing an adequate curling to the wad of paper money which is, in turn, strapped with the roll paper 302 supplied from the roll paper supplying means 310 includes: a movable base plate 321 having an approximate square shape and being perpendicularly mounted on the base frame 300a such that the movable base plate 321 is capable of moving towards the pair of roll paper guiding members 315 and 316; the above-described curling bars 322 extending from each corner of the movable base plate 321 toward the pair of roll paper guiding members 315 and 316, each having an angled surface

322a with a decreasing angle as going towards an end part of one surface of the selected curling bar 322, opening the pair of roll paper guiding members 315 and 316 in opposite direction by being contacted to the respective roll paper
5 guide driving rollers 318 as the curling bars 322 move together with the movable base plate 321, and pressing upper and lower portions of the wad of paper money fed into the space of the pair of left and right frames 311 and 312; interlocking bars 323 interlocking with the movement of the
10 movable base plate 321; a pair of curling rotary moving bodies 324 each rotating around a respective central axle 324a and having one end pressed by the respective interlocking bar 323; a curling contact bar 325 being connected to the other end of each curling rotary moving
15 body 324 and pressing a rear side, i.e., the side opposite to a side with which the curling bars 322 are contacted, of the wad of paper money fed by the rotation of the curling rotary moving bodies 324; a plurality of first elastic restoring members 326 restoring the movable base plate 321
20 into an original position; and a driving means for driving the movable base plate 321.

The curling rotary moving bodies 324 are built in a vertical frame 300b being perpendicularly mounted on the base frame 300a and supporting configuration elements. A
25 plurality of second elastic restoring members 324b for restoring the curling rotary moving bodies 324 into an original position after the rotation of the curling rotary moving bodies 324 are formed in the other upper end of each curling rotary moving body 324 and in one upper side of the
30 vertical frame 300b.

Herein, for detail description about the mechanism of the roll paper guide driving rollers 318 and the curling bars 322 for opening the pair of roll paper guiding members 315 and 316 in opposite direction, when the curling bars
35 322 move as contacting the roll paper guide driving rollers

318, the roll paper guide driving rollers 318 move as riding on the respective angled surfaces 322a of the curling bars 322, thereby opening the pair of roll paper guiding members 315 and 316 in opposite direction. The
5 reason for opening the pair of roll paper guiding members 315 and 316 is to block the pair of roll paper guiding members 315 and 316 from interfering with activities of a subsequent cutter assembly 332 such as cutting and adhesion of the roll paper 302. More detail explanation of these
10 activities will be provided later.

The driving means for driving the movable base plate 321 can be embodied in any form that allows the movable base plate 321 to move toward the pair of roll paper guiding members 315 and 316. For instance, the driving
15 means includes: a cam driving motor 326 disposed in one side of the base frame 300a; a driving gear 327a rotating by the cam driving motor 326; a transmission gear 327b engaging with the driving gear 327a; a curl driving cam 327c driving with the transmission gear 327b by having the
20 same shaft to the transmission gear in one end part of the transmission gear 327b; a curl driving lever 327d being rotatable around one end of the curl driving lever 327d as a rotation axle in the base frame 300a and rotating as the other end of the curl driving lever is interlocked with the
25 curling driving cam 327c; and a wire 328 being a medium member for moving the curling means 320 by the rotation of the curl driving lever 327d.

Next, the roll paper strapping means 330 includes: a cutter driving cam 331 disposed in the other end of the
30 transmission gear 327b by having the same shaft to the transmission gear 327b and driving together with the transmission gear 327b; the above mentioned cutter assembly 332 adhering the roll paper 302 used for strapping the wad of paper money as the cutter assembly 332 is shifted to the
35 rear side of the wad of paper money by the cutter driving

cam 331 and cutting the adhered roll paper 302; and a second detecting means for detecting the rotation of the cutter driving cam 331, i.e., that of the cam driving motor 326.

5 The cutter assembly 332 includes: a heater 332a for adhering the roll paper 302; and a cutter 332b for cutting the adhered roll paper 302.

 The second detecting means includes: a sensor plate 330a rotating around the same shaft to the cutter driving
10 cam 331 and having detecting apertures (not shown) opened with a predetermined distance along a rim of the sensor plate 330a; a grooved strapping sensor 330b being formed in one side of the sensor plate 330a such that a detection unit of the grooved strapping sensor 330b faces towards the
15 detecting apertures of the sensor plate 330a and detecting the rotation of the sensor plate 330a; and a jammed roll paper removing sensor 330c formed in the other side of the sensor plate 330a such that a detecting unit of the jammed roll paper removing sensor 330c faces towards the detecting
20 apertures of the sensor plate 330a and sensing and detecting a jammed piece of roll paper in the roll paper guiding passage of the roll paper guiding members 315 and 316 during the strapping operation by the strapping device 300. Herein, the grooved strapping sensor 330b is a photo-
25 sensor for detecting a driving of one rotation made by the cam driving motor 326.

 In other words, the grooved strapping sensor 330b is a sensor for checking an initial state and a completed driving state based on the fact that, when the cam driving
30 motor 326 completes one rotation, all relevant actuations of the strapping device 300 completes one cycle. Also, the jammed roll paper removing sensor 330c is a photo-sensor that drives the curling means 320 by making a half-rotation of the cam driving motor 326 when a piece of the roll paper
35 302 is jammed in the roll paper guiding passage of the roll

paper guiding members 315 and 316, so that the roll paper guiding members 315 and 316 are opened in both directions, further resulting in an easy of removing the jammed piece of the roll paper 302.

5 The two sensors, i.e., the grooved strapping sensor 330b and the jammed roll paper removing sensor 330c, proceed with the detecting activity where the detecting apertures of the sensor plate 330a are not formed, but stop the detecting activity where the detecting apertures are
10 formed. Thus, with use of this detection signal, it is possible to detect degrees of the rotation made by the cam driving motor 326 in a forward direction or in a reverse direction.

 In accordance with this preferred embodiment of the
15 present invention, it is exemplified that the cam driving motor 326 driving the movable base plate 321 is used as a driving source for driving the cutter driving cam 331 of the roll paper strapping means 330. However, it is still possible to use other additional driving sources for
20 achieving the same goal.

 With reference to Fig. 2, an unexplained reference numeral 300b is a case for covering the strapping device 300 for protection. Also, a roll paper stacking unit 340 where the roll paper 302 supplied to the roll paper
25 supplying means 310 is stacked is formed in one exterior side of the case 300b, i.e., a rear side of the diagram shown in Fig. 2. Furthermore, a plurality of roll paper guide rollers 371 to 373 for guiding the roll paper 302 supplied in an unrolled manner from the roll paper stacking
30 unit 340 to the roll paper supplying means 310 are formed with a predetermined distance in an upper exterior side of the case 300b.

 Also, an unexplained reference numeral 521 is a strapping key (refer to Fig. 1) for selecting the strapping
35 operation to the wad of paper money calculated at the

calculating device unit. The strapping key is formed in one side of the case 300b of the strapping device 300.

Reference numerals 522A and 522B (refer to Fig. 1) are roll paper feeding keys disposed in an exterior side of the case 300b of the strapping device 300. Specifically, the reference numerals 522A and 522B are a roll paper supplying key and a roll paper releasing key, respectively. The roll paper supplying key 522a is used when a user manually feeds the roll paper 302 which is not fed into the space between the roll paper guiding members 315 and 316 at an initial stage. The roll paper 302 precedently fed by the roll paper supplying key 522a is supplied by pressing a strapping key 521 in a subsequent operation. The roll paper releasing key 522b serves a role in releasing the roll paper 302 from the roll paper guiding members 315 and 316 when errors occur during the operation. If an error does not occur, the roll paper releasing key 522b is not used. Also, the roll paper releasing key 522b can be used when replacing the roll paper 302.

Meanwhile, referring to Figs. 9 and 10, another preferred embodiment of the strapping device 300 will be explained in detail. Herein, the same reference numerals are used for the same configuration elements described in the precedent preferred embodiment, and their detailed description about those configuration elements will be omitted.

Fig. 9 is a perspective view showing a strapping device unit of the paper money calculating apparatus in accordance with another preferred embodiment of the present invention. Fig. 10 is a perspective view showing the configuration of the strapping device unit except for a roll paper guiding means in accordance with said another preferred embodiment of the present invention.

As shown in the drawings, the strapping device 300 includes: a base frame 300a; a paper money feeding plate

301 formed in an extending line of a paper money transportation direction from the transporting device 200; a roll paper 302 (Refer to Fig. 2) supplied to strap a wad of paper money fed into the paper money feeding plate 301; 5 a roll paper supplying means 310 being mounted on the base frame 300a and serving a role in supplying the roll paper 302 and guiding the roll paper 302 to circle around the wad of paper money; a curling means 350 providing an adequate curling to the wad of paper money by moving toward the roll 10 paper supplying means 310, more particularly, by moving in a perpendicular direction to the wad of paper money; and a roll paper strapping means 360 strapping the wad of paper money in a predetermined curled state with the roll paper 302 supplied from the roll paper supplying means 310 and 15 then cutting the strapped roll paper 302.

Since this strapping device 300 except for the curling means 350 and the roll paper strapping means 360 is identical to the strapping device provided in accordance with the precedently described preferred embodiment of the 20 present invention, detailed description about those identical configuration elements will be omitted. Herein, the roll paper guiding members 315a and 316a modified corresponding to changes in the shape of curling means 350 will be described along with describing the curling means 25 350.

As shown in Figs. 9 and 10, the curling means 350 in accordance with another preferred embodiment serves a role in providing an adequate curl to a wad of paper money prior to strapping the wad of paper money with the roll paper 302 30 supplied from the roll paper supplying means 310. The curling means 350 includes: a movable base plate 351 having an approximate square shape and being perpendicularly mounted on the base frame 300a such that the movable base plate 351 is capable of moving towards the pair of roll 35 paper guiding members 315a and 316a; a plurality of bottom

plates 352 extending from both end sides of the movable base plate 351 towards the roll paper guiding members 315a and 316a; a plurality of projection plates 353 each projecting from an upper surface of the bottom plate 352 in an upward direction; a plurality of curling bars 354 formed in bottom and top parts of projection plates 353 and pressing upper and lower parts of the wad of paper money fed into a space of a left and a right frames 311 and 312 as the curling bars 354 move along the movable base plate 351; a plurality of contact plates 355 being disposed on portions of the projection plates 353 facing to portions where the curling bars 354 are formed and contacting both sidewalls of the roll paper guiding members 315a and 316a prior to making a forward movement; a plurality of elastic members 356 each formed in a forth side of the bottom plate 353 and inducing the elastic movement of the movable base plate 351; a pair of curling rotary moving bodies 324 each rotating around a respective central axle 324a and being connected with the first elastic members 356 in one edge side; a curling contact bar 325 extending from the other upper edge side of each curling rotary moving body 324 and pressing a rear side, i.e., the side facing to a surface to which the curling bars 354 make a contact, of the wad of paper money fed by the rotation of the curling rotary moving bodies 324; a plurality of second elastic members 357 for providing elasticity in an opposite direction to the first elastic members 356 by being formed in the other lower edge side of the curling rotary moving body 324; a plurality of elastic restoring members 324b each being formed in the other upper edge side of each curling rotary moving body 324 for restoring the curling rotary moving bodies 324 into an original position; and a driving means for driving the movable base plate 351.

The pair of curling rotary moving bodies 324 is mounted on a vertical frame 300b which supports

configuration elements by being placed in perpendicular to the base frame 300a. Also, the projection plate 353 is formed in an arc shape having a predetermined curvature, and the curling bars 354 are formed at a starting point and
5 at an end point of the arc, respectively.

Herein, a separation elastic member (not shown) is formed between the roll paper guiding members 315a and 316a to provide left and right movements of the roll paper guiding members 315a and 316a. Before the movable base
10 plate 351 moves, the contact plates 355 are in a state of making a contact with outer walls of the roll paper guiding members 315a and 316a. Thus, left and right movements of the roll paper guiding members 315a and 316a are restrained by the contact plates 355. Also, the separation elastic
15 member (not shown) under a compressed state exerts a repulsion force that makes the roll paper guiding members face in opposite.

The driving means for driving the movable base plate 351 can be embodied in any type as long as the movable base
20 plate 351 can move towards the roll paper guiding members 315a and 316a. For example, the driving means includes: a cam driving motor 326 disposed in one side of the base frame 300a; a driving gear 327a rotating by the cam driving motor 326; a transmission gear 327b engaging with the
25 driving gear 327a; a curl driving cam 327c driving with the transmission gear 327b by having the same shaft to the transmission gear 327b in one end part of the transmission gear 327b; a curl driving level 327d being rotatable around one end as a rotation axle in the base frame 300a and
30 rotating as the other end of the curl driving lever 327d is interlocked with the curling driving cam 327c; and a wire 328 being a medium member for moving the curling means 320 by the rotation of the curl driving lever 327d.

Herein, one end of the wire 328a is connected to one
35 of the second elastic member 357, and the other end of the

wire 328a is connected to the movable base plate 351.

(3) Arranging Device 400

With reference to Fig. 11, the arranging device 400 for arranging the wad of paper money before strapping the transported wad of paper money by the strapping device 300 will be described. The arranging device 400 is formed in a place where the wad of paper money is fed by the transporting device 200 and strapped by the strapping device 300, i.e., in the paper money feeding plate side of the strapping device 300. Fig. 11 is a perspective view showing an arranging device unit configured in the paper money calculating apparatus provided with the auto strapping-function in accordance with the present invention.

