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(72) Inventors:
• **TAKADA, Atsushi**
Tokyo 105-8460 (JP)
• **HARA, Junichiro**
Tokyo 105-8460 (JP)

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(74) Representative: **Betten & Resch**
Patentanwälte
Theatinerstrasse 8
80333 München (DE)

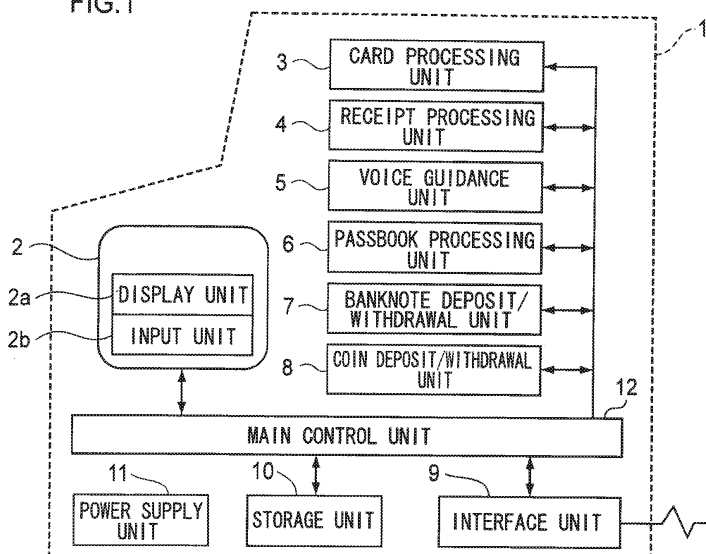
(71) Applicant: **Oki Electric Industry Co., Ltd.**
Minato-ku
Tokyo 105-8460 (JP)

(54) **AUTOMATIC TRANSACTION DEVICE AND METHOD**

(57) An automated teller machine that receives customer operation and performing payment and deposit transactions of money is provided. In the automated teller machine, a main control unit calculates, as a deposit amount, the difference between the payment amount the input of which has been received by an input section and a withdrawal amount which exceeds the payment amount

and that can be withdrawn with money of denomination capable of being withdrawn. A deposit/withdrawal section performs the deposit processing of the money equivalent to the deposit amount, performs the withdrawal processing of the money equivalent to the withdrawal amount, and performs the payment transaction of the inputted payment amount.

FIG.1



Description

TECHNICAL FIELD

[0001] The present invention relates to an automated teller machine that is installed in a financial establishment such as a bank, accepts operation by a customer, and performs payment transactions and deposit transactions of cash.

BACKGROUND ART

[0002] In a payment transaction where a conventional automated teller machine is to pay out an amount of cash that has been inputted by operation by a customer, the conventional automated teller machine cannot perform that payment transaction when the automated teller machine cannot pay out to the customer the inputted amount of cash due to a shortage of cash inside cash storage boxes that store cash by different money denominations, which has led to a drop in service to the customer.

In order to avoid such a drop in service to the customer, there is a system that rejects input of unpayable amounts and accepts input of payable amounts (e.g., when payment is possible only in 10,000 yen bills, the system allows input of payment amounts in 10,000 yen denominations and rejects input of payment amounts in 1,000 yen denominations) to thereby perform payment transactions.

[0003] Further, there is also a system where the number of cash storage boxes of different money denominations that store cash of the same denominations is increased so as to become plural so that, even if there is a shortage of cash inside one of the cash storage boxes, the system can pay out cash from another cash storage box and thereby continue to perform payment transactions (e.g., see Japanese Patent Application Laid-Open (JP-A) No. 5-143822).

Moreover, there is also a system where a loading/collecting cassette that stores cash is disposed separately from cash storage boxes of different money denominations, and when there is a shortage of cash inside one of the cash storage boxes, the system restocks that cash storage box with cash of the money denomination of which there is a shortage from that loading/collecting cassette so that the system can continue to perform payment transactions (e.g., see JP-A No. 5-54230).

DISCLOSURE OF THE INVENTION

Problem to be Solved by the Invention

[0004] However, in the conventional technologies described above, when the system accepts input of payable amounts but there is a shortage of 1,000 yen banknotes, for example, customers cannot input amounts in 1,000 yen denominations. For that reason, there is the problem that the system cannot perform payment transactions to

pay amounts of cash desired by customers.

Further, there is the problem that the automated teller machine ends up becoming larger in size when the number of cash storage boxes is increased or when a loading/collecting cassette is disposed. Further, there is the problem that the number of cash storage boxes cannot be increased and a loading/collecting cassette cannot be disposed in a compact automated teller machine.

[0005] Moreover, when a loading/collecting cassette is disposed and there is a shortage of cash inside one of the cash storage boxes, even when the automated teller machine restocks that cash storage box with cash of the money denomination of which there is a shortage from that loading/collecting cassette, the automated teller machine cannot perform payment transactions while performing the restocking. For that reason, there is the problem that the waiting time of the customer ends up becoming longer.

An object of the present invention is to solve such problems.

Means for Solving the Problem

[0006] One aspect of the present invention is an automated teller machine that accepts operation by a customer and performs payment transactions and deposit transactions of money, the automated teller machine including: an input unit that accepts input of a payment amount of money by customer operation; a deposit and withdrawal unit that performs deposit processing to store, in a safe deposit box, money that has been deposited into a deposit slot and withdrawal processing to pay out, to a withdrawal slot, money stored in different safe deposit boxes for different money denominations; and a difference calculating section that calculates, as a deposit amount, the difference between the accepted payment amount and a withdrawal amount that exceeds the payment amount and that can be withdrawn in money of money denominations capable of being withdrawn, wherein the deposit and withdrawal unit performs deposit processing of money corresponding to the calculated deposit amount and performs withdrawal processing of money corresponding to the withdrawal amount and thereby performs a payment transaction for the inputted payment amount.

Another aspect of the present invention is an automated teller method that accepts operation by a customer and performs payment transactions and deposit transactions of money, the automated teller method including: accepting input of a payment amount of money by customer operation; calculating, as a deposit amount, the difference between the accepted payment amount and a withdrawal amount that exceeds the payment amount and can be withdrawn in money of money denominations capable of being withdrawn; and performing deposit processing of money corresponding to the calculated deposit amount and performing withdrawal processing of money corresponding to the withdrawal amount and

thereby performing a payment transaction for the inputted payment amount.

Effects of the Invention

[0007] In the present aspects configured in this manner, there is obtained the effect that, even when there is a shortage of money (banknotes and/or coins) of a money denomination needing to be withdrawn with respect to a payment amount desired by a customer, withdrawal processing can be performed in withdrawable money. Further, there is obtained the effect that payment transactions to pay payment amounts desired by customers can always be performed.

Further, there is obtained the effect that, even when there is a shortage of money of a money denomination needed to be withdrawn, it becomes unnecessary to urgently restock the money of which there is a shortage, and the customer is no longer made to wait.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

FIG. 1 is a block diagram showing the configuration of an automated teller machine in an exemplary embodiment of the present invention;

FIG. 2 is a perspective diagram showing the exterior of the automated teller machine in the embodiment;

FIG. 3 is a flowchart showing normal payment transaction processing in the embodiment;

FIG. 4 is a flowchart showing difference deposit and payment transaction processing in the embodiment;

FIG. 5A is an explanatory diagram of a display screen in the embodiment;

FIG. 5B is an explanatory diagram of a display screen in the embodiment;

FIG. 5C is an explanatory diagram of a display screen in the embodiment;

FIG. 5D is an explanatory diagram of a display screen in the embodiment;

FIG. 5E is an explanatory diagram of a display screen in the embodiment;

FIG. 5F is an explanatory diagram of a display screen in the embodiment;

FIG. 5G is an explanatory diagram of a display screen in the embodiment;

FIG. 5H is an explanatory diagram of a display screen in the embodiment;

FIG. 5I is an explanatory diagram of a display screen in the embodiment;

FIG. 6A is an explanatory diagram of a display screen in the embodiment;

FIG. 6B is an explanatory diagram of a display screen in the embodiment;

FIG. 6C is an explanatory diagram of a display screen in the embodiment;

FIG. 6D is an explanatory diagram of a display

screen in the embodiment;

FIG. 6E is an explanatory diagram of a display screen in the embodiment;

FIG. 6F is an explanatory diagram of a display screen in the embodiment; and

FIG. 6G is an explanatory diagram of a display screen in the embodiment.

