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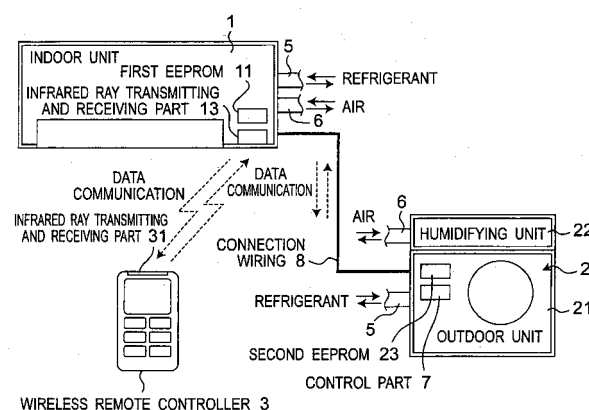
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(54) **AIR CONDITIONER**

(57) When an infrared ray transmitting and receiving part of an indoor unit receives a command signal for turning on ventilating operation from a wireless remote controller, information of the on-state of the ventilating operation is stored in a first EEPROM of the indoor unit and a second EEPROM of an outdoor unit. By starting up an air blower in a humidifying unit and switching a switchover damper connected to a ventilation pipe, indoor air is dis-

charged to the outside of the room or outdoor air is taken into the room. When the ventilating operation is once stopped by power failure, the ventilating operation resumes on the basis of the information of the on-state of the ventilating operation stored in the first EEPROM after recovery from the power failure. The disadvantage that the ventilating operation stops though no command for turning off the ventilating operation has been received from the operator can be prevented.

Fig.1



Description

TECHNICAL FIELD

[0001] The present invention relates to air conditioners, and in particular, to an air conditioner having a ventilating part that ventilates a room.

BACKGROUND ART

[0002] Conventionally, there is disclosed an air conditioner, in which an indoor unit and an outdoor unit are connected with each other via a ventilation pipe, and one end of the ventilation pipe is connected to the inlet side and the outlet side of an air blower provided for the outdoor unit switchably by means of a damper (JP 2003-176944 A).

[0003] In the conventional air conditioner, the ventilation pipe is connected to the inlet side of the air blower, and the air blower takes in indoor air via the ventilation pipe and the indoor unit and discharges the air to the outside of the room in a first switch position of the damper. On the other hand, in a second switch position of the damper, the ventilation pipe is connected to the outlet side of the air blower, and the air blower supplies the outdoor air to the inside of the room via the ventilation pipe and the indoor unit. By thus discharging the indoor air to the outside of the room or supplying the outdoor air to the inside of the room by the air conditioner, indoor air ventilating operation is performed.

[0004] The air conditioner also includes a remote controller that receives a command of an operating state from an operator and transmits a signal corresponding to the command to the indoor unit, and a control part that controls the operating state of the air conditioner in accordance with the signal from the remote controller. When the operator commands the remote controller to perform ventilating operation, the control part that receives the signal from the remote controller controls the damper and the air blower to perform the ventilating operation.

[0005] However, in a case where power failure occurs while the ventilating operation is performed, the conventional air conditioner enters a stop state even if the power failure is recovered and sometimes fails in returning to the ventilating operation before the power failure. Moreover, when the battery of the remote controller is replaced while the ventilating operation is performed, the remote controller is set back to its initial state, and a signal of the initial state is transmitted to the indoor unit, sometimes stopping the air conditioner.

[0006] Recently, all buildings are obliged to be equipped with a mechanical ventilation facility in principle as a countermeasure to the so-called sick house syndrome due to the revision of Building Standard Law.

[0007] However, there is a problem that the conventional air conditioner, which sometimes stops the ventilating operation though it has not received the command

of stopping the ventilating operation by the operator as described above, is therefore not able to function as a mechanical ventilation facility provided by Building Standard Law.

DISCLOSURE OF THE INVENTION

[0008] It is an object of the present invention to provide an air conditioner capable of preventing the disadvantage that the ventilating operation stops though no command of stopping the ventilating operation has been received from the operator.

[0009] In order to achieve the above object, there is provided an air conditioner comprising:

a ventilating part that ventilates a room;
a first nonvolatile memory that stores operation information representing an operating state of the ventilating part at a previous time of operation; and
a control part that controls operation of the ventilating part on a basis of operation information stored in the first nonvolatile memory at a present time of operation.

[0010] According to the above construction, when the ventilating part was in the operating state at the previous time of operation, the operation of the ventilating part is controlled to the operating state by the control part at the present time of operation on the basis of the operation information that is the operation information stored in the first nonvolatile memory and represents the operating state. For example, by controlling the ventilating part so that the operating state becomes identical to the operating state at the previous time of operation even when the ventilating operation stops due to, for example, power failure, the ventilating operation can be resumed at the present time of operation after recovery from the power failure. Therefore, the disadvantage that the ventilating operation stops though no command for stopping the ventilating operation has been received as in the conventional case can be prevented.

[0011] In one embodiment of the invention, the air conditioner further comprises:

an indoor unit having the first nonvolatile memory, a receiving part that receives a command signal for commanding the operating state of the ventilating part and a transmitting part that transmits an operation information signal representing the operation information stored in the first nonvolatile memory; and
a remote controller having a transmitting part that transmits the command signal and a receiving part that receives the operation information signal.

[0012] According to the embodiment, the command signal is transmitted from the transmitting part of the remote controller on the basis of the input to the remote controller by the operator. The command signal is re-

ceived by the receiving part of the indoor unit, and the ventilating part is controlled to the operating state corresponding to the command signal.

[0013] Moreover, the operation information signal that represents the operation information stored in the first nonvolatile memory of the indoor unit is transmitted by the transmitting part of the indoor unit. The operation information signal is received by the receiving part of the remote controller. Therefore, since the remote controller can obtain the information identical to the operation information stored in the first nonvolatile memory of the indoor unit even when the operating state is set back to the initial state due to, for example, replacement of the battery of the remote controller, the operation information can be prevented from differing between the remote controller and the indoor unit. Therefore, the disadvantage that the command signal of the initial state is transmitted from the remote controller set back to the initial state to the indoor unit and the operation of the ventilating part stops though no command of stopping the ventilating operation is inputted to the remote controller can be prevented.

