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(72) TANIGUCHI, MASANORI, JP
(72) SUGAHARA, KAZUMA, JP
(72) SUZUKI, MASAAKI, JP
(72) KIBIHARA, FUMIO, JP
(71) GLORY KOGYO KABUSHIKI KAISHA, JP

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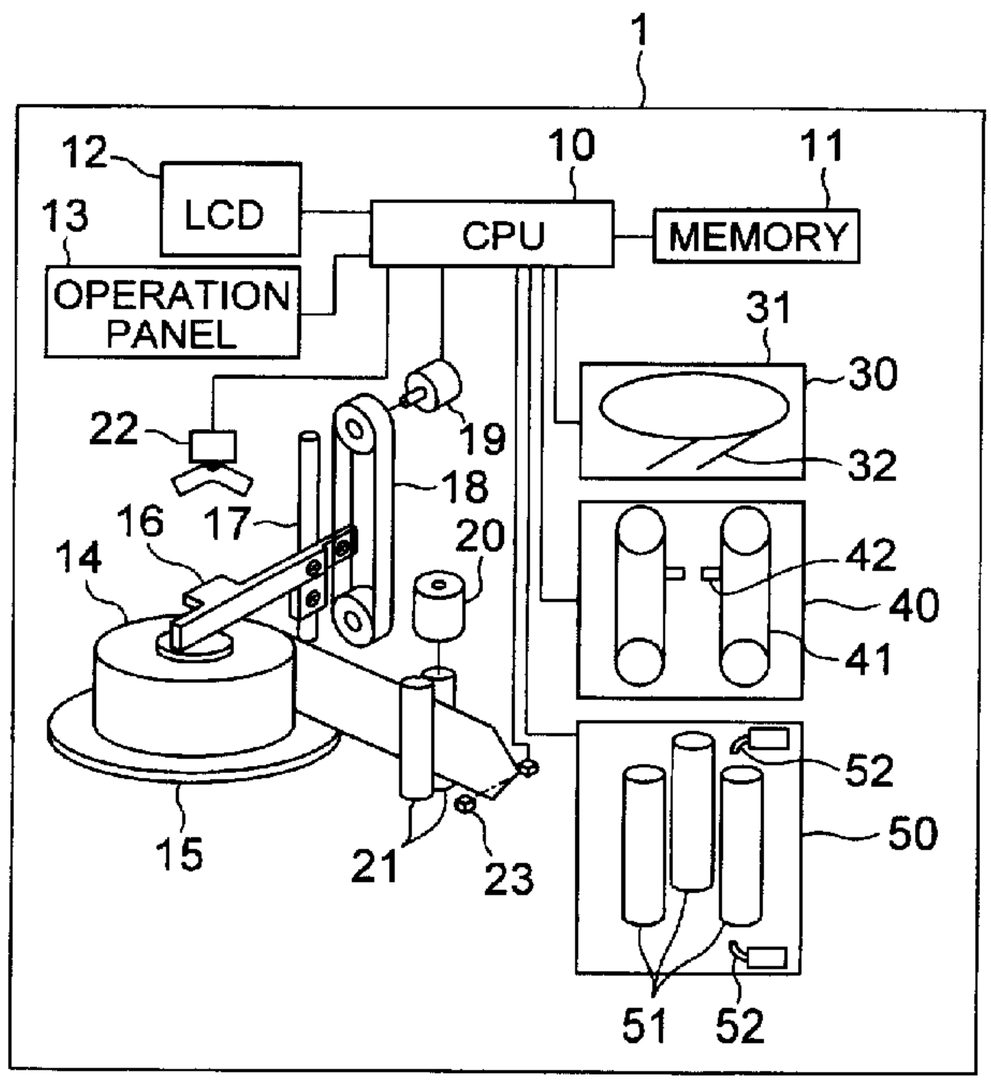
(54) **APPAREIL D'EMBALLAGE DES PIECES DE MONNAIE**
(54) **COIN PACKAGING APPARATUS**



(57) A coin packaging apparatus is provided, which has a structure facilitating confirmation of incorrectness of packaging paper and correct packaging paper when wrong packaging paper is set, and facilitating replacement of the packaging paper. In the coin packaging apparatus according to the invention, a comparator compares the paper width value of the packaging paper detected by a paper width detecting device with a recommended paper width value at a predetermined timing before starting coin packaging operation, to progress the operation under judgement that the packaging paper is correct if the result of comparison indicates that the calculated paper width value is within the predetermined allowable range for the recommended paper width value, and to represent incorrectness of the packaging paper and the recommended paper width value and have the packaging paper gripped by the paper supply/discharge device be discharged automatically or manually under judgement that the packaging paper is wrong if the calculated paper width value is out of the predetermined allowable range for the recommended paper width value.

ABSTRACT OF THE DISCLOSURE

A coin packaging apparatus is provided, which has a structure facilitating confirmation of incorrectness of packaging paper and correct packaging paper when wrong packaging paper is set, and facilitating replacement of the packaging paper. In the coin packaging apparatus according to the invention, a comparator compares the paper width value of the packaging paper detected by a paper width detecting device with a recommended paper width value at a predetermined timing before starting coin packaging operation, to progress the operation under judgement that the packaging paper is correct if the result of comparison indicates that the calculated paper width value is within the predetermined allowable range for the recommended paper width value, and to represent incorrectness of the packaging paper and the recommended paper width value and have the packaging paper gripped by the paper supply/discharge device be discharged automatically or manually under judgement that the packaging paper is wrong if the calculated paper width value is out of the predetermined allowable range for the recommended paper width value.

COIN PACKAGING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to a coin packaging apparatus configured to packaging a stack of coins by winding packaging paper onto its side surface, and more particularly to a coin packaging apparatus using different kinds of packaging paper, depending upon the sort or number of coins to be packaged.

Fig. 9 is a perspective view showing an outline of a conventional coin packaging apparatus.

The conventional coin packaging apparatus 100 shown in Fig. 9 includes: a coin insertion hopper 103 which opens to the top portion of a machine unit 102; a first coin supply rotating plate 104 driven for rotation to receive and supply coins inserted into the coin insertion hopper 103; a second coin supply rotating plate 105 driven for ration to supply coins delivered from the first coin supply rotating plate 104 to have them sequentially processed one by one; a coin passage 106 extending substantially tangential to the second coin supply rotating plate 105 to perform separation, counting and other processing of coins supplied from the second coin supply rotating plate 105; a coin stacking portion 107 located at one end of the coin passage 106 to stack a predetermined number of coins into the form of a rod; three packaging rollers 109 located under the coin stacking portion 107 to receive a rod of stacked coins from the coin stacking portion 107 and to wind packaging paper 108 wider than the length of the rod of stacked coins onto the side surface of the rod of stacked coins; a paper feeding roller 112 supplying the packaging paper 108; a cutter for cutting the packaging paper 108 into a desired length; folding heads 114 located near the top and the bottom of the packaging roller 109 to fold and tightly press upper end lower ends of packaging paper 108 wound onto the side surface of the rod of stacked coins to make a packaged rod of coins; and a packaged coin outlet 111 located underpart of the machine unit 102 to discharge packed rods of coins. Three packing rollers 109 and the folding heads 114 form a coin packaging portion 110.

As apparent from the structure explained above, the conventional coin packaging apparatus 100 is configured to package

each rod of stacked coins by activating three packing rollers 109 to wind the packaging paper 108 wider than the length of the rod of stacked coins onto the side surface of the rod of stacked coins, and by activating the folding heads 114 to fold and tightly press upper and lower ends of the packaging paper 108. If thickness of coins to be packaged varied among different kinds of coins, or number of coins to be packaged as a single rod varied, the packing paper 108 is changed from wrong one to correct one having a width meeting the kind and number of coins under the packaging process.

An invention of a coin packaging apparatus, intended to confirm whether predetermined packaging paper with a suitable width was set or not upon replacement of packing paper, is disclosed in Japanese Patent Laid-Open Publication No. 113216-1996.

