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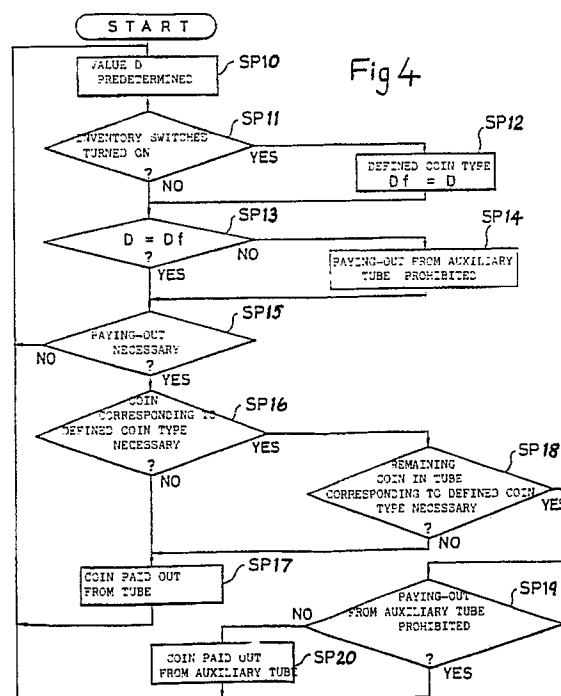
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54 **Coin return control system for vending machines.**

57 A coin return control system for vending machines is disclosed which includes predetermined coin type detecting portion for detecting the coin type predetermined by the coin type predetermination switch every predetermined time. A memory memorizes the coin type detected by the coin type detecting portion immediately after operating a particular switch except for the coin type predetermination switch. A variation detecting portion detects the variation of the coin type predetermined by the coin type predetermination switch based on the coin type detected by the predetermined coin type detecting portion and the coin type memorized by the memory. An instruction portion instructs the coin paying-out mechanism to return a coin from the auxiliary change retaining tube when the number of the coin retained in the change retaining tube corresponding to the coin type memorized by the memory is below a predetermined value. A determination portion determines whether or not the instruction portion should instruct the coin paying-out mechanism to return a coin from the auxiliary change retaining tube based on the detected result of the variation detecting portion. Therefore, the coin return control system for vending machines can always correctly pay out a necessary coin.



COIN RETURN CONTROL SYSTEM FOR VENDING MACHINES

The present invention relates to a coin return control system for vending machines, and more particularly, to a coin return system for vending machines which determines a coin should be paid out from a change retaining tube or an auxiliary change retaining tube.

A conventional coin return control system is provided in a vending machine, and receives a coin deposited from outside or pays out a coin as change. The coin return control system pays out a coin in change retaining tubes corresponding a plurality of coin types from a coin carrying out portion based on an instruction signal from a control portion to a return opening.

As shown in Japanese Patent Laid-open Gazette No. 52-82392, the coin return control system is provided with an auxiliary change retaining tube corresponding to the coin type as paid out as change. The coin type of coins which are retained in the auxiliary change retaining tube is predetermined in a coin type predetermination switch which includes small dip switches. A control portion detects the predetermined value of the coin type every predetermined time and instructs a coin paying-out mechanism to pay out the coin in the auxiliary change retaining tube when the number of the coin which is retained in the change retaining tube of the coin type corresponding to the predetermined value is below a predetermined value. That is, as shown in Figure 1, a coin type is first predetermined by a coin type predetermination switch at step S1. The output from step S1 is input to step S2. It is determined at step S2 whether or not it is necessary for change to be paid out. If necessary, the output from step 2 is inputted to step S3. Otherwise, the output from step 2 returns to the input of step S1. It is determined at step S3 whether or not the coin of the coin type predetermined at step S1 is necessary. If necessary, the output from step S3 is input to step S5. Otherwise, the output from step S3 is inputted to step S4, thus, a coin is paid out from a change retaining tube. In step S5, it is determined therein whether or not the number of the coin in the change retaining tube corresponding to the coin type predetermined by the coin type predetermining switch in step S1 is zero. If it is zero, the output from step S5 is input to step S6, and a coin is paid out from the auxiliary change retaining tube. Otherwise, the output from step S5 is input to step S4, and a coin is paid out from the change retaining tube.

