

DESCRIPTION

TITLE OF INVENTION

VENDING MACHINE

TECHNICAL FIELD

The present invention relates to a vending machine for selling commodities such as canned beverages, carton beverages, or boxed snacks.

BACKGROUND ART

Conventionally, such a vending machine has been known including: a plurality of commodity selection units provided correspondingly to a plurality of commodities, respectively; a plurality of commodity information display units provided correspondingly to the commodities; and a control unit that sells a commodity when the commodity is selected using each commodity selection unit, and displays a price or the like of each commodity in each commodity information display unit (for example, see Patent Literature 1).

In such a vending machine, one control unit controls each commodity selection unit and each commodity information display unit, and thus multiple control ports need to be provided between the control unit and each commodity selection unit and between the control unit and each commodity information display unit. In this case, the control unit controls each commodity selection unit and each commodity information display unit via each control port, thereby increasing loads of the control unit and reducing operability.

Thus, to reduce the loads of the control unit, a vending machine has been known including: a first control unit that is

provided to be communicatable with each commodity selection unit, and sells a commodity when the commodity is selected using each commodity selection unit; and a second control unit that is provided to be communicatable with each commodity information display unit, and controls each commodity information display unit; communication for control being performed between the control units. Thus, the loads in control of each commodity selection unit and each commodity information display unit can be distributed to each control unit, thereby preventing reduction in operability.

PATENT LITERATURE 1: Japanese Patent Publication No. 2002-175560

SUMMARY OF INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

In the case where each commodity selection unit and each commodity information display unit are controlled by different control units, each commodity selection unit corresponding to a commodity sample needs to be associated with each commodity information display unit to prevent an erroneous operation by a user or the like. However, the conventional vending machine includes an operation unit such as a switch for an operator to perform the above association, which makes the association in operation complicated for the operator, and increases production costs of the vending machine by providing the operation unit.

The present invention is achieved in view of the above circumstances, and has an object to provide a vending machine that can easily associate each commodity selection unit with each commodity information display unit in the case where each

commodity selection unit and each commodity information display unit are controlled by different control units.

MEANS FOR SOLVING THE PROBLEMS

To achieve the object, the present invention provides a vending machine including: a plurality of commodity selection units provided correspondingly to a plurality of commodity samples, respectively; a first control unit that is provided to be communicatable with each commodity selection unit, and performs sales operation of a commodity when the commodity is selected using each commodity selection unit; a plurality of commodity information display units provided correspondingly to the commodity samples, respectively; and a second control unit that is provided to be communicatable with each commodity information display unit and provided separately from and communicatably with the first control unit, and controls each commodity information display unit, wherein one of the first and second control units transmits, to the other control unit, control information that allows the other control unit to associate each commodity selection unit with each commodity information display unit, and when the other control unit receives the control information, the other control unit performs associating-operation for associating each commodity selection unit with each commodity information display unit on the basis of the control information.

Thus, when the other control unit receives the control information from one control unit, the other control unit associates each commodity selection unit with each commodity information display unit on the basis of the control information, thereby allowing each commodity selection unit to be

automatically associated with each commodity information display unit.

ADVANTAGES OF THE INVENTION

As described above, according to the present invention, each commodity selection unit can be automatically associated with each commodity information display unit. Thus, even if each commodity selection unit and each commodity information display unit are controlled by different control units, each commodity selection unit can be easily associated with each commodity information display unit. This eliminates the need for an operation unit for the above association, thereby increasing convenience for an operator, and reducing production costs of the vending machine.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic configuration diagram of a vending machine according to an embodiment of the present invention.

Figure 2 is a side sectional view of the vending machine shown in Figure 1.

Figure 3 is a front enlarged view of essential parts of the vending machine shown in Figure 1.

Figure 4 is a function block diagram of the vending machine shown in Figure 1.

Figure 5 shows an example of data configuration of control information.

Figure 6 is a sequence diagram illustrating an operation of a control unit.

