(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 4 273 463 A1

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

(43) Date of publication:
**08.11.2023 Bulletin 2023/45**

(21) Application number: **21926703.6**

(22) Date of filing: **25.10.2021**

(51) International Patent Classification (IPC):
***F24F 11/61*** (2018.01) ***F24F 11/65*** (2018.01)
***F24F 11/74*** (2018.01) ***F24F 11/79*** (2018.01)
***F24F 1/008*** (2019.01) ***F24F 1/0355*** (2019.01)

(52) Cooperative Patent Classification (CPC):
**F24F 1/008; F24F 1/0355; F24F 11/61; F24F 11/65; F24F 11/74; F24F 11/79**

(86) International application number:
**PCT/JP2021/039227**

(87) International publication number:
**WO 2022/176274 (25.08.2022 Gazette 2022/34)**

(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 MK MT NL NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
**BA ME**
Designated Validation States:
**KH MA MD TN**

(30) Priority: **19.02.2021 JP 2021025495**

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# (54) INDOOR UNIT FOR AIR CONDITIONER

(57) Provided is an indoor unit for an air conditioner, capable of preventing the interior of the indoor unit from being in a high humidity state for a long period of time. The present invention comprises: a housing (10) that has a space (13) formed inside and an air outlet (11) communicating between the space (13) and the outside; a flap (20) that opens and closes the air outlet (11); an ozone generator (40) that is disposed in the space (13); and a control unit. After the cooling or dehumidification operation is stopped, the control unit generates ozone from the ozone generator (40) when the air outlet (11) is in the open state, not closed by the flap (20).

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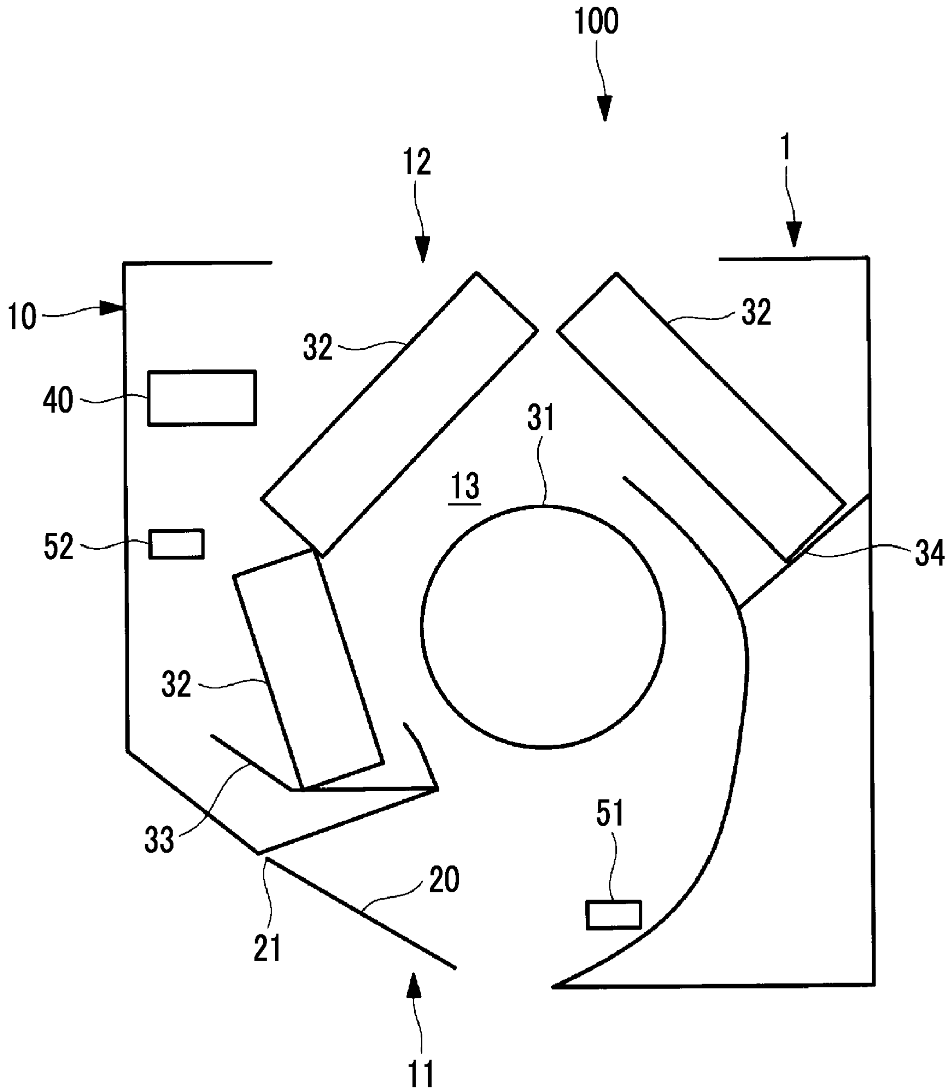
FIG. 1



## Description

Technical Field

**[0001]** The present disclosure relates to an indoor unit for an air conditioner.

Background Art

**[0002]** In an indoor unit for an air conditioner, bacteria mixed in air sucked in during a cooling operation may adhere to the interior of the indoor unit. In a case where dew condensation water is generated inside the indoor unit due to the cooling operation, the dew condensation water facilitates breeding of bacteria. In a case where bacteria breed, it causes a stain or an odor. Therefore, it is required to suppress the breeding of bacteria.

**[0003]** As a method for suppressing the breeding of bacteria, for example, PTL 1 discloses a method using ozone. According to this method, after a cooling operation is stopped, sterilization treatment is performed by generating OH radicals by generating ozone in a state where a discharge outlet is closed, and then the wet interior of the indoor unit is dried by a heating operation.

Citation List

Patent Literature

**[0004]** [PTL 1] Japanese Unexamined Patent Application Publication No. 2008-111623

Summary of Invention

Technical Problem

**[0005]** However, in the method of PTL 1, since it takes time to start drying, the interior of the indoor unit remains in a high humidity state for a long period of time, which is not preferable in terms of the purpose of suppressing the breeding of bacteria.

**[0006]** The present disclosure has been made in view of such circumstances, and has an object to provide an indoor unit for an air conditioner in which it is possible to prevent the interior of the indoor unit from being in a high humidity state for a long period of time.

Solution to Problem

**[0007]** In order to solve the above problem, an indoor unit for an air conditioner of the present disclosure adopts the following means.

**[0008]** That is, an indoor unit for an air conditioner according to an aspect of the present disclosure includes: a housing having a space formed inside, and a discharge outlet making the space communicate with an outside; a flap that opens and closes the discharge outlet; an ozone generator provided in the space; and a control unit, the control unit causing the ozone generator to generate ozone in an open state where the flap does not close the discharge outlet, after a cooling operation or a dehumidification operation is stopped.

Advantageous Effects of Invention

**[0009]** According to the indoor unit for an air conditioner according to the present disclosure, it is possible to prevent the interior of the indoor unit from being in a high humidity state for a long period of time.