In the above coin return control system, it may pay out a different coin since the control portion detects the predetermined value of the coin type predetermination switch every predetermined time

and instructs the coin paying-out mechanism to pay out the coin in the auxiliary change retaining tube. That is, the first predetermined value of the coin type predetermination switch may be different from the predetermined value thereof after a particular period of time because of the outside cause, e.g., in case that an operator to completely set the switch when the coin type of the coin in the auxiliary change retained tube is predetermined in the coin type predetermination switch or a liquid such as water invades into the interior of the switch. If those causes occur, the coin return control system results in paying out a different coin.

Preferred embodiments of this invention may provide a coin return control system for vending machines which can always correctly pay out a necessary coin.

A coin return control system for vending machines according to the present invention comprises a plurality of change retaining tubes corresponding to coin type of deposited coins and at least one auxiliary change retaining tube. Coin type predetermination switch predetermines a particular coin type of coins retained in the auxiliary change retaining tube. Coin paying-out mechanism returns a coin from one of the plurality of change retaining tubes or such auxiliary change retaining tube. Predetermined coin type detecting portion detects the coin type predetermined by the coin type predetermination switch every predetermined time. A memory memorizes the coin type detected by the coin type detecting portion immediately after operating a particular switch except for the coin type predetermination switch. A variation detecting portion detects the variation of the coin type predetermined by the coin type predetermination switch based on the coin type detected by the predetermined coin type detecting portion and the coin type memorized by the memory. An instruction portion instructs the coin paying-out mechanism to return a coin from the auxiliary change retaining tube when the number of the coin retained in the change retaining tube corresponding to the coin type memorized by the memory is below a predetermined value. A determination portion determines whether or not the instruction portion should instruct the coin paying-out mechanism to return a coin from the auxiliary change retaining tube based on the detected result of the variation detecting portion.

Further objects, features and other aspects of this invention will be understood from the following detailed description of a preferred embodiment of this invention referring to be annexed drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a flow chart of a conventional coin return control system.

Figure 2 (a) is a schematic front view of a coin return control system in accordance with one embodiment of this invention.

Figure 2 (b) is a schematic side view including a cut-out portion of a coin return control system as shown in Figure 2 (a).

Figure 3 is a block diagram of an electrical circuit of a coin return control system as shown in Figure 2 (a).

Figure 4 is a flow chart of a coin return control system as shown in Figure 2 (a).

With reference to Figures 2(a) and (b), the construction of a coin return control system for vending machines in accordance with one embodiment of this invention is shown. Coin return control system 1 includes coin distributing mechanism 2 at front upper position thereof and change retaining tubes 3, 4 and 5 for one hundred, ten and fifty unit coins, respectively, disposed in series under coin distributing mechanism 2. Auxiliary change retaining tube 6 is disposed adjacent to coin distributing mechanism 2 and change retaining tube 5. Coin paying-out mechanism 7 is disposed below change retaining tubes 3, 4 and 5, and auxiliary change retaining tube 6. A plurality of switches 8a-8d corresponding to respective change retaining tubes 3, 4 and 5 are disposed adjacent to change retaining tube 3. Control unit 9 is disposed behind the above tubes and mechanism. Coin type predetermination switch 10 is disposed on control unit 9 at its upper end to enable to be operated by removing auxiliary change retaining tube 6.