BEST MODE FOR CARRYING OUT THE INVENTION

[0009] An exemplary embodiment of an automated teller machine according to the present invention will be described below with reference to the drawings.

[0010] FIG. 1 is a block diagram showing the configuration of the automated teller machine in the exemplary embodiment, and FIG. 2 is a perspective diagram showing the exterior of the automated teller machine in the embodiment.

In FIG. 1 and FIG. 2, an automated teller machine 1 is installed in a branch office of a financial establishment such as a bank or a post office or in a store such as a convenience store, accepts operation by a customer, and performs transactions such as cash payments and cash deposits.

[0011] A deposit and withdrawal unit 2 is disposed in the front surface of the automated teller machine 1 and is configured by the combination of a display unit 2a such as a CRT or an LCD and an input unit 2b comprising a position signal detector such as a touch panel. The display unit 2a of the deposit and withdrawal unit 2 displays a transaction selection screen for selecting transactions, a screen asking what the customer desires to do, a guidance screen prompting operation by the customer, and operation buttons for accepting operation, and the input unit 2b accepts operation by the customer.

[0012] A card processing unit 3 reads stored information from a customer identification card (hereinafter called a "cash card") that is issued by the financial establishment or the like and on which are recorded the identification code of the financial establishment, the account number and the name of the customer, and the like. The card processing unit 3 is equipped with a communication unit that reads information recorded in a magnetic stripe or the like of the cash card that has been inserted into a card insertion/return slot 3a disposed in the front surface of the automated teller machine 1 and which transmits information to and receives information from an IC chip or the like of an inserted IC card. The card processing unit 3 can, via the communication unit, read information recorded in the IC chip or the like and request processing. The IC card does not have to be a card equipped with a magnetic stripe. Further, the card processing unit 3 ejects the card whose information has read from the card insertion/return slot 3a and returns the card to the customer.

[0013] A receipt processing unit 4 prints on a statement (hereinafter called a "receipt") the content of the transaction that the automated teller machine 1 has performed

after accepting operation by the customer, ejects that receipt from an unillustrated receipt ejection slot, and issues the receipt to the customer. The receipt is a slip of paper on which is printed information relating to the transaction that the customer has performed, such as a deposit, a payment, a balance inquiry, a direct bank transfer, a transfer between accounts, a remittance, or a time deposit setting, and the account number, the type of financial transaction and the transaction amount are printed on the receipt. A receipt may be issued only when the customer desires one.

[0014] A voice guidance unit 5 outputs voice guidance messages and the like for guiding operation by the customer on the basis of voice data stored beforehand in a storage unit described later.

A passbook processing unit 6 reads recorded information from a magnetic stripe or the like of a passbook inserted into a passbook insertion and return slot 6a disposed in the front surface of the automated teller machine 1, prints in the passbook the content of the transaction that the automated teller machine 1 has performed after accepting operation by the customer, ejects that passbook from the passbook insertion and return slot 6a, and returns the passbook to the customer. The passbook is a booklet-like passbook such as a deposit passbook that the financial establishment or the like has issued with respect to the customer, and records of transactions such as deposits, payments, passbook entries, balance inquiries, direct bank transfers, transfers between accounts, remittances, and time deposit settings are printed in the passbook. This passbook is equipped with a magnetic stripe for recording information such as the name and the account number of the customer on the front cover or the back cover. The member for recording information may also be an IC chip embedded in the passbook instead of a magnetic stripe.

Further, a magnetic head or an IC interface that reads recorded information from and writes information to the magnetic stripe or the IC chip of the passbook is disposed in the passbook processing unit 6.

[0015] A banknote deposit/withdrawal unit 7 performs deposit processing to discriminate the authenticity of banknotes that have been deposited into a banknote deposit/withdrawal slot 7a disposed in the front surface of the automated teller machine 1 by operation by the customer, count the banknotes, retain the banknotes in an unillustrated temporary retention unit, bring up the retained banknotes from the temporary retention unit when the deposit amount is verified by the customer, and store the banknotes in safe deposit boxes of different money denominations, and withdrawal processing to bring up an amount of banknotes that has been designated by operation by the customer from the safe deposit boxes of the different money denominations, convey the banknotes to the banknote deposit/withdrawal slot 7a, and pay the banknotes to the customer.

[0016] The banknote deposit/withdrawal unit 7 can perform deposit processing and withdrawal processing

of banknotes of plural money denominations because of equipment of the safe deposit boxes of the different money denominations. In the present embodiment, the banknote deposit/withdrawal unit 7 is equipped with three types of safe deposit boxes that store 10,000 yen bills, 1,000 yen bills, and 5,000 yen bills and 2,000 yen bills; the 10,000 yen bill safe deposit box and the 1,000 yen bill safe deposit box are configured such that they can store and bring up those banknotes, and the safe deposit box that stores 5,000 yen bills and 2,000 yen bills is configured such that it can store those banknotes but cannot bring those banknotes up. Consequently, the banknote deposit/withdrawal unit 7 can perform withdrawal processing of 10,000 yen bills and 1,000 yen bills and can perform deposit processing of 10,000 yen bills, 5,000 yen bills, 2,000 yen bills and 1,000 yen bills.

[0017] Further, each of the safe deposit boxes is provided with a detecting section such as a sensor that can detect the presence or absence of stored banknotes and a counter of the number of the banknotes of the different money denominations stored in the safe deposit boxes which is stored in a storage unit described later, so that the money denominations of banknote that can be processed for withdrawal can be discerned.

Here, the banknote of the highest denomination that the banknote deposit/withdrawal unit 7 can process for withdrawal will be called a "high-denomination banknote" and banknotes of lower denominations than the high-denomination banknote of the banknotes that the banknote deposit/withdrawal unit 7 can process for deposit will be called "low-denomination banknotes". In the present embodiment, the 10,000 yen bills are the high-denomination banknote, and the 5,000 yen bills, the 2,000 yen bills and the 1,000 yen bills are the low-denomination banknote.

[0018] A coin deposit/withdrawal unit 8 performs deposit processing to discriminate the authenticity of coins that have been deposited into a coin deposit/withdrawal slot 8a disposed in the front surface of the automated teller machine 1 by operation by a customer, count the coins, retain the coins in an unillustrated temporary retention unit, bring up the retained coins from the temporary retention unit when the deposit amount is verified by the customer, and store the coins in safe deposit boxes of different money denominations, and withdrawal processing to bring up an amount of coins that has been designated by operation by the customer from the safe deposit boxes of the different money denominations, convey the coins to the coin deposit/withdrawal slot 8a, and pay the coins to the customer.

[0019] The coin deposit/withdrawal unit 8 also can perform deposit processing and withdrawal processing of coins of plural money denominations because it is equipped with the safe deposit boxes of the different money denominations.

Further, each of the safe deposit boxes is provided with a detecting section such as a sensor that can detect the presence or absence of stored coins and a counter of the number of the coins of the different money denomi-

nations stored in the safe deposit box which is stored in a storage unit described later, so that the money denominations of coins that can be processed for withdrawal can be discriminated.

[0020] The banknote deposit/withdrawal unit 7 and the coin deposit/withdrawal unit 8 will be generically called a "deposit/withdrawal unit" and banknotes and/or coins will be generically called "money".

An interface unit 9 performs communication control to transmit and receive information for obtaining permission for various types of transactions and information for performing ID verification resulting from PIN numbers and biometric information to and from an unillustrated host computer communicably connected to the interface unit 9 via a communication line.