The coin packaging apparatus according to the invention disclosed in Japanese Patent Laid-Open Publication No. 113216-1996 includes: a packaging paper width detecting mechanism mounted for vertical movements near a packaging paper table supporting a roll of packaging paper thereon and having a packaging paper height detecting lever which can be put on the top surface of the packaging paper roll on the packaging paper table; a fold-and-press mechanism having a pair of fold-and-press heads vertically movable toward and away from each other between pause positions and fold-and-press positions to fold and press upper and lower ends of the packaging paper wound on stacked coins when they are moved to the fold-and-press positions; and a coupling shaft located between the packaging paper width detecting mechanism and the fold-and-press mechanism to vertically shift the pause position of the upper fold-and-press head in accordance with the height of the packaging paper height detecting lever. This coin packaging apparatus further includes a detector device provided in the fold-and-press machine to detect the relative distance between the fold-and-press heads and thereby detect the paper width of the packaging paper roll on the packaging paper table; an operational device through which the type of coins corresponding to the packaging paper roll on the packaging paper table can be input; a memory which stores a plurality of paper widths of packaging rolls for different types of coins as reference paper widths; and an identify/control device which identifies whether a

particular packaging paper roll on the packaging paper table meets with the type of coins selected through the operational device by comparing the paper width of the packing paper roll detected by the detector device with one of the reference paper width in the memory intended for the selected type of coins. The identify/control device is configured to output an alarm when the paper width of the packaging paper roll detected by the detector device does not meet the reference paper width in the memory for the type of coins selected through the operational device. That is, the coin packaging apparatus according to the invention disclosed in Japanese Patent Laid-Open Publication No. 113216-1996 is configured to detect the paper width of the packaging paper, confirm whether the packaging paper corresponds to the selected type of coins, and output an alarm when the packaging paper does not meet the selected type of coins.

Coin packaging apparatuses of this type, however, are usually configured to simply output an alarm when any of various abnormal matters occurs. Therefore, even when an alarm was output, an operator could not locate which type of abnormality was meant by the alarm. As a result, the operator was compelled to refer to operation manuals or check various points of the coin packaging apparatuses, and it took him much time to replace the packaging paper with predetermined packaging paper of a correct paper width and to actually package the coins.

Even in packaging apparatuses designed to inform that the alarm means wrong packaging paper being set, there still remained the problem that operators had to locate correct packaging paper and often set another wrong packaging paper.

Moreover, when the packaging paper is not the correct one for the selected type of coins, the packaging paper should be immediately replaced. However, since the packaging paper was gripped by the packaging paper supply rollers, the packaging paper had to be forcibly pulled out to remove it, the apparatus was inconvenient for replacement.

SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide a coin packaging apparatus having a structure which makes it easy to

recognize that wrong packaging paper is set, if so, and to know correct packaging paper, and also makes it easy to replace the packaging paper.

According to this invention, there is provided a coin packaging apparatus comprising: a setting device permitting operation to set conditions of packaging operation including a coin type and an unit number of coins per package, and to enter a command to start the packaging operation; a memory which stores information including coin types and unit numbers of coins per package and recommended paper widths of packaging paper; a coin stacking device which stacks coins of the set type and the set unit number of coins per package in form of a rod; a paper supply device which supplies packaging paper to be used for packaging the rod of coins stacked by said coin stacking device; a coin packaging device which winds said packaging paper around the side surface of said rod of stacked coins and fold and press upper and lower ends of said packaging paper to package said rod of stacked coins; a paper width detecting device which detects the paper width of said packaging paper set on said paper supply device; a comparator which compares the value of the detected paper width of said packaging paper with a predetermined allowable range for the recommended paper width value of packaging paper suitable for the coins of the set type and the set unit number of coins per package; and a display which represents incorrectness of the packaging paper and said recommended paper width value when the result of comparison indicates that the paper width value of the packaging paper is out of the predetermined allowable range for said recommended paper width value.

In the coin packaging apparatus according to the invention, since a display represents that the packaging paper currently set is wrong and the value of the recommended paper width, operators can immediately know that the current abnormality is mismatching of packaging paper, and the recommended paper width of packaging paper suitable for the coin type and the unit number of coins per package. Therefore, the operators can undertake replacement of the wrong packaging paper with correct packaging paper for the coin type and the unit number of coins per package. When the apparatus includes a paper supply/discharge device, unlike the conventional

apparatus using paper supply rollers exclusive for paper supply operations, the apparatus is also operative for paper discharge to quickly discharge the packaging paper heretofore gripped by the paper supply/discharge device.

If the comparator is configured to execute comparison when a coin type and an unit number of coins per package is selected through the setting device or when a packaging start command is input through the setting device, it is prevented that wrong packaging paper is erroneously supplied and incomplete packaging of coins is effected.

When the apparatus includes a paper supply/discharge switch, the comparator preferably executes comparison when paper supply control is manually selected by the paper supply/discharge switch.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic diagram partly showing the structure of a coin packaging apparatus according to an embodiment of the invention;

Fig. 2 is a perspective view showing an outline of a coin packaging apparatus according to an embodiment of the invention;

Fig. 3 is a list of recommended paper widths of packaging paper corresponding to coin types and unit numbers of coins per package;

Fig. 4 is an explanatory diagram showing an example of representation of a notice that the current packaging paper is wrong and the value of the recommended paper width;

Fig. 5 is an explanatory diagram showing an example of representation of a notice that the current packaging paper is correct and the apparatus is ready for normal packaging operation;

Fig. 6 is a flow chart showing procedure of a first method for comparing the value of the calculated paper width with the value of the recommended paper width in the coin packaging apparatus according to the invention;

Fig. 7 is a flow chart showing procedure of a second method for comparing the value of the calculated paper width with the value of the recommended paper width in the coin packaging apparatus

according to the invention;

Fig. 8 is a flow chart showing procedure of a third method for comparing the value of the calculated paper width with the value of the recommended paper width in the coin packaging apparatus according to the invention; and

Fig. 9 is a perspective view showing an outline of a conventional coin packaging apparatus.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Explained below is an embodiment of the coin packaging apparatus according to the invention.

Fig. 1 is an explanatory diagram schematically showing a part of the structure related to the invention in the embodiment of the coin packaging apparatus according to the invention. Fig. 2 is a perspective view showing an outline structure of the embodiment of the coin packaging apparatus according to the invention.

The coin packaging apparatus 1 according to the invention shown in Figs. 1 and 2 includes: a coin insertion hopper 2 opened to the top portion of the machine unit; a coin supply portion 30 having a second coin supply rotating plate 31 driven for rotation to supply coins delivered from a first coin supply rotating plate (not shown) driven for ration to receive and supply coins inserted into the coin insertion hopper 2 so as to have these coins processes one by one, and having a coin passage 32 which extends substantially tangential to the second coin supply rotating plate 31 to perform separation, counting and other processing of the coins supplied from the second coin supply rotating plate 31; a coin stacking portion 40 having a coin hold portion 42 and a coin stack belt 41 located at one end of the coin passage 32 to stack a selected number of coins in form of a rod, and a coin stack belt 41; a coin packaging portion 50 having three packaging rollers 51 which are located under the coin stacking portion 40 to receive a rod of stacked coins from the coin stacking portion 40 and wind packaging paper 14 with a paper width longer than the length of the rod of stacked coins onto the side surface of the rod of stacked coins, and including a pair of fold-and-press heads located near the top end and the bottom end of the packaging rollers 51 to fold and tightly press the upper and lower ends of the packaging

paper 14 wound around the side surface of the rod of stacked coins; a packaging paper table 15 supported for free rotation and supporting a roll of the packaging paper 14 set thereon; a paper supply/discharge motor 20 for controlling to supply or discharge the packaging paper 14; a paper supply/discharge roller 21 driven by the paper supply/discharge motor 20 to supply or discharge the packaging paper 14; a feed switch 22 manually operated for paper supply control and paper discharge control to have the paper supply/discharge motor 20 execute paper supply and paper discharge; a position detecting sensor 23 for detecting that the leading edge of the packaging paper 14 fed from the paper supply/discharge roller 21 has reached a predetermined position; a cutter (not shown) for cutting the packaging paper 14 to a predetermined length; a paper width detecting portion having a paper width detecting lever 16 fixed at a middle portion thereof to a lift shaft 17 for vertical movements together with the lift shaft 17 to be positioned at a height corresponding to the paper width of the packaging paper when one end thereof is put on a center of the roll of the packaging paper 14, a moving amount converting portion 18 including a timing belt fixedly coupled to the other end of the paper width detecting lever 16 and rotated in response to an up or down movement of the paper width detecting lever 16 and its support pulley shaft, and a potentiometer 19 coupled to the pulley shaft of the moving amount converting portion 18 to output the rotating amount of the pulley shaft as a paper width detection signal corresponding to the paper width of the packaging paper 14; memory 11 storing information on coin types and thicknesses of coins to be packaged and recommended paper widths of packaging paper corresponding to the coin types and unit numbers of coins in rods of stacked coins per package, among others; an LCD 12 for representing the status of packaging operation, status of each portion in the machine unit, and other information; a setting portion 13 enabling manipulation of setting conditions of a packaging operation and other manipulation (including a start/stop button 13a for a command of starting or stopping the operation, a clear button 13b for clearing the operation, currently selected conditions or display, and so on); a central processing unit (CPU) for controlling calculation of the paper width of a roll of packaging paper 14 actually set,

comparison between the value of the recommended paper width of the packaging paper corresponding to the set type and the set unit number of coins per package with the value of the calculated value of the paper width, and other setting and processing of the entire coin packaging apparatus; a small-diameter coin excluding portion 3 for excluding coins with small diameters than the diameter of coins to be packaged; a fraction coin discharge portion 4 for discharging coins remaining as fractions after packaging of coins; and a packaged coin discharge portion 5 located underpart of the machine unit to discharge packaged rods of stacked coins.