A coin deposited into coin inlet 2a of coin distributing mechanism 2 is determined at its authenticity and type during its passage through coin distributing mechanism 2. The coin determined to be an unacceptable coin (for example, a metal slug or foreign coin) is distributed to a return opening (not shown). When a deposited coin is an acceptable coin, and when it is determined to be a one hundred monetary unit coin, it is distributed to change retaining tube 3; when it is determined to be a ten unit coin, it is distributed to change retaining tube 4; when it is determined to be a fifty unit coin, it is distributed to change retaining tube 5. When change retaining tubes 3, 4 and 5 are filled with respective corresponding coins, it is distributed to a safe. Coin distributing mechanism 2 distributes the deposited coin in accordance with the instruction from control portion 11 (a micro-computer) disposed on control unit 9.

With reference to Figure 3, control portion 11 is directly connected to several portions, e.g., coin distributing mechanism 2, coin paying-out mechanism 7, inventory switches 8a-8d, coin type pre-

determination switch 10 and operating portion 12 of a vending machine, respectively.

Coin distributing mechanism 2 includes a sensor (not shown) to detect the materials, form and the other things of the deposited coin and outputs the detected signal to control portion 11. Coin distributing mechanism 2 operates distributing gates (not shown) in accordance with signals from control portion 11, and introduces the deposited coin into the respective corresponding change retaining tubes 3, 4 and 5. Coin paying-out mechanism 7 pays out a coin from change retaining tubes 3, 4 or 5 or auxiliary change retaining tube 6 to a return opening (not shown) in accordance with the instruction of control portion 11 and includes a plurality of sensors (not shown) to detect the number of the remaining coins in change retaining tubes 3, 4 and 5. When the number of the remaining coins respective therein is zero, coin paying-out mechanism 7 outputs a signal to communicate a such a condition into control portion 11.

Inventory switches 8a-8d outputs a signal to forcedly pay out a coin in change retaining tubes 3, 4 or 5 or auxiliary change retaining tube 6 into control portion 11. For example, before a vending machine starts to sale a merchandise, the condition of paying out a coin in change retaining tubes 3, 4 or 5 or auxiliary retaining tube 6 to a return opening can be tested by operating inventory switches 8a-8d.

Coin type predetermination switch 10 is to predetermine the coin type of the coin in auxiliary change retaining tube 6, which retains the coin often paid out as change. The coin type of the coin paid out as change can be changed by operating coin type predetermination switch 10 so that the coin type can be corresponded to the price of the merchandise. The predetermined value of coin predetermination switch 10 is detected by control portion 11 every predetermined time.

With reference to Figure 4, the function of the control portion in accordance with one embodiment of this invention is shown.

In step SP10, predetermined value D predetermined by coin type predetermination switch 10 is input to control portion 11. Then, it is determined in step SP11 whether or not inventory switch 8d corresponding to auxiliary change retaining tube 6 is turned on. If it is turned on, the output of step SP11 is input to step SP12, and predetermined value D is memorized as defined coin type value Df in step SP12. Although not shown in the flow chart, when it is turned on, the output of step SP11 is input to coin paying-out mechanism 7 to pay out a coin from auxiliary change retaining tube 6, and the condition of paying-out a coin is thus tested.

If inventory switch 8d is not turned on, the

output of step SP11 is input to step SP13, and it is determined in step SP13 whether or not predetermined value D equals defined coin type value Df. If predetermined value D does not equal defined coin type value Df, the output of step SP13 is input to step SP14 and the paying-out a coin from auxiliary change retaining tube 6 is prohibited. Otherwise, the output of step SP13 is input to step SP15, and it is determined in step SP15 whether or not it is necessary to pay out a coin. That is, it is determined therein whether or not it is necessary to pay out a coin based on the result of the comparison of the amount of the coin deposited through coin inlet 2a with the selling price of a purchase. If not necessary, the output of step SP15 is returned to step SP10. Otherwise, the output of step SP15 is input to step SP16. It is determined in step SP16 whether or not the coin of the coin type corresponding to defined coin type value Df, i.e., the coin in auxiliary change retaining tube 6, is necessary. If it is not necessary, the output of step SP16 is input to step SP17, and coin paying-out mechanism 7 is thus instructed so that a necessary coin can be paid out from change retaining tubes 3, 4 or 5 except for a change retaining tube corresponding to the coin type of auxiliary change retaining tube 6.