As shown, the arranging device 400 includes: an arrangement driving motor 410 capable of making forward and reverse rotations; an arrangement driving pulley 420 being connected to a rotation shaft of the arrangement driving motor 410 and having a rotation plate 422 in one side, wherein the rotation plate 422 has apertures 421 opened with a predetermined distance along a rim of the rotation plate 422; an arrangement bell metal pulley 430 being disposed with a predetermined distance from the arrangement driving pulley 420 in an upward direction and rotating by a driving force transmitted from the arrangement driving pulley 420 through the use of an arrangement driving belt 431 as a medium; an arrangement base block 440 fixed in one portion of the arrangement driving belt 431 and making upward and downward movements along with the movement of the arrangement driving belt 431; an arrangement means moving upwardly and downwardly along with the movement of the arrangement base block 440 by being adjoined with the arrangement base block 440, thereby arranging the wad of paper money in upward and downward directions and in left and right directions; at least more than one guiding

members 460 guiding the arrangement base block 440 to direct upwardly and downwardly; and a controlling means controlling the upper and lower movements of the arrangement base block 440.

5 Said at least more than one guiding members 460 penetrate the arrangement base block 440 and are preferably formed in a bar type to allow the arrangement base block 440 to slide upwardly and downwardly along said at least more than one guiding members 460. Also, it is preferable
10 to form said at least more than one guiding members 460 in pairs for a stable support and movement of the arrangement base block 440.

Also, a slide bearing (not) can be formed inside of the arrangement base block 440 through which said at least
15 more than one guiding members 460 pass in order to make the arrangement base block 440 slide upwardly and downwardly along said at least more than one guiding members 460.

The controlling means includes: an arrangement encoder sensor 470 controlling forward and reverse rotations of the
20 arrangement driving motor 410 to thereby control upward and downward movements of the arrangement base block 440; and a grooved arrangement sensor 480 being formed in one side of the arrangement base block 440 and detecting an original position of the arrangement base block 440.

25 In case of controlling a position of the arrangement base block 440 by the arrangement encoder sensor 470, the original position is first decided by using the grooved arrangement sensor 480. The grooved arrangement sensor 480 is also used to initialize the position of the arrangement
30 driving motor 410 when errors occur.

The arrangement encoder sensor 470 is a photo-sensor, and a detecting unit of the arrangement encoder sensor 470 faces to the apertures 421 of the rotation plate 422 of the arrangement driving pulley 420. Therefore, when the
35 arrangement driving pulley 420 rotates, the detection

operation is carried out where the apertures 421 do not exist, but stops where the apertures 421 exist. As a result of this selective detection operation, it is possible to detect a degree of forward or reverse rotation
5 made by the arrangement driving motor 410.

As mentioned above, the arrangement means 450 moves upwardly and downwardly along with the movement of the arrangement base block 440 by being adjoined with the arrangement base block 440, thereby arranging the wad of
10 paper money in upward and downward directions and in left and right directions. The arrangement means 450 includes: a frame 451 connected to the arrangement base block 440; contact plates 452 formed in upper and lower sides of the frame 451; a plurality of connecting bars 453 connecting
15 the contact plates 452 with each other as passing through the frame 451 by giving movability to the contact plates 452; and an elastic body 454 providing an elastic support to a space between the frame 451 and one contact plate 452 disposed in the upper side of the frame 451.

20 Herein, the arrangement driving pulley 420, the arrangement bell metal pulley 430 and the arrangement driving belt 431 are media for driving the arrangement base block 440 by a driving force provided from the arrangement driving motor 410. Thus, it is known that these media can
25 be formed in any type as long as the driving force of the arrangement driving motor 410 can be transmitted to the arrangement base block 440.

(5) Discharging Device 600

With reference to Fig. 12, the discharging device 600
30 for discharging the strapped wad of paper money at the strapping device 300 will be described in detail. Fig. 12 is a bottom-side perspective view showing a transportation device unit and a discharge device unit configured in the paper money calculating apparatus provided with the auto
35 strapping-function in accordance with the present

invention.

As shown in Fig. 12, in an extended line of the paper money transportation direction of the transporting device 200, the discharging device 600 is formed in a bottom forth side of the base frame 300a of the strapping device 300. The discharging device 600 includes: a discharge driving bar 610 of which one end moves as being pressed by the transportation base block 250 of the transportation device 200; a plurality of restoring springs 620 restoring the moved discharge driving bar 610 into an original position; at least more than one discharge guiding blocks 630 fixed in a bottom surface of the base frame 300a to allow the discharge driving bar 610 to be guided as the discharge driving bar 610 passes through the discharge guiding blocks 630; and a discharge member 640 formed in the other end of the discharge driving bar 610 and discharging the wad of paper money strapped by the strapping device 300.

The discharge member 640 is a plate placed in perpendicular to the other end of the discharge driving bar 610.

(6) Central Controlling Device 500

Referring to Fig. 13, detailed description on the central controlling device 500 for controlling operation of each configuration element will be provided hereinafter. Fig. 13 is a configuration diagram showing a central controlling device unit configured in the paper money calculating apparatus provided with the auto strapping-function in accordance with the present invention.

As shown in the drawing, the central controlling device 500 receives and outputs signals from a roll paper detecting sensor 511 for detecting whether a piece of roll paper 302 is supplied, a supplied paper money detecting sensor 512 for detecting whether pieces of the paper money are supplied to the paper money receiving unit 111, a discharged paper money detecting sensor 513 for detecting

whether a wad of the paper money is discharged to the discharge unit 113, a transported paper money detecting sensor 514 being formed in the paper money transportation passage for detecting the number of paper money moved along the above passage, a grooved strapping sensor 515 for detecting an initial position of the cam driving motor 326, a jamming removal allocating sensor 516 for detecting a half-rotation of the cam driving motor 326 to open the pair of roll paper guiding members 315 and 316 for the purpose of easily removing pieces of roll paper jammed in between the roll paper guiding members 315 and 316, the grooved transportation sensor 290 for detecting whether a wad of paper money is transported, the transportation encoder sensor 280 for detecting a location of the transportation driving motor 210, a roll paper encoder sensor 518 for controlling supply and discharge of the roll paper 302 by detecting an encoder plate placed in opposite to a shaft of the reduction gear 313b driving by engaging with the roll paper supplying gear 313a, the grooved arrangement sensor 470 for detecting an original position of the arrangement base block 450, and the arrangement encoder sensor 480 for controlling the position of the arrangement base block 450. Also, the central controlling device 500 controls the cam driving motor 326, the transportation driving motor 210, the roll paper supplying motor 313, the arrangement driving motor 410, and the cutter assembly 332. Furthermore, the central controlling device 500 receives signals from the strapping key 521 for selecting the strapping function of the calculated paper money and roll paper feeding keys 522a and 522b (refer to Fig. 1) to control corresponding mechanisms.

The roll paper feeding keys 522a and 522b disposed in an exterior side of the strapping device 300 are a roll paper supplying key and a roll paper releasing key, respectively. The roll paper supplying key 522a is used

when a user manually feeds a piece of the roll paper 302 which is not fed into the space between the roll paper guiding members 315 and 316 at an initial stage. The roll paper 302 precedently fed by the roll paper supplying key 5 522a is supplied by a strapping key 521 in a subsequent operation. The roll paper releasing key 522b serves a role in releasing pieces of the roll paper 302 from the roll paper guiding members 315 and 316 when errors occur during the operation. If an error does not occur, the roll paper 10 releasing key 522b is not used. Also, the roll paper releasing key 522b can be used when replacing the roll paper 302.

Among the above described configuration elements, the motors operating as a driving source are capable of making 15 forward and reverse rotations and are controlled by the central controlling device 500.

Hereinafter, operation of the paper money calculating apparatus provided with the auto strapping-function will be described in accordance with the present invention.

20 First, when a user puts a predetermined number of paper money to be calculated on the paper money receiving unit 111, the supplied paper money detecting sensor 512 senses this action. Then, the main motor 120 and the discharge motor 124 are automatically driven by a command 25 from the central controlling device 500.

As a result of this automatic drivability, the first transporting roller 121, the second transporting roller 122 and the pick-up roller 123 interlocking with this automatic driving start rotating, and among the predetermined number 30 of paper money placed on the paper money receiving unit 111, the pick-up roller 123 sequentially picks-up pieces of the paper money in order from the bottom one to the top one with a predetermined time-interval. The picked-up paper money is fed into an upper side of the second transporting 35 roller 122.

Next, because of the rotations of the first and the second transporting rollers 121 and 122, the pieces of paper money fed into the upper side of the second transporting roller 122 are sequentially transported along
5 rims of the first and the second transporting rollers 121 and 122 and are then individually injected in between the discharge wings 131 of the discharge wheel 130. Thereafter, the pieces of paper money are stacked on the
10 the discharge wings 131. In the course of the transportation, the transported paper money, detecting sensor 514 disposed in the paper money transportation passage calculates the passed number of paper money.

The calculated number of paper money is displayed on
15 the light emitted diode (LED) display 141, and all pieces of paper money are put again into the paper money receiving unit 111. If the supplied paper money detecting sensor 512 senses this action, the central controlling apparatus 500 stops the main motor 120 and the discharge motor 124 from
20 driving.

During or after the calculation of paper money at the calculating device 100, the roll paper supplying motor 313 of the strapping device 300 is driven by a command from the central controlling device 500 when a user pushes the
25 strapping key 521. As a result, the roll paper supplying gear 313a connected with the roll paper supplying motor in one axle starts driving.

Subsequent to the driving of the roll paper supplying gear 313a, the roll paper 302 is guided from the roll paper
30 stacking unit 340 by the plurality of roll paper guiding rollers 371 to 373 and is fed by the roll paper feeding rollers (not shown) allocated at bottom of the roll paper feeding inlet 314 of the left frame 311 and the right frame 312. The roll paper 302 fed by the roll paper feeding
35 rollers is supplied along the roll paper guiding passage

(not shown) formed inside of the space between the pair of left and right frames 311 and 312 and the pair of roll paper guiding members 315 and 316. Herein, the roll paper 302 is supplied under a state that a user manually feeds the roll paper 302 into a space between the roll paper feeding rollers through a roll paper feeding inlet 314 at an initial operation stage.

Meanwhile, prior to transporting the wad of paper money, discharged to the stacker 112 of the paper money discharge unit 113 after the calculation operation at the calculation device 100, into the strapping device 300 with use of the transporting device 200, the arrangement driving motor 410 of the arrangement device 400 drives by a command from the central controlling device 500. Also, the arrangement driving pulley 420 connected with the arrangement driving motor 410 in one axle, the arrangement bell metal pulley 430 and the arrangement driving belt 431 connecting the arrangement driving pulley 420 with the arrangement bell metal pulley 430 in one orbit are driven by forward and reverse rotations of the arrangement driving motor 410. As a result, the arrangement base-block 440 moves as being guided along the arrangement guiding members 431.

Because the arrangement driving belt 431 drives, the arrangement base block 440 fixed in the arrangement driving belt 431 starts moving, and as a result, the arrangement means 450 moves to a predetermined downward position. The predetermined position of the arrangement means 450 is controlled by the arrangement encoder sensor 470 and corresponds to approximately a central point of a lateral side of the wad of paper money.

The transportation driving motor 210 of the transporting device 200 is driven by a command from the central controlling device 500. Then, as the transportation driving motor 210 drives, the transportation

driving pulley 220 connected with the transportation driving motor 210 in one side, the plurality of transportation bell metal pulleys 241 to 243 and the transportation driving belt 230 connecting the transportation driving pulley 210 with the plurality of transportation bell metal pulleys 241 to 243 start driving. Hence, the transportation driving belt 230 is guided along the guiding members 260, and as a result of these sequential actions, the wad of paper money placed on the stacker 112 is transported.

Because of the driving of the transportation driving belt 230, the transportation base block 250 connected to the transportation driving belt 230 and the moving bar 270 integrated with the transportation base block 250 move towards the strapping device 300.

At this time, the wad of paper money is transported as much as the predetermined transportation distance set by a user, and the transportation encoder sensor 280 controls the transportation distance.

Under the state that the one side of the wad of paper transported by the transporting device 200 is contacted to and supported by the moving bar 270, the wad of paper money is transported until the other side of the wad of paper money touches the arrangement means 450 of the arranging device 400. At this position, the transportation base block 250 stops moving.

Under the stopped transportation, the transportation base block 250 moves with a predetermined distance to a counter-direction of the transportation. That is, the transportation base block 250 moves backward to a range of distance from approximately 10 mm to approximately 20 mm. Subsequent to this backward movement, the transportation base block 250 moves forward to push the wad of paper money to the arrangement base block 450. These backward and forward movement steps are repeated three times to arrange

the wad of paper in left and right directions and in upper and lower directions.

Afterwards, the transportation base block 250 moves backward again with a predetermined distance, and the arrangement driving motor 410 of the arranging device 400 is simultaneously driven to make the interlocked arrangement base block 450 move to an initial starting position detected by the grooved arrangement sensor 480.

Then, the transportation driving motor 210 of the transporting device 200 is driven again. The interlocked transportation base block 250 moves forwardly, and the wad of paper money is transported inside of the strapping device 300 by the moving bar 270.