In the coin packaging machine 1 according to the invention, the distal end of the paper width detecting lever 16 is put on the roll of packaging paper 14 set on the packaging paper table 15. At a predetermined time before packaging of coins is started, the CPU 10 calculates the paper width of the roll of packaging paper 14 set on the packaging paper table 15 from a paper width detection data in the paper width detection signal generated and transmitted to the CPU 10 by the potentiometer 19 in response to the moving amount of the moving amount converting portion 18, then reads out from the memory 11 the recommended paper width data of packaging paper corresponding to the set coin type and the set unit number of coins per package, which is entered and set in the CPU from the setting portion 13. If the results of comparison shows that the calculated paper width value is within a predetermined allowable range for the recommended paper width value, the CPU 10 judges that the packaging paper is correct, and undertakes the subsequent processing. If the calculated paper width value is out of the allowable range for the recommended paper width value, the CPU 10 judges that the packaging paper is wrong. Then the CPU 10 displays the judgement and a recommended paper width value on the LCD. Consequently, the currently gripped packaging paper 14 by the paper supply/discharge roller 21 is discharged automatically or manually.

Since the notice that the packaging paper is wrong and the recommended paper width value are displayed on the LCD 12, it is prevented that wrong packaging paper is supplied and incomplete packaging of coins is conducted. The operator can immediately recognize that the alarmed abnormality point out incorrectness of the

packaging paper and the recommended paper width of packaging paper fitting the coin type and the unit number of coins per package. Therefore, the operator can quickly cope with it by replacing the wrong packaging paper with one meeting the coin type and the unit number of coins per package.

Additionally, since the paper supply/discharge roller 21 is operative for discharging paper, unlike the conventional paper supply roller exclusive for paper supply operation, the wrong packaging paper 14 gripped by the paper supply/discharge roller 21 can be discharged quickly.

In the case of discharging the packaging paper 14 manually, it is recommended to invalidate paper supply control by the feed switch 22 and to permit paper discharge control alone. Then, it is prevented that erroneous feeding of wrong packaging paper and incomplete packaging of coins occur.

Fig. 3 is a list of exemplary representation of recommended paper widths of packaging paper for types and number of coins to be packaged. In this example, recommended paper widths of packaging paper meeting with coin types used in the U. S. and unit numbers of coins are shown.

Recommended paper width for packaging 50 one-cent coins is 97.0 mm, and recommended paper widths for packaging 20 five-cent coins and 40 of the same coins are 60.5 mm and 99.0 mm, respectively. Recommended paper width for packaging 50 ten-cent coins is 88.5 mm, and recommended paper widths for packaging 20 twenty five-cent coins and 40 of the same coins are 57.0 mm and 91.5 mm, respectively. Recommended paper width for packaging 20 fifty-cent coins is 64.5 mm. Recommended paper width for packaging 25 one-dollar coins is 71.5 mm, and recommended paper with for packaging 20 tokens (medal-shaped pieces used for getting on subways) is 74.0 mm.

Next made is an explanation on specific display contents by the LCD 12 and on the setting portion 13.

Fig. 4 is an explanatory diagram showing an example of representation of the notice that packaging paper is wrong and the value of recommended paper width. Fig. 5 is an explanatory diagram showing an example of representation of the notice that the packaging

paper is correct and the apparatus is reedy for normal packaging operation.

As explained above, as a result of comparison between the calculated paper width value and the recommended paper width value by the CPU 10 in the coin packaging apparatus 1, if the calculated paper width value is out of a predetermined allowable range for the recommended paper width value, the CPU 10 judges that the packaging paper is wrong, and has this notice and a recommended paper width value displayed on the LCD 12. Fig. 4 shows an example of such representation.

Displayed on the LCD 12 shown in Fig. 4 are the currently set coin type and unit number of coins per package 120, coin types and unit numbers of coins which can be selected to package them 121, icons 122 representing functions of respective operational keys on the setting portion 13, representation notifying abnormality of packaging paper, i.e. incorrectness of the packaging paper 124 (periodically repeating normal display and highlighted display of the packaging portion in the illustration), notice instructing replacement of packaging paper 125, and recommended paper width value of packaging paper meeting the currently set coin type and unit number of coins per package 126. In the representation 121 of possible coin types and unit numbers of coins per package, P means "penny" (one-cent coin), N means "nickel" (five-cent coin), D means "dime" (ten-cent coin), Q means "quarter" (25-cent coin), and H means "half" (50-cent coin), and any of these coin types and unit numbers of coins per package can be selected through operation keys in the setting portion 13 corresponding to icons of "UP and "DOWN".

Since there are displayed the representation 124 notifying that the packaging paper is wrong and the representation 125 instructing replacement of the packaging paper, together with the representation 126 of the recommended paper width value of packaging paper which meets the currently set coin type and unit number of coins per package, the operator can immediately recognize the need for replacement of packaging paper and the type of packaging paper suitable for the coin type and unit number of coins per package, and can quickly be dealt it by changing the wrong packaging paper with correct packaging paper for the coin type and unit number of coins

per package.

Displayed on the display portion 12 shown in Fig. 5 are the currently set coin type and unit number of coins per package 120, coin types and unit numbers of coins which can be selected to package them 121, icons 122 representing functions of respective operational keys on the setting portion 13, representation noticing correctness of the packaging paper currently set 124' (merely displaying the packaging portion in the illustration in the normal way), and representation 127 meaning that the apparatus is ready for starting coin packaging operation.

When correct packaging paper for the coin type and unit number of coins per package is set, representation is made on the display as shown in fig. 5, and the operator can confirm this representation and can perform necessary operation for starting the coin packaging process.

Next explained are three methods, regarding which timing is suitable for comparing the calculated paper width value and the recommended paper width value in the coin packaging apparatus according to the invention.

Fig. 6 is a flow chart showing procedure of a first method for comparing the calculated paper width value and the recommended paper width value in the coin packaging apparatus according to the invention. The first method shown in Fig. 6 executes comparison between the calculated paper width value and the recommended paper width value upon changing selection of the coin type and unit number of coins per package.

When changing selection of the coin type and unit number of coins per package is demanded by operation through operation keys of the setting portion 13 which correspond to "UP" and "DOWN" of the icons 122 (step S61), the coin packaging apparatus according to the invention changes the coin type and unit number of coins per package (step S62). That is, respective mechanisms are moved to positions for the newly set coin type and unit number of coins per package, and the newly set coin type and unit number of coins per package is set in the CPU (controller) 10. The CPU 10 reads out from the memory 11 a recommended paper width data of packaging paper corresponding to the set coin type and unit number of coins per

package (step S63), and reads out a paper width detection data (digital data) in a paper width detection signal generated and transmitted to CPU 10 by an AD converter in the potentiometer 19 in response to the height of the paper width detection lever 16 (step S64). Further, CPU 10 calculates the paper width of the roll of packaging paper 14 set on the packaging paper table 15 from the paper width detection data obtained (step S65), and compares the calculated paper width value with the recommended paper width value (step S66).

If the calculated paper width value is within the predetermined allowable range for the recommended paper width value (in this case, ±5 mm) as a result of the comparison, the CPU 10 judges it to be correct packaging paper and executes subsequent processing (step S66). If the calculated paper width value is out of the predetermined allowable range for the recommended paper width value, the CPU 10 judges it to be wrong packaging paper and changes representation on the LCD 12 as shown in Fig. 4 to display representation 124 noticing incorrectness of the packaging paper, representation 125 instructing replacement of the packaging paper and representation of recommended paper width value 126 (step S67). Simultaneously, it controls to discharge the packaging paper 14 currently gripped by the paper supply/discharge roller 21 (step S68). That is, it controls the paper supply/discharge motor (feed motor) 20 to rotate in the opposite direction from the direction for supplying paper and discharge the wrong packaging paper.

As explained above, by executing comparison between the calculated paper width value and the recommended paper width value upon changing selection of the coin type and unit number of coins per package, it is prevented that wrong paper is erroneously supplied and coins are incompletely packaged.

Fig. 7 is a flow chart showing procedure of the second method for comparing the calculated paper width value and the recommended paper width value in the coin packaging apparatus according to the invention. The second method shown in Fig. 7 executes comparison between the calculated paper width value and the recommended paper width value when a command of starting packaging operation is entered.

