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(54) **METHOD OF AND APPARATUS FOR CONTROLLING THE ISSUING OF NOTES AND COINS AT A CASH REGISTER AND A PROGRAME ROUTINE FOR CAUSING A CONTROL UNIT TO CONTROL SAID ISSUING**

VERFAHREN UND VORRICHTUNG ZUR STEUERUNG DES AUSGEBENS VON GELDSCHEINEN UND MÜNZEN AN EINER REGISTRIERKASSE UND PROGRAMMROUTINE ZUR BEWIRKUNG, DASS EINE STEUEREINHEIT DAS AUSGEBEN STEUERT

PROCEDE ET DISPOSITIF DESTINES A CONTROLER L'EMISSION DE BILLETS ET DE PIECES SUR UNE CAISSE ET ROUTINE DE PROGRAMME DESTINEE A COMMANDER LE CONTROLE DE L'EMISSION PAR L'UNITE DE COMMANDE

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- **PATENT ABSTRACTS OF JAPAN vol. 2000, no. 9 13 October 2000 & JP 2000 163618 A (TOSHIBA CORP) 16 June 2000**
- **PATENT ABSTRACTS OF JAPAN vol. 2000, no. 2 29 February 2000 & JP 11 306 416 A (FUJI ELECTRIC CO LTD) 05 November 1999**

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Description

BACKGROUND TO THE INVENTION

[0001] The present invention relates to a self-contained apparatus for handling notes and coins according to the preamble to Claim 1. The invention relates to cash register systems in shops where a customer can pay with notes and coins that are inserted in the apparatus and the apparatus pays back change with items that have been inserted previously. The invention can also relate to shops and chains of shops where the apparatus is used. The present invention also relates to a method according to the preamble of Claim 6. This patent application is concurrent with Swedish patent application no. 0200986-8.

[0002] There are paying-out devices in which various methods are used to issue notes and coins in as efficient a way as possible. For example, in US 4 185 646 a design is described in which the paying out of different denominations takes place simultaneously to save time.

[0003] A note and coin handling apparatus of the Cash-Guard type (registered trademark) is currently used successfully. A separate note handling device is described in SE 504 358.

[0004] The device works satisfactorily, but it has been found that a shopkeeper or cashier must empty certain handling units in the storage device of a cash register relatively frequently. In addition, it has similarly been found that the shopkeeper must replenish the cash register with change relatively frequently. This involves expensive purchase of change, and expensive labour due to the frequently recurrent replenishment of notes and coins causing annoyance, etc.

US 6 356 805 A discloses a method of controlling the dispensing of money in the form of units available in a plurality of denominations comprises selecting the units for a dispensing operation by considering the rate of change of the number of stored units for at least one denomination.

[0005] An object of the present invention is to avoid the said disadvantages of known apparatus for handling notes and coins in cash register systems, such as how to make the apparatus less bulky.

[0006] Another object is to achieve an apparatus for handling notes and coins that can be used in a system in conjunction with other apparatus in the shop, in order to reduce the amount of transportation of notes and coins to and from the shop.

[0007] The problems described above are solved by means of the self-contained apparatus for handling notes and coins described in the introduction, characterised by the features of claim 1's characterising part. In this way, a shopkeeper can carry out his business more cost-effectively than with known technology. Using the apparatus and method according to the present invention, the frequency of replenishing and emptying of notes and coins at a cash register is reduced. This means that the shopkeeper does not need to buy notes and coins from a bank in the form of change as often as was previously the case. Handling of notes and coins is more efficient and the amount of transportation of notes and coins to the shop is reduced. The shopkeeper does not need to empty storage devices of notes and coins as often as was previously the case, which is cost-effective.

[0008] Each handling unit is suitably allocated a counter unit which is arranged to work in conjunction with the said control unit for counting the number of items to be issued, which items are to replace items of the denomination that is not being issued.

[0009] In this way, the counter units can be used for storage of data relating to the number of items to be issued prior to a calculation being carried out of how many items there are of the next denomination. The counter unit is then adjusted according to the new calculations and issuing is carried out. By this means, the counter units can be utilised partly for calculation and partly for recording. This integrated function contributes to efficient and cost-effective storage of notes and coins and results in a less complicated piece of apparatus than previously known apparatus.

[0010] The said limit value is preferably set at an upper limit value to reduce the number of items in the said handling unit.

[0011] Accordingly, a handling unit, such as a note cassette for a particular denomination of note, does not need to be emptied for transportation to the bank as frequently as with previously known technology. When a note cassette is full, this is emptied and refilled with a predetermined number of items as change. As a lower limit value for the number of items can be implemented, as described below, the shopkeeper does not need to replenish an unnecessary amount of items in the handling unit, as the apparatus ensures that the items that are about to run out are replaced by items of the next denomination. This means that the handling unit can be filled with fewer items, which means it has a greater capacity for receiving new items and that the final emptying is thereby delayed.

[0012] Alternatively, the limit value is set at a lower limit value to maintain the number of items in the said handling unit.

[0013] Accordingly, the respective handling unit does not need to be refilled as often as according to known technology. While the items in the handling unit become fewer in number at a slower rate where the items have a tendency otherwise to run out quickly, this will at the same time have a favourable effect on the issuing of items of denominations where the number has a tendency to increase. The frequency of issuing items of this denomination thus reduces. A combination of the upper and lower limit values thus means that denominations that tend to decrease in number quickly in a cash register while a lower denomination increases in number at item level, are automatically caused to decrease or increase in number respectively at a lower rate than with previously known technology.

[0014] The said item recording unit is suitably arranged to work in conjunction with a central database unit for recording items that are put in and are issued regarding information comprising the number of items by denomination and to work in conjunction with a control device connected to this database unit. In this way, a shop with more than one checkout can coordinate the issuing of items by the different apparatus for handling notes and coins. If, for example, the number of items of a note denomination tends to increase at one checkout, other checkouts can automatically commence issuing this denomination instead of the denomination that was first calculated to be issued. In this way, the total stock of notes and coins of denominations that tend to increase in number more quickly than other denominations is caused to increase at a slower rate in the shop, which is efficient and cost-effective in a similar way to that described above. If there are denominations that tend to reduce in number at one checkout relatively quickly, this is recorded in the central database unit, whereupon the control device ensures at central level that other checkouts comprising an item recording unit reduce the issuing of this denomination by giving as change a different denomination to this one, whereby the total number of items in the shop can be regulated automatically. This results in less frequent transportation of items to the shop from the bank, which is cost-effective and has also environmental benefits.

[0015] An additional object of the present invention is to achieve a method for controlling notes and coins from an apparatus for handling notes and coins and a means for making handling of notes and coins less complicated for the shopkeeper.

[0016] For this purpose, the method described in the introduction is characterised by the steps of claims 6's characterising part. In this way, a type of item of a denomination that tends to need emptying is issued primarily in such a way that the emptying procedure is delayed.

[0017] Alternatively, the method comprises the steps of: checking whether the number of items of the denomination marked by the indicator is less than or equal to a lower predetermined limit value and checking whether the number of items of the next denomination is greater than the lower limit value.

[0018] By this means, a self-regulating function of delaying the running out or replenishment of items in the respective handling unit is achieved, which method is carried out in conjunction with a cash register system, for example, of the type described in EP 0832473, where a requested amount, entered amount and change are determined. In conjunction with this cash register system, the control unit can control the issue of items from the storage device in question. In this way, the issuing of items from the respective handling units where shortages have occurred can be carried out less frequently than with known technology.

