



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
16.03.2005 Bulletin 2005/11

(51) Int Cl.7: **G07D 11/00**

(21) Application number: **04021262.3**

(22) Date of filing: **08.09.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL HR LT LV MK

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(30) Priority: **10.09.2003 JP 2003318568**

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(54) **Paper money processor**

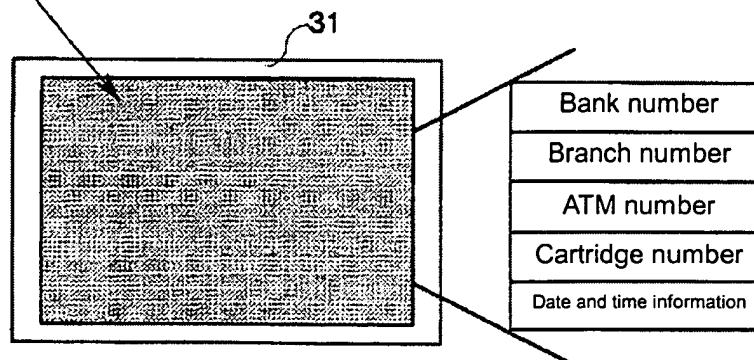
(57) A paper money processor is provided which can sufficiently suppress the cost and running cost for the main body of the processor, and can also indicate information enabling tracing of a person having inserted a counterfeit paper money when the counterfeit paper money is found.

An ATM houses a separator medium (31) with paper money management information written thereon in a cartridge at a predetermined time. This paper money

management information includes the time of housing of the separator medium (31) in the cartridge and processor identification information for specifying the main body of the processor. Therefore, when a counterfeit paper money is found among paper moneys taken out of the cartridge, it is possible to trace a person having inserted the counterfeit paper money by using the paper money management information written on the separator medium (31).

Fig. 3

Magnetic recording side



Description

BACKGROUND OF THE INVENTION

Technical Field

[0001] The present invention relates to a paper money processor for processing a paper money having been inserted into a slot, to house the paper money in a cartridge, and especially to a paper money processor for managing a paper money housed in the cartridge so that, when a counterfeit paper money is found among paper moneys housed in the cartridge, a person having inserted the counterfeit paper money can be traced.

Related Prior Art

[0002] Conventionally, a common automatic teller machine (ATM) comprises a deposit processing function where an amount of money corresponding to an amount of paper moneys inserted into the main body through a slot is deposited into a designated account. The ATM identifies in a paper money identifying section the kinds of respective paper moneys inserted into the slot to obtain a total amount of paper moneys inserted into the main body (deposit amount). In the identifying section, each inserted paper money is also identified as either genuine or counterfeit. The identifying section identifies whether an inserted paper money is genuine or not, using basic information registered by each kind of money. This basic information includes a characteristic amount of an image printed on a paper money and the size of the paper money and the like. The identifying section checks, against the basic information, a characteristic amount of an image printed on an inserted paper money, the size of the paper money and the like, which are subjected to identification, and identifies the paper money as genuine when a resultant similarity exceeds a predetermined threshold while, on the contrary, identifying the paper money as counterfeit when the resultant similarity does not exceed the predetermined threshold. A paper money identified as genuine in the identifying section is housed in a cartridge provided in the main body. Contrary to this, a paper money identified as counterfeit is not housed in the cartridge provided in the main body, but carried back to the slot so as to be returned to a user (person who inserted this paper money).

[0003] In the meantime, there are some cases where the identifying section erroneously identifies an ingenious counterfeit paper money as genuine. Although it is technically possible to completely eliminate the probability of occurring such erroneous identification, doing so may cause a large problem from the aspect of operating an ATM. Specifically, because even an extremely ingenious counterfeit paper money has some part different from a genuine paper money, the probability of occurring erroneous identification of a counterfeit paper money as genuine can be completely eliminated by set-

ting the threshold to substantially 100%. However, with the threshold increased, the probability of occurring erroneous identification of a genuine paper money as counterfeit increases. In particular, because an ATM handles paper moneys in circulation and many of paper moneys to be inserted in the main body thus have wrinkles or stains attached thereto, when the threshold is set to substantially 100%, those paper moneys may be identified as counterfeit although they are genuine, attributed to the wrinkles or stains thereon. In this case, only limited paper moneys, which have no wrinkle and no stain attached thereto, can be handled by an ATM, and the ATM thereby becomes appropriately inoperable. For this reason, the threshold is set to a value with which a genuine paper money having a certain degree of wrinkles or stains thereon is correctly identified as genuine. Therefore, on rare occasion, an ingenious counterfeit paper money is erroneously identified as genuine, as described above. In many cases, a counterfeit paper money erroneously identified as genuine is found when paper moneys housed in a cartridge are under close investigation.

[0004] As thus described, a counterfeit paper money is, although infrequently, erroneously identified as genuine, and the following techniques have accordingly been proposed in order to trace a person who inserted into an ATM a counterfeit paper money found: a technique of printing information such as the date and time of receipt on the edge of each paper money received as a genuine paper money, with a liniment mixed with a fluorescer having a short service time (Japanese Patent No. 3148917); and a technique of providing in a cartridge a memory section for associating to memorize a serial number of a paper money, the date and time of receipt, a user's ID, and the like, which are associated with each other (Japanese Laid-Open Patent Publication No. Hei 11-328493). Further, as a method for clearly distinguishing among paper moneys in each account, insertion of a separator card on (or under) a stack of paper moneys in each account has been proposed (Japanese Unexamined Patent Publication No. 2000-503956). On this separator card, information including account data and the number of paper moneys is written.

[0005] However, Japanese Patent No. 3148917 mentioned above has a problem that, since information such as the date and time of receipt is printed on the edge of each paper money received as a genuine paper money, the printing is time consuming and thus the time required for transaction processing (deposit processing) is increased, resulting in lowered process efficiency as well as significantly increased running cost due to the liniment used for the printing.

[0006] Japanese Laid-Open Patent Publication No. Hei 11-328493 mentioned above also has a problem that, since the memory section is provided in the cartridge, paper moneys needs to be handled while being kept housed in the cartridge even when corrected from

an ATM to be sent to a central bank or the like.

