(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 327 680 A1

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
30.05.2018 Bulletin 2018/22

(21) Application number: **16827769.7**

(22) Date of filing: **19.07.2016**

(51) Int Cl.:
G07D 3/00 *(2006.01)* ***B65H 31/24*** *(2006.01)*
G07D 7/20 *(2016.01)* ***G07D 9/00*** *(2006.01)*

(86) International application number:
PCT/JP2016/071100

(87) International publication number:
WO 2017/014209 (26.01.2017 Gazette 2017/04)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **21.07.2015 JP 2015144281**

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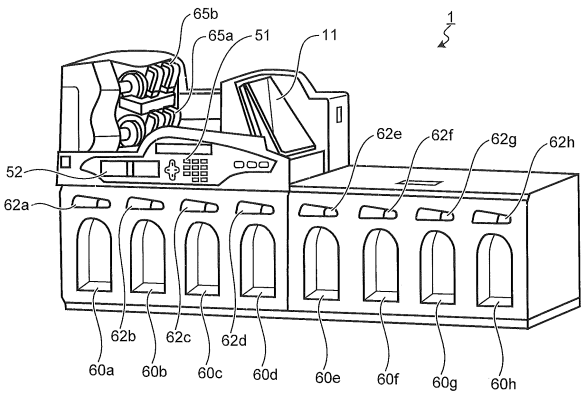
(54) PAPER CURRENCY PROCESSING DEVICE AND PAPER CURRENCY PROCESSING METHOD

(57) The object is to recognize an issuance origin of a banknote of the same currency, and to sort banknotes according to an issuance origin. A banknote handling apparatus includes a receiving unit that receives a plurality of banknotes, a transport unit that transports the banknotes received in the receiving unit one by one, a plurality of stacking units that stack the banknote transported by the transport unit, a recognition unit that recognizes identification information indicating an issuance origin of the banknote transported by the transport unit, and a control unit that controls to sort and stack each of the banknotes of one currency in one of the plurality of stacking units corresponding to the issuance origin based on the identification information recognized by the recognition unit.

FIG.1



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Description

[Technical Field]

[0001] The present invention relates to a banknote handling apparatus and a banknote handling method adapted to recognize banknotes and sort the banknotes by the type of the banknotes.

[Background Art]

[0002] Conventionally, a banknote handling apparatus that recognizes and counts banknotes and sorts the banknotes by the type of the banknotes is used in financial institutions. For example, Patent Document 1 discloses a banknote handling apparatus that recognizes a currency, a denomination, a note type (version), an orientation, fitness of each of the banknotes and sorts the banknotes by the type of the banknotes. Some banknote handling apparatuses have a plurality of stacking units. In such a banknote handling apparatus, by previously setting the type of the banknote to be stacked in each of the stacking units, the banknotes can be sorted and stacked in each of the stacking units by the type of the banknotes.

[Citation List]

[Patent Document]

[0003] [Patent Document 1] Japanese Patent Application Laid-Open No. 2013-175100

[Summary of Invention]

[Technical Problem]

[0004] There is a case where banknotes could not be sorted even by using the conventional technology. Specifically, when the same currency is adopted in a plurality of countries, and banknotes having the same design are issued by these countries, such banknotes could not be sorted by the issuing country. In some countries, a damaged banknote that is not suitable for the circulation use in the market is collected as an unfit note by financial institutions. Even if there is a desire by some issuing countries of the banknotes to collect unfit notes issued by that country, it was not possible in the conventional banknote handling apparatus to sort by the issuing country the unfit notes that were collected by the financial institutions.

[0005] For example, CFA franc banknotes are issued in a plurality of countries, such as Cote d'Ivoire and Benin, that are the members of the West African Economic and Monetary Union. With the conventional device, it is possible to sort the CFA franc banknotes, the Euro banknotes and the like by the currency type of the banknotes, or to sort the 500 CFA francs, the 1000 CFA francs, and the like by the denomination of the CFA franc banknotes. However, it is not possible to sort the 500 CFA francs banknotes issued in Cote d'Ivoire and the 500 CFA francs banknotes issued in Benin, that is, it is not possible to sort banknotes by the issuing country.

[0006] The present invention is made to address the problems in the conventional technology. One object of the present invention is to provide a banknote handling apparatus and a banknote handling method capable of recognizing different issuance origins of banknotes of the same currency and sorting the banknotes by the issuance origin.

[Means for Solving Problems]

[0007] To solve the above problems and to achieve the above object, a banknote handling apparatus according to one aspect of the present invention includes a receiving unit that receives a plurality of banknotes; a transport unit that transports the banknotes received in the receiving unit one by one; a plurality of stacking units that stack the banknote transported by the transport unit; a recognition unit that recognizes identification information indicating an issuance origin of the banknote transported by the transport unit; and a control unit that controls to sort and stack each of the banknotes of one currency in one of the plurality of stacking units corresponding to the issuance origin based on the identification information recognized by the recognition unit.

[0008] In the above banknote handling apparatus, the recognition unit recognizes fitness of the banknote, and the control unit controls to stack only unfit notes issued by one issuance origin in one of the plurality of stacking units to sort the unfit notes by issuance origin in the plurality of stacking units.

[0009] In the above banknote handling apparatus, the recognition unit recognizes fitness of the banknote, and the control unit controls to stack fit notes issued by different issuance origins in one of the plurality of stacking units.

[0010] In the above banknote handling apparatus, the recognition unit recognizes a banknote number of each of the banknotes and identifies the identification information included in the banknote number.

[0011] The above banknote handling apparatus further includes a memory that stores sort setting information in which information about the issuance origin of banknotes to be stacked in each of the plurality of stacking units is set. The control unit controls to sort and stack each of the banknotes in one of the plurality of stacking units corresponding to the issuance origin based on the sort setting information.

[0012] In the above banknote handling apparatus, the identification information is information of at least one letter of the banknote number of the banknote. The sort setting information includes digit position setting information in which a digit position of the at least one letter in the banknote number is set. The recognition unit recognizes the identification information included in the banknote number based on the digit position setting information.

[0013] In the above banknote handling apparatus, in the sort setting information, the information of at least one letter is allocated to each of the plurality of stacking units.

[0014] In the above banknote handling apparatus, in the sort setting information, a plurality of pieces of the information of at least one letter are allocated to each of the plurality of stacking units.

[0015] In the above banknote handling apparatus, in the sort setting information, at least one among a denomination, fitness, an orientation, and a version of banknotes to be stacked in each of the plurality of stacking units is set.

[0016] The above banknote handling apparatus further includes a bundling part that bundles a predetermined number of banknotes. The control unit controls the bundling part to bundle the banknotes of a predetermined issuance origin.

[0017] The above banknote handling apparatus further includes a cutting part that cuts a banknote. The control unit controls the cutting part to cut a banknote of a predetermined issuance origin.

[0018] In the above banknote handling apparatus, the identification information is information of at least one among a country, a financial institution, a printing bureau, and a printing factory that issued the banknote.

[0019] In the above banknote handling apparatus, the control unit receives information to identify a financial institution and controls to sort the banknotes into the banknotes issued by the issuance origin corresponding to the financial institution and the banknotes issued by other issuance origins and stack the banknotes by the issuance origin.

[0020] In the above banknote handling apparatus, the control unit controls to acquire, as the information to identify the financial institution, banknote storage container identification information for recognizing a banknote storage container, and controls to sort the banknotes to be stored in the banknote storage container based on the banknote storage container identification information.

[0021] In the above banknote handling apparatus, the control unit controls to notify of, as a quantity of the banknotes stacked in the stacking unit, at least one between a quantity of the banknotes stacked in the plurality of stacking units after starting banknote handling and a quantity of the banknotes currently stacked in the plurality of stacking units.

[0022] According to another aspect of the present invention, a banknote handling method of sorting banknotes by issuance origin by using a banknote handling apparatus by which an issuance origin collects the banknotes issued by the issuance origin among the banknotes of the same currency issued by a plurality of issuance origins, includes recognizing the identification information indicating an issuance origin of the banknote by the banknote handling apparatus; and sorting the banknotes of the same currency by issuance origin based on the recognized identification information in the banknote handling apparatus.

[0023] In the above banknote handling method, the recognizing includes recognizing fitness of the banknote, and the sorting includes sorting unfit notes by the issuance origin.

[0024] In the above banknote handling method, the sorting includes sorting all fit notes as one type irrespective of the issuance origin.

[Advantageous Effects of Invention]

[0025] According to the present invention, the banknote handling apparatus recognizes each of banknotes to acquire identification information used for identifying the issuance origin such as the issuing country, the financial institution, the printing bureau, and the printing factory. The banknote handling apparatus stacks the banknotes in the stacking unit corresponding to the identification information, and the banknotes are sorted by the issuance origin. For example, in a case where the banknotes of the same currency are issued by a plurality of the issuing countries, the banknote handling apparatus sorts the banknotes by the issuing country and each of the issuing countries can collect only the banknotes issued by their own.

[0026] According to the present invention, the banknote handling apparatus sorts banknotes by using a plurality of the stacking units. For example, the fit notes are stacked in the stacking units without sorting by the issuance origin, and the unfit notes are sorted and stacked by the issuance origin in other stacking units. For example, in a case where banknotes of the same currency are issued by a plurality of the issuing countries, the financial institution uses the banknote handling apparatus to sort unit notes to be collected by the issuing country and fit notes to be reused in the financial institution. In this process, the financial institution can sort the unfit notes by the issuing country, irrespective

of the denomination while sorting the fit notes by the denomination, irrespective of the issuing country.

[Brief Description of Drawings]

[0027]

FIG. 1 is a perspective view of an external appearance of a banknote handling apparatus according to a first embodiment.
FIG. 2 is a schematic cross section of an internal configuration of the banknote handling apparatus.
FIG. 3 is a schematic block diagram of a functional configuration of the banknote handling apparatus.
FIGS. 4A and 4B are schematic diagrams indicating an example of an identification letter printed on a banknote to identify an issuance origin of the banknote.
FIG. 5 shows an example of a setting screen for specifying a type of the banknotes to be stacked in a stacking unit by a digit position of a banknote number and the identification letter present at that digit position.
FIG. 6 is a table indicating an example of a stacking pattern for specifying the types of the banknotes to be stacked in various stacking units.
FIGS. 7A to 7C are views for explaining a method of setting a type of banknotes to be stacked in the various stacking units by selecting from the issuance origins registered previously.
FIG. 8 is a schematic cross section of a configuration example of a banknote handling apparatus including a bundling unit for bundling banknotes.
FIG. 9 is a schematic cross section of a configuration example of a banknote handling apparatus including a cutting unit for cutting banknotes.
FIG. 10 depicts a schematic internal configuration of a banknote handling apparatus according to a second embodiment.
FIG. 11 depicts an example of a stacking pattern used in the banknote handling apparatus shown in FIG. 10.
FIG. 12 depicts a schematic internal configuration of a banknote handling apparatus according to a third embodiment.
FIG. 13 depicts an example of a stacking pattern used in the banknote handling apparatus shown in FIG. 12.
FIG. 14 depicts an example of storage container information.
FIGS. 15A and 15B are schematic diagrams for explaining a method of preparing banknotes by using a storage container.
FIG. 16 is a schematic diagram for explaining a method of preparing banknotes by using an ATM cassette.

[Description of Embodiments]

[0028] Exemplary embodiments of a banknote handling apparatus and a banknote handling method according to the present invention are explained in detail below with reference to the accompanying drawings. To summarize the banknote handling apparatus according to the present embodiment, the banknote handling apparatus has a function to recognize an issuance origin in addition to a currency, a denomination, a version, an orientation, authenticity, and fitness of each of banknotes that are transported one by one, and a function to sort the banknotes by the type of the banknotes based on the obtained recognition result. The banknote handling apparatus includes a plurality of stacking units. By setting an issuance origin of the banknotes to be stacked for each of the stacking units, banknotes can be stacked in each of the stacking units according to the issuance origin of the banknotes.

First Embodiment

[0029] FIG. 1 is a perspective view of an external appearance of a banknote handling apparatus 1 according to a first embodiment. FIG. 2 is a schematic cross section of an internal configuration of the banknote handling apparatus 1. The banknote handling apparatus 1 includes a receiving unit 11 that receives a plurality of banknotes, and a feed unit 10 that feeds the received banknotes, one by one, inside the apparatus from the receiving unit 11. On a front surface of the apparatus are arranged an operation unit 51 and a display 52. The operation unit 51 is used for inputting various information when performing a setting change, giving instructions regarding a processing, and the like. The display unit 52 is used for displaying various information when confirming setting information, a processing result, and the like.

[0030] As shown in FIG. 2, inside the banknote handling apparatus 1, are arranged a transport unit 70 that transports along a transport path the banknotes fed inside the apparatus by the feed unit 10, and a recognition unit 55 that recognizes and counts the banknotes transported by the transport unit 70. The banknote handling apparatus 1 includes two reject units 65 (65a, 65b) for discharging therein reject banknotes. The reject banknotes include a banknote that is not the processing object, a counterfeit note, a suspect banknote that is suspected of being a counterfeit note but whose authenticity cannot be confirmed, and the like. A reject banknote can be sorted and discharged into a first reject unit

65a or a second reject unit 65b depending on the cause of rejection.

[0031] The recognition unit 55 has a function to recognize a currency, a denomination, a version, an orientation, authenticity, fitness, and an issuance origin of the banknote transported by the transport unit 70 and count the recognized banknote. Moreover, the recognition unit 55 has a function to recognize characters such as a banknote number (serial number) printed on a banknote to recognize the banknote.

[0032] Stacking units 60 (60a to 60h) have a function to receive and stack the banknotes transported by the transport unit 70. Based on the recognition result obtained by the recognition unit 55, reject banknotes such as counterfeit notes and suspect banknotes are stacked in the reject unit 65 and genuine banknotes are sorted and stacked in the stacking units 60a to 60h by the type of the banknotes. Which type of the banknotes are to be stacked in each of the stacking units 60a to 60h can be set previously before starting the banknote handling. Alternatively, such a setting is not made previously before starting the banknote handling, but can be made after starting the banknote handling depending on the type of the banknote recognized by the recognition unit 55. The details will be explained later.

[0033] As shown in FIG. 1, the stacking unit 60 has an opening on a front surface thereof, and an operator of the banknote handling apparatus 1 can remove the banknotes stacked in the stacking unit 60 from the opening. Display units 62a to 62h for displaying information about the stacked banknotes are arranged on the front surface of the apparatus. One display unit among the display units 62a to 62h corresponds with one stacking unit among a first stacking unit 60a to an eighth stacking unit 60h.

[0034] As shown in FIG. 2, the transport unit 70 includes a plurality of diverters 71 for diverting the banknotes transported on the transport path. Moreover, the transport unit 70 includes a plurality of sensors 72 for detecting the banknotes being transported on the transport path. After the recognition unit 55 has recognized the banknote, based on the recognition result, a control unit 50 determines a stacking destination of the banknote between the stacking unit 60 and the reject unit 65. By controlling a divergence operation of the diverters 71 while detecting with the sensors 72 a position of the banknote being transported, the control unit 50 causes the banknote to be transported to and stacked in the determined stacking destination of the banknote. A sensor 73 is arranged in each of the stacking units 60 for detecting presence or absence of the banknote in that stacking unit. Thus, it is possible to detect removal of the banknotes from the stacking unit 60. The sensors 72 are also arranged in the receiving unit 11. Thus, it is possible to detect presence or absence of the banknote in the receiving unit 11.

[0035] FIG. 3 is a schematic block diagram of a functional configuration of the banknote handling apparatus 1. As shown in FIG. 3, in addition to the above mentioned components, the banknote handling apparatus 1 includes the control unit 50 that controls the various components to realize the functions and operations explained below, and a memory 56 that stores therein various data such as computer programs and setting information necessary for the operation of the control unit 50.

[0036] One feature of the banknote handling apparatus 1 is that, the recognition unit 55 recognizes the issuance origin of the banknote in addition to the currency, the denomination, the version, the orientation, the authenticity, and the fitness, and based on the obtained recognition result, the control unit 50 sorts and stacks the banknotes in the first stacking unit 60a to the eighth stacking unit 60h by the type of the banknote. The currency recognized by the recognition unit 55 is information to distinguish a country or an allied country guaranteeing the value of the banknote. For example, a Japanese banknote, a US banknote, a Euro banknote and the like is obtained as the recognition result of the currency. The currency is also information indicating a currency unit such as yen, dollar, euro, and the like. The denomination is information to distinguish the value of the banknote. For example, a 10000-yen note, a 5000-yen note, and the like is obtained as the recognition result of the denomination for Japanese banknotes. The version is information indicating the series of the banknote of the same denomination For example, E-notes that are currently issued, D-notes that were used before issuing the E-notes, and the like is obtained as the recognition result of the version for Japanese 10000-yen banknotes. The orientation is information that indicates which surface of the banknote is up (face side up/back side up) and a portrait direction of the banknote (portrait normal/portrait reverse). The authenticity is information that indicates whether the banknote is a genuine banknote. The fitness is information that indicates a degree of damage of a banknote determined based on fitness criteria set previously. For example, a banknote that is suitable for reuse in the market is recognized as a fit note and a banknote that is not suitable for reuse in the market is recognized as an unfit note.