[0021] A storage unit 10 is configured by a semiconductor memory or a magnetic disk. The storage unit 10 stores control programs (software) for controlling the operation of the entire automated teller machine 1, information needed for various types of transactions, and image information for display on the display unit 2a of the deposit and withdrawal unit 2. Moreover, the storage unit 10 stores, as the counters, data indicating the numbers of banknotes of the different money denominations stored in the safe deposit boxes of the banknote deposit/withdrawal unit 7 and data indicating the numbers of coins of the different money denominations stored in the safe deposit boxes of the coin deposit/withdrawal unit 8.

[0022] A power supply unit 11 supplies power to the entire automated teller machine 1.

Main control unit 12 is configured by a Central Processing Unit (CPU) or the like and controls the operation of the entire automated teller machine 1 including the deposit and withdrawal unit 2, the card processing unit 3, the receipt processing unit 4, the voice guidance unit 5, the passbook processing unit 6, the banknote deposit/withdrawal unit 7, the coin deposit/withdrawal unit 8, the interface unit 9 and the storage unit 10 on the basis of the control programs stored in the storage unit 10.

[0023] The main control unit 12 is equipped with a difference calculating section (a control program) that calculates, as a deposit amount, the difference between the payment amount whose input has been received by the input unit 2b and a withdrawal amount that exceeds that payment amount and can be withdrawn in money of money denominations capable of being withdrawn on the basis of the counters stored in the storage unit 10.

The operation of the configuration described above will be described.

[0024] The operation of each unit described below is controlled by an unillustrated control unit such as a central processing unit on the basis of programs (software) stored in an unillustrated storage unit such as a memory or a magnetic disk.

Further, a "business execution program" for executing various types of transactions is stored beforehand in the storage unit 10 of the automated teller machine 1 in the embodiment described below.

[0025] First, a normal payment transaction will be described in accordance with the steps indicated by S in the flowchart of FIG. 3 showing normal payment transaction processing in the embodiment.

5 A clerk in the financial establishment or the like switches ON the power of the automated teller machine 1 at the start of the workday. The power supply unit 11 of the automated teller machine 1 supplies power to each unit. Thus, the "business execution program" stored in the
10 storage unit 10 of the automated teller machine 1 is automatically started.

[0026] S1: When the "business execution program" starts, the main control unit 12 of the automated teller machine 1 displays a transaction selection screen shown
15 in FIG. 5A on the display unit 2a of the deposit and withdrawal unit 2 and stands by for operation by a customer. This selection screen is configured by a message prompting the customer to press a transaction button and by transaction buttons for selecting transactions, such
20 as a "withdrawal" button for executing a payment transaction, a "deposit" button for executing a deposit transaction, a "direct bank transfer" button for executing a direct bank transfer transaction, a "transfer between ac-
25 counts" button for executing a transfer-between-accounts transaction, a "balance inquiry" button for executing a balance inquiry transaction to inquire about an account balance, and a "passbook entry" button for executing a passbook entry transaction to enter unentered transaction data into a passbook.

30 **[0027]** In the present embodiment, the customer may select the payment transaction from the screen of the display unit 2a and use the input unit 2b to press the "withdrawal" button.

S2: The main control unit 12 recognizes, with a position
35 signal or the like of the input unit 2b, the transaction selected by the customer, advances processing to S4 when the recognized transaction is the payment transaction and advances processing to S3 in the case of all other transactions.

40 **[0028]** S3: When the transaction selected by the customer is recognized to be a transaction other than the payment transaction, the main control unit 12 executes normal processing of the other transaction that has been selected, but description thereof will be omitted.

45 The main control unit 12 that has completed execution of other transaction processing advances processing to S1, displays the transaction selection screen on the display unit 2a, and stands by.

S4: When the transaction selected by the customer is
50 recognized to be the payment transaction, the main control unit 12 displays on the display unit 2a a card insertion guidance screen shown in FIG. 5B on which are displayed a message prompting the customer to insert his/her cash card, an illustration of that cash card, and a
55 "cancel" button for canceling the transaction.

[0029] The customer may insert his/her cash card into the card insertion/return slot 3a in accordance with the card insertion guidance screen. The main control unit 12

that has detected insertion of the cash card causes the card processing unit 3 to import the cash card and read the card information stored on that cash card such as the account number of the customer.

When the customer presses the "cancel" button, the main control unit 12 ends the payment transaction and advances processing to S1 (hereinafter, operation when the customer presses "cancel" button is the same, and if the cash card is inserted in the automated teller machine 1, that cash card is ejected and returned to the customer).

[0030] S5: The main control unit 12 displays on the display unit 2a a PIN number input screen shown in FIG. 5C on which are displayed a message prompting the customer to input his/her PIN number, a PIN number display field, a numerical keypad for inputting the PIN number, a "correct" button for correction input mistakes, an "enter" button for fixing input of the PIN number, and a "cancel" button for canceling the transaction. The customer may use the numerical keypad or the like to input his/her PIN number and may press the "enter" button.

[0031] S6: The main control unit 12 that has recognized input of the PIN number prompts the customer to input the payment amount by displaying on the display unit 2a a payment amount input screen shown in FIG. 5D on which are displayed a message prompting the customer to input the payment amount, a payment amount input field, a numerical keypad for inputting the payment amount, denomination keys such as "10,000 yen", a "correct" button for correcting input mistakes, an "enter" button for fixing input of the payment amount, and a "cancel" button for canceling the transaction. The customer may use the numerical keypad or the like to input the payment amount and may press the "enter" button.

[0032] S7: The main control unit 12 that has detected input of the payment amount asks the customer to stand by for a moment by displaying on the display unit 2a a standby request screen shown in FIG. 5E on which are displayed a message asking the customer to stand by for a moment and an animation such as a product showcase, and the main control unit 12 performs intercommunication with the host computer. That is, the main control unit 12 attaches the inputted PIN number and payment amount to the card information of the cash card, creates an electronic transaction message, transmits the electronic transaction message via the communication line to the host computer, and asks whether or not there is no problem with the PIN number of the customer and the payment amount.

[0033] The host computer that has received the electronic transaction message references the customer information that is managed therein to determine whether or not there is a problem, judges the propriety of the transaction (whether or not to proceed with the transaction), and transmits the result thereof as an electronic transaction propriety message to the automated teller machine 1. S8: The main control unit 12 determines the propriety of the transaction (whether or not to proceed with the transaction) of the customer on the basis of the electronic

transaction propriety message the host computer has received, advances processing to S10 when the transaction is allowable, and advances processing to S9 when the transaction is not allowable.

[0034] S9: The main control unit 12 that has determined that the transaction of the customer is not allowable displays on the display unit 2a a card acceptance request screen shown in FIG. 5F on which are displayed a message prompting the customer to take his/her cash card and an illustration of the cash card, and the main control unit 12 ejects the cash card from the card processing unit 3. The main control unit 12 verifies that the customer has taken his/her cash card, ends payment transaction processing, returns to S1, displays the transaction selection screen on the display unit 2a, and stands by.

[0035] S10: The main control unit 12 that has determined that the transaction of the customer is allowable selects the money denominations corresponding to the inputted payment amount while continuing to display the standby request screen, uses a single-banknote separation mechanism of the banknote deposit/withdrawal unit 7 to bring up banknote one-by-one from the safe deposit boxes in which banknotes of those money denominations are stored, conveys the banknotes to a banknote discriminating section, discriminates the money denominations of those banknotes, performs counting, conveys the banknotes to the banknote deposit/withdrawal slot 7a, and uses a banknote separation/integration mechanism to integrate (gather) the banknotes corresponding to the payment amount in the banknote deposit/withdrawal slot 7a.

[0036] S11: In parallel with S10, the main control unit 12 creates print data on the basis of the transaction content, sends the print data to the receipt processing unit 4, and uses the receipt processing unit 4 to print the print data on a transaction statement.

Then, the main control unit 12 displays on the display unit 2a a card and statement acceptance request screen shown in FIG. 5G on which are displayed a message prompting the customer to take his/her cash card and transaction statement and an illustration of a transaction statement, ejects the cash card and the transaction statement from the card processing unit 3 and the receipt processing unit 4, and returns the cash card and issues the transaction statement.

