



(11)

EP 4 509 768 A1

(12)

EUROPEAN PATENT APPLICATION
published in accordance with Art. 153(4) EPC

(43) Date of publication:
19.02.2025 Bulletin 2025/08

(51) International Patent Classification (IPC):
F24F 11/49 ^(2018.01) **F24F 11/52** ^(2018.01)
F24F 11/58 ^(2018.01) **F24F 11/64** ^(2018.01)

(21) Application number: **23831642.6**

(52) Cooperative Patent Classification (CPC):
F24F 11/49; F24F 11/58; F24F 2110/52;
F24F 2110/64

(22) Date of filing: **30.06.2023**

(86) International application number:
PCT/JP2023/024485

(87) International publication number:
WO 2024/005203 (04.01.2024 Gazette 2024/01)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

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(30) Priority: **30.06.2022 JP 2022105880**

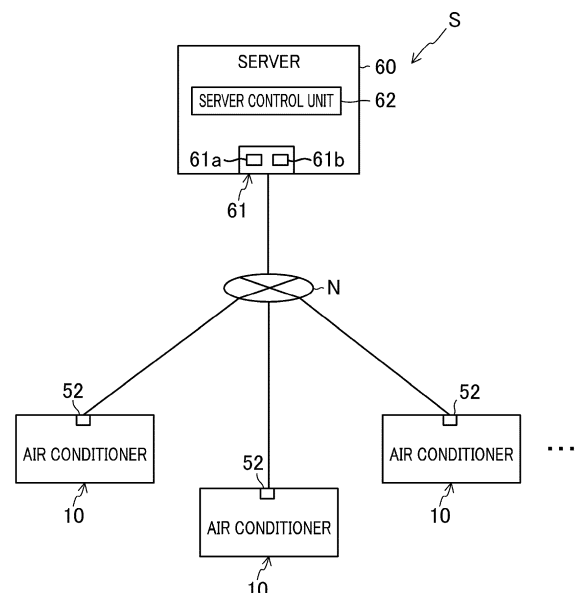
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(54) **SERVER DEVICE, METHOD FOR MANAGING AIR-CONDITIONING DEVICE, AND AIR CONDITIONING SYSTEM**

(57) A server (60) includes: a first receiver (61a) configured to receive first information including information on a user of an air conditioner (10), information on an installation worker of the air conditioner (10), or information on the air conditioner (10); and a first transmitter (61b) configured to transmit second information necessary for starting operation of the air conditioner (10) if it is determined that the operation of the air conditioner (10) is permitted based on the first information.

FIG.4



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Description

TECHNICAL FIELD

[0001] The present disclosure relates to a server, a method for managing an air conditioner, and an air conditioning system.

BACKGROUND ART

[0002] Patent Document 1 discloses an air conditioner in which, after the air conditioner is installed, check items for the installation can be input. If the installation is conducted properly based on the check items, operation of the air conditioner is permitted.

CITATION LIST

PATENT DOCUMENT

[0003] Patent Document 1: Japanese Unexamined Patent Publication No. 2016-191519

SUMMARY OF THE INVENTION

TECHNICAL PROBLEM

[0004] For the air conditioner disclosed in Patent Document 1, a controller is provided on site to operate the determination. The controller is sometimes unable to sufficiently manage the air conditioner because of limited resources for processing information.

[0005] An object of the present disclosure is to sufficiently manage the air conditioner.

SOLUTION TO THE PROBLEM

[0006] A first aspect is directed to a server including: a first receiver (61a) configured to receive first information including information on a user of an air conditioner (10), information on an installation worker of the air conditioner (10), or information on the air conditioner (10); and a first transmitter (61b) configured to transmit second information necessary for starting operation of the air conditioner (10) if it is determined that the operation of the air conditioner (10) is permitted based on the first information.

[0007] In the first aspect, the first receiver (61a) in the server (60) receives the first information. The first information includes information on a user of the air conditioner (10), information on an installation worker of the air conditioner (10), or information on the air conditioner (10). By receiving the first information, the server (60) can determine whether or not the operation of the air conditioner (10) is started based on the first information. This determination may be made automatically or may be made manually. Next, the first transmitter (61b) in the server (60) transmits the second information necessary for starting the operation of the air conditioner (10). The

operation of the air conditioner (10) can be started based on the second information. As can be seen from above, in the first aspect, the server (60) is used to determine whether the operation of the air conditioner (10) is started. Thus, the air conditioner (10) is managed sufficiently.

[0008] A second aspect is an embodiment of the first aspect. In the second aspect, the server (60) further includes: a control unit (62) configured to determine whether or not the operation of the air conditioner (10) is permitted based on the first information, wherein The first transmitter (61b) transmits the second information based on a result of the determination by the server control unit (62).

[0009] In the second aspect, the control unit (62) of the server determines whether or not the operation of the air conditioner (10) is permitted based on the first information. The control unit (62) of the server can process more sufficient information than a controller or the like on site, and thus the air conditioner (10) can be managed sufficiently.

[0010] A third aspect is an embodiment of the first or second aspect. In the third aspect, the first information includes information on the user.

[0011] In the third aspect, whether or not the operation of the air conditioner (10) is permitted can be determined based on the information on the user.

[0012] A fourth aspect is an embodiment of any one of the first to third aspects. In the fourth aspect, the first information includes information on an installation state of the air conditioner (10).

[0013] In the fourth aspect, whether or not the operation of the air conditioner (10) is permitted can be determined based on the information on the installation state of the air conditioner (10). Thus, for example, the operation of the air conditioner (10) can be prohibited in the event of installation failure.

[0014] A fifth aspect is an embodiment of any one of the first to fourth aspects. In the fifth aspect, the first information includes information on an installation site of the air conditioner (10).

[0015] In the fifth aspect, whether or not the operation of the air conditioner (10) is permitted can be determined in consideration of the risk inherent to each installation site of the air conditioner (10).

[0016] A sixth aspect is an embodiment of any one of the first to fifth aspects. In the sixth aspect, the first information includes image data of the air conditioner (10) in an installed state.

[0017] In the sixth aspect, the installation state or the installation site of the air conditioner (10) can be identified based on the image data of the air conditioner (10).

[0018] A seventh aspect is an embodiment of any one of the first to sixth aspects. In the seventh aspect, the first information includes information on test operation of the air conditioner (10).

[0019] In the seventh aspect, whether or not the main operation of the air conditioner (10) is permitted can be

determined based on a result of the test operation of the air conditioner (10).

[0020] An eighth aspect is an embodiment of any one of the first to seventh aspect. In the eighth aspect, the second information includes an operation constant necessary for operation of the air conditioner (10).

[0021] In the eighth aspect, the first transmitter (61b) transmits the operation constant necessary for the operation of the air conditioner (10) as the second information necessary for starting the operation of the air conditioner (10).

[0022] A ninth aspect is directed to an embodiment of any one of the first to eighth aspects. In the ninth aspect, the first receiver (61a) receives the first information transmitted from the air conditioner (10) or a terminal device (70) capable of communicating with the air conditioner (10).

[0023] In the ninth aspect, the air conditioner (10) or the terminal device (70) transmits the first information. The first receiver (61a) receives the first information.

[0024] A tenth aspect is directed to an embodiment of any one of the first to ninth aspects. In the tenth aspect, the first transmitter (61b) transmits the second information to the air conditioner (10) or the terminal device (70) capable of communicating with the air conditioner (10).

[0025] In the tenth aspect, the first transmitter (61b) transmits the second information to the air conditioner (10) or the terminal device (70).

[0026] An eleventh aspect is an embodiment of any one of the first to tenth aspects. In the eleventh aspect, the first information includes contract information on a contract for use of the air conditioner (10).

[0027] In the eleventh aspect, whether or not the operation of the air conditioner (10) is permitted can be determined based on the contract information on the air conditioner (10).

[0028] A twelfth aspect is an embodiment of the eleventh aspect. In the twelfth aspect, the contract information includes agreement information on an agreement with the user or installation worker about the contract.

[0029] In the twelfth aspect, whether or not the operation of the air conditioner (10) is permitted can be determined based on the agreement information on an agreement with the user or installation worker about the contract.

[0030] A thirteenth aspect is directed to an embodiment of the twelfth aspect. In the thirteenth aspect, the agreement information is agreement information on an agreement with the user or installation worker about the contract for installation of the air conditioner (10).

[0031] In the thirteenth aspect, whether or not the operation of the air conditioner (10) is permitted can be determined based on the agreement information about the contract for the installation.

[0032] A fourteenth aspect is directed to a method for managing an air conditioner, the method including: receiving first information including information on a user of the air conditioner (10), information on an installation

worker of the air conditioner (10), or information on the air conditioner (10) via a network (N); and transmitting second information necessary for starting operation of the air conditioner (10) to the air conditioner (10) as a target via the network (N) if it is determined that the operation of the air conditioner (10) is permitted based on the first information.

[0033] A fifteenth aspect is directed to an air-conditioning system including: an air conditioner (10) or a terminal device (70) capable of communicating with the air conditioner (10); and a server (60), wherein the server (60) includes: a first receiver (61a) configured to receive first information including information on a user of the air conditioner (10), information on an installation worker of the air conditioner (10), or information on the air conditioner (10); and a first transmitter (61b) configured to transmit second information necessary for starting operation of the air conditioner (10) if it is determined that the operation of the air conditioner (10) is permitted based on the first information, the air conditioner (10) or the terminal device (70) includes: a second transmitter (52a) configured to transmit the first information to the server (60); and a second receiver (52b) configured to receive the second information transmitted from the server (60).

