

## PAPER SHEET HANDLING SYSTEM

## BACKGROUND OF THE INVENTION

## Field of the Invention

5       The present invention relates to a paper sheet handling system, and more particularly to a bill handling system in which a clerk at the counter of a financial institution operates a counter terminal apparatus to accept bills into or pay bills out of a bill handling apparatus.

## 10   Description of the Related Art

      When bills are to be deposited into a paper sheet handling apparatus, the clerk can confirm that they are bills, but some of them may be rejected by the apparatus on account of smear or some other cause. In such a case, if the minimum acceptance  
15   level is reduced, the rejected bills can be recognized as bills and accepted into the apparatus. However, acceptance at a reduced level may invite wrong identification of bills, which would prevent accurate balance management of bills in the paper sheet handling apparatus. A remedy to this problem is proposed  
20   in JP-A-265288/2004 for instance.

      Also, JP-A-30106/2000 discloses a paper sheet handling apparatus whose clerk checks the bills found indistinguishable by the distinguishing unit of the apparatus and forcibly places them into the apparatus to be classified and accepted therein.

## SUMMARY OF THE INVENTION

As stated above, if a function to accept smeared or otherwise unacceptable bills in a specific recognition mode is added by any currently available technique, any wrong  
5 identification of bills would prevent accurate cash management of bills in the apparatus. This would necessitate recounting of the cash on hand at the time of close examination, which would cause extra time consumption.

An object of the present invention is to provide a paper  
10 sheet handling system which, even when bills are to be accepted into it in a specific recognition mode entailing visually watched counting by the clerk, enables the cash in the apparatus to be managed accurately.

A paper sheet handling system according to the invention  
15 preferably is a paper sheet handling system for receiving and turning out paper sheets, including an inlet/outlet for receiving and turning out such paper sheets; a distinguishing unit for distinguishing at least the authenticity and denominations of received paper sheets; a device for conveying  
20 to and storing into a storage unit, if the distinguishing by the distinguishing unit reveals all the paper sheets to be normal, in a normal mode; a returning device for returning, if the distinguishing by the distinguishing unit reveals any of the paper sheets to be not normal, such paper sheets; a specific  
25 recognition mode selecting device for changing over by the clerk,

if the distinguishing by the distinguishing unit reveals any abnormality, to a specific recognition mode in which the distinguishing level of paper sheets is altered; an input device for enabling the clerk, in the specific recognition mode, to input monetary sum information (first monetary sum information) calculated by visual observation of the paper sheets returned by the returning device; a processing device for causing the distinguishing unit, in the specific recognition mode, to distinguish the paper sheets returned and inputted again to the inlet/outlet and figuring out monetary sum information on the distinguished paper sheets (second monetary sum information); and a displaying device for displaying, related to each other, the first monetary sum information inputted from the input device and the second monetary sum information figured out by the processing device, wherein the paper sheets to be received in the specific recognition mode are, if the first monetary sum information and the second monetary sum information displayed on the displaying device are found identical with each other, conveyed to and stored into the storage unit on the basis of an inputting operation by the clerk through the input device.

In a preferable case, a paper sheet handling system according to the invention is a paper sheet handling system having a paper sheet handling apparatus for receiving and turning out paper sheets and a terminal apparatus connected to the paper sheet handling apparatus to control the paper sheet

handling apparatus in accordance with operations by a clerk,  
the paper sheet handling apparatus including an  
inlet/outlet for receiving and turning out such paper sheets;  
a distinguishing unit for distinguishing at least the  
5 authenticity and denominations of received bills; a device for  
conveying to and storing into a storage unit, if the  
distinguishing by the distinguishing unit reveals all the paper  
sheets to be normal, in a normal mode; a returning device for  
returning, if the distinguishing by the distinguishing unit  
10 reveals any of the paper sheets to be not normal, such paper  
sheets; and a processing device for figuring out monetary sum  
information on the paper sheets at least according to a result  
of distinguishing by the distinguishing unit; and