[0037] Moreover, the issuance origin is information that issued the banknote. The issuing country, financial institution, printing bureau, printing factory, and the like is obtained as the recognition result of the issuance origin. For example, the Japanese banknotes are issued by the Bank of Japan; however, the banknotes are actually printed in various factories such as the Odawara factory and the Hikone factory belonging to the National Printing Bureau. The printing factory in which the banknote was printed can be identified as the issuance origin of the banknote from an identification letter (identification information) present at a predetermined digit in the banknote number printed on the banknote. The US banknotes are issued by a plurality of Federal Reserve Banks such as the Boston Federal Reserve Bank and the New York Federal Reserve Bank. The Federal Reserve Bank that issued the banknote can be identified as the issuance origin of the banknote from an identification letter present at a predetermined digit in the banknote number. The Euro banknotes used in Europe are issued in a plurality of countries such as Germany and France. The country that issued

the banknote (issuing country) can be identified as the issuance origin of the banknote from an identification letter included in the banknote number. The CFA franc banknotes used in Africa are issued in a plurality of countries such as Cote d'Ivoire and Benin. The issuing country can be identified from an identification letter included in the banknote number. As long as the identification information that indicates the issuance origin of the banknote is given on each of the banknotes, it is not necessary that the identification information is included in the banknote number. For example, the identification information may be printed on the banknote in the form of a symbol or a mark separately from the banknote number. Moreover, the identification information can be stored into an IC chip and the IC chip can be embedded in the banknote.

[0038] FIGS. 4A and 4B are schematic diagrams indicating an example of an identification letter printed on a banknote to identify an issuance origin of the banknote. For example, as shown in FIG. 4A, an identification letter that is used to recognize an issuance origin of a banknote 100 is present at a predetermined digit position of a banknote number 200, such as at the end of the banknote number 200, printed on the banknote 100. In this case, the recognition unit 55 performs character recognition of an image of the banknote 100 to recognize the banknote number 200. The identification letter at the predetermined digit position that indicates the issuance origin is extracted from the recognition result of the banknote number 200, and the extracted identification letter is used to identify the issuance origin.

[0039] Moreover, as shown in FIG. 4B, in some cases, an identification letter 202 that is used to recognize an issuance origin of a banknote 101 is printed before or after a banknote number 201 printed on the banknote 101 such that there is a small gap between the identification letter 202 and the banknote number 201. Also, in some cases, the identification letter 202 and the banknote number 201 are printed in different fonts. In this case, the recognition unit 55, performs the character recognition of only the identification letter 202 to identify the issuance origin without considering the banknote number 201. Alternatively, the recognition unit 55 considers the identification letter 202 as a part of the banknote number and performs the character recognition of the entire string. In this case, the recognition unit 55 extracts the identification letter 202 from the recognition result obtained by the character recognition. When considering the identification letter 202 to be a part of the banknote number, the five-digit banknote number 201 and the one-digit identification letter 202 shown in FIG. 4B are considered to be a six-digit banknote number. The recognition unit 55 performs character recognition of this six-digit banknote number, and extracts the rightmost letter at the 6th digit from the recognized six-digit character obtained as the character recognition result. The recognition unit 55 acquires the rightmost letter as the identification letter 202

[0040] In the banknote handling apparatus 1, it is possible to identify the issuance origin of the banknotes, such as an issuing country, a financial institution, a printing bureau, and a printing factory. The banknote handling apparatus 1 sorts and stacks the banknotes into the first stacking unit 60a to the eighth stacking unit 60h by the issuance origin. Below, a case has been explained as an example in which it is assumed that banknotes of the same currency (currency X) are issued in different eight issuing countries, and those banknotes of the currency X are processed to sort by the issuing country. It is assumed that, a 12-digit banknote number is printed on the banknote of the currency X. Moreover, an English capital letter among the eight letters A, B, C, D, H, K, S, T is printed at the rightmost 12th digit position of the banknote number as an identification letter that indicates the issuing country.

[0041] FIG. 5 shows an example of a setting screen for specifying the type of the banknotes to be stacked in the stacking units 60 by using the digit position of the banknote number and the identification letter present at the specified digit position. Information that is shown with an underline in the setting screen shown in FIG. 5 is information that can be changed as desired. By operating the operation unit 51 while looking at the setting screen displayed on the display unit 52, digit position setting information can be created by specifying a digit position. The digit position for extracting the identification letter (identification information) from the banknote number is specified in a setting item "banknote number digit position". Additionally, which banknote is to be stacked is specified in a setting item "identification letter". The banknote to be stacked is set by specifying the letter at the digit position set in the "banknote number digit position". Based on the sort setting information created for sorting banknotes, the banknotes can be sorted and stacked in the stacking units 60 by the issuance origin of the banknotes.

[0042] FIG. 5 shows an example of a setting in which a banknote is stacked in the first stacking unit 60a when an identification letter A is present at the 12th digit in the banknote number. Likewise, this example shows that a banknote is sorted and stacked in any of the second stacking unit 60b to the eighth stacking unit 60h when an identification letter B, C, D, H, K, S, T is respectively present at the 12th digit in the banknote number.

[0043] In this setting screen, the type of banknote to be stacked in each of the stacking units 60a to 60h is specified by using the digit position in the banknote number and the identification letter present at this digit position. Each of those identification letters corresponds with an issuing country. Therefore, by making the above setting, the banknotes will be sorted and stacked in the stacking units 60a to 60h by the issuing country.

[0044] Specifically, when the handling of the banknotes of the currency X is started in the banknote handling apparatus 1 after preparing the setting shown in FIG. 5, the recognition unit 55 performs the character recognition of the banknote number of each of the banknotes to recognize the identification letter included in the character recognition result of the banknote number. The control unit 50 determines a stacking destination of the banknote based on the recognized

identification letter. A stacking unit, among the stacking units 60, corresponding to the recognized identification letter is determined as the stacking destination of the banknote. The control unit 50 controls the transport unit 70 to transport this banknote to thus determined stacking unit 60. The control unit 50 also controls the diverters 71 while detecting a position of the banknote on the transport path by using the sensors 72, and the banknote is transported to and stacked in the determined stacking unit 60. As a result, banknotes can be sorted and stacked in the stacking units 60a to 60h by the issuing country.

[0045] FIG. 5 shows an example in which only one identification letter is specified in the setting item of the identification letter; however, a plurality of identification letters can be specified in this setting item. For example, when specifying three consecutive alphabets A, B, C, the range of the consecutive characters can be specified as "A to C". When specifying a plurality of alphabets that are not consecutive, such as A and C, each of the identification letters can be specified as "A, C".

[0046] For example, when the banknote number digit position is specified as "12" and the identification letter at the specified digit position is specified as "A to C" with respect to the first stacking unit 60a in the setting screen shown in FIG. 5, the banknotes with the identification letter A at the 12th digit in the banknote number, the banknotes with the identification letter B at the 12th digit in the banknote number, and the banknotes with the identification letter C at the 12th digit in the banknote number are stacked in the first stacking unit 60a. Because each of the identification letters corresponds to an issuing country, the banknotes issued by three issuing countries will be stacked in a mixed state in the first stacking unit 60a.

[0047] The example of specifying one digit position of the banknote number in the setting item of the banknote number digit position is shown in FIG. 5; however, it is possible to specify a plurality of digit positions and specify the identification letter for each of the plurality of digit positions. In the same manner as when specifying the identification letter, the digit position can be set by specifying, for example, a range of the digit positions from 10th to 12th digits like "10 to 12", or a plurality of digit positions can be specified like "10, 12". When a plurality of digit positions are specified in the setting item of the banknote number digit position, the identification letter at each of the plurality of digit positions is specified in the setting item of the identification letter.

[0048] For example, assume that the banknotes having A at both the 11th digit and the 12th digit in the banknote number are to be stacked in the first stacking unit 60a, and the banknotes having A at the 11th digit and having B at the 12th digit in the banknote number are to be stacked in the second stacking unit 60b. In this case, in the setting screen shown in FIG. 5, the banknote number digit position are specified as "11, 12" or "11-12", and the identification letter is specified as "11-A, 12-A" for the first stacking unit 60a. The banknote number digit position are specified as "11, 12" or "11-12", and the identification letter is specified as "11-A, 12-B" for the second stacking unit 60b. For example, when the issuing country is represented by using two or more digits in the banknote number printed on the banknotes, these banknotes can also be sorted by the issuing country.

[0049] In the banknote handling apparatus 1, a stacking pattern can be prepared. In the stacking pattern, the type of the banknotes to be stacked in each of the stacking units 60a to 60h is registered. A plurality of stacking patterns can be prepared and stored previously in the memory 56. When starting the banknote handling, one of the stacking patterns can be retrieved from the memory 56 to set the stacking destination of the banknotes. A digit position at which an identification letter (identification information) is to be extracted from a banknote number and an identification letter at this digit position are specified in each of the stacking patterns. As a result, such stacking patterns can be used as the sort setting information to sort and stack the banknote by the issuance origin in each of the stacking units 60.

[0050] An example of the stacking patterns is explained below. As is the case in FIG. 5, the identification letter is printed at the rightmost 12th digit of the banknote number printed on the banknote, and the identification letter is one of the letters A, B, C, D, H, K, S, T. The letter indicates which issuing country among the eight issuing countries issued the banknote. To simplify the explanation, the following explanation is given assuming that the identification letter indicates the country name of the issuing country. For example, the recognition letter A is printed on banknotes issued by the issuing country A, and the recognition letter B is printed on banknotes issued by the issuing country B. Relations between the issuing countries (issuance origins) and the identification letters are stored previously in the memory 56 of the banknote handling apparatus 1.

[0051] FIG. 6 is a table indicating an example of stacking patterns each of which specifies the types of the banknotes to be stacked in the stacking units 60. An item "No." in FIG. 6 indicates the number for identifying each stacking pattern, and an item "contents" indicates a summary of the set content of each of the stacking patterns. An item "attribute" is information of each of the banknotes to be acquired as a recognition result by the recognition unit 55. The information of the item "attribute" is used by the control unit 50 for determining the stacking destination of each of the banknotes.

[0052] In all the stacking patterns No. 1 to 4 shown in FIG. 6, the type of the banknotes to be stacked in the first reject unit 65a is set to "REJECT", and the type of the banknotes to be stacked in the second reject unit 65b is set to "SUSP". Those setting mean that counterfeit notes and suspect banknotes, which are banknotes recognized by the recognition unit 55 as suspected of being the counterfeit notes, are stacked in the second reject unit 65b. Moreover, the reject banknotes other than the counterfeit notes and the suspect banknotes, such as transport error notes, banknotes that

cannot be stacked in the first stacking unit 60a to the eighth stacking unit 60h as these banknotes are not handling objects, and the like, are stacked in the first reject unit 65a. In the example shown in FIG. 6, the setting of the first reject unit 65a and the second reject unit 65b are common in all the stacking patterns, therefore, the setting of the first stacking unit 60a to the eighth stacking unit 60h will be explained below.

[0053] The stacking pattern No. 1 depicts a setting to stack, by an issuing country, the banknotes of the currency X in a denomination mixed state in the first stacking unit 60a to the eighth stacking unit 60h. No setting regarding the version, the orientation, and the fitness is made in the stacking pattern No. 1, and therefore the control unit 50 does not use the information of the version, the information of the orientation and the information of the fitness when determining the stacking destination of the banknotes.

[0054] A setting "currency X" in FIG. 6 denotes that the banknotes of the currency X are the stacking objects. A setting "MIX" denotes that the banknotes are stacked, irrespective of denominations, in the denomination mixed state. In a setting item "banknote number", information in which a digit position in a banknote number and an identification letter at the digit position are coupled is input. A setting "12-A" denotes that banknotes having an identification letter A at the 12th digit in the banknote number are the stacking objects. That is, the stacking pattern No. 1 denotes the setting to sort and stack, by the issuance origin, the banknotes of the currency X depending on the identification letter at the 12th digit in the banknote number in the first stacking unit 60a to the eighth stacking unit 60h.

[0055] When one stacking pattern is selected from the stacking patterns stored in the memory 56 by operating the operation unit 51 and the banknote handling is started in the banknote handling apparatus 1, the recognition unit 55 recognizes each of the banknotes. Also, the recognition unit 55 performs character recognition of each of the letters in the banknote number printed on the banknote. Based on the recognition result, such as the fitness, and the character recognition result of the banknote number obtained by the recognition unit 55, and the setting content of the selected stacking pattern, the control unit 50 determines the transportation destination of the banknote from the stacking unit 60 and the reject unit 65. Then, the control unit 50 controls the transport unit 70 to transport the banknote, and controls the diverters 71 while detecting the position of the banknote on the transport path by the sensors 72, so that the banknote is transported to and stacked in the determined transportation destination.

[0056] When the stacking pattern No. 1 is selected in the banknote handling apparatus 1, the banknotes are stacked in the denomination mixed state, irrespective of the version, the orientation, and the fitness of the banknotes. The banknotes of the issuing country A are stacked in the first stacking unit 60a, the banknotes of the issuing country B are stacked in the second stacking unit 60b, the banknotes of the issuing country C are stacked in the third stacking unit 60c, the banknotes of the issuing country D are stacked in the fourth stacking unit 60d, the banknotes of the issuing country H are stacked in the fifth stacking unit 60e, the banknotes of the issuing country K are stacked in the sixth stacking unit 60f, the banknotes of the issuing country S are stacked in the seventh stacking unit 60g, and the banknotes of the issuing country T are stacked in the eighth stacking unit 60h. That is, the banknotes can be sorted and stacked by issuing country in the stacking units 60a to 60h.

[0057] The stacking pattern No. 2 depicts a setting by which the banknotes of the currency X are sorted into the fit notes and the unfit notes in the denomination mixed state, and each of the fit notes and the unfit notes are sorted according to the issuing countries. A setting "FIT" in FIG. 6 denotes that the fit notes are the stacking objects, and a setting "UNFIT" denotes that the unfit notes are the stacking objects. No setting regarding the version and the orientation is made in the stacking pattern No. 2, and therefore the control unite 50 does not use the information of the version and the information of the orientation when determining the stacking destination of the banknotes.

[0058] When the stacking pattern No. 2 is selected in the banknote handling apparatus 1, the banknotes are stacked in the denomination mixed state, irrespective of the version and the orientation of the banknotes. The fit notes of the issuing country A and the fit notes of the issuing country B are stacked in the first stacking unit 60a, the fit notes of the issuing country C and the fit notes of the issuing country D are stacked in the second stacking unit 60b, the fit notes of the issuing country H are stacked in the third stacking unit 60c, and the fit notes of the issuing country S and the fit notes of the issuing country T are stacked in the fourth stacking unit 60d. Moreover, the unfit notes of the issuing country A and the unfit notes of the issuing country B are stacked in the fifth stacking unit 60e, the unfit notes of the issuing country C and the unfit notes of the issuing country D are stacked in the sixth stacking unit 60f, the unfit notes of the issuing country H are stacked in the seventh stacking unit 60g, and the unfit notes of the issuing country S and the unfit notes of the issuing country T are stacked in the eighth stacking unit 60h. That is, the banknotes are sorted into the fit notes and the unfit notes, the fit notes are stacked in the first stacking unit 60a to the fourth stacking unit 60d and the unfit notes are stacked in the fifth stacking unit 60e to the eighth stacking unit 60h, and each of the fit notes and the unfit notes are sorted and stacked to separate the banknotes issued by the issuing country A and the issuing country B, the banknotes issued by the issuing country C and the issuing country D, the banknotes issued by the issuing country H, and the banknotes issued by the issuing country S and the issuing country T.

[0059] The stacking pattern No. 3 depicts a setting by which the banknotes of the currency X are sorted into the fit notes and the unfit notes, the fit notes are sorted by denomination irrespective of the issuing countries, and the unfit notes are sorted by issuing country irrespective of the denominations. No setting regarding the version and the orientation

is made in the stacking pattern No. 3, and therefore the control unit 50 does not use the information of the version and the information of the orientation when determining the stacking destination of the banknotes. Moreover, no setting regarding the banknote number is made in the first stacking unit 60a to the fourth stacking unit 60d, and therefore the control unit 50 does not use the information of the banknote number when determining the stacking destination from among the first stacking unit 60a to the fourth stacking unit 60d.

[0060] In the stacking patterns No. 3 and No. 4 in FIG. 6, "10000", "5000", "2000", and "1000" denote the denominations of the banknotes as the stacking objects. For example, when the currency X is CFA franc banknotes, the denominations denote 10000 CFA francs, 5000 CFA francs, 2000 CFA francs, and 1000 CFA francs.

[0061] When the stacking pattern No. 3 is selected in the banknote handling apparatus 1, irrespective of the version, the orientation, and the issuing country of the banknotes, the fit notes of the denomination 10000 of the currency X are stacked in the first stacking unit 60a, the fit notes of the denomination 5000 of the currency X are stacked in the second stacking unit 60b, the fit notes of the denomination 2000 of the currency X are stacked in the third stacking unit 60c, and the fit notes of the denomination 1000 of the currency X are stacked in the fourth stacking unit 60d. Moreover, in the denomination mixed state, irrespective of the version and the orientation, the unfit notes of the issuing country A are stacked in the fifth stacking unit 60e, the unfit notes of the issuing country B are stacked in the sixth stacking unit 60f, the unfit notes of the issuing country C are stacked in the seventh stacking unit 60g, and the unfit notes of the issuing country D are stacked in the eighth stacking unit 60h.

[0062] That is, the banknotes are sorted into the fit notes and the unfit notes, the fit notes are stacked in the first stacking unit 60a to the fourth stacking unit 60d and the unfit notes are stacked in the fifth stacking unit 60e to the eighth stacking unit 60h, the fit notes are sorted and stacked by denomination in an issuing country mixed state in the four stacking units 60a to 60d, and the unfit notes are sorted and stacked by issuing country in the denomination mixed state in the four stacking units 60e to 60h.