[0034] A sixteenth aspect is directed to an embodiment of the fifteenth aspect. In the sixteenth aspect, the air-conditioning system further includes: a detector (53) configured to detect that an installation position of the air conditioner (10) has been changed; an air conditioning control unit (50) configured to prohibit the operation of the air conditioner (10) if the detector (53) detects that the installation position of the air conditioner (10) has been changed; and a notification unit (41) configured to propose checking the installation position of the air conditioner (10) if the detector (53) detects that the installation position of the air conditioner (10) has been changed.

[0035] In the sixteen the aspect, if the detector (53) detects that the installation position of the air conditioner (10) has been changed, the air conditioning control unit (50) prohibits the operation of the air conditioner (10), and the notification unit (41) proposes checking the installation position of the air conditioner (10).

[0036] A seventeenth aspect is directed to an embodiment of the fifteenth or sixteenth aspect. In the seventeenth aspect, a two-dimensional code including address information on address of the server (60) is put on the air conditioner (10), and the terminal device (70) is capable of communicating with the server (60) by reading the two-dimensional code.

[0037] In the seventeenth aspect, the terminal device (70) reads the two-dimensional code put on the air conditioner (10), such that the terminal device (70) can easily communicate with the server (60).

BRIEF DESCRIPTION OF THE DRAWINGS

[0038]

FIG. 1 is a schematic piping system diagram of an air conditioner according to an embodiment.

FIG. 2 is a schematic perspective view of the air conditioner.

FIG. 3 is a block diagram of the air conditioner.

FIG. 4 is a schematic diagram of a general configuration of an air-conditioning system.

FIG. 5 is a flowchart of a method for managing the air conditioner in an installed state.

FIG. 6 is a schematic diagram of a general configuration of an air-conditioning system of a second variation.

FIG. 7 is a schematic perspective view of an indoor unit of the second variation.

FIG. 8 is a block diagram of an air conditioner of the third variation.

DESCRIPTION OF EMBODIMENTS

[0039] Embodiments of the present disclosure will be described in detail below with reference to the drawings. The present disclosure is not limited to the embodiments shown below, and various changes can be made within the scope without departing from the technical concept of the present disclosure. Each of the drawings is intended to illustrate the present disclosure conceptually, and dimensions, ratios, or numbers may be exaggerated or simplified as necessary for the sake of ease of understanding.

<<Embodiments>>

[0040] The air-conditioning system (S) of this embodiment includes air conditioners (10) and a server (60). The air conditioners (10) are installed in, for example, an ordinary house. The server (60) is connected to the air conditioners (10) via a network (N). The server (60) is used to determine whether or not operation of the air conditioners (10) is permitted when the air conditioners (10) are installed on sites.

(1) General Configuration of Air Conditioner

[0041] FIG. 1 is a schematic piping system diagram illustrating the air conditioner (10). FIG. 2 is a schematic perspective view of the air conditioner (10).

[0042] The air conditioner (10) controls the temperature of air in a target space. The target space is an indoor space (I). The air conditioner (10) performs a cooling operation and a heating operation. In the cooling operation, the air conditioner (10) cools the air in the indoor space (I). In the heating operation, the air conditioner (10) heats the air in the indoor space (I).

[0043] The air conditioner (10) includes a refrigerant circuit (11). The refrigerant circuit (11) is filled with a refrigerant. The refrigerant circuit (11) circulates the refrigerant therethrough to perform a refrigeration cycle.

[0044] The air conditioner (10) includes an outdoor unit

(20), an indoor unit (30), a first connection pipe (12), and a second connection pipe (13). The air conditioner (10) is a pair-type air conditioner including one outdoor unit (20) and one indoor unit (30). The first connection pipe (12) is a gas connection pipe, and a second connection pipe (13) is a liquid connection pipe.

[0045] The outdoor unit (20) is installed outdoors. The outdoor unit (20) includes an outdoor casing (20a) and an outdoor element housed in the outdoor casing (20a). The outdoor element includes a compressor (21), an outdoor heat exchanger (22), an expansion valve (23), a four-way switching valve (24), and an outdoor fan (25).

[0046] The compressor (21) is, for example, a rotary compressor of an oscillating piston type, a rotary type, or a scroll type. The outdoor heat exchanger (22) is a fin-and-tube heat exchanger. The four-way switching valve (24) switches between a first state (the state indicated by the solid curves in FIG. 1) and a second state (the state indicated by the broken curves in FIG. 1). The four-way switching valve (24) in the first state makes a discharge portion of the compressor (21) and a gas end of the outdoor heat exchanger (22) communicate with each other, and makes a suction portion of the compressor (21) and the first connection pipe (12) communicate with each other. The four-way switching valve (24) in the second state makes the discharge portion of the compressor (21) and the first connection pipe (12) communicate with each other, and makes the suction portion of the compressor (21) and the gas end of the outdoor heat exchanger (22) communicate with each other. The outdoor fan (25) is a propeller fan.

[0047] The indoor unit (30) includes an indoor casing (30a) and an indoor element housed in the indoor casing (30a). The indoor element includes an indoor heat exchanger (31) and an indoor fan (32). The indoor heat exchanger (31) is a fin-and-tube heat exchanger. The indoor fan (32) is a cross-flow fan.

(1-1) Refrigerant

[0048] A refrigerant in the refrigerant circuit (11) is a flammable refrigerant. The refrigerant in this example is propane (R290), which is a highly flammable natural refrigerant. The natural refrigerant is a refrigerant having an ozone depletion potential of zero, having a low global warming potential, and having a small impact on the environment. The flammable refrigerant may be, for example, ammonia (R717), which is a natural refrigerant. The flammable refrigerant may also be methane (R50), ethane (R170), butane (R600), or isobutane (R600a), which is a highly flammable natural refrigerant. The refrigerant may be difluoromethane (R32), 2,3,3,3-tetrafluoropropene (HFO-1234yf), or 1,3,3,3-tetrafluoropropene (HFO-1234ze). The refrigerant may be a single component refrigerant or a refrigerant mixture mixed with another refrigerant.

(1-2) Refrigerant Leakage Sensor

[0049] The air conditioner (10) includes a refrigerant leakage sensor (35). The refrigerant leakage sensor (35) is a sensor for detecting leakage of the refrigerant. The refrigerant leakage sensor (35) is activated by electric power being supplied from the outside to the air conditioner (10). The refrigerant leakage sensor (35) is disposed inside the indoor casing (30a) of the indoor unit (30). The refrigerant leakage sensor (35) may be disposed in the indoor space (I). If the condition that the concentration of the refrigerant around the refrigerant leakage sensor (35) exceeds a predetermined value is satisfied, the refrigerant leakage sensor (35) outputs a signal indicating that the refrigerant has leaked. The refrigerant leakage sensor (35) may include an alarm device configured to give an alarm if the condition is satisfied.

(1-3) Air Conditioning Control Unit

[0050] As illustrated in FIG. 3, the air conditioning control unit (50) includes an indoor controller (IC), an outdoor controller (OC), and a remote controller (RC). The air conditioning control unit (50) controls the air conditioner (10).

[0051] The outdoor controller (OC) is provided for the outdoor unit (20). The outdoor controller (OC) is disposed inside the outdoor casing (20a). The outdoor controller (OC) controls the compressor (21), the expansion valve (23), the four-way switching valve (24), and the outdoor fan (25). Strictly speaking, the outdoor controller (OC) controls start and stop of the compressor (21), the number of revolutions of the compressor (21), the opening degree of the expansion valve (23), the state of the four-way switching valve (24), start and stop of the outdoor fan (25), and the number of revolutions of the outdoor fan (25).

[0052] The indoor controller (IC) is provided for the indoor unit (30). The indoor controller (IC) is disposed inside the indoor casing (30a). The indoor controller (IC) controls the indoor fan (32). Specifically, the indoor controller (IC) controls start and stop of the indoor fan (32) and the number of revolutions of the indoor fan (32). The indoor controller (IC) receives a signal output from the refrigerant leakage sensor (35).

[0053] The indoor controller (IC) and the outdoor controller (OC) are connected to each other by a first transmission line (W1) which is wired or wireless. The indoor controller (IC) and the outdoor controller (OC) are configured to be able to exchange signals with each other.

[0054] The indoor controller (IC) includes a storage (51). The storage (51) is configured as a nonvolatile memory such as an electrically erasable programmable read-only memory (EEPROM). The storage (51) stores an operation constant which is an operation parameter for operating the air conditioner (10). When the air conditioner (10) of this example is shipped, the storage (51)

does not store the operation constant. Thus, the air conditioner (10) cannot be operated until the operation constant is stored in the air conditioner (10). As will be described in detail later, the server (60) transmits the operation constant to the air conditioner (10).

[0055] The remote controller (RC) is installed in the indoor space (I). The remote controller (RC) is a unit for a user or the like to switch the operation of the air conditioner (10). The remote controller (RC) and the indoor controller (IC) are connected to each other by a second transmission line (W2) which is wireless or wired. The remote controller (RC) and the indoor controller (IC) are configured to be able to exchange signals with each other.