If it is necessary, the output of step SP16 is input to step SP18, and it is determined in step SP18 whether or not the number of the remaining coin in the change retaining tube corresponding to defined coin type value Df is zero. If it is zero, the output of step SP18 is input to step SP17. Otherwise, the output of step SP18 is input to step SP19, and it is determined in step SP19 whether or not the paying-out a coin from auxiliary change retaining tube 6 is prohibited. If it is not prohibited, the output of step SP19 is input to step SP20, and the number of the necessary coin is paid out from auxiliary change retaining tube 6. Otherwise, the output of step SP19 is returned to step SP 10.

As mentioned above, when predetermined value D of coin type predetermination switch 10 is changed in spite of that inventory switch 8d corresponding to auxiliary change retaining tube 6 is not turned on, the paying-out of a coin from auxiliary change retaining tube 6 is prohibited. Accordingly, even though predetermined value D is caused to be varied because of the bad condition in contact of coin type predetermination switch 10 or predetermined value D is caused to be varied because of invading liquid like water into coin type predetermination switch 10, it can be prevented to pay out the coin of a different coin type from auxiliary change retaining tube 6 as change.

This invention has been described in detail in connection with a preferred embodiment, but this is an example only and the invention is not restricted

thereto. It will be easily understood by those skilled in the art that other variations and modifications can be easily made within the scope of this invention.

Claims

1. A coin return control system for vending machines comprising:
a plurality of change retaining means corresponding to coin type of deposited coins;
at least one auxiliary change retaining means
coin type predetermination means predetermining a particular coin type of coins retained in said auxiliary change retaining means;
coin paying-out means for returning a coin from one of said plurality of change retaining means or such auxiliary change retaining means;
predetermined coin type detecting means for detecting the coin type predetermined by said coin type predetermination means every predetermined time;
memory means memorizing the coin type detected by said coin type detecting means immediately after operating a particular switch except for said coin type predetermination means;
variation detecting means detecting the variation of the coin type predetermined by said coin type predetermination means based on the coin type detected by said predetermined coin type detecting means and the coin type memorized by said memory means;
instruction means instructing said coin paying out means to return a coin from said auxiliary change retaining means when the number of the coin retained in said change retaining means corresponding to the coin type memorized by said memory means is below a predetermined value; and
determination means determining whether or not said instruction means should instruct said coin paying-out means to return a coin from said auxiliary change retaining means based on the detected result of said variation detecting means.