[0037] S12: The main control unit 12 displays on the display unit 2a a banknote acceptance request screen shown in FIG. 5H on which are displayed a message asking the customer to take his/her banknotes and an animation showing that acceptance operation and causes an unillustrated shutter of the banknote deposit/withdrawal slot 7a to open and thereby open the banknote deposit/withdrawal slot 7a.

S13: The main control unit 12 that has opened the banknote deposit/withdrawal slot 7a waits and stands by for the customer to remove the banknotes integrated in the banknote deposit/withdrawal slot 7a and moves processing to S14 when it has detected removal of the banknotes.

The main control unit 12 continues to stand by when the removal of the banknotes has not been detected.

[0038] S14: The main control unit 12 that has detected removal of the banknotes displays on the display unit 2a a transaction end screen shown in FIG. 5I on which are displayed an acknowledgement and an animation of that operation, causes the unillustrated shutter to close and thereby close the banknote deposit/withdrawal slot 7a, ends the normal payment transaction, returns to S1, displays the transaction selection screen on the display unit 2a, and stands by.

In this manner, the automated teller machine 1 performs the normal payment transaction.

[0039] Next, withdrawal processing when the payment transaction described above has been performed plural times and the automated teller machine 1 has run out of the 1,000 yen bills stored in the safe deposit box of the 1,000 yen bills that are low-denomination banknotes will be described in accordance with the steps indicated by S in the flowchart of FIG. 4 showing difference deposit and payment transaction processing.

The main control unit 12 detects that the automated teller machine 1 has run out of the 1,000 yen banknotes stored in the safe deposit box of the 1,000 yen banknotes that are low-denomination banknotes on the basis of the counters indicating the numbers of the banknotes of the different money denominations stored in the safe deposit boxes stored in the storage unit 10 and the detecting sections such as sensors.

[0040] S101: This operation is the same as S1 in FIG. 3, so description thereof will be omitted.

S102: The main control unit 12 that has recognized, with a position signal of the input unit 2b or the like, the transaction selected by the customer advances processing to S104 if the transaction recognized is the payment transaction and advances processing to S103 in the case of all other transactions.

S103: The main control unit 12 that has recognized that the transaction selected by the customer is a transaction other than the payment transaction executes normal processing of the other transaction that has been selected, and description thereof will be omitted.

[0041] The main control unit 12 that has ended execution of other transaction processing advances processing to S101, displays the transaction selection screen on the display unit 2a, and stands by.

S104: The main control unit 12 that has recognized that the transaction selected by the customer is the payment transaction displays on the display unit 2a a payment transaction continuance confirmation screen shown in FIG. 6A on which are displayed a guidance message such as "I cannot accommodate withdrawals of 1,000 yen banknotes. I can only accommodate withdrawals in 10,000 yen bills. You can also deposit, in 1,000 yen bills, the difference with the withdrawal amount you desire and make a withdrawal in 10,000 yen banknotes. Would you like to continue with your transaction?", an "enter" button for continuing with the transaction and a "cancel" button

for canceling the transaction.

[0042] When the main control unit 12 recognizes that the customer has pressed the "enter" button, the processing advances to S105, and when the main control unit 12 recognizes that the customer has pressed the "cancel" button, the main control unit 12 cancels the transaction, displays the transaction selection screen on the display unit 2a, and stands.

S105: The main control unit 12 that has recognized that the customer has pressed the "enter" button displays on the display unit 2a the card insertion guidance screen shown in FIG. 5B on which are displayed a message prompting the customer to insert his/Tier cash card, an illustration of that cash card, and a "cancel" button for canceling the transaction.

[0043] The customer may insert his/her cash card into the card insertion/return slot 3a in accordance with the card insertion guidance screen. The main control unit 12 that has detected insertion of the cash card uses the card processing unit 3 to import the cash card and read the card information stored on the cash card such as the account number of the customer.

When the customer presses the "cancel" button, the main control unit 12 ends the payment transaction and advances processing to S1 (hereinafter, operation when the customer presses "cancel" button is the same, and if the cash card is inserted in the automated teller machine 1, the cash card is ejected and returned to the customer).

[0044] S106 and S107: These operations are the same as S5 and S6 in FIG. 3, so description thereof will be omitted.

S108: The main control unit 12 (the difference calculating section) that has detected that the customer has pressed the "enter" button determines whether the inputted payment amount is in 10,000 yen denominations or in 1,000 yen denominations, that is, whether or not the inputted payment amount is a payment amount requiring the withdrawal of low-denomination banknotes not stored in the safe deposit boxes. If the main control unit 12 has determined that the inputted payment amount is in 10,000 yen denominations, which can be withdrawn in only the high-denomination banknotes and which does not require the withdrawal of low-denomination banknotes, the processing advances to S116. If the main control unit 12 has determined that the inputted payment amount is in 1,000 yen denominations, which requires the withdrawal of low-denomination banknotes not stored in the safe deposit boxes, the processing advances to S109.

[0045] S109: When the main control unit 12 determines that the inputted payment amount is in 1,000 yen denominations, which requires the withdrawal low-denomination banknotes not stored in the safe deposit boxes, the main control unit 12 (the difference calculating section) calculates, as a deposit amount, the difference between the inputted payment amount and the lowest amount that exceeds the inputted payment amount and can be withdrawn in only the high-denomination banknotes which are capable of being withdrawn. Then, the

main control unit 12 displays on the display unit 2a a difference deposit guidance screen as shown in FIG. 6B on which are displayed a message prompting the customer to deposit that difference, an "enter" button for depositing the difference, and a "cancel" button for canceling the transaction.

[0046] For example, when the inputted payment amount is 17,000 yen, the main control unit 12 displays a message such as "Payment is 17,000 yen. If you deposit 3,000 yen, we may pay you in two 10,000 yen banknotes. Would you like to deposit 3,000 yen?" and prompts the customer to deposit 3,000 yen that is the difference between the inputted payment amount and 20,000 yen that is the lowest amount that exceeds the inputted payment amount and can be withdrawn in only the high-denomination banknotes capable of being withdrawn.

[0047] The main control unit 12 advances the processing to S110 when the main control unit 12 detects that the customer has pressed the "enter" button, and advances the processing to S115 when the main control unit 12 detects that the customer has pressed the "cancel" button.

S110: The main control unit 12 that has detected that the customer has pressed the "enter" button causes the unillustrated shutter of the banknote deposit/withdrawal slot 7a to open to thereby open the banknote deposit/withdrawal slot 7a and displays on the display unit 2a a banknote deposit guidance screen shown in FIG. 6C on which are displayed a message prompting the customer to deposit the banknotes, an illustration of those banknotes, and a "cancel button for canceling the transaction.

[0048] S111: The main control unit 12 that has detected that the customer has deposited the banknotes causes the unillustrated shutter of the banknote deposit/withdrawal slot 7a to close to thereby close the banknote deposit/withdrawal slot 7a, displays on the display unit 2a a standby screen shown in FIG. 6D on which are displayed a message instructing the customer to stand by and an animation, uses the single-banknote separation mechanism of the banknote deposit/withdrawal unit 7 to bring up the banknotes one-by one from the banknote deposit/withdrawal slot 7a, conveys the banknotes to the banknote discriminating section, discriminates the money denominations of those banknote, performs counting, conveys the banknotes to the temporary retention unit, and integrates the banknotes.

[0049] S112: When the main control unit 12 causes the banknotes to be integrated in the temporary retention unit, the main control unit 12 displays on the display unit 2a a counted amount verification screen shown in FIG. 6E on which are displayed a message instructing the customer to verify the counted amount, the counted amount indicating the result of counting the banknotes, an "enter" button for allowing the customer to proceed with deposit processing when the counted amount is the correct counted amount, a "stop" button for allowing the

customer to stop deposit processing when there is a mistake in the counted amount, and a "cancel" button for canceling the transaction.

[0050] S113: The main control unit 12 advances the processing to S116 when the main control unit 12 detects that the customer has pressed the "enter" button, and advances processing to S114 when the main control unit 12 detects that the customer has pressed the "stop" button.