When a command of starting packaging operation is entered,

that is, when the start button 13a is pressed (step S71), the CPU 10 read out from the memory 11 a recommended paper width data of packaging paper corresponding to the set coin type and unit number of coins per package (step S72), and read out a paper width detection data (digital data) in the paper width detection signal generated and transmitted to CPU 10 by the AD converter in the potentiometer 19 in response to the height of the paper width detection lever 16 (step S73). Further, CPU 10 calculates the paper width of the roll of packaging paper 14 set on the packaging paper table 15 from the paper width detection data obtained (step S74), and compares the calculated paper width value with the recommended paper width (step S75).

If the calculated paper width value is within the predetermined allowable range for the recommended paper width value (in this case, ±5 mm) as a result of the comparison, CPU 10 judges that the packaging paper is correct, and confirms through the position detecting sensor 23 that the packaging paper is fed out by the paper supply/discharge roller 21 and correctly set at the predetermined position (step S76). If the packaging paper is not detected by the position detecting sensor 23, CPU 10 makes the paper supply/discharge roller 21 feed out and supply the packaging paper (step S77), and thereafter starts packaging operation (step S78). If the position detecting sensor 23 certainly detects the packaging paper in the predetermined position, packaging operation is started directly (step S78).

On the other hand, if the calculated paper width value is out of the predetermined allowable range for the recommended paper width value, CPU 10 judges that the packaging paper is wrong, and changes representation on the display 12 as shown in Fig. 4 to display representation 124 indicating incorrectness of the packaging paper, representation 125 indicating the need for replacement of the packaging paper and representation of the recommended paper width value 126 (step S79). Simultaneously, it controls to discharge the packaging paper 14 gripped by the paper supply/discharge roller 21 (step S80).

As explained above, by executing comparison between the calculated paper width value and the recommended paper width value upon entry of the command to start packaging operation, it is

prevented that wrong paper is erroneously supplied and coins are incompletely packaged even if the packaging paper is replaced by wrong packaging paper while the power source of the coin packaging apparatus is OFF, for example.

Fig. 8 is a flow chart showing procedure of the third method for comparing the calculated paper width value and the recommended paper width value in the coin packaging apparatus according to the invention. The third method shown in Fig. 8 executes comparison between the calculated paper width value and the recommended paper width value when packaging paper is replaced or newly set.

After a roll of packaging paper 14 is set on the packaging paper table 15 and the distal end of the paper width detection lever 16 is put on the center of the roll of packaging paper 14, when the feed switch 22 is pressed to have the paper supply/discharge roller 21 grip the leading edge of the packaging paper (step S81), if the feed switch 22 is pressed for the paper supply side (paper feeding side) (step S82), the CPU 10 reads out from the memory 11 a recommended paper width data of packaging paper corresponding to the set coin type and unit number of coins per package (step S83), and read out a paper width detection data (A/D data) in the paper width detection signal generated and transmitted to CPU 10 by the AD converter in the potentiometer 19 in response to the height of the paper width detection lever 16 (step S84). Further, CPU calculates the paper width of the roll of packaging paper 14 set on the packaging paper table 15 from the paper width detection data obtained (step S85), and compares the calculated paper width value with the recommended paper width value (step S86).

If the calculated paper width value is within the predetermined allowable range for the recommended paper width value (in this case, ±5 mm) as a result of the comparison, the CPU 10 judges that the packaging paper is correct, and has the packaging paper supplied (step S87). If the calculated paper width value is out of the predetermined allowable range for the recommended paper width value, the CPU 10 judges that the packaging paper is wrong. Then it invalidates feed supply control by the feed switch 22 and makes paper discharge control alone effective.

On the other hand, if the feed switch 22 is pressed to the paper

discharge side (paper rewind side) (step S82), the CPU 10 does not perform comparison between the calculated paper width value and the recommended paper width value, and discharges the packaging paper 14 gripped by the paper supply/discharge roller 21 (step S88).

As explained above, by executing comparison between the calculated paper width value and the recommended paper width value when packaging paper is replaced or newly set, and invalidating paper feed control by the feed switch 22 in case of wrong packaging paper, it is prevented that wrong paper is erroneously set.

In the coin packaging apparatus according to the invention, the comparator compares the paper width value of packaging paper detected by the paper width detecting device with the recommended paper width value at a predetermined timing before starting coin packaging operation, to progress the operation under judgement that the packaging paper is correct if the result of comparison indicates that the calculated paper width value is within the predetermined allowable range for the recommended paper width value, and to display incorrectness of the packaging paper and the recommended paper width value and have the packaging paper gripped by the paper supply/discharge device be discharged automatically or manually under judgement that the packaging paper is wrong if the calculated paper width value is out of the predetermined allowable range for the recommended paper width value. Therefore, supply of wrong packaging paper and incomplete packaging of coins thereby can be prevented, and operators can immediately recognize that currently existing abnormality indicates incorrectness of the packaging paper and can know the recommended paper width suitable for the coin type and unit number of coins per package. Thus, the operator can quickly deal with it by replacing the wrong packaging paper with correct packaging paper suitable for the coin type and unit number of coins per package.

The paper supply/discharge device is operative for automatically discharge paper as well when the packaging paper is judged to be wrong, unlike the conventional paper supply roller exclusive for paper supply. Therefore, the wrong packaging paper gripped by the paper supply/discharge device can be discharged quickly.

When packaging paper is exchanged or newly set, and supply or discharge of packaging paper is executed by the paper supply/display switch, if the packaging paper is judged to be wrong, the paper supply control by the paper supply/discharge switch is invalidated, and paper discharge control alone is permitted. Therefore, erroneous setting of wrong packaging paper can be prevented.

WHAT IS CLAIMED IS:

1. A coin packaging apparatus comprising:

a setting device permitting operation to set conditions of packaging operation including a coin type and an unit number of coins per package, and to enter a command to start the packaging operation;

a memory which stores information including coin types and unit numbers of coins per package and recommended paper widths of packaging paper;

a coin stacking device which stacks coins of the set type and the set unit number of coins per package in form of a rod;

a paper supply device which supplies packaging paper to be used for packaging the rod of coins stacked by said coin stacking device;

a coin packaging device which winds said packaging paper around the side surface of said rod of stacked coins and fold and press upper and lower ends of said packaging paper to package said rod of stacked coins;

a paper width detecting device which detects the paper width of said packaging paper set on said paper supply device;

a comparator which compares the value of the detected paper width of said packaging paper with a predetermined allowable range for the recommended paper width value of packaging paper suitable for the coins of the set type and the set unit number of coins per package; and

a display which represents incorrectness of the packaging paper and said recommended paper width value when the result of comparison indicates that the paper width value of the packaging paper is out of the predetermined allowable range for said recommended paper width value.

2. The coin packaging apparatus according to claim 1, wherein said comparator executes said comparison when a coin type and an unit number of coins per package are demanded through said setting device.

3. The coin packaging apparatus according to claim 1, wherein said comparator executes said comparison when a command to start the packaging operation is entered through said setting device.

4. A coin packaging apparatus comprising:

a setting device permitting operation to set conditions of packaging operation including a coin type and an unit number of coins per package, and to enter a command to start the packaging operation;

a memory which stores information including coin types and unit numbers of coins per package and recommended paper widths of packaging paper;

a coin stacking device which stacks coins of the set type and the set unit number of coins per package in form of a rod;

a paper supply/discharge device which supplies packaging paper to be used for packaging the rod of coins stacked by said coin stacking device and discharges said packaging paper in a direction opposite from the direction for supplying the packaging paper;

a coin packaging device which winds said packaging paper around the side surface of said rod of stacked coins and fold and press upper and lower ends of said packaging paper to package said rod of stacked coins;

a paper width detecting device which detects the paper width of said packaging paper set on said paper supply/discharge device;

a comparator which compares the value of the detected paper width of said packaging paper with a predetermined allowable range for the recommended paper width value of packaging paper suitable for the coins of the set type and the set unit number of coins per package; and

a paper discharge control device which controls said paper supply/discharge device to discharge the packaging paper when the result of said comparison indicates that the paper width value of the packaging paper is out of the predetermined allowable range for said recommended paper width value.

5. The coin packaging apparatus according to claim 4, wherein said comparator executes said comparison when a coin type and an

unit number of coins per package are demanded through said setting device.

6. The coin packaging apparatus according to claim 4, wherein said comparator executes said comparison when a command to start the packaging operation is entered through said setting device.

