

**SHEET PROCESSING APPARATUS AND
BILL PROCESSING APPARATUS**

BACKGROUND OF THE INVENTION

5 1. Field of the Invention

This invention relates to a sheet processing apparatus and a bill processing apparatus for handling various bills different in size, such as domestic bills and foreign bills, and more particularly to a sheet processing apparatus and
10 a bill processing apparatus high in common availability that a storage section can be easily adjusted so as to be sized responsive to bills of a specific size handled on a country-by-country basis.

2. Description of the Related Prior Art

15 In the description to follow, a bill processing apparatus is taken as an example. The bill processing apparatus contains a cartridge allowing a large number of bills to be stored. The cartridge comprises storage guide plates 102 placed at storage intervals responsive to the size of each bill 101 allowed to
20 be handled as shown in Fig. 10. When the bills 101 are introduced into the cartridge, they are arranged and stacked on each other while the bills 101 are guided into the space between the storage guide plates 102.

In this case, the manufacturer or the official in charge
25 previously adjusts the space between the storage guide plates

102 of the cartridge by denomination size of bills handled in the manufacturing process of the bill processing apparatus or at a place where the bill processing apparatus is installed for use.

5 However, the official in charge cannot precisely be provided with initial adjustment information of the space between the storage guide plates of the cartridge previously adjusted or change adjustment information of the space between the storage guide plates of the cartridge after change, thus
10 it takes time in checking. Further, if the space between the storage guide plates of the cartridge needs to be changed, an adjustment instruction book describing the sizes of bills handled on a country-by-country basis is required. Then the official in charge sees the adjustment instruction book to adjust
15 the space between the storage guide plates, thus time and labor are required and because of poor reliability, erroneous use may be made if erroneous adjustment is made.

 If a stored bill 112 has a size 112a smaller than an internal size 111a of the space between storage guide plates 111 of a
20 cartridge, for example, as shown in FIG. 11, a stack failure biased to a bend state occurs as the bills 112 of the smaller size are stacked. In contrast, if the bill size is larger than the space between the storage guide plates, likewise a stack failure in which the bills are bent like U in the space between
25 the storage guide plates occurs. Therefore, if such an

erroneous adjustment is made, it cannot be found until the official in charge becomes aware based on the fact that a stack failure occurred, or notices an error.

If an already adjusted cartridge is set in a bill processing apparatus of any other country than the target country in error, the erroneous setting cannot be found until denomination bills not handled are used, causing a stack failure to occur. In this case, there are problems that trouble at the use location is caused to occur and the reliability is impaired.

10

SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide a sheet processing apparatus and a bill processing apparatus high in acceptance management performance for enabling the official in charge to immediately know an erroneous adjustment or an acceptance error by providing the main unit of the apparatus with acceptance guide information matching data by size of sheets and outputting the acceptance guide information as guidance given to the official in charge.

20 A sheet processing apparatus for processing sheets different in size, according to a first aspect of the invention, comprises: first storage means for previously storing data by size of the sheets; second storage means for previously storing positioning data by the sheet size, the positioning data being data of guides of cartridges for storing the sheets; read means

25

for reading the data by the size of the sheets to be processed
from the first storing means; comparison means for comparing
the data by the size of the sheets to be processed read from
the first storing means with the positioning data of the guides
5 by the sheet size stored in the second storing means; and output
means for outputting guide information matching the data by
the size of the sheet to be processed based on a comparison
result of the comparison means.

According to a second aspect of the invention, in the sheet
10 processing apparatus according to the first aspect of the
invention, preferably, output means may display means for
displaying the guide information.

In the sheet processing apparatus, it is preferable that
the display means displays determination information as to
15 whether or not adjustment of the guide made based on the guide
information is adequate.

Further, in the sheet processing apparatus, it is
preferable that the display means displays positioning
information by the sheets preset as the guide information.

20 A bill processing apparatus, according to a third aspect
of the invention, having a bill inlet inserted bills; a validation
section for determining validity and denomination of the bills
inserted into the bill inlet; a temporary hold section for
temporarily holding the determined bills therein; and a storage
25 section for storing the bills held in the temporary hold section;

the apparatus comprising: first storage means for previously storing data by size according to denominations of the bills;
second storage means for previously storing positioning data by the bill size, the positioning data being data of guides
5 of cartridges for storing the bills; read means for reading the data by the size of the bills to be inserted from the first storing means; comparison means for comparing the data by size of the bill to be inserted read from the first storing means with the positioning data of the guides by the bill size stored
10 in the second storage means; display means for displaying guide information matching the data by size of the bills to be inserted based on a comparison result of the comparison means; input means for entering an adjustment value of adjustment of the guides made based on the guide information displayed on the
15 display means; and determination means for determining whether or not the adjustment value entered through the input means is proper.