[0063] The stacking pattern No. 4 depicts a setting by which the banknotes of the currency X are sorted into the fit notes and the unfit notes, the fit notes are sorted by denomination irrespective of the issuing countries, and the unfit notes are sorted by issuing country irrespective of the denominations. In the stacking pattern No. 4, like in the stacking pattern No. 3, the information of the version and the information of the orientation are not used by the control unit 50 to determine the stacking destination. Moreover, no setting regarding the banknote number is made in the first stacking unit 60a to the fourth stacking unit 60d, and therefore the information of the banknote number is not used when determining the stacking destination from among the first stacking unit 60a to the fourth stacking unit 60d.

[0064] In the setting of the stacking pattern No. 3, the issuing country of the banknotes to be stacked in each of the fifth stacking unit 60e to the eighth stacking unit 60h is previously determined to sort the unfit notes by issuing country. In contrast, in the stacking pattern No. 4, the issuing country of the banknotes to be stacked in each of the fifth stacking unit 60e to the eighth stacking unit 60h is automatically determined during the banknote handling, and the unfit notes are sorted by the issuing country. A setting "12-Auto" shown in FIG. 6 denotes that the stacking objects are automatically determined based on the identification letter at the 12th digit in the banknote number obtained during the banknote handling.

[0065] Assume that the banknote handling is started after selecting the stacking pattern No. 4 in the banknote handling apparatus 1, the banknote recognized first by the recognition unit 55 is the unfit note, and for example, the identification letter at the 12th digit in the banknote number of this banknote is A. There is no stacking unit 60 that handles the banknotes with the identification letter A as the stacking object; however, there is the stacking unit 60 for which "12-Auto" has been set. That is, there is the stacking unit 60 for which the identification letter at the 12th digit in the banknote number of the stacking object banknotes are determined automatically. Therefore, the control unit 50 allocates "12-A" to the fifth stacking unit 60e. The banknotes having the identification letter A at the 12th digit in the banknote number is set as the stacking object of the fifth stacking unit 60e. As a result, the control unit 50 stacks in the fifth stacking unit 60e the first unfit note having the identification letter A. Thereafter, the unfit notes having the identification letter A at the 12th digit in the banknote number are stacked in the fifth stacking unit 60e.

[0066] Now assume that the banknote recognized second by the recognition unit 55 is the unfit note, and the identification letter at the 12th digit in the banknote number of this banknote is B. There is no stacking unit that handles the banknotes with the identification letter B as the stacking object; however, there still remain the sixth stacking unit 60f to the eighth stacking unit 60h for which "12-Auto" have been set. That is, there remains the stacking unit 60 for which the identification letter at the 12th digit in the banknote number of the stacking object banknotes is determined automatically. Therefore, the control unit 50 allocates "12-B" to the sixth stacking unit 60f. The banknotes having the identification letter B at the 12th digit in the banknote number is set as the stacking object of the sixth stacking unit 60f. As a result, the control unit 50 stacks in the sixth stacking unit 60f the second unfit note having the identification letter B. Thereafter, the unfit notes having the identification letter B at the 12th digit in the banknote number are stacked in the sixth stacking unit 60f.

[0067] In this manner, when the recognition unit 55 recognizes that the banknote is the unfit note of the currency X, the control unit 50 determines presence or absence of the stacking unit 60 corresponding to the identification letter of this banknote. If the corresponding stacking unit 60 is present, the control unit 50 stacks the banknote in this stacking

unit 60. On the other hand, if the stacking unit 60 corresponding to the identification letter is absent, but, if the stacking unit 60 that can automatically set the identification letter is present, the control unit 50 allocates the obtained identification letter to this stacking unit 60 and sets this stacking unit 60 as the stacking destination of the banknotes.

[0068] As a result, when the stacking pattern No. 4 is selected in the banknote handling apparatus 1, irrespective of the version, the orientation, and the issuing country of the banknotes, the fit notes of the denomination 10000 of the currency X are stacked in the first stacking unit 60a, the fit notes of the denomination 5000 of the currency X are stacked in the second stacking unit 60b, the fit notes of the denomination 2000 of the currency X are stacked in the third stacking unit 60c, and the fit notes of the denomination 1000 of the currency X are stacked in the fourth stacking unit 60d. Moreover, the identification letter of the unfit note of the currency X acquired first is set for the fifth stacking unit 60e, and the unfit notes having this identification letter are stacked therein in the denomination mixed state irrespective of the version and the orientation. Likewise, the identification letters of the banknotes recognized as the unfit notes of the currency X are allocated sequentially to the sixth stacking unit 60f to the eighth stacking unit 60h, and the unfit notes having the allocated identification letter are stacked therein in the denomination mixed state irrespective of the version and the orientation.

[0069] That is, the banknotes are sorted into the fit notes and the unfit notes, the fit notes are stacked in the first stacking unit 60a to the fourth stacking unit 60d and the unfit notes are stacked in the fifth stacking unit 60e to the eighth stacking unit 60h, the fit notes are sorted and stacked by the denomination in the four stacking units 60a to 60d. Moreover, the unfit notes are sorted and stacked by issuing country while automatically allocating the identification letter acquired by the recognition unit 55 to the four stacking units 60e to 60h.

[0070] In FIG. 6, an example in which the currency is specified in the currency setting, and the digit position and the identification letter of the banknote number is set in the banknote number setting; however, the setting method of the stacking pattern is not limited to this. For example, by registering previously information necessary to obtain the identification letter of each of the currencies in the memory 56, the setting can be performed by using this information. Specifically, with respect to the banknotes of the currency X, the digit position setting information indicating that the issuing country can be identified based on the identification letter at the 12th digit in the banknote number is previously registered in the memory 56. Then, for example, with respect to the setting for the first stacking unit 60a in the stacking pattern No. 1 shown in FIG. 6, after setting "currency X" in the currency setting, only the identification letter "A" is set in the banknote number setting. By specifying the "currency X" in the currency setting, the control unit 50 can refer the digit position setting information previously registered in the memory 56 and recognize that the issuing country can be identified based on the identification letter at the 12th digit in the banknote number of the currency X. Accordingly, sorting of the banknotes can be realized by simply setting "A" in the banknote number setting.

[0071] If a handling object currency of the banknote handling apparatus 1 is previously determined, the currency setting can be omitted, and only the identification letter is set in the banknote number setting. For example, if the banknote handling apparatus 1 is an apparatus for exclusive use of the currency X, the currency setting in the stacking pattern can be omitted, and only the identification letter is specified in the banknote number setting. In the stacking pattern setting, what kind of attributes are to be set, and how they are to be set, can be appropriately modified depending on how the banknote handling apparatus 1 is used.

[0072] In the banknote handling apparatus 1, as shown in FIGS. 5 and 6, the issuance origin is set by specifying the digit position of the identification letter included in the banknote number and the identification letter of this digit position. Alternatively, a plurality of issuance origins are previously registered in the banknote handling apparatus 1, and a desired issuance origin is set by selecting from the registered issuance origins.

[0073] FIGS. 7A to 7C are views for explaining a method of setting a type of banknotes to be stacked in the stacking units 60 by selecting from the issuance origins registered previously. FIG. 7A depicts an example of a setting screen, FIG. 7B depicts an example of issuance origin information registered previously, and FIG. 7C depicts a setting example of a stacking pattern.

[0074] As shown in FIG. 7B, for each currency, information of the issuance origin of the banknote and information on how to acquire an identification letter identifying the issuance origin of the banknote are registered previously in an associate manner in the memory 56. For example, based on the information shown in FIG. 7B, to identify that the banknote of the currency X was issued by the issuing country A, the control unit 50 shall recognize that it should be confirmed that the recognition letter at the 12th digit in the banknote number is A. Likewise, for example, to identify that the banknote of the currency Y was issued by the issuing bank A, the control unit 50 shall recognize that it should be confirmed that the identification letter at the second digit in the banknote number is J. Likewise, for example, to identify that the banknote of the currency Z was printed in the printing factory A, the control unit 50 shall recognize that it should be confirmed that the last letter of the banknote number is one of A to G.

[0075] When setting the issuance origins of the banknotes to be stacked in each of the stacking units 60a to 60h, the setting screen shown in FIG. 7A is displayed on the display unit 52, and the underlined parts in the screen are selected by operating the operation unit 51. By this operation, a list of issuance origins registered previously in the memory 56 as shown in FIG. 7B is displayed on the screen. A desired issuance origin can be set by selecting from the list on the screen.

[0076] FIG. 7A depicts an example in which the setting has been made so that the banknotes issued by the issuing

country A are stacked in the first stacking unit 60a, and the banknotes of the currency X issued by the issuing country B are stacked in the second stacking unit 60b. In this manner, when the issuance origins of the banknotes to be stacked in the stacking units 60 of the banknote handling apparatus are set and then the handling of banknotes of the currency X is started, the control unit 50 refers the information shown in FIG. 7B, and recognizes that it is necessary to extract the identification letter from the 12th digit in the banknote number to identify the issuance origin of the banknote. Then, the control unit 50 extracts the identification letter from the result of the character recognition of the banknote number obtained by the recognition unit 55, and identifies the issuance origin of the banknote. Accordingly, the banknotes are sorted and stacked by issuance origin in each of the stacking units 60a to 60h.

[0077] When setting the stacking pattern shown in FIG. 7C, the type of the banknotes to be stacked in each of the stacking units 60a to 60h can be set by selecting the issuance origin of the banknote. The stacking pattern shown in FIG. 7C depicts an example in which the setting same as the stacking pattern No. 1 shown in FIG. 6 is set by selecting the issuing country.

[0078] In the stacking pattern No. 1 shown in FIG. 6, for example, the currency setting of the first stacking unit 60a is set as "currency X" and the banknote number setting is set as "12-A", whereby the banknotes of the issuing country A, on which the recognition letter A is printed at the 12th digit in the banknote number, are set as the stacking object.

[0079] In contrast, in the example shown in FIG. 7C, by selecting the "issuing country A" as the issuance origin setting of the first stacking unit 60a, the banknotes of the issuing country A are set as the stacking object. When the stacking pattern shown in FIG. 7C is selected and the banknote handling is started in the banknote handling apparatus 1, the control unit 50 refers the information shown in FIG. 7B and recognizes that, for example, the setting of the first stacking unit 60a is set so that the banknotes of the currency X of which the identification letter at the 12th digit in the banknote number is A are stacked. Thus, by the control unit 50 referring to the information shown in FIG. 7B, in the same manner as when the stacking pattern No. 1 shown in FIG. 6 is selected, the banknotes of the currency X are sorted and stacked by the issuing country in each of the stacking units 60a to 60h.

[0080] FIGS. 1 and 2 show an example in which the banknote handling apparatus 1 includes the eight stacking units 60 of the first stacking unit 60a to the eighth stacking unit 60h. However, the structure of the banknote handling apparatus 1 is not limited the above-mentioned structure, and the number of the stacking units 60 is not particularly limited.

[0081] As shown in FIGS. 1 and 2, a structure that includes the receiving unit 11, the reject unit 65, the recognition unit 55, and the four stacking units 60a to 60d can be considered as a base unit, and one extension unit including the four stacking units 60e to 60h can be connected to this base unit. Alternatively, two or more extension units can be connected to the base unit. Moreover, alternatively, for example, instead of or in addition to the extension unit including the four stacking units 60e to 60h, a bundling unit that includes a bundling part that bundles the banknotes, and/or a cutting unit that includes a cutting part that cuts the banknotes can be connected to the base unit.

[0082] FIG. 8 is a schematic cross section of a configuration example of the banknote handling apparatus including the bundling unit for bundling the banknotes. The bundling unit includes three stacking units for bundling 210 (210a to 210c) for stacking therein the banknotes as the bundling object that have been transported by the transport unit 70 and sent from the base unit, a bundling part 250 that bundles with a bundling tape a predetermined number of the banknotes stacked in the stacking unit for bundling 210 thereby generating bundled banknotes, and a reject unit 290 arranged at an end of the transport unit 70 inside the bundling unit. A not-shown sensor that detects the presence or absence of banknote in the stacking unit for bundling 210 is arranged in the stacking unit for bundling 210.

[0083] Moreover, the bundling unit includes a pre-bundling transport unit 220 that transports the banknotes to be bundled from the stacking unit for bundling 210 to the bundling part 250, a post-bundling transport unit 260 that transports the bundled banknotes bundled by the bundling part 250, a bundled banknotes stacking unit 270 that stores therein the bundled banknotes transported by the post-bundling transport unit 260, and a not-shown bundle discharging unit. The bundle discharging unit protrudes the bundled banknotes stacking unit 270 on the front surface side of the apparatus, the operator can take out the bundled banknotes stored in the bundled banknotes stacking unit 270 to the outside of the apparatus.

[0084] The pre-bundling transport unit 220 has a function, when the number of the banknotes stacked in the stacking unit for bundling 210 reaches a predetermined number (for example, 100), to remove those banknotes and to transport them to the bundling part 250. The bundling part 250 winds a bundling tape around the banknotes of the predetermined number transported by the pre-bundling transport unit 220, and bundles the banknotes by thermal fixing the bundling tape and the like to obtain the bundled banknotes. Moreover, at the end of the banknote handling, if some banknotes are remaining in the stacking unit for bundling 210 without being bundled, the pre-bundling transport unit 220 removes such banknotes and transports them to a remaining banknote return outlet 285. The operator can remove the banknotes transported to the remaining banknote return outlet 285.

[0085] The post-bundling transport unit 260 includes a holding transport unit 261 that holds and transports the bundled banknotes bundled by the bundling part 250, and a bundled banknotes lifting unit 262 that transports upward in a vertical direction the bundled banknotes held by the holding transport unit 261. The bundled banknotes transported by the bundled banknotes lifting unit 262 are pushed by a not-shown pushing mechanism, and the bundled banknotes drops

from above in the bundled banknotes stacking unit 270 and stacks thereon.

[0086] When it is necessary to reject a reject banknote on the transport path downstream of the two reject units 65 arranged in the base unit, such a reject banknote is discharged in the reject unit 290 arranged at the end of the transport unit 70. For example, a banknote that could not be diverted to the stacking unit 60 and the stacking unit for bundling 210 due to a transportation error such as the skew, such a banknote is discharged as a reject banknote in the reject unit 290.

[0087] Even for the stacking units for bundling 210a to 210c, as shown in FIGS. 5 to 7C, the type of the banknotes can be set as the stacking objects. For example, it can be set that the banknotes of the issuing country A are stacked in the stacking unit for bundling 210a and bundled, the banknotes of the issuing country B are stacked in the stacking unit for bundling 210b and bundled, and the banknotes of the issuing country C are stacked in the stacking unit for bundling 210c and bundled. The number of the stacking units for bundling 210 is not limited to three. The number of the stacking units for bundling 210 can be equal to or less than two, or equal to or more than four.

[0088] One of the three stacking units for bundling 210 can be set as a spare stacking unit, and the stacking destination of the banknotes of the type that exceeded 100 in number can be changed to this spare stacking unit. For example, the banknotes of the issuing country A can be set as the bundling object, and a setting is made so that the banknotes of the issuing country A are stacked in the stacking unit for bundling 210 after aligning the face side up/back side up. Specifically, the stacking unit for bundling 210c is set as the spare stacking unit, and the banknotes of the issuing country A are stacked in the stacking unit for bundling 210a in face side up manner, and the banknotes of the issuing country A are stacked in the stacking unit for bundling 210b in back side up manner. When the number of the banknotes stacked in the face side up manner reaches 100, those banknotes of the issuing country A are stacked in the face side up manner in the stacking unit for bundling 210c that is set as the spare stacking unit while bundling the banknotes in the stacking unit for bundling 210a in the bundling part 250. When the stacking unit for bundling 210a becomes ready for stacking the banknotes, the stacking unit for bundling 210a is set as the spare stacking unit. Thus, by preparing the spare stacking unit, the banknotes of the issuing country A of face side up/back side up can be stacked in the corresponding stacking unit for bundling 210 and bundled by the bundling part 250 each time the number of the stacked banknotes reaches the predetermined number.

[0089] Similarly, for example, the stacking object in the stacking unit for bundling 210 can be set to the banknotes of the issuing country A and the banknotes of the issuing country B, and irrespective of whether the banknotes are face side up/back side up, the banknotes of the issuing country A and the banknotes of the issuing country B can be stacked in the corresponding stacking unit for bundling 210 and bundled each time the number of the stacked banknotes reaches the predetermined number.

[0090] FIG. 9 is a schematic cross section of a configuration example of the banknote handling apparatus including the cutting unit for cutting the banknotes. The banknotes that are transported by the transport unit 70 of the base unit and discharged in the cutting unit are cut by a cutting part 310. The paper scrap obtained when the banknote is cut is stored in a box 320. The box 320 can be removed from the banknote handling apparatus 1 and the paper scrap can be discarded from the box 320.

[0091] Even the type of the banknotes to be transported to the cutting unit can be set as shown in FIGS. 5 to 7C. Accordingly, for example, the issuing country of the banknotes to be transported to the cutting unit is set, so that the unfit note issued by the issuing country A are transported to the cutting unit without stacking in the stacking unit 60, and cut by the cutting part 310 and discarded.

[0092] In the banknote handling apparatus 1, for efficiently performing the recognition of the currency, the denomination, the version, the orientation, the authenticity, the fitness, and the issuance origin of the banknote and sorting the banknotes based on the recognition result, if an erroneous operation by the operator is predicted, the banknote handling can be terminated, and the operator can be prompted to confirm.