Brief Description of Drawings

**[0010]**

Fig. 1 is a side sectional view of an indoor unit for an air conditioner.
Fig. 2 is a side sectional view of the indoor unit for an air conditioner.
Fig. 3 is a side sectional view of the indoor unit for an air conditioner.
Fig. 4 is a side sectional view of the indoor unit for an air conditioner.
Fig. 5 is a side sectional view of the indoor unit for an air conditioner.
Fig. 6 is a diagram showing the relationship between the amount of dew condensation, the number of remaining bacteria, and time.
Fig. 7 is a diagram showing a difference in the amount of dew condensation reduction according to the state of the flap in the relationship between the amount of dew condensation and time.

Description of Embodiments

**[0011]** Hereinafter, an indoor unit for an air conditioner according to an embodiment of the present disclosure will be described with reference to the drawings.

**[0012]** In the present embodiment, a wall-mounted type indoor unit will be described as an example. However, the type of the indoor unit is not limited to the wall-mounted type, and other types of indoor units can also be applied.

[Configuration of Indoor Unit]

**[0013]** Side sectional views of an indoor unit 1 for an air conditioner 100 are shown in Figs. 1 to 4.

**[0014]** The air conditioner 100 includes the indoor unit 1 that is installed indoors and an outdoor unit (not shown) that is installed outdoors. The indoor unit 1 and the outdoor unit are connected by a refrigerant pipe or the like (not shown).

**[0015]** The indoor unit 1 includes a housing 10, a flap 20, a fan 31, a heat exchanger 32, and an ozone generator 40.

**[0016]** A space 13 is formed inside the housing 10. The fan 31, the heat exchanger 32, and the ozone generator 40 are accommodated in the space 13.

**[0017]** A discharge outlet 11 is provided in a lower portion of the housing 10. The discharge outlet 11 makes the space 13 communicate with the outside (the room inside) of the housing 10. The discharge outlet 11 is an opening for blowing out temperature-adjusted air into the room.

**[0018]** A suction port 12 is provided in an upper portion (ceiling portion) of the housing 10. The suction port 12 makes the space 13 communicate with the outside (the room inside) of the housing 10. The suction port 12 is an opening for taking in air in the room before temperature adjustment into the space 13.

**[0019]** The flap 20 is a plate-like component provided in the discharge outlet 11. As shown in Figs. 1 to 4, the flap 20 is configured to move between a closed-state position (Fig. 1) in which the discharge outlet 11 is closed and an open-state position (Figs. 2 to 4) in which the discharge outlet 11 is opened without being closed.

**[0020]** The closed-state position in which the discharge outlet 11 is closed refers to, for example, a state where the housing 10 and a tip portion 21 of the flap 20 are smoothly substantially flush with each other, as shown in Fig. 1. The tip portion 21 of the flap 20 is an end portion that is located on the upstream side in a direction in which air is blown out.

**[0021]** Even if there is an unavoidable gap (opening) between the housing 10 and the flap 20, if the flap 20 is at a limit position of closing the discharge outlet 11 from a mechanical point of view, it is in the closed-state position.

**[0022]** The fan 31 is a cylindrical cross-flow fan. The fan 31 extends in a direction perpendicular to the plane of the paper of the drawing. The fan 31 is driven by a motor (not shown).

**[0023]** The heat exchanger 32 is provided so as to surround the fan 31 from the outer periphery. The heat exchanger 32 is of, for example, a plate-fin tube type.

**[0024]** Drain pans 33 and 34 are provided below the heat exchangers 32 to receive water droplets generated due to heat exchange.

**[0025]** A flow of air is generated by the rotation of the fan 31, and the air is taken into the space 13 through the suction port 12. The air taken in through the suction port 12 is supplied to the heat exchanger 32. The air heat-exchanged in the heat exchanger 32 is blown out from the discharge outlet 11 to the outside (the room inside) of the housing 10.

**[0026]** The ozone generator 40 is a device that generates ozone in the space 13. The ozone generator 40 is of, for example, an electric discharge type. The ozone generator 40 is provided, for example, on the front surface side of the housing 10 in the space 13.

**[0027]** The installation locations or the number of ozone generators 40 is not limited to that shown in Figs. 1 to 4. For example, as shown in Fig. 5, two ozone generators 40 may be provided, and the ozone generator 40 may be installed in the vicinity of the discharge outlet 11.

**[0028]** The indoor unit 1 configured as described above is appropriately controlled by a control unit (not shown) and operated in various operation modes (cooling, dehumidification, air blowing, heating, and the like).

**[0029]** Here, the control unit is composed of, for example, a CPU (Central Processing Unit), a RAM (Random Access Memory), a ROM (Read Only Memory), a computer-readable storage medium, and the like.

**[0030]** Then, a series of processing for realizing various functions is stored in a storage medium or the like in the form of a program, as an example, and the CPU reads out this program to a RAM or the like, and executes processing for information processing and calculation, whereby various functions are realized.

**[0031]** As the program, a form installed in advance in a ROM or other storage medium, a form of being provided in a state where it is stored in a computer-readable storage medium, a form of being delivered via wired or wireless communication means, or the like may be applied.

**[0032]** The computer-readable storage media is a magnetic disk, a magneto-optical disk, a CD-ROMs, a DVD-ROMs, a semiconductor memory, or the like.

[About Sterilization Treatment]

**[0033]** Sterilization with ozone in a dry state is generally well known.

**[0034]** Further, it has been found that the sterilization effect is improved by dissolving ozone in water and then drying it. This is considered to be due to the following factors. That is, water and ozone come into contact with each other, so that OH radicals having stronger oxidizing power than ozone are generated, and these OH radicals exhibit a strong sterilization effect.

**[0035]** The indoor unit 1 can perform the sterilization treatment as described above after a cooling operation or a dehumidification operation is stopped. Control of each device related to the sterilization treatment is performed by a control unit (not shown).

**[0036]** After stopping of the cooling operation or the dehumidification operation refers to, for example, a state where a compressor (not shown) is stopped and the flap 20 is moved to the closed-state position.

**[0037]** The relationship between the amount of dew condensation present in the space 13 after the cooling operation or the dehumidification operation is stopped, the number of remaining bacteria, and time is shown in Fig. 6.

**[0038]** As shown in Fig. 6, a certain amount of dew condensation water and bacteria are present until the cooling operation or the dehumidification operation is stopped.

**[0039]** After the cooling operation or the dehumidification operation is stopped, the ozone generator 40 generates ozone to dissolve the ozone in the dew condensation water. At this time, OH radicals having stronger oxidizing power than the ozone are generated due to the contact between the dew condensation water and the ozone. Then, the amount of dew condensation water decreases as the drying progresses, and the number of remaining bacteria also decreases.

**[0040]** In the present embodiment, ozone is generated (that is, the ozone generator 40 is started) while drying the space 13. The inventors have found that this method can prevent the space 13 from being in a high humidity state for a long period of time and increase the concentration of OH radicals dissolved in the dew condensation water in a short time.

**[0041]** Drying of the space 13 is started by opening at least the flap 20 regardless of whether or not the fan 31 blows air.