According to the invention, to adjust the storage size of the storage section contained in the sheet processing
20 apparatus, the official in charge previously knows the size of handled sheets prior to the adjustment and thus specifies the data corresponding to the size of the handled sheets. Then, the read means reads the specified data by size of the sheets. The comparison means compares the data read by the read means
25 with guide positioning data by the sheet size stored in the

second storage means, and the output means outputs the guide information matching the data by size of the handled sheets based on the comparison result.

Consequently, various pieces of guide information such
5 as initial acceptance guide information of the initially adjusted storage section and change acceptance guide information of later changing and adjusting the storage size can be output as guidance given to the official in charge, so that the official in charge can immediately find an erroneous
10 adjustment or an acceptance guide error.

If display means for displaying the guide information is adopted as an example of the output means, the official in charge can obtain necessary information simply by glancing the guide information on the display means.

15 Particularly, if the display means is provided for displaying determination information as to whether or not adjustment of the guide made based on the guide information is adequate, whether or not adjustment is proper can be checked instantly after adjustment, so that time and labor in adjustment
20 can be saved and an erroneous adjustment can be found immediately.

Further, if the display means is provided for displaying positioning information by the sheets preset as the guide information, the official in charge may adjust the position
25 in accordance with the positioning information; even if the

official in charge is not a skilled person, he or she can adjust the position efficiently in a short time.

If the invention is applied to, for example, the bill processing apparatus which comprises a validation section for
5 determining the validity and denomination of a bill inserted into the bill inlet and a temporary hold section for temporarily holding the determined bill, a storage section for storing the bill held in the temporary hold section, the official in charge previously knows handled bill denomination and thus enters the
10 denomination data. Then, the read means reads the data by size of the bills entered. The comparison means compares the data read by the read means with the guide positioning data by bill size stored in the second storage means, and the display means displays the guide information by corresponding denomination
15 matching the data by size of the inserted bill based on the comparison result. The official in charge enters the adjustment value of adjustment made based on the guide information displayed on the display means through the input means. Then, the determination means determines whether or
20 not the entered adjustment value is proper.

If such a configuration is adopted, the adjustment value of the storage section can be easily provided on the display means. Thus, the official in charge need not see the description of an adjustment instruction book, etc., and can adjust
25 accurately simply by seeing the guide information required for

adjustment at a glance. When an error of erroneous adjustment, etc., occurs, it is also displayed as guidance given to the official in charge, thus eliminating use of the bill processing apparatus remaining in an error; administration of the bill
5 processing apparatus high in acceptance management performance avoiding a bill stack failure is enabled.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a bill processing apparatus
10 of the invention with the main part broken away;

FIG. 2 is an internal configuration drawing to show storage passages of the bill processing apparatus of the invention;

FIG. 3 is a perspective view to show an acceptance guide mechanism of the bill processing apparatus of the invention;

15 FIG. 4 is a front view to show the main part of the acceptance guide mechanism of the bill processing apparatus of the invention;

FIG. 5 is a block diagram of a control circuit of the bill processing apparatus of the invention;

20 FIG. 6 is a flowchart to show the adjustment processing operation and the check processing operation of the acceptance guide mechanism of the bill processing apparatus of the invention;

FIG. 7 is a schematic representation of display on a display
25 at the adjustment time of the acceptance guide mechanism of

the invention;

FIG. 8 is a schematic representation of entry guidance on the display after adjustment of the acceptance guide mechanism of the invention;

5 FIG. 9 is a schematic representation of guidance on the display when erroneous adjustment occurs after adjustment value entry in the invention;

FIG. 10 is a front view to show a proper bill stack state with storage guide plates in a related art; and

10 FIG. 11 is a front view to show a stack failure state of bills with storage guide plates in a related art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the accompanying drawings, there is shown
15 a preferred embodiment of the invention.