7. A coin packaging apparatus comprising:

a setting device permitting operation to set conditions of packaging operation including a coin type and an unit number of coins per package, and to enter a command to start the packaging operation;

a memory which stores information including coin types and unit numbers of coins per package and recommended paper widths of packaging paper;

a coin stacking device which stacks coins of the set type and the set unit number of coins per package in form of a rod;

a paper supply/discharge device which supplies packaging paper to be used for packaging the rod of coins stacked by said coin stacking device and discharges said packaging paper in a direction opposite from the direction for supplying the packaging paper;

a paper supply/discharge switch manually operated for paper supply control and paper discharge control to have said paper supply/discharge device execute paper supply and paper discharge;

a coin packaging device which winds said packaging paper around the side surface of said rod of stacked coins and fold and press upper and lower ends of said packaging paper to package said rod of stacked coins;

a paper width detecting device which detects the paper width of said packaging paper set on said paper supply/discharge device;

a comparator which compares the value of the detected paper width of said packaging paper with a predetermined allowable range for the recommended paper width value of packaging paper suitable for the coins of the set type and the set unit number of coins per package; and

a paper supply/discharge switch control device which invalidates paper supply control by said paper supply/discharge

switch and permits only paper discharge control when the result of comparison indicates that the paper width value of the packaging paper is out of the predetermined allowable range for said recommended paper width value.

8. The coin packaging apparatus according to claim 7, wherein said comparator executes said comparison when said paper supply/discharge switch is manually operated for paper supply control.

FIG. 1

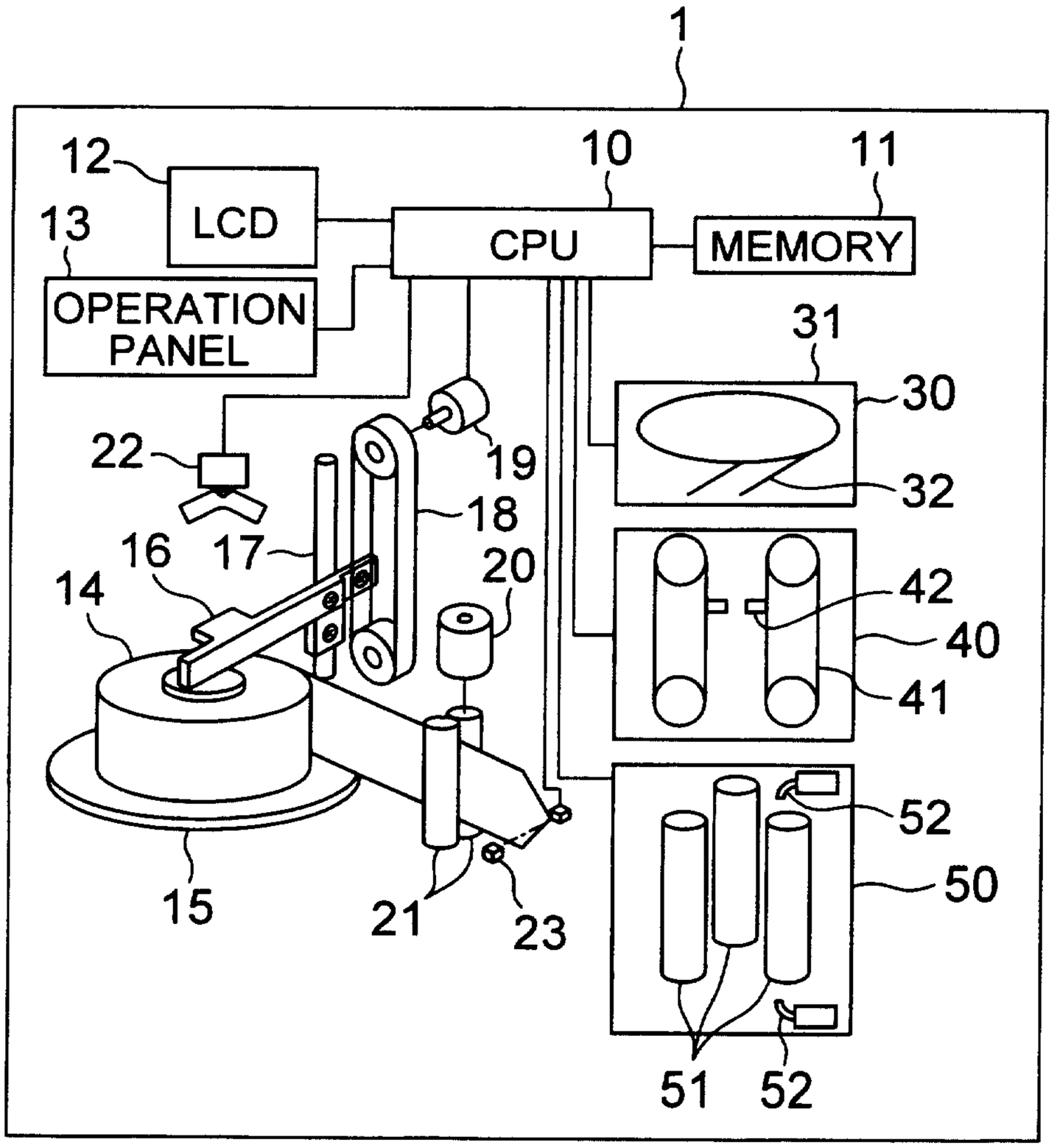

1
12
LCD
10
CPU
11
MEMORY
13
OPERATION PANEL
31
30
32
22
19
18
16
17
20
14
42
40
41
52
50
15
21
23
51
52

FIG. 2

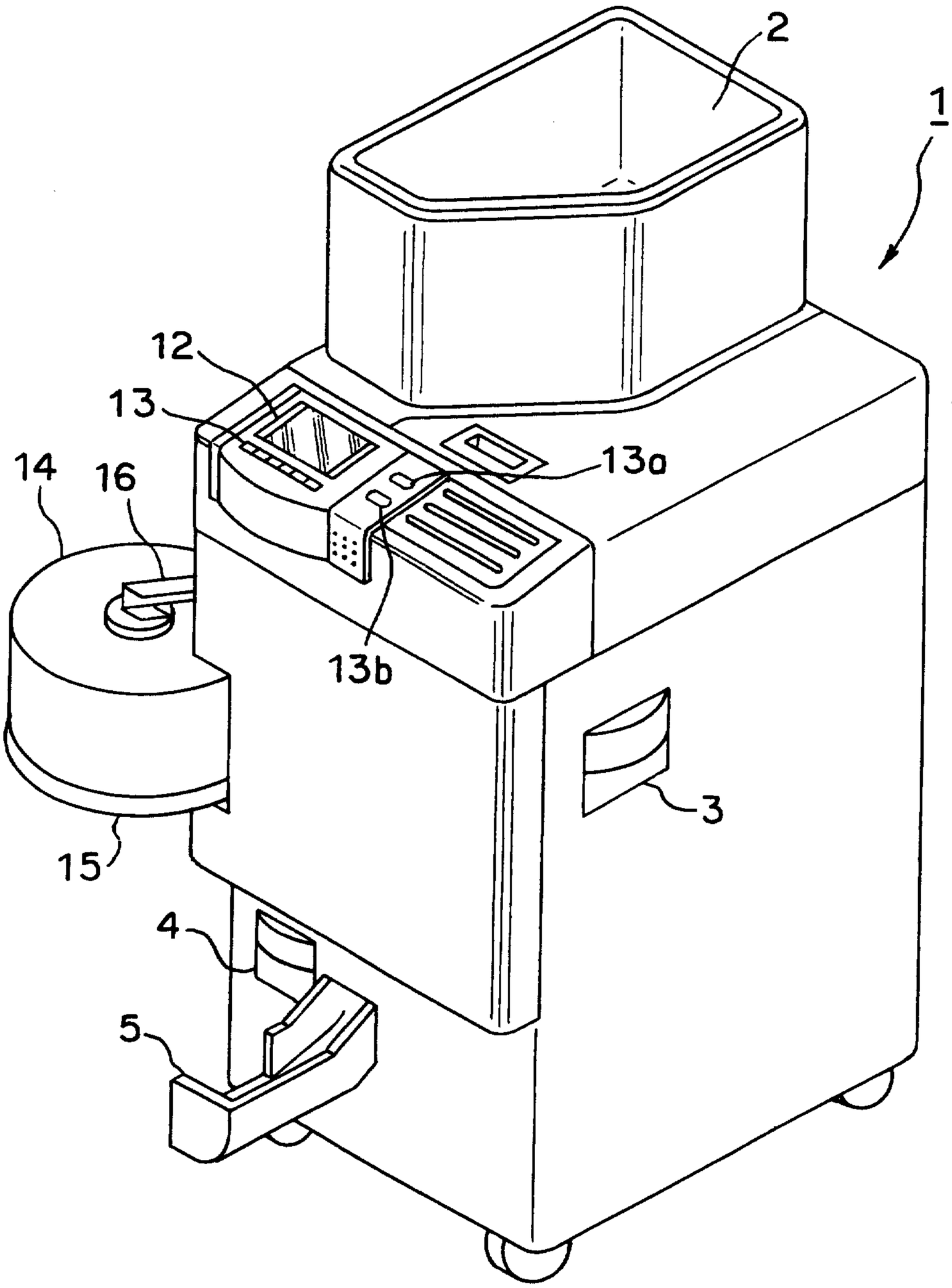


FIG. 3

COIN TYPE	UNIT NUMBER OF COINS PER PACKAGE	RECOMMENDED WIDTH
1 CENT	50	97.0
5 CENT	20	60.5
5 CENT	40	99.0
10 CENT	50	88.5
25 CENT	20	57.0
25 CENT	40	91.5
50 CENT	20	64.5
1 DOLLAR	25	71.5
TOKEN	20	74.0