Figure 7 is a sequence diagram illustrating the operation of the control unit.

DESCRIPTION OF SYMBOLS

- 14 plurality of commodity selection buttons
- 15 plurality of commodity information display units
- 100 first control unit
- 200 second control unit
- C commodity
- S commodity sample

DESCRIPTION OF EMBODIMENTS

Figures 1 to 7 show an embodiment of the present invention. Figure 1 is a schematic configuration diagram of a vending machine, Figure 2 is a side sectional view of the vending machine shown in Figure 1, Figure 3 is a front enlarged view of essential parts of the vending machine shown in Figure 1, Figure 4 is a function block diagram of the vending machine shown in Figure 1, Figure 5 shows an example of data configuration of control information, and Figures 6 and 7 are sequence diagrams illustrating an operation of a control unit.

First, with reference to Figures 1 to 3, a structure of the vending machine will be described.

The vending machine body 1 has a box shape, and includes therein a heat insulating chamber 1a with an open front surface. The heat insulating chamber 1a is separated into a plurality of commodity storages SR arranged in a width direction of the vending machine body 1 by heat insulating partition plates (not shown).

Commodity storage racks 2 constituted by serpentine racks are placed in each commodity storage SR. Each commodity storage rack 2 has a commodity supply port 2a in an upper portion on a

front side, and stores commodities C such as cans, bottles or pet bottles of beverages horizontally stacked in a serpentine storage path 2b. A commodity discharging mechanism 2c for dropping and discharging stored commodities C one by one onto a chute plate 3 is provided in a lower portion of each commodity storage rack 2. Further, the commodity storage rack 2 provided in each commodity storage SR includes a sold-out detection sensor (not shown) that detects presence or absence of the commodity C in each storage path 2b. The commodity storage rack 2 is not limited to the serpentine rack, but a rack of other types may be used from which stored commodities can be discharged one by one like the serpentine rack.

Each commodity storage SR includes a chute plate 3 and a duct plate 4 from a bottom to a back thereof. In a space on lower and back sides of the chute plate 3 and the duct plate 4, an evaporator 5, an electric heater 6, a cooling/heating air circulation blower 7, or the like among devices that constitute a refrigerator are placed. And a space on a back side of the duct plate 4 is formed as a duct D. Further, a temperature sensor (not shown) that detects a temperature of the commodity storage SR is provided in each commodity storage SR.

A machine room MR is provided on a lower side of a bottom plate 1b of the heat insulating chamber 1a. In the machine room MR, a condenser 8, a compressor 9 and expansion means (not shown), a heat exhaust blower 10, or the like among devices that constitute the refrigerator are placed.

On a front side of the heat insulating chamber 1a, a heat insulating inner door 11 is provided that openably/closably covers the front surface opening of the heat insulating chamber 1a. On upper, lower, left and right front ends (the lower front

end is a front end of the bottom plate 1b) of the heat insulating chamber 1a and a front end of each partition plate, packing (no reference symbol) is provided for bringing the commodity storage SR into an airtight state with the inner door 11 closed, and each commodity storage SR is an independent heat insulating space with the inner door 11 closed. Further, in a lower portion of the inner door 11, a plurality of window holes 11a corresponding to the chute plate 3 of each commodity storages SR are formed, and a flap door 11b pushed open by a commodity C sliding down on the chute plate 3 is provided in each window hole 11a.

Specifically, in this vending machine, each commodity storage SR constitutes an independent heat insulating space, and also each commodity storage SR independently includes an evaporator 5 and an electric heater 6. Thus, any one of three modes: cooling, heating, and non-cooling/heating modes can be selected and performed for each commodity storage SR by a temperature adjusting setter 170 (see Figure 4) described later.

