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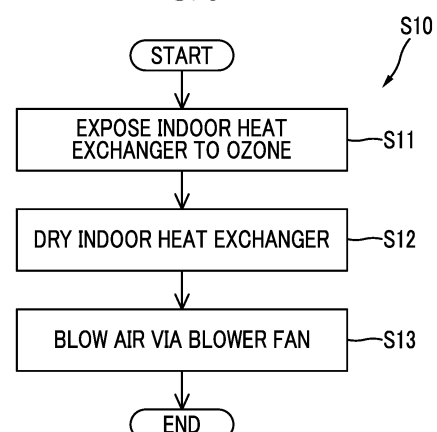
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(54) **AIR CONDITIONING SYSTEM CONTROL DEVICE, AIR CONDITIONING SYSTEM CONTROL METHOD, PROGRAM, AND AIR CONDITIONING SYSTEM**

(57) This air conditioning system control device comprises an ozone exposure control unit for exposing an indoor heat exchanger to ozone generated by an ozone generator, and an operation control unit for controlling an operating mode of an indoor unit, wherein, in a state in which the indoor heat exchanger is damp, the damp indoor heat exchanger is exposed to ozone and is dried by exposing the indoor heat exchanger to the ozone generated by the ozone generator, operating the indoor unit in a space heating mode by means of the operation control unit, and heating the indoor heat exchanger to maintain the indoor heat exchanger at a temperature equal to or greater than an internal temperature of the indoor unit and less than 45°C.

FIG. 3



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Description

Technical Field

[0001] The present disclosure relates to a control device of an air conditioning system, a control method of an air conditioning system, a program, and an air conditioning system.

[0002] This application claims priority to Japanese Patent Application No. 2022-067587, filed in Japan on April 15, 2022, the content of which is incorporated herein by reference.

Background Art

[0003] PTL 1 discloses a configuration in which an ozone treatment operation of supplying ozone to an inside of an indoor unit is performed after a space cooling operation or a dehumidification operation ends, and a space heating operation is performed after the ozone treatment operation ends to dry an inner surface of the indoor unit. In this configuration, the ozone treatment operation is performed in a state where relative humidity inside the indoor unit is 70% or higher.

Citation List

Patent Literature

[0004] [PTL 1] Japanese Patent No. 4396688

Summary of Invention

Technical Problem

[0005] Meanwhile, in the configuration described in PTL 1, in a case where moisture remains in the indoor unit after the ozone treatment operation and the space heating operation end, there is a possibility that a mold grows inside the indoor unit while an operation of the indoor unit is stopped. In contrast, in order to sufficiently dry the inner surface of the indoor unit during the space heating operation after the ozone treatment operation, when a space heating operation temperature is increased or a space heating operation time is made long, warm air generated by the space heating operation flows out indoors, and an indoor temperature rises. In addition, during the space heating operation after the ozone treatment operation, dew condensation may occur on a surface of the indoor unit due to a temperature difference between the inside and an outside of the indoor unit.

[0006] The present disclosure has been made to solve the above problems, and an object of the present disclosure is to provide a control device of an air conditioning system, a control method of an air conditioning system, a program, and an air conditioning system, which can inhibit a growth of mold while suppressing an influence on an indoor environment.

Solution to Problem

[0007] In order to solve the above problems, a control device of an air conditioning system according to the present disclosure is a control device of an air conditioning system including an indoor unit including an indoor heat exchanger and an ozone generator, the control device includes an ozone exposure control unit that exposes the indoor heat exchanger to ozone generated by the ozone generator, and an operation control unit that controls an operating mode of the indoor unit, in which the indoor heat exchanger is exposed to the ozone generated by the ozone generator in a state where the indoor heat exchanger is wet, and the indoor heat exchanger exposed to the ozone and in a state of being wet is dried by operating the indoor unit in a space heating mode via the operation control unit to heat the indoor heat exchanger such that a temperature of the indoor heat exchanger is maintained at a temperature equal to or higher than an internal temperature of the indoor unit and lower than 45°C.

[0008] A control method of an air conditioning system according to the present disclosure is a control method of an air conditioning system including an indoor unit including an indoor heat exchanger and an ozone generator, the control method includes exposing the indoor heat exchanger to ozone in a state where the indoor heat exchanger is wet, and drying the indoor heat exchanger exposed to the ozone and in a state of being wet by operating the indoor unit in a space heating mode to heat the indoor heat exchanger such that a temperature of the indoor heat exchanger is maintained at a temperature equal to or higher than an internal temperature of the indoor unit and lower than 45°C.

[0009] A program of an air conditioning system according to the present disclosure causes a computer of a control device of an air conditioning system including an indoor unit including an indoor heat exchanger and an ozone generator to execute exposing the indoor heat exchanger to ozone in a state where the indoor heat exchanger is wet, and drying the indoor heat exchanger exposed to the ozone and in a state of being wet by operating the indoor unit in a space heating mode to heat the indoor heat exchanger such that a temperature of the indoor heat exchanger is maintained at a temperature equal to or higher than an internal temperature of the indoor unit and lower than 45°C.

[0010] An air conditioning system according to the present disclosure includes an indoor unit including an indoor heat exchanger and an ozone generator, and a control device that controls an operation of the indoor unit, in which the control device includes an ozone exposure control unit that exposes the indoor heat exchanger to ozone generated by the ozone generator, and an operation control unit that controls an operating mode of the indoor unit, the indoor heat exchanger is exposed to the ozone generated by the ozone generator in a state where the indoor heat exchanger is wet, and the indoor

heat exchanger exposed to the ozone and in a state of being wet is dried by operating the indoor unit in a space heating mode via the operation control unit to heat the indoor heat exchanger such that a temperature of the indoor heat exchanger is maintained at a temperature equal to or higher than an internal temperature of the indoor unit and lower than 45°C.

Advantageous Effects of Invention

[0011] According to a control device of an air conditioning system, a control method of an air conditioning system, a program, and an air conditioning system of the present disclosure, it is possible to inhibit a growth of mold while suppressing an influence on an indoor environment.

Brief Description of Drawings

[0012]

Fig. 1 is a diagram showing a schematic configuration of an air conditioning system according to an embodiment of the present disclosure.

Fig. 2 is a functional block diagram of a control device of an air conditioning system according to the embodiment of the present disclosure.

Fig. 3 is a flowchart showing a procedure of a control method of an air conditioning system according to the embodiment of the present disclosure.

Fig. 4 is a chart diagram showing states of an operating mode, a flap, a blower fan, and an ozone generator in the control method of an air conditioning system according to the embodiment of the present disclosure.

Fig. 5 is a chart diagram showing states of an operating mode, a flap, a blower fan, and an ozone generator in a control method of an air conditioning system according to a modification example of the embodiment of the present disclosure.

Fig. 6 is a diagram showing a hardware configuration of the control device of an air conditioning system according to the embodiment of the present disclosure. Description of Embodiments

(Configuration of Air Conditioning System)

[0013] Hereinafter, a control device of an air conditioning system, a control method of an air conditioning system, a program, and an air conditioning system according to the embodiment of the present disclosure will be described with reference to Figs. 1 to 4.

[0014] As shown in Fig. 1, an air conditioning system 1 mainly includes an indoor unit 2, an outdoor unit (not shown), and a control device 4.

(Configuration of Indoor Unit)

[0015] The indoor unit 2 is installed indoors.

[0016] The indoor unit 2 and the outdoor unit are connected by a refrigerant pipe (not shown).

[0017] The indoor unit 2 suctions indoor air, adjusts a temperature or humidity, and thereafter, blows out the air indoors to perform indoor air conditioning.