FIG. 4

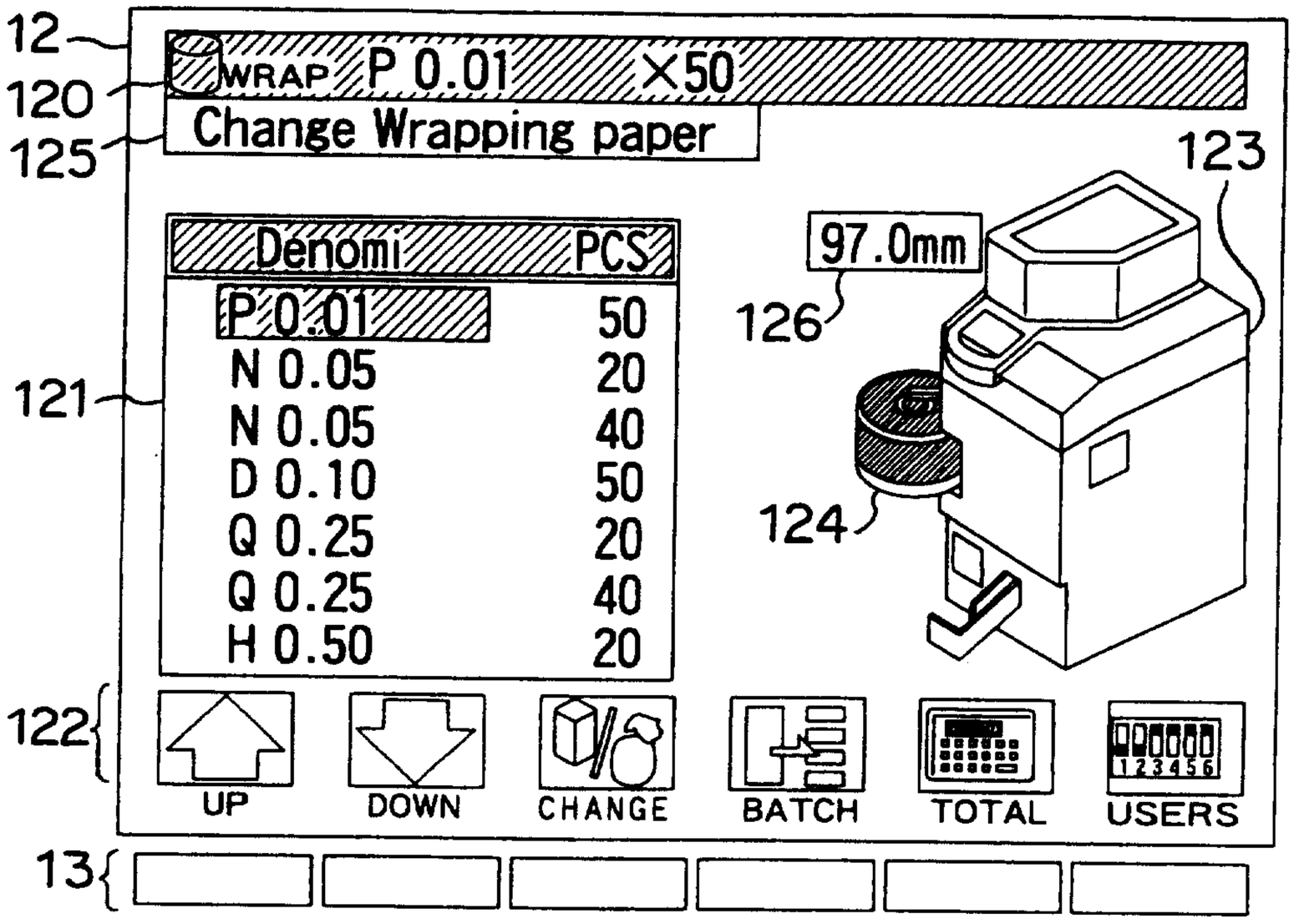

12
120
125
WRAP P 0.01 ×50
Change Wrapping paper
123
97.0mm
126
124
Denomi PCS
121
P 0.01 50
N 0.05 20
N 0.05 40
D 0.10 50
Q 0.25 20
Q 0.25 40
H 0.50 20
122
UP
DOWN
CHANGE
BATCH
TOTAL
USERS
13

FIG. 5

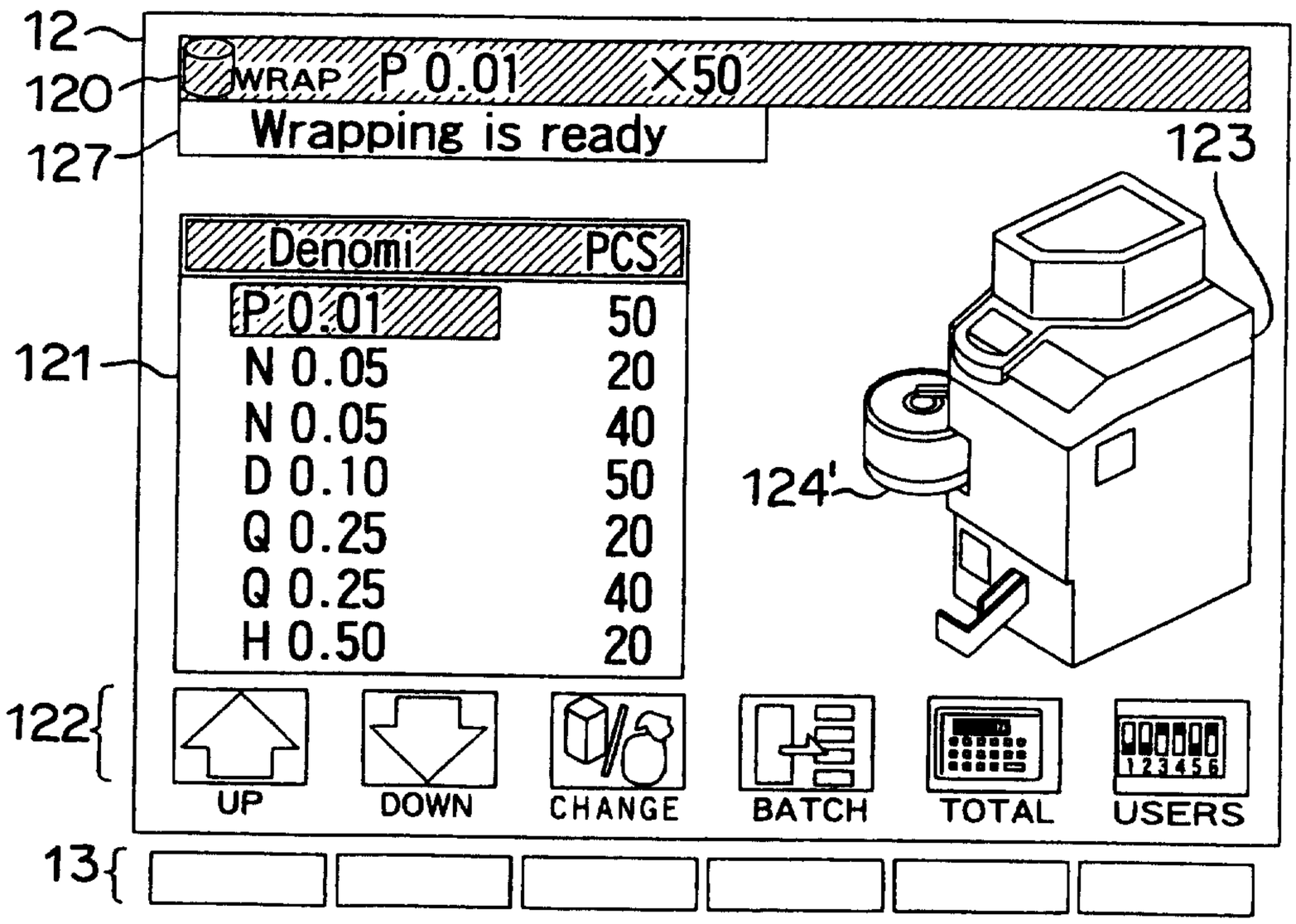

12
120
127
WRAP P 0.01 ×50
Wrapping is ready
123
Denomi PCS
121
P 0.01 50
N 0.05 20
N 0.05 40
D 0.10 50
Q 0.25 20
Q 0.25 40
H 0.50 20
124'
122
UP
DOWN
CHANGE
BATCH
TOTAL
USERS
13