[0019] By means of the program routine, the shopkeeper or a cashier can himself program in what level he wants to assign to the upper and lower limit values respectively. This provides flexibility when using the apparatus at different times, such as in the evenings or at weekends, when the shopkeeper knows from experience that, for example, a particular denomination is issued from the stock more quickly than usual.

BRIEF DESCRIPTION OF DRAWINGS

[0020] The invention will be described in the following with reference to the drawings, in which:

Figure 1a shows schematically two apparatus for handling notes and coins, Figure 1b shows schematically a single apparatus for handling notes and coins,
Figure 2a shows schematically, according to a first embodiment, different numbers of items of different denominations in the respective handling units in an apparatus for handling notes and coins,
Figure 2b shows schematically, according to a second embodiment, different numbers of items of different denominations in the respective handling units in an apparatus for handling notes,
Figure 3 shows schematically a flow chart according to the first embodiment,
Figure 4 shows schematically a flow chart according to the second embodiment,
Figures 5 and 6 show schematically how the number of items varies in a handling unit over time, and
Figures 7 and 8 show schematically how the number of items varies in known handling units over time.

DETAILED DESCRIPTION OF THE INVENTION

[0021] The invention will now be described in the form of embodiments. For the sake of clarity, components that are not of significance for the invention have been omitted in the drawings.

[0022] Figure 1a shows schematically two self-contained apparatus 1 for handling notes and coins, also called apparatus. Such apparatus 1 are currently found in shops 2. A device arranged for alternating input and issuing of notes 6 is described in EP 0 615 643. Devices for handling coins 7 are also currently available on the market. A customer (not shown) pays to a cashier (not shown) a requested amount for goods (not shown) purchased in the shop 2. Often the customer hands over to the cashier an amount larger than the requested amount and then waits for change. The cashier feeds into the apparatus 1 the notes 6 and/or coins 7 received from the customer as payment. In order for the apparatus 1 to be able to carry out its task, however, it needs to obtain the information that a cash register 3 handles, such as the requested amount and the amount paid in. The difference between the amount requested and the amount paid in corresponds to the change. A type of cash register system for working in conjunction with the abovementioned

arrangement is described in EP 0 832 473.

[0023] The self-contained apparatus 1 for handling notes and coins comprises a control unit 5 arranged for inputting and issuing the notes 6 and coins 7, also called items 8, into and from a storage device 9 arranged in the apparatus 1.

[0024] The storage device 9 comprises in addition a handling unit 11 and 11' designed for each denomination and for the storage system. Each handling unit 11, in the form of a note handling device, comprises a spool arrangement 12 for rolling up and emptying notes 6. The handling unit, in the form of a coin handling device 11', can be a known model of the CashGuard type (registered trademark). The control unit 5 can be connected to an item recording unit 13 assigned to the apparatus 1 and can be connected to the handling unit 11.

[0025] The control unit 5 comprises a first memory device 15 for storing a program routine 17 which is arranged at item level to cause the control unit 5 to control the flow of notes 6 and coins 7 during issuing on the basis of a predetermined warning value (w, see Figure 2b) relating to the number of items 8 that can be stored in each handling unit 11 in such a way that, in relation to the calculated denomination to be issued, items 8 of the next lower denomination are issued when the warning value w is reached.

[0026] Each handling unit 11 is allocated a counter unit 19, which is arranged to work in conjunction with the said control unit 5 and is arranged to count the number of items 8 to be issued, which are to replace items 8 of the denomination that is not issued.

[0027] When the control unit 5 counts how many items 8 of each denomination are to be issued as change, it carries out this calculation in such a way that primarily items 8 of the highest denomination are issued. In Sweden, the control unit 5 starts the calculation with the denomination SEK 1000, often SEK 1000 notes are not used in Sweden, but instead SEK 500 notes, and continues down to the denomination 50 öre. Algorithms for this procedure work satisfactorily at present and are implemented in the paying in and issuing devices of the CashGuard type (registered trademark) described in the introduction.

[0028] The apparatus 1 described above is advantageously used in a shop 2 where there is only one cash register or just a few. Figure 1b shows schematically an apparatus 11 working in conjunction with a cash register 3, but not working in conjunction with any central database unit.

[0029] The item recording unit 13 in Figure 1 is alternatively arranged to work in conjunction with a central database unit 21 for recording input and issued items 8 with regard to information comprising the number of items 8 stored in the apparatus 1 on the basis of denomination and with a control unit 23 implemented in association with this central database 21, which control unit 23 controls at least two apparatus 1 so that the issuing of notes 6 and coins 7 is carried out on the basis of the predetermined warning value w concerning the number of items 8 that can be stored in each handling unit 11 in such a way that in relation to the calculated number of items 8 of a denomination to be issued, items 8 of the next lower denomination are issued when the warning value w is reached.

[0030] A cup 27 for issued coins is arranged according to known technology on the handling unit 11' for coins on the storage device. Detectors 28 are arranged to send signals to the item recording unit 13 concerning passing items 8 according to known technology. The different components are connected via cables 29 for electrical communication or alternatively via wireless communication. An opening 30 for inputting and issuing items according to denomination is arranged in the apparatus 1.

[0031] Figure 2a shows schematically, according to a first embodiment, how the first memory device 15 has been arranged in the control unit 5 comprising the counter unit 19 and the program routine 17 for reducing the number of issued items 8 over time with the help of the first warning value w set at an upper limit value ög, also called high warning.

[0032] The apparatus 1 comprises the note handling unit 11 and coin handling unit 11'. The upper limit value ög is illustrated by a dashed and dotted line. Each hatched column 24 illustrates the current number of items 8 stored in the respective handling unit 11. It is shown schematically that the number of items 8 in the handling unit 11 designed for storing SEK 100 notes has reached the upper limit value ög, whereupon a signal (not shown) is sent to the control unit 5. In Figure 2a the denomination n_1 corresponds to SEK 1000 notes (often not used in Swedish cash register systems), the denomination n_2 to SEK 500 notes, the denomination n_3 to SEK 100 notes and so on. Using an indicator 25, the program routine 17 goes through each handling unit 11 with regard to the number of items 8 and investigates whether the next denomination exceeds the upper limit value ög. If this is the case, the issuing of the denomination that is currently being investigated is replaced by an issue of the next denomination corresponding to the same amount. In this case, five SEK 100 notes are paid out instead of one SEK 500 note, as the upper limit value ög has been reached for n_3. In this way, the time for emptying the SEK 100 notes is delayed. The shopkeeper or cashier thus does not need to replenish the handling unit 11 as often as according to known technology, which is cost-effective. Thereafter the indicator 25 is moved to the next denomination, and the procedure is repeated until the next denomination is the last, that is items 8 of the denomination n_9, that is 50 öre.

[0033] Figure 2b shows schematically, according to a second embodiment, how different numbers of items 8 of different denominations in different handling units 11 in an apparatus 1 are controlled using the control unit 5 comprising a second program routine 17'.

[0034] The control unit 5 is thus arranged to ensure an increase of the number of items 8 when a second warning

value w' set at a lower limit value ug, also called low warning, has been reached in the handling unit 11 that is currently being investigated and that is indicated by the indicator 25. This is achieved by instead of issuing one SEK 500 note issuing five items 8 of the next denomination, that is five SEK 100 notes. In this way, the time for replenishing SEK 500 notes is delayed, which is cost effective.

[0035] A combination of the upper and lower limit values means that the time for replenishing and emptying items 8 is delayed, as the handling units 11, 11' are replenished and emptied less frequently than according to known technology. This will be explained in greater detail in association with Figures 5-8 below.