S114: When the main control unit 12 detects that the customer has pressed the "stop" button, the main control unit 12 uses the single-banknote separation mechanism of the banknote deposit and withdrawal unit 7 to bring up the banknotes integrated in the temporary retention unit one-by-one, conveys the banknotes to the banknote deposit/withdrawal slot 7a, and uses the separation/integration mechanism to integrate those banknotes in the banknote deposit/withdrawal slot 7a.

[0051] The main control unit 12 displays on the display unit 2a a returned banknote acceptance request screen shown in FIG. 6F on which are displayed a message asking the customer to take the returned banknotes and an illustration of banknote and causes the unillustrated shutter of the banknote deposit/withdrawal slot 7a to open and thereby open the banknote deposit/withdrawal slot 7a.

The main control unit 12 that has opened the banknote deposit/withdrawal slot 7a waits and stands by for the customer to remove the banknotes integrated in the banknote deposit/withdrawal slot 7a, and when the main control unit 12 has detected removal of the banknotes, closes the shutter and thereby close the banknote deposit/withdrawal slot 7a. The main control unit 12 continues to stand by when the removal of the banknotes has not been detected.

[0052] S115: The main control unit 12 displays on the display unit 2a the card acceptance request screen shown in FIG. 5F on which are displayed a message prompting the customer to take his/her cash card and an illustration of the cash card, and the main control unit 12 ejects the cash card from the card processing unit 3. The main control unit 12 verifies that the customer has taken his/her cash card, ends payment transaction processing, returns to S1, displays the transaction selection screen on the display unit 2a, and stands by.

S116: The main control unit 12 asks the customer stand by for a moment by displaying on the display unit 2a the standby request screen shown in FIG. 5E on which are displayed a message asking the customer to stand by for a moment and an animation such as a product showcase, and the main control unit 12 performs intercommunication with the host computer. That is, the main control unit 12 attaches the inputted PIN number and payment amount to the card information of the cash card, creates an electronic transaction message, transmits the electronic transaction message via the communication line to the host computer, and asks whether or not there is no problem with the PIN number of the customer and the

payment amount.

[0053] The host computer that has received the electronic transaction message references the customer information the host computer manages to determine whether or not there is a problem (e.g., whether the payment amount is within the balance of the account), judges the propriety of the transaction, and transmits the result thereof as an electronic transaction propriety message to the automated teller machine 1.

S117: The main control unit 12 determines the propriety of the transaction of the customer on the basis of the electronic transaction propriety message received, advances the processing to S118 when the transaction is allowable, and advances the processing to S115 when the transaction is not allowable. When the transaction is not allowable and the customer has already deposited the difference, the main control unit 12 performs the return of the banknotes deposited in S114.

[0054] S118: The main control unit 12 that has determined that the transaction of the customer is allowable uses a storage mechanism of the banknote deposit and withdrawal unit 7 to cause the banknotes integrated in the temporary retention unit to be stored in the safe deposit boxes of the different money denominations while continuing to display the standby request screen.

S119: When the banknotes are stored in the safe deposit boxes, the main control unit 12 adds together the inputted payment amount and the difference-deposited deposit amount to calculate the withdrawal amount, selects banknotes of the money denominations corresponding to the withdrawal amount, uses the single-banknote separation mechanism of the banknote deposit and withdrawal unit 7 to bring up the banknotes one-by-one from the safe deposit boxes of the banknotes of those money denominations, conveys the banknotes to the banknote discriminating section, discriminates the money denominations of the banknotes, performs counting, conveys the banknotes to the banknote deposit/withdrawal slot 7a, and uses the separation/integration mechanism to integrate the banknotes corresponding to the withdrawal amount in the banknote deposit/withdrawal slot 7a.

[0055] For example, when the inputted payment amount is 17,000 yen and the difference-deposited deposit amount is 3,000 yen, the withdrawal amount is 20,000 yen, and the main control unit 12 integrates two 10,000 yen bills in the banknote deposit/withdrawal slot 7a.

S120 to S123: These operations are the same as S11 to S14 in FIG. 3, so description thereof will be omitted.

In this manner, even when the automated teller machine 1 has run out of 1,000 yen bills that are low-denomination banknotes stored in the safe deposit boxes, the automated teller machine 1 may perform payment transactions in 10,000 yen banknotes that are high-denomination banknotes.

[0056] In the present embodiment, the automated teller machine 1 has been described as performing payment transactions in high-denomination banknotes when low-

denomination banknotes stored in the safe deposit boxes has been run out. However, the automated teller machine 1 may also be configured to perform payment transactions in high-denomination coins when low-denomination coins stored in the safe deposit boxes has been run out. Further, the automated teller machine 1 may also be configured to perform payment transactions in withdrawable money such as high-denomination banknotes and high-denomination coins not only when low-denomination banknotes stored in the safe deposit boxes has been run out but also when there are few low-denomination banknotes stored in the safe deposit boxes and it cannot pay an inputted payment amount. At this time, the main control unit 12 determines whether or not it is possible to pay an inputted payment amount on the basis of the counters indicating the numbers of the banknotes of the different money denominations stored in the safe deposit boxes stored in the storage unit 10.

[0057] Moreover, in the present embodiment, the automated teller machine 1 has been configured such that the customer deposits, in banknotes, the difference between the inputted payment amount and the lowest amount that exceeds that inputted payment amount and can be withdrawn in only the high-denomination banknotes capable of being withdrawn. However, the automated teller machine 1 may also be configured such that the customer deposits the difference in coins.

That is, the automated teller machine 1 can also be configured such that the difference calculating section calculates, as a deposit amount, the difference between the inputted payment amount and a withdrawal amount that exceeds that payment amount and can be withdrawn in money (banknotes and/or coins) of money denominations capable of being withdrawn, and such that the banknote and coin deposit/withdrawal units perform deposit processing of money corresponding the calculated deposit amount and perform withdrawal processing of money corresponding to the withdrawal amount to thereby perform a payment transaction of the inputted payment amount. Thus, the automated teller machine 1 can perform payment transactions in high-denomination money even when low-denomination money cannot be withdrawn.

[0058] In the present embodiment, the automated teller machine 1 is configured to display the fact that payment to the customer is possible in two 10,000 yen bills if the customer deposits 3,000 yen with respect to the payment amount of 17,000 yen inputted by the customer. However, considering cases where the customer does not have 3,000 yen, as shown in FIG. 6G, the automated teller machine 1 can also be configured to display, for example, the three options of payment of 17,000 yen to be paid in two 10,000 yen bills if the customer deposits 3,000 yen, payment of 18,000 yen to be paid in two 10,000 yen bills if the customer deposits 2,000 yen, and payment of 19,000 yen to be paid in two 10,000 yen bills if the customer deposits 1,000 yen and to prompt the customer to make a election.

[0059] In the present embodiment, a case where there is a shortage in the number of the banknotes held inside the safe deposit boxes has been taken as an example and described, but the present invention can also be applied even in cases where the automated teller machine cannot perform withdrawal processing because the automated teller machine is not equipped with a withdrawal function.

For example, in an automated teller machine 1 that is equipped with a banknote deposit and withdrawal function and a coin deposit function but is not equipped with a coin withdrawal function, when the payment amount inputted by the customer is 17,100 yen, the automated teller machine 1 can be configured to perform the payment transaction if the customer deposits 900 yen in coins and withdraws 18,000 yen in one 10,000 yen bill and eight 1,000 yen bills. Further, in that automated teller machine 1, when the automated teller machine 1 cannot perform withdrawal processing of 1,000 yen bills and the payment amount inputted by the customer is 17,100 yen, the automated teller machine 1 can be configured to perform the payment transaction if the customer deposits 2,000 yen in banknotes, deposits 900 yen in coins, and withdraws 20,000 yen in two 10,000 yen bills.