FIG. 6

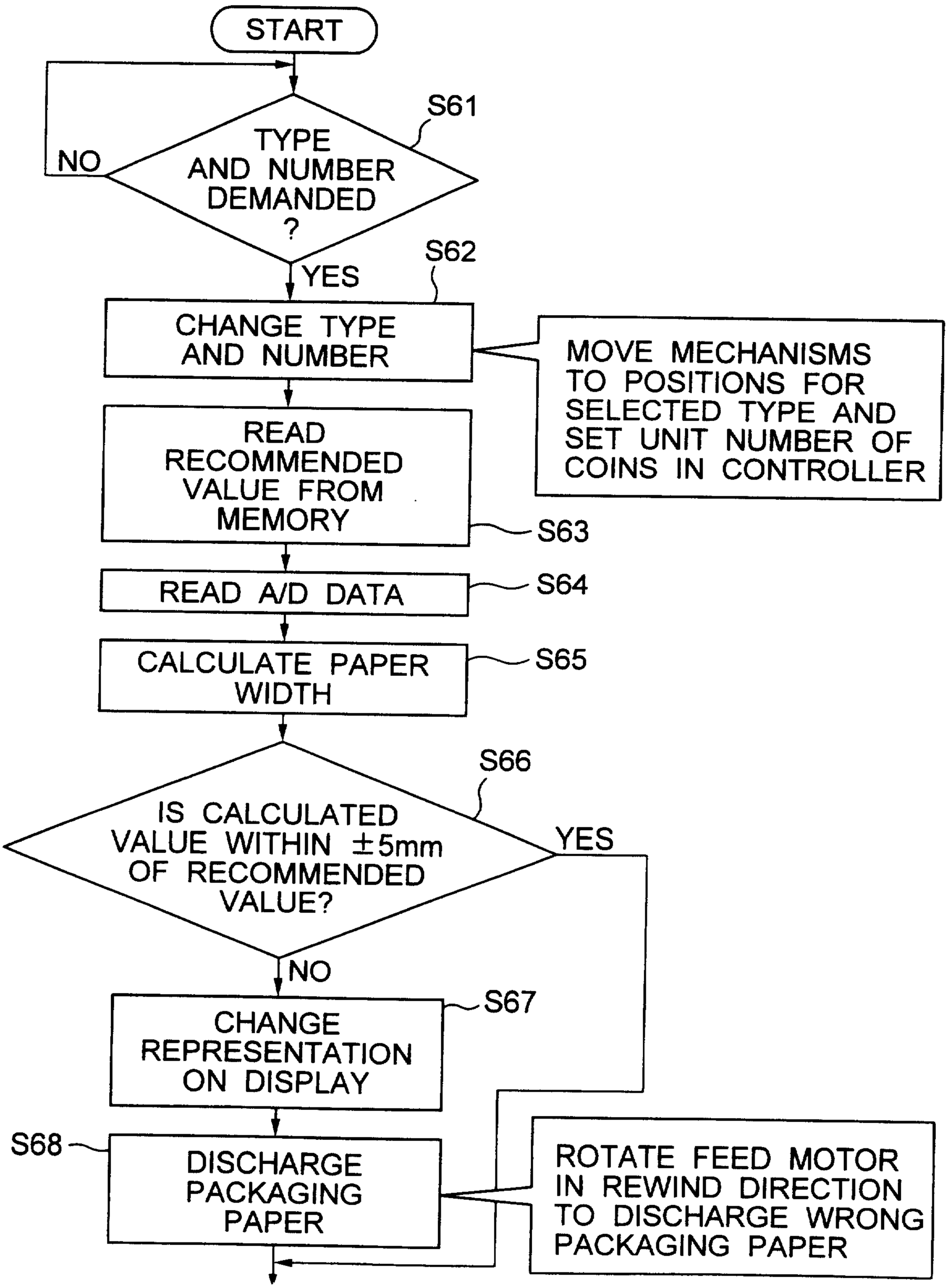

START
S61
TYPE AND NUMBER DEMANDED ?
NO
YES
S62
CHANGE TYPE AND NUMBER
MOVE MECHANISMS TO POSITIONS FOR SELECTED TYPE AND SET UNIT NUMBER OF COINS IN CONTROLLER
READ RECOMMENDED VALUE FROM MEMORY
S63
READ A/D DATA
S64
CALCULATE PAPER WIDTH
S65
S66
IS CALCULATED VALUE WITHIN ±5mm OF RECOMMENDED VALUE?
YES
NO
S67
CHANGE REPRESENTATION ON DISPLAY
S68
DISCHARGE PACKAGING PAPER
ROTATE FEED MOTOR IN REWIND DIRECTION TO DISCHARGE WRONG PACKAGING PAPER

FIG. 7

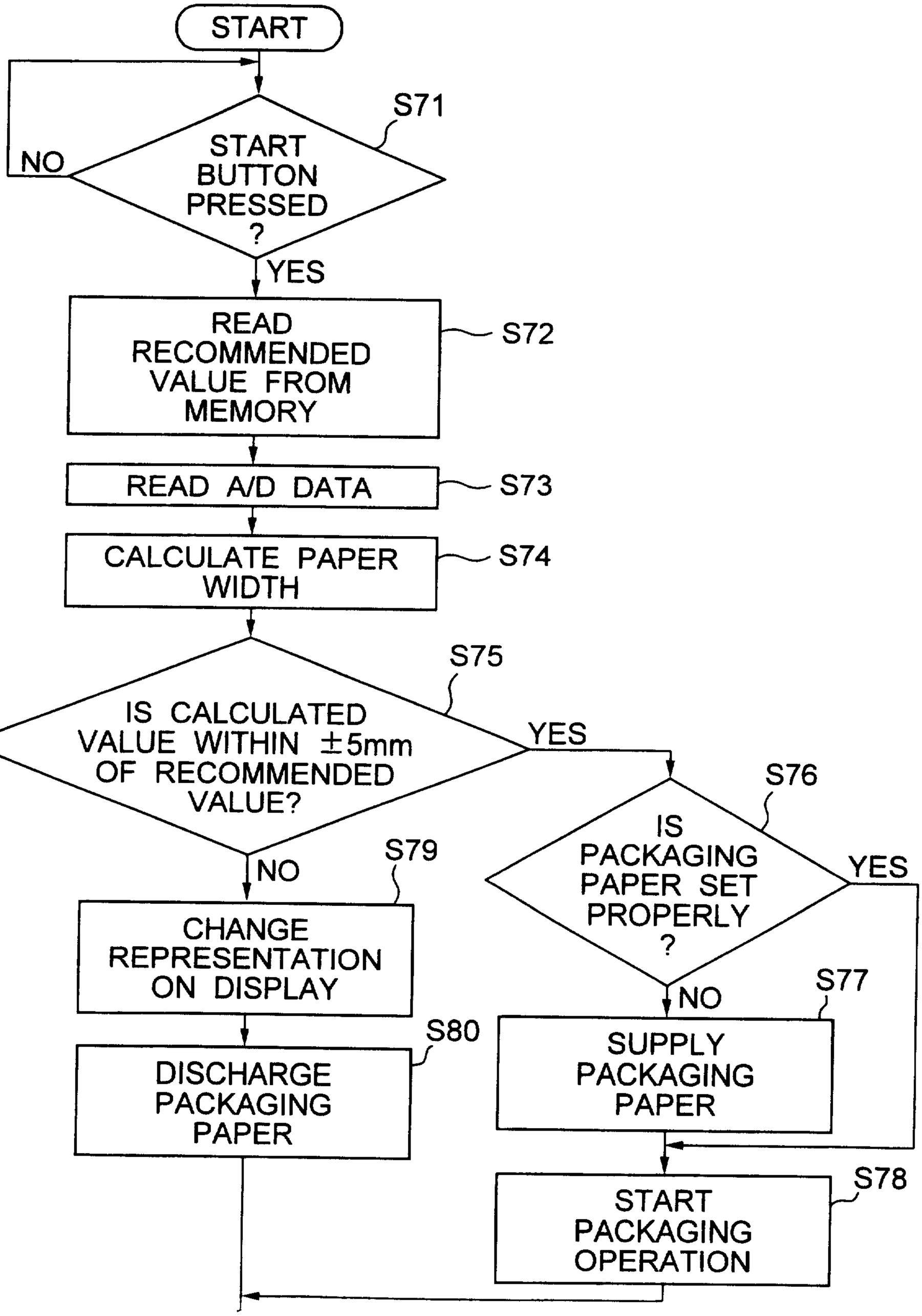

START
S71
START BUTTON PRESSED ?
NO
YES
READ RECOMMENDED VALUE FROM MEMORY
S72
READ A/D DATA
S73
CALCULATE PAPER WIDTH
S74
S75
IS CALCULATED VALUE WITHIN ±5mm OF RECOMMENDED VALUE?
YES
S76
IS PACKAGING PAPER SET PROPERLY ?
YES
NO
S77
SUPPLY PACKAGING PAPER
S78
START PACKAGING OPERATION
NO
S79
CHANGE REPRESENTATION ON DISPLAY
S80
DISCHARGE PACKAGING PAPER