**[0042]** However, the fan 31 may be driven at the same time as the starting of the ozone generator 40. In this way, it is possible to further promote drying of the space 13.

**[0043]** A difference in the amount of dew condensation reduction according to the state of the flap 20 in the relationship between the amount of dew condensation and time in a case where the fan 31 is driven is shown in Fig. 7. According to this, it can be seen that drying is promoted in a case where the flap 20 is in an open state (indicated by a solid line), as compared to a case where the flap 20 is in a closed state (indicated by a dashed-dotted line).

**[0044]** Further, the fan 31 may be driven when a predetermined time (a first predetermined time) has elapsed after starting of the ozone generator 40. In this way, it is possible to take a sufficient time for the ozone to dissolve in the dew condensation water. Since the discharge outlet 11 is in an open state, drying of the space 13 is also performed between the starting of the ozone generator 40 and the driving of the fan 31.

**[0045]** The first predetermined time is a time obtained by a test conducted in advance, and is, for example, a time in a range of 30 to 60 minutes.

**[0046]** It is preferable that the flap 20 is located within an allowable range of the flap 20 during a normal cooling operation or dehumidification operation while the space 13 is dried. In this way, it is possible to effectively perform drying. In particular, drying can be most efficiently performed by locating the flap 20 at its maximum air volume position (refer to Fig. 3) during a normal cooling operation or dehumidification operation.

**[0047]** Further, the flap 20 may be located on the side (the side close to the state in Fig. 1) where the discharge outlet 11 is closed outside the allowable range of the flap 20 during a normal cooling operation or dehumidification operation. In this way, the possibility that the humid air coming out of the discharge outlet 11 during the sterilization treatment may hit against the user can be reduced.

**[0048]** The sterilization treatment started as described above is ended, for example, as follows.

[Management with Time]

**[0049]** The sterilization treatment is stopped when a predetermined time (a second predetermined time) has elapsed after start of the sterilization treatment. Here, stopping of the sterilization treatment refers to stopping of the ozone generator 40 or stopping of the fan 31. In this way, it is possible to stop the sterilization treatment with simple control.

**[0050]** The second predetermined time is a time obtained by a test conducted in advance, and is a time during which the space 13 can be sufficiently dried. The second predetermined time is, for example, a time in a range of 60 to 120 minutes.

[Management according to Humidity Difference]

**[0051]** After the sterilization treatment is started, the sterilization treatment is stopped when the difference in humidity between the sucked air and the blown air becomes substantially the same value. In this way, it is possible to stop the sterilization treatment after it is confirmed that the space 13 is surely dried.

**[0052]** The humidity of the sucked air and the humidity of the blown air are measured as follows.

**[0053]** That is, as shown in Fig. 1, a humidity sensor (a first humidity sensor 51) is provided in the vicinity of the discharge outlet 11 or in the space 13 on the downstream side with respect to the heat exchanger 32 in the air flow direction. Further, another humidity sensor (a second humidity sensor 52) is provided in the vicinity of the suction port 12 and in the space 13 on the upstream side with respect to the heat exchanger 32. In this way, it is possible to measure the humidity of the sucked air and the humidity of the blown air.

**[0054]** According to the present embodiment, the following effects are obtained.

**[0055]** According to the indoor unit 1, since the control unit causes the ozone generator 40 to generate ozone in the open state where the flap 20 does not close the discharge outlet 11 after the cooling operation or the dehumidification operation is stopped, the ozone can be dissolved in the dew condensation water generated in the space 13 to generate OH radicals, and at the same time, drying of the space 13 can be started. In this way, it is possible to prevent the space 13 from being in a high humidity state for a long period of time and to increase the concentration of OH radicals dissolved in the dew condensation water in a short time. Therefore, after the cooling operation or the dehumidification operation is stopped, it is possible to efficiently suppress the breeding of bacteria and to exhibit the sterilization effect by the OH radicals generated from ozone in a short time.

**[0056]** Further, in a case where the fan 31 is driven at the same time as the starting of the ozone generator 40, it is possible to promote drying of the space.

**[0057]** Further, in a case where the fan 31 is driven when the first predetermined time has elapsed after starting of the ozone generator 40, it is possible to take a sufficient time for ozone to dissolve in the dew condensation water. Since the discharge outlet 11 is in an open state, drying of the space 13 is performed between the starting of the ozone generator 40 and the driving of the fan 31.

**[0058]** Alternatively, in a case where the fan 31 is stopped when the second predetermined time has elapsed after driving of the fan 31, stopping of the sterilization treatment can be controlled based on a time. In this way, it is possible to stop the sterilization treatment with simple control.

**[0059]** Alternatively, since the fan 31 is stopped when the measurement value of the first humidity sensor 51 and the measurement value of the second humidity sensor 52 become substantially the same value after the fan 31 is driven, it is possible to stop the sterilization treatment, based on the difference in humidity between the sucked air and the blown air. In this way, it is possible to stop the sterilization treatment after it is confirmed that the space 13 is surely dried.

**[0060]** Further, in a case where the flap 20 that is in the open state is located within an allowable range of the flap 20 during the cooling operation or the dehumidification operation, the inside (the space 13) of the housing 10 and the outside (the room inside) of the housing 10 communicate with each other with a sufficient area through the discharge outlet 11. In this way, it is possible to efficiently perform drying of the space 13. In particular, in a case where the flap is at its maximum air volume position during the cooling operation or the dehumidification operation, it is possible to most efficiently perform drying of the space 13.

**[0061]** Further, in a case where the flap 20 that is in the open state is located on the side where the discharge outlet 11 is closed outside the allowable range of the flap during the cooling operation or the dehumidification operation, the possibility that the humid air coming out of the discharge outlet 11 during the sterilization treatment may hit against the user can be reduced.

**[0062]** The embodiment described above can be understood as follows, for example.

**[0063]** That is, an indoor unit (1) for an air conditioner (100) according to an aspect of the present disclosure includes: a housing (10) having a space (13) formed inside, and a discharge outlet (11) making the space communicate with the outside; a flap (20) that opens and closes the discharge outlet; an ozone generator (40) provided in the space; and a control unit, in which the control unit causes the ozone generator to generate ozone in an open state where the flap does not close the discharge outlet, after a cooling operation or a dehumidification operation is stopped.

**[0064]** According to the indoor unit for an air conditioner according to this aspect, since the control unit causes the ozone generator to generate ozone in the open state where the flap does not close the discharge outlet after the cooling operation or the dehumidification operation is stopped, the ozone can be dissolved in the dew condensation water generated in the space to generate OH radicals, and at the same time, drying of the space can be started. In this way, it is possible to prevent the space from being in a high humidity state for a long period of time and to increase the concentration of OH radicals dissolved in the dew condensation water in a short time. Therefore, after the cooling operation or the dehumidification operation is stopped, it is possible to efficiently suppress the breeding of bacteria and to exhibit the sterilization effect by the OH radicals generated from ozone in a short time.