[0007] Furthermore, in such a method as proposed in Japanese Unexamined Patent Publication No. 2000-503956 where each separator card is inserted on (or under) a corresponding stack of paper moneys in each account, a great amount of separator cards are inserted into the cartridge to cause a significant decrease in total number of paper moneys that can be housed in the cartridge. This necessitates that a person in charge frequently replaces the cartridge or frequently takes out paper moneys and separator cards housed in the cartridge, causing a problem of increasing personnel cost. There is another problem that, because of the need for using a great amount of separator cards, the running cost significantly increases attributed to the cost for those separator cards.

DISCLOSURE OF THE INVENTION

[0008] It is an object of the present invention to provide a paper money processor which is readily handled, and capable of suppressing the number of separator mediums used, with paper money management information written thereon, and also capable of indicating information with which a person having inserted a counterfeit paper money can be traced when the counterfeit paper money is found, without increasing the processing time.

[0009] In order to solve the above-mentioned problems, the present invention comprises the following configurations:

(1) A paper money processor comprises: a carrying device for carrying a paper money having been inserted into the main body and a separator medium housed in a separator medium housing section, to be housed in a cartridge; and a management information writing device for writing, on the separator medium being carried by the carrying device, paper money management information for managing a paper money to be housed in the cartridge for housing the separator medium, the paper money processor comprising a controlling device for effecting the operations of the carrying device and the management information writing device at a predetermined time, to house in the cartridge the separator medium with paper money management information written thereon.

In this configuration, a separator medium is housed in a cartridge at a predetermined time. On this separator medium, paper money management information for managing a paper money housed in the cartridge has been written. The paper money management information may for example be the time when the separator medium was housed in the cartridge and processor information for specifying the main body of the processor (identification code of the main body of the processor). Since paper

moneys housed in the cartridge are separated by the separator medium which was housed at a predetermined time, when a counterfeit paper money is found among paper moneys taken out (together with the separator medium) from the cartridge for close investigation, paper money management information written on the separator medium indicates as to when and into which processor the counterfeit paper money was inserted. In a processor specified according to the paper money management information written on the separator medium, a log of transactions, such as deposit processing, during a specific time period is used to trace a person having inserted the found counterfeit paper money into the main body.

One separator medium is housed in the cartridge not in each transaction, but once in a day at a predetermined time, such as the time when the date changes, the operation initiating time or the operation terminating time of a day in a processor with the main body applied thereto, or a time period between the operation initiating time and the first transaction initiating time of a day in the same processor; or a separator medium is housed in every one hour (at the beginning of every hour). This enables suppression of the number of separator mediums to be housed in the cartridge, thereby suppressing the number of separator mediums necessary while preventing a significant decrease in total number of paper moneys that can be housed in the cartridge. Since it is neither necessary that a person in charge frequently replace the cartridge or frequently take out paper moneys housed in the cartridge nor that a great amount of separator mediums be used, the running cost can be kept sufficiently low.

(2) The controlling device cancels housing of a new separator medium in the cartridge when the cartridge has housed no paper money at a predetermined time since housing of a previous separator medium.

In this configuration, housing of a new separator medium in the cartridge is cancelled when the cartridge has housed no paper money since housing of a previous separator medium. This can prevent the separator mediums from being housed one upon another in the cartridge so that the number of separator medium necessary can further be suppressed.

It is to be noted that the cancellation of housing of a new separator medium would not cause a problem because no paper money has been housed in the cartridge since the housing of the previous separator medium and thus no counterfeit paper money could be found among paper moneys transacted during the time from the housing of the previous separator medium to this point (when housing of a new separator medium is cancelled).

(3) A paper money processor comprises: a carrying device for carrying a paper money having been inserted into the main body and a separator medium housed in a separator medium housing section, to be housed in a cartridge; and a management information writing device for writing, on the separator medium being carried by the carrying device, paper money management information for managing paper money to be housed in the cartridge for housing the separator medium, the paper money processor comprising a controlling device for effecting the operations of the carrying device and the management information writing device when the number of paper moneys which have been housed in the cartridge since housing of a previous separator medium exceeds a fixed number, to house in the cartridge the separator medium with paper money management information written thereon.

In this configuration, since a separator medium is housed in a cartridge every time the number of paper moneys housed in the cartridge exceeds a fixed number, it is neither necessary that a person in charge frequently replace a cartridge or frequently take out paper moneys housed in a cartridge nor that a great amount of separator mediums be used, and thereby the running cost can be kept sufficiently low, as in (1) above.

(4) The paper money processor comprises: an identifying device for identifying the kind of paper money being carried by the carrying device; wherein the cartridges are provided by kind of money; the carrying device switches carriage paths according to the kind of money identified by the identifying device to house a paper money having been inserted into the main body in the cartridge for the corresponding kind of money; the controlling device effects the operations of the carrying device and the management information writing device to house in each of the cartridges the separator medium with the paper money management information written thereon.

In this configuration, since the separator medium is housed in each of the cartridges for housing a paper money by kind, whatever kind of counterfeit paper money is found, it is possible to identify as to what time of a day and into which processor this counterfeit paper money was inserted.

(5) The paper money processor comprises: an identifying device for identifying the kind of paper money being carried by the carrying device; wherein the cartridge houses a paper money found defective as a result of identification of the kind of money by the identifying device.

In this configuration, a paper money the kind of which could not be identified in the identifying section, i.e. a paper money suspected of being a counterfeit paper money, is housed in a specific cartridge and the separator medium is housed in this cartridge at a predetermined time or every time a fixed

number of paper moneys are housed.

(6) The paper money processor comprises: a user-specific information acquiring device for acquiring user-specific information to specify a user having inserted a paper money into the main body; and an outputting device for outputting the user-specific information acquired by the user-specific information acquiring device, associated with paper money information on the paper money inserted by this user into the main body.

[0010] In this configuration, the user-specific information acquiring device acquires information for specifying a user having inserted a paper money, such as an account number designated in deposit processing, and the outputting device outputs this information, associated with paper money information on the paper money inserted by this user (e.g. information obtained in identification, the number of paper moneys inserted by kind) and the like. Therefore, when a counterfeit paper money is found, a user having inserted this counterfeit paper money can be specified with ease by using information output by this outputting device.