[0018] The indoor unit 2 is fixed to an upper portion of an indoor wall surface.

[0019] The indoor unit 2 includes a housing 20 and a main body 21.

[0020] The housing 20 accommodates the main body 21 therein.

[0021] The housing 20 includes a rear surface panel 20b, a front surface panel 20f, a top surface panel 20t, a bottom surface panel 20d, and a pair of side surface panels (not shown).

[0022] The rear surface panel 20b is fixed along the indoor wall surface.

[0023] In the present specification, a side of the rear surface panel 20b fixed to the wall surface is referred to as a rear, and a side of the front surface panel 20f opposite to the rear surface panel 20b is referred to as a front.

[0024] The front surface panel 20f covers the main body 21 from the front.

[0025] The top surface panel 20t is provided at the upper portion of the housing 20.

[0026] The top surface panel 20t covers the main body 21 from above.

[0027] The top surface panel 20t is provided with a suction port (not shown) that suctions indoor air into the housing 20.

[0028] The bottom surface panel 20d is provided at the bottom portion of the housing 20.

[0029] The bottom surface panel 20d covers the main body 21 from below.

[0030] A blowout port 20h is formed in the bottom surface panel 20d.

[0031] The blowout port 20h is formed to penetrate the bottom surface panel 20d up and down.

[0032] The blowout port 20h extends in a width direction of the housing 20 (direction orthogonal to the paper surface in Fig. 1).

[0033] The main body 21 includes an indoor heat exchanger 22, a blower fan 23, a flap 24, and an ozone generator 25.

[0034] The indoor heat exchanger 22 is provided to surround the blower fan 23 from the outer peripheral side.

[0035] The indoor heat exchanger 22 exchanges heat between the refrigerant fed from the outdoor unit (not shown) and the atmosphere in the main body 21.

[0036] A drain pan (not shown) that receives the dew condensation water generated by the condensation (dew condensation) of the air in the housing 20 due to heat exchange is provided below the indoor heat exchanger 22.

[0037] The dew condensation water received by the

drain pan is discharged outdoors through a drain pipe (not shown) connected to the drain pan.

[0038] The blower fan 23 is rotationally driven by a motor (not shown) disposed in the housing 20.

[0039] The rotation of the blower fan 23 generates air in the housing 20.

[0040] Due to the rotation of the blower fan 23, the air outside the housing 20 is suctioned into the housing 20 from the suction port (not shown).

[0041] A guide plate 26 that guides the flow direction of air is provided from the rear surface side of the blower fan 23 to the blowout port 20h.

[0042] The air suctioned into the housing 20 flows into the indoor heat exchanger 22, and heat exchange with the refrigerant is performed.

[0043] The air that has been heat-exchanged in the indoor heat exchanger 22 is guided along the guide plate 26 to the blowout port 20h, and is blown out indoors from the blowout port 20h.

[0044] The flap 24 is provided at the blowout port 20h.

[0045] The flap 24 is provided to be rotatable around a rotation axis extending in the width direction of the housing 20 (direction orthogonal to the paper surface of Fig. 1).

[0046] The flap 24 opens and closes the blowout port 20h.

[0047] The flap 24 is in an open state during the operation of the air conditioning system 1.

[0048] The flap 24 is in a closed state when the air conditioning system 1 is stopped, and covers the blowout port 20h.

[0049] The flap 24 can adjust the direction of the blow-out air blown out from the blowout port 20h by adjusting the opening degree thereof.

[0050] The ozone generator 25 is provided at a predetermined position in the housing 20.

[0051] The ozone generator 25 generates ozone (O₃) and releases the ozone into the housing 20.

[0052] The ozone generator 25 is, for example, a discharge type ozone generator.

[0053] The ozone generator 25 may be of a type other than the discharge type.

(Configuration of Control Device)

[0054] The control device 4 controls the operation of the indoor unit 2.

[0055] As shown in Fig. 2, the control device 4 includes a central processing unit (hereinafter, referred to as a "CPU") 41 and a memory 42.

[0056] The CPU 41 functionally includes an operation control unit 411, an ozone exposure control unit 412, and a flap control unit 413.

[0057] That is, the CPU 41 operates based on a predetermined program to function as the operation control unit 411, the ozone exposure control unit 412, and the flap control unit 413.

[0058] The memory 42 stores various pieces of data

acquired by the control device 4.

[0059] The operation control unit 411 controls the operating mode of the indoor unit 2.

[0060] The operation control unit 411 operates the indoor unit 2 in various operating modes set in advance, such as a space cooling mode, a dehumidification mode, a space heating mode, and an air blowing mode.

[0061] The operation control unit 411 operates the indoor unit 2 in a predetermined operating mode via the user's operation input to the remote controller (not shown), the setting input of a timer or the like, or the like.

[0062] The operation control unit 411 causes the indoor unit 2 to perform an internal clean operation, which will be described in detail later, when the operation in the space cooling mode or in the dehumidification mode ends.

[0063] The ozone exposure control unit 412 controls the operation of the ozone generator 25.

[0064] The ozone exposure control unit 412 generates ozone via the ozone generator 25.

[0065] The ozone exposure control unit 412 exposes the indoor heat exchanger 22 to the ozone generated by the ozone generator 25.

[0066] Simply bringing the ozone gas into contact with the microorganism (bacteria) such as a mold in a dry state has little sterilization effect. Therefore, the ozone exposure control unit 412 exposes the indoor heat exchanger 22 to the ozone when the surface of the indoor heat exchanger 22 is in a wet state due to the dew condensation water generated by the heat exchange in the indoor heat exchanger 22.

[0067] When the indoor heat exchanger 22 in the wet state is exposed to the ozone, the ozone in the air in the housing 20 is dissolved in the water. In this manner, the sterilization effect is improved. It is also considered that the high affinity between the water and the microorganisms is related to the improvement in the sterilization effect.

(Procedure of Control Method of Air Conditioning System)

[0068] As shown in Fig. 3, a control method S10 of the air conditioning system 1 according to the embodiment of the present disclosure includes step S11 of exposing the indoor heat exchanger to ozone, step S12 of drying the indoor heat exchanger, and step S13 of blowing air via the blower fan.

[0069] In the present embodiment, the control method S10 of the air conditioning system 1 is automatically executed when the operation of the indoor unit 2 in the space cooling mode or in the dehumidification mode is stopped.

[0070] In a case where the indoor unit 2 is operated in the space cooling mode or in the dehumidification mode, the surface of the indoor heat exchanger 22 is wet with dew-condensed water (dew condensation water).

[0071] Immediately after the indoor unit 2 stops the

operation in the space cooling mode or in the dehumidification mode, the surface of the indoor heat exchanger 22 is wet with the dew condensation water.

[0072] Step S11 of exposing the indoor heat exchanger to ozone is automatically started at a point in time at which a preset time (for example, several seconds) has elapsed after the operation of the indoor unit 2 in the space cooling mode or in the dehumidification mode is stopped.

[0073] In step S11 of exposing the indoor heat exchanger to ozone, the ozone generator 25 is switched to be turned on in a state where the indoor heat exchanger 22 is wet, and ozone is generated by the ozone generator 25, as shown in Fig. 4.

[0074] The indoor heat exchanger 22 is exposed to the ozone generated by the ozone generator 25.

[0075] In step S11 of exposing the indoor heat exchanger to ozone, the operation in the space cooling mode is stopped, and the blower fan 23 is turned off.

[0076] In step S11 of exposing the indoor heat exchanger to ozone, the flap 24 is opened.