**[0065]** Further, the indoor unit for an air conditioner according to an aspect of the present disclosure further includes a fan (31) provided in the space and sending air to the discharge outlet, in which the control unit drives the fan at the same time as starting of the ozone generator.

**[0066]** According to the indoor unit for an air conditioner according to this aspect, since the control unit drives the fan at the same time as starting of the ozone generator, it is possible to promote drying of the space.

**[0067]** Further, the indoor unit for an air conditioner according to an aspect of the present disclosure further includes a fan provided in the space and sending air to the discharge outlet, in which the control unit drives the fan when a first predetermined time has elapsed after starting of the ozone generator.

**[0068]** According to the indoor unit for an air conditioner according to this aspect, since the control unit drives fan when the first predetermined time has elapsed after starting of the ozone generator, it is possible to take a sufficient time for ozone to dissolve in the dew condensation water. Since the discharge outlet is in an open state, drying of the space is performed between the starting of the ozone generator and the driving of the fan.

**[0069]** Further, in the indoor unit for an air conditioner according to an aspect of the present disclosure, the control unit stops the fan when a second predetermined time has elapsed after driving of the fan.

**[0070]** According to the indoor unit for an air conditioner according to this aspect, since the control unit stops the fan when the second predetermined time has elapsed after driving of the fan, the stop of the sterilization treatment can be controlled based on a time. In this way, it is possible to stop the sterilization treatment with simple control.

**[0071]** Further, in the indoor unit for an air conditioner according to an aspect of the present disclosure, the housing has a suction port (12) that makes the space communicate with the outside, the indoor unit further includes a first humidity sensor(51) provided in the space in the vicinity of the discharge outlet, and a second humidity sensor (52) provided in the space in the vicinity of the suction port, and the control unit stops the fan when a measurement value of the first humidity sensor and a measurement value of the second humidity sensor become substantially the same value after the fan is driven.

**[0072]** According to the indoor unit for an air conditioner according to this aspect, since the control unit stops the fan when the measurement value of the first humidity sensor and the measurement value of the second humidity sensor become substantially the same value after the fan is driven, it is possible to stop the sterilization treatment, based on the difference in humidity between the sucked air and the blown air. In this way, it is possible to stop the sterilization treatment after it is confirmed that the space is surely dried.

**[0073]** Further, in the indoor unit for an air conditioner according to an aspect of the present disclosure, the flap that is in an open state is located within an allowable range of the flap during the cooling operation or the dehumidification operation.

**[0074]** According to the indoor unit for an air conditioner according to this aspect, since the flap that is in an open state is located within an allowable range of the flap during the cooling operation or the dehumidification operation, the inside (the space) of the housing and the outside (the room inside) of the housing communicate with each other with a sufficient area through the discharge outlet. In this way, it is possible to efficiently perform drying of the space.

**[0075]** Further, in the indoor unit for an air conditioner according to an aspect of the present disclosure, the flap that is in an open state is at its maximum air volume position during the cooling operation or the dehumidification operation.

**[0076]** According to the indoor unit for an air conditioner according to this aspect, since the flap that is in an open state is at its maximum air volume position during the cooling operation or the dehumidification operation, it is possible to most efficiently perform drying of the space.

**[0077]** Further, in the indoor unit for an air conditioner according to an aspect of the present disclosure, the flap that is in an open state is located on the side where the discharge outlet is closed outside an allowable range of the flap during the cooling operation or the dehumidification operation.

**[0078]** According to the indoor unit for an air conditioner according to this aspect, since the flap that is in an open state is located on the side where the discharge outlet is closed outside the allowable range of the flap during the cooling operation or the dehumidification operation, the possibility that the humid air coming out of the discharge outlet during the sterilization treatment may hit against the user can be reduced.

Reference Signs List

**[0079]**

1: indoor unit
10: housing
11: discharge outlet
12: suction port
13: space
20: flap
21: tip portion
31: fan
32: heat exchanger
33: drain pan
34: drain pan
40: ozone generator
51: first humidity sensor
52: second humidity sensor
100: air conditioner

## Claims

**1.** An indoor unit for an air conditioner, comprising:

a housing having a space formed inside, and a discharge outlet making the space communicate with an outside;
a flap that opens and closes the discharge outlet;
an ozone generator provided in the space; and
a control unit,
wherein the control unit causes the ozone generator to generate ozone in an open state where the flap does not close the discharge outlet, after a cooling operation or a dehumidification operation is stopped.

**2.** The indoor unit for an air conditioner according to Claim 1, further comprising:

a fan provided in the space and sending air to the discharge outlet,
wherein the control unit drives the fan at the same time as starting of the ozone generator.

**3.** The indoor unit for an air conditioner according to Claim 1, further comprising:

a fan provided in the space and sending air to the discharge outlet,
wherein the control unit drives the fan when a first predetermined time has elapsed after starting of the ozone generator.

**4.** The indoor unit for an air conditioner according to Claim 2 or 3, wherein the control unit stops the fan when a second predetermined time has elapsed after driving of the fan.

**5.** The indoor unit for an air conditioner according to Claim 2 or 3, wherein the housing has a suction port that makes the space communicate with the outside,

the indoor unit further comprises
a first humidity sensor provided in the space in the vicinity of the discharge outlet, and
a second humidity sensor provided in the space in the vicinity of the suction port, and
the control unit stops the fan when a measure-

ment value of the first humidity sensor and a measurement value of the second humidity sensor become substantially the same value after the fan is driven.

**6.** The indoor unit for an air conditioner according to any one of Claims 1 to 5, wherein the flap that is in an open state is located within an allowable range of the flap during the cooling operation or the dehumidification operation.

**7.** The indoor unit for an air conditioner according to Claim 6, wherein the flap that is in an open state is at its maximum air volume position during the cooling operation or the dehumidification operation.

**8.** The indoor unit for an air conditioner according to any one of Claims 1 to 5, wherein the flap that is in an open state is located on a side where the discharge outlet is closed outside an allowable range of the flap during the cooling operation or the dehumidification operation.