the terminal apparatus including a specific recognition  
15 mode selecting device for changing over by a clerk, if the  
distinguishing by the distinguishing unit reveals any  
abnormality, to a specific recognition mode in which the  
distinguishing level of paper sheets is altered; an input device  
for inputting the clerk's operations including inputting, in  
20 the specific recognition mode, monetary sum information (first  
monetary sum information) calculated by visual observation of  
the paper sheets returned by the returning device; and a  
displaying device for displaying at least the monetary sum  
information figured out by the processing device, wherein the  
25 processing device causes the distinguishing unit, in the

specific recognition mode, to distinguish the paper sheets returned and inputted again to the inlet/outlet and figures out monetary sum information on the distinguished paper sheets (second monetary sum information); the displaying device  
5 displays, related to each other, the first monetary sum information inputted from the input device and the second monetary sum information figured out by the processing device; and the paper sheets to be received in the specific recognition mode are, if the first monetary sum information and the second  
10 monetary sum information displayed on the displaying device are found identical with each other, conveyed to and stored into the storage unit on the basis of an inputting operation by the clerk through the input device.

In another preferable case, the processing device may  
15 have a sub-device for calculating differences between the first monetary sum information and the second monetary sum information, and the displaying device displays the calculated differences, classified by the denomination and related to the first monetary sum information and the second monetary sum  
20 information.

In another preferable case, the system may further have a storage device for storing the first monetary sum information, the second monetary sum information and, if necessary, information on the differences, wherein the displaying device  
25 displays information stored in the storage device.

In another preferable case, the returning device may return paper sheets to the inlet/outlet or a return receptacle provided separately from the inlet/outlet.

In another preferable case, the paper sheet handling  
5 apparatus may have a temporary holding unit for temporarily holding the paper sheets distinguished by the distinguishing unit; and, if any difference is displayed on the displaying device as a result of processing by the processing device, the processing device will cancel acceptance and the returning  
10 device returns the paper sheets held by the temporary holding unit at a received bill return instruction by the attendance through the input device.

In another preferable case, the specific recognition mode selecting device has a sub-device for displaying on a screen  
15 of the displaying device an instruction items in the specific recognition mode and, when the clerk executes the instruction item, a change-over is made to the specific recognition mode in which the distinguishing level of paper sheets is altered.

According to the invention, even when bills are to be  
20 accepted into the apparatus in a specific recognition mode, the cash therein can be managed accurately.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows the configuration of a bill handling system  
25 which is an embodiment of the present invention.

Fig. 2 shows the internal configuration of a bill handling apparatus 2 in this embodiment.

Fig. 3 shows the configuration of the bill handling system of one embodiment.

5 Fig. 4 charts how bills are accepted into the bill handling system in the normal recognition mode.

Fig. 5 charts how bills are accepted into the bill handling system in the specific recognition mode.

10 Fig. 6 charts a case in which the hand-counted number of bills is found inconsistent with the machine-counted number in the bill acceptance processing by the bill handling system in the specific recognition mode.

Fig. 7 shows the screen displayed when cash is closely examined in the bill handling system.

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#### DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the present invention will be described in detail below with reference to the accompanying drawings.

20 Fig. 1 shows connections in a bill handling system which is the preferred embodiment of the invention.

The bill handling system includes a counter terminal apparatus 1 and a bill handling apparatuses 2 connected to each other by transmission lines 4. In this counter terminal system,  
25 each counter clerk operates two counter terminal apparatuses

1. The bill handling apparatus 2 has a mechanism for accepting and paying bills, and this function can be performed by the clerk's operation of a counter terminal apparatus 1. The bill handling apparatus 2 can be connected to up to two counter terminal apparatuses 1, but it can operate with only one such apparatus as well. Reference numeral 5 denotes a start button which is to be pressed down when starting acceptance of bills.

Fig. 2 shows the internal configuration of the bill handling apparatus 2.