As the wad of paper money moves inside of the strapping device 300 by the transportation driving motor 210, the arrangement driving motor 410 of the arranging device 400 drives to make the interlocked arrangement base block 450 driven downwardly. The driving distance is controlled by the arrangement encoder sensor 470, and the arrangement means 450 moving downwardly presses a top surface of the wad of paper money. These upward and downward movements of the arrangement means 450 are repeated in a predetermined number of times, e.g., approximately three times, thereby carrying out the upward and downward arrangement of the wad of paper money.

Next, as the moving bar 270 moves the wad of paper money inside of the strapping device 300 by the transportation driving motor 210 of the transporting device 200, the transportation base block 250 of the transporting device 200 pushes the discharge driving bar 610 of the discharging device 600, and as the discharge driving bar 610 is pushed, the restoring springs 620 of the discharging device 600 become tensile. The tensile force provided from the restoring springs 620 is used for discharging the strapped wad of paper money from the strapping device 300.

Subsequently, when the wad of paper money is completely transported to the strapping device 300 through the transportation device 200, the cam driving motor 326 of the strapping means 330 rotates by a command from the central controlling device 500, and the driving gear 327a is driven by the rotation of the cam driving motor 326. Also, the rotation of the cam driving motor 326 drives the transmission gear 327b connected with the driving gear 327a. If the transmission gear 327b is driven, the curl driving cam 327c and the cutter driving cam 331 respectively connected to opposite portions of the axle of the transmission gear 327b are also driven.

At this time, the driving of the curl driving cam 327c makes the driving lever 327d rotate around one end as an axis, and the driving lever 327d pushes the wire 328 as the driving lever 327d rotates. The pushed wire 328 moves the curling means 320 connected to the wire 328 toward the roll paper guiding members 315 and 316 in which the wad of paper money is disposed inside.

Because of the movement of the curling means 320, the curling bars 322 of the curling means 320 also moves, thereby pressing left and right corners and upper and lower corners of the wad of paper money disposed inside of the space created between the pair of left and right frames 311 and 312 and the pair of roll paper guiding members 315 and 316. Simultaneously, when the curling bars 322 of the curling means 320 move, the roll paper guide driving rollers 318 formed in both exterior sides of the roll paper guiding members 315 and 316 moves as riding on the angled surface 322a of each curling bar 322 to thereby make the roll paper guiding members 315 and 316 opened from the pair of left and right frames 311 and 312.

As simultaneous to the movement of the roll paper guiding members 315 and 316, the curling means 320 also moves, so that the interlocking bars 323 interlocked with

the curling means 320 move forward, pushing each one end of the curling rotary moving bodies 324.

The rotary movement of the curling rotary moving bodies 324 makes the curling contact bar 325 being
5 connected to the other end of each curling rotary moving body 324 allocated in the space created between the pair of left and right frames 311 and 312 and the pair of roll paper guiding members 315 and 316. The curling bars 322 of the curling means 320 serves a role in smoothly curling the
10 wad of paper money by pressing a central portion of one side of the wad of paper money opposite to the other side of the wad of paper money where four points of the wad of paper money are pressed by the curling bars of the curling means 320.

15 Under this state, the roll paper supplying motor 313 makes a reverse rotation by a command from the central controlling device 500 to thereby firmly strap the curled wad of paper money in the roll paper guiding passage formed inside of the space between the pair of left and right
20 frames 311 and 312 and the pair of the roll paper guiding members 315 and 316. At this time, since the pair of roll paper guiding members 315 and 316 move in left and right directions by the curling means 320, there is not interference between the roll paper 302 and the pair of
25 roll paper guiding members 315 and 316 even if the roll paper 302 departs from the roll paper guiding passage.

The wad of paper money is curled by the curling means 320 as the curl driving cam 327c drives. Also, while the curled wad of paper money is strapped with the roll paper
30 302, the cutter driving cam 327c also simultaneously drives, resulting that the cutter assembly 332 moves forward to a rear side of the wad of paper money. Subsequently, the cutter assembly 322 adheres the roll paper 302 supplied to the roll paper supplying means 310
35 and cuts the strapped roll paper 302 thereafter.

Herein, the moments of curling the wad of paper money, reversely supplying the roll paper 302 and adhering and cutting the roll paper 302 are determined by a time chart used during designing the curl driving cam 327c and the
5 cutter driving cam 331.

When the strapping of the wad of paper money is completed at the strapping device 300, the transportation driving motor 210 of the transportation device 400 is driven by a command from the central controlling apparatus
10 500. Subsequently, the transportation driving pulley 220, the plurality of transportation bell metal pulleys 241 to 243 and the transportation driving belt 230 drive. As a result, the transportation base block 250 interlocked with the transportation driving pulley 220, the plurality of
15 transportation bell metal pulleys 241 to 243 and the transportation driving belt 230 returns to the initial position detected by the grooved transportation sensor 290.

As the transportation device 200 returns to the initial state, the restoring springs 620 of the discharging device 600 conserving a tensile force as being pushed by the transportation base-block 250 return to the initial
20 position. As simultaneous to the returning to the initial position of restoring springs 620, the discharge plate 640 formed in one end of the discharge driving bar 610 moves, thereby discharging the strapped wad of paper money from
25 the strapping device 300 in an opposite direction to the feeding direction of the paper money.

Meanwhile, another operation of the paper money calculating apparatus having another embodied strapping device unit shown in Figs. 9 and 10 will be described in
30 accordance with the present invention. Herein, in this case, detailed description on the operation of the paper money calculating apparatus with another embodied strapping device unit will be omitted because of the identicalness to
35 the first described paper money calculating apparatus

except for the operation of the strapping device unit. Thus, only the operation of another embodied strapping device unit will be described hereinafter.

When the wad of paper money is transported to the strapping device 300 by the transporting device 200, the cam driving motor 326 of the strapping means 330 rotates by a command from the central controlling device 500, and the rotation of the cam driving motor 326 drives the driving gear 327a, thereby further driving the transmission gear 327b connected with the driving gear 327a. Once the transmission gear 327b is driven, the curl driving cam 327c and the cutter driving cam 331 respectively connected to both ends of the axle of the transmission gear 327b start driving.

At this time, because of the driving of the curl driving cam 327c, the driving lever 327d rotates in a clockwise direction by taking one end as an axis, and as rotating, the driving lever 327d pushes the wire 328a of which one end is connected to one of the second elastic members 357 and the other end is connected to the movable base plate 351. Thus, the connected second elastic member 357 is compressed, and the movable base plate 351 moves towards the pair of roll paper guiding members 315a and 316a having the space in which the wad of paper money is disposed inside.

As simultaneously as the movable base plate 351 moves, the curling rotary moving bodies 324 connected with the second elastic members 357 rotates in a clockwise direction. As a result, the first elastic members 356 connected to the bottom plate 352, which moves along with the movement of the movable base plate 351, are also compressed to thereby assist the movement of the movable base plate 351 caused by the wire 328a.

As the movable base plate 351 moves, the curling bars 354 of the curling means 350 also move, thereby pressing

left and right and top and bottom corners of the wad of paper money disposed inside of the space created between the pair of left and right frames 311 and 312 and the pair of roll paper guiding members 315a and 316a.

5 Simultaneously, when the curling bars 354 of the curling means 350 move, the contact plates 355 contacted to both exterior sides of the roll paper guiding members 315a and 316a do not hold the outer walls of the roll paper guiding members 315a and 316a. Hence, the separation
10 elastic member formed inside of the pair of roll paper guiding members 315a and 316a separates the pair of roll paper guiding members 315a and 316a in opposite direction.

As the wire 328a is driven, the second elastic members 357 move as simultaneously as the movable base plate 351
15 moves. The curling rotary moving bodies 324 connected with the second elastic members 357 make a clockwise rotation, and as a result, the curling contact bars 325 formed at the other end of each curling rotary moving body 324 is allocated at the space between the pair of left and right
20 frames 311 and 312 and the pair of roll paper guiding members 315a and 316a and serves a role in smoothly curling the wad of paper money by pressing a central portion of one side of the wad of paper money opposite to a side in which four points are pressed by the curling bars 354 of the
25 curling means 350.

Under this state, the roll paper supplying motor 313 makes a reverse rotation by a command from the central controlling device 500 to thereby firmly strap the curled wad of paper money in the roll paper guiding passage formed
30 inside of the space between the pair of left and right frames 311 and 312 and the pair of the roll paper guiding members 315a and 316a. At this time, since the pair of roll paper guiding members 315a and 316a move in left and right directions by the curling means 350, there is not
35 interference between the roll paper 302 and the pair of

roll paper guiding members 315a and 316a even if the roll paper 302 departs from the roll paper guiding passage.

The wad of paper money is curled by the curling means 350 as the curl driving cam 327c drives. Also, while the 5 curled wad of paper money is strapped with the roll paper 302, the cutter driving cam 327c also simultaneously drives, resulting that the cutter assembly 332 moves forwardly to a rear side of the wad of paper money. Subsequently, the cutter assembly 322 adheres the roll 10 paper 302 supplied to the roll paper supplying means 310 and cuts the roll paper 302 thereafter.

Herein, the moments of curling the wad of paper money, reversely supplying the roll paper 302 and adhering and cutting the roll paper 302 are determined by a time chart 15 used during designing the curl driving cam 327c and the cutter driving cam 331.

When the strapping of the wad of paper money is completed at the strapping device 300, the transportation driving motor 210 of the transportation device 400 is 20 driven by a command from the central controlling apparatus 500. Subsequently, the transportation driving pulley 220, the plurality of transportation bell metal pulleys 241 to 243 and the transportation driving belt 230 start to drive. As a result, the transportation base block 250 interlocked 25 with the transportation driving pulley 220, the plurality of transportation bell metal pulleys 241 to 243 and the transportation driving belt 230 return to the initial position detected by the grooved transportation sensor 290.

As the transportation device 200 returns to the 30 initial position, the restoring springs 620 of the discharging device 600 conserving a tensile force as being pushed by the transportation base block 250 return to the initial position. As simultaneous to the returning to the initial position of the restoring springs 620, the 35 discharge plate 640 formed in one end of the discharge

driving bar 610 starts moving, thereby discharging the strapped wad of paper money from the strapping device 300 in an opposite direction to the feeding direction of the paper money.

5 With reference to Figs. 14 and 15, the strapping operation of the paper money calculating apparatus provided with the auto strapping-function will be described in accordance with the present invention. Herein, detailed description about the calculating operation will be omitted
10 since the calculating operation by the calculating device of the paper money calculating apparatus is the well-known technical field. Hereinafter, the strapping operation will be described in detail. Especially, Figs. 14 and 15 are flowcharts describing the strapping operation of the paper
15 money calculating apparatus provided with the auto strapping-function in accordance with the present invention.

As shown in Figs. 14 and 15, at step S1, it is determined whether each value of the sensors is normal in a
20 standby mode. If each sensor value is determined to be normal, at step S2, it is determined whether the roll paper supplying key for supplying the roll paper in an initial operation stage is pressed. If each sensor value is determined to be abnormal, a message indicating an error in
25 the sensor appears on the display unit.

If the roll paper supplying key is pressed, at step S3, it is determined whether the roll paper for use in strapping is rolled properly. If the strapping roll paper is rolled, the standby mode is maintained. If otherwise,
30 the roll paper supplying motor for supplying the strapping roll paper starts driving. After driving the roll paper supplying motor, it is decided again whether the strapping roll paper is rolled properly by the roll paper supplying motor. If the strapping roll paper is properly rolled, the
35 standby mode is maintained. If otherwise, a message

indicating an error in the roll paper supply appears on the display unit.

Next, if it is decided that the roll paper supplying key is not pressed, it is accepted that the roll paper releasing key for releasing the roll paper from the strapping device is pressed at step S4. The roll paper supplying motor for removing the roll paper drives in an opposite direction to the roll paper supplying direction. If it is determined that the roll paper releasing key is not pressed, the next step S5 of determining whether the strapping key is pressed proceeds.

If it is accepted that the strapping key is not pressed, the operation returns to the standby mode. Meanwhile, if the strapping key is pressed, it is checked whether the strapping roll paper is properly rolled. If the strapping roll paper is not properly rolled, the roll paper supplying motor for supplying the roll paper drives in a direction of supplying the roll paper.

After driving the roll paper supplying motor, it is checked whether the supplied roll paper is rolled properly at step S6. If the rolling is not properly done, the display unit shows a message indicating there is an error in the roll paper supply. If otherwise, a command signal to strap the wad of paper money is transmitted to the calculating device from the central controlling device.

At step S7, it is checked whether a signal for starting the strapping operation is received from the central controlling device. If the above signal is received, the transportation driving motor starts to drive. If otherwise, it is determined whether time exceeds at step S8. If the time exceeds, a message indicating an error in communication with the central controlling device appears on the display unit. If otherwise, the operation is returned to the step S7.

After driving the transportation driving motor, it is

determined whether the transportation driving motor drives normally at step S9. In case of the normal driving of the transportation driving motor, the transportation driving motor gets to stop driving to proceed with the strapping mode (refer to Fig. 11). In case of the abnormal driving of the transportation driving motor, at step S10, it is decided whether time exceeds at step S10. If the time dose not exceed, the operation is returned to the step S9. If otherwise, the transportation driving motor gets to stop driving and a message indicating an error in the transportation driving motor, appears on the display unit.

Afterwards, once the strapping mode is carried out, the cam driving motor drives in a forward direction, and then, it is decided whether it is a moment to push the roll paper at step S11. In case of determining to push the roll paper, the roll paper supply motor drives in an opposite direction to the roll paper supplying direction. If otherwise, the cam driving motor continuously drives.

