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

(11) **EP 4 394 262 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
03.07.2024 Bulletin 2024/27

(21) Application number: **23220339.8**

(22) Date of filing: **27.12.2023**

(51) International Patent Classification (IPC):
F24F 1/0011 *(2019.01)* ***F24F 1/0014*** *(2019.01)*
F24F 1/0057 *(2019.01)* ***F24F 13/20*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
F24F 1/0011; F24F 1/0014; F24F 1/0057; F24F 13/20

(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

(30) Priority: **26.12.2022 KR 20220184394**
30.05.2023 KR 20230068978

(71) Applicant: **LG Electronics Inc.**
Yeongdeungpo-gu
Seoul 07336 (KR)

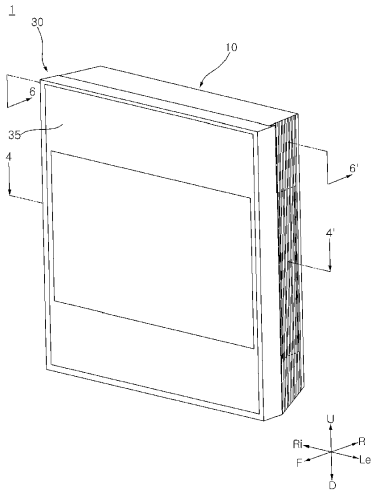
(72) Inventors:
- **Kim, Dohyung**
  08592 Seoul (KR)
- **Jung, Yuheon**
  08592 Seoul (KR)
- **Jung, Jichan**
  08592 Seoul (KR)

(74) Representative: **Ter Meer Steinmeister & Partner Patentanwälte mbB**
Nymphenburger Straße 4
80335 München (DE)

(54) INDOOR UNIT OF AIR CONDITIONER

(57) An indoor unit of an air conditioner according to the present disclosure includes: a cabinet having an inlet through which outside air is introduced and an outlet through which air is discharged; a heat exchanger disposed in the cabinet; a blower fan disposed in the cabinet, the blower fan being configured to draw in air through the inlet and discharge the air to the outlet through the heat exchanger; and a plurality of discharge guides configured to control a direction of the air discharged to the outlet, wherein the plurality of discharge guides includes: a main discharge guide that has a first inclination angle with a baseline intersecting a rotation axis of the blower fan; and an auxiliary discharge guide including a first portion that has the first inclination angle with the baseline and a second portion that has a second inclination angle with the baseline, and wherein the second inclination angle is less than the first inclination angle.

Fig. 1



EP 4 394 262 A1

Description

BACKGROUND

Field

[0001] The present disclosure relates to an indoor unit of an air conditioner, and more particularly, to an indoor unit of an air conditioner capable of reducing the formation of dew around an outlet, and to an air conditioner including the same.

Description of the Related Art

[0002] In general, an air conditioner is an apparatus for cooling and heating an indoor space by using a refrigerant refrigeration cycle consisting of a compressor, a four-way valve, an outdoor heat exchanger (condenser or evaporator), an expansion mechanism, and an indoor heat exchanger (evaporator or condenser) to create a more comfortable indoor environment for users. Air conditioners may be classified into a separated-type air conditioner and an integrated-type air conditioner.

[0003] The separate-type air conditioner and the integrated-type air conditioner are functionally the same. In the case of the separate-type air conditioner, an indoor unit (in which a heat dissipation/cooling device, an indoor fan, and an indoor fan motor are installed) and an outdoor unit (in which a heat dissipation/cooling device, a compressor, an outdoor fan, and an outdoor fan motor are installed) are separated from each other and are connected by a refrigerant pipe. In the case of the integrated-type air conditioner, the functions of cooling and heat dissipation are integrated.

[0004] The separate-type air conditioner is usually installed by placing an indoor unit upright in an indoor space, hanging the indoor unit on a wall, or embedding the indoor unit in a ceiling, while the integrated-type air conditioner is installed by drilling a hole in a wall of a house, installing a device on a window, or being placed outdoors and connected to an indoor space by a duct.

[0005] Referring to FIG. 14, an indoor unit of an air conditioner of the related art (Patent Document 1), which is hereby incorporated by reference, is illustrated. Air inlet and an air outlet (41) are formed in a chassis, and a vane (44) to guide air discharged through the outlet is installed. The vane (44) rotates about a hinge (44a) and allows a direction of the air discharged through the outlet to be changed. In addition, a stopper (47) is used to limit or inhibit the rotation of the vane.

[0006] However, in the case of the indoor unit of the related art, when air is discharged through the outlet, if an angle of the vane differs from a direction of the outlet or the angle changes rapidly, the flow of air at the bottom of the vane or an upper end portion of the outlet becomes uneven. This uneven air flow causes the formation of dew on the vane and the upper end portion of outlet, which then falls to the indoor space.

[0007] In addition, when the stopper 47 is provided, air passing through the outlet does not flow uniformly due to resistance of the stopper, and a vortex is generated, causing the formation of dew around the stopper.

[0008] Also, when the vane has an angle almost parallel to the outlet, it causes the formation of dew on a wall adjacent to the outlet.

[0009] In the case of Patent Document 2, two vanes are used, but the same problem arises as in the Patent Document 1 using one vane.

Related Art

Patent Document

[0010]

Patent Document 1- Korean Laid-Open Patent Publication No. 20060011656

Patent Document 2- Korean Laid-Open Patent Publication No. 20160085355

SUMMARY

[0011] It is an object of the present disclosure to provide an indoor unit of an air conditioner that can prevent the formation of dew on a rear part of a vane and a rear part of a front panel, and an air conditioner including the same.

[0012] It is another object of the present disclosure to provide an indoor unit of an air conditioner that can allow a uniform air flow when air heat-exchanged in a heat exchanger is discharged through an outlet, and an air conditioner including the same.

[0013] It is yet another object of the present disclosure to provide an indoor unit of an air conditioner that can prevent the formation of dew around an outlet when a decorative panel is only used without a rotatable vane in the outlet, and an air conditioner including the same.

[0014] At least one of these objects is solved by the features of the independent claim. The objects of the present disclosure are not limited to the objects described above, and other objects not stated herein will be clearly understood by those skilled in the art from the following description.

[0015] An indoor unit of an air conditioner according to the present disclosure may be characterized in that some of a plurality of discharge guides are configured to have two portions with different inclination angles, and a portion located relatively inward has a smaller inclination angle.

[0016] Alternatively or in addition, the indoor unit of the air conditioner according to the present disclosure may be characterized in that an opening is formed in a cover that covers an outlet, and an opening edge that defines the opening is rounded.

[0017] Alternatively or in addition, the indoor unit of the air conditioner according to the present disclosure may

be characterized in that one of a plurality of outlets is closed when a dew formation condition is satisfied.

[0018] According to an aspect of the present invention, an indoor unit of an air conditioner includes: a cabinet having an inlet through which outside air is introduced and an outlet through which air is discharged; a heat exchanger disposed in the cabinet; a blower fan disposed in the cabinet, the blower fan being configured to draw in air through the inlet and discharge the air to the outlet; and a plurality of discharge guides configured to control a direction of the air discharged to the outlet.

[0019] According to an aspect of the present invention, an indoor unit of an air conditioner includes: a cabinet having an inlet through which outside air is introduced and an outlet through which air is discharged; a heat exchanger disposed in the cabinet; a blower fan disposed in the cabinet, the blower fan being configured to draw in air through the inlet and discharge the air through the outlet (e.g. through the heat exchanger); and a plurality of discharge guides configured to control a direction of the air discharged through the outlet, wherein the plurality of discharge guides includes: a main discharge guide that has a first inclination angle (e.g. with a baseline intersecting a rotation axis of the blower fan); and an auxiliary discharge guide including a first portion that has the first inclination angle (e.g. with the baseline) and a second portion that has a second inclination angle (e.g. with the baseline). The second inclination angle may be less than the first inclination angle.

[0020] According to an aspect, an indoor unit of an air conditioner includes: a cabinet having an inlet through which outside air is introduced and an outlet through which air is discharged; a heat exchanger disposed in the cabinet; a blower fan disposed in the cabinet, the blower fan being configured to draw in air through the inlet and discharge the air to the outlet (e.g. through the heat exchanger); and a cover including a cover plate coupled to the cabinet, a cover opening formed through the cover plate and disposed corresponding to the outlet to allow air discharged to the outlet to be discharged through the cover opening, and a plurality of discharge guides configured to control a direction of the air discharged to the cover opening, wherein an opening edge that defines the cover opening includes a rounded portion having a curvature.

[0021] According to an aspect, an indoor unit of an air conditioner includes: a cabinet having an inlet through which outside air is introduced, a first outlet through which air is discharged, and a second outlet through which air is discharged in a direction different from the first outlet; a heat exchanger disposed in the cabinet; a blower fan disposed in the cabinet, the blower fan being configured to draw in air through the inlet and discharge the air to the outlet (e.g. through the heat exchanger); a fan motor configured to rotate the blower fan; a control vane configured to open the second outlet; a vane motor configured to control the control vane; a temperature sensor installed at the cabinet; a humidity sensor installed at the cabinet; and a controller, the controller being configured to: determine a dew formation condition based on temperature and humidity around the cabinet and a rotational speed of the fan motor; and control, in response to the dew formation condition being satisfied, the vane motor such that the control vane closes the second outlet.

[0022] The indoor unit according to any one of these aspects may include one or more of the following features:

The indoor unit may be a wall-type and/or ceiling type indoor unit, i.e. to be mounted on a wall (i.e. the base being in a vertical orientation) and/or on a ceiling (i.e. the base being in a horizontal orientation).