[0056] The remote controller (RC) includes a display (41) and an operation unit (42). The display (41) is an example of a notification unit of the present disclosure. The display (41) is a display such as a liquid crystal display. The operation unit (42) includes a button and the like operated by a user. A touch panel may be used as both the display (41) and the operation unit (42).

[0057] The remote controller (RC) outputs an operation command to the indoor controller (IC) in response to the operation of the operation unit (42). The operation command includes a command for switching start and stop of the air conditioner (10), a command for switching the operating mode (the cooling operation or the heating operation) of the air conditioner (10), and a command for switching a target temperature (set temperature) of the indoor space (I).

[0058] The indoor controller (IC), the outdoor controller (OC), and the remote controller (RC) each include a micro control unit (MCU), an electric circuit, and an electronic circuit. The MCU includes a central processing unit (CPU), a memory, and a communication interface. The memory stores various programs to be executed by the CPU.

[0059] The air conditioning control unit (50) includes a first communication interface (52) for connecting with a network (N). The first communication interface (52) is provided on, for example, an indoor controller (IC). The first communication interface (52) is connected to the network (N) in a wireless or wired manner. The first communication interface (52) of this example includes a second transmitter (52a) and a second receiver (52b) as functional elements. The second transmitter (52a) transmits the first information to the server (60). The second receiver (52b) receives the second information from the server (60).

(2) Operation

[0060] The air conditioner (10) performs a cooling operation and a heating operation.

[0061] In the cooling operation, the four-way switching valve (24) is switched to the first state. The refrigerant compressed in the compressor (21) dissipates heat in the outdoor heat exchanger (22) and is decompressed in the

expansion valve (23). The refrigerant that has been decompressed evaporates in the indoor heat exchanger (31). The air cooled in the indoor heat exchanger (31) is supplied to the indoor space (I). The refrigerant that has evaporated in the indoor heat exchanger (31) is sucked into the compressor (21).

[0062] In the heating operation, the four-way switching valve (24) is switched to the second state. In the heating operation, the refrigerant compressed in the compressor (21) dissipates heat in the indoor heat exchanger (31), and then is decompressed in the expansion valve (23). The air heated in the indoor heat exchanger (31) is supplied to the indoor space (I). The refrigerant that has been decompressed evaporates in the outdoor heat exchanger (22), and then is sucked into the compressor (21).

(3) Overview of Server

[0063] The server (60) is connected to the network (N). The server (60) is connected via the network (N) to the air conditioner (10) installed on site. In the air-conditioning system (S), the server (60) and multiple air conditioners (10) are communicably connected to each other via the network (N). For example, the manufacturer or the like of the air conditioner (10) manages the server (60).

[0064] As illustrated in FIG. 4, the server (60) includes a second communication interface (61) and a server control unit (62). The second communication interface (61) includes a first receiver (61a) and a first transmitter (61b) as functional elements. The first receiver (61a) receives the first information. The server control unit (62) is an example of a control unit of the present disclosure. The server control unit (62) determines whether the operation of the air conditioner (10) is permitted based on the first information received. The first transmitter (61b) transmits the second information based on a result of the determination by the server control unit (62).

(3-1) First Information

[0065] The first information is information on the site where the air conditioner (10) is installed. The first information includes at least one of information on the user, information on the installation worker, or information on the air conditioner (10).

[0066] The information on the user includes at least one of the name of the user, the address of the user, or the contact address of the user.

[0067] The information on the installation worker includes at least one of the name of the installation worker, the address of the installation worker, or the contact address of the installation worker.

[0068] The information on the air conditioner (10) includes at least one of information on the installation state of the air conditioner (10), information on the installation site of the air conditioner (10), image data of the air conditioner (10) in the installed state, or information on

the test operation of the air conditioner (10).

[0069] The information on the installation state of the air conditioner (10) include items to be checked when the air conditioner (10) is installed. Specifically, the information includes the fastening state of bolts, nuts, and the like, the connection state in brazing and the like of refrigerant pipes, the attachment state of heat insulators, pipe covers, and the like, the attachment state of drain hose, and the connection state of electric wires.

[0070] The information on the installation state may include information on a room temperature of a space where the air conditioner (10) is installed, an outdoor air temperature, an ambient environment of the outdoor unit (20), and the like.

[0071] The information on the installation site of the air conditioner (10) includes the address of the installation site of the air conditioner (10) and the specific installation position of the air conditioner (10) in a house or building. The information on the specific installation position includes information on which floor the air conditioner (10) is installed on, which room the air conditioner (10) is installed in, and the installation height of the air conditioner (10). If the air conditioner (10) is installed in, for example, a basement or a semi-basement, the risk caused by the refrigerant leakage increases. This is because the refrigerant is likely to accumulate in a space such as a basement or a semi-basement. Thus, the information on the installation site of the air conditioner (10) is useful for evaluating the risk associated with the operation of the air conditioner (10).

[0072] The image data of the air conditioner (10) in the installed state is acquired by a camera device. The camera device may be mounted on or may be separate from the air conditioner (10). The image data is useful to visually identify the installation state and the installation site of the air conditioner (10).

[0073] The information on the test operation of the air conditioner (10) is acquired when the installation worker conducts a test operation of the air conditioner (10). The information on the test operation of the air conditioner (10) includes at least one of the number of revolutions of the compressor (21), the temperature of the refrigerant flowing through the outdoor heat exchanger (22) and the indoor heat exchanger (31), or the temperatures of refrigerants on the discharge side and the suction side of the compressor (21) during the operation of the air conditioner (10). These pieces of information are useful for evaluating whether or not the refrigeration cycle is appropriately performed in the air conditioner (10). Whether or not a refrigeration cycle is appropriately performed may be evaluated by comparing a Mollier diagram obtained based on parameters acquired during the test operation and a Mollier diagram employed in design.

[0074] The first information includes contract information on a contract for use of the air conditioner (10). The contract information includes agreement information on an agreement with a user or installation worker about the contract. The agreement information is agreement infor-

mation on an agreement with the user or installation worker about the contract for installation of the air conditioner (10).

The user or installation worker needs to abide by the contract for the use of the air conditioner (10) in view of ensuring safety in use of the air conditioner (10). This contract is a contract between the user or installation worker and the manufacturer or distributor of the air conditioner (10). The user or installation worker can check the contract by a contract document, a predetermined terminal device, or the display (41) of the remote controller (RC). Examples of the terminal device include a smartphone, a tablet terminal, and a personal computer. The contract for the use provides, for example, that the air conditioner (10) shall be installed by a designated installation worker and that the air conditioner (10) shall be installed in a designated installation site satisfying predetermined safety standards.

[0075] If the user or installation worker agrees with these contracts, he/she can input a signature for declaring the agreement by using a remote controller (RC), a terminal device, or the like. In this case, the signature of the user or installation worker corresponds to the agreement information. The agreement information does not have to be a signature, and may be any information input via a terminal device or a remote controller (RC) when the user agrees the contract. If the user or installation worker violates the contract, he/she will not be entitled to the warranty of the manufacturer or distributor of the air conditioner (10).

[0076] The first information is input to the air conditioning control unit (50) by, for example, the user or installation worker operating the remote controller (RC). The first information may be input to the terminal device by the user or installation worker. In this case, the first information input to the terminal device is transmitted to the air conditioning control unit (50) in a wireless or wired manner.

(3-2) Second Information

[0077] The second information is information transmitted from the server (60) to the air conditioner (10). The second information is transmitted from the server (60) to the air conditioner (10) if the server (60) determines that the operation of the air conditioner (10) is permitted.

[0078] The second information of this example includes the operation constant of the air conditioner (10). The operation constant transmitted to the air conditioner (10) is stored in the storage (51) of the air conditioning control unit (50). Accordingly, the operation of the air conditioner (10) is permitted thereafter. The second information may not be the operation constant, and may be, for example, a signal for establishing a flag that permits operation of the air conditioner (10).

(4) Management Method and Control

[0079] A method for managing the air conditioner (10) at the time of installation and control of the air-conditioning system will be described in detail below.

[0080] As illustrated in FIG. 5, if the installation of the air conditioner (10) is completed in Step S11, a user or the like uses a remote controller (RC) or a terminal device to input first information in Step S12. The first information may be input by text or may be selected from a check box or a pull-down menu. If the first information is input to the air conditioning control unit (50), the air conditioner (10) transmits the first information to the server (60) in Step S13. Specifically, the second transmitter (52a) transmits the first information to the first receiver (61a) of the server (60) via the network (N). The first information is associated with identification information on identification of the air conditioner (10) as a sender. Thus, the server (60) can identify which air conditioner (10) the received first information corresponds to.

[0081] If the first receiver (61a) of the server (60) receives the first information in Step S14, the server control unit (62) in Step S15 determines, based on the first information, whether or not a first condition for determining whether or not the operation of the air conditioner (10) is permitted is satisfied.

[0082] The first condition includes at least one of the following conditions (a) to (f).

(a) The first information includes information on the user.
(b) The first information includes information on the installation worker. (c) The installation state of the air conditioner (10) satisfies a predetermined condition. (d) The installation site of the air conditioner (10) satisfies a predetermined condition. (e) A result of the test operation of the air conditioner (10) was satisfactory. (f) The user or installation worker has agreed a contract for the use of the air conditioner (10).