[0011] As thus described, according to the present invention, it is possible to indicate information which allows tracking of a person having inserted a counterfeit paper money when the counterfeit paper money is found. It is also possible to suppress the number of separator mediums to be housed in a cartridge, and to prevent significant reduction in total number of paper moneys that can be housed in the cartridge due to an increase in number of separator mediums. Hence it is not necessary for a person in charge to frequently replace the cartridge, thereby enabling suppression of personnel cost.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Fig. 1 shows a diagram showing a configuration of a main part of an ATM to which a paper money processor according to the present invention is applied. Fig. 2 shows a diagram showing an internal configuration of this ATM.

Fig. 3 shows a diagram showing a separator medium.

Fig. 4 shows a flowchart showing operation of an ATM in this embodiment.

Fig. 5 shows a flowchart showing deposit processing.

Fig. 6 shows a flowchart showing processing of housing separator mediums.

Fig. 7 shows a flowchart showing processing of housing separator mediums according to another embodiment.

Fig. 8 shows a flowchart showing operation of an ATM in another embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] In the following, a paper money processor as an embodiment of the present invention is described.

[0014] Herein, an embodiment where a paper money processor according to the present invention is applied to an ATM (automatic teller machine) is described as an example. Fig. 1 shows a block diagram showing a configuration of a control system of a main part of an ATM in this embodiment. In Fig. 1, reference numeral 1 denotes an ATM of the present embodiment; and reference numeral 2 denotes a controlling section for controlling the operation of the ATM 1. Reference numeral 3 denotes an operating section with which the user conducts an operation for input into the main body of the ATM 1; reference numeral 4 denotes an indicating section for indicating operation guidance and the like to the user; and reference numeral 5 denotes a card/bankbook processing section for receiving and processing a card or a bankbook owned by the user. Reference numeral 6 denotes a paper money identifying section for identifying a paper money; reference numeral 7 denotes a management information writing section for writing paper money management information on a later-mentioned separator medium 31; reference numeral 8 denotes a carrying section for carrying a paper money and the separator medium 31, to be housed in a cartridge; and reference numeral 9 denotes an outputting section for sending a description of a transaction processed with input from the user to a higher-level processor (not shown).

[0015] It is to be noted that the ATM 1 of the present embodiment can handle hard moneys as well as paper moneys, as can be done by a known processor, and also comprises a hard money identifying section and the like for identifying a hard money, but those sections are not particularly shown in the drawing.

[0016] The controlling section 2 comprises a memory for temporarily memorizing data produced during an operation, a timer for keeping the current time and the like. The operating section 3 is constituted, for example, of a touch panel disposed on the screen of the indicating section 4. The card/bankbook processing section 5 comprises a reading section for reading information, such as an account number being recorded on a card and a bankbook inserted from a card slot and a bankbook slot (not shown) into the main body, and a printing section for printing a transaction description and the like on the inserted bankbook. The paper money identifying section 6 identifies each paper money received and paid out as whether it is genuine or counterfeit and also identifies the kind of each paper money (one thousand yen, five thousands yen, ten thousands yen or the like). The paper money identifying section 6 memorizes information including the size, as well as a characteristic amount of an image, of each kind of genuine paper money, as basic information. The carrying section 8 carries a paper

money and the separator medium 31 along a carriage path, to be housed in a corresponding cartridge and the like. The outputting section 9 associates, in terms of a transaction processed with input from a user, the transaction date, a user's account number (this corresponds to user-specific information as referred to in this invention), the kind of transaction, and an amount of money transacted, and then sends the associated information to the higher-level processor. When the kind of transaction is a deposit transaction, a characteristic amount of an image and other information of each of the paper moneys having been inserted into the main body by the user, obtained in identification by the paper money identifying section 6, are sent to the higher-level processor as paper money information. The higher-level processor manages an account of each user on the basis of information sent from the ATM 1.

[0017] Fig. 2 shows a diagram showing a configuration of a carriage system according to a paper money transaction of the ATM 1. Fig. 2 does not particularly show a configuration of processing of a card and a bankbook which were inserted by a user, or the like. In Fig. 2, reference numeral 11 denotes a paper money slot, into which the user inserts a paper money, and down below the paper money slot 11, a paper money receiving section 12 is disposed for receiving an inserted paper money. The paper money receiving section 12 is configured such that: when the user inserts a paper money, an opening of the paper money receiving section 12 is in the state of facing the paper money slot 11, as indicated by a solid line in Fig. 2; when a cover disposed at the paper money slot 11 is closed, the paper receiving section 12 turns so that the opening thereof faces a carriage path 30, as indicated by a broken line in Fig. 2, to forward the inserted paper money to the carriage path. Reference numeral 13 denotes a separator medium housing section for housing the separator medium 31. This separator medium housing section 13 can house a plurality of separator mediums 31 in lamination. Reference numeral 14 denotes a front/rear side reversing section for reversing the front and rear sides of a paper money being carried along the carriage path 30 by a known switchback system, and this allows the cartridge to house paper moneys all in the same orientation. Reference numeral 15 denotes a temporary holding section for temporarily holding a paper money, and reference numeral 16 is a holding-for-return section for temporarily holding a paper money to be returned to the user. Reference numerals 17 to 19 denote cartridges for housing paper moneys by kind: the cartridge 17 houses a ten thousands yen note; the cartridge 18 houses a five thousands yen note; and the cartridge 19 houses a one thousand yen note. Further, reference numeral 20 denotes a transaction system correcting section for correcting a paper money which was once received as genuine and then found defective as a result of second identification in the identifying section 6. That a paper money was found defective as a result of identification device that

a paper money was not identified as genuine in the paper money identifying device 6, and does not mean that all such paper moneys are counterfeit. There are some cases where a genuine paper money is found counterfeit as a result of identification attributed to wrinkles or stains on the paper money. Reference numeral 21 denotes a supplement system collecting section for collecting a paper money which was supplemented and then found defective as a result of identification in the identifying section 6; reference numeral 22 denotes a forgotten paper money collecting section for collecting a paper money forgotten to be taken out; and reference numeral 23 denotes an operation cartridge for distributing, closely investigating and collect processing a paper money.