In Fig. 2, reference numeral 6 denotes a conveyance path over which bills are conveyed to different units of the apparatus; 7 denotes a distinguishing unit which distinguishes the denominations and authenticity of bills; 8 through 11 denote bill boxes in which bills can be separated or stacked; 12 denotes a rejection box for bills rejected when they are received or paid out of a bill box and for bills to be accepted in a specific recognition mode; 13 denotes a temporary holding unit for temporarily storing received bills; 14 denotes a bill inlet into which the clerk accepting deposits put the received bills; 15 denotes a return receptacle through which bills the apparatus cannot accept are returned; and 16 denotes a bill outlet through which bills are paid out.

A bill depositing action is begun by pressing down the start button 5. Bills put into the bill inlet 14 are successively separated another. The bills are conveyed over

the conveyance path 6 and distinguished by the distinguishing unit 7. Only the acceptable notes found authentic in the distinguishing process are accumulated in the temporary holding unit 13. Bills unacceptable by the bill handling apparatus 2  
5 are conveyed and returned through the return receptacle 15. The number of bills of each denomination accumulated in the temporary holding unit 13 is notified to the counter terminal apparatus 1.

In the receiving action, bills separated from the  
10 temporary holding unit 13 are distinguished again by the distinguishing unit 7. The bills found acceptable at this step are conveyed to and stacked in the bill boxes 8 through 11. On the other hand, unacceptable bills are stacked in the rejection box 12.

15 In the paying action, the bills separated from the bill boxes 8 through 11 are distinguished by the distinguishing unit 7, and only the bills found appropriate for payment are fed to and paid through the bill outlet 16. The bills found inappropriate for payment by the distinguishing unit 7 are  
20 conveyed to and held in the rejection box 12.

Fig. 3 shows the configuration of the bill handling system of one embodiment.

Each of the two counter terminal apparatuses 1 has a counter control unit 311 and a transmission unit 312 for  
25 controlling data transmission to a transmission line 4. The

counter terminal apparatus 1 is a sort of computer and has a display and an input device though not shown in Fig. 3 (shown in Fig. 1). The counter control unit 311 is configured of a processor for information processing and a program to be  
5 executed therein.

The bill handling apparatus 2 includes a business processing unit 33, a bill handling unit 34 and a bill distinguishing unit 35 (corresponding to the distinguishing unit 7 in Fig. 2). The business processing unit 34 has a  
10 function of processing inputs and outputs for clerk personnel and a maintenance function for maintenance personnel in addition to that of processing data communication mainly to and from the counter terminal apparatus 1. Therefore, the subunits are connected to and control an operating button 332, an audio  
15 device 333, a lamp 334, a display 335 and an input device 336. The operating button 332 here corresponds to the start button. The business processing unit 33, having a processor and a memory though not shown, process various data regarding the processing of bill receiving and paying, and stores that data into the  
20 memory.

The bill handling unit 34 controls conveyance by a bill conveyance unit 342, and also controls the actuators of gates provided on the conveyance path and at the bill box inlets and outlets. The distinguishing unit 35, provided with an  
25 algorithm processing function 351 for distinguishing bills,

distinguishes the authenticity and denominations of bills.

Next, the sequence of bill receipt processing will be described with reference to Figs. 4 through 7.

In each of these drawings, the left column charts the  
5 operation of the input device and the display screen of the display of the counter terminal apparatus 1.

Fig. 4 charts how bills are accepted into the bill handling system in the normal recognition mode.

The counter clerk receives bills from a customer, and puts  
10 them into the bill inlet 14 of the bill handling apparatus 2. When normal acceptance is selected (a normal acceptance button 50 is pressed down) on the counter terminal apparatus 1, an exclusive receipt holding instruction 17 is sent to the bill handling apparatus 2. Having received this instruction, the  
15 bill handling apparatus 2 thereafter does not operate even if it receives an instruction from another counter terminal apparatus 1 until an exclusive receipt hold canceling instruction 30 is received.