[0036] Figure 3 shows schematically a flow chart according to the first embodiment, comprising the steps of:

S1, starting checking the number of items 8 in the respective handling units 11 starting with items 8 of the highest denomination,

S2, moving the indicator 25 to items 8 of the highest relevant denomination to be issued,

S3, checking whether the number of items 8 of the next denomination is greater than or equal to the upper limit value ög,

S4, in the event that the number of items 8 of the next denomination is not greater than or equal to the upper limit value ög, forwarding data for moving the indicator 25 to the next highest denomination to be issued, thereafter repeating step S3,

S5, in the event that the number of items 8 of the next denomination is greater than or equal to the upper limit value ög, forwarding data for storage of the number of items 8 to be issued without any action,

S6, clearing the counter units 19, which hold the number of items 8 to be issued without any action,

S7, setting the number of items 8 of the denomination that the indicator 25 indicates, equal to the amount that is to be paid out,

S8, recalculating the number of items 8 of the next denomination that is to replace the item 8 of the denomination that the indicator 25 indicates,

S9, checking whether the number of items 8 of the next denomination can be issued,

S10, in the event that the condition in step S9 is true, calculating the number of items 8 of the next denomination to be issued by adding the number of calculated items 8 of the next denomination according to step S8 and the stored number of items 8 according to step S5,

S11, after step 10 subtracting 1 from the number of items 8 of the denomination that the indicator 25 indicates,

S12, in the event that the condition in step S9 is not true, resetting the counter units 25 according to the stored data regarding the number of items 8 to be issued without any action according to step S5,

S 13, checking whether the next denomination is the last,

S 14, in the event that the condition in step S13 is true, transmitting data for issuing items 8,

S15, in the event that the condition in step S13 is not true, forwarding data for moving the indicator 25 to items 8 of the next denomination to be issued.

[0037] When a payment order has been transmitted to the said control unit 5 from the said cash register 3, the number of items 8 of each denomination to be issued is calculated on the basis of the payment order. Thereafter the control unit's 5 indicator 25 is moved to the highest relevant denomination to be issued. If the next denomination is greater than or equal to the upper limit value ög, data is stored in the item recording unit 13 concerning the number of items 8 of the denomination that is to be issued. This check whether the number of items 8 of the next denomination in the handling unit 11 designed for this denomination is greater than or equal to the predetermined upper limit value ög is carried out for each denomination.

[0038] After the abovementioned data has been stored, the counter units 19 that are affected by the issuing of the items 8 are cleared, with an amount that is to be issued being set equal to the number of items 8 of the denomination to which the indicator is set. Thereafter the number of items 8 of the next denomination to be issued is calculated, and a check of the number of items in the handling unit 11 designed for the next denomination is carried out. If it is possible to issue this amount, the stored number of items 8 to be issued is added to the calculated number of next denomination to be issued and the denomination to which the indicator 25 is set is decremented by 1.

[0039] If it is not possible to pay out the amount, the counter units 19 are reset to the stored number and the indicator 25 is moved to items 8 of the next denomination. The procedure is repeated, with the indicator 25 being moved to the next denomination that is to be issued, until the next denomination is the last.

[0040] Figure 4 shows schematically a flow chart according to the second embodiment. The flow chart in Figure 4 corresponds in the main to the flow chart shown in Figure 3, but with the difference that a check is carried out whether the number of items 8 of the denomination that the indicator 25 indicates is less than or equal to a lower limit value, ug. The lower limit value ug is predetermined and set by the supplier of the apparatus 1 or by the shopkeeper. This means that there is flexibility for the shopkeeper, as he can adjust the value according to turnover. If turnover is high, he will perhaps want to set the lower limit value ug to a high value. In this way, the time for replenishing the items in the handling unit is delayed.

[0041] If the items 8 indicated by the indicator 25 are less in number than the lower limit value ug, the program routine 17 will check whether the number of items 8 of the next denomination is greater than the lower limit value

ug.

[0042] If the number of items 8 of the next denomination is greater than or equal to the lower limit value ug, data is stored in the item recording unit 13 concerning the number of items 8 of the denomination that is to be issued.

[0043] After the abovementioned data has been stored, the counter units 19 that are affected by the issuing of the items 8 are cleared, and the amount that is to be issued is set equal to the item 8 of the denomination to which the indicator 25 is set and the procedure continues according to the first embodiment.

[0044] The second embodiment follows steps S1-S3 and S5-S15 described above, with the difference that this embodiment also comprises the steps of:

S3A, checking whether the number of items 8 of the denomination that the indicator 25 indicates is less than or equal to the lower limit value ug,

S4A, in the event that the number of items 8 of the denomination that the indicator 25 indicates is not less than or equal to the lower limit value ug, forwarding data for moving the indicator 25 to the next highest denomination, that is to say the next lower denomination, to be issued, thereafter repeating step S3,

S3B, in the event that the number of items 8 of the denomination that the indicator 25 indicates is less than or equal to the lower limit value ug for this denomination, checking whether the number of items of the next denomination is greater than or equal to the lower limit value ug for the number of items 8 of the next denomination,

S4A, in the event that the condition in S3B is not true, forwarding data for moving the indicator 25 to the next highest denomination to be issued, thereafter repeating step S3,

S5, in the event that the condition in S3B is true, continuing the procedure according to the steps described above according to the first embodiment up to step S3.

[0045] In this way, items 8 of which there is a shortage in the apparatus 1 can be issued less frequently.

[0046] Figure 5 shows schematically how the number of items 8 varies over time in a handling unit 11 according to the first embodiment. The number A of items 8 of a denomination is shown along the vertical axis and the time t is shown along the horizontal axis in the figure. The upper limit value and lower limit values ug are shown by dashed and dotted lines. The dashed line f corresponds to the maximum number of items 8 that can be stored in the handling unit 11.

[0047] Figure 5 illustrates how items 8 that have a tendency to increase in number in a handling unit 11 increase in number with time t according to the curve k. When the number of items 8 of the denomination n_3 (see Figure 2a) reaches the upper limit value ög, according to the procedure described above in Figures 3 and 4 the control unit 5 causes the apparatus to issue items 8, the number of which has reached the upper limit value ög, corresponding to the amount of the denomination n_2 that would otherwise have been issued. For example, if the number of items 8, such as SEK 100 notes, has reached the upper limit value ög, and change in the form of one SEK 500 note is to be issued, the control unit 5 causes the apparatus 1 to issue five SEK 100 notes instead.

[0048] The inclination L1 of the line shows how the number S of items 8 increases over time in the handling unit 11. At the time a, emptying is required, as the number has reached the value f. A signal is given to the cashier indicating that emptying is required.

[0049] Figure 6 illustrates how items 8 that have a tendency to reduce in number in a handling unit 11 reduce in number with time. When the number A of items 8 of the denomination n_2 reaches the lower limit value, according to the procedure and the second embodiment described above in Figure 4, the control unit 5 causes the apparatus 1 to issue items 8 of the denomination n_3, that is to say the next denomination instead. For example, if the number of items 8, such as SEK 500 notes, has reached the lower limit value ug, and change in the form of one SEK 500 note is to be issued, the control unit 5 causes the apparatus 1 to issue five SEK 100 notes instead.

[0050] The diagram in Figure 5 shows that the emptying of the items 8 of denomination n_2 at the time a is delayed, which is cost-effective. Similarly, the diagram in Figure 6 shows that the replenishing of the items 8 of denomination n_3 is delayed until time b, which is similarly cost-effective. The inclination L1 and L2 of the respective curves shows the increase and reduction in the number of items 8 in the handling unit 11 over time. By the use of both the limit values, ug and ög, in combination, the inclinations L1 and L2 can be made less steep than according to known technology. That is to say that if there is a lot of one denomination and little of another, the control unit 5 causes the issuing to be carried out in such a way that the denomination of which there is a lot is primarily paid out and the denomination of which there is little is paid out as little as possible.