The outer door 12 is openably/closably provided in the front surface opening of the vending machine body 1, and a transparent plate 12a formed of an acrylic plate or the like is provided in an upper portion of a surface of the outer door 12. A showroom 13 for displaying a plurality of commodity samples S is provided on a rear side of the transparent plate 12a, and in the showroom 13, a plurality of commodity sample shelves 13a on which the commodity samples S are placed are arranged in parallel in a vertical direction. As shown in Figure 3, below each commodity sample S, a commodity selection button 14 as a commodity selection unit, and a commodity information display unit 15 are provided correspondingly to each commodity sample S. The

commodity information display unit 15 is constituted by a light emitting diode (LED) or a liquid crystal display member (LCD), and can display a price of a commodity C, a cold/hot state such as "HOT" or "COLD", sales data such as the number of sales, the number of remaining commodities, the total price of sales, sales period as commodity information. The commodity information display unit 15 can also display information other than the commodity information described above, for example, characters or face marks showing human expression.

In a front surface of the outer door 12, a return lever 16 as a refund instruction portion, a coin slot 17, a bill slot 18, an amount display unit 19 for displaying an amount of input money, a coin return port 20, and a commodity delivery port 21 are provided in the layout shown in Figure 1. A flap door 22 that can be manually opened is provided in the commodity delivery port 21, and a commodity receiving plate 23 that receives a commodity C discharged from the flap door 11b is provided inside the flap door 22.

Next, with reference to Figure 4, a control system configuration of the vending machine shown in Figures 1 to 3 will be described.

A first control unit 100 is constituted by a computer including a CPU, a RAM, a ROM, a timer circuit, or the like. To the first control unit 100, a memory unit 110, a discharge driving unit 120, a coin processing device 130, a bill processing device 140, a compressor driving unit 150, a heater driving unit 160, the temperature adjusting setter 170, each commodity selection button 14, the return lever 16, the amount display unit 19, a modem 180, a communication unit 190, and a second control unit 200 are connected. The first control unit

100 transmits control signals to the devices to control the respective devices. To the first control unit 100, a sold-out detection unit (not shown) that detects, for each storage path 2b, presence or absence of a commodity C in the commodity storage rack 2 placed in each commodity storage SR, and a temperature detection unit (not shown) that can detect a temperature of each commodity storage SR are communicatably connected. When a commodity is selected using the commodity selection button 14, the first control unit 100 performs sales operation of the selected commodity. The operation of the first control unit 100 in this sales operation is the same as that of a well-known vending machine, and thus detailed descriptions thereof will be omitted.

The memory unit 110 is a rewritable memory element such as an EEPROM, and is controlled by the first control unit 100 to store information. The memory unit 110 previously stores control information described later.

The discharge driving unit 120 controls an operation of the commodity discharge mechanism 2c provided in each commodity storage rack 2, specifically, an operation of an actuator such as a solenoid used in the commodity discharge mechanism 2c, and operates a predetermined commodity discharge mechanism 2c to perform desired commodity discharge on the basis of a control signal from the first control unit 100.

The coin processing device 130 and the bill processing device 140 are placed in the outer door 12. The coin processing device 130 identifies authenticity of, counts, stores and discharges coins input through the coin slot 17, and transmits data on the amount of the input coins to the first control unit 100. The bill processing device 140 identifies authenticity of,

counts, stores and discharges a bill input through the bill slot 18, and transmits data on the amount of the input bill to the first control unit 100.

The compressor driving unit 150 controls an operation of the compressor 9 that constitutes the refrigerator, specifically, controls an operation of the motor for driving the compressor 9, and drives a desired compressor on the basis of a control signal from the first control unit 100.

The heater driving unit 160 controls energization to each electric heater 6, and energizes a predetermined electric heater 6 on the basis of a control signal from the first control unit 100.

The temperature adjusting setter 170 selects any one of the three modes: cooling, heating, and non-cooling/heating modes for each commodity storage SR, includes a push button switch for mode selection, or the like, and transmits data on the selected mode to the first control unit 100.

The modem 180 performs data communication with an external server or the like using a public telephone line 181 or the like. The communication unit 190 performs data communication using infrared rays, or the like, with a portable information terminal such as a remote controller (not shown).