After the roll paper supplying motor drives in a reverse direction, at step S12, it is determined whether the cam driving motor reaches a peak. In case of reaching the peak, the cam driving motor gets to stop. If it is determined that the peak is not reached yet, the step S12 is continued to be carried out.

After the cam driving motor stops driving, the transportation driving motor drives in a reverse direction, and then, it is determined whether the transportation driving motor reaches a peak at step S13. If the peak is reached, the transportation driving motor gets to stop to complete the strapping operation. As a result, the operation returns to the standby mode. If otherwise, it is determined whether time exceeds at step S14.

At step S14, if the time does not exceed, the transportation driving motor continuously drives. If otherwise, the transportation driving motor gets to stop

and then, a message indicating an error in the transportation driving motor appears on the display unit.

In accordance with the present invention, there is an advantage that the paper money calculating apparatus is
5 capable of automatically processing sequential steps of calculating predetermined amounts of paper money and strapping the calculated wad of paper money.

Also, the paper money calculating apparatus serves functions of calculating predetermined amounts of paper
10 money and strapping the calculated wad of paper money, and thus, there are effects on improved functionality and usability.

Although the preferred embodiments of the invention have been disclosed for illustrative purposes, those
15 skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

What is claimed is:

1. A paper money calculating apparatus provided with an auto strapping-function, comprising:

5 a calculating device for calculating predetermined amounts of paper money by an inputted command, displaying the calculation result and discharging the calculated paper money;

10 a transporting device for transporting a wad of the discharged paper money calculated from the calculating device into a predetermined place;

a strapping device configured in one side of the calculating device for strapping the wad of the paper money transported by the transportation device;

15 an arranging device for arranging the wad of the paper money transported by the transporting device; and

a central controlling device for controlling configuration devices.

20 2. The paper money calculating apparatus provided with the auto strapping-function of claim 1, further including a discharging device for discharging the wad of the paper money strapped by the strapping device.

25 3. The paper money calculating apparatus provided with the auto strapping-function of claim 1, wherein the calculating device includes:

a case;

30 a paper money receiving unit on which pieces of paper money to be calculated are disposed, the paper money receiving unit being formed in an upper part of the case;

a discharge unit to which the pieces of paper money are discharged, the discharge unit being formed in a lower part of the case;

35 a stacker in which the discharged pieces of paper

money are stacked, the stacker being disposed in a discharge unit side;

a main motor mounted on an inner bottom portion of the case;

5 at least more than one transporting rollers rotating by a driving shaft of the main motor;

a pick-up roller mounted on a portion of a paper money receiving unit and rotating by said at least more than one transporting rollers;

10 a discharge motor mounted on a portion of a discharge unit of the case;

a discharge wheel rotating by the discharge motor and having a plurality of spiral discharge wings on a circumferential surface;

15 a paper money transportation passage in which pieces of paper money discharged from the paper money receiving unit are transported toward a discharge unit side along a circumferential surface of said at least more than one transporting rollers;

20 a detecting means being placed in the paper money receiving unit and the paper money transportation passage to detect the existence of pieces of paper money and predetermined amounts of paper money;

a display unit for displaying the calculated amounts of paper money by an input signal from the detecting means and a status of the paper money calculating apparatus; and

a plurality of function input keys for inputting commands, the plurality of function input keys being formed in an exterior side of the case.

30

4. The paper money calculating apparatus provided with the auto strapping-function of claim 3, wherein the detecting means includes:

35 a supplied paper money detecting sensor for detecting whether pieces of paper money are disposed, the supplied

paper money detecting sensor being formed in the paper money receiving unit;

a discharged paper money detecting sensor for detecting pieces of paper money discharged to the discharge unit, the discharged paper money detecting sensor being formed in lateral sides where the stacker 112 face inward; and

a transported paper money detecting sensor for detecting the number of paper money transported along the paper money transportation passage, the transported paper money detecting sensor being formed in the paper money transportation passage.

5. The paper money calculating apparatus provided with the auto strapping-function of any one of claims 1 to 3, wherein the transporting device includes:

a transportation driving motor being formed in one side of the calculating device and generating a driving force;

a transportation base block for making a sliding movement by receiving the driving force from the transportation driving motor;

a driving medium means for transmitting the driving force from the transportation driving motor to the transportation base block;

at least more than one guiding members for guiding the transportation base block;

a moving bar extending from the transportation base block and transporting a wad of paper money discharged from the calculating device as the transportation base block moves; and

a controlling means for controlling an operation of moving the transportation base block.

6. The paper money calculating apparatus provided

with the auto strapping-function of claim 5, wherein said at least more than one guiding members are formed in a bar shape to allow the transportation base block to make a sliding movement as said at least more than one guiding members pass through the transportation base block.

7. The paper money calculating apparatus provided with the auto strapping-function of claim 6, wherein the transportation base block through which said at least more than one guiding members pass have a slide bearing inside in order for the transportation base block to have a smooth sliding movement along said at least more than one guiding members.

8. The paper money calculating apparatus provided with the auto strapping-function of claim 5, wherein the driving medium means includes:

a transportation driving pulley rotating as the driving motor drives;

at least more than one transportation bell metal pulleys disposed with a predetermined distance; and

a transportation driving belt having a predetermined orbit of connecting the transportation driving pulley to said at least more than one transportation bell metal pulleys and having one portion to which the transportation base block is connected.

9. The paper money calculating apparatus provided with the auto strapping-function of claim 5, wherein the controlling means includes:

a rotation plate rotating with the transportation driving motor and having a plurality of detecting apertures opened with a predetermined distance along a rim of the rotation plate;

a transportation encoder sensor being placed such

that a detecting unit of the transportation encoder sensor faces to a rim part of the rotation plate and controlling forward and reverse rotations of the transportation driving motor in order to control the transportation base block;
5 and

a grooved transportation sensor being placed on one front portion of the transportation base block and detecting a location of the transportation base block.

10 10. The paper money calculating apparatus provided with the auto strapping-function of any one of claims 1 to 3, wherein the strapping device includes:

a base frame;

15 a paper money feeding inlet formed in an extending line of a paper money transportation direction of the transportation device;

a roll paper for use in strapping supplied to strap a wad of paper money fed into the paper money feeding inlet;

20 a roll paper supplying means supplying the roll paper and guiding the roll paper around the fed wad of paper money;

a curling means being formed to be movable toward the roll paper supplying means and giving a predetermined curling state by pressing one surface of the fed wad of
25 paper money; and

a roll paper strapping means strapping the fed wad of paper money with the roll paper supplied by the roll paper supplying means and cutting the strapped roll paper.

30 11. The paper money calculating apparatus provided with the auto strapping-function of claim 10, wherein the roll paper supplying means includes:

a pair of left and right frames formed over a base frame with a predetermined distance and having a space for
35 allocating a wad of paper money fed inside;

a roll paper supplying motor supported in between the pair of left and right frames and capable of making forward and reverse rotations;

5 a roll paper feeding inlet where a piece of roll paper is fed into, the roll paper feeding inlet being opened in upper surfaces of the pair of left and right frames;

10 a pair of roll paper feeding rollers disposed between bottom parts of the pair of left and right frames confined within the roll paper feeding inlet;

a driving medium member for transmitting a driving force from the roll paper supplying motor to the pair of roll paper feeding rollers;

15 a pair of roll paper guiding members having a space corresponding to the space of the pair of left and right frames and capable of moving in opposite direction from each other in both front sides of the pair of left and right frames;

20 a roll paper guiding passage for guiding the roll paper to be supplied along each inner circumference of the spaces of the pair of left and right frames and the pair of roll paper guiding members; and

a plurality of elastic members for restoring the pair of roll paper guiding passage into an original position.

25

12. The paper money calculating apparatus provided with the auto strapping-function of claim 10, wherein the curling means includes:

30 a movable base plate disposed in perpendicular to a base frame;

a plurality of curling bars extending from each corner of the movable base plate toward a wad of paper money;

35 a plurality of interlocking bars interlocking as the movable base plate moves;

a pair of curling rotary moving bodies being capable of rotating around each central axle and having one end pressed by the interlocking bars;

5 a curling contact bar connected to the other end of each curling rotary body and pressing a central portion of a rear surface of the wad of paper money;

a plurality of elastic restoring members for restoring the movable base plate into an original position; and

10 a driving means for moving the movable base plate.

13. The paper money calculating apparatus provided with the auto strapping-function of claim 12, wherein the driving means includes:

15 a cam driving motor;

a reduction gear rotating by the cam driving motor;

a curl driving cam rotating by the rotation of the driving medium member;

20 a curl driving lever being formed to be rotatable around one end as an axle and rotating as the other end of the curl driving lever is connected to the curling driving cam; and

a medium member for moving the movable base plate by the rotation of the curl driving lever.

25

14. The paper money calculating apparatus provided with the auto strapping-function of claim 11 or 12, further including:

30 a plurality of supporting frames 318a having a shape of '□' and formed on both outer walls of the roll paper guiding members to which the curling bars face;

a plurality of roll paper guide driving rollers disposed inside of the supporting frames with a predetermined distance from the outer walls of the roll paper guiding members; and

35

angled surfaces of which angle decreases as going towards an end side, each angled surface being formed at an end part of each curling bar, wherein as the movable base plate moves, the roll paper guide driving rollers gets to
5 move as riding on the respective angled surfaces in a direction to make the roll paper guiding members apart.

15. The paper money calculating apparatus provided with the auto strapping-function of claim 10, wherein the
10 roll paper strapping means includes:

a cutter driving cam; and

a cutter assembly adhering the roll paper strapping the wad of paper money by moving toward a rear surface of the wad of paper money through the use of the cutter
15 driving cam and cutting the adhered roll paper.

16. The paper money calculating apparatus provided with the auto strapping-function of claim 15, wherein the cutter driving cam is driven by a driving force that drives
20 the curling means.

17. The paper money calculating apparatus provided with the auto strapping-function of claim 10, further including:

25 a roll paper stacking unit on which a roll paper for use in strapping are stacked in one exterior side of the case; and

a plurality of roll paper guiding rollers for guiding the roll of paper supplied from the roll paper stacking
30 unit to the roll paper supplying means, the plurality of roll paper guiding rollers disposed in an upper exterior side of the case.

18. The paper money calculating apparatus provided
35 with the auto strapping-function of claim 10, wherein the

curling means includes:

a movable base plate formed to be movable on a base frame;

5 a plurality of bottom plates extending from both bottom end parts of the movable base plate;

a plurality of projection plates each projecting from the respective bottom plate in an upward direction;

10 a plurality of curling bars being disposed in top and bottom parts of the projection plates and pressing upper and lower parts of a wad of paper money;

a plurality of first elastic members being formed in a front side of each bottom plate and inducing an elastic movement of the movable base plate;

15 a pair of curling rotary moving bodies each being formed to be rotatable around a central axle and having one bottom end to which the first elastic member is connected;

a curling contact bar extending from one upper end of each curling rotary moving bodies and pressing a central portion of a rear side of a wad of paper money;

20 a plurality of second elastic bodies being disposed in the other bottom end of each curling rotary moving body and providing elasticity in opposite direction to the first elastic members;

25 a plurality of elastic restoring members being disposed in the other upper end of each curling rotary moving body and restoring the curling rotary moving bodies into an original position; and

a driving means for driving the movable base plate.

30 19. The paper money calculating apparatus provided with the auto strapping-function of claim 18, wherein the driving means includes:

a cam driving motor disposed in one side of the base frame;

35 a driving gear rotating by the cam driving motor;

a transmission gear engaging with the driving gear;
a curl driving cam driving with the transmission gear
by having the same shaft to the transmission gear in one
end part of the transmission gear;

5 a curl driving lever being formed to be rotatable
around one end as an axle in the base frame and rotating as
the other end of the curl driving lever is interlocked with
the curling driving cam; and

a medium member for moving a curling means by the
10 rotation of the curl driving lever.

20. The paper money calculating apparatus provided
with the auto strapping-function of claim 19, wherein the
medium member is a wire of which one end is connected to
15 one of the second elastic members and the other end is
connected to the movable base plate.

21. The paper money calculating apparatus provided
with the auto strapping function of claim 11 or 18, further
20 including:

a separation elastic member disposed between the roll
paper guiding members; and

a plurality of contact plates (355) formed on
portions of the projection plates facing to portions where
25 the curling bars are formed and contacting both outer walls
of the roll paper guiding members before the curling means
moves.

22. The paper money calculating apparatus provided
30 with the auto strapping-function of claim 1, wherein the
arranging device includes:

an arrangement driving motor;

an arrangement base block making a sliding movement
by receiving a driving force from the arrangement driving
35 motor;

a driving medium means for transmitting the driving force from the arrangement driving motor to the transportation base block;

at least more than one guiding members guiding the arrangement base block;

an arrangement means arranging a wad of paper money in upward and downward directions as moving together with the arrangement base block by being connected with the arrangement base block; and

a controlling means controlling upward and downward movements of the arrangement base block.

23. The paper money calculating apparatus provided with the auto strapping-function of claim 22, wherein said at least more than one guiding members are formed in a bar shape to allow the arrangement base block to make a sliding movement as said at least more than one guiding members pass through the arrangement base block.

24. The paper money calculating apparatus provided with the auto strapping-function of claim 23, wherein the arrangement base block through which said at least more than one guiding members pass have a slide bearing inside in order for the arrangement base block to have a smooth sliding movement along said at least more than one guiding members.