[0014] In one embodiment of the invention, the air conditioner further comprises:

an outdoor unit having a second nonvolatile memory that stores the operation information of the ventilating part at the previous time of operation.

[0015] According to the above embodiment, the operation information of the ventilating part at the previous time of operation is stored in the second nonvolatile memory of the outdoor unit. Therefore, the operation information of the ventilating part can be backed up in preparation for the vanishment of the operation information in the first nonvolatile memory due to, for example, the failure or replacement of the indoor unit.

[0016] In one embodiment of the invention, the remote controller comprises:

a third nonvolatile memory that stores the operation information of the ventilating part at the previous time of operation, and
the transmitting part transmits the operation information signal that represents the operation information stored in the third nonvolatile memory to the indoor unit.

[0017] According to the above embodiment, the operation information of the ventilating part at the previous time of operation is stored in the third nonvolatile memory of the remote controller. The operation information signal that represents the operation information stored in the third nonvolatile memory is transmitted to the indoor unit by the transmitting part. By this operation, the operation information of the ventilating part at the previous time of operation can be backed up in preparation for the vanishment of the operation information in the first or second

nonvolatile memory due to, for example, replacement or another cause of electrical components.

[0018] In one embodiment of the invention, when the receiving part of the indoor unit does not receive the command signal for commanding execution of ventilation of the ventilating part at the present time of operation and the operating state of the ventilating part at the previous time of operation represented by the operation information stored in the first nonvolatile memory, the second nonvolatile memory or the third nonvolatile memory is execution of ventilation, the control part controls the operation of the ventilating part on a basis of the stored operation information so that the operating state becomes identical to the operating state at the previous time of operation.

[0019] According to the above embodiment, when the receiving part does not receive the command signal that commands the execution of the ventilation of the ventilating part at the present time of operation, the operation information stored in the first nonvolatile memory, the second nonvolatile memory or the third nonvolatile memory is referred to. When the operating state of the ventilating part at the previous time of operation represented by the operation information stored in the first nonvolatile memory, the second nonvolatile memory or the third nonvolatile memory indicates the execution of ventilation, the operation of the ventilating part is controlled so as to enter the operating state identical to the operating state at the previous time of operation on the basis of the stored operation information. Therefore, when, for example, the previous operation has stopped due to, for example, power failure, the ventilating operation can be resumed as in the previous operation even if the command of executing ventilation is not received from the operator at the time of resuming the present operation. It is noted that the control part may control the operation of the ventilating part at the present time of operation so as to enter the operating state identical to at least part of the operating state at the previous time of operation.

[0020] As described above, the air conditioner of the present invention includes the ventilating part that ventilates the room, the first nonvolatile memory that stores the operation information representing the operating state of the ventilating part at the previous time of operation, and the control part that controls the operation of the ventilating part on the basis of the operation information stored in the first nonvolatile memory at the present time of operation. Therefore, even when the ventilating operation stops due to, for example, power failure, the ventilating operation can be resumed at the present time of operation after recovery from the power failure. Therefore, the disadvantage that the ventilating operation stops after recovery from power failure as in the conventional case can be prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The present invention will become more fully

understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not intended to limit the present invention, and wherein:

FIG. 1 is a schematic view showing an air conditioner according to a first embodiment of the present invention;

FIG. 2 is a flow chart showing processing executed by a control part of the air conditioner of the first embodiment;

FIG. 3 is a schematic view showing an air conditioner according to a second embodiment of the present invention;

FIG. 4A is a flow chart showing processing executed by a control part of the air conditioner of the second embodiment;

FIG. 4B is a flow chart showing processing executed by a control part of the air conditioner of the second embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0022] The present invention will now be described in detail below by the embodiments shown in the drawings.

(First Embodiment)

[0023] FIG. 1 is a schematic view showing an air conditioner according to a first embodiment of the present invention.

[0024] The air conditioner includes an indoor unit 1 placed on a wall surface or the like of a room, and an outdoor unit 2 placed outside the room, and the indoor unit 1 and the outdoor unit 2 are connected with each other via a refrigerant piping 5, a ventilation pipe 6 and a connection wiring 8.

[0025] The indoor unit 1 has an indoor heat exchanger (not shown) to which a refrigerant is supplied from the outdoor unit 2 via the refrigerant piping 5 and a crossflow fan that guides wind to the indoor heat exchanger. Moreover, an opening that communicates with the ventilation pipe 6 is provided on a wind passage generated by the crossflow fan, forming a structure in which outdoor air is supplied to the inside of a room and the indoor air is discharged to the outside of the room via the opening.

[0026] Moreover, the indoor unit 1 has an infrared ray transmitting and receiving part 13 that transmits and receives an infrared signal between the part and a wireless remote controller 3 as a remote controller described later. In detail, the infrared ray transmitting and receiving part 13 receives command signals for commanding the operating states of an operating mode, a preset temperature, a preset air volume, a wind direction and so on from the wireless remote controller 3 and transmits an operation information signal that represents the operating state of the air conditioner to the wireless remote controller 3. As described above, the infrared ray transmitting

and receiving part 13 functions as a receiving part and a transmitting part.

[0027] The wireless remote controller 3 has an input part to which the operating states of the preset temperature, preset air volume, wind direction and so on are commanded and inputted by an operator in the room. The wireless remote controller 3 also has an infrared ray transmitting and receiving part 31 that transmits and receives an infrared signal between the part and the indoor unit 1 to transmit a command signal corresponding to the input to the input part to the indoor unit 1 and receive an operation information signal concerning the operation information from the indoor unit 1. As described above, the infrared ray transmitting and receiving part 31 functions as a receiving part and a transmitting part.

[0028] The indoor unit 1 further includes a first EEPROM (Electrically Erasable Programmable Read-Only Memory) 11 as a first nonvolatile memory that stores the operation information representing the operating state of the air conditioner at the present time of operation.

[0029] The indoor unit 1 further includes an information communicating part that carries out information communication between the unit and the outdoor unit 2 to transmit the command signal received from the wireless remote controller 3 to the outdoor unit 2. The information communicating part transmits an operation information signal that represents the operation information (information identical to the information to be stored in the first EEPROM 11) at the present time of operation to the outdoor unit 2 and receives the operation information signal concerning the air conditioner at the previous time of operation from the outdoor unit 2.