[0018] As shown in Fig. 2, the paper money receiving section 12, the separator medium housing section 13, the front/rear side reversing section 14, the temporary holding section 15, the holding-for-return section 16, the cartridges 17 to 19 by kind of paper money, the transaction system correcting section 20, the supplement system collecting section 21, the forgotten paper money collecting section 22, the operation cartridge 23, the paper money identifying section 6 and the management information writing section 7 are connected with a loop carriage path 30. A paper money inserted from the paper money slot 11 into the paper money receiving section 12 passes through the paper money identifying section 6 and the management information writing section 7 in this order, along the carriage path 30, to be housed in one of the cartridges 17 to 19 for the corresponding kind of money, or the like. The management information writing section 7 does not write management information on the paper money. The separator medium 31 housed in the separator medium housing section 13 passes through the paper money identifying section 6 and the management information writing section 7 in this order, to be housed in one of the cartridges 17 to 19 for the corresponding kind of money, or the like. The management information writing section 7 writes management information on the separator medium 31 being carried along the carriage path 30. Further, the separator medium 31 is housed in one of the cartridges 17 to 19 for the corresponding kind of money, or the like, without being affected by a result of identification in the paper money identifying section 6.

[0019] Fig. 3 shows a separator medium to be housed in a separator medium housing section. The separator medium 31 is slightly larger than a predetermined size, e.g. the size of a ten thousands yen note, and a magnetic recording side for recording magnetic data is formed on one face thereof. Further, the separator medium 31 has a thickness substantially the same as that of a paper money. The management information writing section 7 has a magnetic head with which paper money management information is written on the magnetic recording side. Paper money management information to be written on the separator medium 31 by the manage-

ment information writing section 7 includes: a bank number and a branch number for identifying a bank and a branch of the bank where the ATM 1 is installed; an ATM number for identifying the ATM 1; a cartridge number for identifying a cartridge housing this separator medium 31; and the date and time information for indicating the date and time when the separator medium 31 is housed in the cartridge.

[0020] It is to be noted that, although the separator medium 31 here has a magnetic recording side, it may be a slip of paper without a magnetic recording side. In this case, the management information writing section 7 may be configured such that paper money management information is written on a separator medium, using letters, bar codes or the like, or that management information is written with punch holes.

[0021] The separator medium 31 having a magnetic recording side is repeatedly usable by rewiring management information and thus advantageous in cost performance.

[0022] Next, the operation of the ATM 1 according to the present embodiment is described. Fig. 4 shows a flowchart showing the operation of the ATM. In this ATM 1, the separator medium 31 is housed in each of the cartridges 17 to 19 by kind of money at a predetermined time. The ATM 1 waits for the timing for housing the separator medium 31 in the cartridges 17 to 19 while waiting for a transaction request from a user (s1, s2). Examples of the timing to house the separator medium 31 in the cartridges 17 to 19 include: the time when the date changes (0:00 a.m. each day), the operation initiating time of a day (8:00 a.m. each day, or the like) in a processor with the main body applied thereto, the operation terminating time of a day (1:00 p.m. each day, or the like.) in the same processor, a time period between the operation initiating time and the first transaction initiating time of a day (e.g. 8:00 a.m. to 8:45 a.m. each day, or the like) in the same processor, and every one hour (the beginning of each hour), and this timing is previously set. When a transaction is requested, the ATM 1 processes a transaction of the kind requested (s3). Further, at the timing to house the separator medium 31 in the cartridges 17 to 19, the ATM 1 implements processing of housing a separator medium to house the separator medium 31 in the cartridges 17 to 19.

[0023] The operation of the ATM 1 in the case where the transaction requested in s1 is a deposit transaction is described. Fig. 5 shows a flowchart showing deposit processing in the ATM of the present embodiment. The ATM 1 receives a user's card or bankbook in the card/bankbook processing section 5 to acquire a user's account number (s11). The user's account number as acquired will be used as what is referred to in this invention as user-specific information. A user inserts paper moneys to be deposited from the paper money slot 11 into the paper money receiving section 12, and closes the cover of the paper money slot 11. As the cover of the paper money slot 11 is closed, the ATM 1 picks up the

paper moneys inserted into the paper money receiving section 12 one by one, and carries each of them along the carriage path 30. The ATM 1 identifies the picked-up paper moneys one by one in the paper money identifying section 6 (s 12, s13). The paper money identifying section 6 reads an image of each of the paper moneys being carried and checks the characteristic amount of the image read here against a characteristic amount of an image of a paper money previously registered by kind of money, to calculate a similarity. When the calculated similarity exceeds a predetermined threshold, the paper money is identified as genuine; when it is below the predetermined threshold, the paper money is identified as counterfeit.

[0024] The ATM 1 temporarily houses in the temporary holding section 15 a paper money found genuine as a result of identification in the paper money identifying section 6, while housing in the holding-for-return section 16 a paper money found defective as a result of identification in the paper money identifying section 6. The ATM 1 identifies in the paper money identifying section 6 all the paper moneys inserted into the paper money receiving section 12 by the user, and if any paper money is housed in the holding-for-return section 16, the ATM 1 carries this paper money to the paper money receiving section 12 so as to be returned to the user.

[0025] The ATM 1 indicates in the indicating section 4 a total amount of paper moneys held in the temporary holding section 15, to allow the user to confirm a deposit amount (s14). If the user conducts an input operation for canceling the transaction, the ATM 1 carries all the paper moneys being held in the temporary holding section 15 to the paper money receiving section 12 so as to be returned to the user, and implements canceling processing for canceling the transaction (s15, s18).

[0026] When the user confirms a deposit amount in s13, the ATM 1 implements deposit processing for depositing the confirmed deposit amount into the user's account whose number was acquired in s11 (s16). The ATM 1 picks up the paper moneys held in the temporary holding section 15 one by one, and identifies them again in the paper money identifying section 6, to be housed in the cartridges 17 to 19 for the corresponding kinds of paper moneys. Specifically, a ten thousands yen note, a five thousands yen note and a thousand yen note are housed in the cartridges 17, 18 and 19, respectively. Further, if there is a paper money found defective as a result of identification in the paper money identifying section 6, the paper money was housed in the transaction system correcting section 20. After implementing the deposit processing according to s15, the ATM 1 prints a transaction description on the bankbook, and then returns the bankbook to the user. At this time, the card is also returned to the user.

[0027] It should be noted that, if the user has not inserted a bankbook into the main body, a bill with the transaction description printed thereon is issued, and if the user has not inserted a card, there is no operation

of returning a card.