[0060] As described above, in the present embodiment, the automated teller machine is configured such that, even when there is a shortage of money (banknotes and/or coins) of a money denomination needing to be withdrawn with respect to a payment amount desired by a customer, the automated teller machine performs deposit processing of the difference between the inputted payment amount and a withdrawal amount that exceeds that payment amount and can be withdrawn in money of a money denomination capable of withdrawal processing. Thus, withdrawal processing can be performed in withdrawable money, and payment transactions to pay payment amounts desired by customers can always be performed.

[0061] Further, the automated teller machine is configured such that, when there is a shortage of money of a money denomination needing to be withdrawn with respect to a payment amount desired by a customer, the automated teller machine performs deposit processing of money of the money denominations of which there is a shortage. Thus, it becomes unnecessary to urgently restock the money of which there is a shortage, and the customer is no longer made to wait until restocking of the money of which there is a shortage ends.

Claims

1. An automated teller machine that accepts operation by a customer and performs payment transactions and deposit transactions of money, the automated teller machine comprising:

an input unit that accepts input of a payment

amount of money by customer operation;
a deposit and withdrawal unit that performs deposit processing to store, in a safe deposit box, money that has been deposited into a deposit slot and withdrawal processing to pay out, to a withdrawal slot, money stored in different safe deposit boxes for different money denominations; and

a difference calculating section that calculates, as a deposit amount, the difference between the accepted payment amount and a withdrawal amount that exceeds the payment amount and that can be withdrawn in money of money denominations capable of being withdrawn, wherein the deposit and withdrawal unit performs deposit processing of money corresponding to the calculated deposit amount and performs withdrawal processing of money corresponding to the withdrawal amount and thereby performs a payment transaction for the inputted payment amount.

2. The automated teller machine according to claim 1, further comprising a storage unit that stores data indicating numbers of the money stored in the different safe deposit boxes of the different money denominations, wherein the difference calculating section calculates the deposit amount when the difference calculating section has determined that payment of money corresponding to the payment amount is impossible on the basis of the stored the data indicating numbers of the money of the different money denominations.
3. The automated teller machine according to claim 1, wherein the money that the deposit and withdrawal unit processes for withdrawal is money of a denomination higher than a denomination of the money that the deposit and withdrawal unit processes for deposit.
4. The automated teller machine according to claim 1, further comprising a display unit that displays a screen prompting the customer to deposit money into the deposit slot as well as displaying the deposit amount.
5. The automated teller machine according to claim 1, further comprising a display unit which, after the deposit and withdrawal unit has performed deposit processing of money corresponding to the deposit amount, displays a screen allowing the customer to select whether or not to proceed with withdrawal processing of money corresponding to the withdrawal amount.
6. An automated teller method that accepts operation by a customer and performs payment transactions

and deposit transactions of money, the automated teller method comprising:

accepting input of a payment amount of money
by customer operation; 5
calculating, as a deposit amount, the difference
between the accepted payment amount and a
withdrawal amount that exceeds the payment
amount and can be withdrawn in money of mon- 10
ey denominations capable of being withdrawn;
and
performing deposit processing of money corre-
sponding to the calculated deposit amount and
performing withdrawal processing of money cor- 15
responding to the withdrawal amount and there-
by performing a payment transaction for the in-
putted payment amount.

7. The automated teller method according to claim 6,
wherein the money processed for withdrawal is mon- 20
ey of a denomination higher than a denomination of
the money processed for deposit.
8. The automated teller method according to claim 6,
further comprising displaying a screen prompting the 25
customer to deposit money into the deposit slot as
well as displaying the deposit amount.
9. The automated teller method according to claim 7,
further comprising displaying, after deposit process- 30
ing of money corresponding to the deposit amount
has been performed, a screen allowing the customer
to select whether or not to proceed with withdrawal
processing of money corresponding to the withdraw- 35
al amount.