The second control unit 200 is constituted by a computer including a CPU, a RAM, a ROM, a timer circuit, or the like. The second control unit 200 is provided separately from the first control unit 100, and each commodity information display unit 15 and a memory unit 210 are communicatably connected to the second control unit 200. The second control unit 200 displays commodity information transmitted from the first control unit 100 on a

commodity information display unit 15 corresponding to the commodity.

The memory unit 210 is a rewritable memory element such as an EEPROM, and is controlled by the second control unit 200 to store information. The memory unit 210 stores the control information transmitted from the first control unit 100.

With reference to Figure 5, data configuration of the control information will be described. The control information is information for causing the second control unit 200 to associate each commodity selection button 14 with each commodity information display unit 15. The control information includes "commodity selection button No.", "presence or absence of commodity selection button", "commodity information display unit No.", and "commodity selection button arrangement sequence". The "commodity selection button No." represents the number of commodity selection buttons 14 controllable by the first control unit 100, and No. 1 to 48 are assigned in this embodiment. The "presence or absence of commodity selection button" represents presence or absence of a commodity selection button 14 corresponding to the "commodity selection button No." with on/off of a bit. In this embodiment, as shown in Figure 4, ten commodity selection buttons 14 are arranged in each of upper and lower steps of the commodity sample shelf 13a (corresponding to commodity selection buttons No. 1 to 10 and 33 to 42), and eight commodity selection buttons 14 are arranged in a middle step of the commodity sample shelf 13a (corresponding to commodity selection buttons No. 17 to 20 and 23 to 26). The "commodity information display unit No." represents numbers of the commodity information display units 15 corresponding to the commodity selection buttons 14 provided on the commodity sample

shelf 13a, arranged in a predetermined sequence. In this embodiment, the numbers (1 to 28) are assigned in ascending sequence from a commodity information display unit 15 provided at a left end of the upper step of the commodity sample shelf 13a as a starting point. The "commodity selection button arrangement sequence" is information representing the arrangement sequence of the "commodity selection button No.", and in this embodiment, the numbers are assigned in "ascending sequence from the left end of the upper step of the commodity sample shelf 13a".

For the "commodity information display unit No.", various assigning methods may be applied. For example, the numbers of the commodity information display units 15 may be assigned in ascending sequence from a commodity information display unit 15 provided at a right end of the lower step of the commodity sample shelf 13a as a starting point. The numbers of the commodity information display units 15 may be assigned from any one of the upper, middle and lower steps of the commodity sample shelf 13a as a starting point. Further, the numbers may be assigned in sequence of connection of the commodity information display units 15 to the second control unit 200.

Next, with reference to a sequence diagram in Figure 6, operations of the first and second control units 100 and 200 in association of each commodity selection button 14 with each commodity information display unit 15 in this embodiment will be described.

First, when the power is turned on, the first control unit 100 requests the second control unit 200 to transmit device information (Step S1). In response to the request from the first control unit 100, the second control unit 200 transmits device

information stored in the ROM or the memory unit 210 to the first control unit 100 (Step S2). The device information includes, for example, the number of characters that can be displayed in the commodity information display unit 15, a type of an image, a type of commodity information, or the like.

Next, when the first control unit 100 receives the device information, the first control unit 100 transmits control information stored in the memory unit 110 to the second control unit 200 (Step S3). On the other hand, when the second control unit 200 receives the control information, the second control unit 200 performs associating-operation that associates each commodity selection button 14 with each commodity information display unit 15 on the basis of the control information (Step S4).

Specifically describing the associating-operation, the second control unit 200 specifies each commodity information display unit 15 to be controlled on the basis of the "presence or absence of commodity selection button" of the control information, and assigns the number of each commodity information display unit 15 on the basis of the "commodity information display unit No." and the "commodity selection button arrangement sequence". The second control unit 200 stores the received control information in the memory unit 210. If the number of each commodity information display unit 15 is previously assigned by the second control unit 200, the second control unit 200 may link the previously assigned number to the "commodity information display unit No." for associating-operation.