[0083] If the first information does not include information on the user, there is a possibility that the air conditioner (10) is not used by the authorized user. Thus, in this case, the condition (a) is not satisfied, and the operation of the air conditioner (10) is not permitted.

[0084] If the first information does not include information on the installation worker, there is a possibility that the air conditioner (10) has not been installed by the predetermined installation worker. Thus, in this case, the condition (b) is not satisfied, and the operation of the air conditioner (10) is not permitted.

[0085] If the installation state of the air conditioner (10) does not satisfy a predetermined condition, the risk associated with the operation of the air conditioner (10) increases. Thus, in this case, the condition (c) is not satisfied, and the operation of the air conditioner (10) is not permitted. The predetermined condition herein is, for example, that a connection state of refrigerant pipes, water pipes, and electric wires is satisfactory.

[0086] If the installation site of the air conditioner (10) does not satisfy a predetermined condition because, for

example, the air conditioner (10) is installed in a basement or a semi-basement, the risk associated with the operation of the air conditioner (10) increases. Thus, in this case, the condition (d) is not satisfied, and the operation of the air conditioner (10) is not permitted.

[0087] If some failures occur as a result of the test operation of the air conditioner (10), the risk associated with a subsequent main operation of the air conditioner (10) increases. Thus, in this case, the condition (e) is not satisfied, and the operation of the air conditioner (10) is not permitted.

[0088] If the agreement information (e.g., signature) on an agreement with the user or installation worker about the contract regarding the air conditioner (10) has not been obtained, the user or installation worker does not comply with the rules about the use of the air conditioner (10). Thus, the risk associated with the operation of the air conditioner (10) increases. Thus, in this case, the condition (f) is not satisfied, and the operation of the air conditioner (10) is not permitted.

[0089] If the first information includes image data of the air conditioner (10) in the installed state, the server control unit (62) determines, based on the image data, whether or not the operation of the air conditioner (10) is permitted. In this case, the server control unit (62) analyzes the image data, thereby identifying the installation state or the installation site of the air conditioner (10) to determine the condition (c) or (d).

[0090] If it is determined in Step S16 that the first condition is not satisfied, the process proceeds to Step S17. In Step S17, the server (60) transmits the second information. Specifically, the first transmitter (61b) transmits the second information to the second receiver (52b) via the network (N). The first transmitter (61b) identifies which air conditioner (10) the second information is to be transmitted to, based on the identification information on identification of the air conditioner (10) associated with the first information.

[0091] If the air conditioner (10) receives the second information in Step S18, the operation of the air conditioner (10) is permitted in Step S19. Specifically, if the operation constant included in the second information is input to the air conditioning control unit (50), this operation constant is stored in the storage (51). As a result, the operation of the air conditioner (10) based on the operation constant is permitted thereafter.

[0092] If it is determined in Step S16 that the first condition is not satisfied, the process proceeds to Step S20. In Step S20, the server (60) transmits third information. Specifically, the first transmitter (61b) transmits the third information to the air conditioning control unit (50) via the network (N). The third information is a signal indicating that the operation of the air conditioner (10) is not permitted. If the third information is input to the air conditioner (10), the operation of the air conditioner (10) remains prohibited. In this case, for example, in Step S22, the display (41) as the notification unit indicates that the air conditioner (10) cannot be operated. If the first con-

dition is not satisfied, the server (60) may notify the user's or installation worker's terminal device that the air conditioner (10) cannot be operated.

5 (5) Features

[0093] (5-1)

The server (60) of this embodiment includes: a first receiver (61a) configured to receive first information including information on a user of an air conditioner (10), information on an installation worker of the air conditioner (10), or information on the air conditioner (10); and a first transmitter (61b) configured to transmit second information necessary for starting operation of the air conditioner (10) if it is determined that operation of the air conditioner (10) is permitted based on the first information.

[0094] The air-conditioning system (S) of this embodiment includes an air conditioner (10) and a server (60). The server (60) includes: a first receiver (61a) configured to receive first information including information on a user of an air conditioner (10), information on an installation worker of the air conditioner (10), or information on the air conditioner (10); and a first transmitter (61b) configured to transmit second information necessary for starting operation of the air conditioner (10) if it is determined that operation of the air conditioner (10) is permitted based on the first information. The air conditioner (10) includes a second transmitter (52a) configured to transmit the first information to the server (60), and a second receiver (52b) configured to receive the second information transmitted from the server (60).

[0095] As can be seen from above, with the configuration in which the first information from the air conditioner (10) is transmitted to the server (60), whether or not the operation of the air conditioner (10) is permitted can be easily determined by the server (60). The server (60) can provide sufficient resources for information processing, and thus, the air conditioner (10) can be managed sufficiently. The server (60) can easily aggregate pieces of first information of the multiple air conditioners (10) without being on site.

[0096] (5-2)

The server (60) or the air-conditioning system (S) of this embodiment includes a server control unit (62) configured to determine whether or not the operation of the air conditioner (10) is permitted based on the first information. The first transmitter (61b) transmits the second information based on a result of the determination by the server control unit (62).

[0097] Accordingly, whether or not the operation of the air conditioner (10) is permitted can be automatically determined based on the first information.

[0098] (5-3)

Since the first information includes information on the user, whether or not the operation of the air conditioner (10) is permitted can be determined based on the information on the user. Thus, if the authorized user is not using the air conditioner (10), the operation of the air

conditioner (10) can be prohibited.

[0099] Since the first information includes information on the installation state of the air conditioner (10), whether or not the operation of the air conditioner (10) is permitted can be determined based on the installation state of the air conditioner (10). Thus, if the air conditioner (10) was not installed by the authorized installation worker, or of the air conditioner (10) was installed by the user alone, the operation of the air conditioner (10) can be prohibited.

[0100] The first information includes information on the installation site of the air conditioner (10). Thus, for example, if the air conditioner (10) is installed in a basement or semi-basement such that the risk caused by the refrigerant leakage is high, the operation of the air conditioner (10) can be prohibited.

[0101] In particular, in this embodiment, a flammable refrigerant (e.g., propane) is used as the refrigerant. Thus, the risk caused by the refrigerant leakage becomes high. However, in this embodiment, the operation of the air conditioner (10) can be prohibited if the air conditioner (10) is installed at a site with a high risk of refrigerant leakage. This improves reliability of the air conditioner (10).

[0102] The first information includes image data of the air conditioner (10) in an installed state. Thus, the installation state and the installation site of the air conditioner (10) can be identified based on the image data, and whether or not the operation of the air conditioner (10) is permitted can be determined based on the result of the identification.

[0103] The first information includes information on the test operation of the air conditioner (10). Thus, if the result of the test operation is not satisfactory, the main operation of the air conditioner (10) can be prohibited.

[0104] (5-4)

Since the first information includes contract information on a contract for the use of the air conditioner (10), whether or not the operation of the air conditioner (10) is permitted can be determined based on the contract information.

[0105] Specifically, the contract information includes agreement information on an agreement with the user or installation worker about the contract. Thus, if the agreement by the signature or the like cannot be obtained, the operation of the air conditioner (10) can be prohibited.

[0106] Further, the agreement information is agreement information on an agreement with the user or installation worker about the contract for installation of the air conditioner (10). Thus, if the rules about the installation of the air conditioner (10) are not sufficiently observed, the operation of the air conditioner (10) can be prohibited.

[0107] (5-5)

The second information includes an operation constant necessary for operation of the air conditioner (10). This can reliably prevent the air conditioner (10) from being erroneously operated before the operation of the air

conditioner (10) is permitted.

(6) Variations

[0108] The above embodiment may be implemented as the following variations. In the following description, differences from the embodiment will be described in principle.

10 (6-1) First Variation: Determination of Whether or Not Operation is Permitted

[0109] A manager who has checked the first information in the server (60) may determine whether or not the operation of the air conditioner (10) is permitted. If the manager permits the operation of the air conditioner (10), the manager inputs, to the server (60), a command for transmitting the second information from the server (60).

[0110] The server control unit (62) may use a learned model obtained by machine learning, thereby determining whether or not the operation of the air conditioner (10) is permitted. The server control unit (62) regards the first information as an input value, and regards a result about whether or not the operation is permitted obtained by using the learned model as an output value. The learned model may be generated using teacher data in which the first information aggregated in the server (60) is associated with a result made by the manager about whether or not the operation is permitted. If the first information includes the image data, the learned model regards the image data as an input value, and regards a result about whether or not the operation is permitted as an output value.

35 (6-2) Second Variation: Example of Communication by Terminal Device

[0111] In the embodiments described above, the first information and the second information are exchanged between the air conditioner (10) and the server (60). However, as illustrated in FIG. 6, the first information and the second information may be exchanged between the terminal device (70) capable of communicating with the air conditioner (10) and the server (60).

[0112] The air-conditioning system (S) of the second variation includes an air conditioner (10), a terminal device (70) capable of communicating with the air conditioner (10), and a server (60). The terminal device (70) is used by the user or installation worker. The terminal device (70) is, for example, a smartphone, a tablet terminal, or a personal computer. The terminal device (70) is connected to the corresponding air conditioner (10) via a communication line (74) which is wireless or wired.