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50

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FIG.1

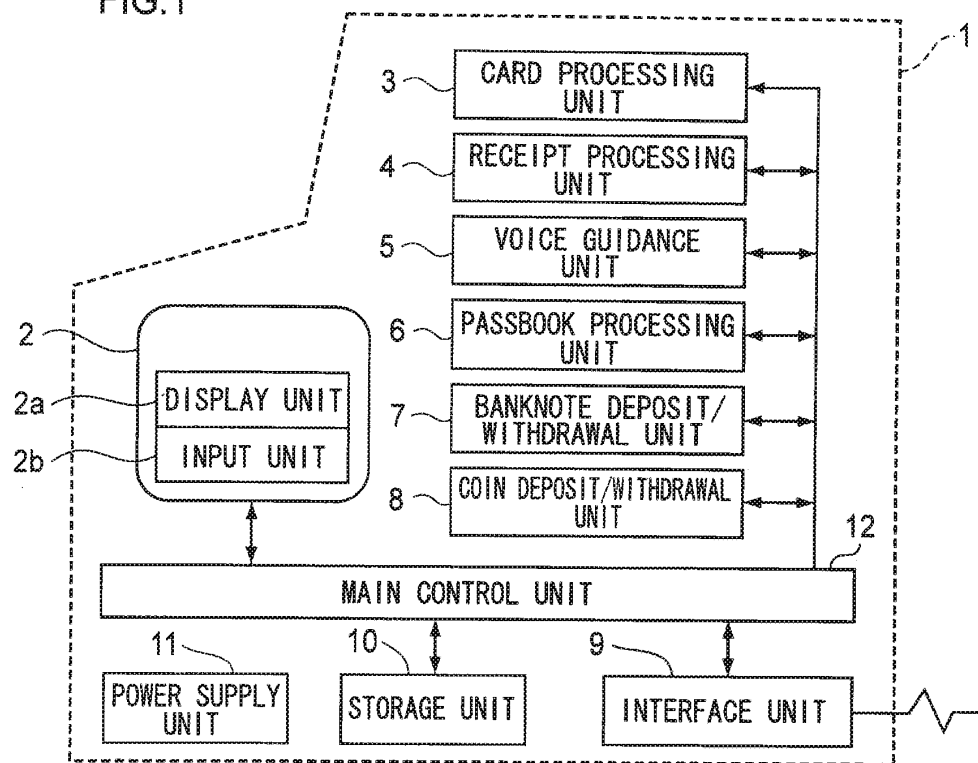


FIG.2

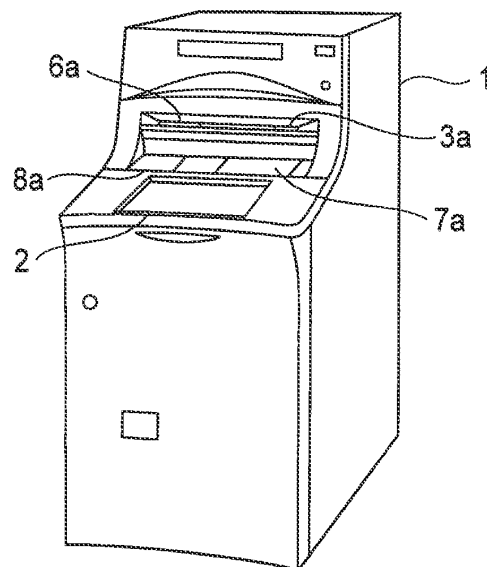


FIG.3

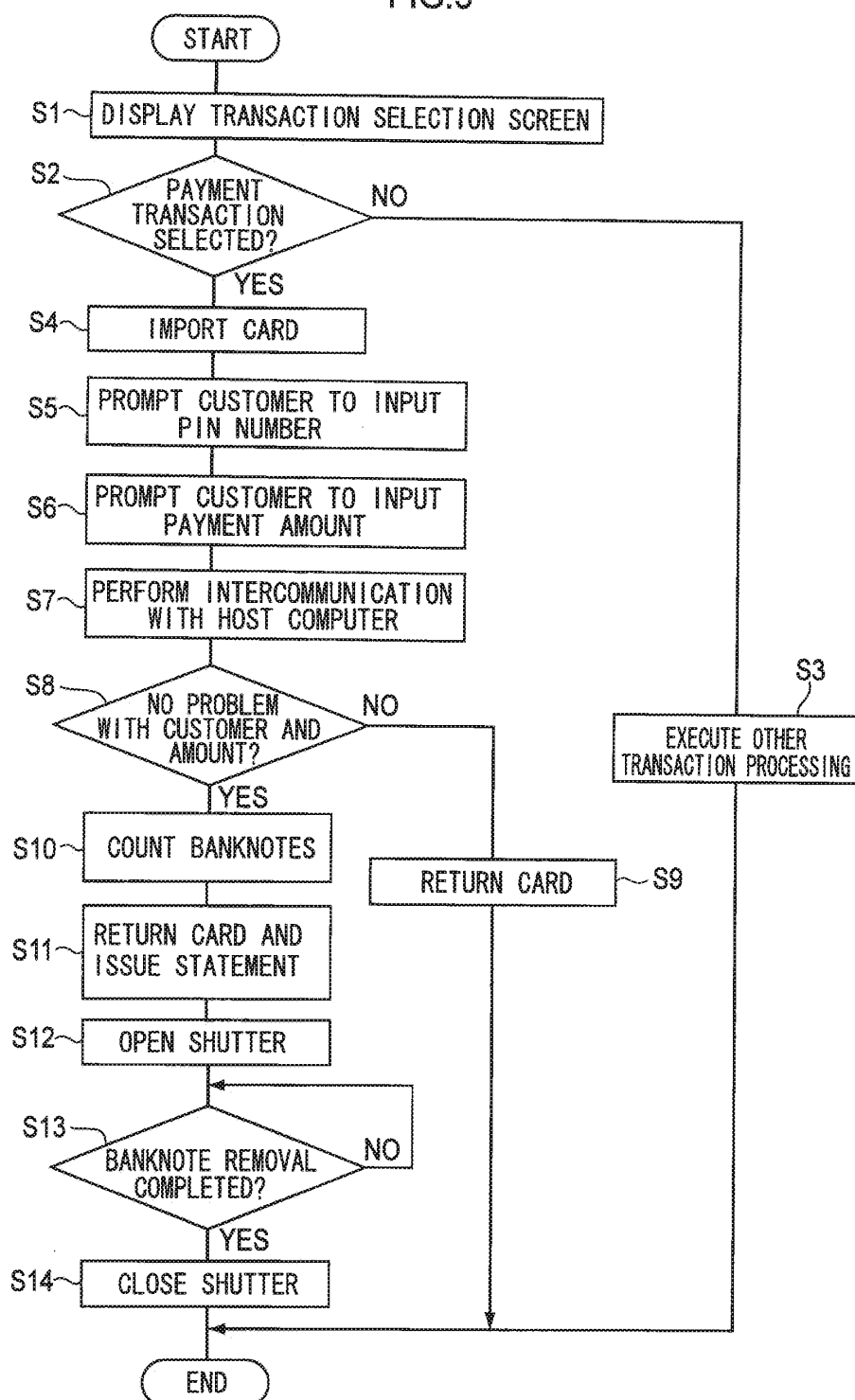


FIG.4

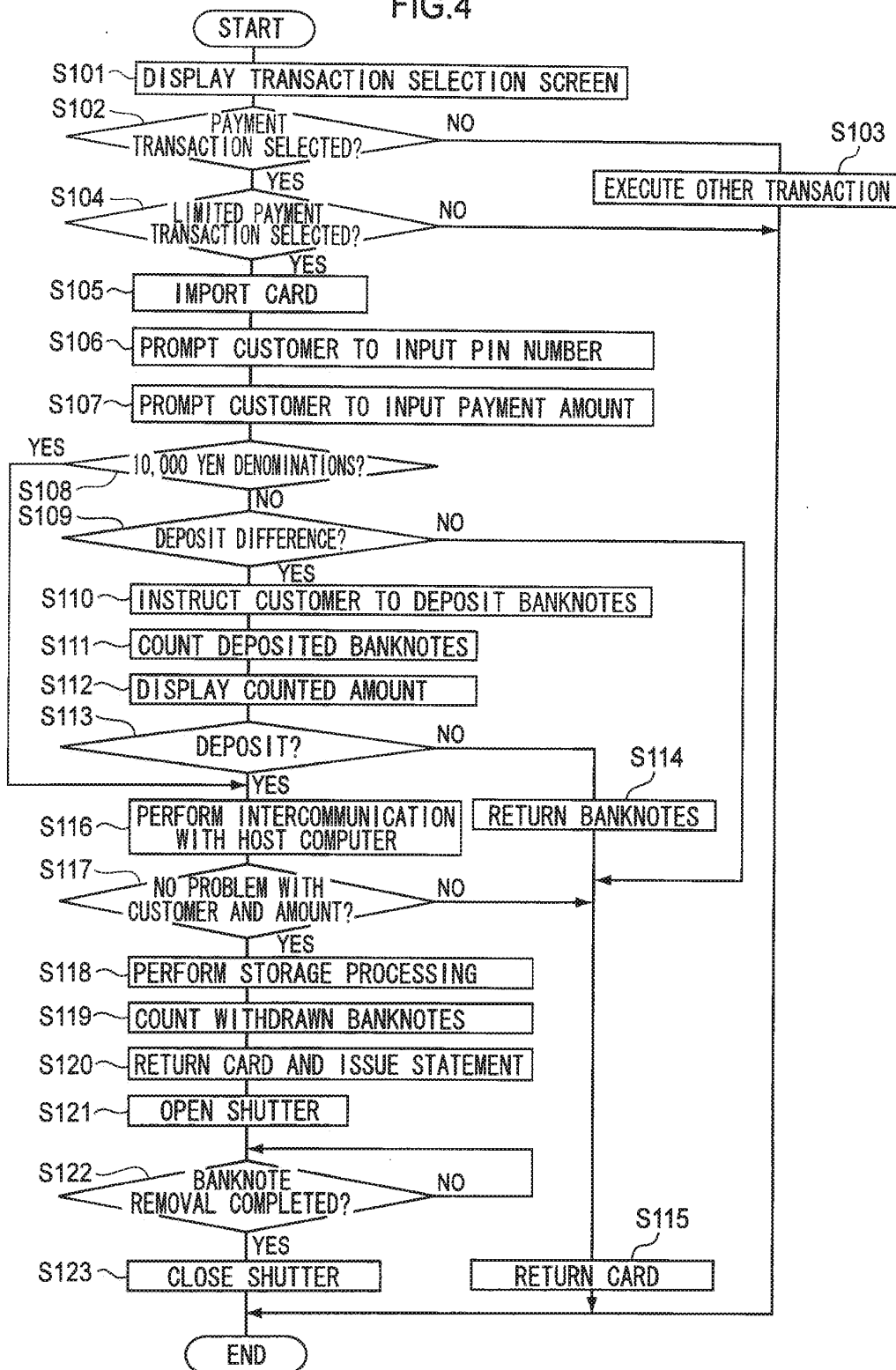


FIG.5A

WELCOME
PLEASE SELECT THE TRANSACTION YOU DESIRE.

ANIMATION	WITHDRAWAL	DIRECT BANK TRANSFER
	DEPOSIT	TRANSFER BETWEEN ACCOUNTS
	BALANCE INQUIRY	PASSBOOK ENTRY

FIG.5B

PLEASE INSERT YOUR CARD.

CANCEL

ILLUSTRATION

FIG.5C

PLEASE ENTER YOUR PIN NUMBER.

CANCEL

PIN NUMBER	1	2	3
	4	5	6
	7	8	9
	0	CORRECT	

ENTER

FIG.5D

CANCEL

PLEASE ENTER PAYMENT AMOUNT.

AMOUNT

¥00, 000

1	2	3	0
4	5	6	10,000
7	8	9	1,000
ENTER		CORRECT	

FIG.5E

PLEASE WAIT WHILE PROCESSING
YOUR TRANSACTION.

ANIMATION

FIG.5F

PLEASE TAKE YOUR CARD.