When starting to accept bills, the clerk presses a start  
20 button 5 on the bill handling apparatus 2. The counter control unit 311 of the counter terminal apparatus 1 transmits a receipt state acquiring instruction 18 to the bill handling apparatus 2 at regular intervals, and sees to that the start button 5 the bill handling apparatus 2 has been pressed down. Having  
25 detected the pressing-down of the start button 5, the bill

handling apparatus 2 starts bill acceptance processing by sending a receipt counting instruction 20 to the bill handling apparatus 2.

In the normal acceptance mode, when the bill handling  
5 apparatus 2 receives the receipt counting instruction 20, the normal recognition mode is set into the distinguishing unit 7. After that, the received bills are distinguished by the distinguishing unit 7, and only those bills determined to be normal are conveyed from the bill inlet 14 to the temporary  
10 holding unit 13. Other bills found unacceptable in the normal recognition mode as a result of distinguishing are conveyed to the return receptacle 15.

By sending the receipt state acquiring instruction 18 to the bill handling apparatus 2 at regular intervals during the  
15 bill acceptance operation, the counter terminal apparatus 1 can monitor the state of the bill handling apparatus 2. After all the bills in the bill inlet 14 have been conveyed to the temporary holding unit 13 or the return receptacle 15, the number of bills normally distinguished is notified by a response to a received  
20 bill number acquiring instruction 23, and is displayed on the display of the counter terminal apparatus 1.

After checking the displayed result (the number of bills counted by the bill handling apparatus 2 (to be referred as the machine-counted number)) with the customer, if there is nothing  
25 wrong about the counted number of bills, the bills are stored,

classified by the denomination, into the bill boxes 8 through 11 at a receipt accepting instruction 27. On the other hand, those bills determined by the distinguishing unit 7 to be abnormal are stored into the rejection box 12. The storing of all the bills in the temporary holding unit 13 into the bill boxes 8 through 11 or the rejection box 12 is notified by a receipt accepting response 29, and the bill handling apparatus 2 is released from exclusive use by the exclusive receipt hold canceling instruction 30.

10        Fig. 5 charts how bills are accepted in the specific recognition mode.

      This specific recognition mode means a processing sequence in which bills cannot be accepted into the bill handling apparatus 2 in the normal recognition mode and, when any bills are returned through the return receptacle 15, the returned bills are accepted into the apparatus.

      First, the clerk operates a button 51 for acceptance in the specific recognition mode, displayed on the screen of the display of the counter terminal apparatus 1. Operation of this button 51 alters all the subsequent commands given the bill handling apparatus 2 into commands for bill acceptance in the specific recognition mode.

      When bills are to be received in the specific recognition mode, the bill handling apparatus 2 may wrongly determine the denominations of bills. In view of this possibility, the clerk

manually counts the bills in advance classified by denomination, and inputs the result of counting through the input device. At the same time, the clerk puts the bills into the bill inlet 14. The result of counting the inputted bills is displayed on the input screen 31 of the display. After that, the exclusive receipt holding instruction 17 is sent to the bill handling apparatus 2. Having received this instruction, the bill handling apparatus 2 thereafter does not operate even if it receives an instruction from another counter terminal apparatus 1 until the exclusive receipt hold canceling instruction 30 is received.

After that, the pressing-down of the start button 5 on the bill handling apparatus 2 is monitored by the counter terminal apparatus 1 (the receipt state acquiring instruction 18 and a bill acceptance state acquisition response 35) and, when the pressing-down is detected, a specific receiving instruction 36 is transmitted to the bill handling apparatus 2.

Having received this instruction, the bill handling apparatus 2 sets the specific recognition mode, different from the normal mode, into the distinguishing unit 7 and, having the distinguishing unit 7 distinguish the bills, conveys only those bills determined to be normal in the specific recognition mode to the temporary holding unit 13 through the bill inlet 14.

During the counting of received bills, the end of the

counting action is monitored by the receipt state acquiring instruction 18 and a specific acceptance response 38. When the end of the counting actions has been determined by that monitoring, the result of counting can be acquired by the received bill number acquiring instruction 23. The acquired counting is displayed in the machine-counted number column for the counter terminal apparatus of the counted result displayed on the display. As a result, the number of bills as directly counted by the clerk (the hand-counted number) and the number of bills as counted by the bill handling apparatus 1 (the machine-counted number) are displayed on the input screen 31 matched with each other. The data to be displayed is stored in the memory.