[0028] The ATM 1 further sends transaction information on the present deposit transaction from the outputting section 9 to the higher-level processor, the transaction information including the characteristic amount of the image of each of the paper moneys inserted from the paper money inlet 11 by the user (user-specific information as referred to in this invention), which was used in identification in the paper money identifying section 6 (s17). This transaction information includes the user's account number (user-specific information as referred to in this invention) acquired in s11, a deposit amount in this deposit transaction, a bank number and a branch number of a bank and a branch thereof installing the ATM 1 where the deposit transaction has been conducted, an ATM number for identifying the ATM 1, the date and time when the deposit transaction is conducted.

[0029] The higher-level processor accumulatively memorizes pieces of transaction information sent from the ATM 1, and manages each account by device of such transaction information.

[0030] As thus described, the ATM 1 of the present embodiment sends transaction information (transaction description) to the higher-level processor every time a transaction is conducted with the user. Since the information sent at this time includes a characteristic amount of an image of each of the paper moneys inserted by the user, which was used in identification in the paper money identifying section 6, when a counterfeit paper money is found, the information can be utilized for specifying a user having inserted the counterfeit paper money, as described later.

[0031] It is to be noted that, although the ATM 1 herein sends a transaction description to the higher-level processor every time a transaction is conducted, the ATM 1 may be provided with a memory section for memorizing descriptions of a plurality of transactions, and when the memorizing area in the memory section is filled to capacity, the ATM 1 may send descriptions of transactions in bulk to the higher-level processor.

[0032] When the ATM 1 determines in s2 that the timing has come for housing the separator medium 31 in the cartridges 17 to 19, it implements processing of housing a separator medium, as shown in Fig. 6. The timing to house the separator medium 31 is previously set, and it may be either once in a day or more than once in a day.

[0033] The ATM 1 picks up the separator medium 31 from the separator medium housing section 13, to be housed in the cartridge 17 for housing a ten thousands yen note (s21). The separator medium 31 picked up here is carried along the carriage path 30 via the paper money identifying section 6 to reach the management information writing section 7. The management information writing section 7 writes on the magnetic recording side of the separator medium 31 a bank number and a branch number of a bank and a branch of the bank

where the ATM is installed, an ATM number for identifying the ATM 1, a cartridge number for identifying a cartridge to house the separator medium 31, and the time and date when the separator medium 31 is housed in the cartridge (the current time and date), as paper money management information (s22). The separator medium 31 with paper money management information written thereon is carried along the carriage path, to be housed in the cartridge 17 for housing a ten thousands yen note (s23). Next, the separator medium 31 to be housed in the cartridge 18 for housing a five thousands yen note is picked up from the separator medium housing section 13 and, by implementing the same processing as above, this separator medium is housed in the cartridge 18 for housing a five thousands yen note (s24 to 26). Further, the separator medium 31 to be housed in the cartridge 19 for housing a one thousand yen note is picked up from the separator medium housing section 13 and, by implementing the same processing as above, this separator medium is housed in the cartridge 19 for housing a one thousand yen note (s27 to 29).

[0034] Since the ATM 1 houses the separator medium 31 with management information written thereon in the cartridges 17 to 19 at a predetermined time, as thus described, paper moneys housed in the cartridges 17 to 19 are separated by the separator medium 31 by time period of housing. Further, the time period of housing and the like can be specified based on paper money management information written on the separator medium 31 separating the paper moneys. It is therefore possible, in the case where a person in charge finds a counterfeit paper money among a stack of paper moneys taken out of the cartridges 17 to 19, to identify which bank/branch installs the ATM 1, which is the ATM 1 among the ATM's installed in the above bank branch, and when the counterfeit paper money found was inserted in the ATM 1, by reading management information written on the separator medium 31 separating the paper moneys including the counterfeit paper money. Moreover, since transaction information to be sent to the higher-level processor by the ATM 1 in the above-mentioned deposit processing includes the characteristic amount of the image of each of the paper moneys, which was used in identification in the paper money identifying section 6, it is possible to specify a user (actually a user's account number in this case) having inserted the counterfeit paper money into the ATM 1, by checking the characteristic amount of the image of the found counterfeit paper money against the characteristic amount of the image of the paper money, which was used in the identification and is included in the transaction information managed by the higher-level processor money.

[0035] Further, because of the configuration of the separator medium 31 that it is housed in the cartridges 17 to 19 not in every transaction with a user, but at a predetermined time, the number of separator mediums 31 to be housed in the cartridges 17 to 19 can be suppressed. This can prevent significant reduction in total

number of paper moneys that can be housed in the cartridges 17 to 19. Hence there is no need for a person in charge to frequently replace the cartridges 17 to 19 and to frequently take out paper moneys housed in the cartridges 17 to 19, thereby suppressing personnel cost and the required number of separator mediums 31, so that the running cost can sufficiently be suppressed.

[0036] It should be noted that, although the separator mediums 31 are housed in the respective cartridges 17 to 19 at the same timing in the above embodiment, the separator mediums 31 may be housed in the respective cartridges 17 to 19 at different timings. In other words, the timing to insert the separator medium 31 can be set separately in the respective cartridges 17 to 19. In this case, the time interval between insertion of a previous separator medium 31 and insertion of a new separator medium 31 may be set differently in the respective cartridges 17 to 19. For example, because a counterfeit ten thousands yen note is found with relatively a high frequency, several separator mediums 31 may be inserted each day in the cartridge 17 for housing a ten thousands yen note, while one separator medium 31 may be inserted each day in each of the cartridges 18 and 19.

[0037] Moreover, although the separator medium 31 is housed in the cartridges 17 to 19 in the present embodiment, the separator medium 31 may be housed in another housing section, such as the transaction system correcting section 20 or the like where a paper money inserted by the user from the paper money slot 11 is housed. In particular, since the transaction system correcting section 20 collects a paper money once received as genuine and then found defective as a result of second identification in the paper money identifying section 6, this section has a higher possibility of housing a counterfeit paper money than the other cartridges, and therefore housing of the separator medium in the transaction system correcting section 20 is effective in tracing a user having inserted a counterfeit paper money.