2. A vending machine including a coin return control system according to claim 1.

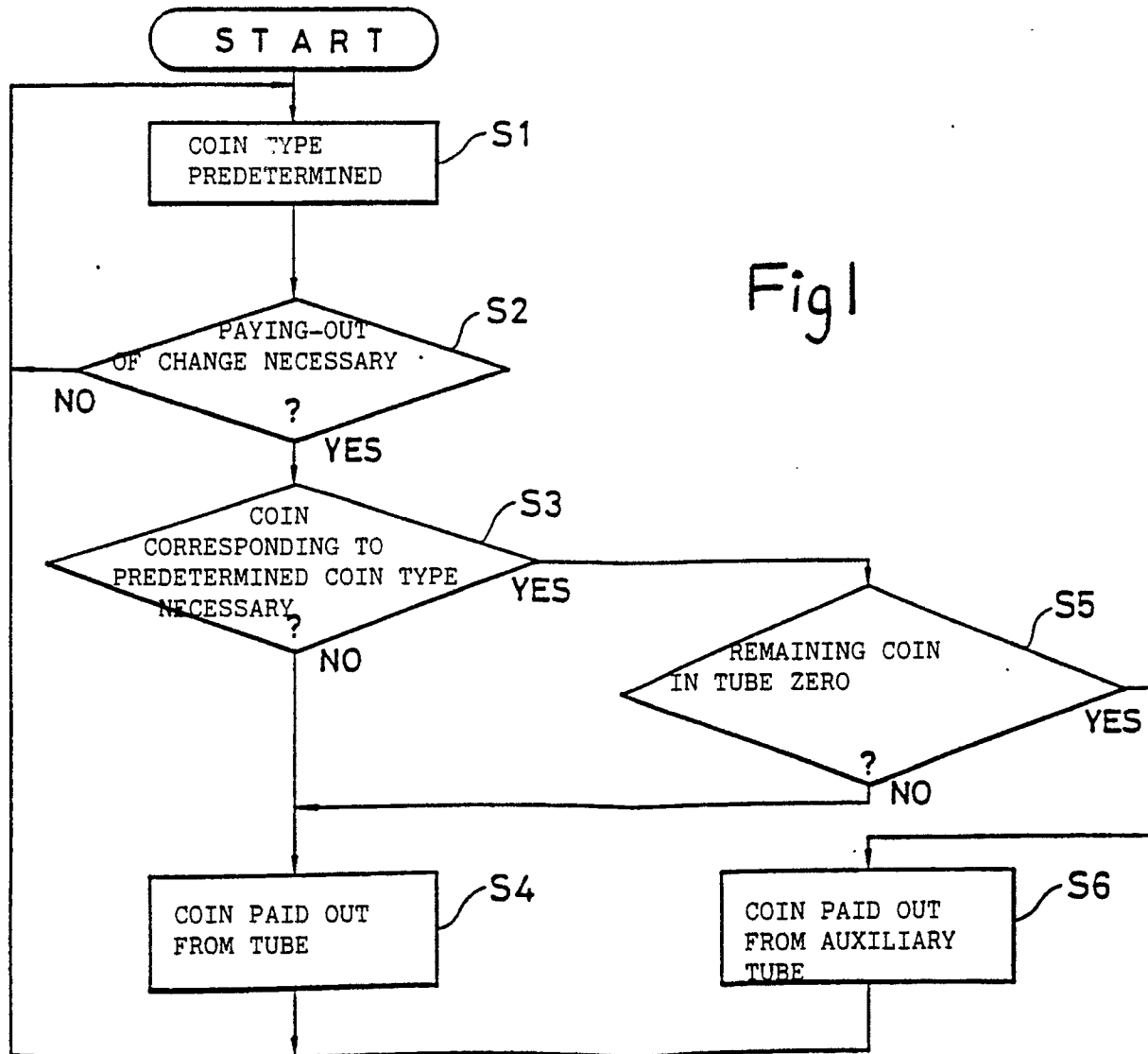


Fig 2a