The counter terminal apparatus 1 calculates the difference between the hand-counted number and the machine-counted number, and displays it on the display. The clerk checks the difference together with the hand-counted number and the machine-counted number and, if they are found consistent, the clerk can collect the bills in the temporary holding unit 13 into the rejection box 12 by the temporary holding unit 13 into the rejection box 12 by a specific accepting instruction 43.

By displaying on the counter terminal apparatus 1 the actions to confirm the number of bills, even when they are inputted in the specific recognition mode, bills out of control

can be prevented from entering into the bill handling apparatus 2 to enable the sum of cash on hand can be accurately managed.

Fig. 6 charts the sequence of a case in which the hand-counted number of bills is found inconsistent with the machine-counted number in the specific recognition mode.

After bills have been accepted in the specific recognition mode, the counting result input screen 31 of the display displays the hand-counted number of bills, the machine-counted number and the difference between them. This example shows that there is one-unit difference each in the numbers of ¥10,000 bills and of ¥5,000 bills. The data to be displayed is stored in the memory.

The attendance checks the reading of the counting result input screen 31 and, if there is any difference indicated, can return to the return receptacle 15 all the bills inputted in the specific recognition mode by a receipt rejecting instruction 54. The returned bills, after being manually counted by the clerk, are subjected to an acceptance action again in the specific recognition mode.

Fig. 7 shows a balance information display screen on the bill handling apparatus 2 at the time of close examination of cash.

A balance data display 60 shows, in addition to the balance information, the grand total with the cumulative total of bills inputted in the specific recognition mode. This enables the

balance in the bill handling apparatus 2 to be confirmed without having to recounting the bills. By operating a print button 61 on the screen, the clerk can print out the balance information (i.e. the contents of the displayed screen stored in the memory) with a printer, and thereby reduce the length of time required for close examination of cash.

The embodiment of the invention described above enables the rate of acceptance into the bill handling apparatus to be enhanced and the sum of cash on hand to be reduced by differentiated acceptance in the normal bill receiving mode and the specific recognition mode. By displaying the number of bills counted by the bill handling apparatus, the number manually counted by the clerk and any difference between the management of bills in the bill handling apparatus can be facilitated.

Although an embodiment of application of the present invention to a configuration embodied in a bill handling system having bill handling apparatuses and a counter terminal apparatus has been described so far, the invention is not limited to this configuration. If, for instance, the functions of the counter terminal apparatus described above can be realized in a bill handling apparatus equipped with an operation panel having an display and an input device, the invention can be implemented in a bill handling apparatus alone.

The invention can be applied to a bill handling system

handling not only bills but also securities such as checks.

What is claimed is:

1. A paper sheet handling system for receiving and turning out paper sheets, comprising:

5        an inlet/outlet for receiving and turning out such paper sheets;

        a distinguishing unit for distinguishing at least the authenticity and denominations of received paper sheets;

        a device for conveying to and storing into a storage unit,  
10        if the distinguishing by the distinguishing unit reveals all the paper sheets to be normal, in a normal mode;

        a returning device for returning, if the distinguishing by the distinguishing unit reveals any of the paper sheets to be not normal, such paper sheets;

15        a specific recognition mode selecting device for changing over by a clerk, if the distinguishing by the distinguishing unit reveals any abnormality, to a specific recognition mode in which the distinguishing level of paper sheets is altered;

        an input device for enabling the clerk, in the specific  
20        recognition mode, to input monetary sum information (first monetary sum information) calculated by visual observation of the paper sheets returned by the returning device;

        a processing device for causing the distinguishing unit, in the specific recognition mode, to distinguish the paper  
25        sheets returned and inputted again to the inlet/outlet and

figuring out monetary sum information on the distinguished paper sheets (second monetary sum information); and

a displaying device for displaying, related to each other, the first monetary sum information inputted from the input device and the second monetary sum information figured out by  
5 the processing device,

wherein the paper sheets to be received in the specific recognition mode are, if the first monetary sum information and the second monetary sum information displayed on the displaying  
10 device are found identical with each other, conveyed to and stored into the storage unit on the basis of an inputting operation by the clerk through the input device.