[0023] The plurality of discharge guides may include at least one of: a main discharge guide and an auxiliary discharge guide. The main discharge guide may have a first inclination angle, e.g. with a plane perpendicular to a rotation axis of the blower fan and/or with a baseline perpendicular to a rotation axis of the blower fan and/or with a baseline intersecting a rotation axis of the blower fan. The auxiliary discharge guide may include a first portion that has the first inclination angle and a second portion that has a second inclination angle, e.g. with a plane perpendicular to a rotation axis of the blower fan and/or with a baseline perpendicular to a rotation axis of the blower fan and/or with a baseline intersecting a rotation axis of the blower fan. The second inclination angle may be less than the first inclination angle. The first and/or second inclination angle may be less than 90°.

[0024] The blower fan may be configured to draw in air through the inlet through/via the heat exchanger. That is, air drawn in through the inlet by the blower fan may pass through the heat exchanger.

[0025] The plurality of discharge guides may be configured to control a direction of the air discharged to/through the outlet. That is, a direction of the discharged air may be controlled by the discharge guides, e.g. by passing therethrough.

[0026] The auxiliary discharge guide may be disposed closer to the blower fan compared to the main discharge guide. The auxiliary discharge guide may be disposed closer to the blower fan than the main discharge guide in a direction parallel to a rotation axis of the blower fan and/or in a direction perpendicular to the rotation axis of the blower fan. The auxiliary discharge guide may be disposed closer to a rotation axis of the blower fan than the main discharge guide.

[0027] The auxiliary discharge guide may be disposed rearward relative to the main discharge guide.

[0028] The second portion may be disposed closer to the blower fan compared to the first portion. The second portion of the auxiliary discharge guide may be disposed closer to the blower fan than the main discharge guide and/or than the first portion in a direction parallel to a rotation axis of the blower fan and/or in a direction perpendicular to the rotation axis of the blower fan. The second portion of the auxiliary discharge guide may be disposed closer to a rotation axis of the blower fan than the

main discharge guide and/or than the first portion.

[0029] The outlet may define a discharge passage. The outlet and/or the discharge passage may include a discharge passage front side and a discharge passage rear side that face each other. The discharge passage rear side may have a third inclination angle with the baseline, and the third inclination angle may be less than the first inclination angle.

[0030] The third inclination angle may be equal to the second inclination angle.

[0031] One end of the second portion may be in contact with one end of the discharge passage rear side.

[0032] The second portion may be located on a same plane as the discharge passage rear side. The second portion may be flush with the discharge passage rear side.

[0033] The discharge passage front side may include a first front portion and/or a second front portion.

[0034] The first front portion may extend parallel to the discharge passage rear side. The second front portion may extend parallel to the main discharge guide.

[0035] The discharge passage front side may include a first front portion parallel to the discharge passage rear side; and/or a second front portion parallel to the main discharge guide.

[0036] The first front portion may be disposed closer to the blower fan compared to the second front portion. The first front portion may be disposed closer to the blower fan than the main discharge guide and/or than the second front portion, e.g. in a direction parallel to a rotation axis of the blower fan and/or in a direction perpendicular to the rotation axis of the blower fan. The first front portion may be disposed closer to a rotation axis of the blower fan than the main discharge guide and/or than the second front portion.

[0037] The second front portion may be disposed closer to the main discharge guide than the first front portion and/or may be disposed in contact with the main discharge guide. The second front portion may be disposed between the main discharge guide and the first front portion. The second front portion may be provided to be flush with the main discharge guide.

[0038] One end of the first front portion that is connected to the second front portion may be disposed closer to the blower fan compared to one end of the discharge passage rear side. That is, an end of the first front portion that is connected or adjacent to the second front portion may be disposed closer to the blower fan than an end of the discharge passage rear side that is connected or adjacent to the discharge guide, i.e. to the auxiliary discharge guide.

[0039] The indoor unit and/or the air conditioner may further include a cover (e.g. a side cover) that includes a cover plate coupled to the cabinet. The cover may include a cover opening formed in or through, i.e. penetrating, the cover plate and/or disposed corresponding to the outlet to allow air discharged to/through the outlet to be discharged through the cover opening. The plurality of discharge guides may be disposed in the cover opening, i.e. the discharge guides may extend across the cover opening. The cover opening may be defined by an opening edge of the cover plate. The discharge guides may extend between opposite edges/points of the opening edge. The opening edge may include a rounded portion with a curvature.

[0040] An opening edge that defines the cover opening may include a rounded portion with a curvature. The rounded portion may be formed on an edge of the opening edge extending in horizontal direction.

[0041] The opening edge may include a front edge that extends in a direction parallel to the discharge guide. The opening edge may include a rear edge that faces the front edge. The opening edge may include an upper edge that connects an upper end of the front edge to an upper end of the rear edge. The opening edge may include a lower edge that connects a lower end of the front edge to a lower end of the rear edge. The front edge and/or the rear edge may extend in vertical direction and/or perpendicular to a rotation axis of the blower fan. The upper edge and/or the lower edge may extend in horizontal direction and/or parallel to a rotation axis of the blower fan.

[0042] The rounded portion may be formed on at least one of or each of the upper edge and the lower edge.

[0043] The rounded portion may be eccentric from the upper edge to a direction away from the blower fan.

[0044] One end of the opening edge may be connected to one end of the cover plate. The rounded portion may be positioned at a portion where the opening edge and the cover plate are connected.

[0045] The cabinet may have a first outlet through which air is discharged and a second outlet through which air is discharged in a direction different from the first outlet. That is, the outlet may include a first outlet through which air is discharged, and a second outlet through which air is discharged in a direction different from the first outlet. A control vane may be provided at the second outlet to open and/or close the second outlet.

[0046] The indoor unit and/or the air conditioner may include a vane motor configured to control the control vane. The indoor unit and/or the air conditioner may include a fan motor configured to rotate the blower fan.

[0047] The indoor unit may include at least one of a temperature sensor installed at the cabinet and a humidity sensor installed at the cabinet.

[0048] The indoor unit and/or the air conditioner may include a controller configured to: determine a dew formation condition based on temperature and humidity around the cabinet and a rotational speed of a fan motor; and control, in response to the dew formation condition being satisfied, a vane motor such that a control vane closes the second outlet. The controller may determine that the dew formation condition is satisfied based on the temperature around the cabinet being a predetermined temperature range, the humidity around the cabinet being greater than or equal to predetermined reference humidity, and the rotational speed of the fan motor being

less than a reference speed. The controller may be configured to, based on the dew formation condition being satisfied, increase the rotational speed of the fan motor from a current rotational speed.

[0049] According to another aspect, an indoor unit of an air conditioner includes: a cabinet having an inlet through which outside air is introduced and an outlet through which air is discharged; a heat exchanger disposed in the cabinet; a blower fan disposed in the cabinet, the blower fan being configured to draw in air through the inlet and discharge the air to the outlet (e.g. through the heat exchanger); and a cover including a cover plate coupled to the cabinet, a cover opening formed through the cover plate and disposed corresponding to the outlet to allow air discharged to the outlet to be discharged through the cover opening, and a plurality of discharge guides configured to control a direction of the air discharged to the cover opening, wherein an opening edge that defines the cover opening includes a rounded portion having a curvature.

[0050] The opening edge may include: a front edge that extends in a direction parallel to the discharge guide; a rear edge that faces the front edge; an upper edge that connects an upper end of the front edge to an upper end of the rear edge; and a lower edge that connects a lower end of the front edge to a lower end of the rear edge.

[0051] The rounded portion may be formed on each of the upper edge and the lower edge.

[0052] The rounded portion may be eccentric from the upper edge to a direction away from the blower fan.

[0053] According to another aspect, an indoor unit of an air conditioner includes: a cabinet having an inlet through which outside air is introduced, a first outlet through which air is discharged, and a second outlet through which air is discharged in a direction different from the first outlet; a heat exchanger disposed in the cabinet; a blower fan disposed in the cabinet, the blower fan being configured to draw in air through the inlet and discharge the air to the outlet (e.g. through the heat exchanger); a fan motor configured to rotate the blower fan; a control vane configured to open the second outlet; a vane motor configured to control the control vane; a temperature sensor installed at the cabinet; a humidity sensor installed at the cabinet; and a controller, the controller being configured to: determine a dew formation condition based on temperature and humidity around the cabinet and a rotational speed of the fan motor; and control, in response to the dew formation condition being satisfied, the vane motor such that the control vane closes the second outlet.

[0054] The controller may determine that the dew formation condition is satisfied based on the temperature around the cabinet being a predetermined temperature range, the humidity around the cabinet being greater than or equal to predetermined reference humidity, and the rotational speed of the fan motor being less than a reference speed.

[0055] The controller may be configured to, based on the dew formation condition being satisfied, increase the rotational speed of the fan motor from a current rotational speed.

[0056] According to a further aspect of the present invention an air conditioner is provided including an indoor unit according to any one of the herein described aspects and embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0057]

FIG. 1 is a perspective view showing an indoor unit of an air conditioner according to an embodiment of the present disclosure.

FIG. 2 is a perspective view showing an open state of a display panel of the indoor unit in FIG. 1.

FIG. 3 is an exploded perspective view of the indoor unit in FIG. 1.

FIG. 4 is a cross-sectional view taken along line 4-4' of the indoor unit in FIG. 1.

FIG. 5 is an enlarged view showing a portion of FIG. 4.