[0030] The outdoor unit 2 includes an outdoor unit 21 and a humidifying unit 22. A compressor that compresses a refrigerant, an expander that reduces the pressure by adiabatically expanding the refrigerant, an outdoor heat exchanger that exchanges heat between the refrigerant and outdoor air and a four-way changeover valve for changeover between cooling operation and heating operation by changing the direction of flow of the refrigerant are housed in the outdoor unit 21. Moreover, electrical components are housed in the outdoor unit 21, and the electrical components include a power circuit of the air conditioner and a control part 7 constructed of a CPU. The CPU reads a control program stored in a ROM and executes control of the air conditioner. The refrigerant piping 5 is connected to the outdoor unit 21 and supplied with the refrigerant of prescribed temperature and pressure by changeover control of the four-way changeover valve and capacity control of the compressor.

[0031] On the other hand, a humidifying rotor formed of a moisture adsorbent material such as zeolite, an air blower to which the humidifying rotor is selectively connected to the inlet side, and a connection damper that connects the ventilation pipe 6 to the inlet side or the outlet side of the air blower in a changeover manner are housed in the humidifying unit 22 of the outdoor unit 2. In a first switch position of the connection damper, the

ventilation pipe 6 is connected to the inlet side of the air blower, and the air blower takes in the indoor air via the ventilation pipe 6 and the indoor unit 1 and discharges the air to the outside of the room. On the other hand, in a second switch position of the connection damper, the ventilation pipe 6 is connected to the outlet side of the air blower, and the air blower supplies the outdoor air humidified via the humidifying rotor or the outdoor air that does not pass through the humidifying rotor into the room via the ventilation pipe 6 and the indoor unit 1.

[0032] The indoor air ventilating operation is thus performed by discharging the indoor air to the outside of the room via the indoor unit 1, the ventilation pipe 6 and the outdoor unit 2 or supplying the outdoor air into the room. That is, a ventilating part is constructed of an opening formed in the ventilation flue of the indoor unit, the ventilation pipe 6 that communicates with the opening, the air blower connected to the ventilation pipe 6 and the connection damper that switches the connection of the ventilation pipe 6 to the air blower.

[0033] The outdoor unit 2 further includes an information communicating part that carries out information communication between the unit and the indoor unit 1 to receive the command signal, which has been transmitted from the wireless remote controller 3 and received by the transmitting and receiving part 13 of the indoor unit 1, from the information communicating part of the indoor unit 1. A second EEPROM 23 that stores the operation information at the present time of operation that the information communicating part has received from the indoor unit 1 is further provided.

[0034] The control part 7 provided for the electrical components in the outdoor unit 21 carries out capacity control and start/stop of the compressor, changeover of the four-way changeover valve, capacity control and start/stop of the air blower and changeover of the connection damper on the basis of the command signal from the indoor unit 1. Moreover, the control part 7 controls storage and read from and to the first EEPROM 11, transmission and reception to and from the wireless remote controller 3 and storage and read from and to the second EEPROM 23 regarding the operation information of the air conditioner.

[0035] The ventilating operation by the air conditioner of the above construction is described with reference to the flow chart of FIG. 2. The flow chart shows the processing executed by the control part 7.

[0036] First of all, power of the air conditioner is turned on to start up the air conditioner (step S1). The control part 7 is started up by turning on the power and determines whether or not the command signal of the contents to turn on the ventilating operation has been received from the wireless remote controller 3 (step S2). When it is determined that the command signal for turning on the ventilating operation has been received from the wireless remote controller 3, information that represents the on-state of the ventilating operation is stored into the first EEPROM 11 of the indoor unit 1 (step S3). Subsequently,

information that represents the on-state of the ventilating operation is stored into the second EEPROM 23 of the outdoor unit 2 (step S4).

[0037] Subsequently, it is determined whether the command signal from the wireless remote controller 3 has the contents representing the on-state of the ventilating operation or the contents representing the off-state of the ventilating operation (step S5).

[0038] When it is determined that the command signal for turning on the ventilating operation is not received from the wireless remote controller 3 in step S2, the information stored in the first EEPROM 11 of the indoor unit 1 is read to determine whether or not the ventilating operation has been on at the previous time of operation (step S7). When the information stored in the first EEPROM 11 is the information of the on-state of the ventilating operation and it is determined that the ventilating operation has been on at the previous time of operation, the program flow proceeds to the step S5.

[0039] When the information stored in the first EEPROM 11 is the information of the off-state of the ventilating operation in the step S7, the information stored in the second EEPROM 23 is read to determine whether or not the ventilating operation has been on at the previous time of operation (step S10). When it is determined that the information stored in the second EEPROM 23 is the information of the on-state of the ventilating operation and the ventilating operation has been on at the previous time of operation, information that represents the on-state of the ventilating operation is stored into the first EEPROM 11 (step S11). Subsequently, operation information that represents the on-state of the ventilating operation is transmitted to the wireless remote controller 3 (step S12). Thereafter, the program flow proceeds to the step S5.

[0040] When the information stored in the second EEPROM 23 is the information of the off-state of the ventilating operation in the step S10, the program flow proceeds to the step S5.

[0041] When the command signal from the wireless remote controller 3 has the contents that represent the on-state of the ventilating operation in step S5, the ventilating operation is executed (step S6). That is, the connection damper of the outdoor unit 2 is switched to connect the ventilation pipe 6 to the inlet side or the outlet side of the air blower, and the air blower is started up.

[0042] When the command signal from the wireless remote controller 3 has the contents that represent the off-state of the ventilating operation in step S5, it is determined whether or not the information stored in the first EEPROM 11 represents the on-state of the ventilating operation (step S8). When the information stored in the first EEPROM 11 represents the on-state of the ventilating operation, the program flow proceeds to the step S6 to execute the ventilating operation.

[0043] When the information stored in the first EEPROM 11 is the off-state of the ventilating operation in the step S8, the ventilating operation is brought into a stop state (step S9).

[0044] After the step S6 and step S9, the program flow returns to step S2 to determine whether or not the command signal of the on-state of the ventilating operation has been received from the wireless remote controller 3.