25. The paper money calculating apparatus provided with the auto strapping-function of claim 22, wherein the driving medium means includes:

an arrangement driving pulley rotating as the arrangement driving motor drives;

an arrangement bell metal pulley disposed with a predetermined distance from the driving pulley; and

an arrangement driving belt having a predetermined

orbit of connecting the arrangement driving pulley to the arrangement bell metal pulley and having one portion with which the arrangement base block is connected.

5 26. The paper money calculating apparatus provided with the auto strapping-function of claim 22, wherein the controlling means includes:

 a rotation plate rotating with the arrangement driving motor and having a plurality of detecting apertures
10 opened with a predetermined distance along a rim of the rotation plate;

 an arrangement encoder sensor being placed such that a detecting unit of the arrangement encoder sensor faces to a rim part of the rotation plate and controlling forward
15 and reverse rotations of the arrangement driving motor in order to control the arrangement base block; and

 a grooved arrangement sensor being placed in one front portion of the arrangement base block and detecting a location of the arrangement base block.

20

 27. The paper money calculating apparatus provided with the auto strapping-function of claim 22, wherein the arrangement means includes:

 a frame connected with the arrangement base block;
25 a plurality of contact plates formed in upper and lower sides of the frame;

 a plurality of connection bars connecting the contact plates with each other as passing through the frame by giving movability to the contact plates; and

30 an elastic body provides an elastic support between the frame and the contact plate disposed in the upper side of the frame.

 28. The paper money calculating apparatus provided
35 with the auto strapping-function of claim 1, wherein the

discharging device includes:

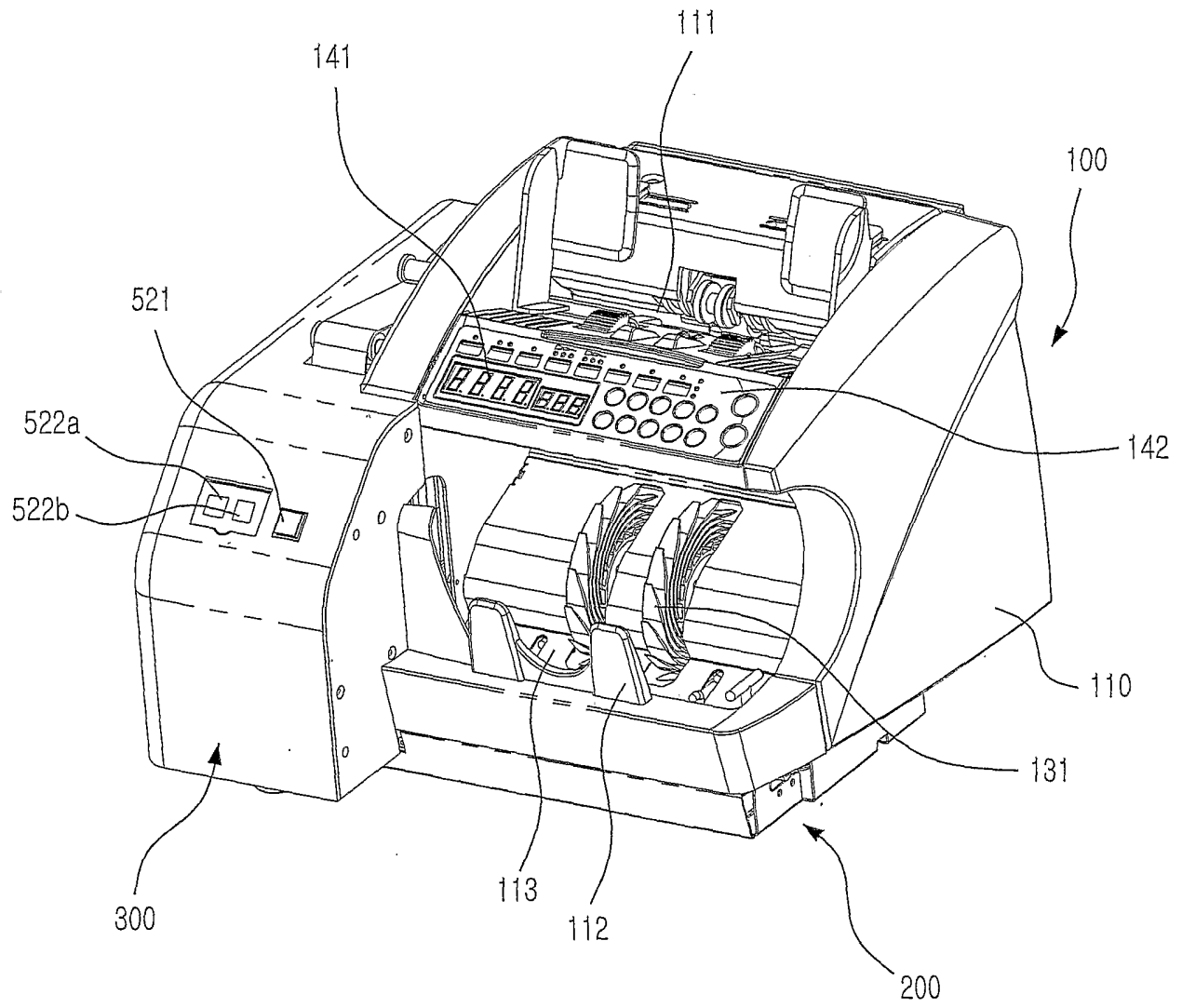
a discharge driving bar moving by the transporting device;

5 a plurality of restoring springs restoring the discharge driving bar into an original position;

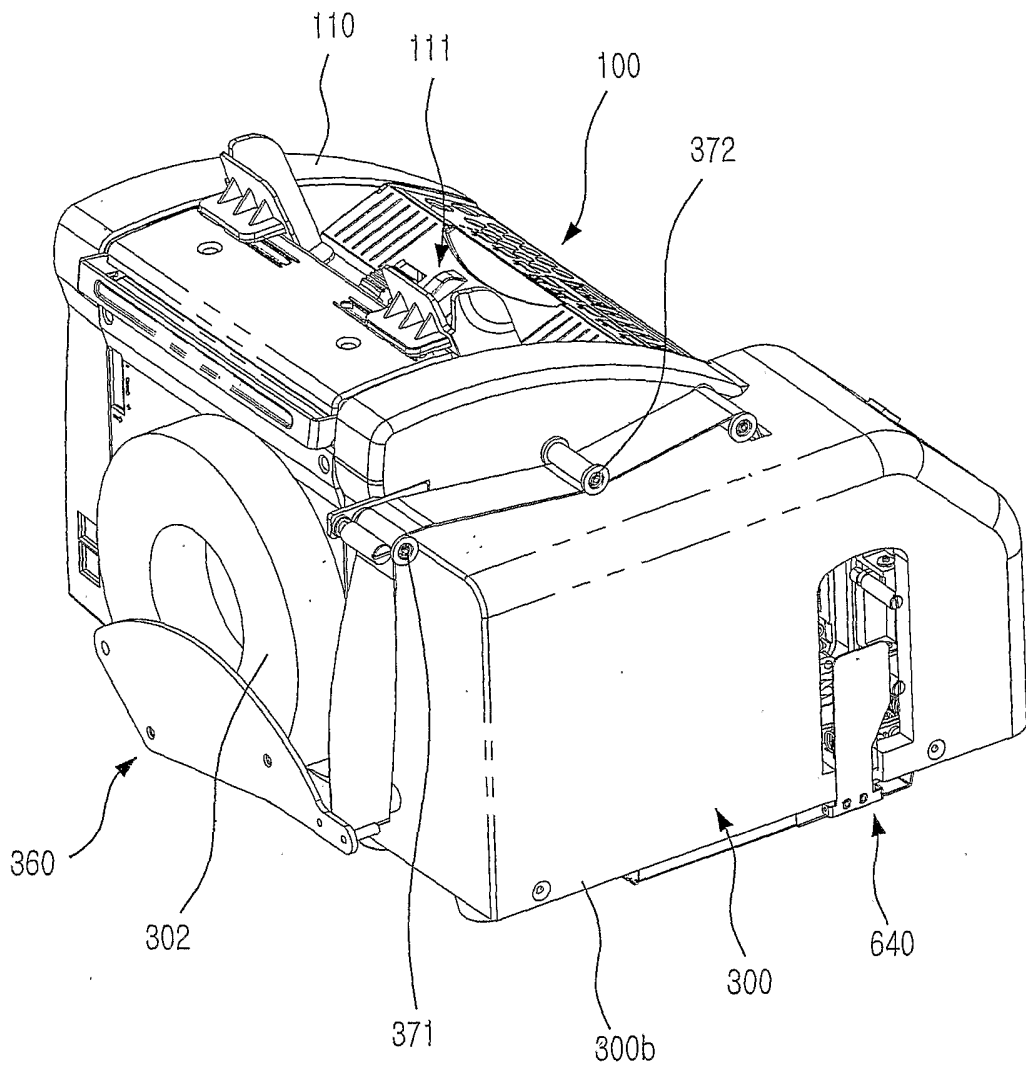
at least more than one discharge guiding blocks guiding the discharge driving bar to move by passing through said at least more than one discharge guiding blocks; and

10 a discharge member formed in the other end of the discharge driving bar and discharging a wad of paper money strapped by the strapping device.

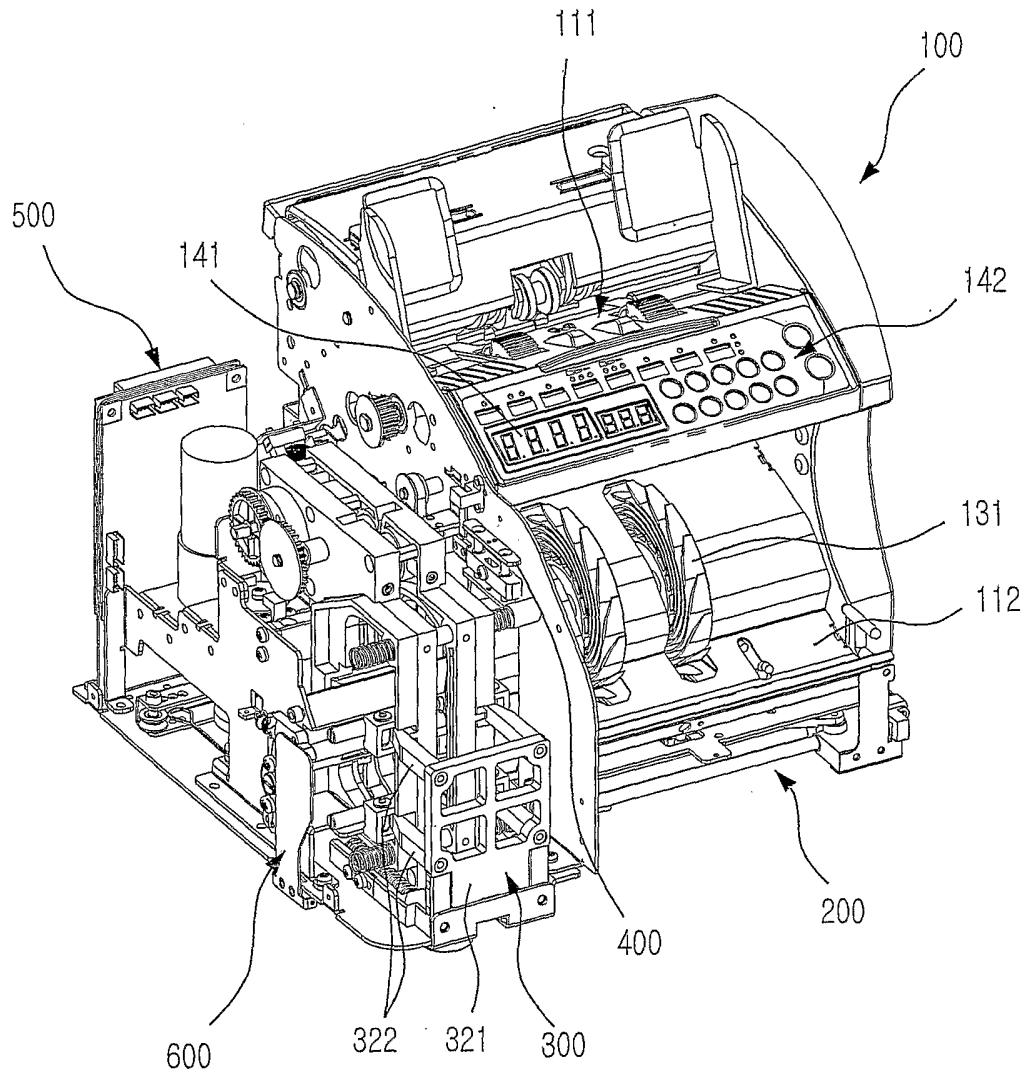
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FIG. 1