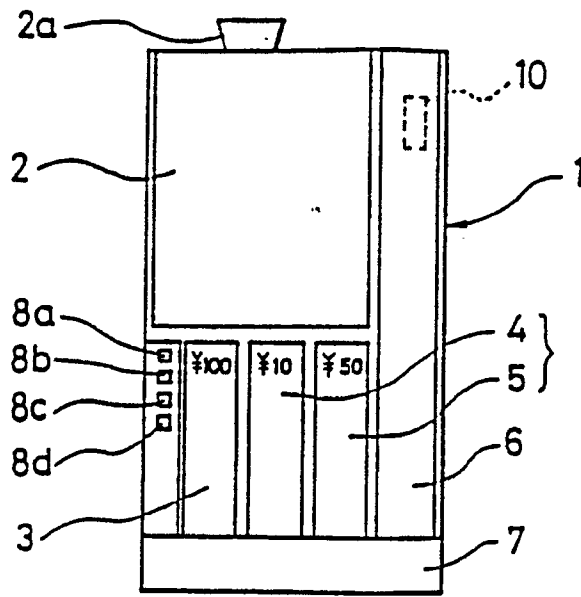
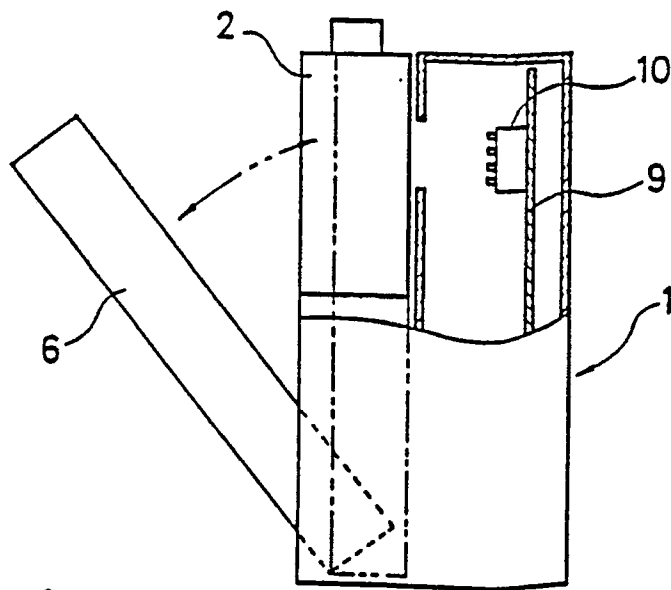


Fig 2b



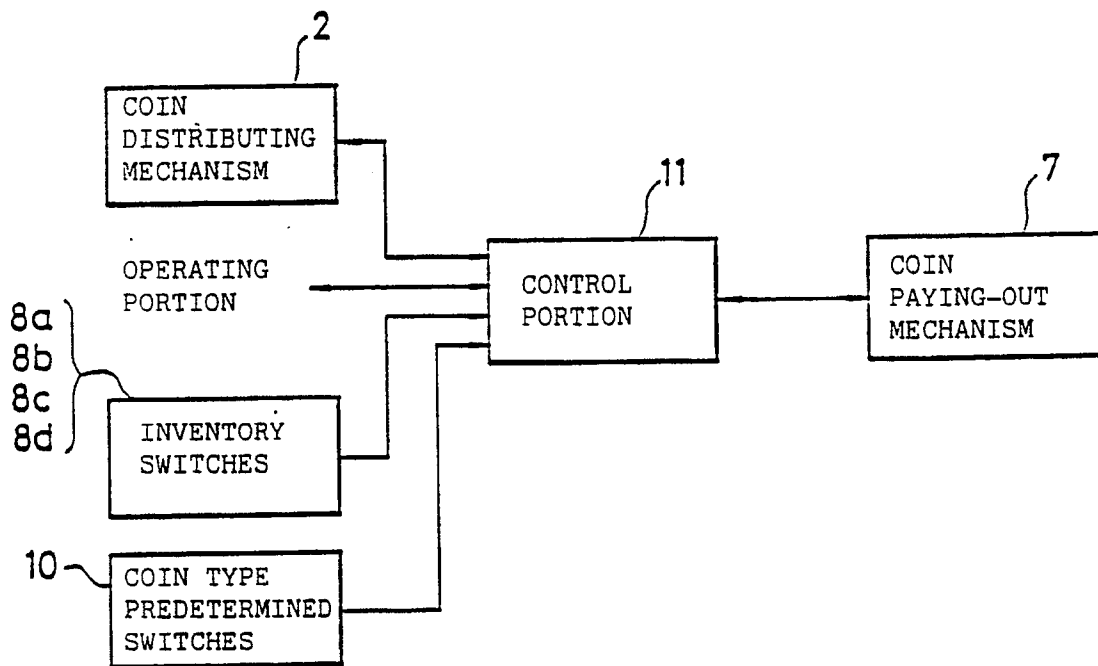


Fig 3

Fig 4