FIG. 6 is a cross-sectional view taken along line 6-6' of the indoor unit in FIG. 1.

FIG. 7 is a perspective view of a left cover according to an embodiment of the present disclosure.

FIG. 8 is a longitudinal cross-sectional view of the left cover of FIG. 7.

FIG. 9 is a cross-sectional perspective view showing an open state of a second outlet of the indoor unit in FIG. 1.

FIG. 10 is a cross-sectional view showing an open state of a second outlet 16c of the indoor unit in FIG. 1.

FIG. 11 is a cross-sectional view showing a closed state of a second outlet of the indoor unit in FIG. 1.

FIG. 12 is a control block diagram according to an embodiment of the present disclosure.

FIG. 13 is a control method according to an embodiment of the present disclosure.

FIG. 14 illustrates an outlet and a vane according to the related art.

DETAILED DESCRIPTION

[0058] Advantages and features of the present disclosure and methods for achieving those of the present disclosure will become apparent upon referring to embodiments described later in detail with reference to the attached drawings. However, embodiments are not limited to the embodiments disclosed hereinafter and may be embodied in different ways. The embodiments are provided for perfection of disclosure and for informing persons skilled in this field of art of the scope of the present disclosure. The same reference numerals may refer to the same elements throughout the specification.

[0059] Spatially-relative terms such as "below", "be-

neath", "lower", "above", or "upper" may be used herein to describe one element's relationship to another element as illustrated in the Figures. It will be understood that spatially-relative terms are intended to encompass different orientations of the device in addition to the orientation depicted in the Figures. For example, if the device in one of the figures is turned over, elements described as "below" or "beneath" other elements would then be oriented "above" the other elements. The exemplary terms "below" or "beneath" can, therefore, encompass both an orientation of above and below. Since the device may be oriented in another direction, the spatially-relative terms may be interpreted in accordance with the orientation of the device.

[0060] The terminology used in the present disclosure is for the purpose of describing particular embodiments only and is not intended to limit the disclosure. As used in the disclosure and the appended claims, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless context clearly indicates otherwise. It will be further understood that the terms "comprises" and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0061] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and the present disclosure, and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0062] In the drawings, the thickness or size of each layer is exaggerated, omitted, or schematically illustrated for convenience of description and clarity. Also, the size or area of each constituent element does not entirely reflect the actual size thereof.

[0063] Hereinafter, exemplary embodiments of the present disclosure will be described with reference to the accompanying drawings.

[0064] FIG. 1 is a perspective view showing an indoor unit of an air conditioner according to an embodiment of the present disclosure, FIG. 2 is a perspective view showing an open state of a display panel of the indoor unit in FIG. 1, and FIG. 3 is an exploded perspective view of the indoor unit in FIG. 1.

[0065] Referring to FIGS. 1 to 3, an indoor unit of an air conditioner according to an embodiment of the present disclosure includes a cabinet 10 and a display panel 30 coupled to a front surface of the cabinet 10. The cabinet 10 includes therein a base 12 having a space in which a blower fan 14, an orifice 13, and a heat exchanger 50 are accommodated and a front panel 20 configured to cover the base 12.

[0066] The display panel 30 is installed to the front panel 20 while being spaced apart from the front panel 20 by a predetermined distance.

[0067] The front panel 20 is provided at its center with an inlet 15 and is fixed or secured to the cabinet 10, and the cabinet 10 is provided with at least one outlet 16.

[0068] The outlet 16 may include a first outlet 16a, 16b and a second outlet 16c. The first outlet 16a, 16b may include a left outlet 16a that is disposed at a left side of the cabinet 10 and a right outlet 16b that is disposed at a right side of the cabinet 10. The second outlet 16c may be disposed at a bottom side of the cabinet 10.

[0069] Specifically, the first outlet 16a, 16b and the second outlet 16c may be formed in the base 12.

[0070] Here, a front-and-rear direction (FR) refers to a direction parallel to a rotation axis Ax of the blower fan 14. With respect to the blower fan 14, a direction to the display panel 30 is defined as a forward or front direction F, and a direction to the base 12 is defined as a rearward or rear direction R.

[0071] In addition, an up-and-down direction (UD) refers to a direction perpendicular to the rotation axis of the blower fan 14. With respect to the rotation axis Ax of the blower fan 14, a direction to the second outlet 16c is defined as a downward or down direction D, and a direction opposite to the downward direction is defined as an upward or up direction U.

[0072] Also, a left-and-right direction (LeRi) refers to a direction perpendicular to the up-and-down direction and the left-and-right direction.

[0073] The display panel 30 may be installed at the front of the front panel 20 while being spaced apart from the front panel 20 by a predetermined distance, thereby forming a gap. Air flows to the inlet 15 through the gap formed between the front panel 20 and the display panel 30.

[0074] The base 12 may be provided with the blower fan 14 through which indoor air is drawn in/discharged, the orifice 13 disposed at the front of the blower fan 14 to guide air drawn in through the inlet 15 to the blower fan 14, and the heat exchanger 50 installed at the front of the orifice 13.

[0075] Here, the blower fan 14 is installed between the base 12 and the orifice 13 to guide all of the air drawn in through the inlet 15 to the outlet 16.

[0076] The blower fan 14 is a centrifugal fan configured to discharge air introduced from the orifice 13 in a circumferential direction. A fan motor 14a configured to rotate the blower fan 14 is connected to the blower fan 14.

[0077] The left outlet 16a and the right outlet 16b, which are configured to guide air discharged from the blower fan 14 to an outside of the cabinet 10, are formed on both sides of the blower fan 14, namely, both sides of the base 12.

[0078] In addition, the second outlet 16c configured to guide air discharged from the blower fan 14 to the outside of the cabinet 10 may be provided on a bottom side of

the base 12. The second outlet 16c may be provided with a control vane 510 configured to open and close the second outlet 16c, and a vane motor 520 configured to rotate the control vane 510.

[0079] A side cover 41, 42 and a lower cover 43 to cover at least the outlet 16 may be coupled to both side surfaces and a lower surface of the base 12. The side cover 41, 42 may be provided with a discharge guide 412 configured to guide air discharged from the outlet 16. The side cover 41, 42 may include a left cover 41 and a right cover 42. The side cover 41, 42 and the lower cover 43 may be collectively referred to as a cover. This will be described in detail later with reference to FIG. 4 and FIG. 8.

[0080] The base 12 is fixed to a wall of an indoor space by a bracket 17 installed on a rear surface of the base 12.

[0081] Meanwhile, an electrical unit 2 constituting a controller 560 of the air conditioner is installed on an upper portion of the orifice 13.

[0082] The heat exchanger 50 is installed at the front of the orifice 13 to cool/heat introduced indoor air heat-exchanged with indoor air, and a drain pan 100 is disposed under the heat exchanger 50 to store (or collect) and discharge condensate generated in the heat exchanger 50.

[0083] Here, the heat exchanger 50 is fixed to the front panel 20 or the orifice 13, and is provided at its one side with a connecting pipe 52 so as to be connected to a refrigerant pipe (not shown) installed from the outside.

[0084] The front panel 20 is disposed at the front of the heat exchanger 50 to be coupled to the base 12.

[0085] The cabinet 10 is provided at its corner with a pipe cover 11, and the pipe cover 11 is installed at a corner of the base 12 to thereby define a portion of the outer appearance of the indoor unit.

[0086] Here, the pipe cover 11 is provided at a plurality of corners among four corners of the cabinet 10. In this embodiment, two pipe covers 11 are respectively installed at two lower corners of the cabinet 10, and an external refrigerant pipe passes through the pipe cover 11 to be guided inside the cabinet 10.

[0087] The front panel 20 is provided with the inlet 15 at its central portion and a front grille 21 by which the inlet 15 is divided into a plurality of regions.

[0088] The inlet 15 is provided with a filter 60 to filter indoor air flowing to the orifice 13.

[0089] Meanwhile, the filter 60 according to the present disclosure is detachably attached to the front panel 20, and in this embodiment, the filter 60 is supported by the front grille 21 of the front panel 20.

[0090] Here, the filter 60 and the front grille 21 that supports the filter 60 may be formed by gently protruding forward by a predetermined thickness with respect to the front panel 20. The filter 60 supported by being seated on the front grille 21 is prevented from contact with the heat exchanger 50.

[0091] Meanwhile, the display panel 30 may be hinged to the front panel 20 by a link assembly 3. The link assembly 3 may include a link 3a and a link motor 3b.

[0092] The display panel 30 may be provided with a display unit 35 configured to display an operation state of the indoor unit, etc. The display panel 30 includes a rear frame 34 and a front frame 32, and the display unit 35 is disposed between the front frame 32 and the rear frame 34.

[0093] The front frame 32 may have an opening through which the display unit 35 is exposed. A side frame 36 may be installed at a portion where the front frame 32 and the rear frame 34 are coupled.

[0094] Hereinafter, a structure of the outlet 16 and a structure of the cover (41, 42, 43) for preventing the formation of dew will be described in detail.

[0095] FIG. 4 a cross-sectional view taken along line 4-4' of the indoor unit in FIG. 1, FIG. 5 is an enlarged view showing a portion of FIG. 4, and FIG. 6 is a cross-sectional view taken along line 6-6' of the indoor unit in FIG. 1.

[0096] Referring to FIGS. 4 to 6, the outlet 16 may define a discharge passage and include a discharge passage front side 162, a discharge passage rear side 161, which face each other, a discharge passage upper side 154 that connects an upper end (or top) of the discharge passage front side 162 to an upper end (or top) of the discharge passage rear side 16, and a discharge passage lower side 166 that connects a lower end (or bottom) of the discharge passage front side 162 to a lower end (or bottom) of the discharge passage rear side 161.