2. A paper sheet handling system having a paper sheet handling apparatus for receiving and turning out paper sheets  
15 and a terminal apparatus connected to the paper sheet handling apparatus to control the paper sheet handling apparatus in accordance with operations by a clerk,

the paper sheet handling apparatus comprising:

an inlet/outlet for receiving and turning out such paper  
20 sheets;

a distinguishing unit for distinguishing at least the authenticity and denominations of received bills;

a device for conveying to and storing into a storage unit, if the distinguishing by the distinguishing unit reveals all  
25 the paper sheets to be normal, in a normal mode;

a returning device for returning, if the distinguishing by the distinguishing unit reveals any of the paper sheets to be not normal, such paper sheets; and

a processing device for figuring out monetary sum  
5 information on the paper sheets at least according to a result of distinguishing by the distinguishing unit; and

the terminal apparatus comprising:

a specific recognition mode selecting device for changing over by a clerk, if the distinguishing by the distinguishing  
10 unit reveals any abnormality, to a specific recognition mode in which the distinguishing level of paper sheets is altered;

an input device for inputting the clerk's operations including inputting, in the specific recognition mode, monetary sum information (first monetary sum information) calculated by  
15 visual observation of the paper sheets returned by the returning device; and

a displaying device for displaying at least the monetary sum information figured out by the processing device,

wherein the processing device causes the distinguishing  
20 unit, in the specific recognition mode, to distinguish the paper sheets returned and inputted again to the inlet/outlet and figures out monetary sum information on the distinguished paper sheets (second monetary sum information);

the displaying device displays, related to each other,  
25 the first monetary sum information inputted from the input

device and the second monetary sum information figured out by the processing device; and

the paper sheets to be received in the specific recognition mode are, if the first monetary sum information and the second monetary sum information displayed on the displaying device are found identical with each other, conveyed to and stored into the storage unit on the basis of an inputting operation by the clerk through the input device.

3. The paper sheet handling system according to Claim 1,  
10 wherein the processing device has a sub-device for calculating the differences between the first monetary sum information and the second monetary sum information, and the displaying device displays the calculated differences, classified by the denomination and related to the first monetary sum information and the second monetary sum  
15 information.

4. The paper sheet handling system according to Claim 2,  
wherein the processing device has a sub-device for calculating differences between the first monetary sum  
20 information and the second monetary sum information, and the displaying device displays the calculated differences, classified by the denomination and related to the first monetary sum information and the second monetary sum information.

25 5. The paper sheet handling system according to Claim 3,

further comprising a storage device for storing the first monetary sum information, the second monetary sum information and, if necessary, information on the differences,

wherein the displaying device displays information  
5 stored in the storage device.

6. The paper sheet handling system according to Claim 1,  
wherein the returning device returns paper sheets to the inlet/outlet or a return receptacle provided separately from the inlet/outlet.

10 7. The paper sheet handling system according to Claim 4,  
wherein the paper sheet handling apparatus has a temporary holding unit for temporarily holding the paper sheets distinguished by the distinguishing unit; and

if any difference is displayed on the displaying device  
15 as a result of processing by the processing device, the processing device cancels acceptance and the returning device returns the paper sheets held by the temporary holding unit at a received bill return instruction by the attendance through the input device.

20 8. The paper sheet handling system according to Claim 1,  
wherein the specific recognition mode selecting device has a sub-device for displaying on a screen of the displaying device instruction items in the specific recognition mode and, when the clerk executes any such instruction item, a change-over  
25 is made to the specific recognition mode in which the

distinguishing level of paper sheets is altered.