[0113] The terminal device (70) includes a terminal display (71), a terminal operation unit (72), and a camera (73). The terminal display (71) is an example of a notification unit of the present disclosure. The terminal display (71) is a display such as a liquid crystal display. The

terminal operation unit (72) includes a touch panel, a keyboard, a button, and the like operated by a user. A touch panel may be used as both the terminal display (71) and the terminal operation unit (72).

[0114] The camera (73) is operated by the user or installation worker to acquire image data. Thus, the image data of the air conditioner (10) in the installed state can be easily acquired by the camera (73) of the terminal device (70).

[0115] In the second variation, the first communication interface (52) of the embodiment is provided in the terminal device (70). The first communication interface (52) includes a second transmitter (52a) and a second receiver (52b) as functional elements.

[0116] As illustrated in FIG. 7, a two-dimensional code (80) is put on the air conditioner (10) of the second variation. The two-dimensional code (80) is, for example, a QR code (registered trademark), but may be another code such as DataMatrix, MaxiCode, or the like. The two-dimensional code (80) of this example is put as a sticker or the like on an outer surface of the indoor casing (30a). The two-dimensional code includes address information on address of the server (60). The terminal device (70) has a function of reading two-dimensional data captured by the camera (73) as information. In other words, the terminal device (70) is capable of communicating with the server (60) by reading the two-dimensional code. In the second variation, when installation of the air conditioner (10) is completed, the user or installation worker uses the terminal device (70) to input the first information. The camera (73) of the terminal device (70) is used to read the two-dimensional code (80), so that address information in the server (60) is input to the terminal device (70). Thus, the server (60) can be easily accessed through the terminal device (70).

[0117] The first information input to the terminal device (70) is transmitted to the server (60) via the network (N). The second information from the server (60) is received by the second receiver (52b) of the terminal device (70) via the network (N). The terminal device (70) having received the second information transmits the second information to the air conditioner (10) via a communication line (74). Accordingly, the operation of the air conditioner (10) is permitted.

[0118] The third information from the server (60) is received by the second receiver (52b) of the terminal device (70) via the network (N). The terminal device (70) having received the third information indicates on a terminal display (71) that the air conditioner (10) cannot be operated. Accordingly, the user or installation worker is quickly notified that the operation of the air conditioner (10) is not permitted.

[0119] In the second variation, the second information in the server (60) may be transmitted to the air conditioner (10). Specifically, the second information from the server (60) may be received by the second receiver (52b) of the air conditioner (10) via the network (N). Accordingly, the operation of the air conditioner (10) can be permitted

without access to the terminal device (70).

[0120] In the second variation, the third information in the server (60) may be transmitted to the air conditioner (10). Specifically, the third information from the server (60) may be received by the second receiver (52b) of the air conditioner (10) via the network (N). Accordingly, the operation of the air conditioner (10) can keep prohibited without access to the terminal device (70). In this case, similarly to the embodiments described above, the display (41) of the air conditioner (10) may indicate that the air conditioner (10) cannot be operated.

(6-3) Third Variation: Configuration for Detection of Change in Position of Air conditioner

[0121] An air-conditioning system (S) of the third variation illustrated in FIG. 8 includes a detector (53) configured to detect that an installation position of the air conditioner (10) has been changed. The detector (53) is, for example, an acceleration sensor or an inclination sensor attached to the indoor unit (30). An output signal of the detector (53) is input to the air conditioning control unit (50).

[0122] If the detector (53) detects that the installation position of the air conditioner (10) has been changed, an air conditioning control unit (50) prohibits operation of the air conditioner (10). Accordingly, for example, even if the air conditioner (10) is installed in a basement or the like where the risk of the refrigerant leakage is high, the air conditioner (10) cannot be operated. This improves reliability of the air conditioner (10).

[0123] If the detector (53) detects that the installation position of the air conditioner (10) has been changed, the notification unit proposes checking the installation position of the air conditioner (10). The notification unit may be, for example, the display (41) of the remote controller (RC) or the terminal display (71) of the terminal device (70). The notification unit proposes that the user or the like should check the installation position. After checking the installation position, the user contacts, for example, an installation worker, a maintenance company, a manufacturer, a distributor, or the like to take a predetermined measure. Thus, the safety control of the air conditioner (10) can be sufficiently performed.

(7) Other Embodiments

[0124] The air conditioner (10) is a pair-type air conditioner including one indoor unit (30) and one outdoor unit (20). However, the air conditioner (10) may be an indoor-multi-type air conditioner including two or more indoor units (30) or an outdoor-multi-type air conditioner including two or more outdoor units (20).

[0125] The air conditioner (10) may be a ventilator configured to ventilate air, an air purifier configured to purify air, or a humidity controller configured to humidify or dehumidify air. In other words, the "air conditioning" described herein means not only temperature control of

air but also ventilation of air, purification of air, and humidity control of air.

[0126] The air conditioner (10) may further include a countermeasure device against the refrigerant leakage. The countermeasure device includes a fan configured to agitate air, a ventilator configured to ventilate air, and a shutoff valve configured to close the refrigerant pipe, each activated if the refrigerant leakage is detected. The fan may be an indoor fan (32).

[0127] The notification unit may be a unit configured to emit sound or light.

[0128] While the embodiment and variations thereof have been described above, it will be understood that various changes in form and details may be made without departing from the spirit and scope of the claims. The elements according to the embodiment, variations thereof, and the other embodiments may be combined and replaced with each other.

[0129] The ordinal numbers such as "first," "second," "third," ... , described above are used to distinguish the terms to which these expressions are given, and do not limit the number and order of the terms.

INDUSTRIAL APPLICABILITY

[0130] As can be seen in the foregoing description, the present disclosure is useful for a server, a method for managing an air conditioner, and an air-conditioning system.

DESCRIPTION OF REFERENCE CHARACTERS

[0131]

10	Air Conditioner
41	Display (Notification Unit)
50	Air Conditioning Control Unit
52a	Second Transmitter
52b	Second Receiver
53	Detector
60	Server
61a	First Receiver
61b	First Transmitter
62	Server Control Unit (Control Unit)
70	Terminal Device
80	Two-Dimensional Code
N	Network
S	Air-Conditioning System

Claims

1. A server comprising:
a first receiver (61a) configured to receive first information including information on a user of an air conditioner (10), information on an installation worker of the air conditioner (10), or information on the air conditioner (10); and a first transmitter (61b) configured to transmit second information necessary for

starting operation of the air conditioner (10) if it is determined that the operation of the air conditioner (10) is permitted based on the first information.

2. The server of claim 1, further comprising:
a control unit (62) configured to determine whether or not the operation of the air conditioner (10) is permitted based on the first information, wherein
the first transmitter (61b) transmits the second information based on a result of the determination by the control unit (62).
3. The server of claim 1 or 2, wherein
the first information includes information on the user.
4. The server of any one of claims 1 to 3, wherein
the first information includes information on an installation state of the air conditioner (10).
5. The server of any one of claims 1 to 4, wherein
the first information includes information on an installation site of the air conditioner (10).
6. The server of any one of claims 1 to 5, wherein
the first information includes image data of the air conditioner (10) in an installed state.
7. The server of any one of claims 1 to 6, wherein
the first information includes information on a test operation of the air conditioner (10).
8. The server of any one of claims 1 to 7, wherein
the second information includes an operation constant necessary for the operation of the air conditioner (10).
9. The server of any one of claims 1 to 8, wherein
the first receiver (61a) receives the first information transmitted from the air conditioner (10) or a terminal device (70) capable of communicating with the air conditioner (10).
10. The server of any one of claims 1 to 9, wherein
the first transmitter (61b) transmits the second information to the air conditioner (10) or a terminal device (70) capable of communicating with the air conditioner (10).
11. The server of any one of claims 1 to 10, wherein
the first information includes contract information on a contract for use of the air conditioner (10).
12. The server of claim 11, wherein
the contract information includes agreement information on an agreement with the user or installation

worker about the contract.

- 13.** The server of claim 12, wherein the agreement information is agreement information on an agreement with the user or installation worker about the contract for installation of the air conditioner (10). 5
- 14.** A method for managing an air conditioner, the method comprising: 10
- receiving first information including information on a user of the air conditioner (10), information on an installation worker of the air conditioner (10), or information on the air conditioner (10) via a network (N); and 15
- transmitting second information necessary for starting operation of the air conditioner (10) to the air conditioner (10) as a target via the network (N) if it is determined that the operation of the air conditioner (10) is permitted based on the first information. 20
- 15.** An air-conditioning system comprising: 25
- an air conditioner (10) or a terminal device (70) capable of communicating with the air conditioner (10); and
- a server (60), 30
- wherein the server (60) includes:
- a first receiver (61a) configured to receive first information including information on a user of the air conditioner (10), information on an installation worker of the air conditioner (10), or information on the air conditioner (10); and a first transmitter (61b) configured to transmit second information necessary for starting operation of the air conditioner (10) if it is determined that the operation of the air conditioner (10) is permitted based on the first information, and 35
- the air conditioner (10) or the terminal device (70) includes: 45
- a second transmitter (52a) configured to transmit the first information to the server (60); and 50
- a second receiver (52b) configured to receive the second information transmitted from the server (60).
- 16.** The air-conditioning system of claim 15, further comprising: 55
- a detector (53) configured to detect that an in-

stallation position of the air conditioner (10) has been changed;

an air conditioning control unit (50) configured to prohibit the operation of the air conditioner (10) if the detector (53) detects that the installation position of the air conditioner (10) has been changed; and

a notification unit (41) configured to propose checking the installation position of the air conditioner (10) if the detector (53) detects that the installation position of the air conditioner (10) has been changed.