[0093] For example, assume that, while performing one handling (one transaction) in which the banknotes received by the receiving unit 11 are processed, the number of the banknotes that are stacked in the reject unit 65 as not being the handling object reaches the predetermined number. In this case, the control unit 50 determines that the stacking setting of the stacking unit 60 shown in FIGS. 5 to 7C or the type of the banknotes put in the receiving unit 11 may be wrong. The control unit 50 terminates the feeding of the banknotes from the receiving unit 11, and displays information on the display unit 52 to prompt the operator to check the stacking setting of the stacking unit 60 and to check whether the banknotes put in the receiving unit 11 are correct.

[0094] Specifically, for example, if the number of banknotes of non-selected currencies that are rejected because the result of the recognition by the recognition unit 55 indicates that the currencies of those banknotes were not set as the stacking object of the stacking unit 60 reached the predetermined number set previously for one handling, the control unit 50 determines that there may be an error in the stacking setting of the stacking unit 60, or the banknotes and the like put in the receiving unit 11 by the operator is wrong. Thereafter, the control unit 50 stops the banknote handling and in order to prompt the operator to check, displays a message such as "DIFFERENT CURRENCY, CONFIRM CURRENCY", on the display unit 52.

[0095] Moreover, for example, if the number of banknotes of non-selected denominations that are rejected because

the result of the recognition by the recognition unit 55 indicates that the denominations of those banknotes were not set as the stacking object of the stacking unit 60 reached the predetermined number set previously for one handling, the control unit 50 determines that there may be an error in the stacking setting of the stacking unit 60, or the banknotes and the like put in the receiving unit 11 by the operator is wrong. Thereafter, the control unit 50 stops the banknote handling and in order to prompt the operator to check, displays a message such as "DIFFERENT DENOMINATION, CONFIRM PATTERN" on the display unit 52.

[0096] When the banknote handling is stopped in the banknote handling apparatus 1 and the message prompting the operator to confirm is displayed on the display unit 52, the operator checks the stacking setting of the stacking unit 60 and the type of the banknotes put in the receiving unit 11. The operator checks the cause of the rejection of the large number of banknotes, and changes the stacking setting, replaces the banknotes put in the receiving unit 11 with appropriate banknotes, and the like as needed. If there is no mistake with the setting content or the banknotes put in the receiving unit, the operator operates the operation unit 51 to resume the banknote handling.

[0097] The determination condition used to prompt the operator can be changed as desired by changing the setting. For example, it is possible to set the determination condition, so that the operator is prompted when banknotes of non-selected currencies are detected in succession and the number of these detected banknotes has reached a predetermined number set previously. Also, it is possible to set the determination condition, so that the operator is prompted when banknotes of non-selected denominations are detected in succession and the number of these detected banknotes has reached a predetermined number set previously.

[0098] Moreover, the stacking unit 60 can be specified in the determination condition. For example, it is possible to set the determination condition, so that the operator is prompted when the number of banknotes stacked in this stacking unit 60 has reached a predetermined number set previously. Also, it is possible to set the determination condition, so that the operator is prompted when banknotes to be stacked in this stacking unit 60 are detected in succession and the number of these detected banknotes has reached a predetermined number set previously. Specifically, assume that a banknote of a certain currency and a certain denomination is included in handling objects of the banknote handling apparatus 1, however, this banknote is not expected to be handled in large numbers in one handling. In this case, the stacking unit for stacking such banknotes can be specified in the determination condition as above. Accordingly, when a large number of banknotes are stacked in the specified stacking unit in which it is not expected that these many banknotes would be stacked, the operator is prompted to check whether there is an error in the stacking setting and the like.

[0099] In the present embodiment, an example in which the issuance origin of the banknotes to be transported to the stacking unit 60, the stacking unit for bundling 210, and the cutting part 310 has been set is shown. However, even the issuance origin of the banknotes to be transported to the reject unit 65 can be set. For example, it is possible to set so that if the banknotes of the issuing country A are to be rejected, those banknotes are discharged in the first reject unit 65a, and if the banknotes of the issuing country B are to be rejected, those banknotes are discharged in the second reject unit 65b. Alternatively it is possible to set so that if the banknotes of the issuing country A are to be rejected, those banknotes are discharged in the first reject unit 65a, and all other reject banknotes are discharged in the second reject unit 65b. Moreover, an example in which the issuance origin is identified based on the character recognition of the identification letter is explained above. However, there are situations in which the information about the issuance origin is printed as a sign or a mark on each of the banknotes, or such information is recorded in the storage medium such as an IC chip embedded in each of the banknotes. In this case, the recognition unit 55 performs recognition of the sign or the mark, or reads the information from the storage medium, and each of the banknotes can be processed based on the issuance origin.

[0100] As stated above, with the banknote handling apparatus 1 according to the present embodiment, the banknotes can be sorted according to the issuance origin of the banknotes such as the issuing country, the financial institution, the printing bureau, the printing factory, and the like, that issued banknotes. For example, by setting the issuance origin of the banknotes to be stacked in each of the stacking units 60, the banknotes can be sorted and stacked in the stacking units 60 by the issuance origin.

[0101] In the banknote handling apparatus 1, the issuance origin of the banknote can be identified by performing character recognition of the identification letter, which indicates the issuance origin, printed on the banknote. For example, when the identification letter that indicates the issuance origin is included in the banknote number as a part of the banknote number, the digit position of the identification letter in the banknote number can be specified, and the stacking object banknote can be set for each of the stacking units 60 so that the banknotes are sorted according to the character recognition result obtained at the specified digit position.

[0102] Moreover, when the banknote handling apparatus 1 includes the bundling unit, the bundling unit can bundle the banknotes of a predetermined issuance origin. When the banknote handling apparatus 1 includes the cutting unit, the cutting unit can cut the unfit note of a predetermined issuing country.

Second Embodiment

[0103] In the first embodiment, an example in which the banknotes are sorted and stacked by the issuing country is explained; however, in the banknote handling apparatus according to the present invention, other than the issuing country, the banknotes can be handled according to the financial institution, the printing bureau, the printing factory, and the like that issued banknotes. In the present embodiment, a method of handling the banknotes depending on the issuing bank is explained. A banknote handling apparatus according to the present embodiment has a configuration that is partially different from that of the apparatus according to the first embodiment.

[0104] In the banknote handling apparatus according to the present embodiment, information that indicates an association of the currency, the issuance origin, and the identification letter as shown in FIG 7B is prepared previously. By using this information, the banknote handling apparatus identifies the issuing bank that issued the banknote based on the identification letter of the banknote. Then, a stacking destination of each of the banknotes corresponding to the identified issuing bank can be determined based on the issuing bank specified in the item "issuance origin" in the stacking pattern.

[0105] FIG. 10 depicts a schematic internal configuration of a banknote handling apparatus 400 according to the present embodiment. In the banknote handling apparatus 400, a money deposit process and a money dispensing process can be performed by using a receiving inlet 410 and a discharge outlet 420 each having an opening that opens to the outside of the apparatus. In the money deposit process, the banknote handling apparatus 400 takes inside the apparatus the deposited banknotes put in the receiving inlet 410, and stores those banknotes inside the apparatus. In the money dispensing process, the banknote handling apparatus 400 discharges the banknotes that have been stored inside the apparatus to the discharge outlet 420 as dispensed banknotes.

[0106] As shown in FIG. 10, inside the banknote handling apparatus 400 is arranged a loop-like transport path constituting a transport unit 470. To the loop-like transport path are connected the receiving inlet 410, the discharge outlet 420, a recognition unit 455, a first storing and feeding unit 461 to a fourth storing and feeding unit 464, a collecting unit 465, and a temporarily stacking unit 480. Although not show in FIG. 10, in addition, the banknote handling apparatus 400 includes a control unit that controls various structural components, a memory that stores therein various data such as a computer program and setting information necessary to operate the control unit, and an operation/display unit for inputting and displaying various information.

[0107] The first storing and feeding unit 461 to the fourth storing and feeding unit 464 perform storing of the banknotes and feeding of the banknotes inside the apparatus. The operator can set so that, in the money deposit process, the deposited banknotes are stored in the first storing and feeding unit 461 to the fourth storing and feeding unit 464, and, in the money dispensing process, the banknotes being stored in the first storing and feeding unit 461 to the fourth storing and feeding unit 464 are fed as the dispensed banknotes to the transport path for circulation use. "Circulation use" means reusing of the banknotes. In the circulation use, the banknotes once stored in the storing and feeding unit (461 to 464) during the money deposit process can be dispensed again as the dispensed banknote.

[0108] The collecting unit 465 is a cassette-type banknote storing unit removably attached to the banknote handling apparatus 400. The operator can remove the collecting unit 465 from the banknote handling apparatus 400 while the banknotes are still being stored in the collecting unit 465 thereby collecting the banknotes. The collecting unit 465 has a function to store the banknotes but the collecting unit 465 cannot feed the stored banknotes to the transport path. Therefore, the collecting unit 465 is used to stack the banknotes of the type that are not to be circulated in the banknote handling apparatus 400, the banknotes that cannot be stored in the first storing and feeding unit 461 to the fourth storing and feeding unit 464, and the like, are stored in the collecting unit 465.

[0109] In the money deposit process, deposited banknotes received in the receiving inlet 410 is fed inside the apparatus one by one, and the fed banknote is transported by the transport unit 470. The recognition unit 455 recognizes the currency, the denomination, the version, the orientation, the authenticity, the fitness, and the issuance origin of the deposited banknotes that are transported on the transport path, and counts the banknotes. Moreover, in the same manner as in the first embodiment, the recognition unit 455 performs character recognition of the letters, such as the banknote number, printed on each of the banknotes, and recognizes the type and the issuance origin of each of the banknotes.

[0110] The reject banknotes that could not be recognized by the recognition unit 455 and the like, is discharged to the discharge outlet 420. On the other hand, the banknote that could be recognized by the recognition unit 455 is temporarily stored in the temporarily stacking unit 480. When the recognition and counting process of all the deposited banknotes received in the receiving inlet 410 is completed by the recognition unit 455, the not-shown control unit controls the operation/display unit to display the result of the recognition and counting process of the deposited banknotes. The operator checks the result of the recognition and counting process and confirms the money deposit process by operating the operation/display unit. When the money deposit process is confirmed by the operator, the control unit feeds the banknotes stored in the temporarily stacking unit, one by one sequentially, to the transport path. The control unit determines, from among the first storing and feeding unit 461 to the fourth storing and feeding unit 464 and the collecting unit

465, a stacking destination of each of the banknotes fed to the transport path. Then, the control unit performs control by which each of the banknotes is transported to the determined stacking destination and stacked therein. The stacking destination of each of the banknotes fed from the temporarily stacking unit is determined based on the recognition result of each of the banknotes obtained by the recognition unit 455 and the stacking pattern set previously.

[0111] FIG. 11 depicts an example of the stacking pattern used in the banknote handling apparatus 400 shown in FIG. 10. No setting regarding the version and the orientation is made in the stacking pattern shown in FIG. 11, and therefore the control unit does not use the information of the version and the information of the orientation when determining the stacking destination of the banknotes. It is assumed that the banknotes of the same type are issued by a plurality of banks. Specifically, the banknotes of denominations D1 to D4 of a currency Y shown in the FIG. 11 are issued by two banks A and B.

[0112] In the stacking pattern shown in the FIG. 11, a fit note ("FIT" in figure) of the denomination D1 issued by the bank A is stored in the first storing and feeding unit 461, a fit note of the denomination D2 issued by the bank A is stored in the second storing and feeding unit 462, a fit note of the denomination D3 issued by the bank A is stored in the third storing and feeding unit 463, and a fit note of the denomination D4 issued by the bank A is stored in the fourth storing and feeding unit 64. Moreover, an unfit note ("UNFIT" in figure) issued by the bank A is collect in the collecting unit 465 in the denominations mixed state. Moreover, the banknotes issued by the bank B, irrespective of whether a fit note or an unfit note, are collected in the collecting unit 465 in the denominations mixed state.

[0113] That is, the stacking pattern shown in the FIG. 11 is set so that the fit notes issued by the bank A are sorted and stored by denomination in the first storing and feeding unit 461 to the fourth storing and feeding unit 464 for circulation use, and the unfit notes issued by the bank A and banknotes issued by the bank B are collected in the collecting unit 465 irrespective of the denomination thereof.

[0114] In FIG. 11, a setting example in which "MIX" is set for the item of the denomination to collect all the banknotes issued by the bank B; however, it is possible to set so that such an item of the denomination is not specified. When it is set not to specify the item of the denomination, all the banknotes issued by the bank B can be collected in the collecting unit 465 without using the denomination information when determining the stacking destination of the banknote. Moreover, because there are two issuance origins of the banknotes, that is, the bank A and the bank B, FIG. 11 shows a setting example in which "bank B" is set in the item of the issuance origin; however, it is possible to set the item of the issuance origin as "other than the bank A". If there are many issuing banks, setting can be performed easily by specifying the banks to be excluded.

[0115] After the operator has performed the operation to confirm the money deposit process, each of the banknotes fed from the temporarily stacking unit 480 is stored in one of the first storing and feeding unit 461 to the fourth storing and feeding unit 464 and the collecting unit 465 based on the recognition result obtained by the recognition unit 455 and the stacking pattern shown in the FIG. 11. In the money dispensing process, the control unit receives the specified denomination and the specified number (amount) of the banknotes to be dispensed, controls the transport unit 470 to feed each of the banknotes sequentially from a corresponding storing and feeding unit among the first storing and feeding unit 461 to the fourth storing and feeding unit 464. The fed banknotes are transported to and discharged in the discharge outlet 420 as dispensed banknotes. For example, when dispensing 10 banknotes of the denomination D1 in the money dispensing process, in the conventional apparatus, irrespective of whether the banknotes have been issued by the bank A or have been issued by the bank B, the banknotes of the denomination D1 will be dispensed in the issuance origin mixed state. However, in the banknote handling apparatus 400 according to the present embodiment, only the banknotes of the denomination D1 issued by the bank A can be dispensed from the first storing and feeding unit 461.

[0116] As has been explained above, in the banknote handling apparatus according to the present embodiment, the banknotes can be handled based on the financial institutions, such as banks, that issued the banknotes. For example, the banknote handling apparatus 400 can be installed at the teller window of the head office and the branch office of the bank A, and the stacking pattern shown in FIG. 11 is set. As a result, the banknotes issued by other banks can be collected in the collecting unit 465 so as not to be circulated. Only the banknotes issued by own bank can be sorted and stored by denomination in the first storing and feeding unit 461 to the fourth storing and feeding unit 464 for circulation use, and stored banknotes can be used as the dispensed banknotes at the teller window.

Third Embodiment

[0117] In the present embodiment, a method of handling the banknotes depending on the issuing bank and the use object of the banknotes is explained. A banknote handling apparatus according to the present embodiment has a configuration that is partially different from that of the apparatus according to the first embodiment and the apparatus according to the second embodiment. Even in the banknote handling apparatus according to the present embodiment, information that indicates an association of the currency, the issuance origin, and the identification letter is prepared previously as shown in FIG. 7B. By specifying the issuing bank in the item of the issuance origin in the stacking pattern, the issuing bank of each of the banknotes is identified from the identification letter included in the banknote number,

and the stacking destination corresponding to the identified issuing bank of each of the banknotes can be determined.

[0118] FIG. 12 depicts a schematic internal configuration of a banknote handling apparatus 500 according to the present embodiment. In the banknote handling, handling object banknotes are put in a receiving unit 510. The banknote handling apparatus 500 includes a reject unit 520 for stacking a reject banknote, a first bundled banknotes stacking unit 571 and a second bundled banknotes stacking unit 572 for respectively stacking bundled banknotes, and a first loose banknotes stacking unit 581 and a second loose banknotes stacking unit 582 for respectively stacking loose banknotes. Each of the reject unit 520, the first bundled banknotes stacking unit 571 and the second bundled banknotes stacking unit 572, and the first loose banknotes stacking unit 581 and the second loose banknotes stacking unit 582 has an opening that opens to the outside of the apparatus. The operator can remove the banknotes stacked in the stacking unit from the opening thereof. Inside the apparatus is arranged a bundling part 560 for stacking loose banknotes that have been transported from a recognition unit 555 and bundling the stacked loose banknote with a bundling tape when the stacked number thereof reaches a predetermined number to form bundled banknotes. Although not show in FIG. 12, in addition, the banknote handling apparatus 500 includes a control unit that controls various structural components, a memory that stores therein various data such as a computer program and setting information necessary to operate the control unit, and an operation/display unit for inputting and displaying various information.

[0119] When the operator puts banknotes in the receiving unit 510 and starts the banknote handling, the banknotes put in the receiving unit 510 are fed inside the apparatus one by one, and the fed banknotes are transported by a transport unit 570. The recognition unit 555 recognizes the currency, the denomination, the version, the orientation, the authenticity, the fitness, and the issuance origin of the banknotes that are transported on the transport path, and counts the banknotes. Moreover, in the same manner as in the second embodiment, the recognition unit 555 performs character recognition of the letters, such as the banknote number, printed on each of the banknotes, and recognizes the type and the issuing bank of each of the banknotes.

[0120] The reject banknote that could not be recognized by the recognition unit 555 and the like is discharged to the reject unit 520. The banknote that could be recognized by the recognition unit 455 is handled based on the recognition result obtained by the recognition unit 555 and the stacking pattern set previously.