The drawings show a bill processing apparatus. As shown in FIG. 1, a bill processing apparatus 11 comprises a bill inlet/output 12, a validation section 13, a temporary hold section 14, and a reject hold section 15. The bill inlet/output
20 12 opens to one side of the top of the bill processing apparatus 11 for taking bills in and out. The validation section 13 is disposed in an inner space communicating with the bill inlet/output 12, and determines the validity of a bill and the denomination thereof. The temporary hold section 14 is
25 disposed to the depth part at the following stage of the

validation section 13 and temporarily holds the bill introduced into the validation section 13 and determined to be valid. The reject hold section 15 is disposed in the upper part at the following stage of the validation section 13, and holds and
5 rejects the bill determined to be invalid. A stack wheel 16 is disposed at the preceding stage of the temporary hold section 14 and the bills introduced into the stack wheel 16 are stacked on each other and stored.

Further, the temporarily held bills are taken out one
10 by one from the temporary hold section 14 and are fed to and stored in first to fourth cartridges C1 to C4 corresponding to denominations and a reject cartridge 5C on the bottom. The bills from the reject hold section 15 are fed to the bill inlet/outlet 12 so that they can be rejected.

15 The elements 12 to 16 and C1 to C5 are connected by a feeding line L like a loop and feeding processing is performed in response to processing items such as paying-in processing, paying-out processing, and careful examination processing.

A display 17 and input keys (containing also input key
20 also used as touch panel of the display 17) 18 for the official in charge are disposed on the top of the outside for displaying various pieces of guide information of input guide of processing item, operation procedure, acceptance guide information, etc., and inputting processing items.

25 FIG. 2 shows storage passages from the temporary hold

section 14 to the cartridges C1 to C5. Bills determined to be paid in are taken out one by one from the temporary hold section 14 and the denomination of each bill is again determined by the validation section 13. The bills are distributed to
5 and stored in the first to fourth cartridges C1 to C4 corresponding to the denominations. Bills inadequate for distribution, such as broken bills, are stored in the reject cartridge C5.

FIG. 3 shows an acceptance guide mechanism 31 contained
10 in each of the first to fourth cartridges C1 to C4 by denomination. The acceptance guide mechanism 31 comprises a bottom plate 32, upright guide plates 33 and 34, and a recess 35. The upright guide plates 33 and 34 upright on both sides of the bottom plate 32 and integrally attached thereto. The recess 35 is formed
15 from the bottom plate 32 and the upright guide plates 33 and 34, and accepts and stores bills. Bills are stacked on each other on the bottom plate 32 of the recess 35. Both ends of the stacked bills in longitudinal direction are guided by the upright guide plates 33 and 34 on both sides and are stacked
20 in alignment.

In this case, the bills differ in length in response to the denomination, thus one upright guide plate (left in the figure) 33 is provided as adjustment upright guide plate 33 for storage size adjustment for allowing the installation
25 position to be changed in response to the bill length. The

other upright guide plate (right in the figure) 34 is set as reference adjustment upright guide plate 34 for reference positioning.

One upright guide plate (left in the figure) 33 has a
5 flat plate shape for guiding the end of a bill and a screw hole
36 for joining the bottom plate. The screw hole 36 is formed
in the center of the elongated bottom face of the lower end
of the upright guide plate 33. A mounting bolt 38 passing through
a long hole 37 penetrating the bottom plate 32 is screwed into
10 the screw hole 36, thus the adjustment upright guide plate 33
is made upright on the bottom plate 32 and the adjustment upright
guide plate 33 and the bottom plate 32 are integrally fixed.

A hemispherical projection 39 for positioning is provided
at positions on both sides of the bottom face of and the adjustment
15 upright guide plate 33. A hemispherical recesses 40 for
positioning are notched at top face positions of the bottom
plate 32 opposed to the hemispherical projections 39. The
hemispherical projections 39 and the hemispherical recesses
40 engage with each other at fixed positions on the bottom plate
20 32 for positioning the adjustment upright guide plate 33.

As shown in FIG. 4, a plurality of pairs of the
hemispherical recesses 40 made in the bottom plate 32 (in the
figure, the top four and the bottom four provide four-step
adjustment guide positions) are disposed along the length
25 direction of the bottom plate 32 as the adjustment direction.

The number of disposed hemispherical recesses 40 is preset in response to the denomination bill size handled in the country using the bill processing apparatus. The installation position of the adjustment upright guide plate 33 is determined in response to the denomination bill length accepted and determined for each of the cartridges C1 to C4 by denomination.

If the installation position of the adjustment upright guide plate 33 needs to be changed to change the cartridge to the purpose of storing bills of a different denomination, the screw position of the mounting bolt 38 mounted through the long hole 37 opened long along the adjustment direction is changed to the change position and the mounting bolt 38 is again screwed, whereby the change operation of the recess 35 is complete.