- 17.** The air-conditioning system of claim 15 or 16, wherein 5
- a two-dimensional code including address information on address of the server (60) is put on the air conditioner (10), and
- the terminal device (70) is capable of communicating with the server (60) by reading the two-dimensional code.

FIG.1

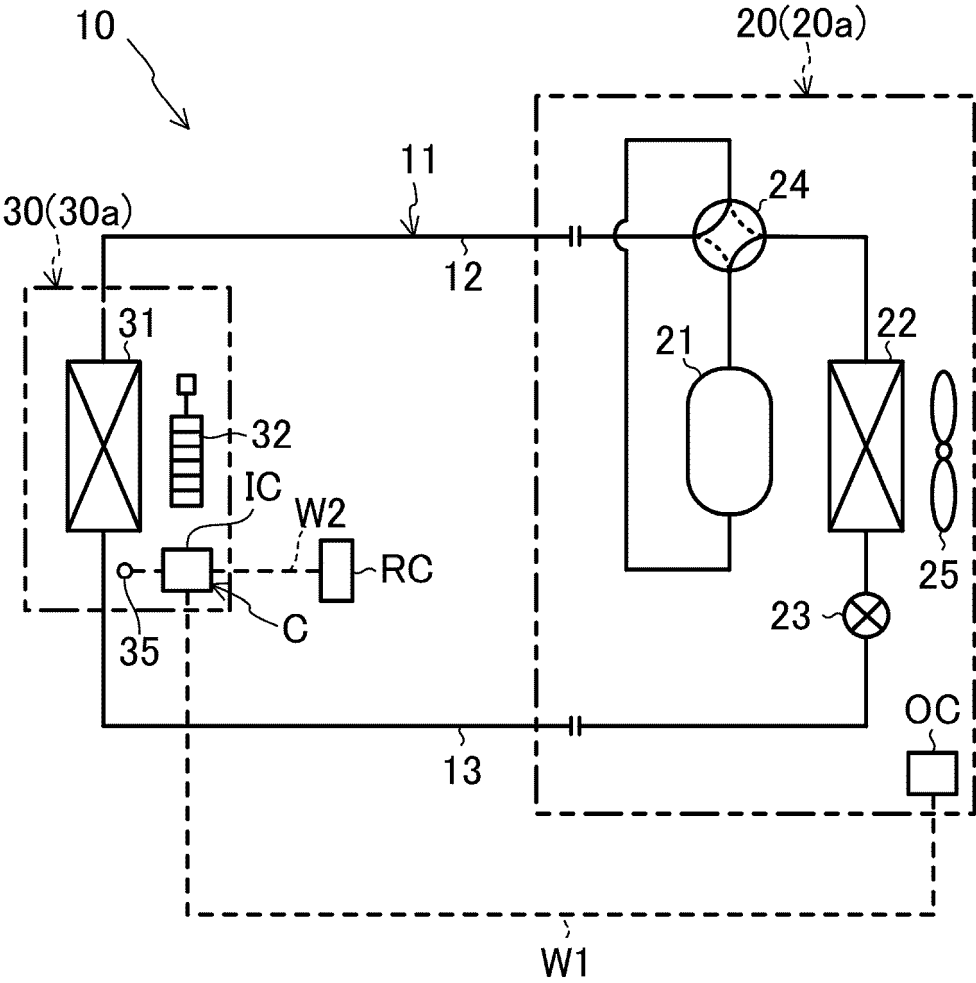


FIG.2

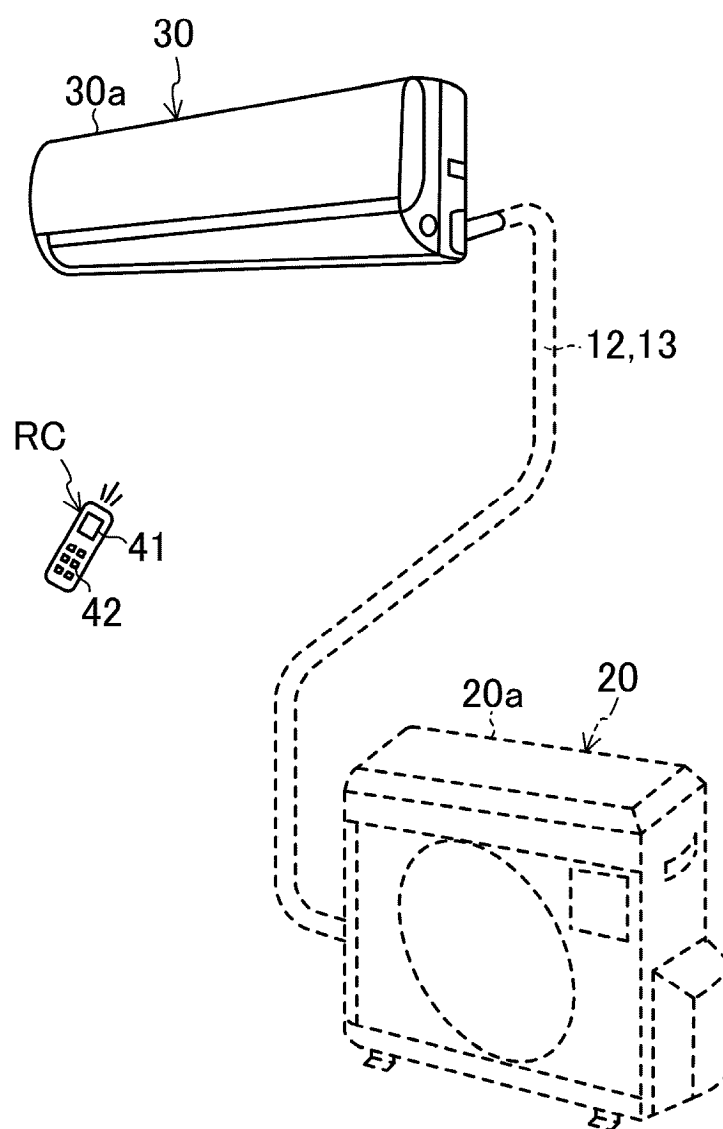


FIG.3

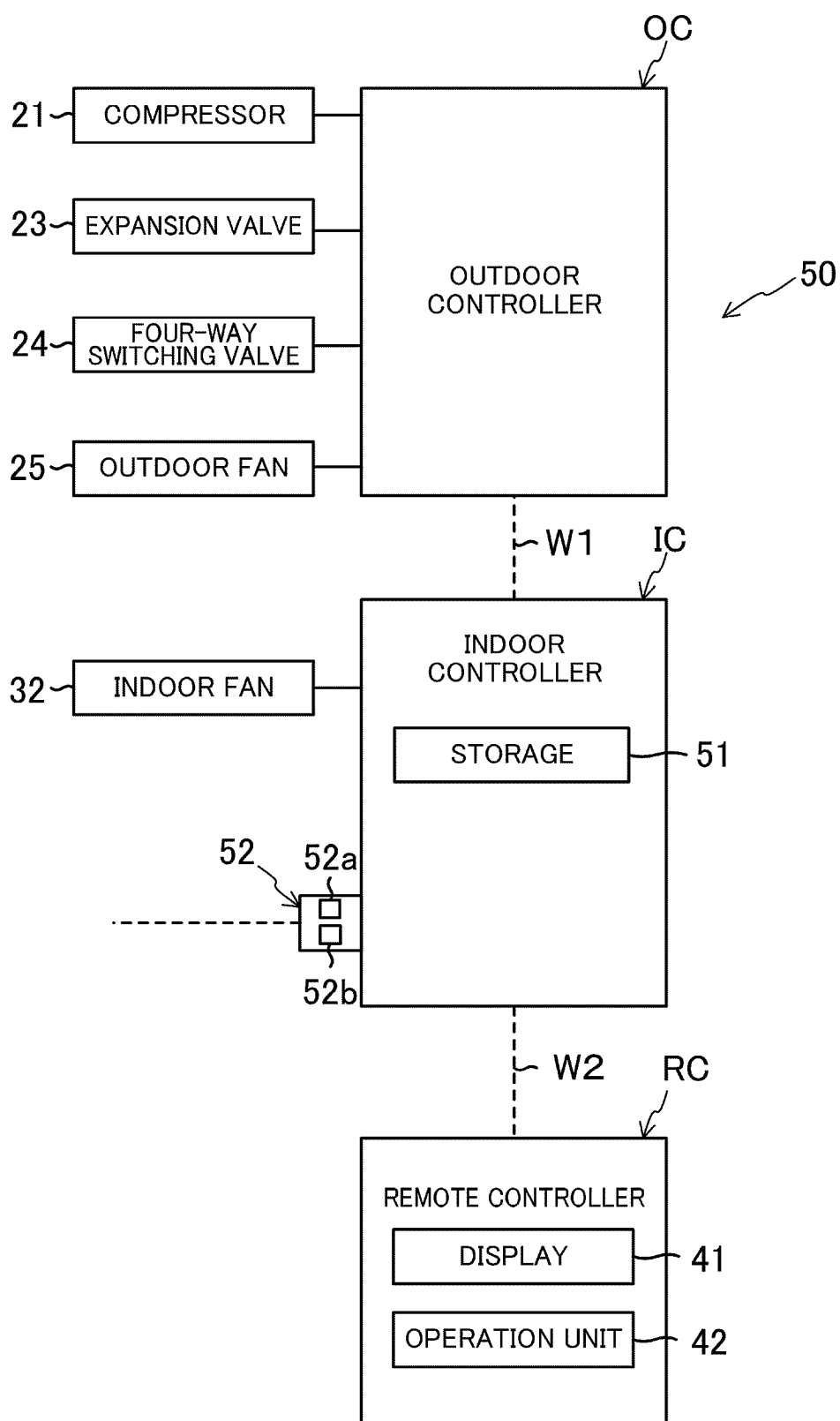


FIG.4

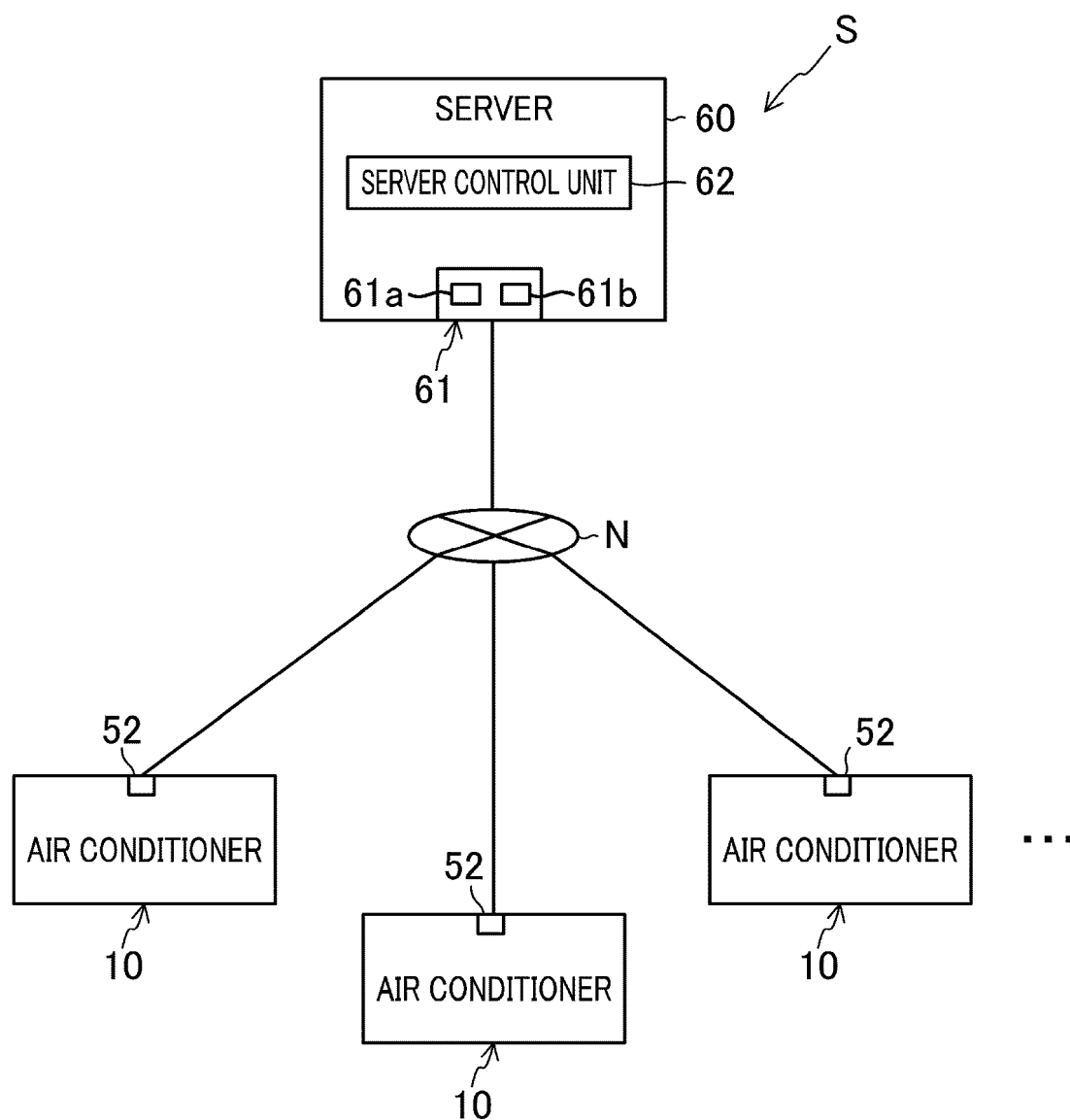


FIG.5

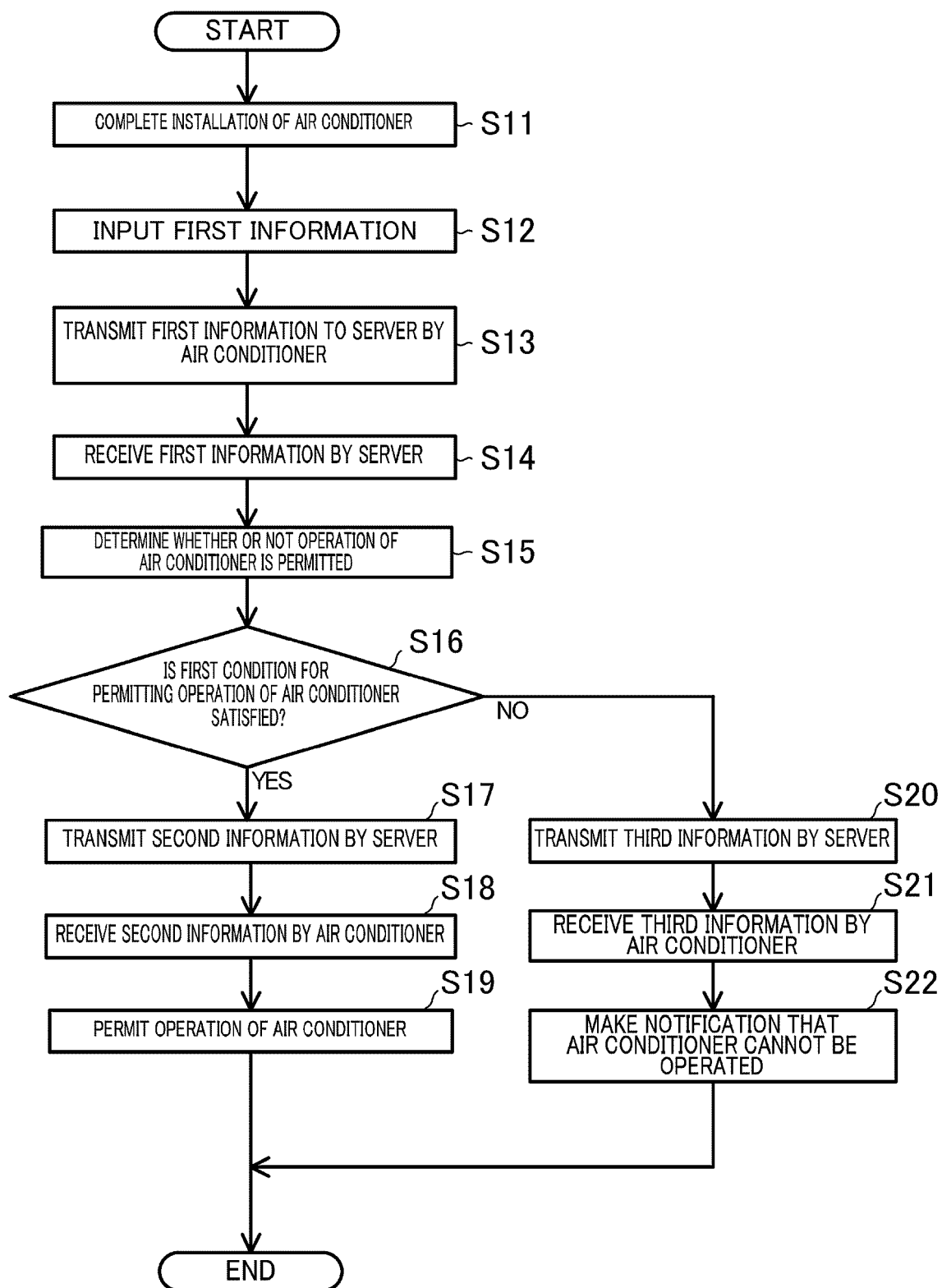


FIG.6

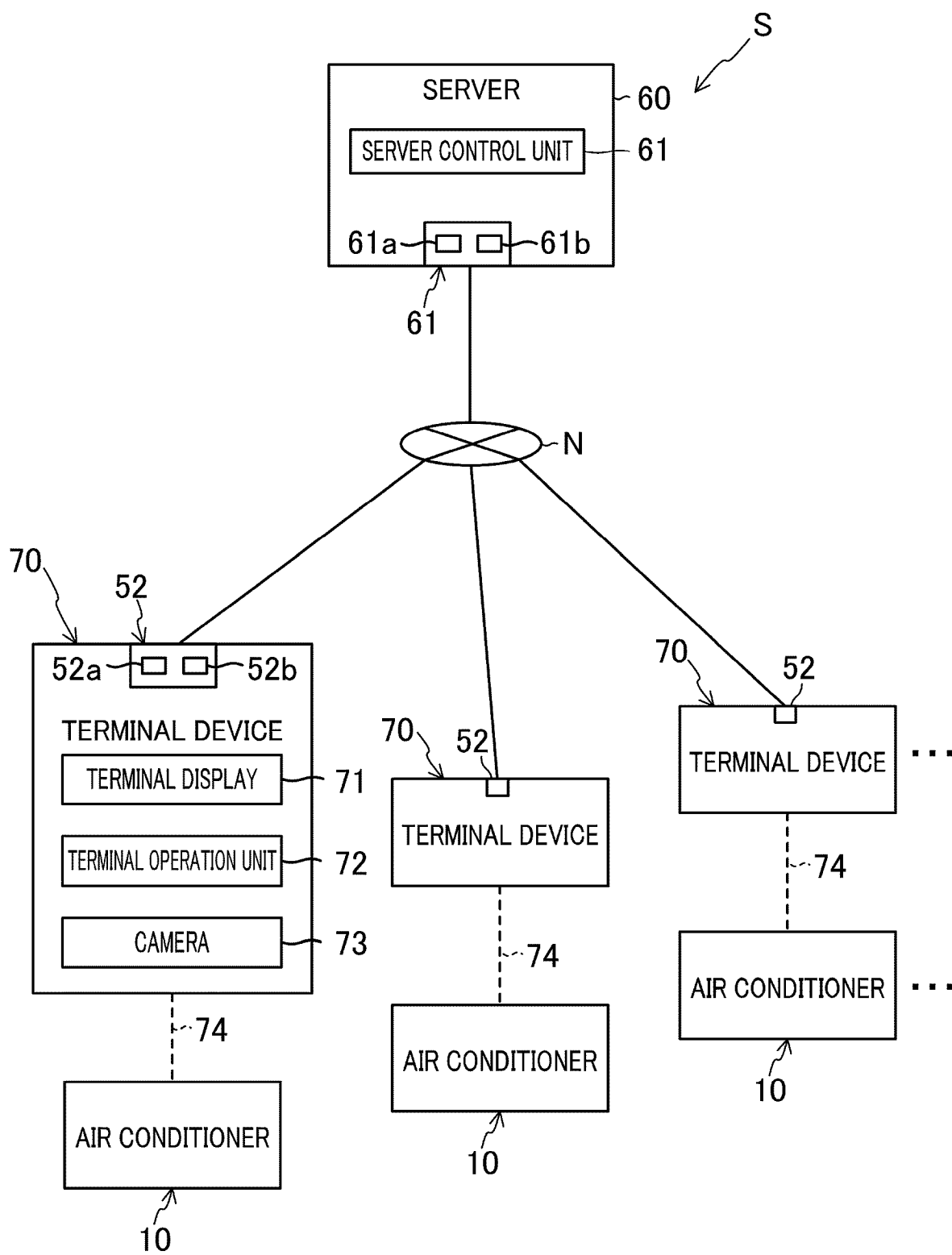


FIG.7

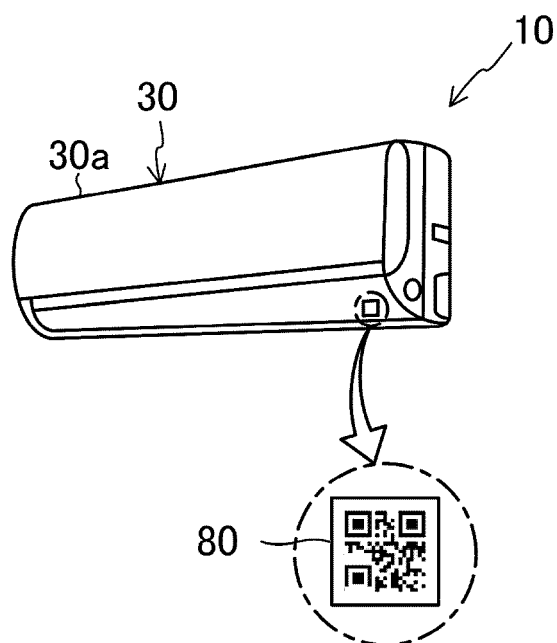
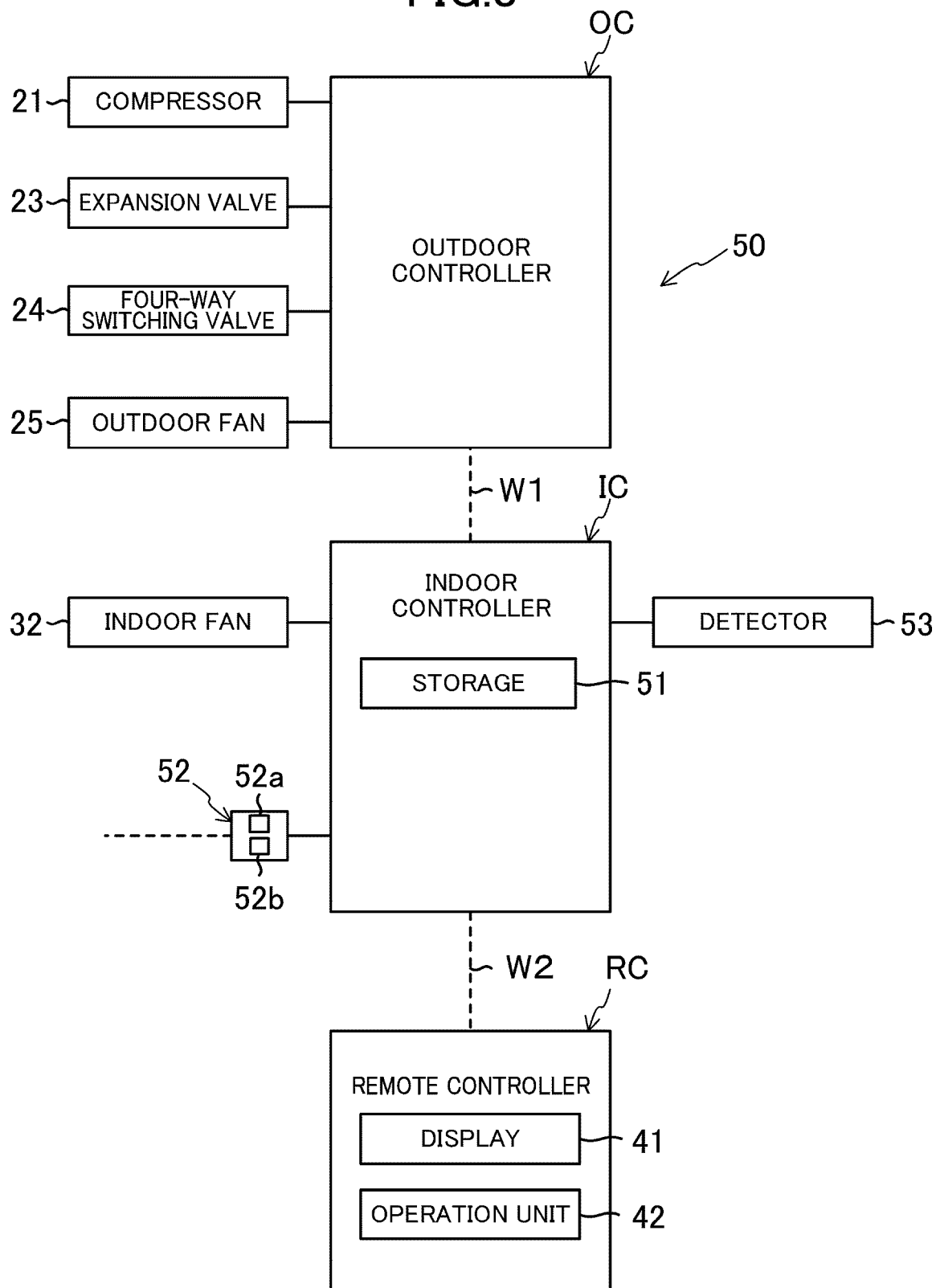


FIG.8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2023/024485

A. CLASSIFICATION OF SUBJECT MATTER

F24F 11/49(2018.01)i; **F24F 11/52**(2018.01)i; **F24F 11/58**(2018.01)i; **F24F 11/64**(2018.01)i
 FI: F24F11/49; F24F11/58; F24F11/52; F24F11/64

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)

F24F11/49; F24F11/52; F24F11/58; F24F11/64

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

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

* Special categories of cited documents:

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“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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“&” document member of the same patent family

Date of the actual completion of the international search

05 September 2023

Date of mailing of the international search report

19 September 2023

Name and mailing address of the ISA/JP

Japan Patent Office (ISA/JP)
 3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915
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Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No. PCT/JP2023/024485

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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Information on patent family members

International application No.

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		EP 4105571 A1	
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