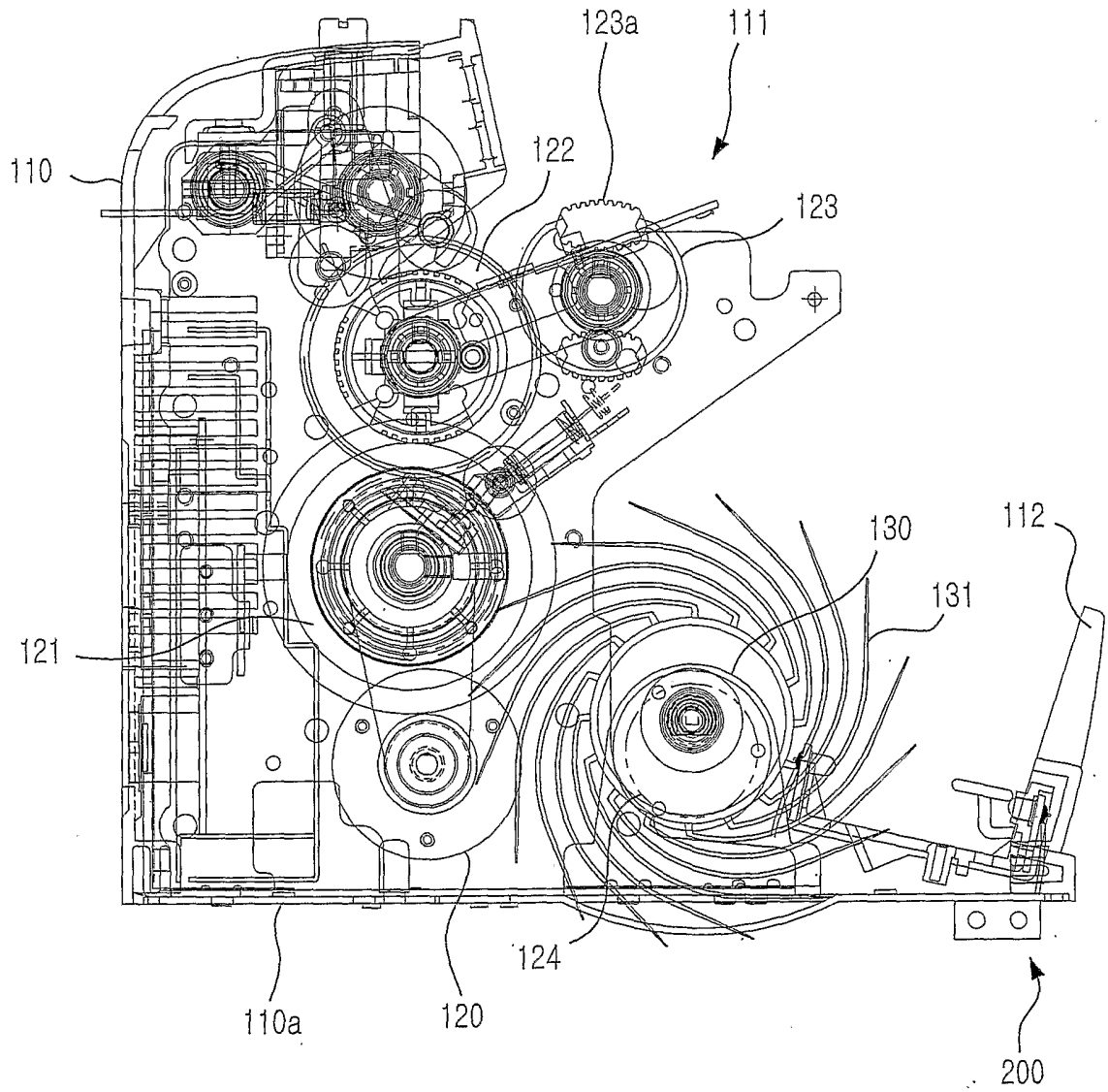
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FIG. 2



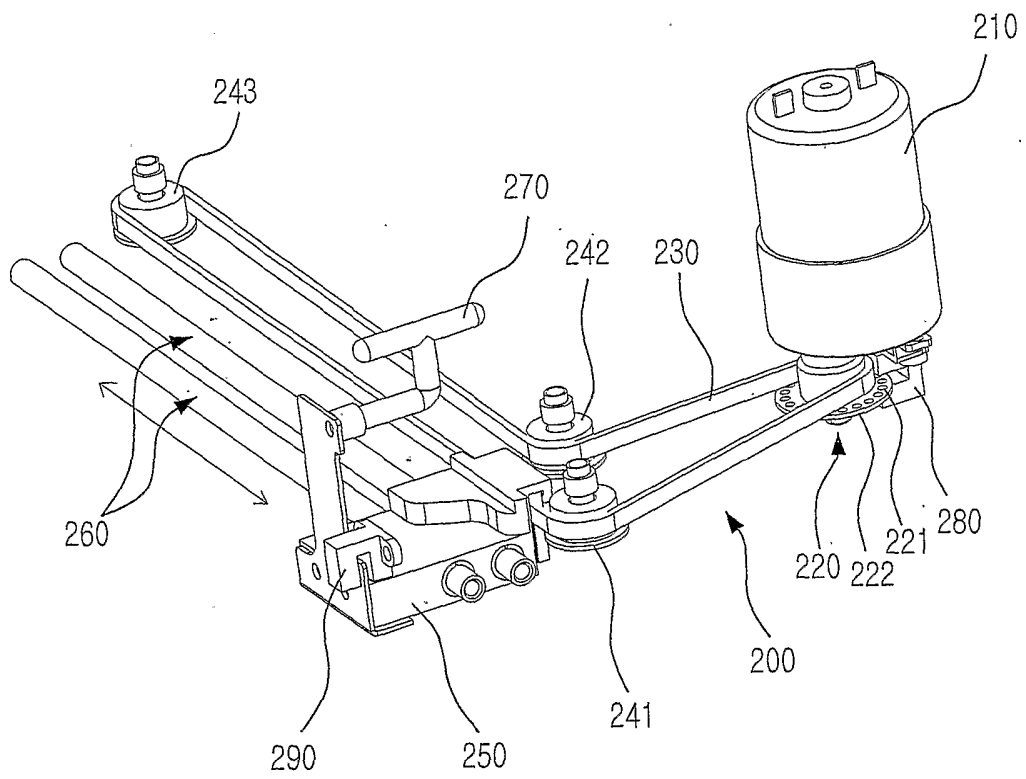
3/15
FIG. 3



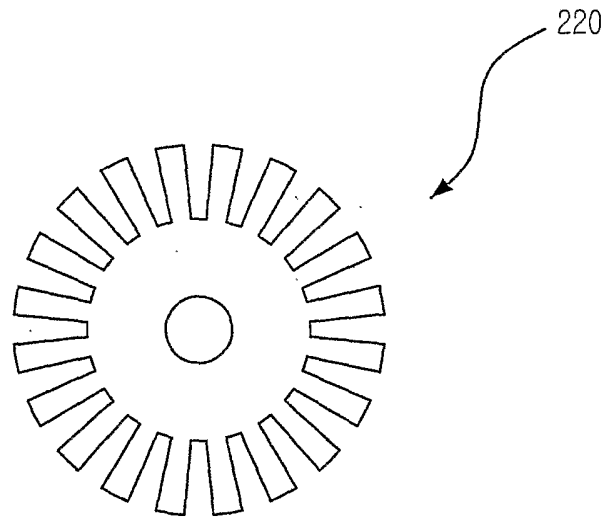
4/15
FIG. 4



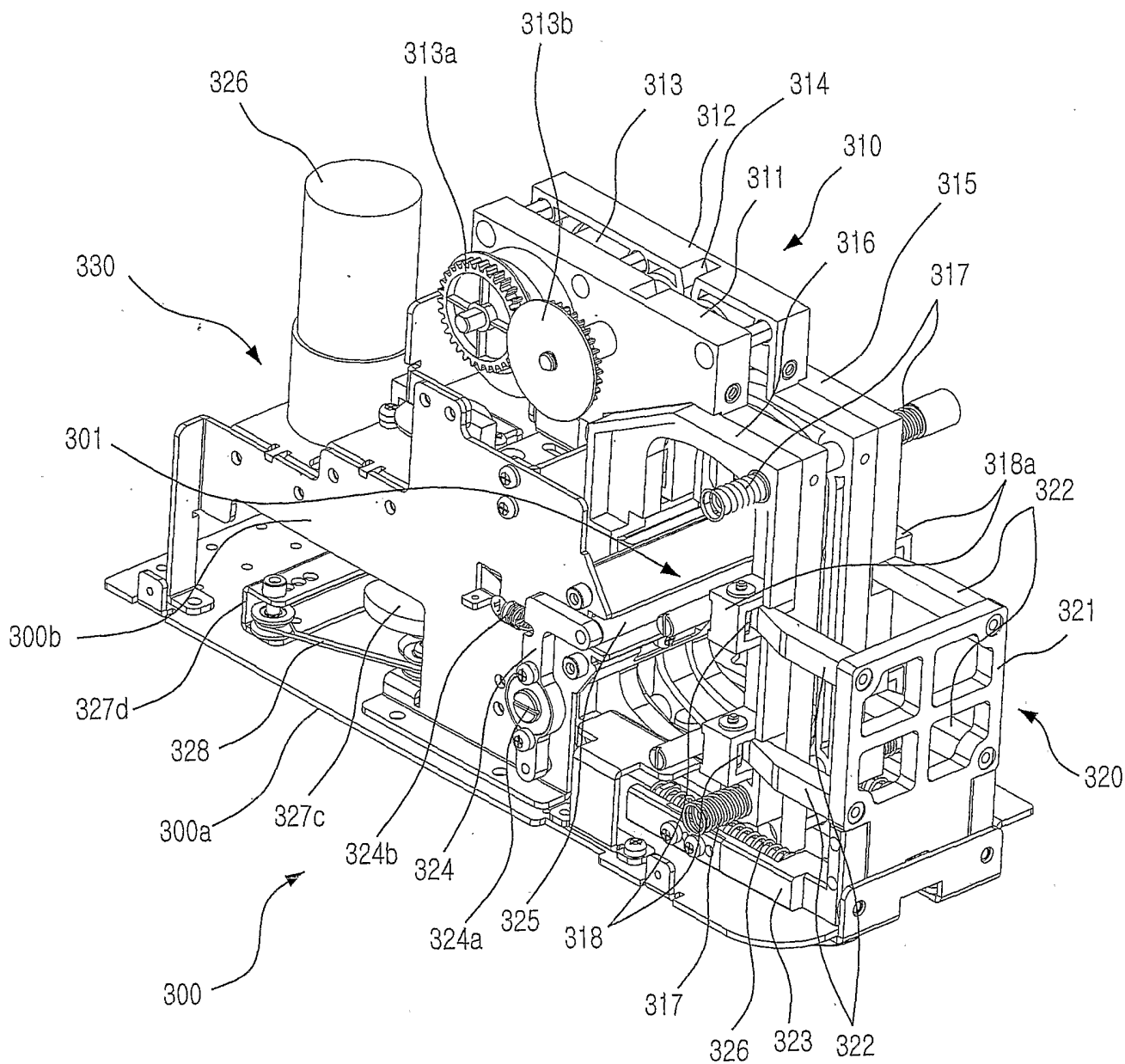
5/15
FIG. 5



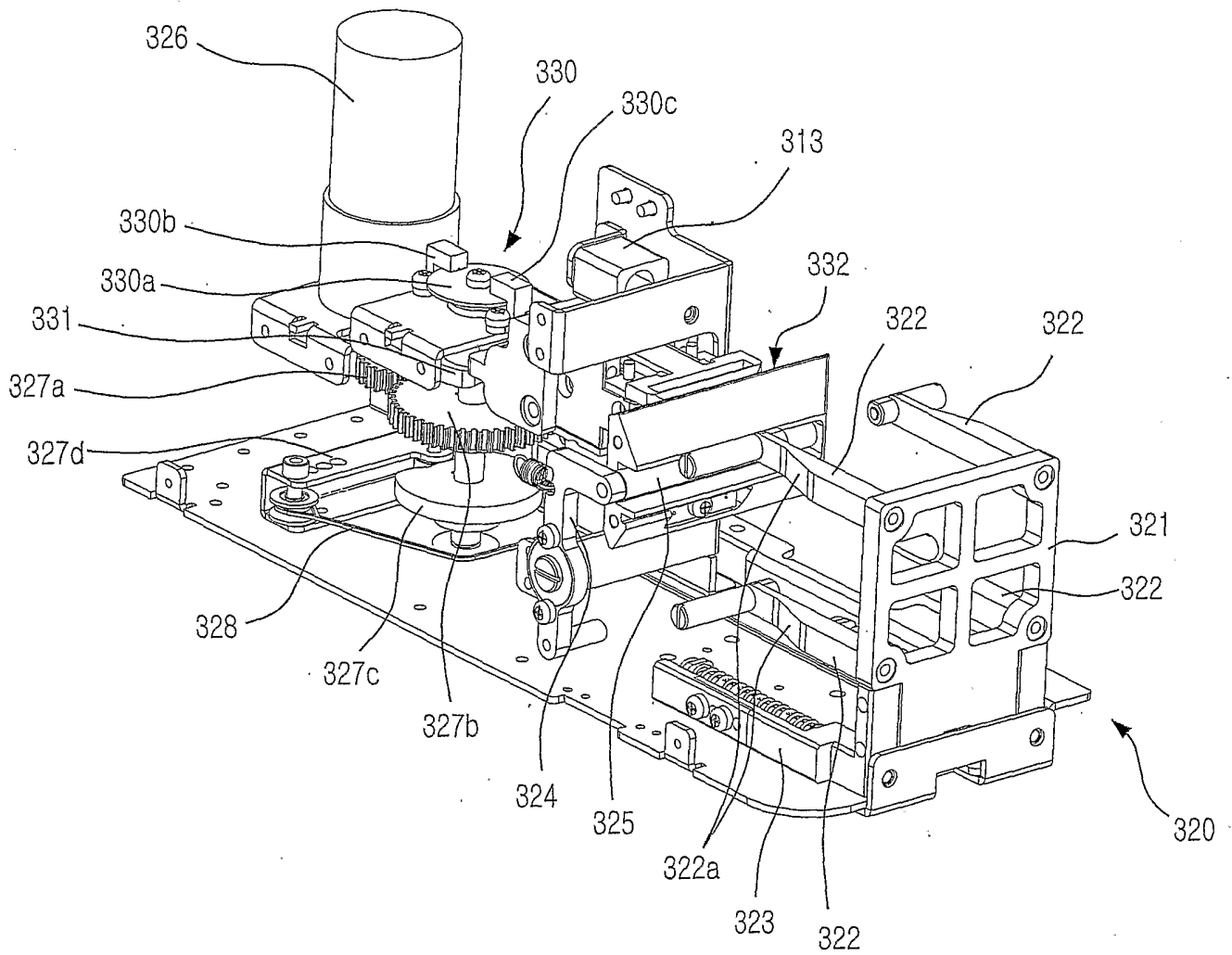
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FIG. 6