[0121] FIG. 13 depicts an example of the stacking pattern used in the banknote handling apparatus 500 shown in FIG. 12. No setting regarding the version and the orientation is made in the stacking pattern shown in FIG. 13, and therefore the control unit does not use the information of the version and the information of the orientation when determining the stacking destination of the banknotes. It is assumed that the banknotes of the currency Y shown in the FIG. 13 are issued by three banks A, B, and C.

[0122] In the stacking pattern A1 shown in the FIG. 13, among the banknotes issued by the bank A, fit notes for ATMs (automatic teller machine) (ATM fit notes, "A-FIT" in figure) are stacked in the first bundled banknotes stacking unit 571, and among the banknotes issued by the bank A, fit notes for teller (teller fit note, "T-FIT" in figure) are stacked in the second bundled banknotes stacking unit 572. On the other hand, the setting is set such that the banknotes issued by the bank B are stacked in the first loose banknotes stacking unit 581 irrespective of the fitness of the banknotes, and the banknotes issued by the bank C are stacked in the second loose banknotes stacking unit 582 irrespective of the fitness of the banknotes. The teller fit note and the ATM fit note depict another attribute for sorting the fit notes. Among the fit notes that can be circulated, the banknote that can be used as the dispensed banknote by a teller at a teller window of a bank is sorted as the teller fit note, and a banknote that is in a better state than the teller fit note and therefore suitable for machine handling is sorted as the ATM fit note.

[0123] When the stacking pattern A1 is selected and the banknote handling is started, the loose banknotes issued by the bank B are stacked in the loose state in the first loose banknotes stacking unit 581 irrespective of the fitness of the banknotes, and the loose banknotes issued by the bank C are stacked in the loose state in the second loose banknotes stacking unit 582 irrespective of the fitness of the banknotes. On the other hand, bundled banknotes obtained by the bundling part 560 by bundling a predetermined number of banknotes stacked in the first bundled banknotes stacking unit 571 and the second bundled banknotes stacking unit 572. Therefore, the ATM fit bundled banknotes issued by the bank A are stacked in the first bundled banknotes stacking unit 571, and the teller fit bundled banknotes issued by the bank A are stacked in the second bundled banknotes stacking unit 572.

[0124] In the stacking pattern B1 shown in the FIG. 13, the setting is set such that a predetermined number of the ATM fit notes issued by the bank B are bundled and stacked in the first bundled banknotes stacking unit 571, and a predetermined number of the teller fit notes issued by the bank B are bundled and stacked in the second bundled banknotes stacking unit 572. Moreover, the setting is set such that the banknotes issued by the bank A are stacked in the first loose banknotes stacking unit 581 in the loose state irrespective of the fitness of the banknotes, and the banknotes issued by the bank C are stacked in the second loose banknotes stacking unit 582 in the loose state irrespective of the fitness of the banknotes.

[0125] In the stacking pattern C1 shown in the FIG. 13, the setting is set such that a predetermined number of the ATM fit notes issued by the bank C are bundled and stacked in the first bundled banknotes stacking unit 571, and a predetermined number of the teller fit notes issued by the bank C are bundled and stacked in the second bundled

banknotes stacking unit 572. Moreover, the setting is set such that the banknotes issued by the bank A are stacked in the first loose banknotes stacking unit 581 in the loose state irrespective of the fitness of the banknotes, and the banknotes issued by the bank B are stacked in the second loose banknotes stacking unit 582 in the loose state irrespective of the fitness of the banknotes.

[0126] In the stacking pattern A2 shown in the FIG. 13, the setting is set such that a predetermined number of the teller fit notes issued by the bank A are bundled and stacked in the first bundled banknotes stacking unit 571, and a predetermined number of the ATM fit notes issued by the bank A are stacked in the first loose banknotes stacking unit 581 is the loose state. Moreover, the setting is set such that the banknotes issued by the bank B and the banknotes issued by the bank C are stacked in the second loose banknotes stacking unit 582 in the mixed and loose state irrespective of the fitness of the banknotes.

[0127] For example, assume that handling to sort the banknotes based on the denomination and the fitness of the banknotes was performed by using a conventional banknote handling apparatus to prepare only fit notes of one denomination. Because the conventional apparatus cannot recognize the issuance origin of the banknotes, the prepared banknotes will be in an issuing bank mixed state. That is, the prepared banknotes will contain a mixture of the fit notes issued by the bank A, the fit notes issued by the bank B, and the fit notes issued by the bank C.

[0128] In this case, these banknotes containing only the fit notes of one denomination can be put in the receiving unit 510 of the banknote handling apparatus 500, and the banknote handling is started after selecting the stacking pattern A1. As a result, with the banknote handling apparatus 500, the banknotes put in the receiving unit 510 are sorted into the banknotes issued by the bank A, the banknotes issued by the bank B, and the banknotes issued by the bank C. Moreover, the fit notes issued by the bank A are sorted into the ATM fit notes and the teller fit notes. Furthermore, the ATM fit notes and the teller fit notes issued by the bank A are stacked in a bundled state in which the predetermined number of the banknotes is bundled.

[0129] By using the banknote handling apparatus 500 in a cash center that prepares banknotes for various banks, for example, for a branch of the bank A, a branch of the bank B, a branch of the bank C, and the like, it is possible to easily prepare for each of the banks the banknotes issued by own bank. Specifically, by performing the banknote handling with the stacking pattern A1, the ATM fit bundled notes and the teller fit notes to be carried to the branch of the bank A can be prepared by using only the banknotes issued by the bank A. Similarly, by selecting the stacking pattern B1, the ATM fit bundled notes and the teller fit bundled notes to be carried to the branch of the bank B can be prepared by using only the banknotes issued by the bank B. Moreover, by selecting the stacking pattern C1, the ATM fit bundled notes and the teller fit bundled notes to be carried to the branch of the bank C can be prepared by using only the banknotes issued by the bank C.

[0130] In the banknote handling apparatus 500, the stacking pattern is directly and manually specified by operating the operation/display unit. Alternatively, information about a storage container for storing and carrying the banknotes can be input into the banknote handling apparatus 500 thereby automatically setting the corresponding stacking pattern.

[0131] In the banknote handling apparatus 500, storage container information, in which a storage container ID for identifying each of a plurality of storage containers and a stacking pattern are associated with each other, is prepared previously. FIG. 14 depicts an example of the storage container information. An item "issuing bank" shown in the FIG. 14 is information indicating the issuing bank of the banknote. An item "ATM-ID" is ATM identification information for identifying an ATM installed in a branch of a bank. An item "storage container ID" is storage container identification information for identifying a storage container of banknotes to be carried to a branch of a bank. An item "stacking pattern" is information indicating a stacking pattern associated with a storage container.

[0132] FIGS. 15A and 15B are schematic diagrams for explaining a method of preparing banknotes by using a storage container. FIG. 15A depicts an example for preparing the banknotes for a branch of the bank A, and FIG. 15B depicts an example for preparing the banknotes for a branch of the bank B.

[0133] A tag with a storage container ID stored therein is attached to the storage container used for carrying the banknotes to the branches of a certain bank. As shown in FIG. 15A, when preparing the banknotes for a branch of the bank A, the storage container ID stored in a tag 701 of a storage container 601 for exclusive use of the bank A is input into the banknote handling apparatus 500. The storage container ID can be manually input by operating the operation/display unit of the banknote handling apparatus 500. Alternatively, the storage container ID can be input by reading the storage container ID from the tag 701 by using an input device such as a scanner and a camera connected to the banknote handling apparatus 500.

[0134] When the storage container ID "A-11" stored in the tag 701 of the storage container 601 is input into the banknote handling apparatus 500, by referring to the storage container information shown in FIG. 14, the control unit of the banknote handling apparatus 500 recognizes that the corresponding stacking pattern is the stacking pattern A1 shown in the FIG. 13. Then, when the operator puts banknotes 110, which are fit notes of one denomination and in the issuing bank mixed state, in the receiving unit 510 of the banknote handling apparatus 500 and starts the banknote handling, the not-shown control unit performs the banknote handling by using the stacking pattern A1. As a result, as shown in FIG. 15A, in the banknote handling apparatus 500, the banknotes 110 are sorted in ATM fit bundled banknotes 121 issued by the bank

A, teller fit bundled banknotes 122 issued by the bank A, loose banknotes 131 issued by the bank B, and loose banknotes 132 issued by the bank C. The operator packs the ATM fit bundled banknotes 121 issued by the bank A in the storage container 601 and packs the teller fit bundled banknotes 122 issued by the bank A in another storage container 602 to prepare the banknotes for use in the branch of the bank A. Then, the two storage containers 601 and 602 are carried to the branch of the bank A. In the branch, the ATM fit bundled banknotes 121 are taken out from the storage container 601 and used in the ATM, and the teller fit bundled banknotes 122 are taken out from the storage container 602 and used by the teller at the bank window.

[0135] When preparing the banknotes for use in a branch of the bank B, similarly, the storage container ID stored in a tag 702 of a storage container 611 for exclusive use of the bank B is input into the banknote handling apparatus 500. As a result, as shown in FIG. 15B, the banknote handling is performed by using the stacking pattern B1, the banknotes 110, which are fit notes of one denomination and in the issuing bank mixed state, are sorted into ATM fit bundled banknotes 141 issued by the bank B, teller fit bundled banknotes 142 issued by the bank B, loose banknotes 151 issued by the bank A, and the loose banknotes 132 issued by the bank C. The operator packs the ATM fit bundled banknotes 141 issued by the bank B in the storage container 611 and packs the teller fit bundled banknotes 142 issued by the bank B in another storage container 612 to prepare the banknotes for use in the branch of the bank B.

[0136] A bag-shaped storage container is shown in the FIG. 15; however, a banknote cassette can be used for transporting the banknotes. When using the banknote cassette, a storage container ID attached to the banknote cassette is input into the banknote handling apparatus 500. Thus, the banknote handling can be performed by using a stacking pattern corresponding to the banknote cassette. For example, when a storage container ID "CST-01" is input into the banknote handling apparatus 500 from a banknote cassette for exclusive use in a branch of the bank A, the stacking pattern A1 is selected based on the storage container information shown in the FIG. 14. Thus, it is possible to prepare the bundled banknotes by using only the banknotes issued by the bank A, pack the banknotes in the banknote cassette, and carry the banknotes.

[0137] Moreover, it is possible to transport the banknotes by using an ATM cassette that can be detachably attached to an ATM. FIG. 16 is a schematic diagram for explaining a method of preparing banknotes by using the ATM cassette.

[0138] An ATM cassette 621 shown in the FIG. 16 is a banknote cassette that can be detachably attached to an ATM installed in a branch of the bank A. When a storage container ID "ATM-C01" stored in a tag 703 of the ATM cassette 621 is input into the banknote handling apparatus 500, by referring to the storage container information shown in FIG. 14, the control unit of the banknote handling apparatus 500 recognizes that the corresponding stacking pattern is the stacking pattern A2 shown in the FIG. 13. Then, when the operator puts banknotes 111 that are fit notes of one denomination and in the issuing bank mixed state in the receiving unit 510 of the banknote handling apparatus 500 and starts the banknote handling, the control unit performs the banknote handling by using the stacking pattern A2. As a result, as shown in FIG. 16, in the banknote handling apparatus 500, the banknotes 111 are sorted into teller fit bundled banknotes 161 issued by the bank A, ATM fit loose bundled banknotes 171 issued by the bank A, and the loose banknotes 172 issued by the bank B and the bank C. The operator packs the teller fit bundled banknotes 161 issued by the bank A in the storage container 602 and packs the ATM fit loose bundled banknotes 171 issued by the bank A in the ATM cassette 621 to prepare the banknotes for use in the branch of the bank A. Then, the storage containers 602 and the ATM cassette 621 are carried to the branch of the bank A. In the branch, the teller fit bundled banknotes 161 are taken out from the storage container 602 and used by the teller at the teller window. The ATM cassette 621 can be attached directly to the ATM and stacked banknotes are used in ATM, without taking out the banknotes from the cassette.

[0139] An example of inputting the storage container ID into the banknote handling apparatus 500 is explained above. Alternatively, bank information or ATM information can be input. For example, in the banknote handling apparatus 500, upon receiving input of the bank information such as a name of the bank A, an identification number of the bank A, a branch name of the bank A, and an identification number of the branch, the stacking pattern, such as the stacking pattern A1 and A2 is selected so that the banknotes are prepared for the branch by using the banknotes issued by the bank A. In this example, when the bank information about the bank B or the branch of the bank B is input, the stacking pattern such as the stacking pattern B1 to prepare the banknotes for the branch by using the banknotes issued by the bank B is selected. Moreover, when the bank information about the bank C or the branch of the bank C is input, the stacking pattern such as the stacking pattern C1 to prepare the banknotes for the branch by using the banknotes issued by the bank C is selected. Moreover, for example, when the banknote handling apparatus 500 receives the input of ATM identification information indicating an ATM of the bank A, the stacking pattern, such as the stacking pattern A1 and A2 is selected to prepare the banknotes for the branch by using the banknotes issued by the bank A. In this example, when ATM identification information indicating an ATM of the bank B is input, the stacking pattern such as the stacking pattern B1 to prepare the banknotes for the branch by using the banknotes issued by the bank B is selected. Moreover, when ATM identification information indicating an ATM of the bank C is input, the stacking pattern such as the stacking pattern C1 to prepare the banknotes for the branch by using the banknotes issued by the bank C is selected.

[0140] While the banknotes for the branch are being prepared, information about the type and quantity of the banknotes stacked in each of the first bundled banknotes stacking unit 571, the second bundled banknotes stacking unit 572, the

first loose banknotes stacking unit 581, and the second loose banknotes stacking unit 582 is displayed on the operation/display unit of the banknote handling apparatus 500. Specifically, as the type information of the banknote, the currency, the denomination, the version, the orientation, the authenticity, the fitness, and the issuance origin are displayed.

[0141] Moreover, as quantity information of the banknotes being handled in the banknote handling apparatus 500, the number and the amount of the banknotes that have been currently stacked, and the total number and the total amount of the banknotes that have been stacked after starting the banknote handling can be displayed. For example, when displaying the quantity information of the banknotes that have been stacked in the first bundled banknotes stacking unit 571, assume that 13 bundles of 100 bundled banknotes have been stacked in the first bundled banknotes stacking unit 571 after starting the banknote handling, and that among them 10 bundles have been already removed from the first bundled banknotes stacking unit 571. In this case, "300 banknotes (total 1300 banknotes)" can be displayed on the operation/display unit. Accordingly, the operator can recognize that the number of the banknotes that have been currently stacked is 300 and that the total 1300 banknotes were stacked after starting the banknote handling. Moreover, if the banknote is a 1-dollar note, "300 dollars (total 1300 dollars)" can be displayed. Accordingly, the operator can recognize the amount of the banknotes that have been currently stacked and the total amount of the banknotes that were stacked after starting the banknote handling. When displaying information about the first loose banknotes stacking unit 581, similarly, assume that 150 banknotes of 5-dollar have been stacked after starting the banknote handling, and that among them 100 banknotes have been already removed. In this case, "50 banknotes (total 150 banknotes), 250 dollars (total 550 dollars)" can be displayed. Accordingly, the operator can recognize that the number and the amount of the banknotes that have been currently stacked is 50 and 250 dollars, respectively, and that the total number and the total amount of the banknotes that were stacked after starting the banknote handling is 150 and 750 dollars, respectively.

[0142] The type of the information to be displayed on the operation/display unit to notify the operator can be changed as desired by changing the setting. Specifically, information to be displayed as the type information of the banknote can be selected from the currency, the denomination, the version, the orientation, the authenticity, the fitness, and the issuance origin. Similarly, with regard to the quantity information, other than the setting for displaying both the total quantity of the banknotes that were stacked after starting the banknote handling and the total quantity of the banknotes that have been currently stacked, a setting can be made to display only one of them. Moreover, whether to display the quantity by using both the number of the banknotes and the amount of money or by using only one between them, can be set as desired. Moreover, a setting can be made so as to display the quantity by the issuance origin. Furthermore, the quantity of the banknotes stacked in each of the stacking units can be displayed by the issuance origin. Alternatively, the total of the quantity of the banknotes stacked in all the stacking unit can be calculated, and the quantity of the banknote handled by the banknote handling apparatus 500 can be displayed by the issuance origin. For example, it is possible to display the stacked number of the banknotes by the issuance origin and the stacked number of all the banknotes calculated by adding the stacked number by the issuance origin on one operation/display unit of the banknote handling apparatus 500 by switching the display. Specifically, the control unit controls the display on the operation/display unit to be switched in the order of "bank A: Na notes", "bank B: Nb notes", "bank C: Nc notes", "total: Nd notes" (where Nd = Na+Nb+Nc).

[0143] In the third embodiment, the banknote handling apparatus 500 having the bundled banknotes stacking units 571 and 572 is explained as an example. However, the banknote handling apparatus according to the third embodiment is not limited to the apparatus that stacks the bundled banknotes. That is, the bundling unit and the bundled banknotes stacking unit can be omitted. In a banknote handling apparatus that can handle only loose banknotes, the banknote handling explained in the third embodiment can be performed by using the stacking pattern and the storage container information. In this case, the stacking pattern shown in FIG. 13 will have the setting for only the loose banknotes stacking unit but not for the bundled banknotes stacking unit, and banknote attributes such as the fitness and the issuance origin will be set for each of the loose banknotes stacking units.