[0077] In step S11 of exposing the indoor heat exchanger to ozone, the indoor heat exchanger 22 is exposed to ozone in a state where the indoor heat exchanger 22 is wet, so that the bacteria such as a mold adhering to the indoor heat exchanger 22 are reduced.

[0078] In step S12 of drying the indoor heat exchanger, the indoor heat exchanger 22 exposed to ozone and in a state of being wet is dried.

[0079] In step S12 of drying the indoor heat exchanger, as shown in Fig. 4, the operation control unit 411 operates the indoor unit 2 in the space heating mode and switches the blower fan 23 to be turned on. In this manner, the indoor heat exchanger 22 exposed to ozone and in a state of being wet is heated, and the indoor heat exchanger 22 is dried.

[0080] In step S12 of drying the indoor heat exchanger, it is preferable to heat the indoor heat exchanger 22 such that the temperature of the indoor heat exchanger 22 is maintained at a temperature equal to or higher than an internal temperature of the indoor unit 2 and lower than 45°C.

[0081] In step S12 of drying the indoor heat exchanger, it is preferable to heat the indoor heat exchanger 22 such that the temperature of the indoor heat exchanger 22 is maintained, for example, at a temperature equal to or higher than 30°C and lower than 45°C.

[0082] In step S12 of drying the indoor heat exchanger, it is particularly preferable to heat the indoor heat exchanger 22 such that the temperature of the indoor heat exchanger 22 is maintained, for example, at a temperature equal to or higher than 35°C and lower than 45°C.

[0083] In step S12 of drying the indoor heat exchanger 22, the flap 24 is controlled by the flap control unit 413 such that the blowout air W is directed to the front of the indoor unit 2.

[0084] In step S12 of drying the indoor heat exchanger 22, the blowout air W is guided by the flap 24 to flow from the blowout port 20h toward the front of the indoor unit 2.

[0085] The temperature of the blowout air W is higher than the room temperature. For this reason, a part of the blowout air W rises indoors and flows along the front surface of the indoor unit 2. Accordingly, the temperature in the vicinity of the indoor unit 2 rises, and the temperature difference between the inside and the outside of the indoor unit 2 is reduced.

[0086] In addition, the flap 24 suppresses warm air flowing out from the indoor unit 2 from being directed downwards to the indoor unit 2.

[0087] After the predetermined time set in advance elapses, step S12 of drying the indoor heat exchanger 22 ends.

[0088] In step S13 of blowing air via the blower fan, air is blown to the indoor heat exchanger 22, which is dried in step S12 of drying the indoor heat exchanger 22, by the blower fan 23.

[0089] In this way, after the indoor heat exchanger 22 is dried, the moisture remaining on the surface of the indoor heat exchanger 22 is even further reduced by blowing air via the blower fan 23.

[0090] After the predetermined time set in advance elapses, step S13 of blowing air via the blower fan ends.

(Operations and Effects)

[0091] In the present embodiment, the control device 4 of the air conditioning system 1 exposes the indoor heat exchanger 22 to the ozone in a state where the indoor heat exchanger 22 is wet. As a result, the bacteria such as a mold adhering to the indoor heat exchanger 22 are reduced.

[0092] Further, the control device 4 dries the indoor heat exchanger 22 exposed to ozone and in a state of being wet. Accordingly, the amount of moisture remaining on the surface of the indoor heat exchanger 22 is reduced.

[0093] Therefore, during the stop of the indoor unit 2, the reproduction of bacteria such as a mold is prevented.

[0094] When the indoor heat exchanger 22 is dried, the indoor unit 2 is operated in the space heating mode. At this time, the indoor heat exchanger 22 is heated such that the temperature of the indoor heat exchanger 22 is maintained at a temperature equal to or higher than the internal temperature of the indoor unit 2 and lower than 45°C. Therefore, the amount of warm air flowing out indoors from the indoor heat exchanger 22 can be reduced, and the rise in indoor temperature can be suppressed.

[0095] When the temperature is too high when the indoor heat exchanger 22 is dried, a temperature difference between the inner side and the outer side of the housing 20 of the indoor unit 2 increases, and dew condensation may occur on the surface of the housing 20. In contrast, the control device 4 maintains the temperature of the indoor heat exchanger 22 at a temperature lower than 45°C. As a result, the occurrence of dew condensation on the surface of the housing 20 is sup-

pressed.

[0096] In this way, it is possible to inhibit the growth of mold while suppressing the influence on the indoor environment.

[0097] In addition, when the control device 4 dries the indoor heat exchanger 22, the control device 4 adjusts the opening degree of the flap 24 such that the blowout air W is directed to the front of the indoor unit 2. Since a temperature of a part of the blowout air W directed to the front of the indoor unit 2 is higher than the room temperature, a part of the blowout air W rises indoors and flows along the front surface of the indoor unit 2. Accordingly, the temperature in the vicinity of the indoor unit 2 rises, and the temperature difference between the inside and the outside of the indoor unit 2 is reduced. Therefore, it is possible to suppress the occurrence of dew condensation on the surface of the housing 20.

[0098] In addition, the opening degree of the flap 24 is adjusted such that the blowout air W is directed to the front of the indoor unit 2, so that the warm air flowing out from the indoor unit 2 is suppressed from being directed downwards to the indoor unit 2. The user is often present in a space below the indoor unit 2 indoors. Therefore, the warm air generated to dry the indoor heat exchanger 22 is prevented from reaching the user.

[0099] In addition, the control device 4 operates the indoor unit 2 in the space cooling mode or in the dehumidification mode during ozone exposure. As a result, the moisture in the air around the indoor heat exchanger 22 is dew-condensed, and the dew condensation water is generated. The bacteria such as a mold, which are sterilized by the ozone exposure, are discharged together with the dew condensation water from the indoor heat exchanger 22. As a result, occurrence of a mold can be suppressed more effectively.

[0100] In addition, the control device 4 causes the blower fan 23 to blow air after the indoor heat exchanger 22 is dried. Accordingly, the amount of moisture remaining on the surface of the indoor heat exchanger 22 can be even further reduced.

[0101] In addition, in the control method S10 of the air conditioning system 1 in the present embodiment, when the indoor heat exchanger 22 is dried after the indoor heat exchanger 22 is exposed to the ozone in a state where the indoor heat exchanger 22 is wet, the indoor unit 2 is operated in the space heating mode. At this time, the indoor heat exchanger 22 is heated such that the temperature of the indoor heat exchanger 22 is maintained at a temperature equal to or higher than the internal temperature of the indoor unit 2 and lower than 45°C. As a result, the occurrence of dew condensation on the surface of the housing 20 is suppressed. In this way, it is possible to inhibit the growth of mold while suppressing the influence on the indoor environment.

[0102] In addition, in the present embodiment, the air conditioning system 1 exposes the indoor heat exchanger 22 to the ozone in a state where the indoor heat exchanger 22 is wet. As a result, the bacteria such as a

mold adhering to the indoor heat exchanger 22 are reduced. Further, the air conditioning system 1 dries the indoor heat exchanger 22 exposed to ozone and in a state of being wet. Accordingly, the amount of moisture remaining on the surface of the indoor heat exchanger 22 is reduced. Therefore, during the stop of the indoor unit 2, the reproduction of bacteria such as a mold is prevented. When the indoor heat exchanger 22 is dried, the indoor unit 2 is operated in the space heating mode. At this time, the indoor heat exchanger 22 is heated such that the temperature of the indoor heat exchanger 22 is maintained at a temperature equal to or higher than the internal temperature of the indoor unit 2 and lower than 45°C. Therefore, the amount of warm air flowing out indoors from the indoor heat exchanger 22 can be reduced, and the rise in indoor temperature can be suppressed. In addition, by maintaining the temperature of the indoor heat exchanger 22 at a temperature lower than 45°C, the occurrence of dew condensation on the surface of the housing 20 is suppressed. In this way, it is possible to inhibit the growth of mold while suppressing the influence on the indoor environment.