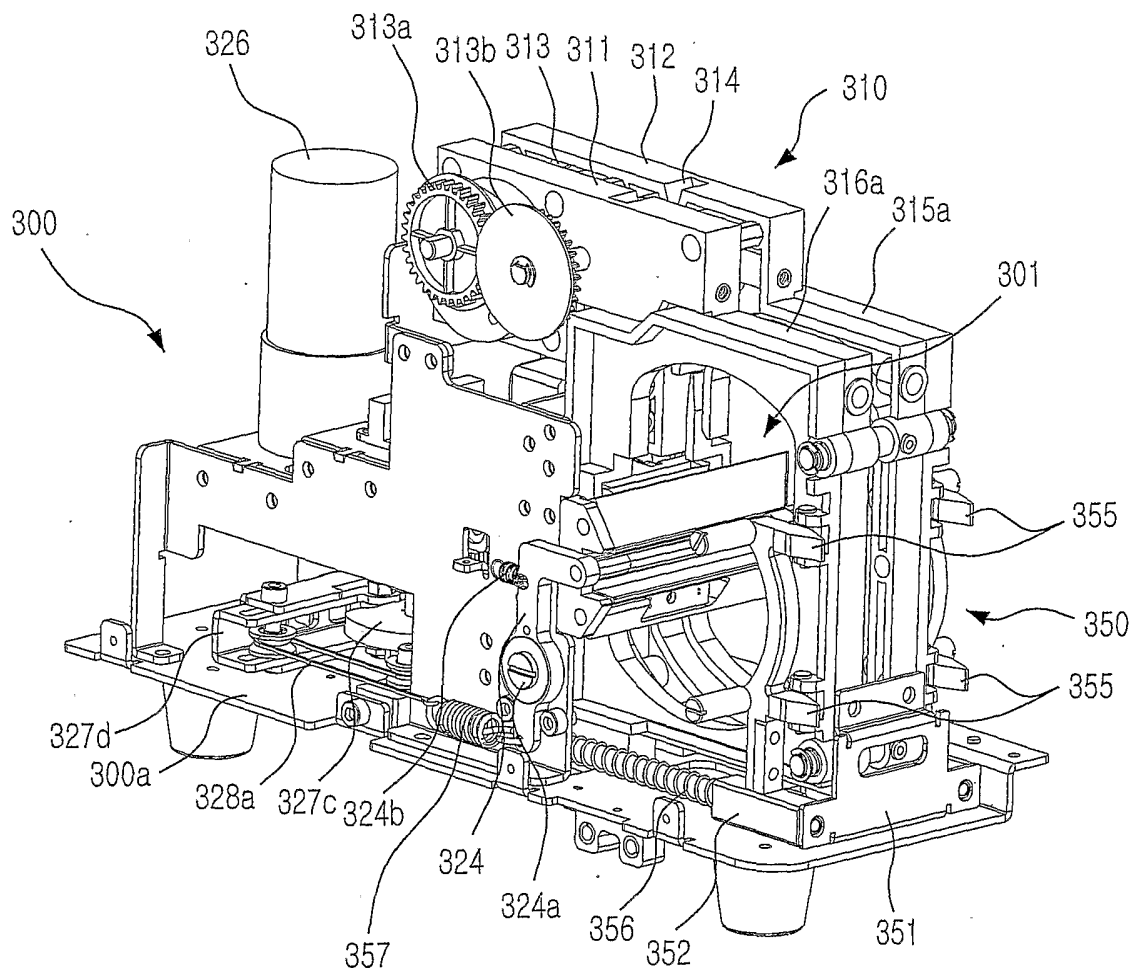
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FIG. 7



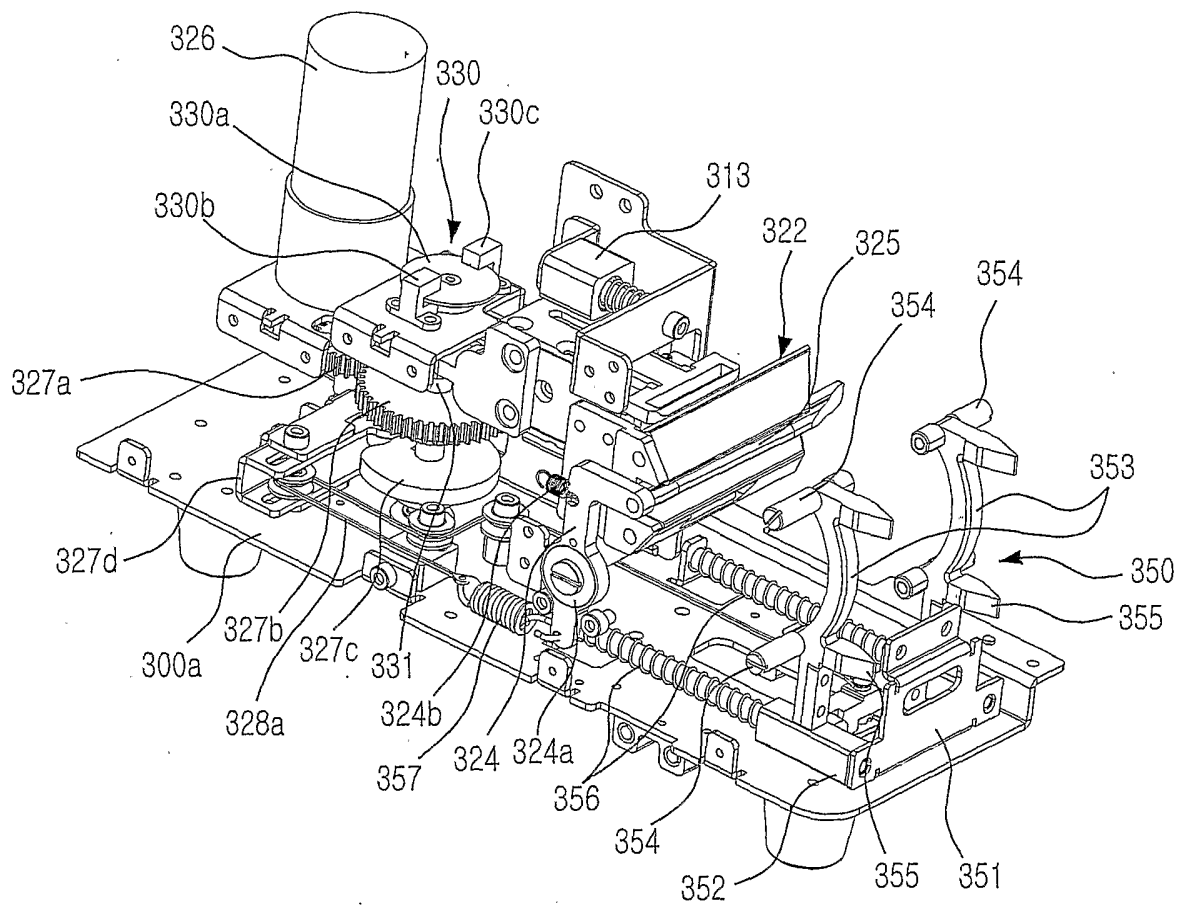
8/15
FIG. 8



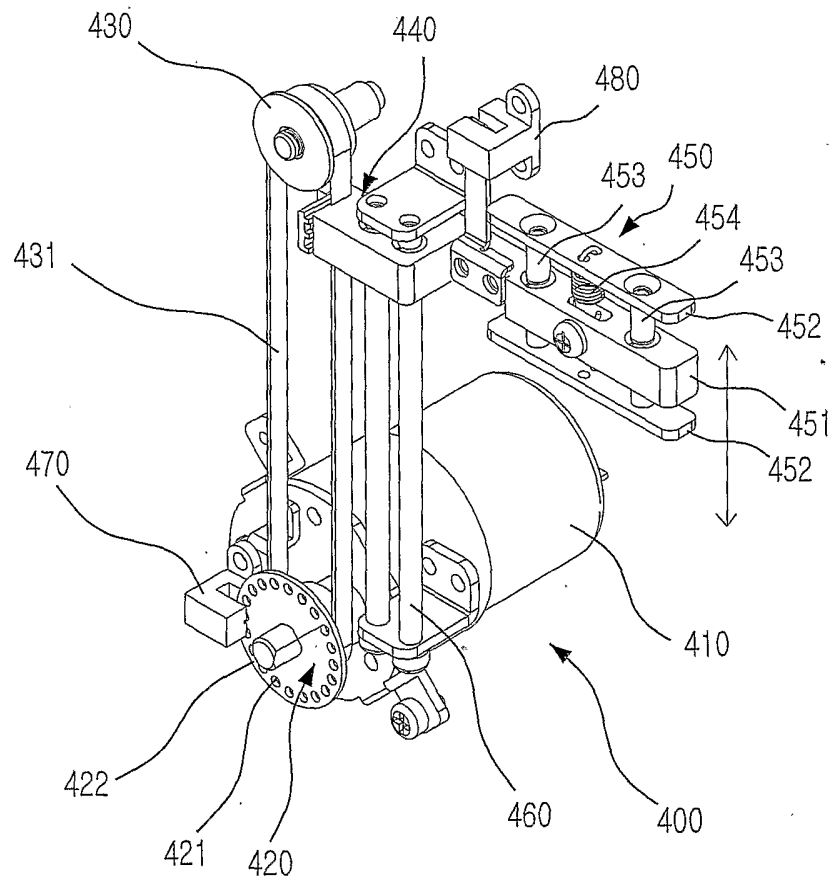
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FIG. 9