[0144] As has been explained above, in the banknote handling apparatus according to the present embodiment, the banknotes can be handled based on the financial institutions, such as the banks, that issued the banknotes. Accordingly, for example, at a base, such as a cash center where the banknotes for use in the branches of the banks are prepared, the banknotes can be sorted based on the issuing bank that issued the banknotes, and the banknotes for a certain branch of a certain bank can be prepared with only the banknotes issued by this bank. Moreover, by previously preparing the stacking patterns, which allow sorting and stacking of the banknotes based on the issuing bank, for the branches of each of the banks, it is possible to prepare the banknotes by simply changing stacking pattern.

[0145] Note that, the embodiments explained above are only exemplary in all the respect and should not be interpreted in a limiting manner. The scope of the present invention is disclosed in the patent claims and not in the above embodiments. Furthermore, the scope of the present invention construed so as to encompass all the changes that fall within the meaning and the scope of the equivalents of the scope of the patent claims.

[Industrial Applicability]

[0146] As explained above, the banknote handling apparatus and banknote handling method according to present invention are useful in recognizing an issuance origin of banknotes of one currency and sorting the banknotes by the issuance origin.

[Explanation of Reference Numerals]

[0147]

1, 400, 500	Banknote handling apparatus
10	Feed unit
11, 510	Receiving unit
50	Control unit
51	Operation unit
52	Display unit
55, 455, 555	Recognition unit
56	Memory
60, 60a to 60h	Stacking unit
62a to 62h	Display unit
65, 65a, 65b, 290, 520	Reject unit
70, 470, 570	Transport unit
71	Diverter
72, 73	Sensor
210, 210a to 210c	Stacking unit for bundling
220	Pre-bundling transport unit
250, 560	Bundling part
260	Post-bundling transport unit
261	Holding transport unit
262	Bundled banknotes lifting unit
270	Bundled banknotes stacking unit
285	Remaining banknote return outlet
310	Cutting part
320	Box
410	Receiving inlet
420	Discharge outlet
461 to 464	Storing and feeding unit
465	Collecting unit
480	Temporal stacking unit
571, 572	Bundled banknotes stacking unit
581, 582	Loose banknotes stacking unit
601, 602, 611, 612	Storage container
621	ATM cassette

Claims

1. A banknote handling apparatus comprising:

a receiving unit that receives a plurality of banknotes;
a transport unit that transports the banknotes received in the receiving unit one by one;
a plurality of stacking units that stack the banknote transported by the transport unit;
a recognition unit that recognizes identification information indicating an issuance origin of the banknote transported by the transport unit; and
a control unit that controls to sort and stack each of the banknotes of one currency in one of the plurality of stacking units corresponding to the issuance origin of each of the banknotes based on the identification information recognized by the recognition unit.

2. The banknote handling apparatus as claimed in claim 1, wherein
the recognition unit recognizes fitness of the banknote, and
the control unit controls to stack only unfit notes issued by one issuance origin in one of the plurality of stacking units to sort the unfit notes by issuance origin in the plurality of stacking units.

3. The banknote handling apparatus as claimed in claim 1 or 2, wherein
the recognition unit recognizes fitness of the banknote, and
the control unit controls to stack fit notes issued by different issuance origins in one of the plurality of stacking units.

4. The banknote handling apparatus as claimed in any of claims 1 to 3, wherein the recognition unit recognizes a banknote number of each of the banknotes and identifies the identification information included in the banknote number.

5. The banknote handling apparatus as claimed in any of claims 1 to 4, further comprising
a memory that stores sort setting information in which information about the issuance origin of banknotes to be stacked in each of the plurality of stacking units is set, wherein
the control unit controls to sort and stack each of the banknotes in one of the plurality of stacking units corresponding to the issuance origin based on the sort setting information.

6. The banknote handling apparatus as claimed in claim 5, wherein
the identification information is information of at least one letter of the banknote number of the banknote,
the sort setting information includes digit position setting information in which a digit position of the at least one letter in the banknote number is set, and
the recognition unit recognizes the identification information included in a recognized banknote number based on the digit position setting information.

7. The banknote handling apparatus as claimed in claim 6, wherein in the sort setting information, the information of at least one letter is allocated to each of the plurality of stacking units.

8. The banknote handling apparatus as claimed in claim 6, wherein in the sort setting information, a plurality of pieces of the information of at least one letter are allocated to each of the plurality of stacking units.

9. The banknote handling apparatus as claimed in any of claims 5 to 8, wherein in the sort setting information, at least one among a denomination, fitness, an orientation, and a version of banknotes to be stacked in each of the plurality of stacking units is set.

10. The banknote handling apparatus as claimed in any of claims 1 to 9, further comprising a bundling part that bundles a predetermined number of banknotes, wherein
the control unit controls the bundling part to bundle the banknotes of a predetermined issuance origin.

11. The banknote handling apparatus as claimed in any of claims 1 to 9, further comprising a cutting part that cuts a banknote, wherein
the control unit controls the cutting part to cut a banknote of a predetermined issuance origin.

12. The banknote handling apparatus as claimed in any of claims 1 to 11, wherein the identification information is information of at least one among a country, a financial institution, a printing bureau, and a printing factory that issued the banknote.

13. The banknote handling apparatus as claimed in any of claims 1 to 12, wherein the control unit receives information to identify a financial institution and controls to sort the banknotes into the banknotes issued by the issuance origin corresponding to the financial institution and the banknotes issued by other issuance origins and stack the banknotes by the issuance origin.

14. The banknote handling apparatus as claimed in claim 13, wherein the control unit controls to acquire, as the information to identify the financial institution, banknote storage container identification information for recognizing a banknote storage container, and controls to sort the banknotes to be stored in the banknote storage container based on the banknote storage container identification information.

15. The banknote handling apparatus as claimed in any of claims 1 to 14, wherein the control unit controls to notify of, as a quantity of the banknotes stacked in the stacking unit, at least one between a quantity of the banknotes stacked in the plurality of stacking units after starting banknote handling and a quantity of the banknotes currently stacked in the plurality of stacking units.

16. A banknote handling method of sorting banknotes by issuance origin by using a banknote handling apparatus by which an issuance origin collects the banknotes issued by the issuance origin among the banknotes of the same currency issued by a plurality of issuance origins, comprising:

recognizing an identification information indicating an issuance origin of the banknote by the banknote handling apparatus; and
sorting the banknotes of the same currency by issuance origin based on recognized identification information in the banknote handling apparatus.

17. The banknote handling method as claimed in claim 16, wherein
the recognizing includes recognizing fitness of the banknote, and
the sorting includes sorting unfit notes by the issuance origin.

18. The banknote handling method as claimed in claim 17, wherein the sorting includes sorting all fit notes as one type irrespective of the issuance origin.

FIG.1

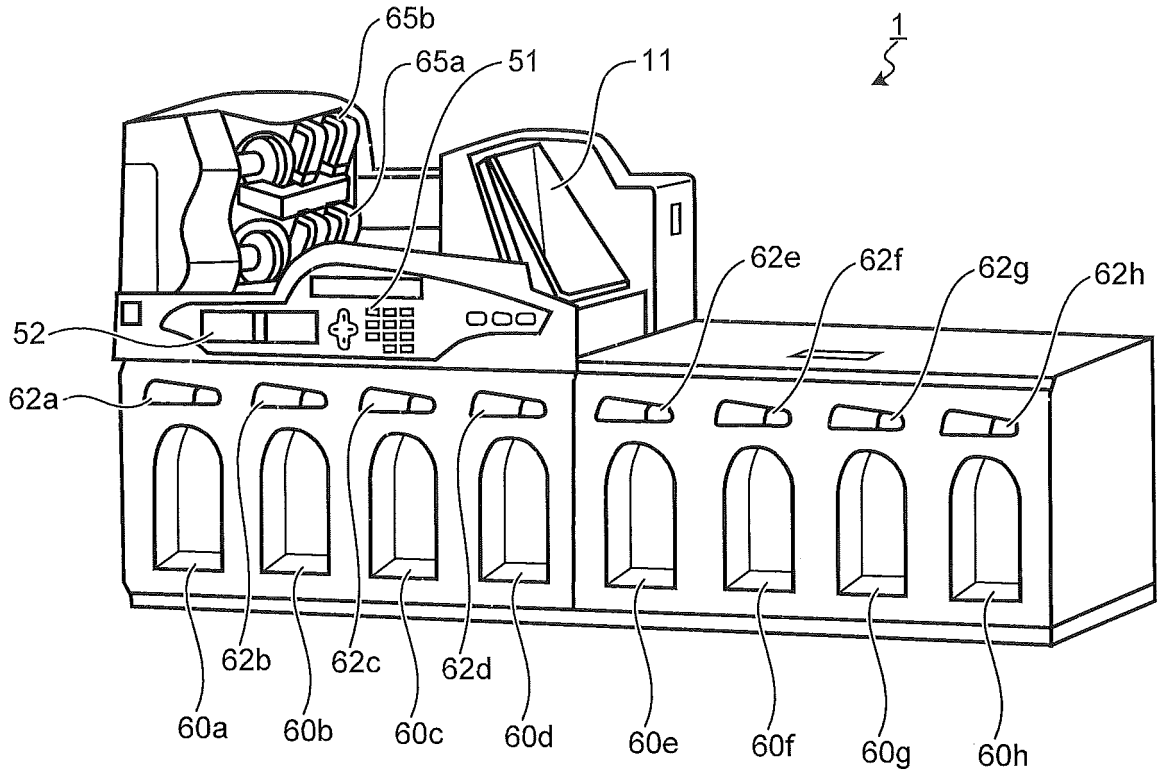
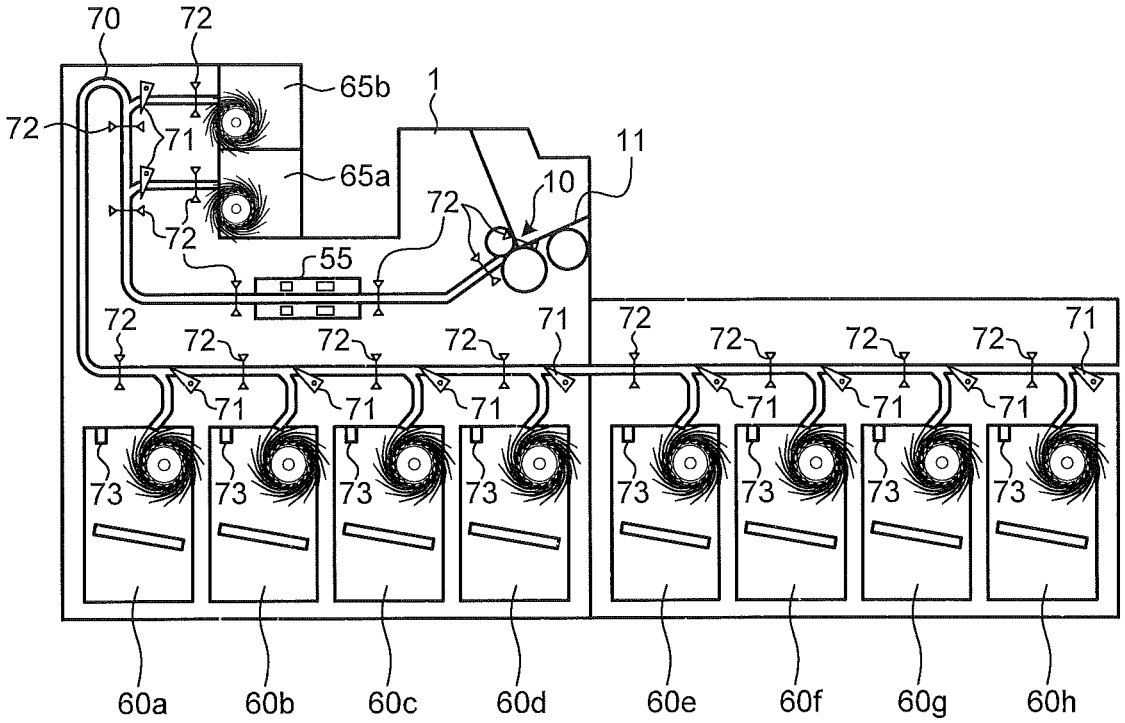

65b
65a
51
11
1
62e
62f
62g
62h
52
62a
62b
62c
62d
60a
60b
60c
60d
60e
60f
60g
60h

FIG.2


70
72
65b
1
72
71
11
65a
10
72
72
55
72
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72
72
71
72
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72
71
71
71
71
71
71
71
71
71
73
73
73
73
73
73
73
73
60a
60b
60c
60d
60e
60f
60g
60h

FIG.3

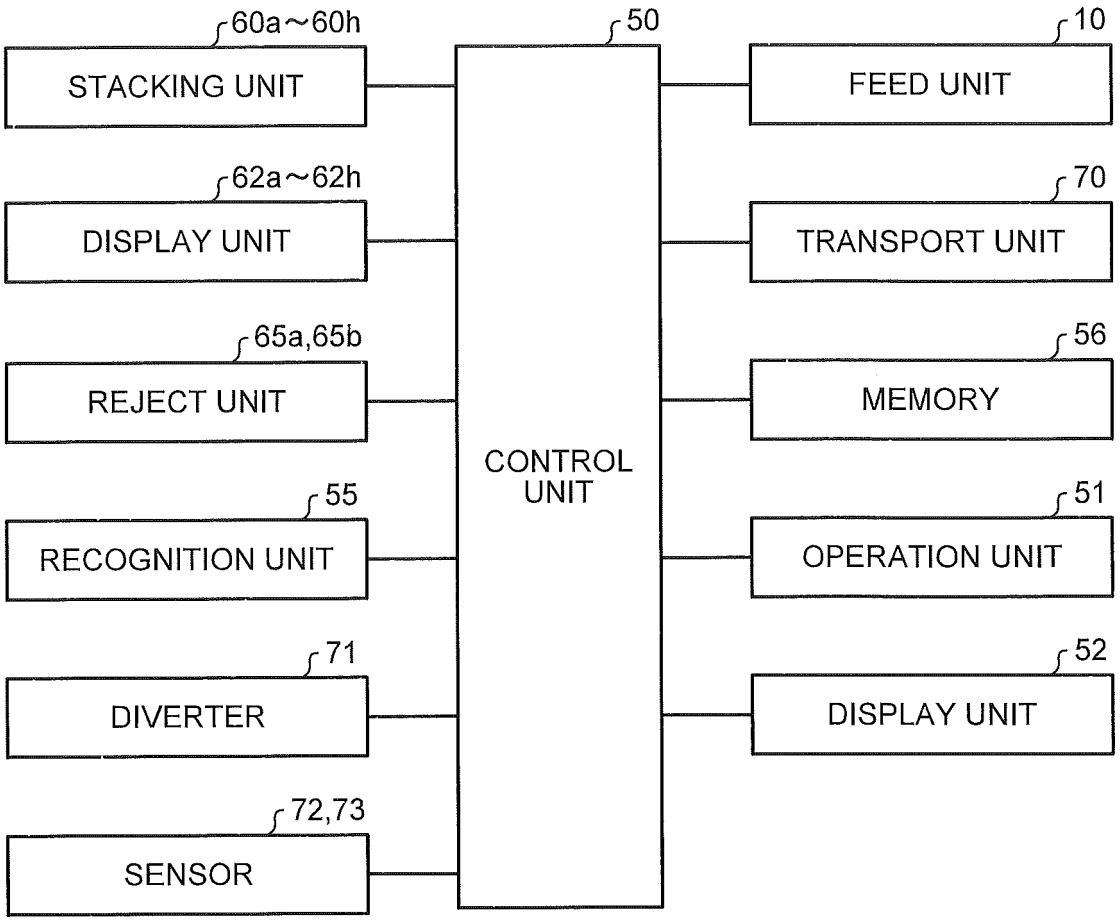

60a~60h
STACKING UNIT
62a~62h
DISPLAY UNIT
65a,65b
REJECT UNIT
55
RECOGNITION UNIT
71
DIVERTER
72,73
SENSOR
50
CONTROL UNIT
10
FEED UNIT
70
TRANSPORT UNIT
56
MEMORY
51
OPERATION UNIT
52
DISPLAY UNIT