[0051] Figures 7 and 8 show schematically how the number of items 8 varies in a known handling unit 11 over time. The difference in comparison with the diagrams in Figures 5 and 6 is that the emptying and replenishing of the handling unit 11 are carried out more frequently at the times a1 and a2 in comparison with the embodiments described above.

[0052] Figure 7 also shows a line x that defines the number of items that the handling unit 11 must be replenished with in order to achieve a buffer B. According to the second embodiment, the buffer B can be made smaller, as according to this embodiment the control unit 5 is arranged primarily not to issue items 8 if the lower limit value ug has been passed. In this way, the apparatus 1 can be made less bulky than according to known tech-

nology. Similarly, more items 8 can be stored for use if the buffer B can be made smaller.

[0053] The control unit comprising the first memory device 15 for storing the program routine 17 is arranged to cause the control unit 5 to control the issuing of notes 6 and coins 7 from the apparatus 1 connected to the cash register 3, which program routine 17 comprises a medium m that can be read by a computer, which, when it is executed by the control unit 5, causes the control unit 5 to carry out the steps of: transmitting the payment order to the item recording unit 13 from the cash register 3, calculating the number of items 8 of each denomination that is to be issued on the basis of the payment order, moving the indicator 25 to a highest denomination that is to be issued, checking whether the number of items 8 of the next denomination in the handling unit 11 designed for this denomination is greater than or equal to an upper predetermined limit value ög, storing data in the item recording unit 13 concerning the number of items 8 of each denomination to be issued, calculating the number of items 8 of the next denomination to be issued, checking data concerning the number of items 8 of the next denomination in the handling unit 11 designed for the next denomination, and repeating the procedure, moving the indicator 25 to the next denomination that is to be issued until the next denomination is the last.

[0054] Alternatively, the program routine 17, comprising a second readable medium m', which program routine 17 can also cause the control unit 5 to carry out the steps of: checking whether the number of items 8 of the denomination indicated by the indicator 25 is less than or equal to the lower predetermined limit value ug, and checking whether the number of items 8 of the next denomination is greater than the lower limit value ug.

[0055] The invention also relates to the use of the self-contained apparatus 1 for handling notes and coins with a cash register 3 for inputting and issuing notes and coins.

[0056] A combination of both embodiments and other embodiments are of course possible, within the framework of the invention. Similarly, the present invention covers variants in which other denominations than consecutive denominations are used. Algorithms and systems for carrying out the issuing of items with denominations several steps removed from the denomination that is indicated can similarly be implemented and constitute a solution to the problems mentioned in the introduction.

[0057] Alternatively, an additional limit value can be introduced, acting as a preliminary warning. An alarm signal can be generated for signalling to the cashier that it is time to empty or replenish. Similarly, statistics can be used on the basis of data stored in the database unit concerning the number of items, which statistics can be utilised by the shopkeeper.

Claims

1. Self-contained apparatus for handling notes and coins at a cash register system, where a customer can pay with notes and coins that are inserted in the apparatus and the apparatus pays back change with items previously inserted (3), which apparatus (1) comprises a control unit (5) arranged for inputting and issuing notes (6) and coins (7), also called items (8), into and from a storage device (9) arranged in the apparatus (1), which storage device comprises a handling unit (11) designed for each denomination and for the storage system, the said control unit (5) being able to be connected to an item recording unit (13) assigned to the apparatus (1) and being able to be connected to the said handling unit (11), **characterised in that** the said control unit (5) comprises a first memory device (15) for storing a program routine (17) which uses an indicator (25) being moved form the highest denomination to the next lower denomination until the next denomination is the last and which program routine (17) is arranged at item level to cause the said control unit (5) to control the flow of notes (6) and coins (7) during issuing on the basis of at least one predetermined limit value (ög, ug) relating to the number of items (8) that can be stored in each handling unit (11) in such a way that, in relation to the calculated number of items (8) of a denomination to be issued, items (8) of the next lower denomination are issued when the said limit value (ög, ug) is reached.

2. Apparatus according to Claim 1, **characterised in that** each handling unit (11) is allocated a counter unit (19), which is arranged to work in conjunction with the said control unit (5) and is arranged to count the number of items (8) to be issued, which items (8) are to replace items (8) of the denomination that is not issued.

3. Apparatus according to Claim 1 or 2, **characterised in that** the said limit value is set at an upper limit value (ög) for reducing the number of items (8) in the said handling unit (11).

4. Apparatus according to Claims 1-3, **characterised in that** the said limit value is set at a lower limit value (ug) for maintaining the number of items (8) in the said handling unit (11).

5. Apparatus according to any one of the preceding claims, **characterised in that** the said item recording unit (13) is arranged to work in conjunction with a central database unit (21) for recording input and issued items (8) with regard to information comprising the number of items (8) on the basis of denomination and with a control unit (23) connected to the said central database (21).

6. Method for controlling the issuing of notes (6) and coins (7) from a self-contained apparatus (1) for han-

dling notes and coins at a cash register system (3), where a customer can pay with notes and coins that are inserted in the apparatus and the apparatus pays back change with items previously inserted, which apparatus (1) comprises a control unit (5) arranged for inputting and issuing notes (6) and coins (7), at item level, into and from a storage device (9) arranged in the apparatus (1) comprising a handling unit (11) designed for each denomination, the said control unit (5) is arranged for calculating the number of items (8) of each denomination that must be issued on the basis of a payment order, said control unit (5) being able to be connected to an item recording unit (13) assigned to the apparatus (1) and being able to be connected to the said handling unit (11), said payment order is transmitted to the said control unit (5) from the said cash register (3), the method being implemented in conjunction with a program routine (17), **characterised by** the steps of:

- moving an indicator (25) to a highest denomination that is to be issued,
- checking whether the number of items (8) of the next lower denomination in the handling unit (11) designed for this denomination is greater than or equal to an upper predetermined limit value (ög),
- storing data in the said item recording unit (13) concerning the number of items (8) of each denomination to be issued without any action,
- calculating the number of items (8) of the next lower denomination to be issued, replacing the item (8) of the denomination that the indication (25) indicates,
- checking whether the number of items (8) in the handling unit (11) designed for the next lower denomination can be issued,
- repeating the said procedure with the said indicator (25) being moved to the next lower denomination that is to be issued until the next denomination is the last, and
- issuing the items (8) on the basis of said checking and calculating steps by means of said control unit (5).

7. Method according to Claim 6, **characterised by** the steps of:

- checking whether the number of items (8) of the denomination indicated by the said indicator (25) is less than or equal to a lower predetermined limit value (ug), and
- checking whether the number of items (8) of the next denomination is greater than the lower limit value (ug).