[0045] As described above, when the command to perform the ventilating operation is inputted to the remote controller by the operator, in the air conditioner of the present embodiment, the ventilating operation is performed in accordance with the command signal from the remote controller. Even in a case where the command to perform the ventilating operation is not inputted to the remote controller by the operator, the ventilating operation can be resumed on the basis of the information of the on-state of the operation stored in the first EEPROM 11 or the second EEPROM 23 when the ventilating operation has been performed at the previous time of operation. Therefore, even when the ventilating operation is stopped by, for example, power failure, the ventilating operation identical to the operation at the previous time of operation before the power failure can be resumed at the present time of operation after recovery from the power failure even if the operator does not input the turning-on of the ventilating operation. Therefore, the conventional disadvantage that the ventilating operation cannot be resumed after recovery from power failure and brought into the stop state though no command for stopping the ventilating operation has been received can effectively be prevented. It is noted that the setting state of the air volume, wind direction and so on other than the operating state may be set back, at the present time of operation, to the initial state or to the state at the previous time of operation by storing also the setting state of the previous time of operation in the first EEPROM 11.

[0046] Moreover, since the signal that represents the operation information stored in the first EEPROM 11 is transmitted to the wireless remote controller 3 regarding the operation information of the ventilating part, the operation information can be prevented from differing between the indoor unit 1 and the wireless remote controller 3 even when the wireless remote controller 3 is set back to the initial state due to, for example, replacement of battery. Therefore, the disadvantage that the command signal in the initial state is transmitted to the indoor unit 1 and the operation of the ventilating part stops though no command for stopping the ventilating operation is inputted by the operator to the wireless remote controller 3 can be prevented.

[0047] Furthermore, since backup is performed by storing the operation information to be stored in the first EEPROM 11 of the indoor unit 1 also in the second EEPROM 23 of the outdoor unit 2, the ventilating operation can be continued on the basis of the operation information stored in the second EEPROM 23 even if the operation information of the first EEPROM 11 vanishes due to, for example, the trouble or replacement of the indoor unit 1.

[0048] As described above, the air conditioner of the present embodiment can continue the execution of the

ventilating operation under the power on condition until receiving the command for turning off the ventilating operation by the operator, even when power failure, trouble of the indoor unit 1, initialization of the wireless remote controller 3 or the like occurs. As a result, the air conditioner can function as a ventilator prescribed in the provision of Building Standard Law.

(Second Embodiment)

[0049] FIG. 3 is a schematic view showing an air conditioner according to another embodiment of the present invention.

[0050] As shown in FIG. 3, an indoor unit 1 and an outdoor unit 2 are connected with each other via a refrigerant piping 5, a ventilation pipe 6 and a connection wiring 8 in the air conditioner of the second embodiment as in the air conditioner of the first embodiment.

[0051] In the air conditioner of the present embodiment, operation information at the present time of operation is stored into a third EEPROM 33 in addition to the first EEPROM 11 and the second EEPROM 23. With this arrangement, even if the operation information stored in the first and second EEPROM's 11 and 23 vanish due to the trouble of the indoor unit and the outdoor unit, replacement of electrical components or the like, ventilating operation similar to that at the previous time of operation can be performed on the basis of the operation information stored in the third EEPROM 33.

[0052] In the present embodiment, components similar to the components of the first embodiment are denoted by the same reference numerals as those used in the first embodiment, and no detailed description is provided for them.

[0053] In the air conditioner of the present embodiment, the wireless remote controller 3 has the third EEPROM 33. Operation information received from the indoor unit 1 is written into the third EEPROM 33, and operation information to be transmitted to the indoor unit 1 is read from the third EEPROM 33. The wireless remote controller 3 transmits the operation information read from the third EEPROM 33 to the indoor unit 1 in addition to the command signal corresponding to the input to the input part by the operator by means of an infrared ray transmitting and receiving part 31 that transmits and receives an infrared signal between the controller and the indoor unit 1. Moreover, the operation information to be written into the third EEPROM 33 is received from the indoor unit 1 by the infrared ray transmitting and receiving part 31. The wireless remote controller 3 further includes an input part for inputting by the operator in the room as in the case of the wireless remote controller 3 of the first embodiment.

[0054] Moreover, the infrared ray transmitting and receiving part 13 of the indoor unit 1 receives the operation information signal that represents the operation information stored in the third EEPROM 33 from the wireless remote controller 3 in addition to the command signal

that issues commands of the operating mode, preset temperature, preset air volume, wind direction and so on, or the operating states of the air conditioner. Moreover, the infrared ray transmitting and receiving part 13 of the indoor unit 1 transmits an operation information signal, which represents the operation information of the air conditioner that should be stored in the third EEPROM 33, to the wireless remote controller 3.

[0055] FIGS. 4A and 4B are flow charts showing the processing executed in the control part 7 of the air conditioner of the present embodiment. The ventilating operation of the air conditioner of the present embodiment is described with reference to the flow charts of FIGS. 4A and 4B.

[0056] First of all, the power of the air conditioner is turned on to start up the air conditioner (step S1) and start up the control part 7, and it is determined whether or not the command signal of the contents of turning on the ventilating operation has been received from the wireless remote controller 3 (step S2). When it is determined that the command signal for turning on the ventilating operation has been received from the wireless remote controller 3, information that represents the on-state of the ventilating operation is stored into the first EEPROM 11 of the indoor unit 1 (step S3). Subsequently, information that represents the on-state of the ventilating operation is stored into the second EEPROM 23 of the outdoor unit 2 (step S4). Further, information that represents the on-state of the ventilating operation is transmitted to the wireless remote controller 3, and the information that represents the on-state of the ventilating operation is stored into the third EEPROM 33 of the wireless remote controller (step S5).

[0057] Subsequently, it is determined whether the command signal from the wireless remote controller 3 has the contents representing the on-state of the ventilating operation or the contents representing the off-state of the ventilating operation (step S6).

[0058] When it is determined that the command signal for turning on the ventilating operation is not received from the wireless remote controller 3 in step S2, the information stored in the first EEPROM 11 of the indoor unit 1 is read to determine whether or not the ventilating operation has been on at the previous time of operation (step S8). When the information stored in the first EEPROM 11 is the information of the on-state of the ventilating operation and it is determined that the ventilating operation has been on at the previous time of operation, the program flow proceeds to the step S6.