<Modification Example of Embodiment>

[0103] In the above-described embodiment, in step S11 of exposing the indoor heat exchanger to ozone, the operation in the space cooling mode is stopped, and the blower fan 23 is turned off. However, the present disclosure is not limited thereto. For example, as shown in Fig. 5, in step S11 of ozone exposure, the indoor unit 2 may be operated in the space cooling mode or in the dehumidification mode by the operation control unit 411, and the indoor heat exchanger 22 may be exposed to the ozone while the blower fan 23 is turned on (the air blowing operation in the subsequent step S13 need not be performed).

[0104] Accordingly, during ozone exposure, the indoor unit 2 is operated in the space cooling mode or in the dehumidification mode, so that the moisture in the air around the indoor heat exchanger 22 is dew-condensed, and the dew condensation water is generated. The generated dew condensation water falls from the indoor heat exchanger 22 to the drain pan (not shown) and is discharged to the outside from the drain pipe. Accordingly, the bacteria such as a mold that are killed by the ozone exposure are discharged together with the dew condensation water. Accordingly, the occurrence of a mold is more effectively suppressed.

[0105] In addition, in the above-described embodiment, the indoor unit 2 is caused to perform the internal clean operation as described above when the operation in the space cooling mode or in the dehumidification mode ends. However, the present disclosure is not limited thereto. For example, the operation control unit 411 may cause the indoor unit 2 to perform the internal clean operation as described above after the operation in the space heating mode, in the air blowing mode, or the like

ends. In this case, when the indoor heat exchanger 22 is not sufficiently wet, the effect of the sterilization treatment via the ozone exposure is reduced. For this reason, in a case where the internal clean operation is performed after the end of the operation in the space heating mode, in the air blowing mode, or the like, the operation control unit 411 may perform the operation in the space cooling mode or in the dehumidification mode for a certain time before the ozone exposure. Accordingly, the surface of the indoor heat exchanger 22 is wet with the dew condensation water, and the effect of the sterilization treatment via the ozone exposure is enhanced. In addition, even in a case except after the end of the operation in the space heating mode, in the air blowing mode, or the like, for example, in a case where the humidity in the housing 20 of the indoor unit 2 falls below a preset lower limit value, the operation in the space cooling mode or in the dehumidification mode may be performed for a certain time before the ozone exposure.

[0106] In the above-described embodiment, a program for realizing various functions of the control device 4 is recorded on a computer-readable recording medium, and the program recorded on the recording medium is loaded onto a computer system such as a microcomputer and executed to perform various kinds of processing. Here, the processes of various kinds of processing of the CPU of the computer system are stored in a computer-readable recording medium in the form of a program, and the various kinds of processing are performed by the computer reading and executing the program. Further, examples of the computer-readable recording medium include a magnetic disk, a magneto-optical disk, a CD-ROM, a DVD-ROM, a semiconductor memory, and the like. Further, this computer program may be transferred to a computer through a communication line, and the computer receiving the transfer may execute the program.

[0107] In the above-described embodiment, an example of a hardware configuration of a computer for executing a program for realizing various functions of the control device 4 will be described.

[0108] As shown in Fig. 6, a computer included in the control device 4 includes the CPU 41, the memory 42, a storage/reproduction device 50, and an input output interface (hereinafter referred to as "IO I/F") 51, and a communication interface (hereinafter referred to as "communication I/F") 52.

[0109] The memory 42 is a medium such as a random access memory (hereinafter referred to as "RAM") that temporarily stores data or the like used in a program executed by the control device 4.

[0110] The storage/reproduction device 50 is a device that stores data or the like in an external medium such as a CD-ROM, a DVD, or a flash memory or that reproduces data or the like in the external media.

[0111] The IO I/F 51 is an interface for inputting/outputting information and the like between the control device 4 and other devices.

[0112] The communication I/F 52 is an interface that communicates with other devices through a communication line such as the Internet or a dedicated communication line.

[0113] Although some embodiments of the present disclosure have been described above, the embodiments are presented as examples and are not intended to limit the scope of the disclosure. The embodiments can be implemented in various other embodiments, and various omissions, replacements, and changes can be made without departing from the scope of the disclosure. The embodiments or modifications thereof are included in the scope and the concept of the disclosure, and are also included in the appended claims and an equivalent scope thereof.

<Additional Notes>

[0114] The control device 4 of the air conditioning system 1, the control method S10 of the air conditioning system 1, a program, and the air conditioning system 1 according to the embodiment are understood as follows, for example.

(1) A control device 4 of an air conditioning system 1 according to a first aspect is the control device 4 of the air conditioning system 1 including an indoor unit 2 including an indoor heat exchanger 22 and an ozone generator 25, the control device 4 includes an ozone exposure control unit 412 that exposes the indoor heat exchanger 22 to ozone generated by the ozone generator 25, and an operation control unit 411 that controls an operating mode of the indoor unit 2, in which the indoor heat exchanger 22 is exposed to the ozone generated by the ozone generator 25 in a state where the indoor heat exchanger 22 is wet, and the indoor heat exchanger 22 exposed to the ozone and in a state of being wet is dried by operating the indoor unit 2 in a space heating mode via the operation control unit 411 to heat the indoor heat exchanger 22 such that a temperature of the indoor heat exchanger 22 is maintained at a temperature equal to or higher than an internal temperature of the indoor unit and lower than 45°C.

In the control device 4 of the air conditioning system 1, the indoor heat exchanger 22 is exposed to ozone in a state where the indoor heat exchanger 22 is wet, so that the bacteria such as a mold adhering to the indoor heat exchanger 22 are reduced. Further, the indoor heat exchanger 22 exposed to the ozone and in a state of being wet is dried, so that the amount of moisture remaining on the surface of the indoor heat exchanger 22 is reduced. Therefore, during the stop of the indoor unit 2, the reproduction of bacteria such as a mold is prevented. When the indoor heat exchanger 22 is dried, the indoor unit 2 is operated in the space heating mode. At this time, the indoor heat exchanger 22 is heated such that the temperature of

the indoor heat exchanger 22 is maintained at a temperature equal to or higher than the internal temperature of the indoor unit 2 and lower than 45°C. Therefore, the amount of warm air flowing out indoors from the indoor heat exchanger 22 can be reduced, and the rise in indoor temperature can be suppressed. In addition, when the temperature is too high when the indoor heat exchanger 22 is dried, a temperature difference between the inner side and the outer side of the housing 20 of the indoor unit 2 increases, and dew condensation may occur on the surface of the housing 20. However, by maintaining the temperature of the indoor heat exchanger 22 at a temperature lower than 45°C, the occurrence of dew condensation on the surface of the housing 20 is suppressed. In this way, it is possible to inhibit the growth of mold while suppressing the influence on the indoor environment.

(2) A control device 4 of an air conditioning system 1 according to a second aspect is the control device 4 of an air conditioning system 1 of (1), the control device 4 further includes a flap control unit 413 that controls a flap 24 that adjusts a direction of blowout air W blown out from the indoor unit 2, in which in a step S12 of drying the indoor heat exchanger 22, the flap 24 is controlled by the flap control unit 413 such that the blowout air W is directed to a front of the indoor unit 2.