The other reference upright guide plate 34 likewise has a flat plate shape and is made upright on the bottom plate 32 as the reference position when bills are stacked in alignment. The bottom face of the reference upright guide plate 34 is screwed and integrally fixed to the bottom plate 32 by the mounting bolt 38.

The acceptance guide mechanism 31 can be applied not only to the first to fourth cartridges C1 to C4 by denomination, but also to the bill inlet/outlet 12 and the temporary hold section 14.

FIG. 5 is a block diagram of a control circuit of the bill processing apparatus 11. A CPU 51 controls the circuits

of the bill processing apparatus 11 according to a program stored in ROM 52 and stores control data in RAM 53 so that the data can be read.

A feeding motor M is driven or stopped based on a feeding
5 control signal from the CPU 51 for feeding or stopping bills fed on the feeding line L one by one in a direction to process the bills.

The validation section 13 is provided with a dedicated validation function for determining the validity of a bill in
10 agreement with the denomination in the country using the bill processing apparatus 11. The validation section 13 is incorporated into the bill processing apparatus in the manufacturing process of the bill processing apparatus 11 or at a location where the bill processing apparatus 11 is installed
15 for use. The validation section 13 previously stores the data by handled denomination size.

The positioning data defining the adjustment guide position of the adjustment upright guide plate 33 responsive to the target denomination is stored in the RAM 53 by denomination
20 size.

Thus, when the adjustment upright guide plate 33 is adjusted, the official in charge, who previously knows the denomination to be handled, specifies denomination data of the denomination to be handled by operating the input key 18, then
25 the CPU 51 compares the data of the specified denomination bills

transferred from the validation section 13 with the positioning data by denomination size stored in the RAM 53 and determines the proper position of the adjustment upright guide plate 33 responsive to the specified denomination bills.

5 The CPU 51 has an information providing function of producing guidance display of the determined proper position of the adjustment upright guide plate 33 on the display 17 so as to provide the official in charge with necessary adjustment work information.

10 The official in charge executes adjustment work of changing the adjustment upright guide plate 33 to one of the attachment positions set stepwise by size, then enters the adjustment value for checking. At this time, the CPU 51 has a determination output function of determining whether or not
15 adequate adjustment has been made and displaying the determination result on the display 17 so as to inform the official in charge of the determination result. Thus, if an erroneous adjustment occurs, immediately the official in charge can find the error and again adjust the position; adjustment
20 management making assurance double sure can be accomplished.

 The adjustment processing operation of the acceptance guide mechanism 31 of the bill processing apparatus 11 thus configured will be discussed with reference to a flowchart of FIG. 6 and display drawings of FIGS. 7 to 9.

25 To initially adjust the bill storage sizes of the first

to fourth cartridges C1 to C4 by denomination contained in the bill processing apparatus 11, the official in charge, who previously knows the denomination to be handled, specifies denomination data of the denomination to be handled by operating
5 the input key 18 in the manufacturing process of the bill processing apparatus 11 or at a location where the bill processing apparatus 11 is installed for use. Then the CPU 51 reads the data by size corresponding to the specified denomination stored in the validation section 13 at step n1
10 and compares the data by size of the specified denomination bills read from the validation section 13 with the positioning data by denomination size previously stored in the RAM 53 and determines the proper adjustment guide position of the adjustment upright guide plate 33 matching the specified
15 denomination bills at step n2.

The determined adjustment guide position is displayed on the display 17 as guidance. The case where seven steps of the adjustment guide positions are provided, for example, as shown in FIG. 7 and the number of bill sizes to be handled is
20 four will be discussed. The bill inlet/outlet 12 and the temporary hold section 14 are set each to the second adjustment guide position for enabling acceptance of the denomination bills of the maximum size among the handled bills; the first cartridge C1 is set to the fifth adjustment guide position for storing
25 the denomination bills of the minimum size among the handled

bills; the second cartridge C2 is set to the fourth adjustment guide position for storing the denomination bills of the third largest size among the handled bills; the third cartridge C3 is set to the third adjustment guide position for storing the denomination bills of the second largest size; and the fourth cartridge C4 is set to the second adjustment guide position for storing the denomination bills of the maximum size among the handled bills at step n3.