[0038] Furthermore, as shown in Fig. 7, s31, s32 and s33 may be provided for preventing the separator mediums 31 from being housed one upon the other in the cartridges 17 to 19. s31, s32 and s33 are steps for determining whether a paper money was housed in the cartridges 17 to 19 during a period from housing of a previous separator medium 31 to the current time, and if no paper money was housed in the cartridge 17, 18 or 19 during the period between the housing of the previous separator medium 31 to the current time, housing of the separator medium 31 in this cartridge is cancelled. This permits further suppression of the number of separator mediums 31 to be housed in each of the cartridges 17 to 19, thereby further reducing the running cost.

[0039] It is to be noted that the cancellation of housing of the separator medium 31 should cause no problem because no counterfeit paper money can be found among paper moneys processed during a period from the housing of the previous separator medium 31 to this time (the time when housing of the separator medium

31 is cancelled).

[0040] Further, although the separator medium 31 is housed in the cartridges 17 to 19 at a predetermined time in the above embodiment, the separator medium 31 may be housed again when a fixed number of paper moneys are housed after the housing of the previous separator medium 31. In this case, the processing shown in Fig. 4 may be replaced by the processing shown in Fig. 8.

[0041] The ATM 1 waits for a transaction request from a user (s41), and then conducts processing of the requested transaction (s42). In s42, for example, the deposit processing shown in Fig. 5 is implemented. After completing the processing of the required transaction in s42, the ATM 1 determines, as for each of the cartridges 17 to 19 and the transaction system correcting section 20, whether the number of paper moneys housed after the housing of the previous separator medium 31 has reached a fixed number (s43).

[0042] It should be noted that the ATM 1 counts the number of paper moneys housed after the housing of the previous separator mediums 31 in each of the cartridges 17 to 19 and the transaction system correcting section 20. Each of the counted numbers is reset when a new separator medium 31 is housed.

[0043] As for each of the cartridges 17 to 19 and the transaction system correcting section 20, the ATM 1 houses a new separator medium 31 when determining that the number of paper moneys housed after the housing of the previous separator medium 31 has reached a fixed number (s44). In this case, the same effect as in the above embodiment is exhibited.

Claims

1. A paper money processor, comprising:

a carrying device for carrying a paper money having been inserted into the main body and a separator medium (31) housed in a separator medium housing section (13), to be housed in a cartridge (17) - (19); and
a management information writing device for writing, on the separator medium (31) being carried by the carrying device, paper money management information for managing a paper money to be housed in the cartridge (17)-(19) for housing the separator medium (31),
the paper money processor comprising a controlling device for effecting the operations of the carrying device and the management information writing device at a predetermined time, to house in the cartridge (17)-(19) the separator medium (31) with paper money management information written thereon.

2. The paper money processor according to claim 1,

wherein the predetermined time is the time when the date changes.

3. The paper money processor according to claim 1, wherein the predetermined time is the operation initiating time or operation terminating time of a day in a processor with the main body applied thereto.
4. The paper money processor according to claim 1, wherein the predetermined time is a time period between the operation initiating time and the first transaction initiating time of a day in a processor with the main body applied thereto.
5. The paper money processor according to any of claims 1 to 4, wherein the controlling device cancels housing of a new separator medium (31) in the cartridge (17)-(19) when the cartridge (17)-(19) has housed no paper money at a predetermined time since housing of a previous separator medium (31).
6. The paper money processor according to claim 1, wherein the controlling device effects the operations of the carrying device and the management information writing device when the number of paper moneys which have housed in the cartridge (17)-(19) since housing of a previous separator medium (31) exceeds a fixed number.
7. The paper money processor according to any of claims 1 to 6, comprising an identifying device for identifying the kind of paper money being carried by the carrying device, wherein
the cartridges (17)-(19) are provided by kind of money, the carrying device switches carriage paths (30) according to the kind of money identified by the identifying device, to house a paper money having been inserted into the main body in the cartridge (17)-(19) for the corresponding kind of money,
the controlling device effects the operations of the carrying device and the management information writing device, to house in each of the cartridges (17)-(19) the separator medium (31) with the paper money management information written thereon.
8. The paper money processor according to any of claims 1 to 6, comprising an identifying device for identifying the kind of paper money being carried by the carrying device, wherein the cartridge (17)-(19) houses a paper money found defective as a result of identification of the kind of money by the identifying device.
9. The paper money processor according to any of claims 1 to 8, wherein the paper money management information writing device writes on the separator medium (31) the current date and time as well

as a processor number for identifying the main body of the processor, as the paper money management information.

10. The paper money processor according to any of claims 1 to 9, comprising: 5

a user-specific information acquiring device for acquiring user-specific information to specify a user having inserted a paper money into the main body; and 10

an outputting device for outputting the user-specific information acquired by the user-specific information acquiring device, associated with paper money information on the paper money inserted by this user into the main body, based on the paper money management information. 15