Accordingly, when the indoor heat exchanger 22 is dried, the blowout air W is directed to the front of the indoor unit 2 by the flap 24. Since a temperature of a part of the blowout air W directed to the front of the indoor unit 2 is higher than the room temperature, a part of the blowout air W flows along the front surface of the indoor unit 2 indoors. Accordingly, the temperature in the vicinity of the indoor unit 2 rises, the temperature difference between the inside and the outside of the indoor unit 2 is reduced, and the occurrence of dew condensation can be suppressed. In addition, warm air flowing out from the indoor unit 2 is suppressed from being directed downwards to the indoor unit 2. Since the user is often present in the space below the indoor unit 2 indoors, the warm air generated to dry the indoor heat exchanger 22 is prevented from reaching the user.

(3) A control device 4 of an air conditioning system 1 according to a third aspect is the control device 4 of an air conditioning system 1 of (1) or (2), in which in the ozone exposure, the indoor heat exchanger 22 is exposed to the ozone while the indoor unit 2 is operated in a space cooling mode or in a dehumidification mode by the operation control unit 411.

Accordingly, during ozone exposure, the indoor unit 2 is operated in the space cooling mode or in the dehumidification mode, so that the moisture in the air around the indoor heat exchanger 22 is dew-condensed, and the dew condensation water is gener-

ated. Accordingly, it is possible to cause the water that has been sterilized by the ozone exposure to flow down from the indoor heat exchanger 22 and to drain the water during the ozone exposure. As a result, occurrence of a mold can be suppressed more effectively.

(4) A control device 4 of an air conditioning system 1 according to a fourth aspect is the control device 4 of an air conditioning system 1 of any one of (1) to (3), in which in the drying of the indoor heat exchanger 22, air is blown to the dried indoor heat exchanger 22 by a blower fan 23.

In this way, after the indoor heat exchanger 22 is dried, the moisture remaining on the surface of the indoor heat exchanger 22 can be even further reduced by blowing air via the blower fan 23.

(5) A control method S10 of an air conditioning system 1 according to a fifth aspect is the control method S10 of the air conditioning system 1 including an indoor unit 2 including an indoor heat exchanger 22 and an ozone generator 25, the control method S10 includes exposing the indoor heat exchanger 22 to ozone in a state where the indoor heat exchanger 22 is wet, and drying the indoor heat exchanger 22 exposed to the ozone and in a state of being wet by operating the indoor unit 2 in a space heating mode to heat the indoor heat exchanger 22 such that a temperature of the indoor heat exchanger 22 is maintained at a temperature equal to or higher than an internal temperature of the indoor unit and lower than 45°C.

In this manner, when the indoor heat exchanger 22 is dried, the indoor unit 2 is operated in the space heating mode. At this time, the indoor heat exchanger 22 is heated such that the temperature of the indoor heat exchanger 22 is maintained at a temperature equal to or higher than the internal temperature of the indoor unit 2 and lower than 45°C. Therefore, the amount of warm air flowing out indoors from the indoor heat exchanger 22 can be reduced, and the rise in indoor temperature can be suppressed. In addition, when the temperature is too high when the indoor heat exchanger 22 is dried, a temperature difference between the inner side and the outer side of the housing 20 of the indoor unit 2 increases, and dew condensation may occur on the surface of the housing 20. However, by maintaining the temperature of the indoor heat exchanger 22 at a temperature lower than 45°C, the occurrence of dew condensation on the surface of the housing 20 is suppressed. In this way, it is possible to inhibit the growth of mold while suppressing the influence on the indoor environment.

(6) A program according to a sixth aspect causes a computer of a control device 4 of an air conditioning system 1 including an indoor unit 2 including an indoor heat exchanger 22 and an ozone generator 25 to execute exposing the indoor heat exchanger 22

to ozone in a state where the indoor heat exchanger 22 is wet, and drying the indoor heat exchanger 22 exposed to the ozone and in a state of being wet by operating the indoor unit 2 in a space heating mode to heat the indoor heat exchanger 22 such that a temperature of the indoor heat exchanger 22 is maintained at a temperature equal to or higher than an internal temperature of the indoor unit and lower than 45°C.

In this manner, when the indoor heat exchanger 22 is dried, the indoor unit 2 is operated in the space heating mode. At this time, the indoor heat exchanger 22 is heated such that the temperature of the indoor heat exchanger 22 is maintained at a temperature equal to or higher than the internal temperature of the indoor unit 2 and lower than 45°C. Therefore, the amount of warm air flowing out indoors from the indoor heat exchanger 22 can be reduced, and the rise in indoor temperature can be suppressed. In addition, when the temperature is too high when the indoor heat exchanger 22 is dried, a temperature difference between the inner side and the outer side of the housing 20 of the indoor unit 2 increases, and dew condensation may occur on the surface of the housing 20. However, by maintaining the temperature of the indoor heat exchanger 22 at a temperature lower than 45°C, the occurrence of dew condensation on the surface of the housing 20 is suppressed. In this way, it is possible to inhibit the growth of mold while suppressing the influence on the indoor environment.

(7) An air conditioning system 1 according to a seventh aspect includes an indoor unit 2 including an indoor heat exchanger 22 and an ozone generator 25, and a control device 4 that controls an operation of the indoor unit 2, in which the control device 4 includes an ozone exposure control unit 412 that exposes the indoor heat exchanger 22 to ozone generated by the ozone generator 25, and an operation control unit 411 that controls an operating mode of the indoor unit 2, the indoor heat exchanger 22 is exposed to the ozone generated by the ozone generator 25 in a state where the indoor heat exchanger 22 is wet, and the indoor heat exchanger 22 exposed to the ozone and in a state of being wet is dried by operating the indoor unit 2 in a space heating mode via the operation control unit 411 to heat the indoor heat exchanger 22 such that a temperature of the indoor heat exchanger 22 is maintained at a temperature equal to or higher than an internal temperature of the indoor unit and lower than 45°C.

[0115] In this manner, the indoor heat exchanger 22 is exposed to ozone in a state where the indoor heat exchanger 22 is wet, so that the bacteria such as a mold adhering to the indoor heat exchanger 22 are reduced. Further, the indoor heat exchanger 22 exposed to the ozone and in a state of being wet is dried, so that the

amount of moisture remaining on the surface of the indoor heat exchanger 22 is reduced. Therefore, during the stop of the indoor unit 2, the reproduction of bacteria such as a mold is prevented. When the indoor heat exchanger 22 is dried, the indoor unit 2 is operated in the space heating mode. At this time, the indoor heat exchanger 22 is heated such that the temperature of the indoor heat exchanger 22 is maintained at a temperature equal to or higher than the internal temperature of the indoor unit 2 and lower than 45°C. Therefore, the amount of warm air flowing out indoors from the indoor heat exchanger 22 can be reduced, and the rise in indoor temperature can be suppressed. In addition, when the temperature is too high when the indoor heat exchanger 22 is dried, a temperature difference between the inner side and the outer side of the housing 20 of the indoor unit 2 increases, and dew condensation may occur on the surface of the housing 20. However, by maintaining the temperature of the indoor heat exchanger 22 at a temperature lower than 45°C, the occurrence of dew condensation on the surface of the housing 20 is suppressed. In this way, it is possible to inhibit the growth of mold while suppressing the influence on the indoor environment.

Industrial Applicability

[0116] According to a control device of an air conditioning system, a control method of an air conditioning system, a program, and an air conditioning system of the present disclosure, it is possible to inhibit a growth of mold while suppressing an influence on an indoor environment.