[0059] When the information stored in the first EEPROM 11 is the information of the off-state of the ventilating operation in the step S8, the information stored in the second EEPROM 23 is read to determine whether or not the ventilating operation has been on at the previous time of operation (step S11). When it is determined that the information stored in the second EEPROM 23 is the information of the on-state of the ventilating operation and the ventilating operation has been on at the previous time

of operation, information that represents the on-state of the ventilating operation is stored into the first EEPROM 11 (step S12). Subsequently, operation information that represents the on-state of the ventilating operation is transmitted to the wireless remote controller 3, information that represents the on-state of the ventilating operation is stored into the third EEPROM 33 of the wireless remote controller (step S13). Thereafter, the program flow proceeds to the step S6.

[0060] When the information stored in the second EEPROM 23 is the information of the off-state of the ventilating operation in the step S11, the wireless remote controller 3 is commanded to read the information stored in the third EEPROM 33 and transmit the information to the indoor unit, and it is determined whether or not the ventilating operation has been on at the previous time of operation on the basis of the information received by the indoor unit (step S14). When the information stored in the third EEPROM 33 is the information of the on-state of the ventilating operation and it is determined that the ventilating operation has been on at the previous time of operation, the information that represents the on-state of the ventilating operation is stored into the first EEPROM 11 (step S15). Subsequently, the information that represents the on-state of the ventilating operation is stored into the second EEPROM 23 of the outdoor unit 2 (step S16). Thereafter, the program flow proceeds to the step S6.

[0061] When the information stored in the third EEPROM 33 represents the off-state of the ventilating operation and it is determined that the ventilating operation has been off at the previous time of operation in the step S14, the program flow proceeds to the step S6.

[0062] When the command signal from the wireless remote controller 3 has the contents that represent the on-state of the ventilating operation in the step S6, the ventilating operation is executed (step S7).

[0063] When the command signal from the wireless remote controller 3 has the contents that represent the off-state of the ventilating operation in step S6, it is determined whether or not the information stored in the first EEPROM 11 represents the on-state of the ventilating operation (step S9). When the information stored in the first EEPROM 11 represents the on-state of the ventilating operation, the program flow returns to the step S7 to execute the ventilating operation.

[0064] When the information stored in the first EEPROM 11 is the off-state of the ventilating operation in the step S9, the ventilating operation is brought into a stop state (step S10).

[0065] After the step S7 and step S10, the program flow returns to step S2 to determine whether or not the command signal of the on-state of the ventilating operation has been received from the wireless remote controller 3.

[0066] As described above, when the command to perform the ventilating operation is inputted to the remote controller by the operator, in the air conditioner of the

present embodiment, the ventilating operation is performed in accordance with the command signal from the remote controller. Even in a case where the command to perform the ventilating operation is not inputted to the remote controller by the operator, the ventilating operation can be resumed on the basis of the information of the on-state of the operation stored in the first EEPROM 11, the second EEPROM 23 or the third EEPROM 33 when the ventilating operation has been performed at the previous time of operation. Therefore, even if the information stored in the first and EEPROM 11 and the second EEPROM 23 vanish due to, for example, replacement, malfunction or the like of electrical components, the air conditioner of the present embodiment can resume the ventilating operation similar to that at the previous time of operation at the present time of operation regardless of an input by the operator.

[0067] Although the information that represents the on-state of the ventilating operation is stored in the third EEPROM 33 by receiving the command signal for turning on the ventilating operation from the wireless remote controller 3 and thereafter transmitting the information that represents the on-state of the ventilating operation to the wireless remote controller 3 (step S5) in the second embodiment, it is acceptable to store the information that represents the on-state of the ventilating operation into the third EEPROM 33 when the input of turning on the ventilating operation is made by the operator to the wireless remote controller 3. In this case, the step S5 may be removed.

[0068] Moreover, when the information of the on-state of the ventilating operation is stored in the second EEPROM 23 or the third EEPROM 33, the information is once stored in the first EEPROM 11 and thereafter the ventilating operation is executed by reading the information stored in the first EEPROM 11 in the first and second embodiments. However, the ventilating operation may immediately be executed by reading the information of the on-state of the ventilating operation stored in the second EEPROM 23 or the third EEPROM 33.

[0069] Moreover, although the first EEPROM 11 is provided as the first nonvolatile memory for the indoor unit 1, the first nonvolatile memory needs not be provided for the indoor unit 1 but allowed to be provided for the outdoor unit 2 or the wireless remote controller 3. For example, it is acceptable to remove the first EEPROM 11 of the indoor unit 1 and make the second EEPROM 23 of the outdoor unit 2 or the third EEPROM 33 of the wireless remote controller 3 function as the first EEPROM 11.

[0070] Moreover, in the first and second embodiments, ventilation means at least one of supply of outdoor air into a room and discharge of indoor air to the outside of the room. Moreover, supply of outdoor air into a room and discharge of indoor air to the outside of the room may alternately be performed on the basis of the input condition by the operator or another condition.

[0071] Moreover, although the information of the on-state and the off-state of the ventilating operation at the

previous time of operation is stored in the first, second and third EEPROM's 11, 23 and 33 in the first and second embodiments, it is acceptable to store the information of distinction between intake and discharge of air, air volume, wind direction, presence or absence of humidifying operation, preset temperature and so on of the ventilating operation besides the information of the on-state or the off-state of the ventilating operation.

[0072] Moreover, although the ventilation pipe 6 is connected to the humidifying unit 22 that has the humidifying rotor in the outdoor unit 2, the ventilation pipe 6 may be connected to an air blower unit that has no humidifying rotor.

[0073] Moreover, the ventilating part may be constructed of a ventilation pipe of which one end communicates with the indoor unit and the other end is opened to the outside of the room and a fan that is provided for the indoor unit and discharges indoor air to the outside of the room or guides outdoor air to the inside of the room via the ventilation pipe.

[0074] Moreover, the nonvolatile memory may be provided by a RAM or a magnetic recording device such as a hard disk besides EEPROM and is, in short, required to be a memory that can maintain the storage state even when the power is cut off.

[0075] Moreover, although the air conditioner is constituted by connecting the indoor unit 1 with the outdoor unit 2 via the ventilation pipe 6, the refrigerant piping 5 and the connection wiring 8, it is acceptable to integrally form the indoor unit 1 with the outdoor unit 2.