[0097] The outlet 16 defines a discharge passage that covers the left-and-right direction by the discharge passage front side 162, the discharge passage rear side 161, the discharge passage lower side 166, and the discharge passage upper side 164. Here, the discharge passage front side 162 is positioned forward relative to the discharge passage rear side 161.

[0098] A plurality of discharge guides 412 may regulate or control the direction of air discharged to the outlet 16. Here, the discharge guide 412 may be positioned adjacent to a discharge end of the outlet 16.

[0099] Here, the discharge end of the outlet 16 is a left end in the case of the left outlet 16a and a right end in the case of the right outlet 16b.

[0100] The following description will be given based on the left outlet 16a, however, the right outlet 16b has the same configuration as the left outlet 16a.

[0101] The plurality of discharge guides 412 may be integrally formed with the base 12, or may be formed in the side cover 41, 42. In this embodiment, it is illustrated that the plurality of discharge guides 412 are provided in the side cover 41, 42, but the present disclosure is not limited thereto.

[0102] The discharge guide 412 may include a main discharge guide 412a having a first inclination angle $\Theta 1$ with a baseline BL perpendicular to the rotation axis Ax of the blower fan 14, and an auxiliary discharge guide 412b.

[0103] Here, a plurality of main discharge guides 412a

may be provided, and one auxiliary discharge guide 412b may be provided.

[0104] The plurality of discharge guides 412 may extend in the up-and-down direction, the planar area when viewed from the left may be greater than the planar area when viewed from the top. The plurality of discharge guides 412 may be disposed to be inclined upward away from the rotation axis Ax of the blower fan 14. Due to the shape of the discharge guides 412, air discharged in a lateral direction of the cabinet 10 is guided to the front of the cabinet 10.

[0105] The plurality of discharge guides 412 may be arranged to be spaced at predetermined intervals in the up-and-down-direction.

[0106] The auxiliary discharge guide 412b may be disposed closer to the blower fan 14 compared to the main discharge guide 412a. Preferably, the main discharge guides 412a may be biased outward toward the front.

[0107] The auxiliary discharge guide 412b may be disposed rearward relative to the main discharge guide 412a. Preferably, a portion of the auxiliary discharge guide 412b may be located on the same plane as the discharge passage rear side 161 of the outlet 16.

[0108] A main discharge guide 412a, among the main discharge guides 412a, located at the foremost position may be in contact with or adjacent to an outer end (left end) of the discharge passage front side 162. The auxiliary discharge guide 412b may be in contact with or adjacent to an outer end (left end) of the discharge passage rear side 161.

[0109] The auxiliary discharge guide 412b may include a first portion 412b-1 having a first inclination angle $\Theta 1$ with the baseline BL, and a second portion 412b-2 having a second inclination angle $\Theta 2$ with the baseline BL.

[0110] A right end (inner end) of the first portion 412b-1 is connected to a left end (outer end) of the second portion 412b-2, and a right end (inner end) of the second portion 412b-2 is in contact with or adjacent to the left end (outer end) of the discharge passage rear side 161. The second portion 412b-2 may be disposed closer to the blower fan 14 compared to the first portion 412b-1.

[0111] The second inclination angle $\Theta 2$ is less than the first inclination angle $\Theta 1$. Here, it is preferable that the second inclination angle $\Theta 2$ has a range of 2 to 6 degrees, and the first inclination angle $\Theta 1$ has a range of 15 to 30 degrees.

[0112] As the auxiliary discharge guide 412b disposed at the rearmost position in the cabinet 10 is divided into two portions, and a portion located closer to the outlet 16 has a smaller slope than a portion located farther from the outlet 16, a rapid change in direction of air at the rear of the cabinet 10 can be suppressed. As a result, a decrease in flow velocity of air is not caused, and the formation of dew is prevented.

[0113] In addition, as the first portion 412b-1 of the auxiliary discharge guide 412b and the main discharge guide 412a are configured to have the same inclination angle, air discharged through the auxiliary discharge guide 412b is discharged, without causing the formation of dew, as desired or set by a user.

[0114] Hereinafter, the structure of the outlet 16 for preventing the formation of dew on the rear of the cabinet 10 will be described.

[0115] The discharge passage rear side 161 may have a third inclination angle $\Theta 3$ with the baseline BL, and the third inclination angle $\Theta 3$ may be less than the first inclination angle $\Theta 1$ of each of the main discharge guide 412a and the first portion 412b-1 of the auxiliary discharge guide 412b.

[0116] Air discharged to the outside of the cabinet 10 by the centrifugal fan is primarily guided in its direction by the discharge passage rear side 161. When a change in the direction is too rapid, a decrease in flow velocity at the discharge passage rear side 161 and an increase in unevenness of the air flow are caused. Therefore, in order to prevent such a decrease in the flow velocity, the discharge passage rear side 161 of the present disclosure has a gentle or shallow inclination angle.

[0117] The third inclination angle $\Theta 3$ may be equal to the second inclination angle $\Theta 2$. Alternatively, the third inclination angle $\Theta 3$ may have a range of 1 to 7 degrees, and the third inclination angle $\Theta 3$ may be different from the second inclination angle $\Theta 2$.

[0118] The discharge passage rear side 161 may be inclined upward toward the outside (left and right sides). A slope of the discharge passage rear side 161 may be constant or increase toward the outside. A length of the discharge passage rear side 161 in the left-and-right direction may be greater than a length of the main discharge guide 412a in the left-and-right direction and a length of the auxiliary discharge guide 412b in the left-and-right direction.

[0119] Specifically, the second portion 412b-2 may be located on the same plane as the discharge passage rear side 161. An upper end of the second portion 412b-2 and an upper end of the discharge passage rear side 161 may be located on the same straight line on a cross section. When the upper end of the second portion 412b-2 and the upper end of the discharge passage rear side 161 are located on the same straight line on the cross section, resistance of air entering the auxiliary discharge guide 412b from the outlet 16 may be reduced to thereby prevent a decrease in flow velocity.

[0120] A rear guide 163 may be connected to a right end of the discharge passage rear side 161. The rear guide 163 compensates for a length difference between upper and lower portions of the centrifugal fan and guides air discharged from the centrifugal fan to the discharge passage rear side 161. The rear guide 163 may be disposed to be inclined upward toward the outside, and an inclination angle of the rear guide 163 may be less than the inclination angle of the main discharge guide 412a and greater than the inclination angle of the discharge passage rear side 161.

[0121] The discharge passage front side 162 may include a first front portion 162a that is parallel to the dis-

charge passage rear side 161, and a second front portion 162b that is parallel to the main discharge guide 412a.

[0122] The first front portion 162a is disposed closer to the blower fan 14 compared to the second front portion 162b. An outer end of the second front portion 162b may be in contact with an inner end of the main discharge guide 412a located at the foremost position among the main discharge guides 412a.

[0123] A lower surface of the second front portion 162b may be disposed on the same straight line on a cross section as a lower surface of the main discharge guide 412a located at the foremost position among the main discharge guides 412a. When the lower surface of the second front portion 162b is located on the same straight line on the cross section as the lower surface of the main discharge guide 412a located at the foremost position among the main discharge guides 412a, it is possible to reduce resistance of air entering the main discharge guide 412a located at the foremost position to thereby prevent a decrease in flow velocity.

[0124] One end of the first front portion 162a connected to the second front portion 162b may be located closer to the rotation axis Ax of the blower fan 14 compared to the outer end (left end) of the discharge passage rear side 161. The distances mentioned herein are based on the minimum distance between two points. In addition, a direction away from the rotation axis Ax of the blower fan 14 may be defined as an outward direction, and a direction closer to the rotation axis Ax of the blower fan 14 may be defined as an inward direction. The outer end (left end) of the second front portion 162b may be located farther from the rotation axis Ax of the blower fan 14 compared to the outer end of the discharge passage rear side 161.

[0125] When the discharge passage front side 162 and the discharge passage rear side 161 of the outlet 16 have the aforementioned arrangement, air discharged in the outward direction with respect to the rotation axis Ax of the blower fan 14 can be easily changed in direction to the front. In addition, unevenness of the air flow can be suppressed, and the formation of dew can be prevented.

[0126] The main discharge guide 412a and the auxiliary discharge guide 412b are installed at the left outlet 16a and the right outlet 16b.

[0127] As described above, the plurality of discharge guides 412 may be integrally formed with the base 12, however, for ease of manufacturing, the plurality of discharge guides 412 are preferably formed in the side cover 41, 42.

[0128] Hereinafter, the structure of the side cover 41, 42 will be described in detail. FIGS. 7 and 8 illustrate the left cover 41, however, the right cover 42 has the same structure as the left cover 41.

[0129] FIG. 7 is a perspective view of a left cover according to an embodiment of the present disclosure, and FIG. 8 is a longitudinal cross-sectional view of the left cover of FIG. 7.

[0130] Referring to FIGS. 5 to 8, the side cover 41, 42 includes a cover plate 411 coupled to the cabinet 10, and a cover opening 413 formed through the cover plate 411 and disposed corresponding to the outlet 16 to allow air discharged to the outlet 16 to be discharged therethrough.

[0131] The cover plate 411 may be provided with a coupling element coupled to the base 12. The cover plate 411 may cover at least the outlet 16. Preferably, the cover plate 411 may have a shape and a size corresponding to each surface of the base 12, and may cover both side surfaces of the base 12.