The first control unit 100 transmits the commodity information and an instruction command as predetermined

instruction information to the second control unit 200 (Step S5). The instruction command includes information representing display modes of the commodity information such as "lighting", "blinking", "blinking of price only", or the like. On the other hand, when the second control unit 200 receives the commodity information and the instruction command, the second control unit 200 displays the commodity information in the commodity information display unit 15 corresponding to the commodity information in a display mode based on the instruction command (Step S6). For example, If the second control unit 200 receives a command of "lighting" commodity information "HOT ¥120" in a commodity information display unit 15 of "commodity information display unit No.=1" from the first control unit 100, the second control unit 200 displays the commodity information ("HOT ¥120") in the commodity information display unit 15 provided at the left end in the upper step of the commodity sample shelf 13a in the display mode ("lighting").

As such, when the second control unit 200 receives the control information from the first control unit 100, each commodity selection button 14 is associated with each commodity information display unit 15 on the basis of the control information, thereby allowing each commodity selection button 14 to be automatically associated with each commodity information display unit 15.

The commodity information cannot be displayed in the display mode instructed by the instruction command in some cases depending on function or performance of the commodity information display unit 15. In this case, the content of the instruction command needs to be changed to display the commodity information in a different display mode. With reference to a

sequence diagram in Figure 7, an operation in the case of changing the content of the instruction command will be now described.

When the first control unit 100 transmits the commodity information and the instruction command to the second control unit 200 (Step S11) as in Step S5 in Figure 6, if, for example, the commodity information display unit 15 cannot display the commodity information in the display mode instructed by the instruction command, the second control unit 200 transmits error information as a predetermined signal representing the content of the impossibility to the first control unit 100 (Step S12).

On the other hand, when the first control unit 100 receives the error information, the first control unit 100 changes the content of the instruction command (Step S13), and transmits the changed instruction command and the commodity information to the second control unit 200 (Step S14). Describing the change of the content of the instruction command, for example, if the first control unit 100 receives error information on impossibility to deal with the display mode "blinking of price only", the first control unit 100 changes the display mode "blinking of price only" to the display mode "lighting" or the like to change the content of the instruction command. When the second control unit 200 receives the changed instruction command and the commodity information, the second control unit 200 displays the commodity information in a commodity information display unit 15 corresponding to the commodity in a display mode based on the instruction command (Step S15).

As such, the display mode of the commodity information can be changed depending on function or performance of the commodity

information display unit 15, thereby increasing reliability of the vending machine and achieving stable operation.

As described above, according to the vending machine of this embodiment, each commodity selection button 14 can be automatically associated with each commodity information display unit 15. Thus, even if each commodity selection button 14 and each commodity information display unit 15 are controlled by different control units 100 and 200, each commodity selection button 14 can be easily associated with each commodity information display unit 15. This eliminates the need for a device for the above association, thereby reducing production costs of the vending machine.

The control information includes information on commodity information display units 15 corresponding to commodity selection buttons 14 arranged in a predetermined sequence, thereby easily and reliably performing association of the second control unit 200.

Further, the second control unit 200 displays at least the price of the commodity C in a commodity information display unit 15 corresponding to the commodity C, and thus the price of the commodity as commodity information can be shown to a user, thereby increasing convenience.

Further, the second control unit 200 displays at least a cold/hot state of the commodity C in a commodity information display unit 15 corresponding to the commodity C, and thus the cold/hot state of the commodity C as commodity information can be shown to the user, thereby increasing convenience.

The first control unit 100 transmits commodity information of a commodity C corresponding to each commodity selection button 14 to the second control unit 200, and when the second

control unit 200 receives the commodity information transmitted from the first control unit 100, the second control unit 200 displays the commodity information of the commodity C in a commodity information display unit 15 corresponding to the commodity C. Thus, for example, commodity information such as the number of remaining commodities C changed depending on sale by the first control unit 100 can be shown to the user, thereby further increasing convenience.