Patentansprüche

1. Unabhängige Vorrichtung zur Handhabung von Geldscheinen und Münzen an einem Registrierkassensystem, wo ein Kunde mit Geldscheinen und Münzen zahlen kann, die in die Vorrichtung eingeführt werden, und die Vorrichtung Wechselgeld mit vorher eingeführten Artikeln (3) zurückzahlt, wobei die Vorrichtung (1) eine Steuereinheit (5) aufweist, die zum Eingeben und Ausgeben von Geldscheinen (6) und Münzen (7), die auch als Artikel (8) bezeichnet werden, in und aus einer Verwahrvorrichtung (9) eingerichtet ist, die in der Vorrichtung (1) angeordnet ist, wobei die Verwahrvorrichtung eine Handhabungseinheit (11) aufweist, die für jeden Nennwert und für die Verwahrvorrichtung bestimmt ist, wobei die Steuereinheit (5) mit einer Artikelaufzeichnungseinheit (13) verbunden werden kann, die der Vorrichtung (1) zugeordnet ist und mit der Handhabungseinheit (11) verbunden werden kann, **dadurch gekennzeichnet, daß** die Steuereinheit (5) eine erste Speichervorrichtung (15) zum Speichern einer Programmroutine (17) aufweist, die einen Indikator (25) verwendet, der vom höchsten Nennwert zum nächsten niedrigeren Nennwert bewegt wird, bis der nächste Nennwert der letzte ist, und wobei die Programmroutine (17) auf Artikelebene eingerichtet ist, die Steuereinheit (5) zu veranlassen, den Fluß von Geldscheinen (6) und Münzen (7) während des Ausgebens auf der Grundlage mindestens eines vorgegebenen Grenzwerts (ög, ug), der die Anzahl von Artikeln (8) betrifft, die in jeder Handhabungseinheit (11) verwahrt werden können, in einer solchen Weise zu steuern, daß in Bezug auf die berechnete Anzahl von Artikeln (8) eines Nennwerts, die ausgegeben werden sollen, Artikel (8) des nächsten niedrigeren Nennwerts ausgegeben werden, wenn der Grenzwert (ög, ug) erreicht ist.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** jeder Handhabungseinheit (11) eine Zähleinheit (19) zugeordnet ist, die eingerichtet ist, in Verbindung mit der Steuereinheit (5) zu arbeiten, und eingerichtet ist, die Anzahl von Artikeln (8) zu zählen, die ausgegeben werden sollen, wobei die Artikel (8) dazu dienen, Artikel (8) des Nennwerts zu ersetzen, der nicht ausgegeben wird.

3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, daß** der Grenzwert auf einen oberen Grenzwert (ög) gesetzt ist, um die Anzahl von Artikeln (8) in der Handhabungseinheit (11) zu reduzieren.

4. Vorrichtung nach Anspruch 1-3, **dadurch gekennzeichnet, daß** der Grenzwert auf einen unteren Grenzwert (ug) gesetzt ist, um die Anzahl von Artikeln (8) in der Handhabungseinheit (11) beizubehal-

ten.

5. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** die Artikelaufzeichnungseinheit (13) eingerichtet ist, in Verbindung mit einer zentralen Datenbankeinheit (21), um eingegebene und ausgegebene Artikel (8) in Hinblick auf Informationen, die die Anzahl von Artikeln (8) aufweisen, auf der Grundlage des Nennwerts aufzuzeichnen, und mit einer Steuereinheit (23) zu arbeiten, die mit der zentralen Datenbank (21) verbunden ist.

6. Verfahren zum Steuern des Ausgebens von Geldscheinen (6) und Münzen (7) aus einer unabhängigen Vorrichtung (1) zur Handhabung von Geldscheinen und Münzen an einem Registrierkassensystem (3), wo ein Kunde mit Geldscheinen und Münzen zahlen kann, die in die Vorrichtung eingeführt werden, und die Vorrichtung Wechselgeld mit vorher eingeführten Artikeln zurückzahlt, wobei die Vorrichtung (1) eine Steuereinheit (5) aufweist, die auf Artikelebene zum Eingeben und Ausgeben von Geldscheinen (6) und Münzen (7) in und aus einer Verwahrvorrichtung (9) eingerichtet ist, die in der Vorrichtung (1) angeordnet ist, die eine Handhabungseinheit (11) aufweist, die für jeden Nennwert bestimmt ist, wobei die Steuereinheit (5) eingerichtet ist, die Anzahl von Artikeln (8) jedes Nennwerts zu berechnen, die auf der Grundlage einer zahlungsanweisung ausgegeben werden müssen, wobei die Steuereinheit (5) mit einer Artikelaufzeichnungseinheit (13) verbunden werden kann, die der Vorrichtung (1) zugeordnet ist, und mit der Handhabungseinheit (11) verbunden werden kann, wobei die Zahlungsanweisung von der Registrierkasse (3) an die Steuereinheit (5) übertragen wird, wobei das Verfahren in Verbindung mit einer Programmroutine (17) ausgeführt wird, die durch die Schritte **gekennzeichnet** ist:

- Bewegen eines Indikators (25) zu einem höchsten Nennwert, der ausgegeben werden soll,
- Prüfen, ob die Anzahl von Artikeln (8) des nächsten niedrigeren Nennwerts in der Handhabungseinheit (11), die für diesen Nennwerts bestimmt sind, größer oder gleich einem oberen vorgegebenen Grenzwert (ög) ist,
- Speichern von Daten in der Artikelaufzeichnungseinheit (13), die die Anzahl von Artikeln (8) jedes Nennwerts betreffen, der ausgegeben werden soll, ohne jede Einwirkung,
- Berechnen der Anzahl von Artikeln (8) des nächsten niedrigeren Nennwerts, die ausgegeben werden sollen,
- Ersetzen der Artikel (8) des Nennwerts, den der Indikator anzeigt,
- Prüfen, ob die Anzahl von Artikeln (8) in der Handhabungseinheit (11), die für den nächsten niedrigeren Nennwert bestimmt ist, ausgegeben werden können,
- Wiederholen der Prozedur, wobei der Indikator (25) zum nächsten niedrigeren Nennwert bewegt wird, der ausgegeben werden soll, bis der nächste Nennwert der letzte ist, und
- Ausgeben der Artikel (8) auf der Grundlage der Prüfungs- und Berechnungsschritte mittels der Steuereinheit (5).

7. Verfahren nach Anspruch 6, **gekennzeichnet durch** die Schritte:

- Prüfen, ob die Anzahl von Artikeln (8) des Nennwerts, der **durch** den Indikator (25) angezeigt wird, kleiner oder gleich einem unteren vorgegebenen Grenzwert (ug) ist, und
- Prüfen, ob die Anzahl von Artikeln (8) des nächsten Nennwerts größer als der untere Grenzwert (ug) ist.

Revendications

1. Appareil intégré pour le traitement de billets et de pièces d'un système de caisse enregistreuse, où un client peut payer avec des billets et des pièces qui sont insérés dans l'appareil et où l'appareil rend la monnaie avec des articles préalablement insérés (3), ledit appareil (1) comprenant une unité de commande (5) conçue pour avaler et émettre des billets (6) et des pièces (7), également appelés articles (8), dans et à partir d'un dispositif de stockage (9) disposé dans l'appareil (1), lequel dispositif de stockage comprend une unité de traitement (11) conçue pour chaque coupure et pour le système de stockage, ladite unité de commande (5) pouvant être connectée à une unité d'enregistrement d'article (13) attribuée à l'appareil (1) et pouvant être connectée à ladite unité de traitement (11), **caractérisé en ce que** ladite unité de commande (5) comprend un premier dispositif à mémoire (15) pour enregistrer une routine de programme (17) qui utilise un indicateur (25) étant déplacé à partir de la coupure la plus haute à la coupure plus basse suivante jusqu'à ce que la prochaine coupure soit la dernière et ladite routine de programme (17) étant conçue au niveau de l'article pour faire que ladite unité de commande (5) commande l'écoulement de billets (6) et de pièces (7) pendant l'émission sur la base d'au moins une valeur limite prédéterminée (ög, ug) liée au nombre d'articles (8) qui peuvent être stockés dans chaque unité de traitement (11) de telle façon que, en relation avec le nombre calculé d'articles d'une coupure devant être émis, des articles (8) de la coupure basse la plus proche sont émis lorsque ladite valeur limite (ög, ug) est atteinte.