[0132] The cover opening 413 may be formed through the cover plate 411, and may be positioned to correspond to the outlet 16. Air discharged to the outlet 16 is discharged through the cover opening 413. The plurality of discharge guides 412 may be disposed in the cover opening 413.

[0133] The cover opening 413 may be defined by an opening edge (421, 422, 424, 425), and the opening edge (421, 422, 424, 425) may include a front edge 425 that extends in a direction parallel to the discharge guide 412, a rear edge 424 that faces the front edge 425, an upper edge 421 that connects an upper end (or top) of the front edge 425 and an upper end (or top) of the rear edge 424, and a lower edge 422 that connects a lower end (or bottom) of the front edge 425 and a lower end (or bottom) of the rear edge 424.

[0134] The opening edge 421, 422, 424, 425 may be disposed corresponding to the discharge passage side of the outlet 16. In detail, the front edge 425 may be or include the main discharge guide 412a located at the foremost position among the main discharge guides 412a, and the rear edge 424 may be or include the auxiliary discharge guide 412b. As the front edge 425 and the rear edge 424 are disposed to correspond to the discharge passage front side 162 and the discharge passage rear side 161, resistance of air in a connecting portion between the side cover 41, 42 and the outlet 16 can be reduced.

[0135] Alternatively, in another embodiment, the front edge 425 and the main discharge guide 412a may be provided separately, the rear edge 424 and the auxiliary discharge guide 412b may be provided separately, and the opening edge 421, 422, 424, 425 may be disposed to correspond to the discharge passage side of the outlet 16.

[0136] In addition, a lower end (or bottom) of the upper edge 421 and a lower end (or bottom) of the discharge passage upper side 164 may be located on the same line, and an upper end (or top) of the lower edge 422 and an upper end (or top) of the discharge passage lower side 166 may be disposed on the same line. As the bottom of the upper edge 421 and the bottom of the discharge passage upper side 164 are disposed on the same line, and the top of the lower edge 422 and the top of the discharge passage lower side 166 are disposed on the same line, resistance of air in the connecting portion between the side cover 41, 42 and the outlet 16 can be

reduced.

[0137] A seating groove 165 in which the upper edge 421 and the lower edge 422 are seated may be formed in the base 12. The upper edge 421 and the lower edge 422 protrude inward from the cover plate 411.

[0138] The opening edge 421, 422, 424, 425 may include a rounded portion 430 with a curvature. Specifically, the rounded portion 430 is formed on each of the upper edge 421 and the lower edge 422. More specifically, one end of the opening edge 421, 422, 424, 425 is connected to one end of the cover plate 411, and the rounded portion 430 is positioned at a portion where the opening edge 421, 422, 424, 425 and the cover plate 411 are connected.

[0139] Due to the discharge guide 412, unevenness of the air flow at the front and rear sides of the opening edge 421, 422, 424, 425 are suppressed, but the air flow at the upper and lower sides of the opening edges 421, 422, 424, 425 is interrupted in the connecting portion with the cover plate 411, causing a decrease in flow velocity of air. This unevenness of the air flow can be solved by designing rounded upper and lower connecting portions between the cover plate 411 and the opening edge 421, 422, 424, 425.

[0140] The rounded portion 430 is eccentric from the opening edge 421, 422, 424, 425 to a direction away from the blower fan 14. Of the rounded portion 430, a center of a radius of curvature of an upper rounded portion 431 formed on the upper edge 421 may be located upward relative to the discharge passage front side 164 and located inward relative to the cover plate 411.

[0141] Of the rounded portion 430, a center of a radius of curvature of a lower rounded portion 432 formed on the lower edge 422 may be located downward relative to the discharge passage lower side 166 and located inward relative to the cover plate 411.

[0142] FIG. 9 is a cross-sectional perspective view showing an open state of a second outlet of the indoor unit in FIG. 1, FIG. 10 is a cross-sectional view showing an open state of the second outlet of the indoor unit in FIG. 1, and FIG. 11 is a cross-sectional view showing a closed state of the second outlet of the indoor unit in FIG. 1.

[0143] Referring to FIGS. 9 to 11, the heat exchanger 50 is positioned between the inlet 15 and the orifice 13. The orifice 13 is positioned between the heat exchanger 50 and the blower fan 14. The inlet 15 may be positioned forward relative to the heat exchanger 50 and the orifice 13.

[0144] The heat exchanger 50 is positioned at the rear of the inlet 15, the orifice 13 is positioned at the rear of the heat exchanger 50, the blower fan 14 is positioned at the rear of the orifice 13, and the fan motor 14a is positioned at the rear of the blower fan 14.

[0145] The outlet 16 may be positioned rearward relative to the heat exchanger 50 and the orifice 13. At least a portion of the blower fan 14 may be positioned to vertically overlap the outlet 16.

[0146] The drain pan 100 is disposed under the heat exchanger 50 to collect condensate falling from the heat exchanger 50. The drain pan 100 may vertically overlap the heat exchanger 50, and may have a width greater than a width of the heat exchanger 50.

[0147] For example, the drain pan 100 may include a first drain member 101 that is positioned forward relative to the heat exchanger 50, a second drain member 102 that is positioned rearward relative to the heat exchanger 50, and a third drain member 103 that connects lower ends of the first drain member 101 and the second drain member 102.

[0148] The condensate dropped from the heat exchanger 50 may flow along a space between the first drain member 101 and the second drain member 102. This prevents the condensate dropped from the heat exchanger 50 from being introduced into the second outlet 16c.

[0149] The drain pan 100 may further include a fourth drain member 104 that is disposed between the first drain member 101 and the second drain member 102 and supports the heat exchanger 50.

[0150] The orifice 13 guides air introduced from the inlet 15 to the blower fan 14, and supplies the air to the blower fan 14 by decompressing the air introduced from the inlet 15 to the blower fan 14.

[0151] The orifice 13 may include a guide hole 131. The orifice 13 may have a size that covers at least the inlet 15 and the heat exchanger 50.

[0152] The guide hole 131 has a smaller cross-sectional area than the inlet 15 and the heat exchanger 50, and is formed through the orifice 13. The guide hole 131 allows air introduced through the inlet 15 to be reduced in pressure and guides the air to the blower fan 14.

[0153] The guide hole 131 may have a circular shape. Specifically, the guide hole 131 may have a circular shape centered on the rotation axis Ax of the blower fan 14.

[0154] The cross-sectional area of the guide hole 131 may decrease in a direction from the inlet 15 to the blower fan 14. The orifice 13 may further include a guide edge 132 that covers the guide hole 131 and protrudes rearward from a main body 133.

[0155] The guide edge 132 may define a boundary of the guide hole 131. The guide edge 132 may have a ring shape and may be inclined in a direction to the rotation axis Ax of the blower fan 14 toward the rear.

[0156] In the process of cooling air by the heat exchanger 50, condensate may accumulate in the heat exchanger 50. This condensate may flow from the heat exchanger 50 to the blower fan 14 due to pressure of the blower fan 14, and the condensate introduced into the blower fan 14 may be discharged through the second outlet 16c. In order to solve this problem, the orifice 13 of the present disclosure further includes a condensate inflow prevention portion 135.

[0157] The condensate inflow prevention portion 135 may prevent condensate generated in the heat exchang-

er 50 from being introduced into the outlet 16.

[0158] The condensate inflow prevention portion 135 may protrude from a bottom of the guide hole 131 to a center of the guide hole 131. When the condensate water inflow prevention portion 135 protrudes too much, the volume of air introduced through the guide hole 131 is reduced to thereby reduce the efficiency of the heat exchanger 50, whereas when the condensate water inflow prevention portion 135 protrudes too little, the inflow of condensate is not prevented.

[0159] Therefore, it is preferable that an upper end of the condensate water inflow prevention portion 135 is located above a lower end of the heat exchanger 50. When the upper end of the condensate inflow prevention portion 135 is located higher than the lower end of the heat exchanger 50, condensate generated in the heat exchanger 50 is collected at the bottom of the heat exchanger 50 due to gravity, thereby suppressing the condensate from entering a bottom of the orifice 13.

[0160] A height of the upper end of the condensate inflow prevention portion 135 may be located below the center of the guide hole 131 and located above the lower end of the heat exchanger 50. Preferably, the upper end of the condensate inflow prevention portion 135 may have a height of 5% to 15% relative to a height of the center of the guide hole 131 with respect to the bottom of the guide hole 131.

[0161] The upper end of the condensate inflow prevention portion 135 may extend horizontally in the left-and-right direction. The upper end of the condensate inflow prevention portion 135 may define a chord of a predetermined fan centered on the bottom of the guide hole 13.

[0162] As the bottom of the guide hole 131 is located slightly higher than the lower end of the heat exchanger 50, condensate may be introduced through the bottom of the guide hole 131. However, since a remining portion other than the bottom of the guide hole 131 has a height sufficiently higher than the lower end of the heat exchanger 50, the inflow of condensate is prevented. Therefore, the condensate water inflow prevention portion 135 is formed at the bottom of the guide hole 131.

[0163] The condensate inflow prevention portion 135 may be located at a position that vertically overlaps the guide hole 131 or the rotation axis Ax of the blower fan 14. The condensate inflow prevention portion 135 may be disposed rearward relative to the heat exchanger 50 and disposed forward relative to the blower fan 14. The condensate inflow prevention portion 135 may be disposed rearward relative to the drain pan 100.