FIG.4A

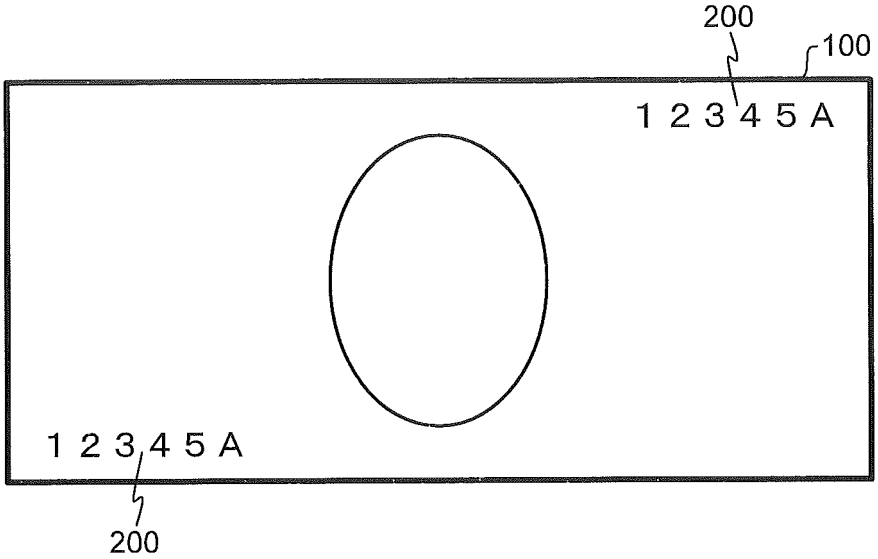


FIG.4B

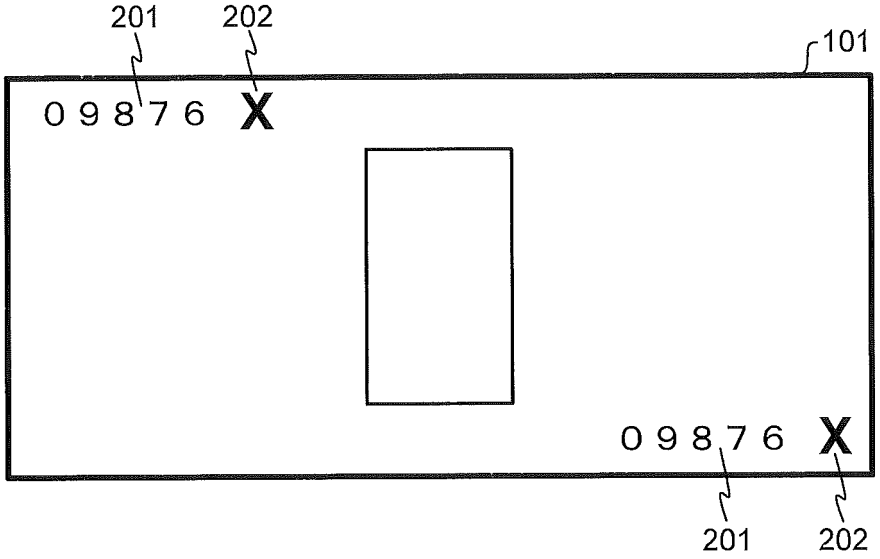


FIG.5

STACKING OBJECT BANKNOTE SETTING

STACKING UNIT	DIGIT POSITION IN BANKNOTE NUMBER	IDENTIFICATION LETTER
FIRST STACKING UNIT	1 2	A
SECOND STACKING UNIT	1 2	B
THIRD STACKING UNIT	1 2	C
FOURTH STACKING UNIT	1 2	D
FIFTH STACKING UNIT	1 2	H
SIXTH STACKING UNIT	1 2	K
SEVENTH STACKING UNIT	1 2	S
EIGHTH STACKING UNIT	1 2	T

FIG.6

STACKING PATTERN		ATTRIBUTE	FIRST STACKING UNIT	SECOND STACKING UNIT	THIRD STACKING UNIT	FOURTH STACKING UNIT	FIFTH STACKING UNIT	SIXTH STACKING UNIT	SEVENTH STACKING UNIT	EIGHTH STACKING UNIT	FIRST REJECT UNIT	SECOND REJECT UNIT
No.	CONTENT											
1	・CURRENCY X ・MIXED DENOMINATION ・ISSUING COUNTRY SORTING	CURRENCY	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	-	-
		DENOMI-NATION	MIX	MIX	MIX	MIX	MIX	MIX	MIX	MIX	REJECT	SUSP
		VERSION	-	-	-	-	-	-	-	-	-	-
		ORIENTATION	-	-	-	-	-	-	-	-	-	-
		FITNESS	-	-	-	-	-	-	-	-	-	-
		BANKNOTE NUMBER	12-A	12-B	12-C	12-D	12-H	12-K	12-S	12-T	-	-
2	・CURRENCY X ・MIXED DENOMINATION ・FITNESS SORTING ・ISSUING COUNTRY SORTING	CURRENCY	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	-	-
		DENOMI-NATION	MIX	MIX	MIX	MIX	MIX	MIX	MIX	MIX	REJECT	SUSP
		VERSION	-	-	-	-	-	-	-	-	-	-
		ORIENTATION	-	-	-	-	-	-	-	-	-	-
		FITNESS	FIT	FIT	FIT	FIT	UNFIT	UNFIT	UNFIT	UNFIT	-	-
		BANKNOTE NUMBER	12-A～B	12-C～D	12-H～H	12-S～T	12-A～B	12-C～D	12-H～H	12-S～T	-	-
3	・CURRENCY X ・FIT NOTE DENOMINATION SORTING ・UNFIT NOTE DENOMINATION MIXED ・UNFIT NOTE ISSUING COUNTRY SORTING (SPECIFIED)	CURRENCY	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	-	-
		DENOMI-NATION	10000	5000	2000	1000	MIX	MIX	MIX	MIX	REJECT	SUSP
		VERSION	-	-	-	-	-	-	-	-	-	-
		ORIENTATION	-	-	-	-	-	-	-	-	-	-
		FITNESS	FIT	FIT	FIT	FIT	UNFIT	UNFIT	UNFIT	UNFIT	-	-
		BANKNOTE NUMBER	-	-	-	-	12-A	12-B	12-C	12-D	-	-
4	・CURRENCY X ・FIT NOTE DENOMINATION SORTING ・UNFIT NOTE DENOMINATION MIXED ・UNFIT NOTE ISSUING COUNTRY SORTING (AUTOMATED)	CURRENCY	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	CURRENCY X	-	-
		DENOMI-NATION	10000	5000	2000	1000	MIX	MIX	MIX	MIX	REJECT	SUSP
		VERSION	-	-	-	-	-	-	-	-	-	-
		ORIENTATION	-	-	-	-	-	-	-	-	-	-
		FITNESS	FIT	FIT	FIT	FIT	UNFIT	UNFIT	UNFIT	UNFIT	-	-
		BANKNOTE NUMBER	-	-	-	-	12-AUTO	12-AUTO	12-AUTO	12-AUTO	-	-
⋮												

FIG.7A

STACKING OBJECT BANKNOTE SETTING	
STACKING UNIT	ISSUANCE ORIGIN
FIRST STACKING UNIT	ISSUING COUNTRY A
SECOND STACKING UNIT	ISSUING COUNTRY B
⋮	⋮

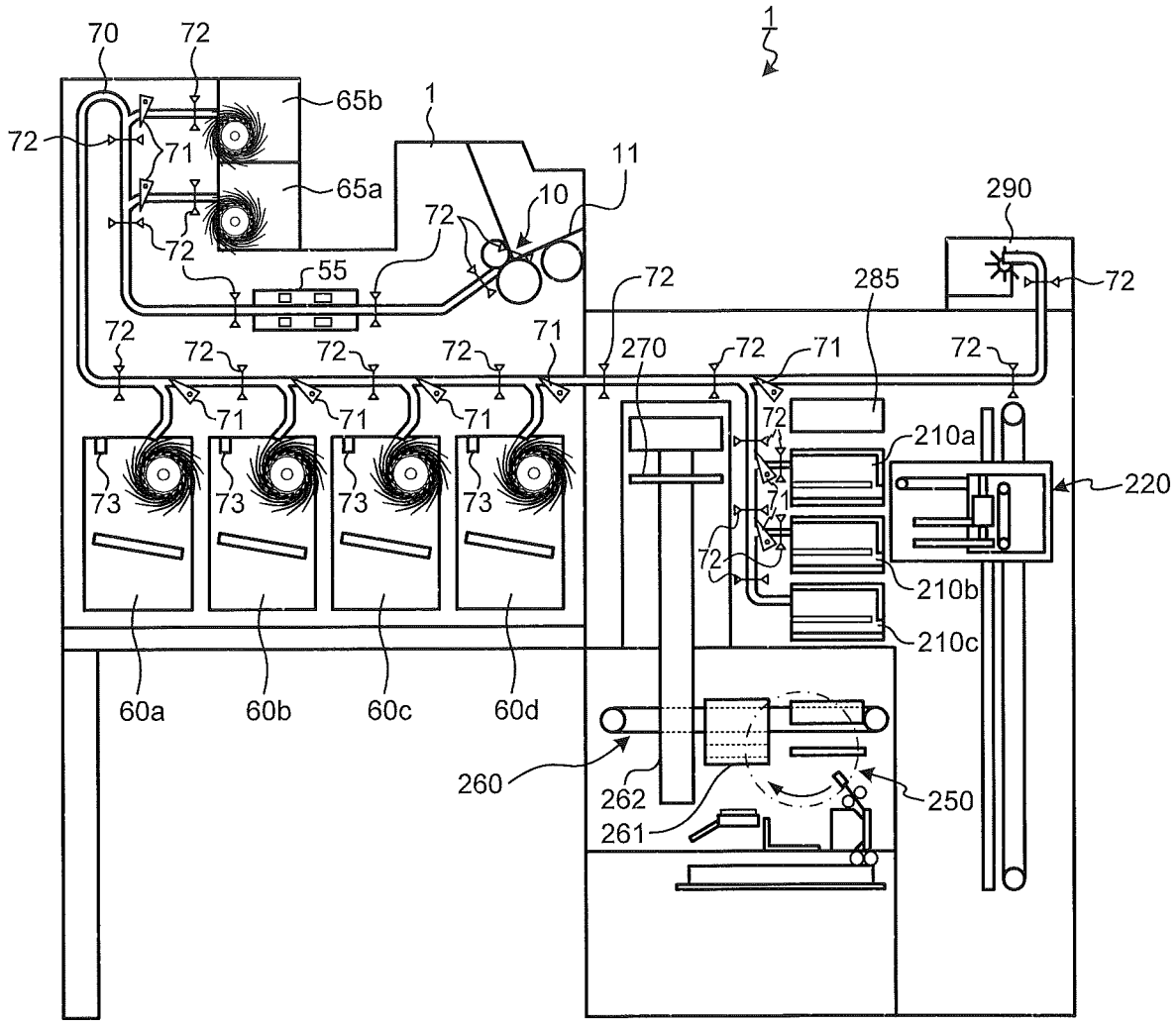
FIG.7B

CURRENCY	ISSUANCE ORIGIN	IDENTIFICATION LETTER
CURRENCY X	ISSUING COUNTRY A	LETTER AT 12th DIGIT IN BANKNOTE NUMBER IS A
	ISSUING COUNTRY B	LETTER AT 12th DIGIT IN BANKNOTE NUMBER IS B
	⋮	⋮
CURRENCY Y	ISSUING BANK A	LETTER AT 2nd DIGIT IN BANKNOTE NUMBER IS J
	ISSUING BANK B	LETTER AT 2nd DIGIT IN BANKNOTE NUMBER IS K
	⋮	⋮
CURRENCY Z	PRINTING FACTORY A	LAST LETTER IN BANKNOTE NUMBER IS ONE OF A to G
	PRINTING FACTORY B	LAST LETTER IN BANKNOTE NUMBER IS ONE OF H,AND J to N
	⋮	⋮

FIG.7C

STACKING PATTERN		ATTRIBUTE	FIRST STACKING UNIT	SECOND STACKING UNIT	THIRD STACKING UNIT	FOURTH STACKING UNIT	FIFTH STACKING UNIT	SIXTH STACKING UNIT	SEVENTH STACKING UNIT	EIGHTH STACKING UNIT	FIRST REJECT UNIT	SECOND REJECT UNIT
No.	CONTENT											
1	・CURRENCY X ・MIXED DENOMINATION ・ISSUING COUNTRY SORTING	DENOMI-NATION	MIX	MIX	MIX	MIX	MIX	MIX	MIX	MIX	REJECT	SUSP
		VERSION	-	-	-	-	-	-	-	-	-	-
		ORIENTATION	-	-	-	-	-	-	-	-	-	-
		FITNESS	-	-	-	-	-	-	-	-	-	-
		ISSUANCE ORIGIN	ISSUING COUNTRY A	ISSUING COUNTRY B	ISSUING COUNTRY C	ISSUING COUNTRY D	ISSUING COUNTRY H	ISSUING COUNTRY K	ISSUING COUNTRY S	ISSUING COUNTRY T	-	-

FIG.8


1
70
72
65b
65a
71
11
10
55
290
285
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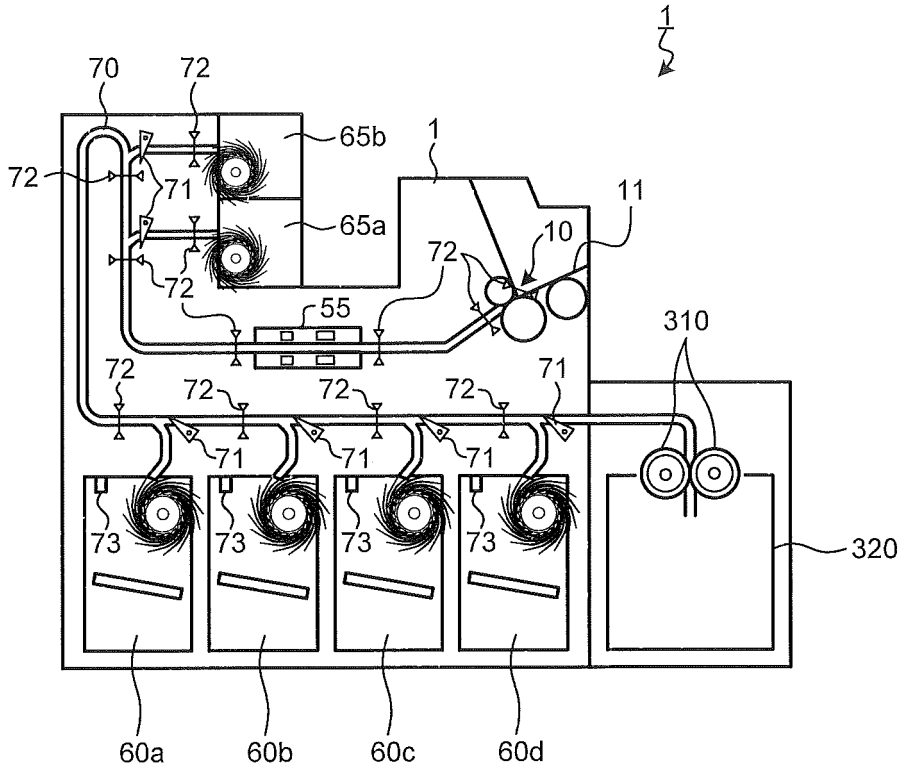
210a
210b
210c
220
73
60a
60b
60c
60d
260
262
261
250

FIG.9


1
70
72
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55
310
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73
73
73
73
320
60a
60b
60c
60d

FIG.10

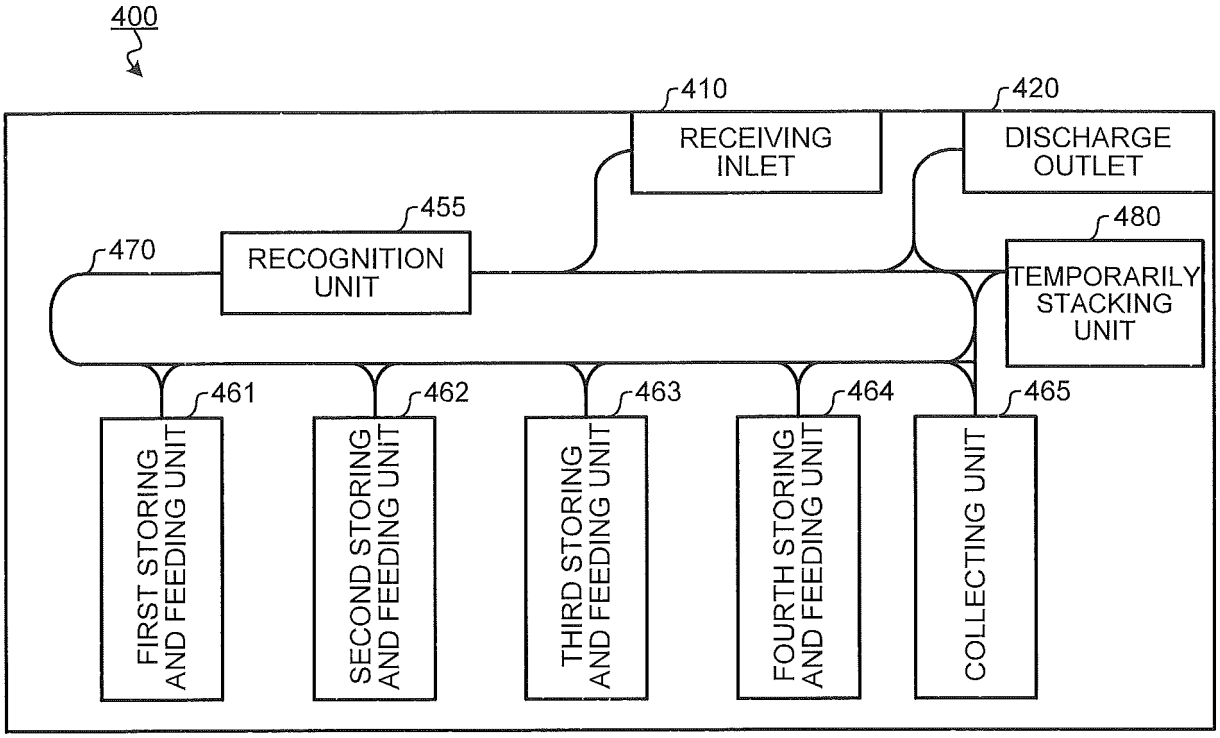

400
410
RECEIVING INLET
420
DISCHARGE OUTLET
455
RECOGNITION UNIT
470
480
TEMPORARILY STACKING UNIT
461
462
463
464
465
FIRST STORING AND FEEDING UNIT
SECOND STORING AND FEEDING UNIT
THIRD STORING AND FEEDING UNIT
FOURTH STORING AND FEEDING UNIT
COLLECTING UNIT

FIG.11

No.	STACKING PATTERN CONTENT	ATTRIBUTE	FIRST STORING AND FEEDING UNIT	SECOND STORING AND FEEDING UNIT	THIRD STORING AND FEEDING UNIT	FOURTH STORING AND FEEDING UNIT	COLLECTING UNIT		DISCHARGE OUTLET REJECTION
							MIX	MIX	
1	▪ CURRENCY Y ▪ ISSUING BANK SORTING - BANK A :FIT NOTE DENOMINATION SORTING :UNFIT NOTE COLLECTION - OTHERS :COLLECTION	DENOMINATION	D1	D2	D3	D4	MIX	MIX	REJECT
		VERSION	—	—	—	—	—	—	—
		ORIENTATION	—	—	—	—	—	—	—
		FITNESS	FIT	FIT	FIT	FIT	UNFIT	—	—
		ISSUANCE ORIGIN	ISSUING BANK A	ISSUING BANK A	ISSUING BANK A	ISSUING BANK A	ISSUING BANK A	ISSUING BANK B	—
...									