FIG. 1

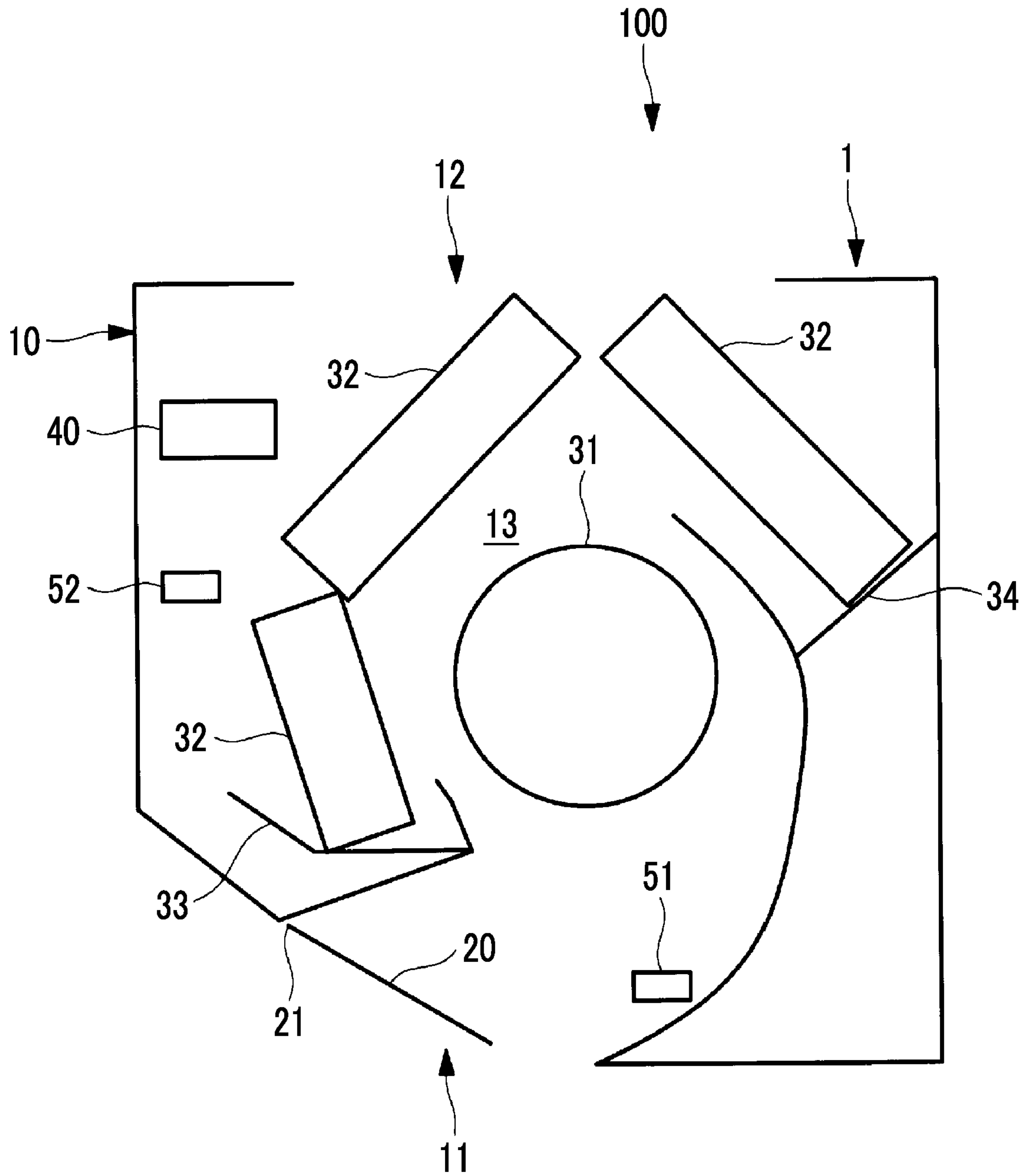


FIG. 2

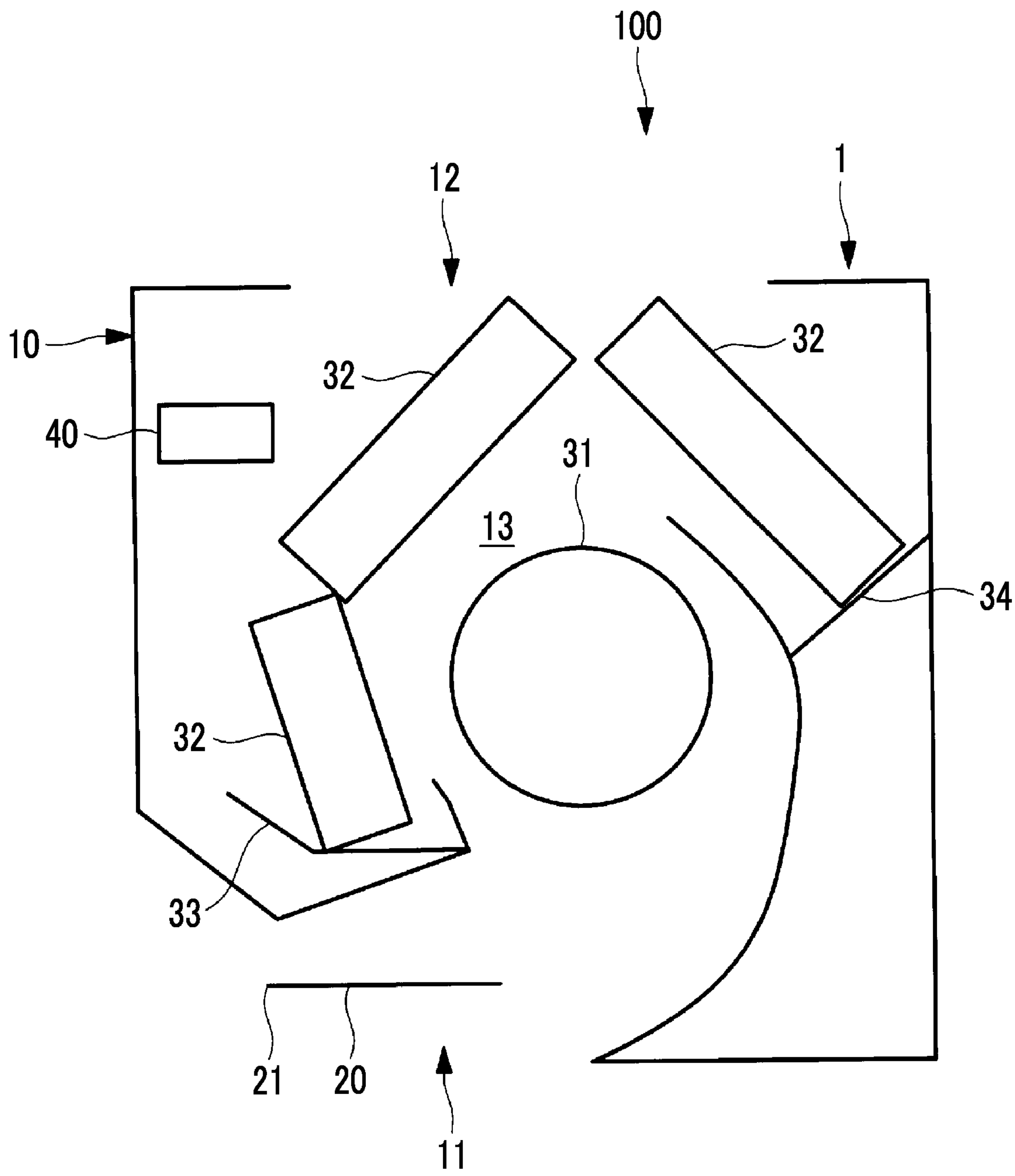


FIG. 3

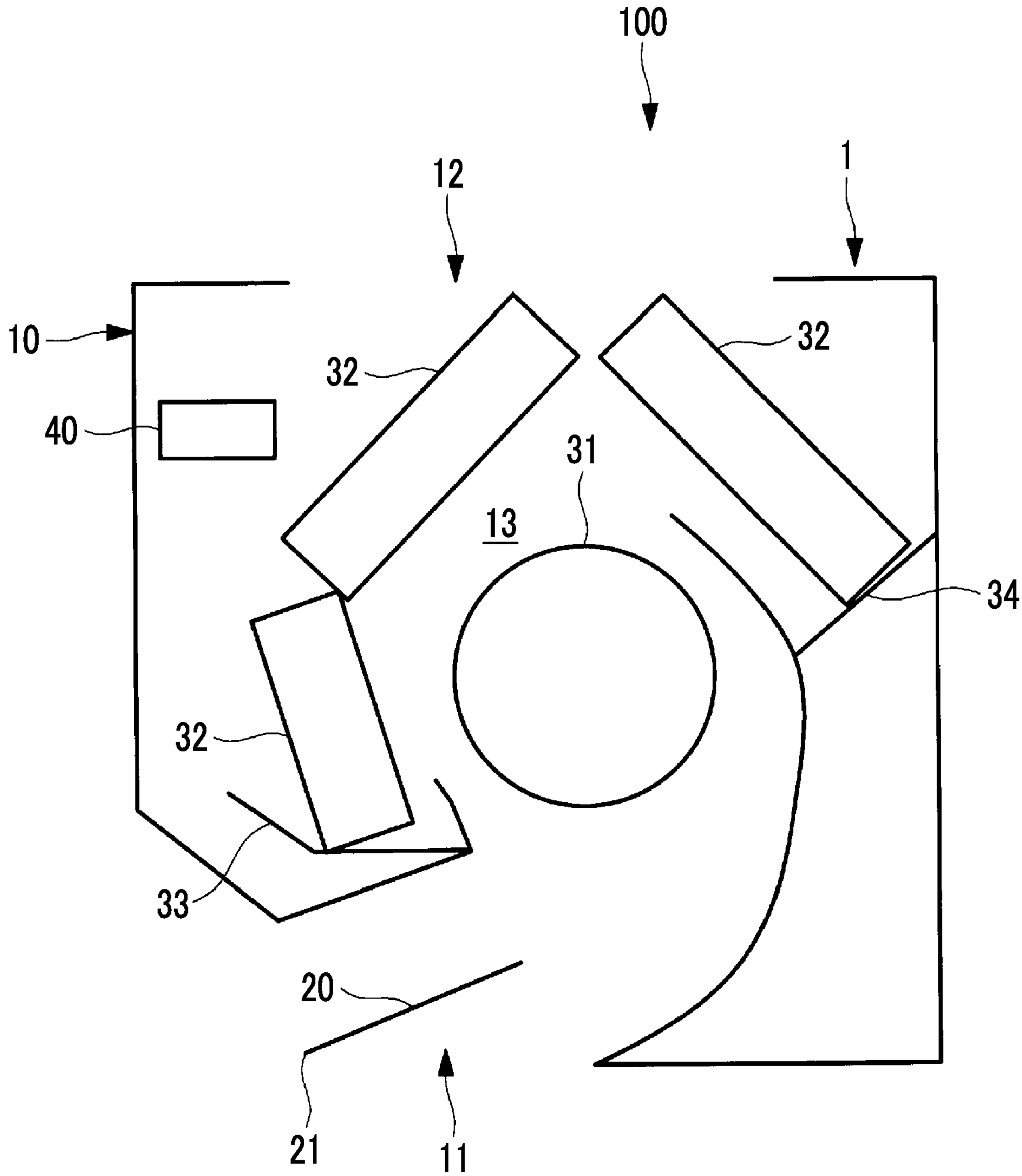


FIG. 4

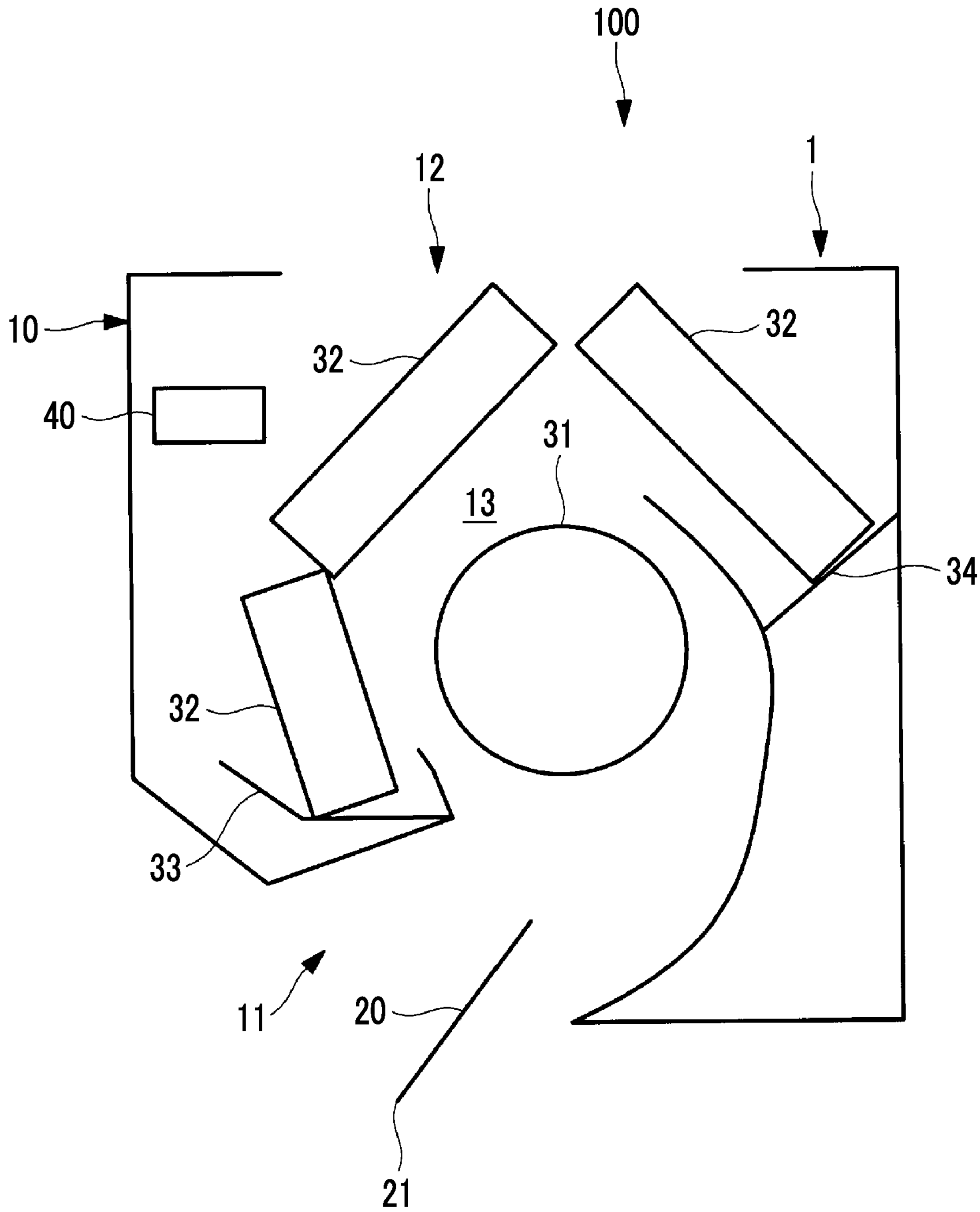


FIG. 5

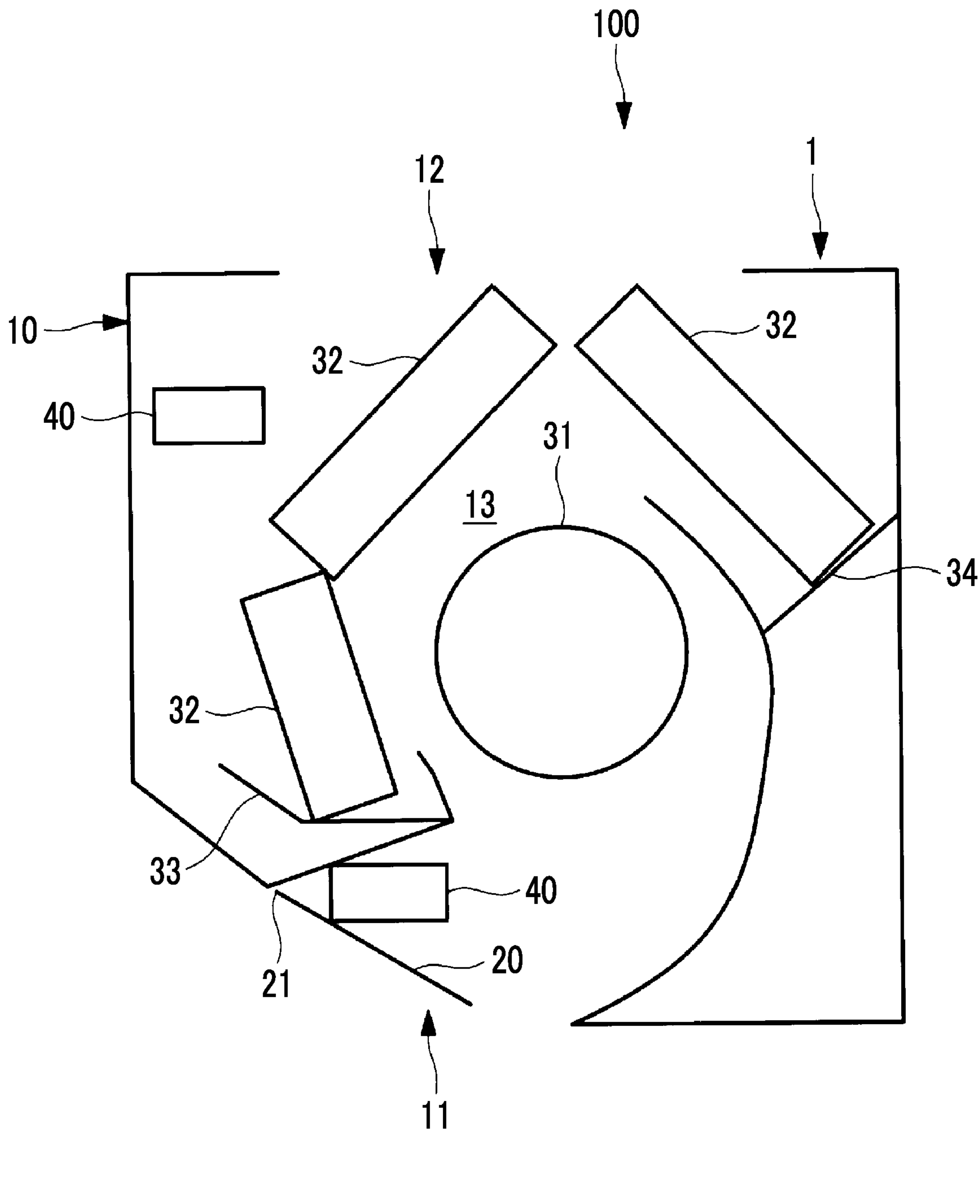


FIG. 6

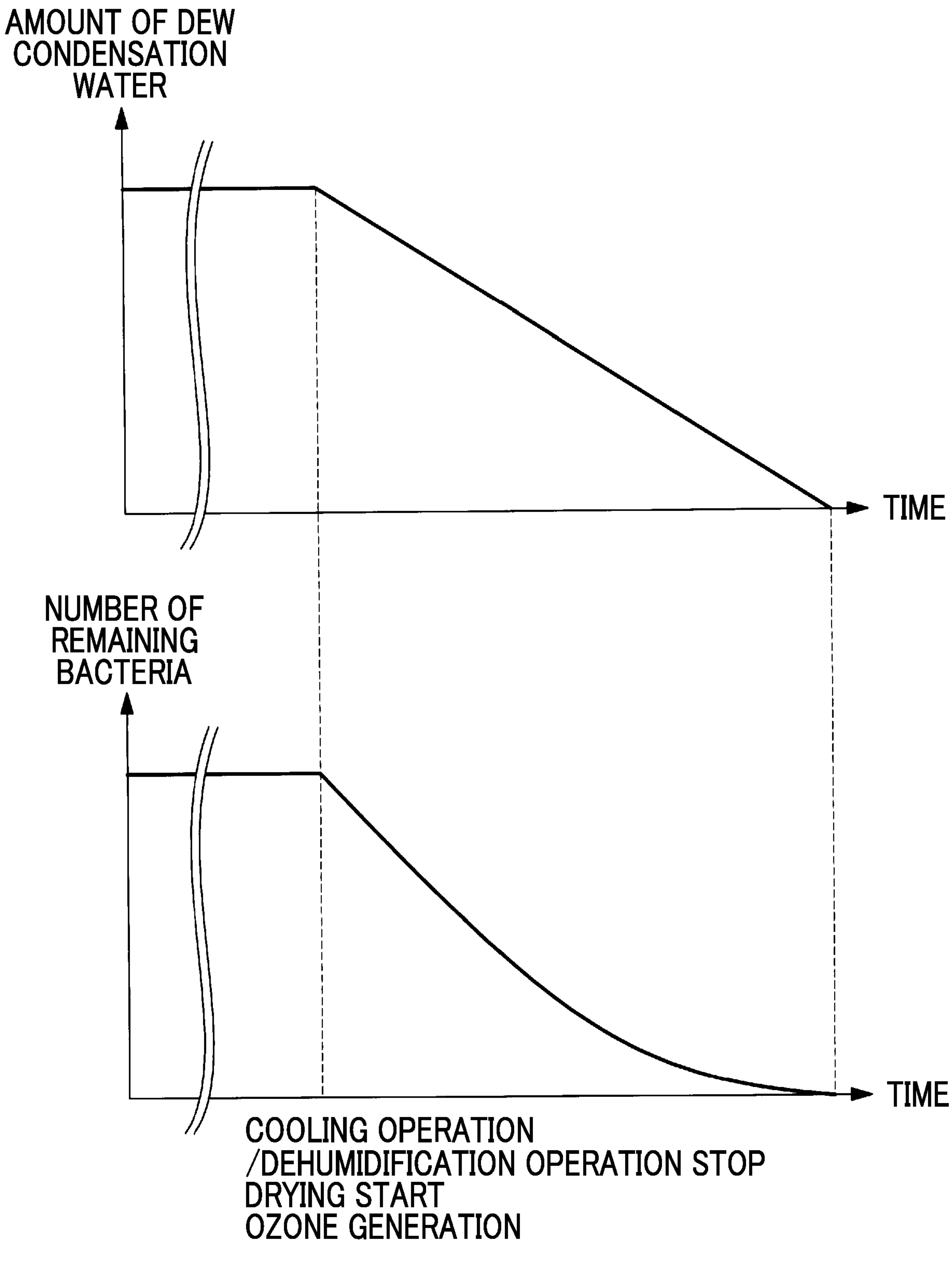
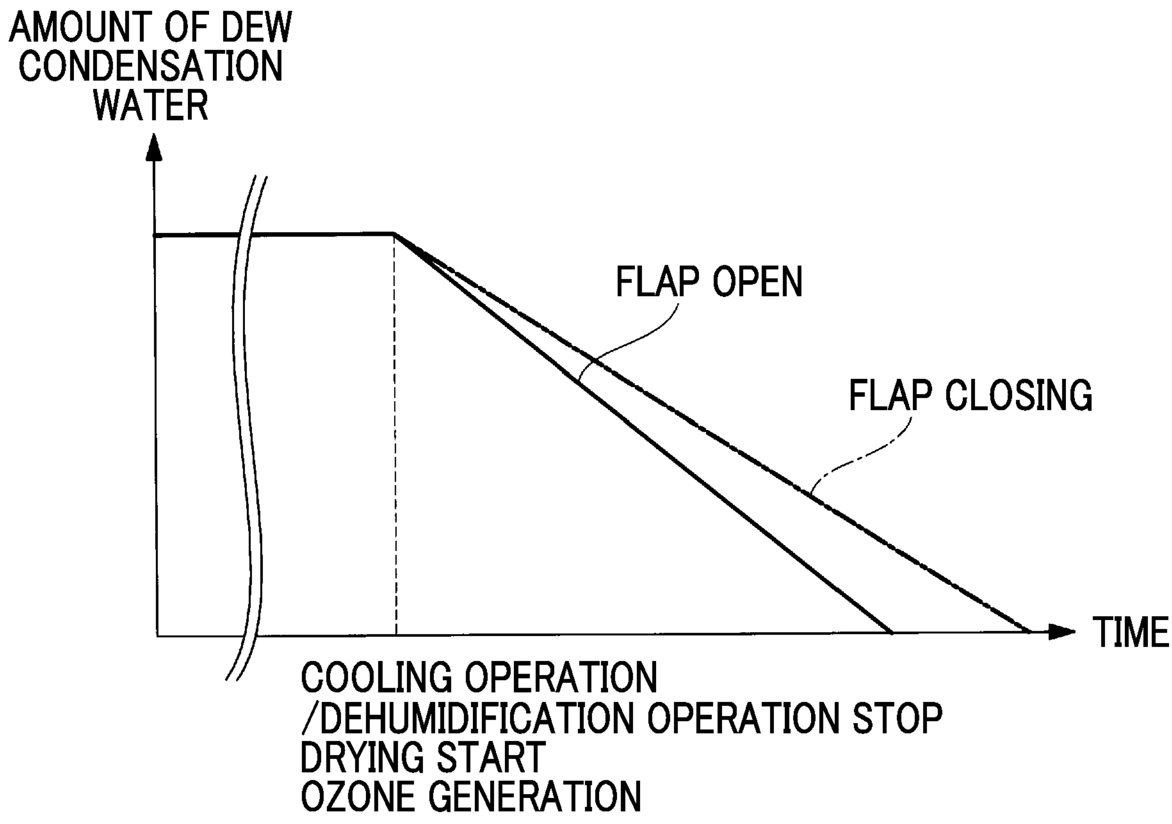

AMOUNT OF DEW CONDENSATION WATER
TIME
NUMBER OF REMAINING BACTERIA
TIME
COOLING OPERATION
/DEHUMIDIFICATION OPERATION STOP
DRYING START
OZONE GENERATION

FIG. 7


AMOUNT OF DEW CONDENSATION WATER
FLAP OPEN
FLAP CLOSING
TIME
COOLING OPERATION
/DEHUMIDIFICATION OPERATION STOP
DRYING START
OZONE GENERATION

**INTERNATIONAL SEARCH REPORT**

International application No. **PCT/JP2021/039227**