Since the optimum bill storage sizes of the bill acceptance sections of the bill processing apparatus 11 are thus listed on the display 17, the official in charge can obtain necessary adjustment information at a glance and further may adjust the position in accordance with the positioning information of the adjustment guide positions displayed on the display 17; even if the official in charge is not a skilled person, he or she can adjust the position efficiently in a short time.

Next, the check operation after the official in charge performs adjustment work in accordance with the positioning information of the adjustment guide positions displayed on the display 17 will be discussed.

Upon completion of the adjustment work of changing the attachment position of the adjustment upright guide plate 33, display 17 displays a message of "ENTER GUIDE POSITIONS" as shown in FIG. 8 at step n4 so that the official in charge can enter the adjustment values of the guide positions of the bill

inlet/outlet 12, the temporary hold section 14, and the first to fourth cartridges C1 to C4.

When the official in charge enters the adjustment values according to the message, the CPU 51 compares the entered data
5 with the validation data previously read in the validation section 13 at step n1 for checking at step n5. If a proper adjustment is made, the CPU 51 displays a message indicating the fact on the display 17 and the adjustment work is complete. In contrast, if an adjustment error of erroneous adjustment,
10 etc., occurs, for example, if the adjustment value of the third cartridge C3 is erroneous, the error is pointed out and guide information for readjustment is displayed on the display 17 for the official in charge with a message of "ADJUSTMENT VALUE IS ERRONEOUS. ADJUSTMENT VALUE OF THIRD CARTRIDGE IS 3" as
15 shown in FIG. 9 at step n6.

Since whether or not adjustment is proper can be thus checked on the display instantly after adjustment, the official in charge can immediately find erroneous adjustment or an acceptance guide error. Further, if an erroneous adjustment
20 occurs, immediately readjustment can be made for eliminating use of the bill processing apparatus remaining in an error. Accordingly, administration of the bill processing apparatus high in acceptance management performance avoiding a bill stack failure is enabled. The guide position information after
25 adjustment can be displayed for the official in charge not only

at the initial adjustment time, but also at the change adjustment time of later changing and adjusting the bill storage size, so that erroneous adjustment can be avoided and stable administration can be accomplished.

5 While there has been described in connection with the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is aimed, therefore, to cover in the appended claim all such
10 changes and modifications as fall within the true spirit and scope of the invention.

WHAT IS CLAIMED IS:

1. A sheet processing apparatus for processing sheets different in size, comprising:

first storage means for previously storing data by size
5 of the sheets;

second storage means for previously storing positioning data by the sheet size, the positioning data being data of guides of cartridges for storing the sheets;

read means for reading the data by the size of the sheets
10 to be processed from said first storing means;

comparison means for comparing the data by the size of the sheets to be processed read from said first storing means with the positioning data of the guides by the sheet size stored in said second storing means; and

15 output means for outputting guide information matching the data by the size of the sheet to be processed based on a comparison result of said comparison means.

2. The sheet processing apparatus as claimed in claim
20 1, wherein said output means is display means for displaying the guide information.



3. The sheet processing apparatus as claimed in claim
2, wherein the display means displays determination information
25 as to whether or not adjustment of the guide made based on the

guide information is adequate.

4. The sheet processing apparatus as claimed in claim
1, wherein said output means is display means for displaying
5 positioning information by the sheets preset as the guide
information;

5. The sheet processing apparatus as claimed in claim
2, wherein the display means displays positioning information
10 by the sheets preset as the guide information.

6. The sheet processing apparatus as claimed in claim
3, wherein the display means displays positioning information
by the sheets preset as the guide information.

15

7. A bill processing apparatus having a bill inlet inserted
bills; a validation section for determining validity and
denomination of the bills inserted into said bill inlet; a
temporary hold section for temporarily holding the determined
20 bills therein; and a storage section for storing the bills held
in said temporary hold section;

said apparatus comprising:

first storage means for previously storing data by size
according to denominations of the bills;

25 second storage means for previously storing positioning



data by the bill size, the positioning data being data of guides of cartridges for storing the bills;

read means for reading the data by the size of the bills to be inserted from said first storing means;

5 comparison means for comparing the data by size of the bill to be inserted read from said first storing means with the positioning data of the guides by the bill size stored in said second storage means;

display means for displaying guide information matching
10 the data by size of the bills to be inserted based on a comparison result of said comparison means;

input means for entering an adjustment value of adjustment of the guides made based on the guide information displayed on said display means; and

15 determination means for determining whether or not the adjustment value entered through said input means is proper.