2. Appareil selon la revendication 1, **caractérisé en ce que** chaque unité de traitement (11) se voit attribuer une unité de comptage (19), qui est conçue pour travailler en conjonction avec ladite unité de commande (5) et est conçue pour compter le nombre d'articles (8) à émettre, lesquels articles (8) doivent remplacer des articles (8) de la coupure qui n'est pas émise.

3. Appareil selon la revendication 1 ou 2, **caractérisé en ce que** ladite valeur limite est fixée à une valeur limite supérieure (ög) pour réduire le nombre d'articles (8) dans ladite unité de traitement (11).

4. Appareil selon les revendications 1-3, **caractérisé en ce que** ladite valeur limite est fixée à une valeur limite inférieure (ug) pour maintenir le nombre d'articles (8) dans ladite unité de traitement (11).

5. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite unité d'enregistrement d'articles (13) est conçue pour travailler en conjonction avec une unité de base de données centrale (21) pour enregistrer des articles (8) avalés et émis en considérant l'information comprenant le nombre d'articles (8) sur la base d'une coupure et avec une unité de contrôle (23) reliée à ladite base de données centrale (21).

6. Méthode de commande de l'émission de billets (6) et de pièces (7) à partir d'un appareil (1) intégré pour traiter des billets et des pièces d'un système de caisse enregistreuse (3), où un client peut payer avec des billets et des pièces qui sont insérés dans l'appareil et où l'appareil rend la monnaie avec des articles préalablement insérés, lequel appareil (1) comprend une unité de commande (5) conçue pour avaler et émettre des billets (6) et des pièces (7), au niveau d'un article, dans et à partir d'un dispositif de stockage (9) disposé dans l'appareil (1) comprenant une unité de traitement (11) conçue pour chaque coupure, ladite unité de commande (5) étant conçue pour calculer le nombre d'articles (8) de chaque coupure qui doit être émis sur la base d'un ordre de paiement, ladite unité de commande pouvant être connectée à une unité d'enregistrement d'articles (13) affectée à l'appareil (1) et pouvant être connectée à ladite unité de traitement (11), ledit ordre de paiement étant transmis à ladite unité de contrôle (5) à partir de ladite caisse enregistreuse (3), ce procédé étant mis en oeuvre en conjonction avec une routine de programme (17), **caractérisée en ce qu'**elle comporte les étapes :

- déplacer un indicateur (25) jusqu'à une coupure la plus haute à émettre,
- vérifier si le nombre d'articles (8) de coupure inférieure la plus proche dans l'unité de traitement (11) conçue pour cette coupure est plus grand que ou égal à une valeur limite supérieure prédéterminée (ög),
- enregistrer des données dans ladite unité d'enregistrement d'articles (13) concernant le nombre d'articles (8) de chaque coupure devant être émis sans aucune action,
- calculer le nombre d'articles (8) de la coupure inférieure suivante devant être émis en remplaçant l'article (8) de la coupure que l'indicateur (25) indique,
- vérifier si le nombre d'articles (8) dans l'unité de traitement (11) conçu pour la coupure inférieure suivante peut être émis,
- répéter ladite procédure en déplaçant ledit indicateur (25) vers la coupure inférieure suivante qui doit être émise jusqu'à ce que la coupure suivante soit la dernière, et
- émettre les articles (8) sur la base desdites étapes de vérification et de calcul au moyen de ladite unité de commande (5).

7. Procédé selon la revendication 6, **caractérisé par** les étapes suivantes :

- vérifier si le nombre d'articles (8) de la coupure indiqué par ledit indicateur (25) est inférieur ou égal à une valeur limite prédéterminée inférieure (ug), et
- vérifier si le nombre d'articles (8) de la coupure suivante est plus grand que la valeur limite inférieure (ug).