**A. CLASSIFICATION OF SUBJECT MATTER**

***F24F 11/61***(2018.01)i; ***F24F 11/65***(2018.01)i; ***F24F 11/74***(2018.01)i; ***F24F 11/79***(2018.01)i; ***F24F 1/008***(2019.01)i; ***F24F 1/0355***(2019.01)i

FI: F24F1/008; F24F1/0355; F24F11/65; F24F11/74; F24F11/61; F24F11/79

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)

F24F11/61; F24F11/65; F24F11/74; F24F11/79; F24F1/008; F24F1/0355

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 1971-2021
Registered utility model specifications of Japan 1996-2021
Published registered utility model applications of Japan 1994-2021

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. |
|---|---|---|
| X | JP 7-269893 A (BLUE MEDICAL SCI KK) 20 October 1995 (1995-10-20) paragraphs [0005]-[0011], fig. 2 | 1-4, 6-7 |
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| Y | JP 2011-169562 A (MITSUBISHI ELECTRIC CORP) 01 September 2011 (2011-09-01) claims 1, 16, paragraphs [0001]-[0002], [0045]-[0053], [0067], [0072] | 1-4, 6, 8 |
| A | claims 1, 16, paragraphs [0001]-[0002], [0045]-[0053], [0067], [0072] | 5, 7 |
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☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

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| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| **10 December 2021** | **11 January 2022** |

| Name and mailing address of the ISA/JP | Authorized officer |
|---|---|
| **Japan Patent Office (ISA/JP)**<br>**3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915**<br>**Japan** | Telephone No. |

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**INTERNATIONAL SEARCH REPORT**

International application No. **PCT/JP2021/039227**

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 2839/1989 (Laid-open No. 96519/1990) (DAIKIN IND LTD) 01 August 1990 (1990-08-01), pp. 1-6, fig. 1 | 1-3 |
| Y | pp. 1-6, fig. 1 | 6-7 |
| A | pp. 1-6, fig. 1 | 4-5 |
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**INTERNATIONAL SEARCH REPORT**
**Information on patent family members**

International application No.
**PCT/JP2021/039227**

| Patent document cited in search report | | | Publication date (day/month/year) | Patent family member(s) | Publication date (day/month/year) |
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| JP | 7-269893 | A | 20 October 1995 | (Family: none) | |
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## REFERENCES CITED IN THE DESCRIPTION

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