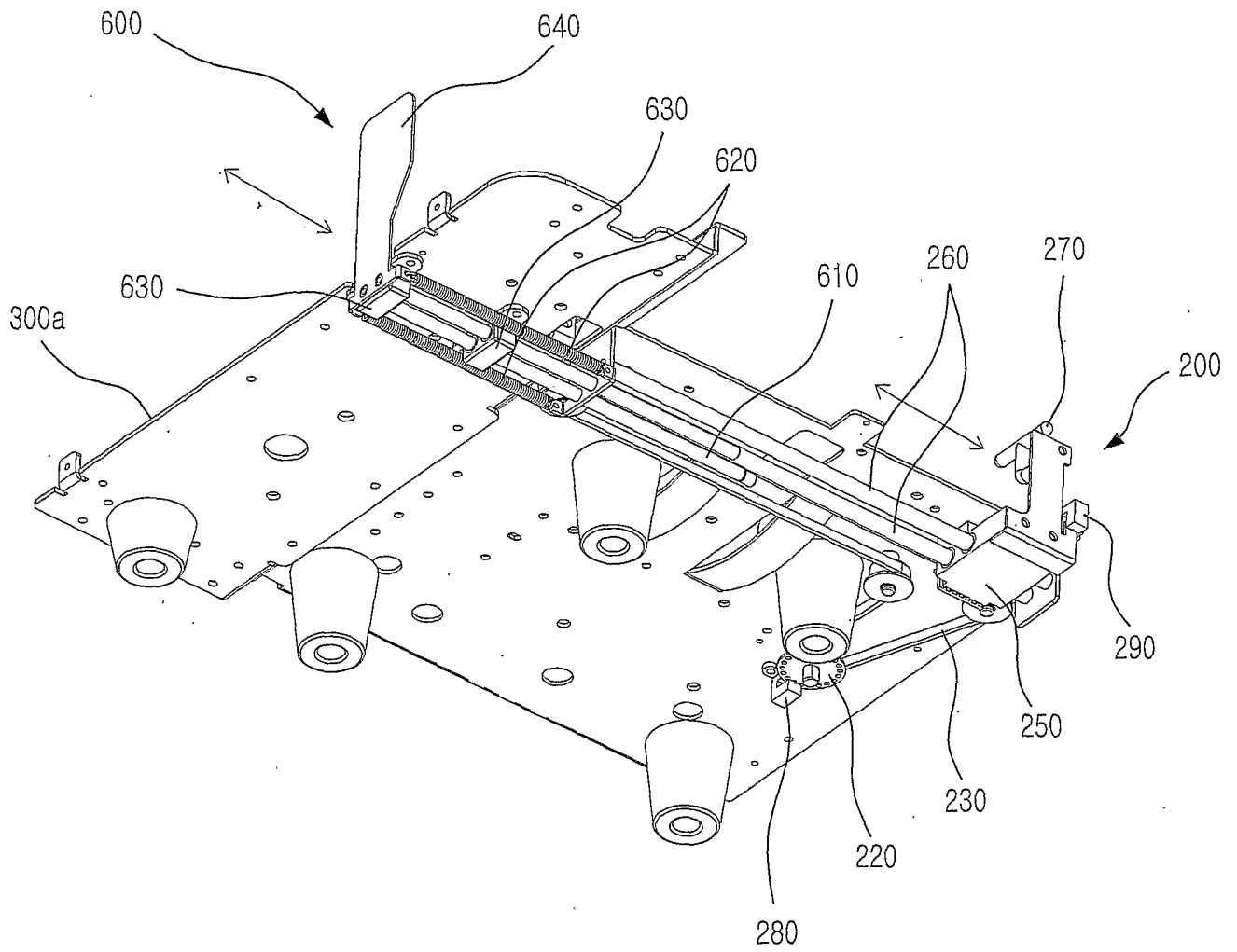
10/15
FIG. 10



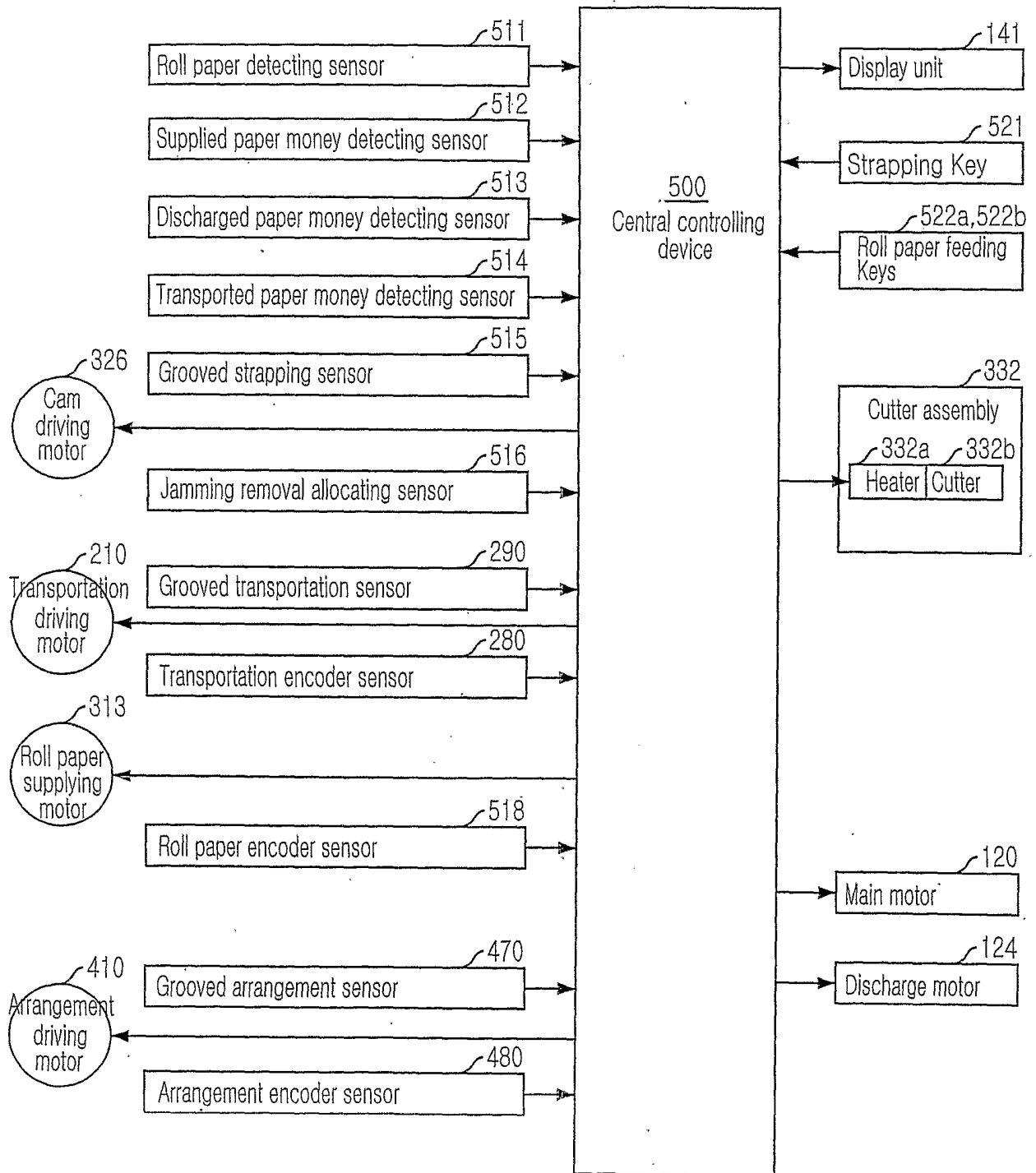
11/15
FIG. 11



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FIG. 12



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FIG. 13



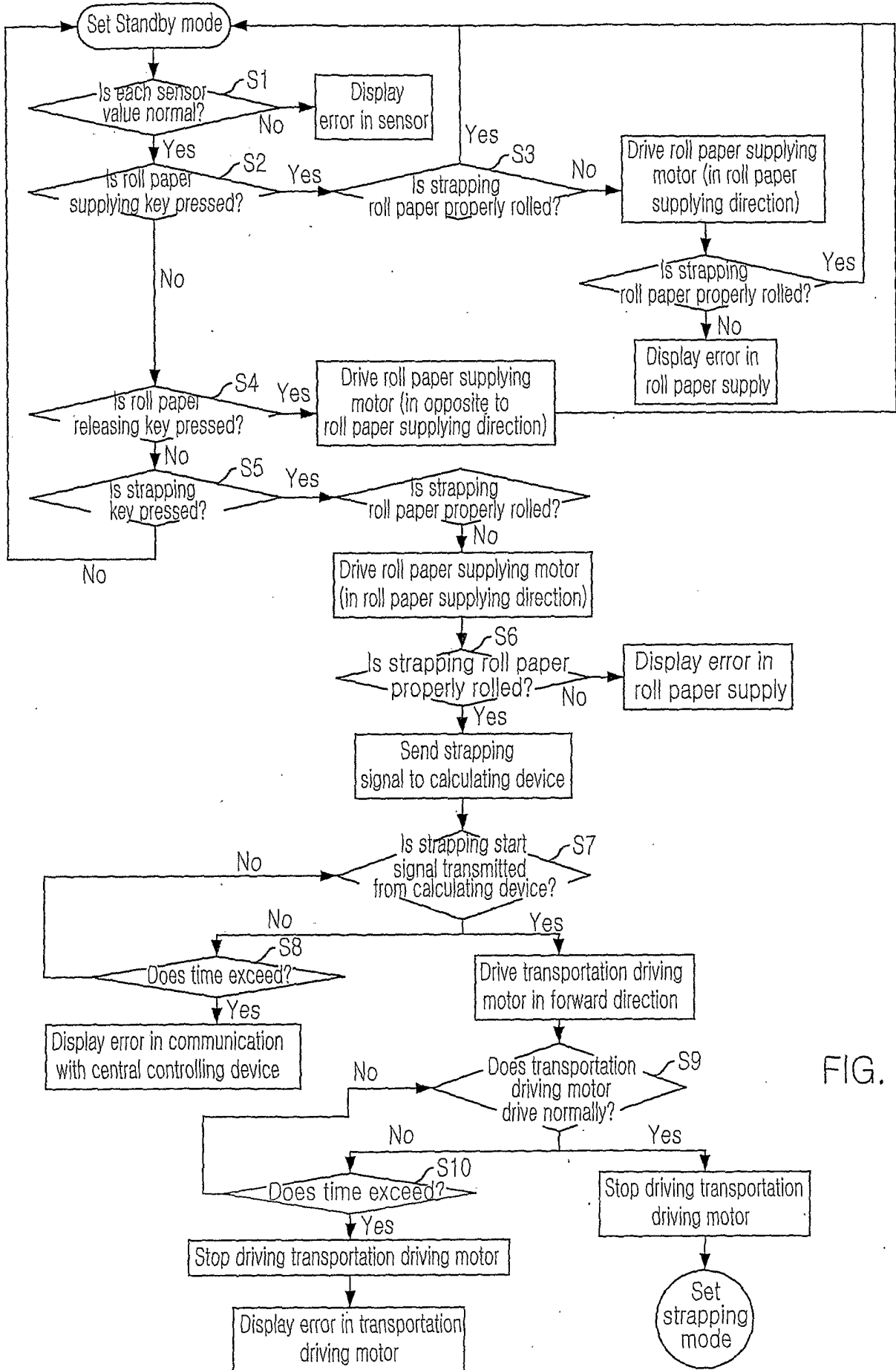
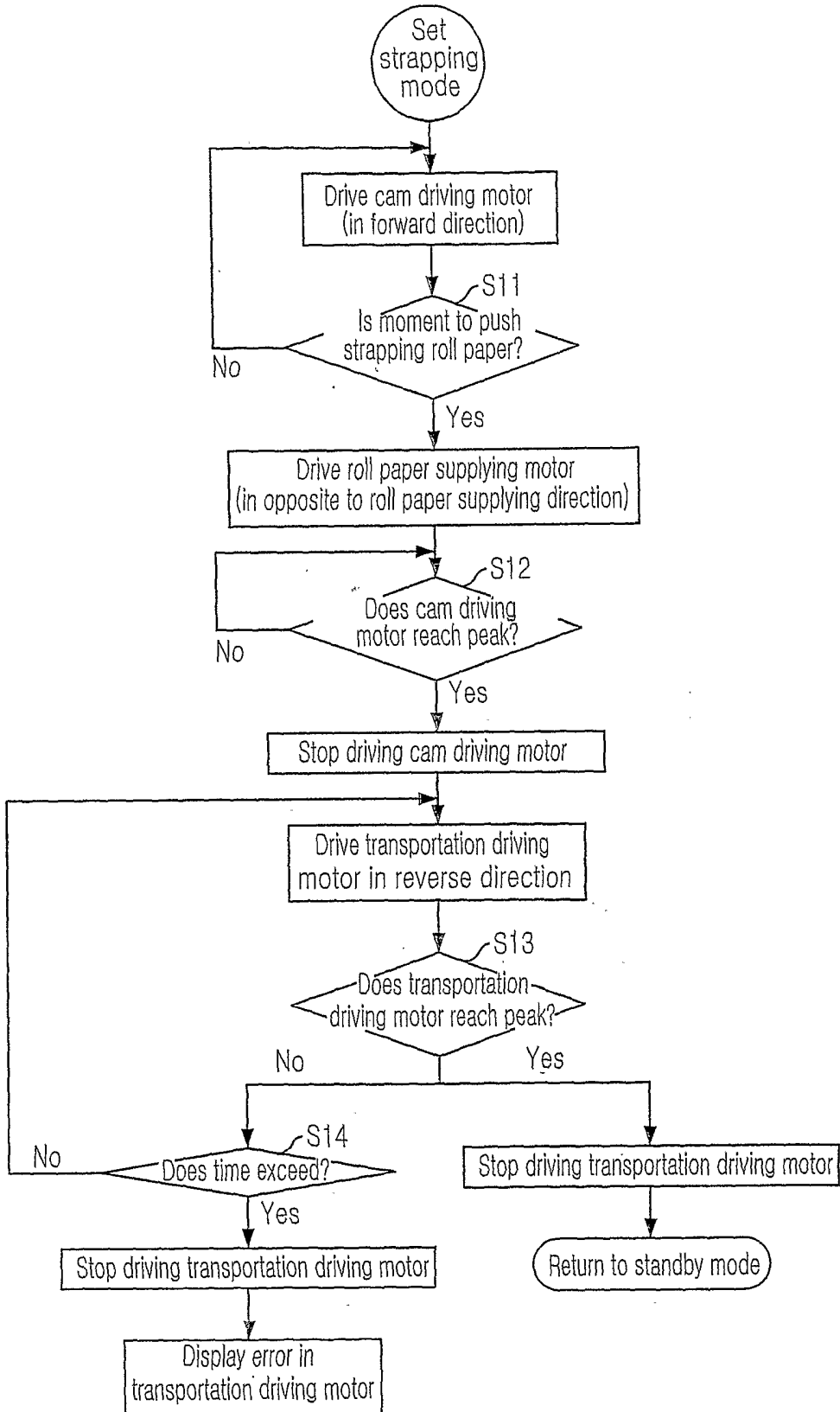


FIG. 14

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FIG. 15



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2004/001399

A. CLASSIFICATION OF SUBJECT MATTER
IPC7 G06M 7/06
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
IPC G06M, H07C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Patents and Applications for Invention since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NPS "bill, banknote, bind, count"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 2002-1964 A (BACK, MAL-NYEO) Jan. 9, 2002 abstract, fig. 1	1-2
P, X	KR 2003-78313 A (DOMOLINK Corp.) Oct. 08, 2003 abstract, fig. 1	1-2
A	US 4681229 A (SADAAKI UESAKA) Jul. 21, 1987 abstract, fig. 1	1-28
A	US 4905840 A (AKIO YUGE) Mar. 6, 1990 abstract, fig. 9	1-28

Further documents are listed in the continuation of Box C.


See patent family annex.


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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"&" document member of the same patent family

Date of the actual completion of the international search
20 SEPTEMBER 2004 (20.09.2004)

Date of mailing of the international search report
21 SEPTEMBER 2004 (21.09.2004)

Name and mailing address of the ISA/KR
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Facsimile No. 82-42-472-7140

Authorized officer
JANG, Hyun Geun

Telephone No. 82-42-481-5775

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2004/001399

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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KR 2003-78313 A	08-10-2003	None	
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