FIG. 8

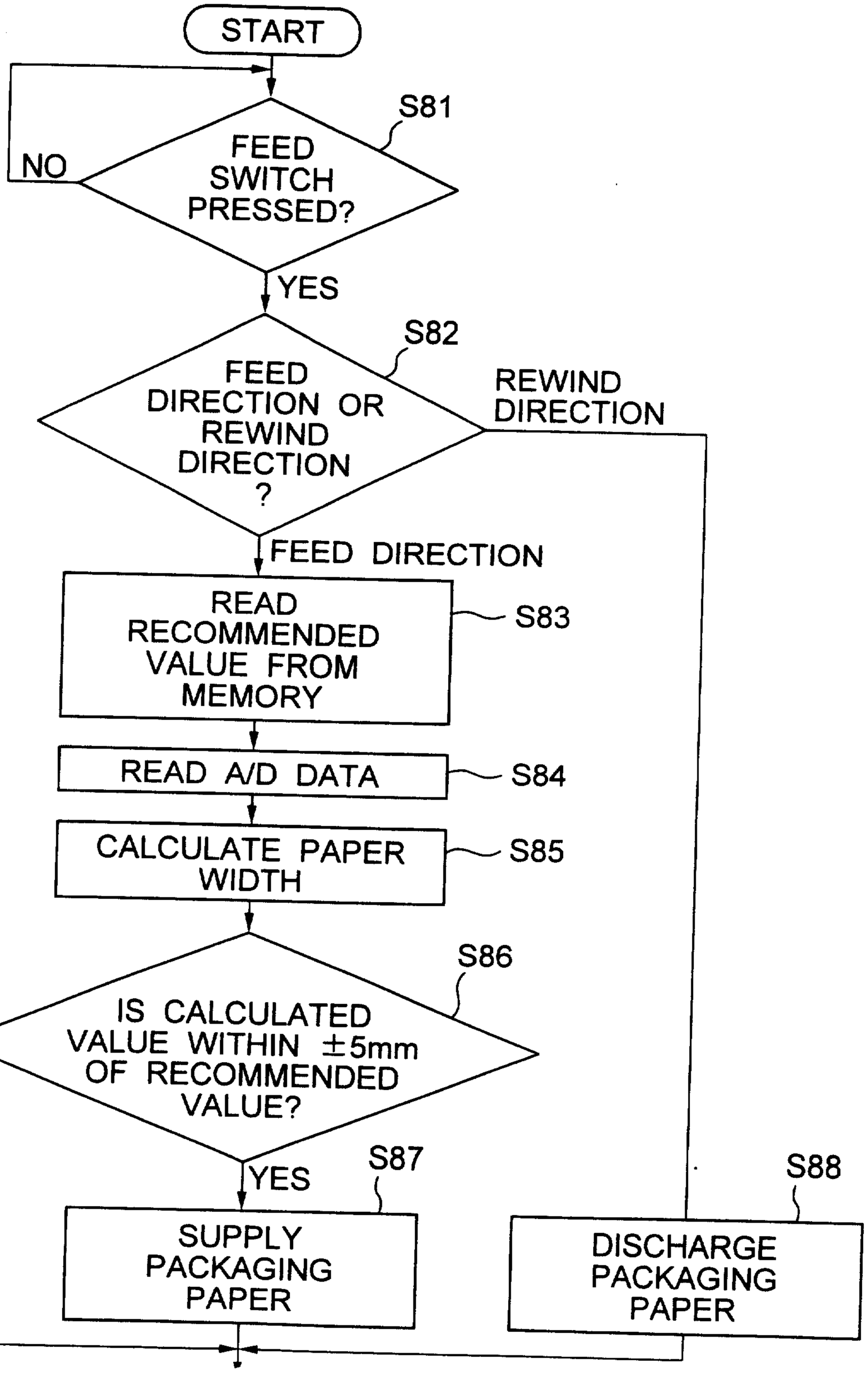
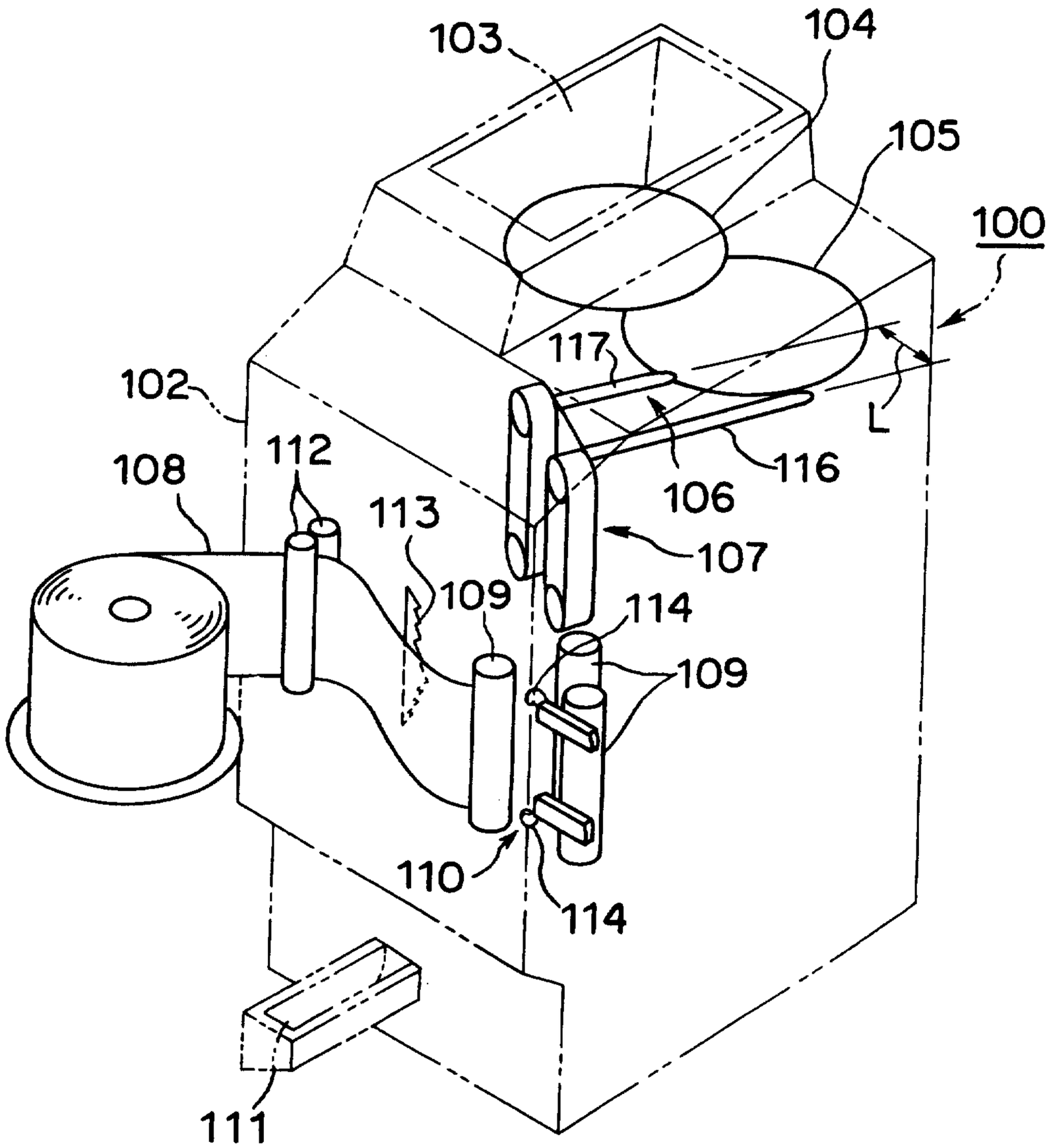

START
S81
FEED SWITCH PRESSED?
NO
YES
S82
FEED DIRECTION OR REWIND DIRECTION ?
REWIND DIRECTION
FEED DIRECTION
READ RECOMMENDED VALUE FROM MEMORY
S83
READ A/D DATA
S84
CALCULATE PAPER WIDTH
S85
S86
IS CALCULATED VALUE WITHIN ±5mm OF RECOMMENDED VALUE?
NO
YES
S87
SUPPLY PACKAGING PAPER
S88
DISCHARGE PACKAGING PAPER

FIG. 9


103
104
105
100
117
102
L
112
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116
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114
111