[0164] Thus, the lower end of the orifice 13 is positioned below the lower end of the heat exchanger 50, the bottom of the guide hole 131 is positioned above the lower end of the heat exchanger 50, and the upper end of the condensate inflow prevention portion 135 is positioned above the bottom of the guide hole 131.

[0165] The second drain member 102 of the drain pan 100 may be positioned rearward relative to a lower end of the main body 133 of the orifice 13, and the first drain member 101 and the fourth drain member 104 may be positioned forward relative to the lower end of the main body 133. Due to this structure, some of the condensate falling from the drain pan 100 can be prevented from being introduced into a space between the drain pan 100 and the lower end of the main body 133.

[0166] The condensate inflow prevention portion 135 may extend upward from the bottom of the guide hole 131, but may have various structures for effectively preventing the inflow of condensate.

[0167] For example, the condensate inflow prevention portion 135 may include a first prevention portion 135a that extends from the guide hole 131 in a central direction of the guide hole 131 and a second prevention portion 135b that extends from one end of the first prevention portion 135a in a direction intersecting the first prevention portion 135a.

[0168] The second prevention portion 135b may protrude from one end of the first prevention portion 135a to a direction in which the heat exchanger 50 is positioned.

[0169] In detail, the first prevention portion 135a may extend upward from the bottom of the guide hole 131, the second prevention portion 135b may protrude forward from an upper end of the first prevention portion 135a. The first prevention portion 135a may extend upward from the bottom of the guide hole 131, and the second prevention portion 135b may extend from the upper end of the first prevention portion 135a in a direction between the front direction and the upward direction.

[0170] As the condensate inflow prevention portion 135 includes the first prevention portion 135a that extends upward and the second prevention portion 135b that protrudes from the upper end of the first prevention portion 135a toward the indoor unit, condensate is primarily blocked by the first prevention portion 135a even when condensate formed on the bottom of the indoor unit is introduced into the bottom of the orifice 13 due to the flow of air, and the inflow of condensate can be suppressed by the second prevention portion 135b even when the condensate flows into the top of the first prevention portion 135a due to the pressure of air.

[0171] The condensate inflow prevention portion 135 is positioned between the heat exchanger 50 and the blower fan 14, and is positioned to overlap the lower end of the heat exchanger 50 in the front-and-rear direction.

[0172] The outlet 16 may define a discharge passage and may include a discharge passage front side 162, a discharge passage rear side 161, which face each other, a discharge passage upper side 164 that connects an upper end (or top) of the discharge passage front side 162 to an upper end (or top) of the discharge passage rear side 161, and a discharge passage lower side 166 that connects a lower end (or bottom) of the discharge passage front side 162 to a lower end (or bottom) of the discharge passage rear side 161.

[0173] The second outlet 16c is defined as a discharge passage that covers the front-and-rear direction and the

left-and-right direction by a lower passage front side 167, a lower passage rear side 168, and one side of the base 12. The second outlet 16c is a flow path that is open at least at the top and the bottom, and the top of the second outlet 16c communicates with the blower fan 14, and the bottom of the second outlet 16c communicates with the outside.

[0174] Here, the lower passage front side 167 is spaced apart from the lower passage rear side 168 to be positioned forward relative to the lower passage rear side 168.

[0175] The lower passage front side 167 and the lower passage rear side 168 may be integrally formed with the base 12 or may be configured separately.

[0176] A lower end of the orifice 13 may be supported on an upper end of the lower passage front side 167. Specifically, the upper end of the lower passage front side 167 supports a lower end of the guide edge 132 of the orifice 13.

[0177] Lower portions of the lower passage lower side 167 and the lower passage rear side 168 may have a slope. The lower passage front side 167 and the lower passage rear side 168 may protrude forward at least from top to bottom.

[0178] The lower passage front side 167 and the lower passage rear side 168 have an inclination angle shallower than a slope of the discharge guide of the lower cover 43, which provides a smooth change in direction when the direction of air is changed in the second outlet 16c through the discharge guide. Accordingly, the flow velocity of air discharged through the outlet is increased, and the air discharged through the outlet has a uniform speed, preventing the formation of dew around the outlet.

[0179] The second outlet 16c is provided with a control vane 510 configured to regulate or control air discharged through the second outlet 16c.

[0180] The control vane 510 may be rotatably installed on the second outlet 16c by the hinge 511. The control vane 510 is rotatably installed on the lower passage rear side 168 by the hinge 511.

[0181] The direction of a rotation axis of the hinge 511 may be a direction that intersects the front-and-rear direction and the up-and-down direction. Preferably, the direction of the rotation axis of the hinge 511 is parallel to the left-and-right direction.

[0182] The control vane 510 has a structure that allows the second outlet 16c to be closed effectively when the control vane 510 closes the second outlet 16c and does not increase resistance of air passing through the second outlet 16c when the control vane 410 opens the second outlet 16c.

[0183] For example, the control vane 510 may include a first vane portion 512 that is connected to the hinge 511, and a second vane portion 513 that is connected to one end of the first vane portion 512.

[0184] The first vane portion 512 and the second vane portion 513 may form a predetermined inclination angle, instead of being parallel to each other. An inclination angle $\Theta 6$ between the first vane portion 512 and the second vane portion 513 may be less than or equal to an inclination angle $\Theta 5$ of each of the lower passage front side 167 and the lower passage rear side 168.

[0185] As for the inclination angle $\Theta 6$ between the first vane portion 512 and the second vane portion 513, when the control vane 510 opens the second outlet 16c, the control vane 510 comes into close contact with the lower passage rear side 168 in line with the inclination angle $\Theta 5$ of the lower passage rear side 168, thereby reducing air resistance by the control vane 510.

[0186] A plurality of grooves 516 may be formed in front surfaces of the first vane portion 512 and the second vane portion 513. The plurality of grooves 516 may extend in the left-and-right direction. The formation of dew on the control vane 510 can be prevented due to the plurality of grooves 516.

[0187] A first vane protrusion 515 may be formed on one end of the first vane portion 512. The first vane protrusion 515 may be formed by protruding from the first vane portion 512. The first vane protrusion 515 may extend in a direction intersecting the first vane portion 512. Specifically, the first vane protrusion 515 may protrude forward from the front surface of the first vane portion 512.

[0188] A second vane protrusion 514 may be formed on one end of the second vane portion 513. The second vane protrusion 514 may be formed by protruding from the second vane portion 513. The second vane protrusion 514 may extend in a direction intersecting the second vane portion 513. Specifically, the second vane protrusion 514 may protrude forward from the front surface of the second vane portion 513.

[0189] The first vane protrusion 515 comes into contact with the lower passage front side 167 when the control vane 510 closes the second outlet 16c, and the second vane protrusion 514 comes into contact with lower passage rear side 168 when the control vane 510 closes the second outlet 16c.

[0190] When the control vane 510 closes the second outlet 16c, the first vane protrusion 515 and the second vane protrusion 514 allow the contact area between the control vane 510 and each of the lower passage front side 167 and the lower passage front side 168 to increase, thereby suppressing air from being discharged to a space between the control vane 510 and each of the lower passage front side 167 and the lower passage front side 168.

[0191] The base 12 is provided with a hidden portion 169 in which the control vane 510 is hidden. The hidden portion 169 is formed by one surface of the second outlet 16c being recessed and defines a space in which the control vane 510 is accommodated.

[0192] Specifically, the hidden portion 169 may be formed by the rear surface of the base 12 being recessed rearward. More specifically, the hidden portion 169 may be formed by the lower passage rear side 168 being recessed rearward. The hidden portion 169 may have a shape corresponding to the control vane 510.

[0193] For example, the hidden portion 169 may include a first hidden surface 169b having a step with the lower passage rear side 168, and a second hidden surface 169c connected to a lower end of the first hidden surface 169b to extend downward while forming an inclination angle with the first hidden surface 169b. The inclination angle formed by the first hidden surface 169b and the second hidden surface 169c may be the same as the inclination angle formed by the first vane portion 512 and the second vane portion 513.

[0194] The first hidden surface 169b may extend parallel to the vertical direction. The first hidden surface 169b may be connected to the lower passage rear side 168 by a recessed surface 169a.

[0195] An accommodation space 168d in which the control vane 510 is accommodated is defined at the front of the first hidden surface 169b and the second hidden surface 169c.

[0196] In a state where the control vane 510 opens the second outlet 16c as shown in FIG. 10, air inside the cabinet 10 is discharged to the outside through the left outlet 16a, the right outlet 16b, and the second outlet 16c.

[0197] In a state where the control vane 510 closes the second outlet 16c as shown in FIG. 11, air inside the cabinet 10 is discharged to the outside through the left outlet 16a and the right outlet 16b. Thus, in this case, the flow velocity of the air discharged through the left outlet 16a and the right outlet 16b can be increased.

[0198] Hereinafter, a control method of preventing dew formation will be described.

[0199] FIG. 12 is a control block diagram according to an embodiment of the present disclosure, and FIG. 13 is a control method according to an embodiment of the present disclosure.

[0200] Referring to FIGS. 12 and 13, the present disclosure may further include a temperature sensor 525, a humidity sensor 530, and a controller 560.

[0201] The temperature sensor 525 may be installed at the cabinet 10. Specifically, the temperature sensor 525 may be installed to be adjacent to the left inlet 16a or the right inlet 16b. The temperature sensor 525 may provide temperature information to the controller 560.

[0202] The humidity sensor 530 may be installed at the cabinet 10. Specifically, the humidity sensor 530 may be installed to be adjacent to the left outlet 16a or the right outlet 16b. The humidity sensor 530 may provide relative humidity information to the controller 560.