Reference Signs List

[0117]

- 1: air conditioning system
- 2: indoor unit
- 4: control device
- 20: housing
- 20f: front surface panel
- 20b: rear surface panel
- 20d: bottom surface panel
- 20t: top surface panel
- 20h: blowout port
- 21: main body
- 22: indoor heat exchanger
- 23: blower fan
- 24: flap
- 25: ozone generator
- 26: guide plate
- 41: CPU
- 42: memory
- 50: storage/reproduction device
- 51: IO I/F
- 52: communication I/F
- 411: operation control unit

412: ozone exposure control unit
 413: flap control unit
 W: blowout air
 S10: control method of air conditioning system 1
 S11: step of exposing indoor heat exchanger to ozone 5
 S12: step of drying indoor heat exchanger
 S13: step of blowing air via blower fan

Claims

1. A control device of an air conditioning system including an indoor unit including an indoor heat exchanger and an ozone generator, the control device comprising: 15
 an ozone exposure control unit that exposes the indoor heat exchanger to ozone generated by the ozone generator; and
 an operation control unit that controls an operating mode of the indoor unit, 20
 wherein the indoor heat exchanger is exposed to the ozone generated by the ozone generator in a state where the indoor heat exchanger is wet, 25
 and
 the indoor heat exchanger exposed to the ozone and in a state of being wet is dried by operating the indoor unit in a space heating mode via the operation control unit to heat the indoor heat exchanger such that a temperature of the indoor heat exchanger is maintained at a temperature equal to or higher than an internal temperature of the indoor unit and lower than 45°C. 30
2. The control device of an air conditioning system according to Claim 1, further comprising: 35
 a flap control unit that controls a flap that adjusts a direction of blowout air blown out from the indoor unit, 40
 wherein in a step of drying the indoor heat exchanger, the flap is controlled by the flap control unit such that the blowout air is directed to a front of the indoor unit. 45
3. The control device of an air conditioning system according to Claim 1 or 2, 50
 wherein in the ozone exposure, the indoor heat exchanger is exposed to the ozone while the indoor unit is operated in a space cooling mode or in a dehumidification mode by the operation control unit.
4. The control device of an air conditioning system according to Claim 1 or 2, 55
 wherein in the drying of the indoor heat exchanger, air is blown to the dried indoor heat exchanger by a blower fan.

5. A control method of an air conditioning system including an indoor unit including an indoor heat exchanger and an ozone generator, the control method comprising:

exposing the indoor heat exchanger to ozone in a state where the indoor heat exchanger is wet; and
 drying the indoor heat exchanger exposed to the ozone and in a state of being wet by operating the indoor unit in a space heating mode to heat the indoor heat exchanger such that a temperature of the indoor heat exchanger is maintained at a temperature equal to or higher than an internal temperature of the indoor unit and lower than 45°C.

6. A program causing a computer of a control device of an air conditioning system including an indoor unit including an indoor heat exchanger and an ozone generator to execute:

exposing the indoor heat exchanger to ozone in a state where the indoor heat exchanger is wet; and
 drying the indoor heat exchanger exposed to the ozone and in a state of being wet by operating the indoor unit in a space heating mode to heat the indoor heat exchanger such that a temperature of the indoor heat exchanger is maintained at a temperature equal to or higher than an internal temperature of the indoor unit and lower than 45°C.

7. An air conditioning system comprising:

an indoor unit including an indoor heat exchanger and an ozone generator; and
 a control device that controls an operation of the indoor unit,
 wherein the control device includes

an ozone exposure control unit that exposes the indoor heat exchanger to ozone generated by the ozone generator, and
 an operation control unit that controls an operating mode of the indoor unit,

the indoor heat exchanger is exposed to the ozone generated by the ozone generator in a state where the indoor heat exchanger is wet, and
 the indoor heat exchanger exposed to the ozone and in a state of being wet is dried by operating the indoor unit in a space heating mode via the operation control unit to heat the indoor heat exchanger such that a temperature of the indoor heat exchanger is maintained at a temperature

equal to or higher than an internal temperature
of the indoor unit and lower than 45°C.