[0076] Embodiments of the invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

Claims

1. An air conditioner comprising:

a ventilating part (6) that ventilates a room;
a first nonvolatile memory (11) that stores operation information representing an operating state of the ventilating part (6) at a previous time of operation; and
a control part (7) that controls operation of the ventilating part (6) on a basis of operation information stored in the first nonvolatile memory (11) at a present time of operation.

2. The air conditioner as claimed in claim 1, comprising:

an indoor unit (1) having the first nonvolatile memory (11), a receiving part (13) that receives a command signal for commanding the operat-

ing state of the ventilating part (6) and a transmitting part (13) that transmits an operation information signal representing the operation information stored in the first nonvolatile memory; and

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a remote controller (3) having a transmitting part (31) that transmits the command signal and a receiving part (31) that receives the operation information signal.

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3. The air conditioner as claimed in claim 2, comprising:

an outdoor unit (2) having a second nonvolatile memory (23) that stores the operation information of the ventilating part (6) at the previous time of operation.

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4. The air conditioner as claimed in claim 2, wherein the remote controller (3) comprises:

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a third nonvolatile memory (33) that stores the operation information of the ventilating part (6) at the previous time of operation, and the transmitting part (31) transmits the operation information signal that represents the operation information stored in the third nonvolatile memory (33) to the indoor unit (1).

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5. The air conditioner as claimed in claim 1, wherein, when the receiving part (13) of the indoor unit does not receive the command signal for commanding execution of ventilation of the ventilating part (6) at the present time of operation and the operating state of the ventilating part (6) at the previous time of operation represented by the operation information stored in the first nonvolatile memory (11), the second nonvolatile memory (23) or the third nonvolatile memory (33) is execution of ventilation, the control part (7) controls the operation of the ventilating part (6) on a basis of the stored operation information so that the operating state becomes identical to the operating state at the previous time of operation.