[0203] The controller 560 may determine a dew formation condition based on temperature and humidity around the cabinet 10 and a rotational speed of the fan motor 14a. When the dew formation condition is satisfied, the controller 560 may control the vane motor 520 such that the control vane 510 closes the second outlet 16c.

[0204] When the second outlet 16c is closed by the control vane 510 under the dew formation condition, the flow velocity of air discharged to the first outlet 16a, 16b increases, thereby preventing the formation of dew on the first outlet 16a, 16b and the second outlet 16c.

[0205] When the temperature around the cabinet 10 is in a predetermined temperature range, the humidity around the cabinet 10 is greater than or equal to predetermined reference humidity, and the rotational speed of the fan motor 14a is less than a reference speed, the controller 560 may determine that the dew formation condition is satisfied.

[0206] In addition, when the dew formation condition is satisfied, the controller 560 may increase the rotational speed of the fan motor 14a from a current rotational speed. When the rotational speed of the fan motor 14a is increased from the current rotational speed based on the dew formation condition being satisfied, the formation of dew on the outlet 16 can be prevented.

[0207] Referring to FIG. 13, the temperature sensor 525 measures temperature around the cabinet 10 to provide the measured temperature to the controller 560 (S10).

[0208] The humidity sensor 530 measures humidity around the cabinet 10 to provide the measured humidity to the controller 560 (S20).

[0209] A rotational speed of the fan motor 14a is measured (S30). The rotational speed of the fan motor 14a may be measured with an ammeter, etc.

[0210] Based on the temperature and humidity around the cabinet 10 and the rotational speed of the fan motor 14a, the controller 560 determines a dew formation condition (S40).

[0211] Based on the dew formation condition being satisfied, the controller 560 controls the vane motor 520 such that the control vane 510 closes the second outlet 16c (S50).

[0212] In addition, based on the dew formation condition being satisfied, the controller 560 may increase the rotational speed of the fan motor 14a from a current rotational speed (S60).

[0213] The indoor unit of the present disclosure has one or more of the following effects.

[0214] First, as a rear side of an outlet has a shallower inclination angle than a discharge guide, a smooth change in direction can be achieved when air discharged from the outlet through the discharge guide, the air discharged through the outlet can be increased in flow velocity and have a uniform speed, thereby preventing the formation of dew around the outlet.

[0215] Second, as the discharge guide located on the same plane as the rear side of the outlet is configured to have a portion with the same inclination angle as the rear side of the outlet and a portion with a greater inclination angle than the rear side of the outlet, allowing air discharged from the outlet to the discharge guide to be more smoothly changed in direction of the air to thereby prevent the formation of dew on the rear side of the outlet. In addition, as the discharge guide has a large angle at the rear side of the outlet, the formation of dew on a wall adjacent to the rear side of the outlet can be prevented.

[0216] Third, as a front side of the outlet is configured to have a portion with an angle equal to an inclination

angle of the discharge guide and a portion with an angle lower than the inclination angle of the discharge guide, a smooth change in direction can be made when the direction of air is changed at the front of the outlet through the discharge guide. Thus, the formation of dew on the front side of the outlet can be prevented.

[0217] Fourth, as a cover opening through which air in the outlet passes is formed in a cover that covers the outlet, a plurality of discharge guides are formed in the cover opening, and portions of the upper and lower sides of the cover opening are rounded, uneven flow of air at the top and the bottom of the cover opening can be suppressed, and the formation of dew on the top and the bottom of the cover opening can be prevented.

[0218] Fifth, by providing at least two outlets, when a dew formation condition is formed at the outlet, one of the two outlets is closed or the discharge rate of air is increased, thereby preventing the formation of dew around the outlet.

[0219] Sixth, as a control vane that opens and closes a bottom outlet is installed at the bottom outlet, one outlet is closed or the discharge rate of air is increased when a dew formation condition is formed, thereby preventing the formation of dew around the outlet. In addition, due to the control vane, an increase in flow resistance of air discharged through the bottom outlet can be suppressed.

[0220] Seventh, by increasing the contact area with both sides of the bottom outlet through vane protrusions on both ends of the control vane, a gap between the control vane and each of both sides of the bottom outlet is reduced when the control vane closes the bottom outlet, and thus, air is prevented from being released through the bottom outlet when the control vane closes the bottom outlet.

[0221] The above-described features, configurations, effects, and the like are included in at least one of the embodiments of the present disclosure, and should not be limited to only one embodiment. In addition, the features, configurations, effects, and the like as illustrated in each embodiment may be implemented with regard to other embodiments as they are combined with one another or modified by those skilled in the art. Thus, content related to these combinations and modifications should be construed as including in the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

1. An indoor unit of an air conditioner comprising:

a cabinet (10) having an inlet (15) through which air is introduced and an outlet (16) through which air is discharged;
a heat exchanger (50) disposed in the cabinet (10);
a blower fan (14) disposed in the cabinet (10), the blower fan (14) being configured to draw in air through the inlet (15) and discharge the air through the outlet (16); and
a plurality of discharge guides (412) configured to control a direction of the air discharged through the outlet (16),
wherein the plurality of discharge guides (412) comprises:

a main discharge guide (412a) that has a first inclination angle (O1) with respect to a baseline perpendicular to a rotation axis of the blower fan; and
an auxiliary discharge guide (412b) comprising a first portion (412b-1) that has the first inclination angle (O1) with the baseline and a second portion (412b-2) that has a second inclination angle (Θ2) with the baseline, and
wherein the second inclination angle (Θ2) is less than the first inclination angle (O1).

2. The indoor unit of claim 1, wherein the auxiliary discharge guide (412b) is disposed closer to the blower fan (50) than the main discharge guide (412a).

3. The indoor unit according to any one of the preceding claims, wherein the second portion (412b-2) is disposed closer to the blower fan (50) than the first portion (412b-1) and/or than the main discharge guide (412a).

4. The indoor unit according to any one of the preceding claims, wherein the outlet (16) defines a discharge passage and comprises a discharge passage front side (162) and a discharge passage rear side (161) that face each other.

5. The indoor unit of claim 4, wherein the discharge passage rear side (161) has a third inclination angle (Θ3) with the baseline being less than the first inclination angle (Θ1) and/or equal to the second inclination angle (Θ2).

6. The indoor unit of claims 4 or 5, wherein one end of the second portion (412b-2) of the auxiliary discharge guide (412b) is in contact with one end of the discharge passage rear side (161).

7. The indoor unit of any one of claims 4 to 6, wherein the second portion (412b-2) of the auxiliary discharge guide (412b) is located on a same plane as the discharge passage rear side (161) and/or provided to be flush with the discharge passage rear side (161).

8. The indoor unit of claim any one of claims 4 to 7, wherein the discharge passage front side (162) comprises:

a first front portion (162a) extending parallel to the discharge passage rear side (162); and
a second front portion (162b) extending parallel to the main discharge guide (412a).

9. The indoor unit of claim 8, wherein the first front portion (162a) is disposed closer to the blower fan (14) compared to the second front portion (162b), and/or wherein an end of the first front portion (162a) that is connected to the second front portion (162b) is disposed closer to the blower fan (14) than an end of the discharge passage rear side (161) adjacent to the discharge guide (412).

10. The indoor unit according to any one of the preceding claims, further comprising:

a cover (41) covering the outlet (16) of the cabinet (10) and having a cover opening (413) corresponding to the outlet (16) in order to allow air discharged through the outlet (16) to be discharged through the cover opening (413),
wherein the plurality of discharge guides (412) extends over the cover opening (413).

11. The indoor unit of claim 10, wherein the cover (41) comprises a cover plate (411) coupled to the cabinet (10) and in which the cover opening (413) is formed, wherein the cover opening (413) is defined by an opening edge of the cover plate (41).

12. The indoor unit of claim 11, wherein the opening edge comprises a rounded portion (430, 431, 432) with a curvature.

13. The indoor unit of claim 11 or 12, wherein the opening edge comprises:

a front edge (425) and a rear edge (424) facing each other and extending parallel to the plurality of discharge guides (412);
an upper edge (421) and a lower edge (422) respectively connecting opposite ends of the front edge (425) and the rear edge (424) to each other;
wherein the rounded portion (430, 431, 432) is formed on each of the upper edge (421) and the lower edge (422).

14. The indoor unit of claim 13, wherein the rounded portion (430, 431, 432) is eccentric from the upper edge (421) to a direction away from the blower fan (14).

15. The indoor unit of claim 12, 13 or 14, wherein one end of the opening edge is connected to one end of the cover plate (411), and
wherein the rounded portion (430, 431, 432) is positioned at a portion where the opening edge and the cover plate (411) are connected.