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FIG. 1

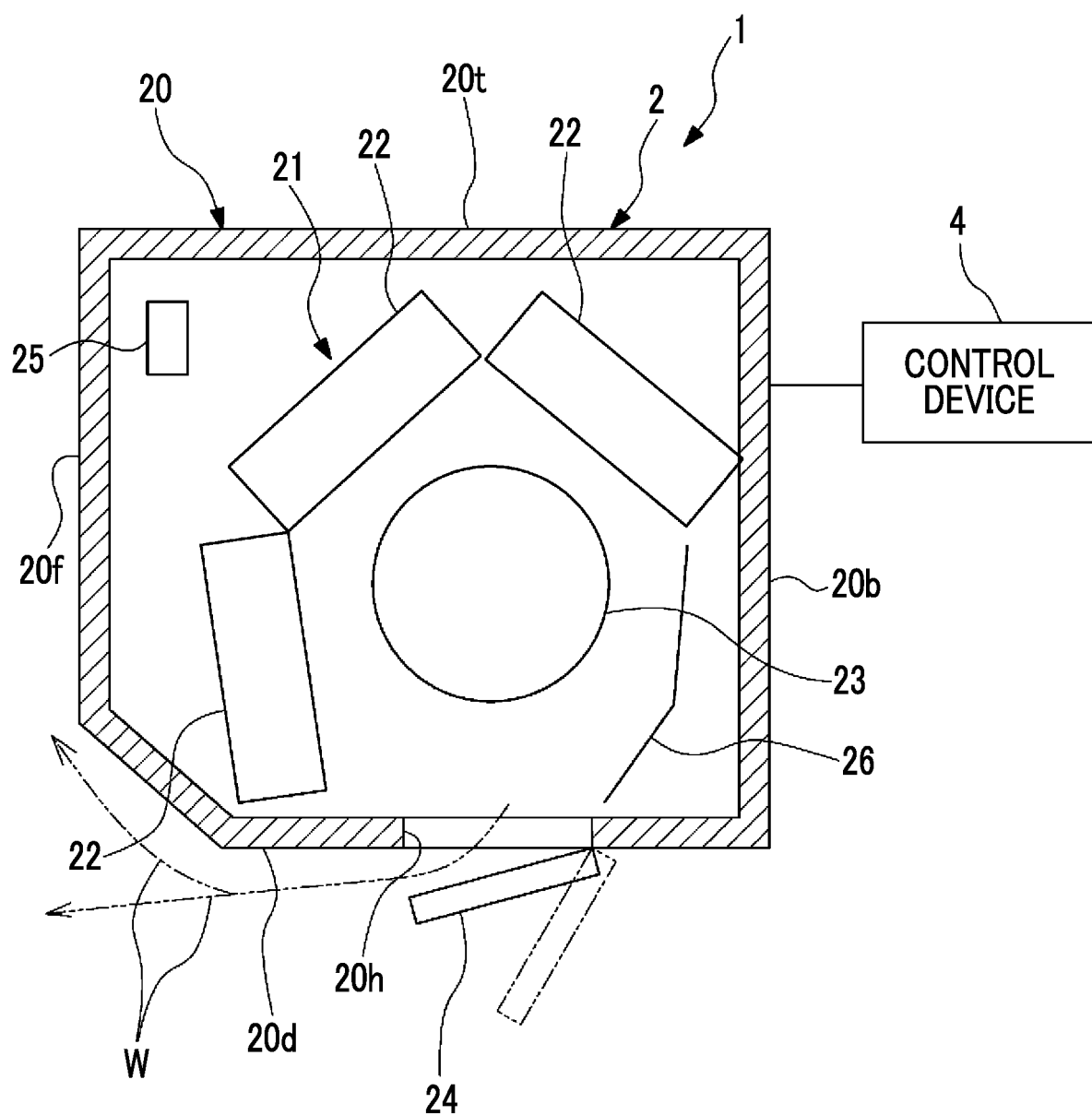


FIG. 2

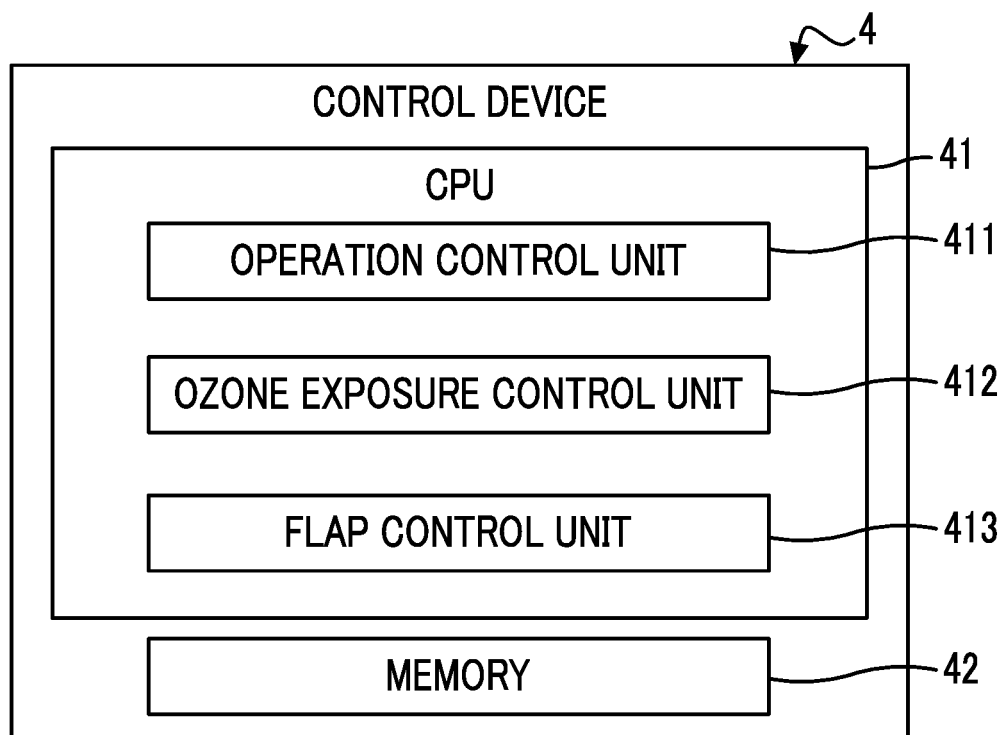


FIG. 3

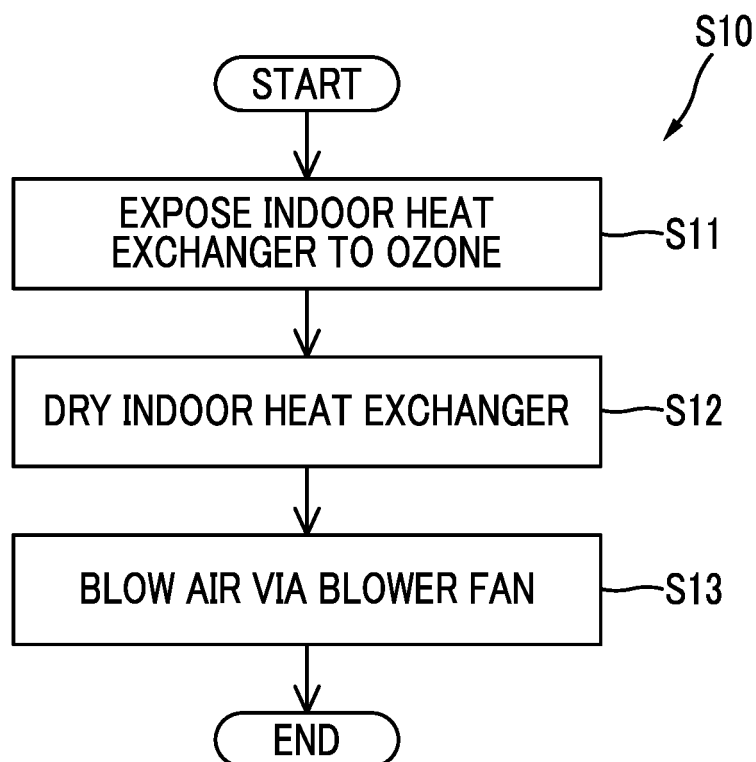


FIG. 4

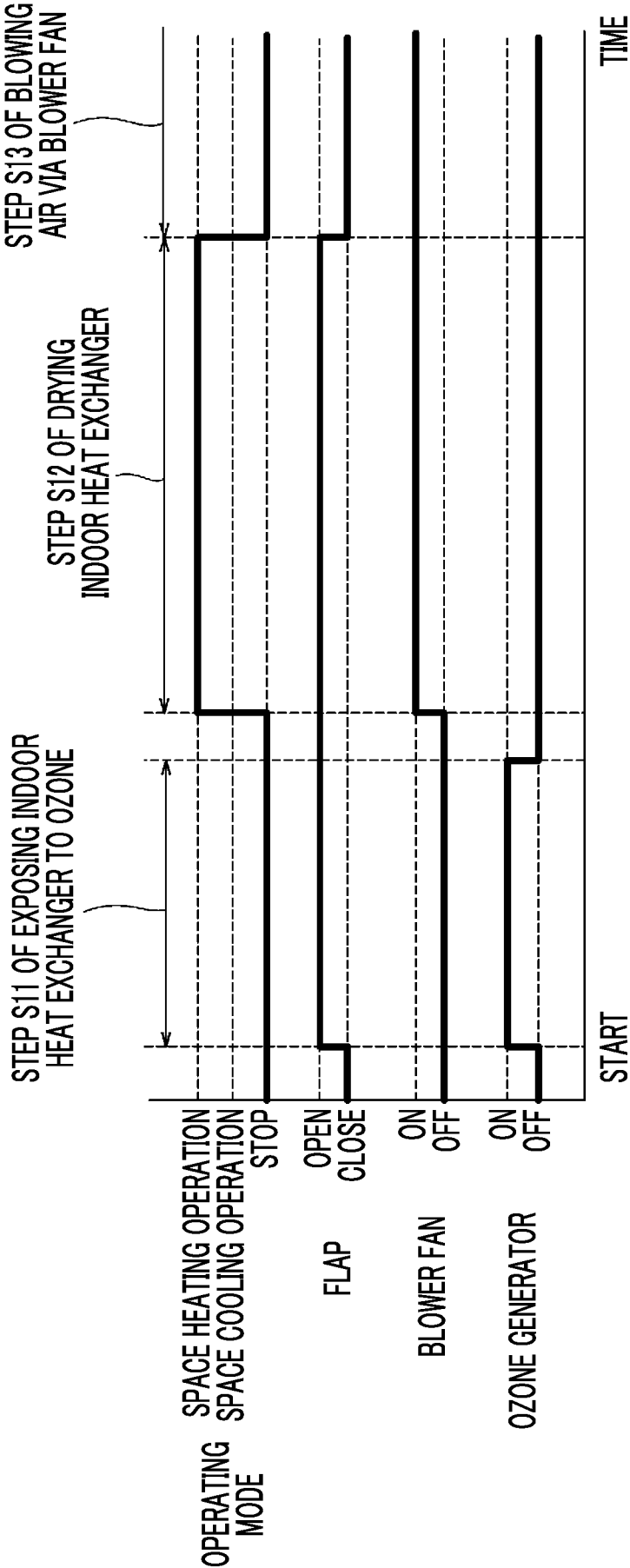


FIG. 5

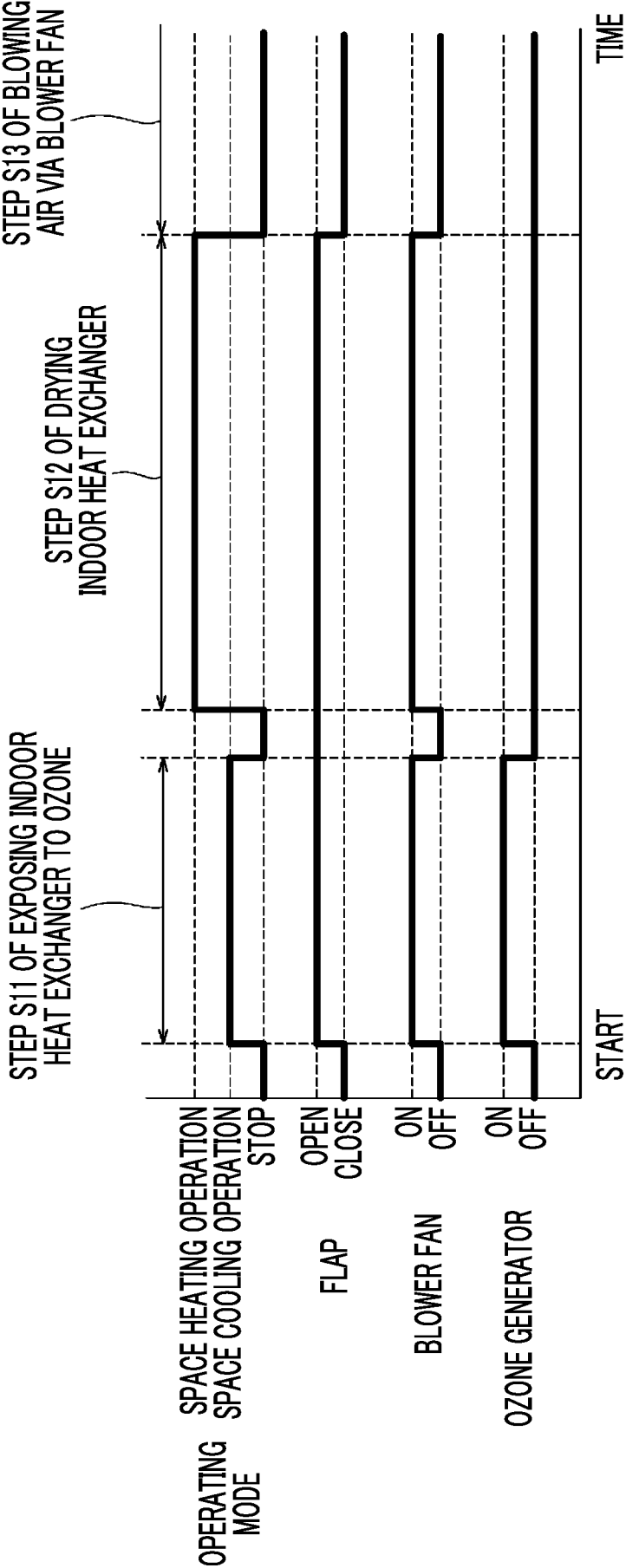
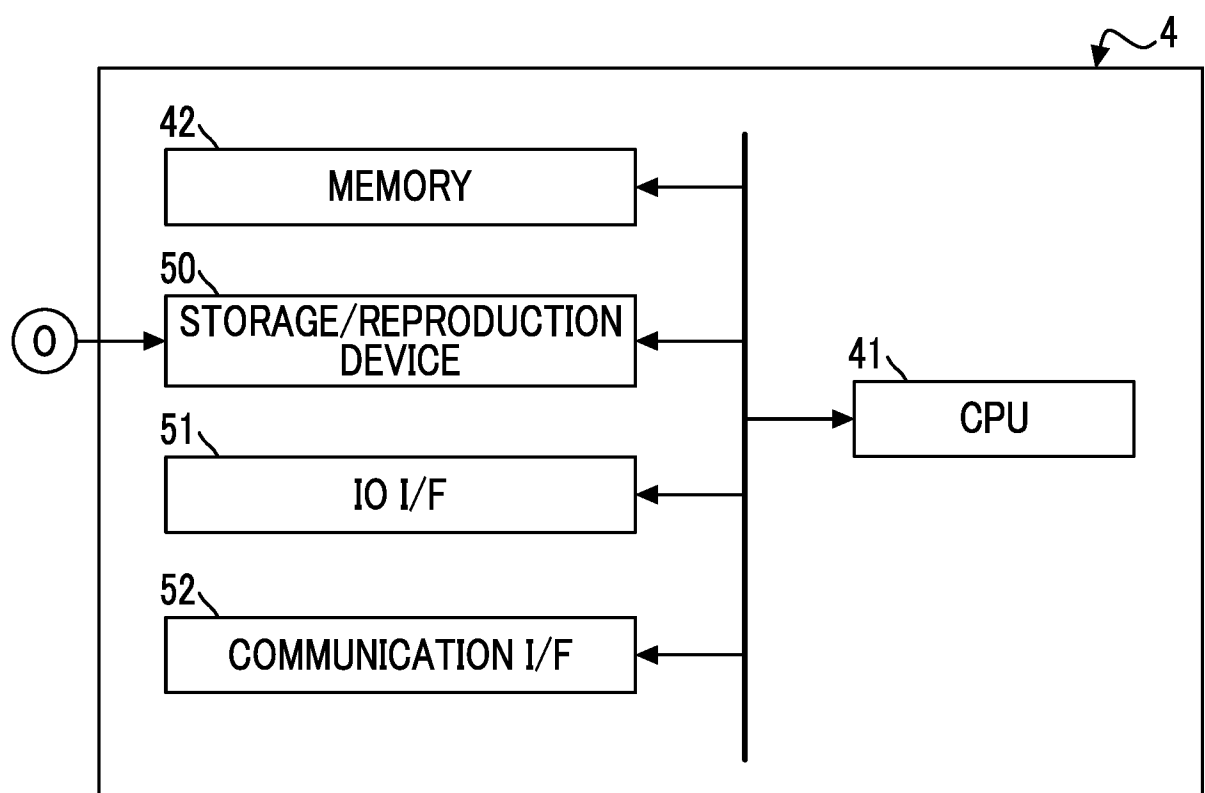


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2023/004356

A. CLASSIFICATION OF SUBJECT MATTER

F24F 11/48(2018.01)i; *F24F 8/26*(2021.01)i; *F24F 11/79*(2018.01)i; *F24F 11/83*(2018.01)i; *F24F 140/20*(2018.01)n
FI: F24F11/48; F24F8/26; F24F11/79; F24F11/83; F24F140/20

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)

F24F11/48; F24F8/26; F24F11/79; F24F11/83; F24F140/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2023
Registered utility model specifications of Japan 1996-2023
Published registered utility model applications of Japan 1994-2023

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.
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A	CN 106123226 A (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO., LTD.) 16 November 2016 (2016-11-16) entire text, all drawings	1-7

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

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"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

19 April 2023

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT Information on patent family members				International application No. PCT/JP2023/004356		
Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)		Publication date (day/month/year)
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				CN 101173804 A		
JP	2014-126303	A	07 July 2014	(Family: none)		
JP	2010-096470	A	30 April 2010	(Family: none)		
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				TW 202104807 A		
JP	2020-200966	A	17 December 2020	(Family: none)		
CN	106123226	A	16 November 2016	(Family: none)		

REFERENCES CITED IN THE DESCRIPTION

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