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Fig. 1

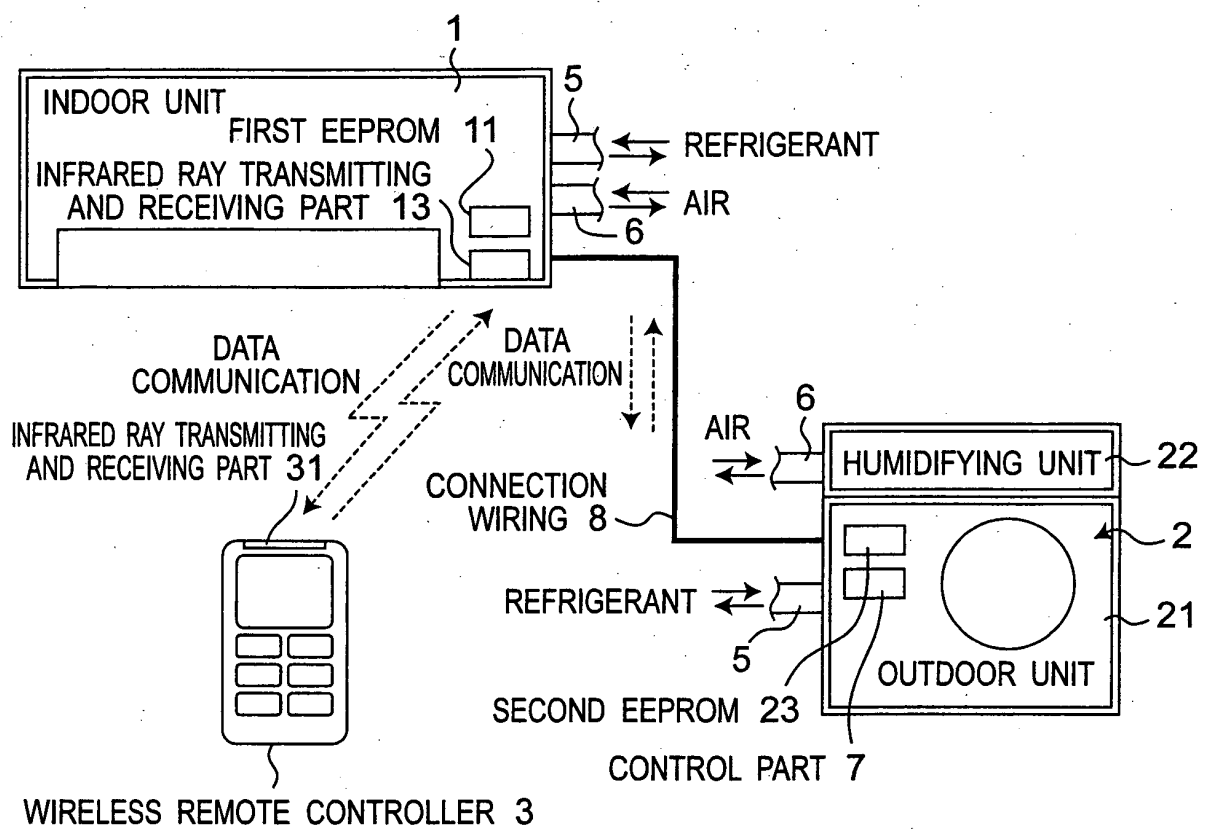


Fig.2

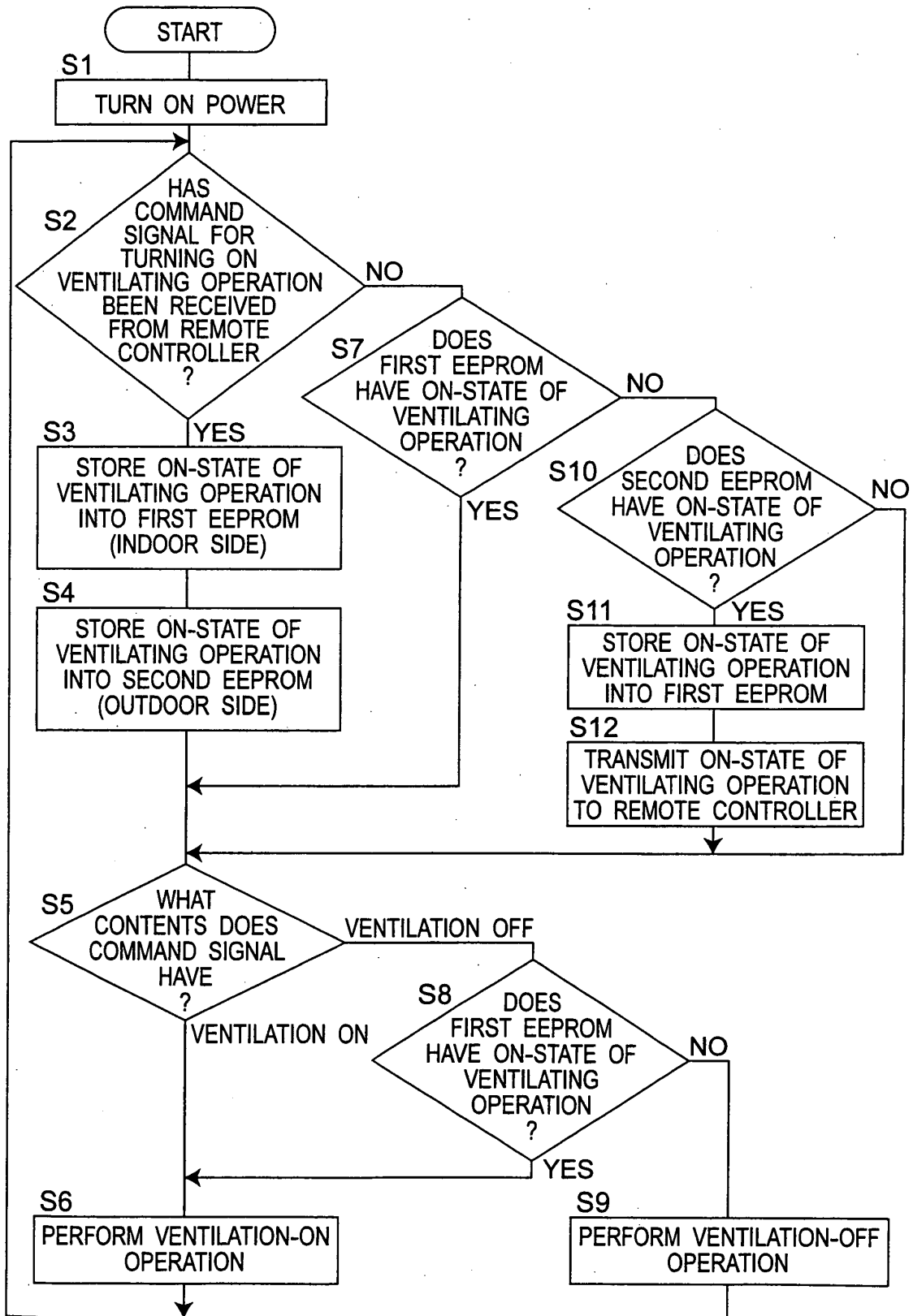


Fig.3

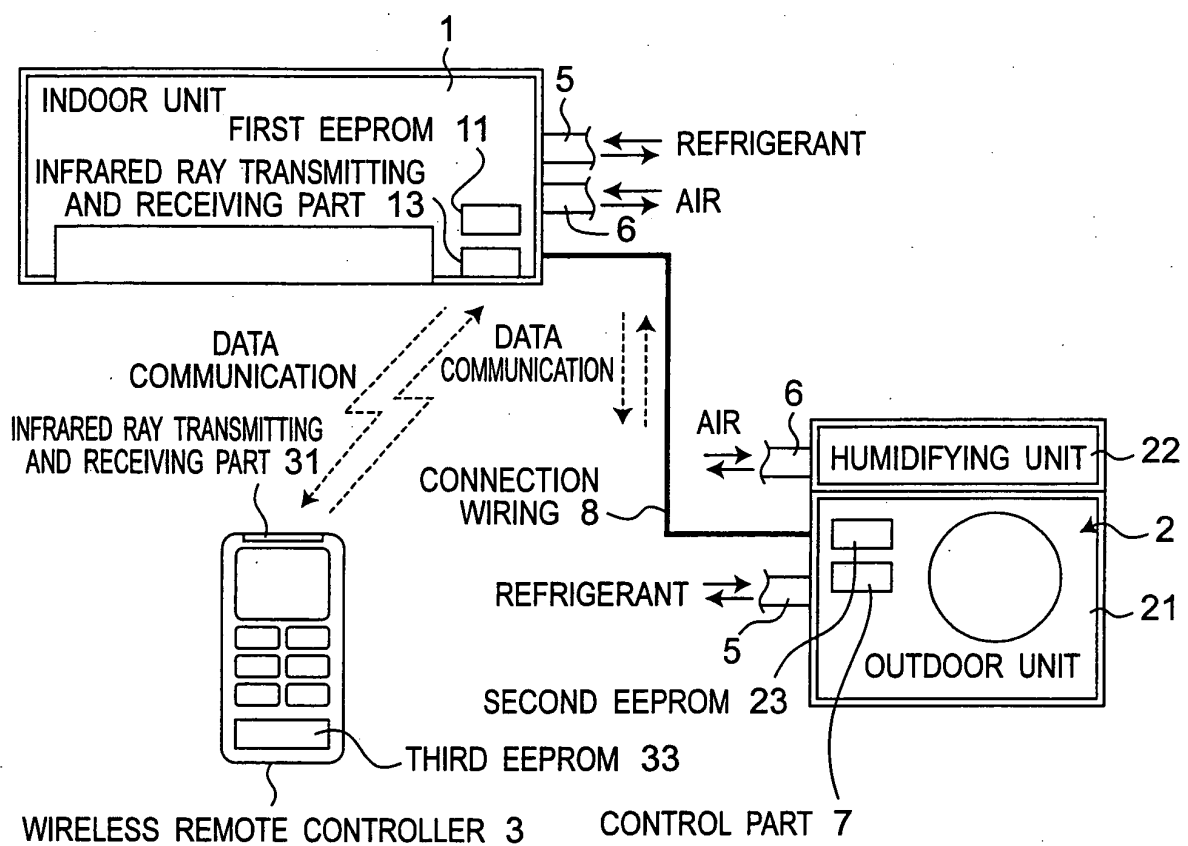


Fig.4A

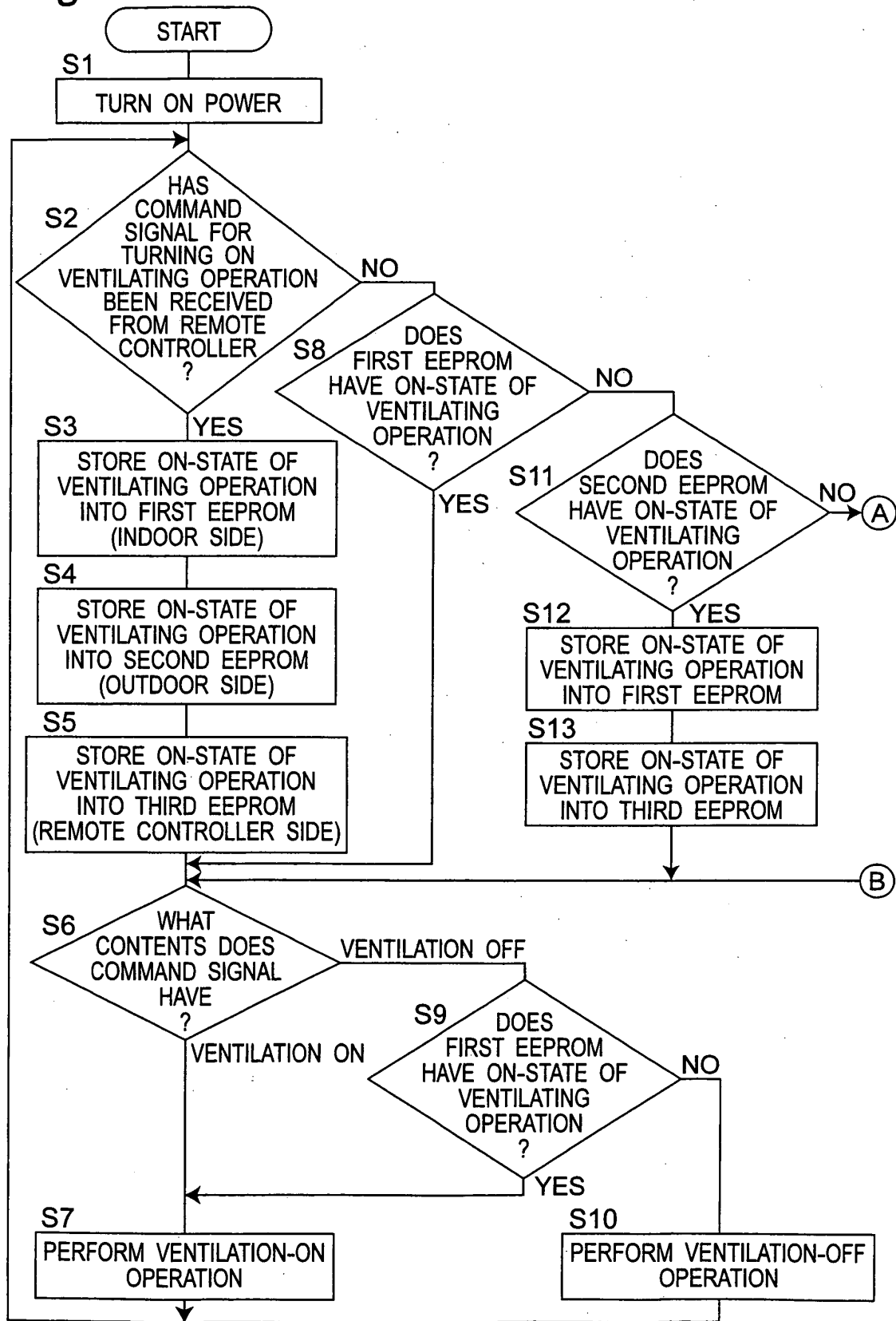
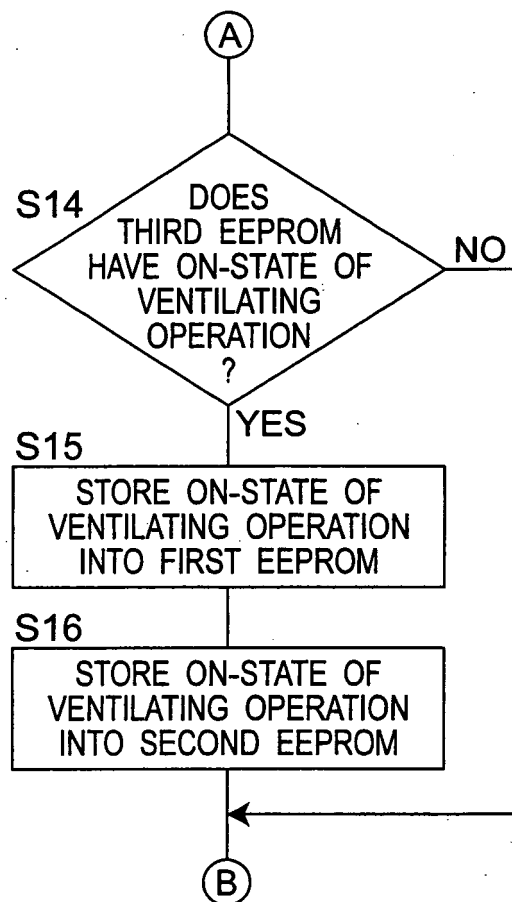


Fig.4B

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2005/021989

A. CLASSIFICATION OF SUBJECT MATTER F24F11/02 (2006.01)		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) F24F11/02		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2006 Kokai Jitsuyo Shinan Koho 1971-2006 Toroku Jitsuyo Shinan Koho 1994-2006		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2001-99477 A (Matsushita Seiko Co., Ltd.), 13 April, 2001 (13.04.01), Full text (Family: none)	1-5
Y	JP 2002-61917 A (Sanyo Electric Co., Ltd., et al.), 28 February, 2002 (28.02.02), Full text (Family: none)	1-5
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
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Date of the actual completion of the international search 30 January, 2006 (30.01.06)		Date of mailing of the international search report 07 March, 2006 (07.03.06)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2003176944 A [0002]