FIG.12

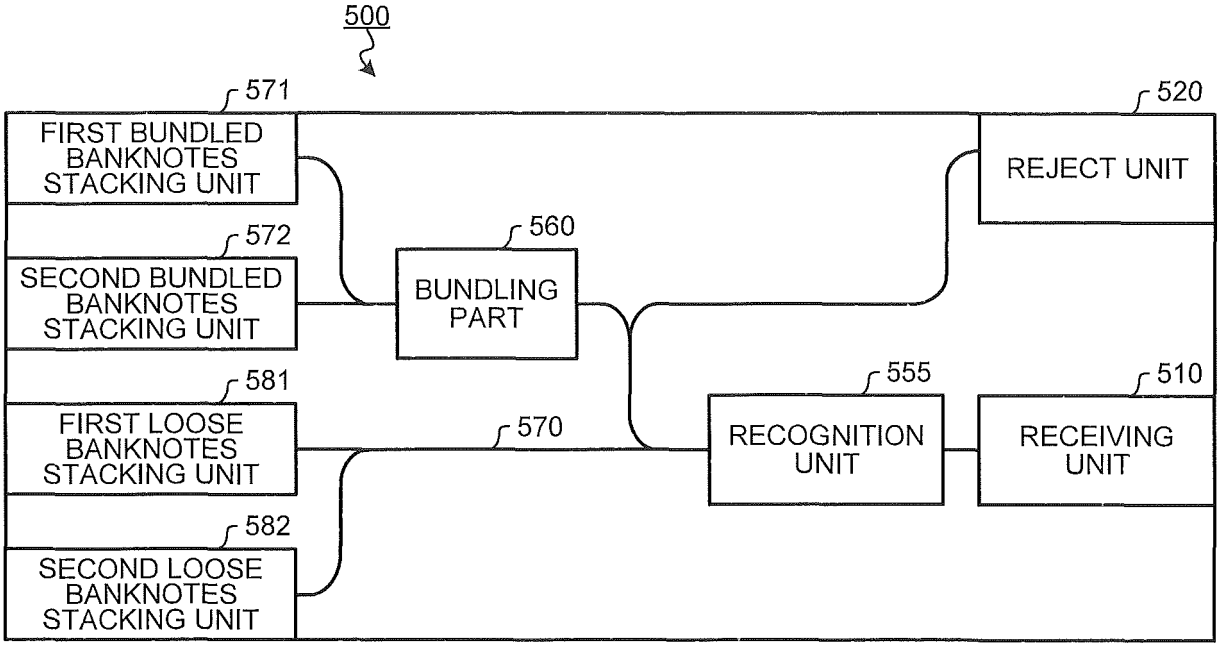

500
571
FIRST BUNDLED BANKNOTES STACKING UNIT
572
SECOND BUNDLED BANKNOTES STACKING UNIT
581
FIRST LOOSE BANKNOTES STACKING UNIT
582
SECOND LOOSE BANKNOTES STACKING UNIT
560
BUNDLING PART
570
520
REJECT UNIT
555
RECOGNITION UNIT
510
RECEIVING UNIT

FIG.13

No.	STACKING PATTERN CONTENT	ATTRIBUTE	FIRST BUNDLED BANK-NOTES STACKING UNIT	SECOND BUNDLED BANK-NOTES STACKING UNIT	FIRST LOOSE BANK-NOTES STACKING UNIT	SECOND LOOSE BANK-NOTES STACKING UNIT	REJECT UNIT
A1	・CURRENCY Y ・FIT NOTES OF ONE DENOMINATION ・ISSUING BANK SORTING BANK A :PREPARATION OF BUNDLED BANKNOTES FOR ATM AND BUNDLED BANKNOTES FOR TELLER	DENOMI-NATION	–	–	–	–	REJECT
		VERSION	–	–	–	–	–
		ORIENTATION	–	–	–	–	–
		FITNESS	A-FIT	T-FIT	–	–	–
		ISSUANCE ORIGIN	ISSUING BANK A	ISSUING BANK A	ISSUING BANK B	ISSUING BANK C	–
A2	・CURRENCY Y ・FIT NOTES OF ONE DENOMINATION ・ISSUING BANK SORTING BANK A :PREPARATION OF LOOSE BANKNOTES FOR ATM AND BUNDLED BANKNOTES FOR TELLER	DENOMI-NATION	–	–	–	–	REJECT
		VERSION	–	–	–	–	–
		ORIENTATION	–	–	–	–	–
		FITNESS	T-FIT	–	A-FIT	–	–
		ISSUANCE ORIGIN	ISSUING BANK A	–	ISSUING BANK A	ISSUING BANKS B,C	–
⋮							
B1	・CURRENCY Y ・FIT NOTES OF ONE DENOMINATION ・ISSUING BANK SORTING BANK B :PREPARATION OF BUNDLED BANKNOTES FOR ATM AND BUNDLED BANKNOTES FOR TELLER	DENOMI-NATION	–	–	–	–	REJECT
		VERSION	–	–	–	–	–
		ORIENTATION	–	–	–	–	–
		FITNESS	A-FIT	T-FIT	–	–	–
		ISSUANCE ORIGIN	ISSUING BANK B	ISSUING BANK B	ISSUING BANK A	ISSUING BANK C	–
⋮							
C1	・CURRENCY Y ・FIT NOTES OF ONE DENOMINATION ・ISSUING BANK SORTING BANK C :PREPARATION OF BUNDLED BANKNOTES FOR ATM AND BUNDLED BANKNOTES FOR TELLER	DENOMI-NATION	–	–	–	–	REJECT
		VERSION	–	–	–	–	–
		ORIENTATION	–	–	–	–	–
		FITNESS	A-FIT	T-FIT	–	–	–
		ISSUANCE ORIGIN	ISSUING BANK C	ISSUING BANK C	ISSUING BANK A	ISSUING BANK B	–
⋮							

FIG.14

ISSUING BANK	ATM-ID	STORAGE CONTAINER ID	STACKING PATTERN
ISSUING BANK A	—	A-11	A1
	—	CST-01	A1
	ATM01	ATM-C01	A2
		⋮	
	⋮		
ISSUING BANK B	—	B-11	B1
	⋮		
ISSUING BANK C	—	C-11	C1
	⋮		
⋮			

FIG.15A

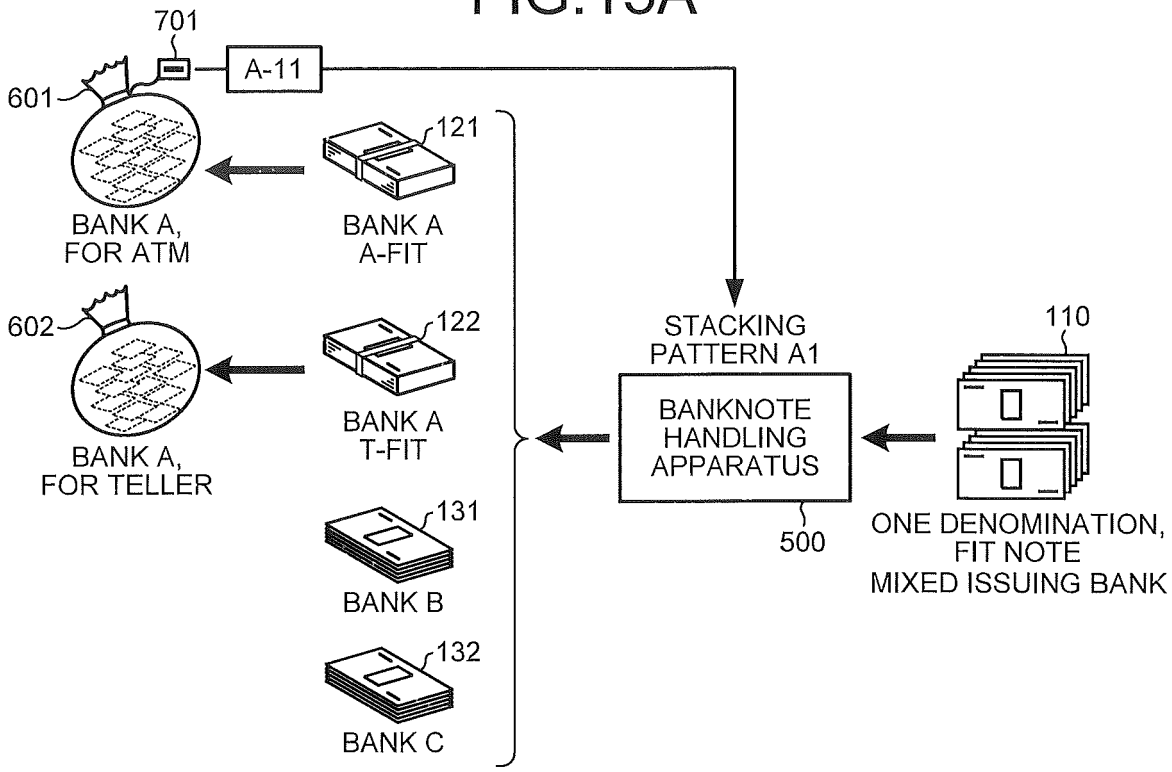


FIG.15B

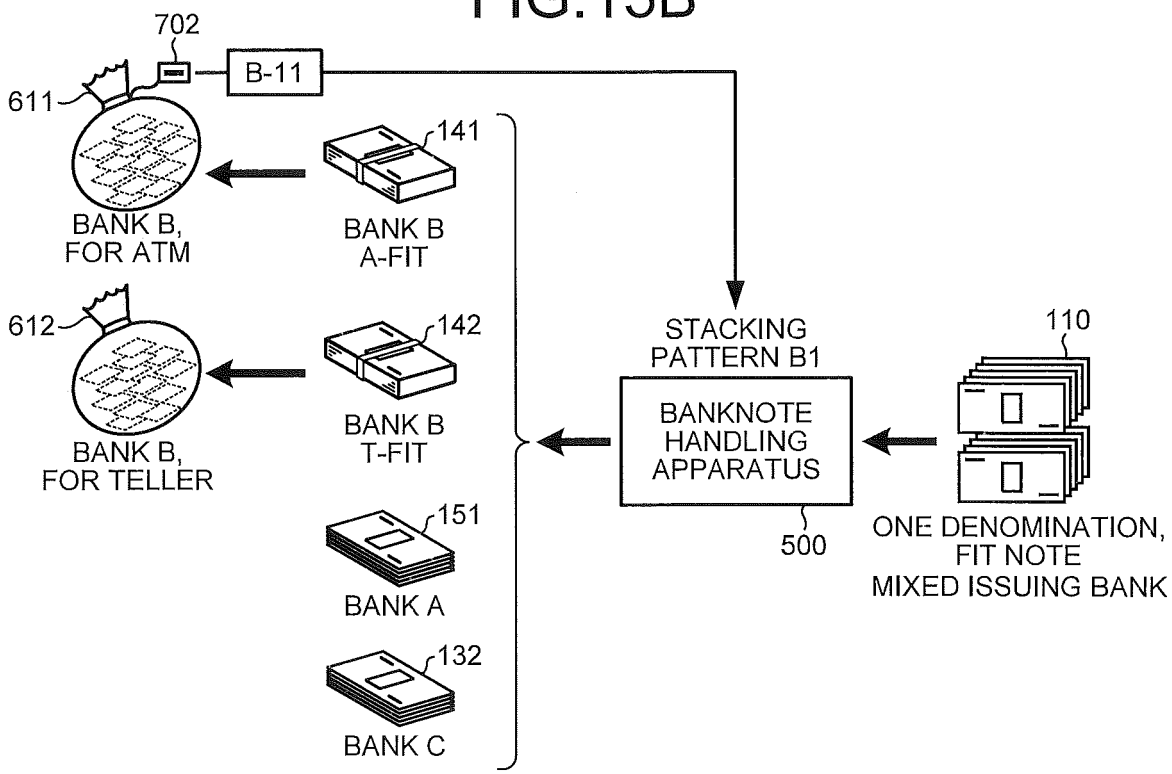
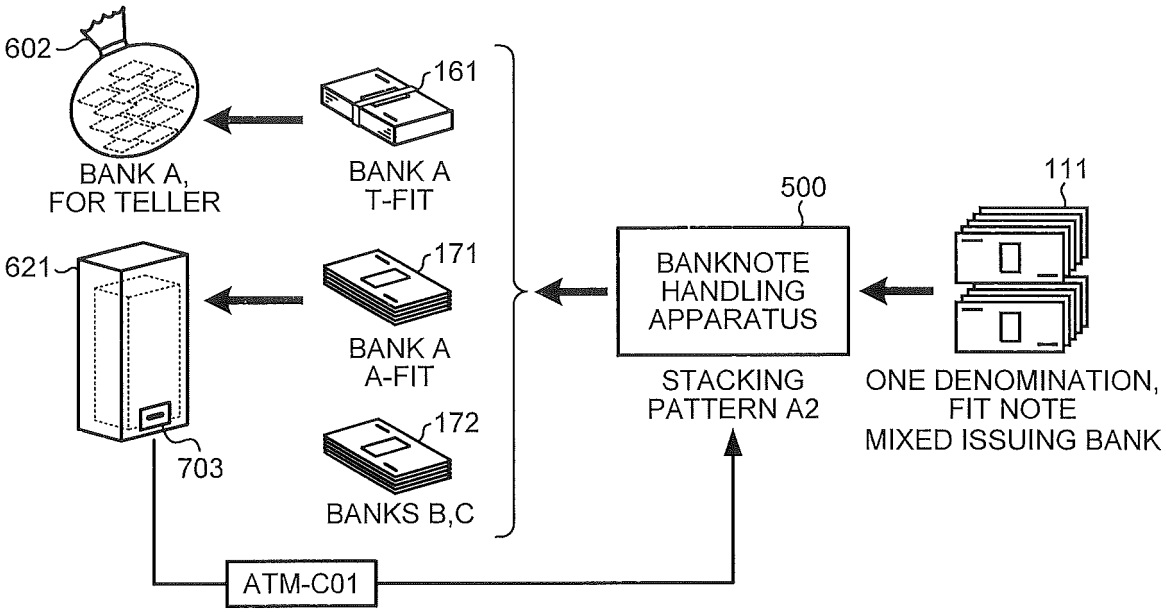


FIG.16


602
BANK A,
FOR TELLER
161
BANK A
T-FIT
621
171
BANK A
A-FIT
703
172
BANKS B,C
ATM-C01
500
BANKNOTE
HANDLING
APPARATUS
STACKING
PATTERN A2
111
ONE DENOMINATION,
FIT NOTE
MIXED ISSUING BANK

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2016/071100

A. CLASSIFICATION OF SUBJECT MATTER
G07D3/00(2006.01)i, *B65H31/24*(2006.01)i, *G07D7/20*(2016.01)i, *G07D9/00*(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)
G07D3/00, B65H31/24, G07D7/20, G07D9/00

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 1996-2016
Kokai Jitsuyo Shinan Koho 1971-2016 Toroku Jitsuyo Shinan Koho 1994-2016

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 2004-164458 A (Toshiba Corp.), 10 June 2004 (10.06.2004), paragraphs [0002] to [0004], [0012] to [0071]; fig. 1 to 4 (Family: none)	1-18
Y	WO 2010/021033 A1 (Glory Ltd.), 25 February 2010 (25.02.2010), paragraphs [0019] to [0065]; fig. 1 to 15 (Family: none)	1-18
Y A	JP 2009-104678 A (Hitachi-Omron Terminal Solutions, Corp.), 14 May 2009 (14.05.2009), paragraphs [0019] to [0023]; fig. 3 (Family: none)	9-15 1-8,16-18

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 September 2016 (27.09.16)	11 October 2016 (11.10.16)
Name and mailing address of the ISA/ Japan Patent Office 3-4-3,Kasumigaseki,Chiyoda-ku, Tokyo 100-8915,Japan	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2016/071100

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2012-188192 A (Toshiba Corp.), 04 October 2012 (04.10.2012), paragraph [0023] (Family: none)	10-15 1-9,16-18
Y A	JP 2003-272018 A (Toshiba Corp.), 26 September 2003 (26.09.2003), paragraphs [0010] to [0015]; fig. 1 to 3 (Family: none)	12-15 1-11,16-18
Y A	JP 2002-319060 A (Mamiya-Op Co., Ltd.), 31 October 2002 (31.10.2002), paragraphs [0044] to [0046] (Family: none)	14-15 1-13,16-18

Form PCT/ISA/210 (continuation of second sheet) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2013175100 A **[0003]**