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Fig. 1

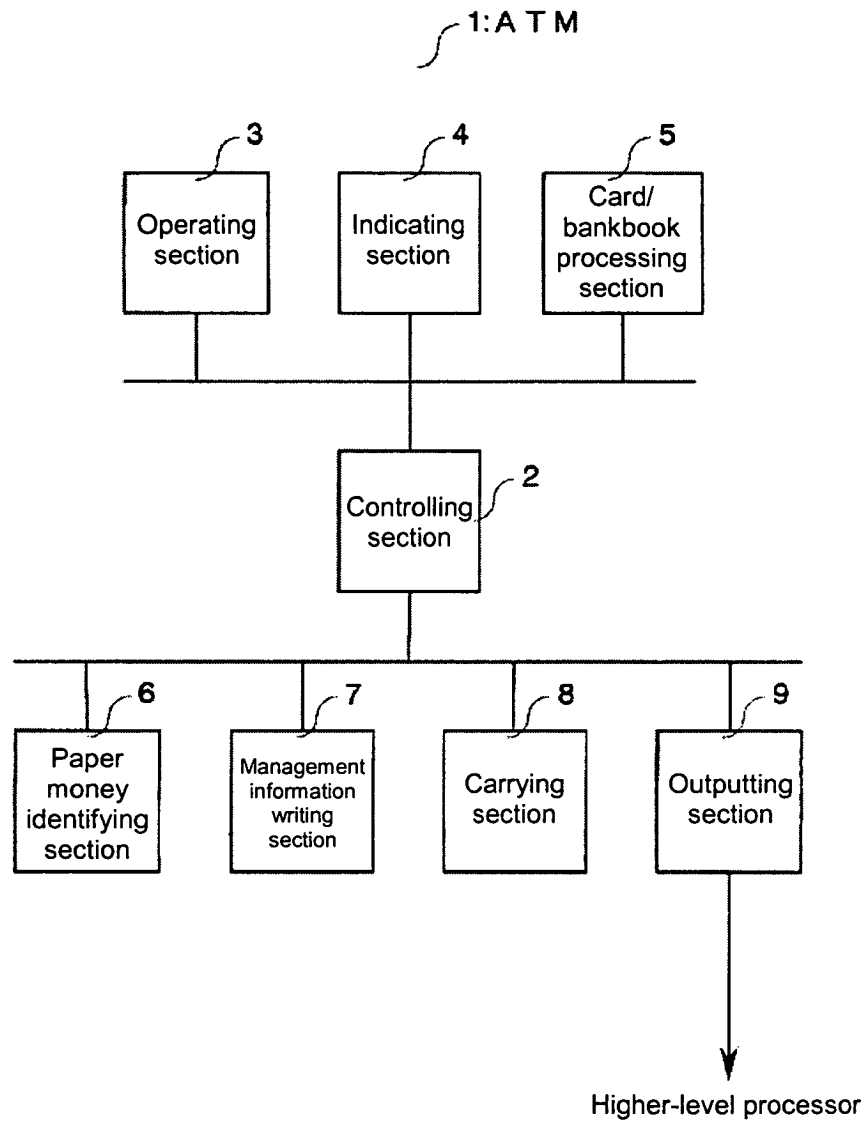


Fig. 2

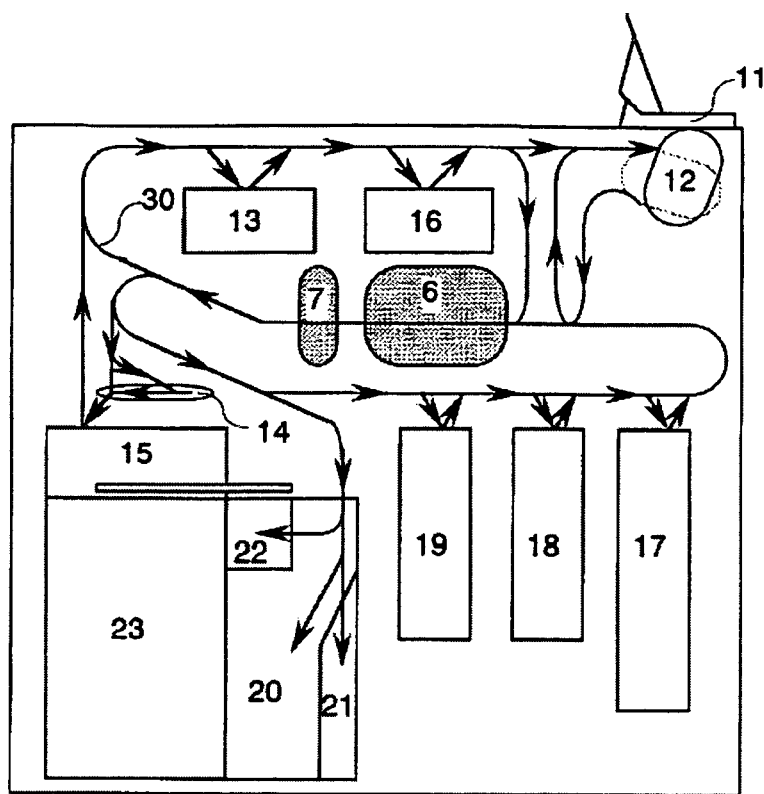


Fig. 3

Magnetic recording side

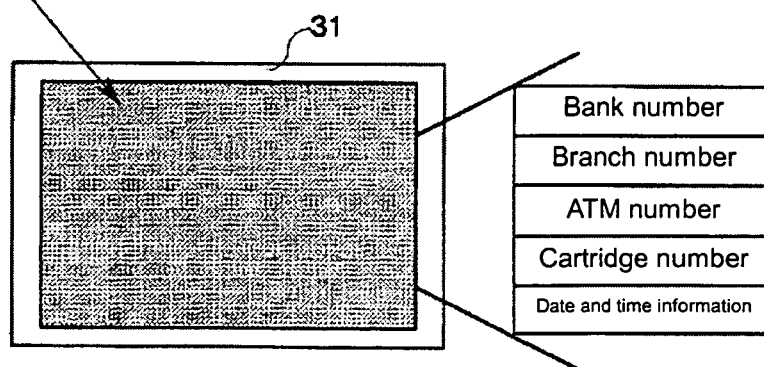