Further, when the second control unit 200 receives an instruction command transmitted from the first control unit 100, the second control unit 200 displays the commodity information in a commodity information display unit 15 corresponding to the commodity C in a display mode based on the instruction command. And if the first control unit 100 receives error information from the second control unit 200 at a predetermined timing, the first control unit 100 changes the content of the instruction command and transmits the instruction command to the second control unit 200. Thus, the display mode of the commodity information can be changed depending on function or performance of the commodity information display unit 15, thereby increasing reliability of the vending machine and achieving stable operation.

The above embodiment is merely a specific example of the present invention, and the present invention is not limited to only the above embodiment. For example, it may be conceivable that the second control unit 200 transmits control information previously stored in the memory unit 210 to the first control unit 100. And when the first control unit 100 receives the control information, the first control unit 100 may perform associating-operation for associating each commodity selection

button 14 with each commodity information display unit 15 on the basis of the control information. The control information includes information on commodity selection buttons 14 corresponding to commodity information display units 15 arranged in a predetermined sequence. Specifically, the configuration with the "commodity selection button No.", the "presence or absence of commodity selection button", the "commodity information display unit No.", and the "commodity selection button arrangement sequence" in Figure 5 are changed to the configuration with "commodity information display unit No.", "presence or absence of commodity information display unit", "commodity selection button No.", and "commodity information display unit arrangement sequence".

In this case, as same as in the above embodiment, association of the first control unit 100 can be easily and reliably performed.

In the above embodiment, when the first control unit 100 receives error information from the second control unit 200 after transmitting the commodity information and the instruction command, the first control unit 100 changes the content of the instruction command and transmits the instruction command to the second control unit 200. However, the content of the instruction command may be changed on the basis of device information received from the second control unit 200 after the power is turned on.

CLAIMS

1. A vending machine comprising:

a plurality of commodity selection units provided correspondingly to a plurality of commodity samples, respectively;

a first control unit that is provided to be communicatable with each commodity selection unit, and performs sales operation of a commodity when the commodity is selected using each commodity selection unit;

a plurality of commodity information display units provided correspondingly to the commodity samples, respectively; and

a second control unit that is provided to be communicatable with each commodity information display unit and provided separately from and communicatably with the first control unit, and controls each commodity information display unit,

wherein one of the first and second control units transmits, to the other control unit, control information that allows the other control unit to associate each commodity selection unit with each commodity information display unit, and

when the other control unit receives the control information, the other control unit performs associating-operation for associating each commodity selection unit with each commodity information display unit on the basis of the control information.

2. The vending machine according to claim 1, wherein the control information includes information on commodity information display units corresponding to commodity selection units arranged in a predetermined sequence.

3. The vending machine according to claim 1, wherein the control information includes information on commodity selection units corresponding to commodity information display units arranged in a predetermined sequence.

4. The vending machine according to claim 1, wherein the second control unit displays at least a price of a commodity in a commodity information display unit corresponding to the commodity.

5. The vending machine according to claim 1, wherein the second control unit displays at least a cold/hot state of a commodity in a commodity information display unit corresponding to the commodity.

6. The vending machine according to claim 1, wherein the first control unit transmits commodity information of a commodity corresponding to each commodity selection unit to the second control unit, and

when the second control unit receives the commodity information transmitted from the first control unit, the second control unit displays commodity information of the commodity in a commodity information display unit corresponding to the commodity.

7. The vending machine according to claim 1, wherein when the second control unit receives predetermined instruction information transmitted from the first control unit, the second control unit displays the commodity information in a commodity

information display unit corresponding to the commodity in a display mode based on the instruction information, and

when the first control unit receives a predetermined signal from the second control unit at a predetermined timing, the first control unit changes the content of the instruction information and transmits the instruction information to the second control unit.