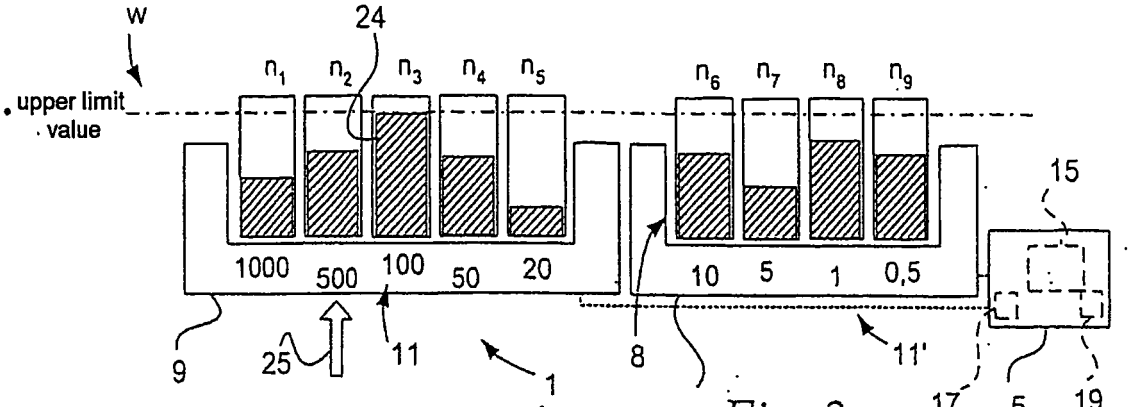


Fig. 2a

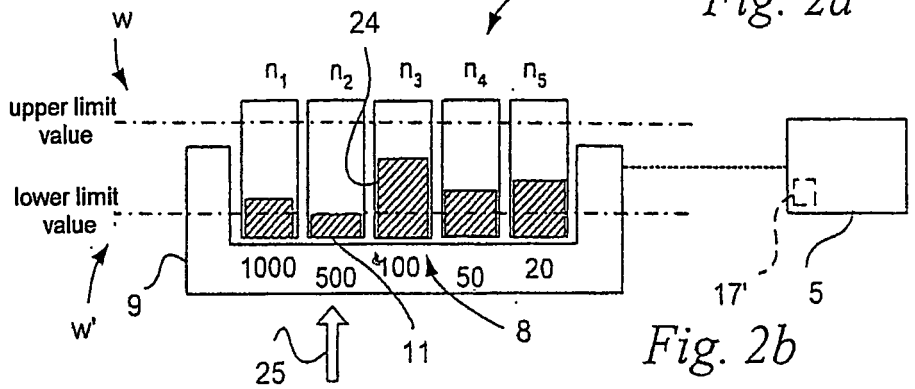


Fig. 2b

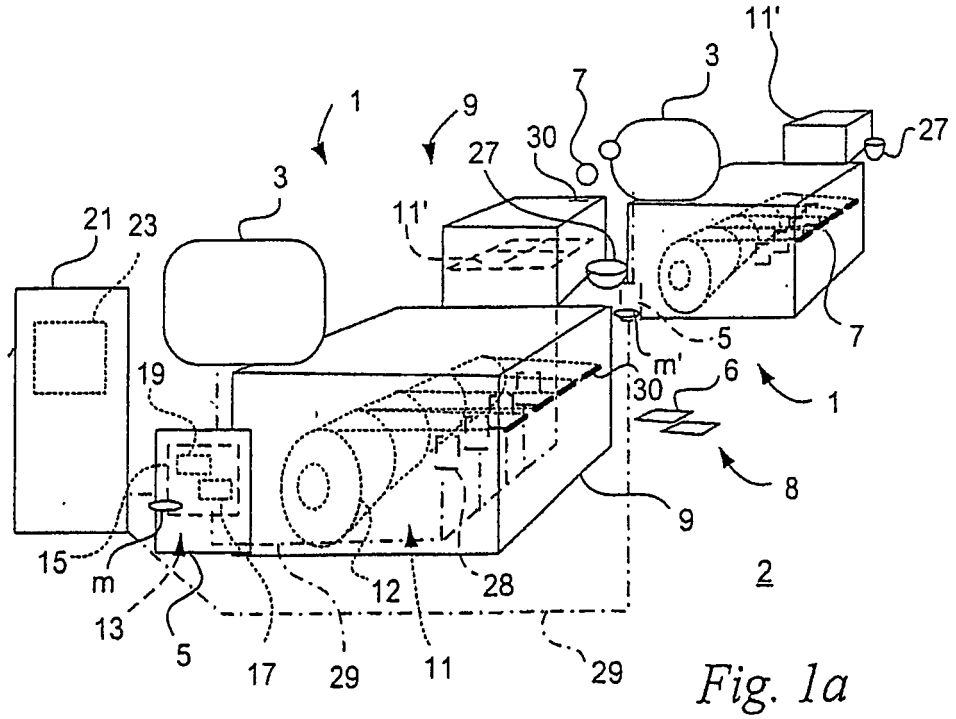


Fig. 1a

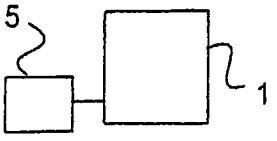


Fig. 1b

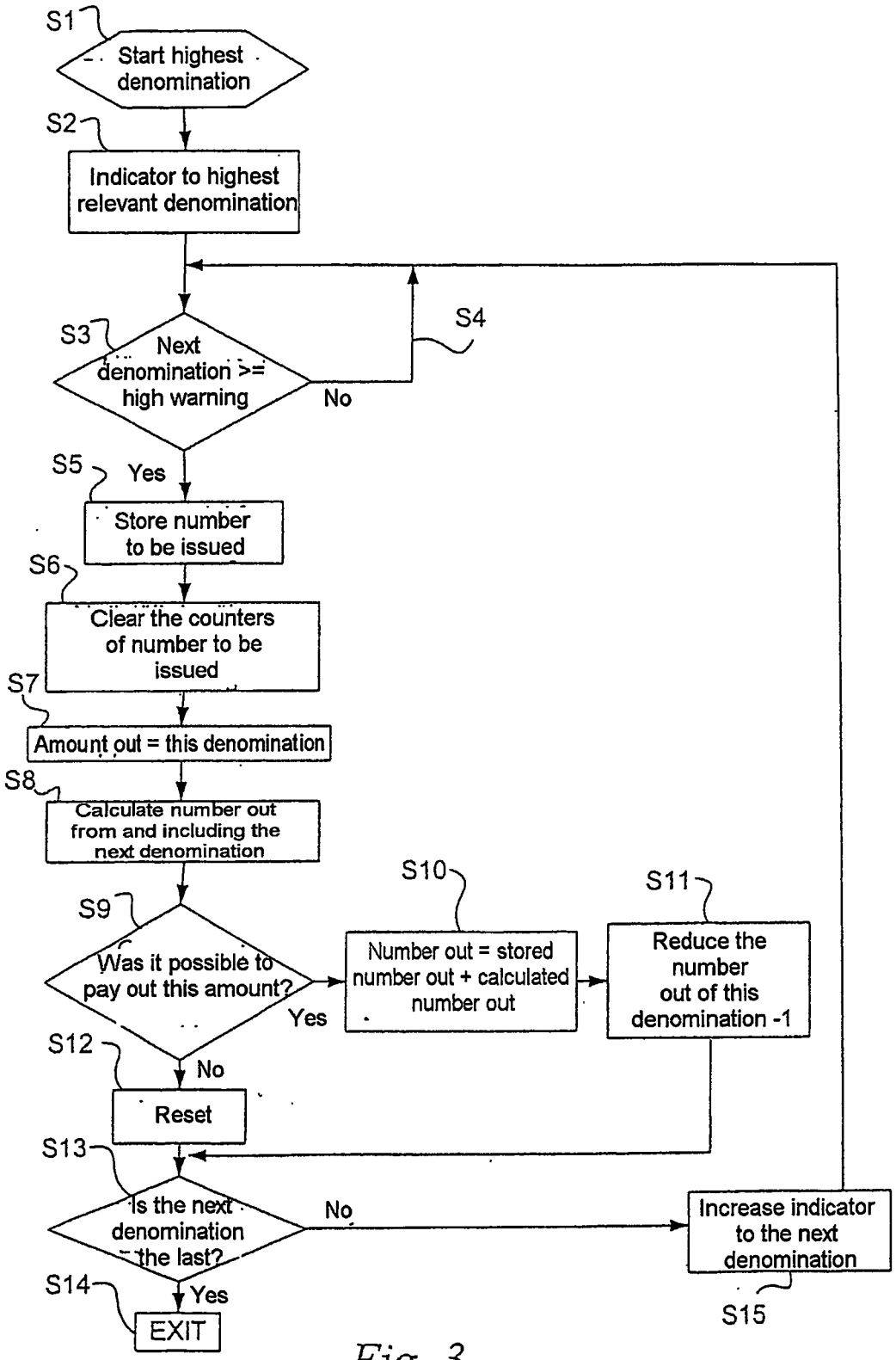

S1
Start highest denomination
S2
Indicator to highest relevant denomination
S3
Next denomination >= high warning
No
S4
Yes
S5
Store number to be issued
S6
Clear the counters of number to be issued
S7
Amount out = this denomination
S8
Calculate number out from and including the next denomination
S9
Was it possible to pay out this amount?
Yes
S10
Number out = stored number out + calculated number out
S11
Reduce the number out of this denomination -1
No
S12
Reset
S13
Is the next denomination = the last?
No
Increase indicator to the next denomination
S15
Yes
S14
EXIT