Fig. 4

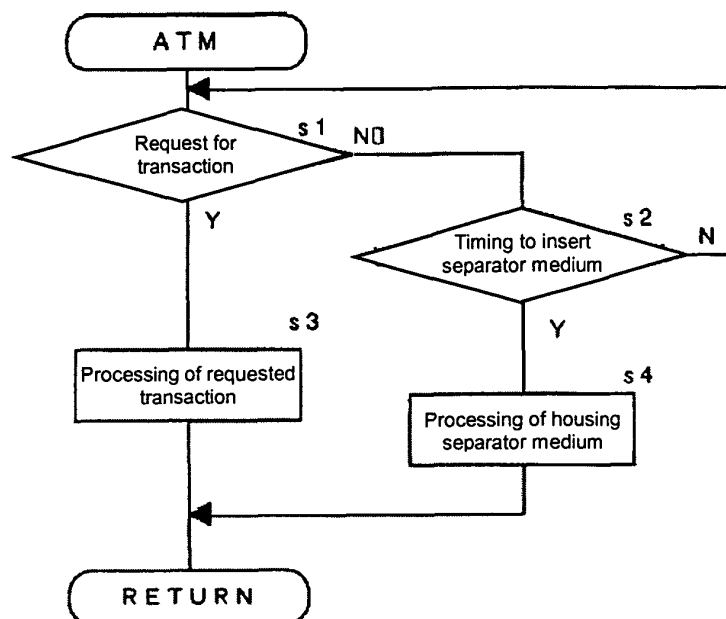


Fig. 5

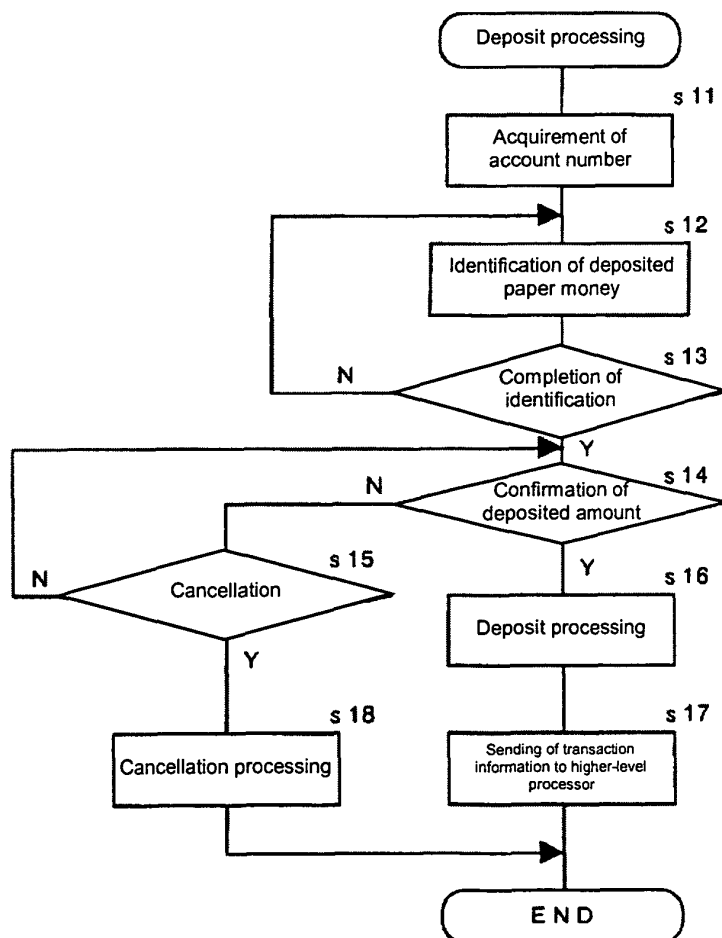


Fig. 6

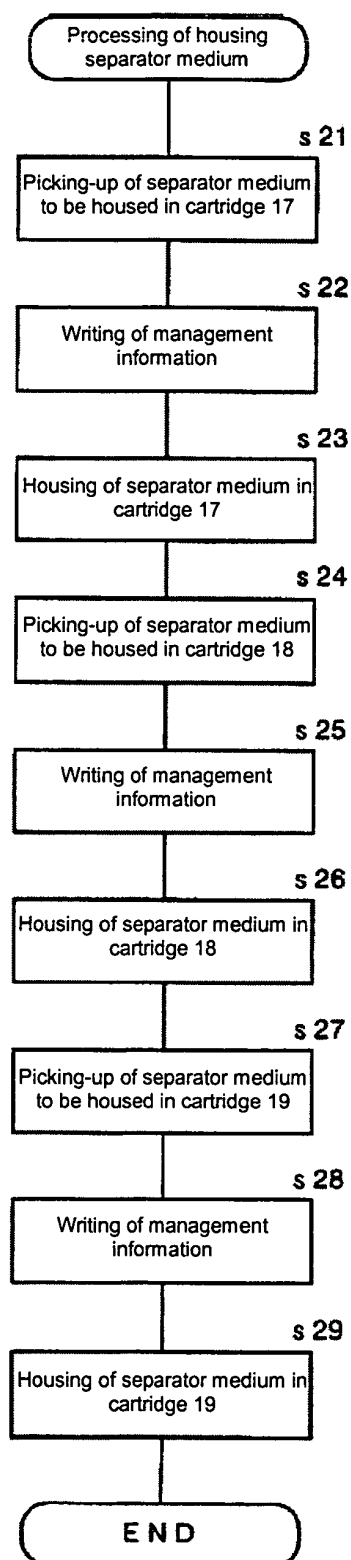


Fig. 7

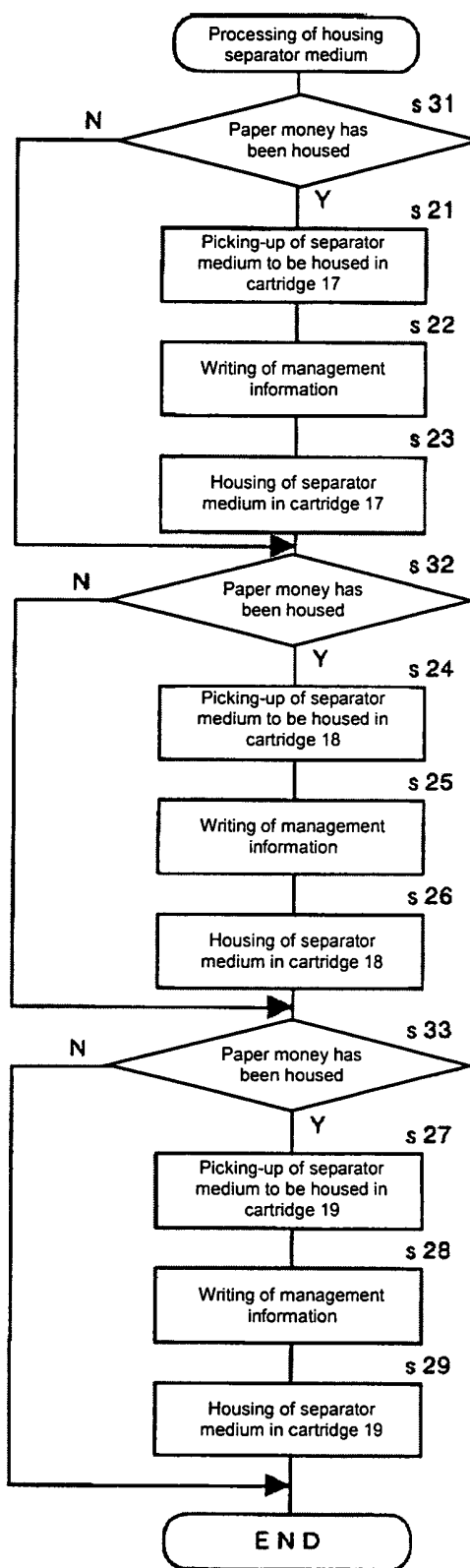


Fig. 8