ILLUSTRATION

FIG.5G

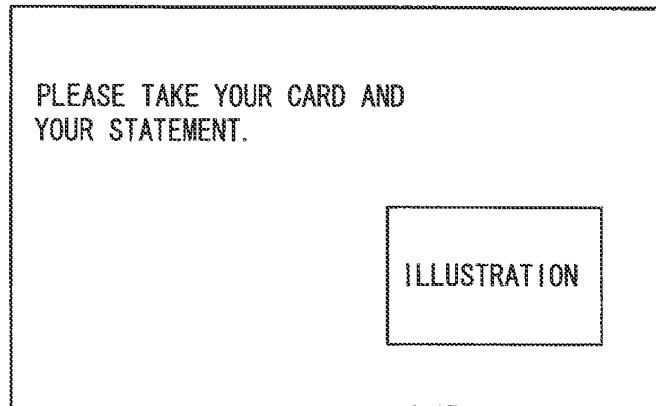


FIG.5H

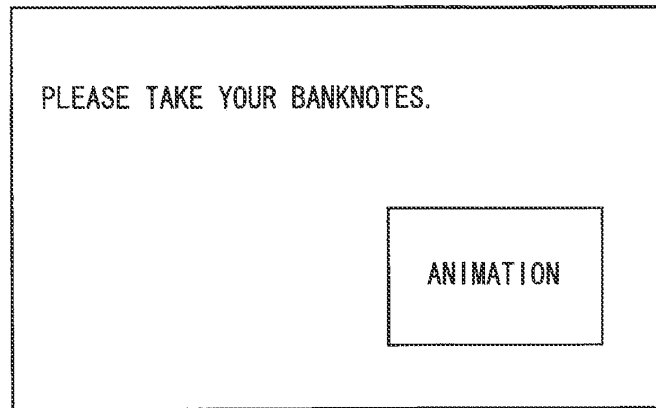


FIG.5 I

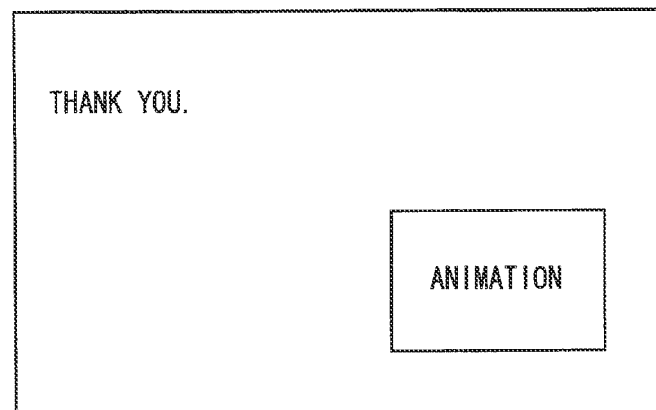


FIG.6A

WE CANNOT ACCOMMODATE WITHDRAWALS OF 1,000 YEN BANKNOTES.
 ONLY WITHDRAWALS IN 10,000 YEN BILLS ARE POSSIBLE.
 YOU CAN ALSO DEPOSIT, IN 1,000 YEN BILLS, THE DIFFERENCE WITH THE WITHDRAWAL AMOUNT YOU DESIRE AND RECEIVE A WITHDRAWAL IN 10,000 YEN BANKNOTES.
 WOULD YOU LIKE TO CONTINUE WITH YOUR TRANSACTION?

FIG.6B

PAYMENT IS 17,000 YEN, SO IF YOU DEPOSIT 3,000 YEN, PAYMENT IN TWO 10,000 YEN BANKNOTES IS POSSIBLE.
 WOULD YOU LIKE TO DEPOSIT 3,000 YEN?

FIG.6C

PLEASE ALIGN AND INSERT BANKNOTES.

BANKNOTE
ILLUSTRATION

FIG.6D

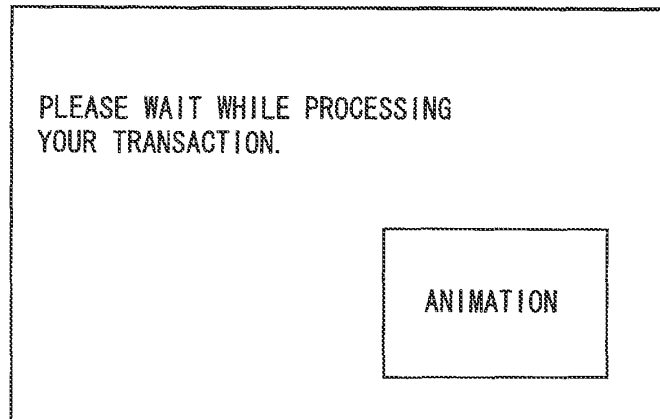


FIG.6E

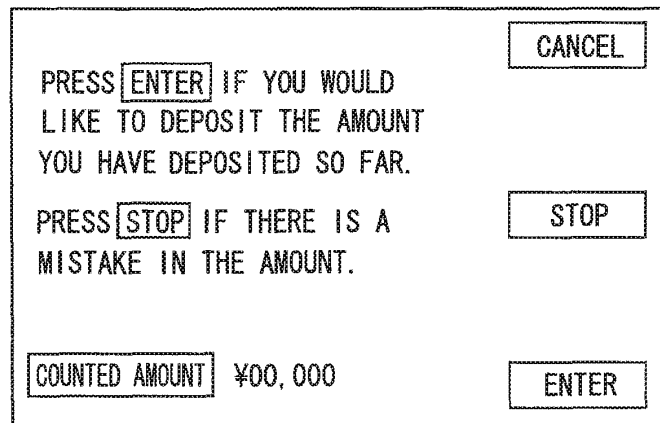


FIG.6F

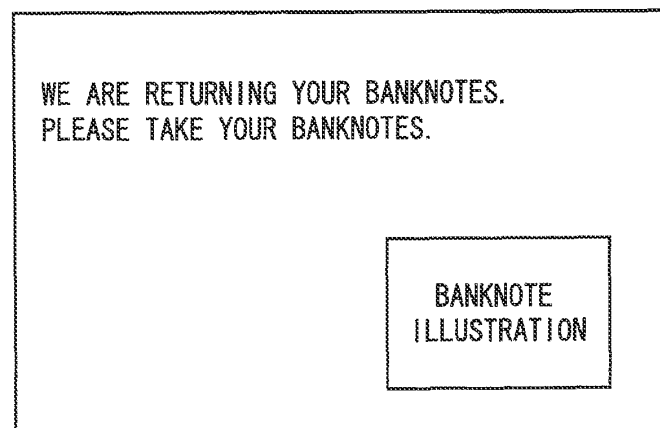


FIG.6G

PLEASE SELECT A PAYMENT METHOD.		CANCEL
A. IF YOU DEPOSIT 3,000 YEN, WE WILL PAY IN TWO 10,000 YEN BANKNOTES (WITHDRAWAL OF 17,000 YEN)		
B. IF YOU DEPOSIT 2,000 YEN, WE WILL PAY IN TWO 10,000 YEN BANKNOTES (WITHDRAWAL OF 18,000 YEN)		
C. IF YOU DEPOSIT 1,000 YEN, WE WILL PAY IN TWO 10,000 YEN BANKNOTES (WITHDRAWAL OF 19,000 YEN)		
A	B	C

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

G07D9/00(2006.01) i, G07D1/04(2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G07D9/00, G07D1/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2008
Kokai Jitsuyo Shinan Koho	1971-2008	Toroku Jitsuyo Shinan Koho	1994-2008

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 11-195159 A (Oki Electric Industry Co., Ltd.), 21 July, 1999 (21.07.99), Par. Nos. [0134], [0135] (Family: none)	1-9
Y	JP 7-105437 A (PFU Ltd.), 21 April, 1995 (21.04.95), Fig. 9 (Family: none)	1-9
Y	JP 2005-202638 A (Matsushita Electric Industrial Co., Ltd.), 28 July, 2005 (28.07.05), Par. Nos. [0026], [0028] (Family: none)	1-9

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search
24 October, 2008 (24.10.08)Date of mailing of the international search report
04 November, 2008 (04.11.08)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

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- JP 5054230 A [0003]