Fig. 3

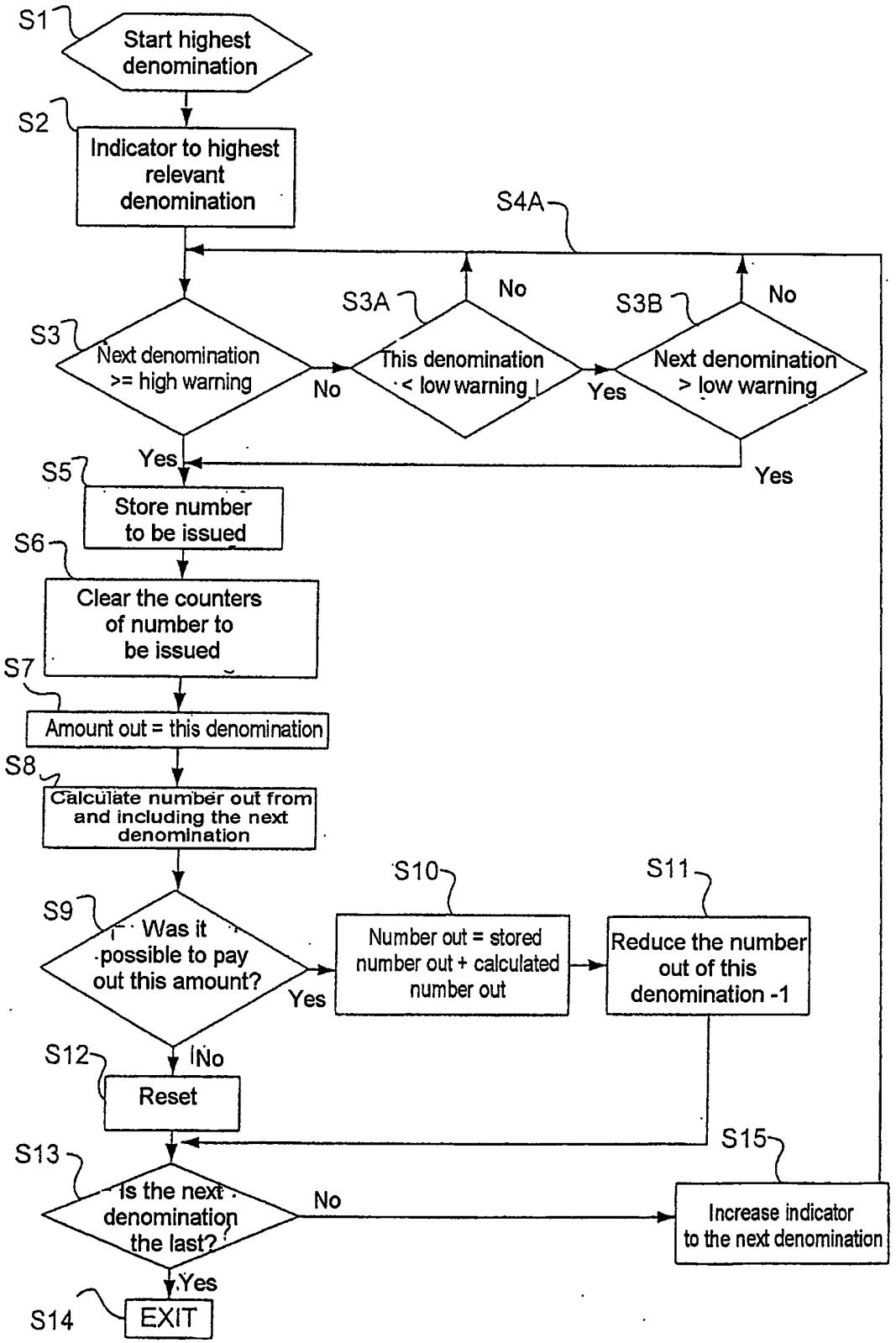

S1
Start highest denomination
S2
Indicator to highest relevant denomination
S4A
S3
Next denomination >= high warning
No
S3A
This denomination < low warning
No
Yes
S3B
Next denomination > low warning
No
Yes
Yes
S5
Store number to be issued
S6
Clear the counters of number to be issued
S7
Amount out = this denomination
S8
Calculate number out from and including the next denomination
S9
Was it possible to pay out this amount?
Yes
S10
Number out = stored number out + calculated number out
S11
Reduce the number out of this denomination -1
No
S12
Reset
S13
Is the next denomination the last?
No
S15
Increase indicator to the next denomination
Yes
S14
EXIT

Fig. 4

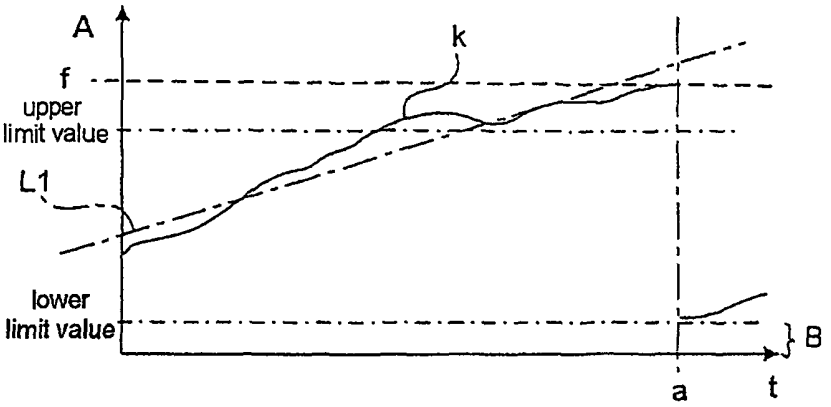


Fig. 5

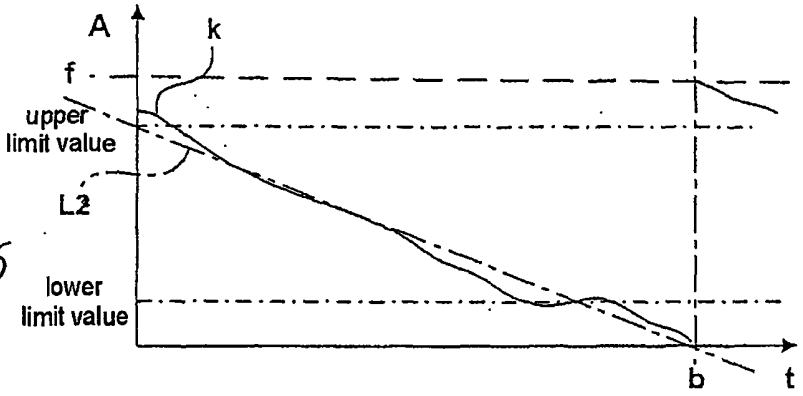


Fig. 6

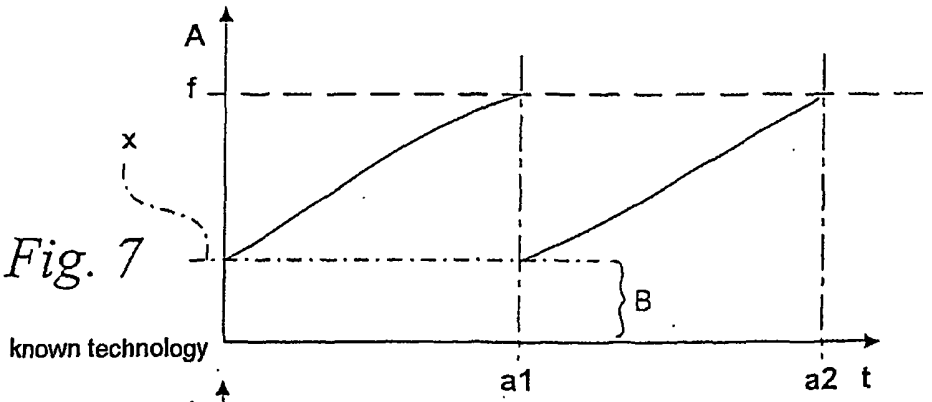


Fig. 7

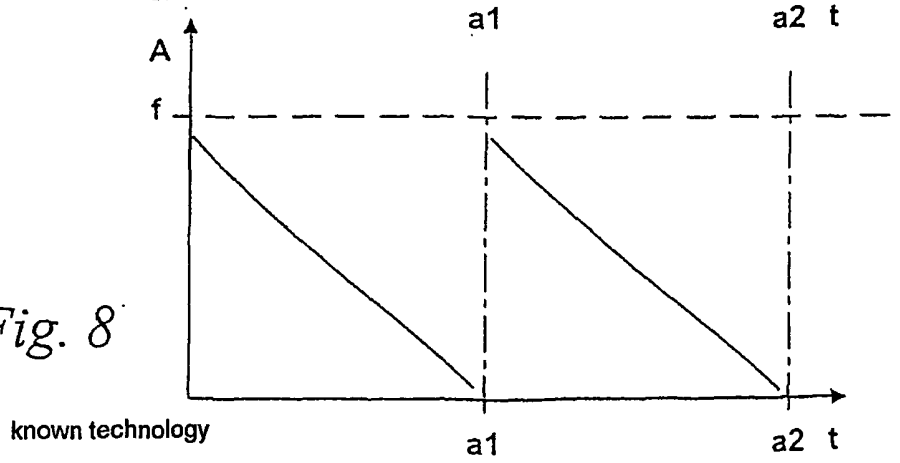


Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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