Fig. 1

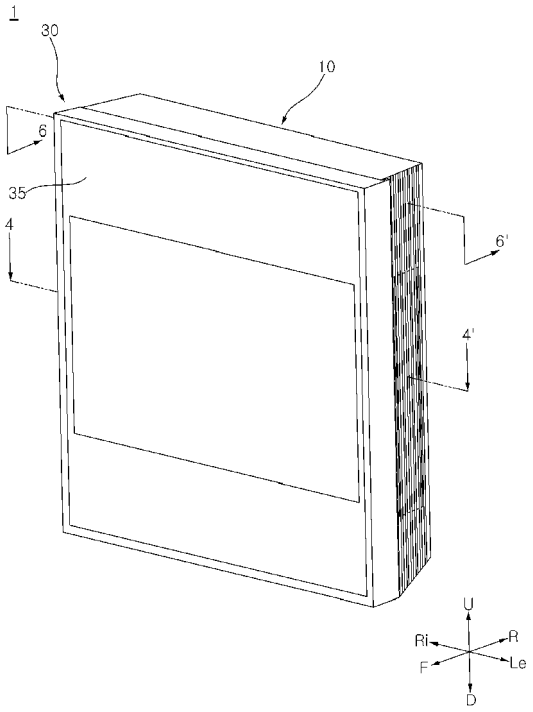


Fig. 2

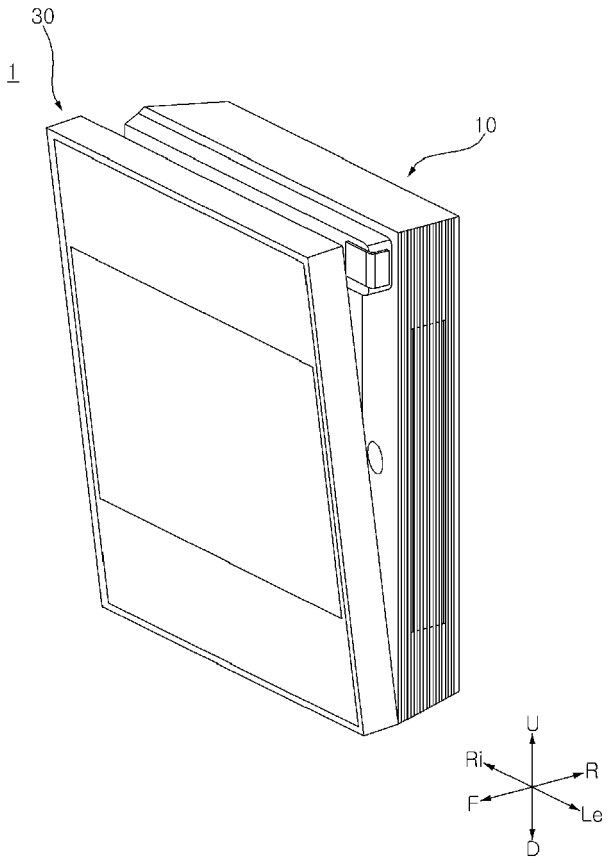


Fig. 3

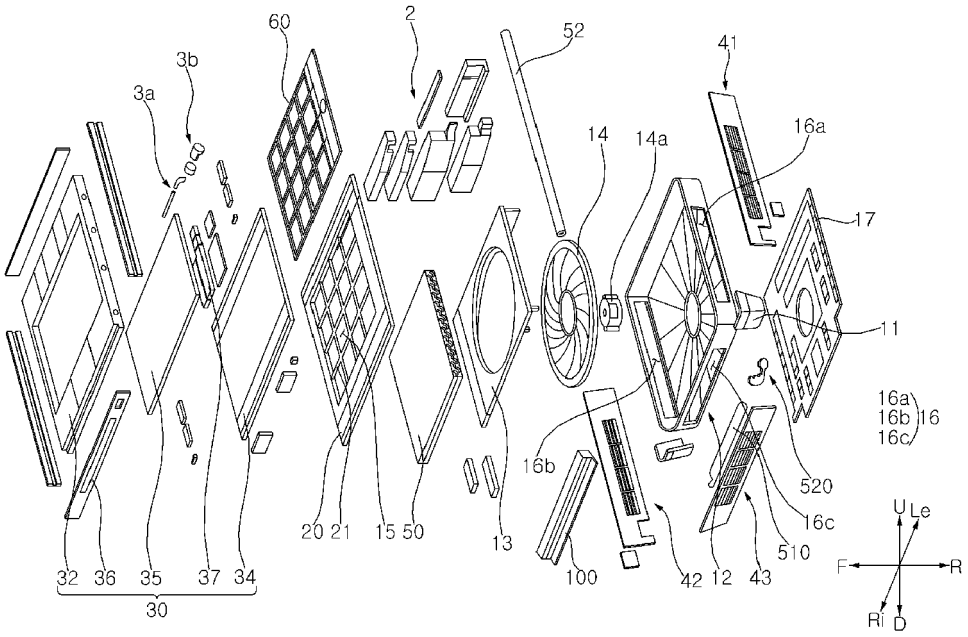

60
2
52
41
3b
3a
14
14a
16a
17
11
16a
16b
16c
16
16b
520
16c
510
U
Le
F
R
Ri
D
20
21
15
50
13
100
42
12
43
32
36
35
37
34
30

Fig. 4

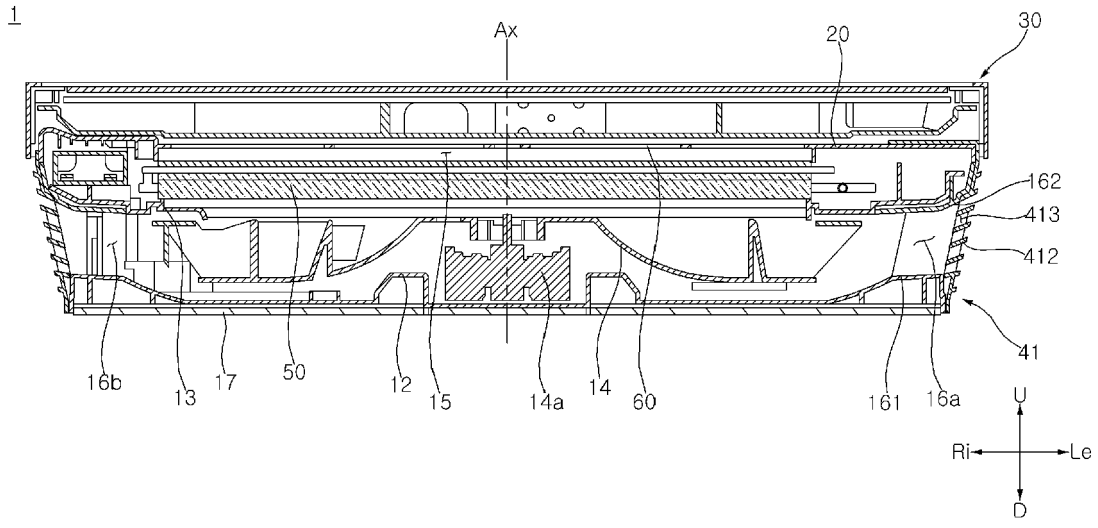

1
Ax
20
30
162
413
412
41
16b
13
17
50
12
15
14a
14
60
161
16a
U
Ri
Le
D

Fig. 5

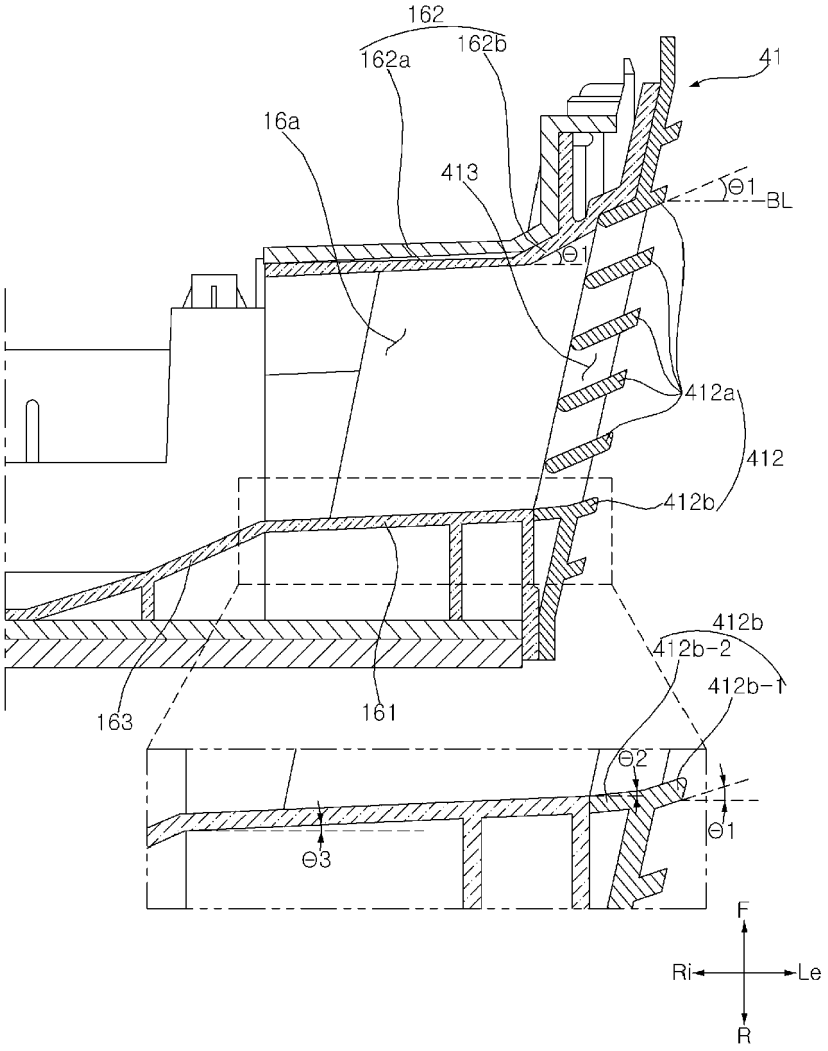

162
162a
162b
41
16a
413
θ1
BL
θ1
412a
412
412b
412b
412b-2
412b-1
163
161
θ2
θ1
θ3
F
Ri
Le
R

Fig. 6

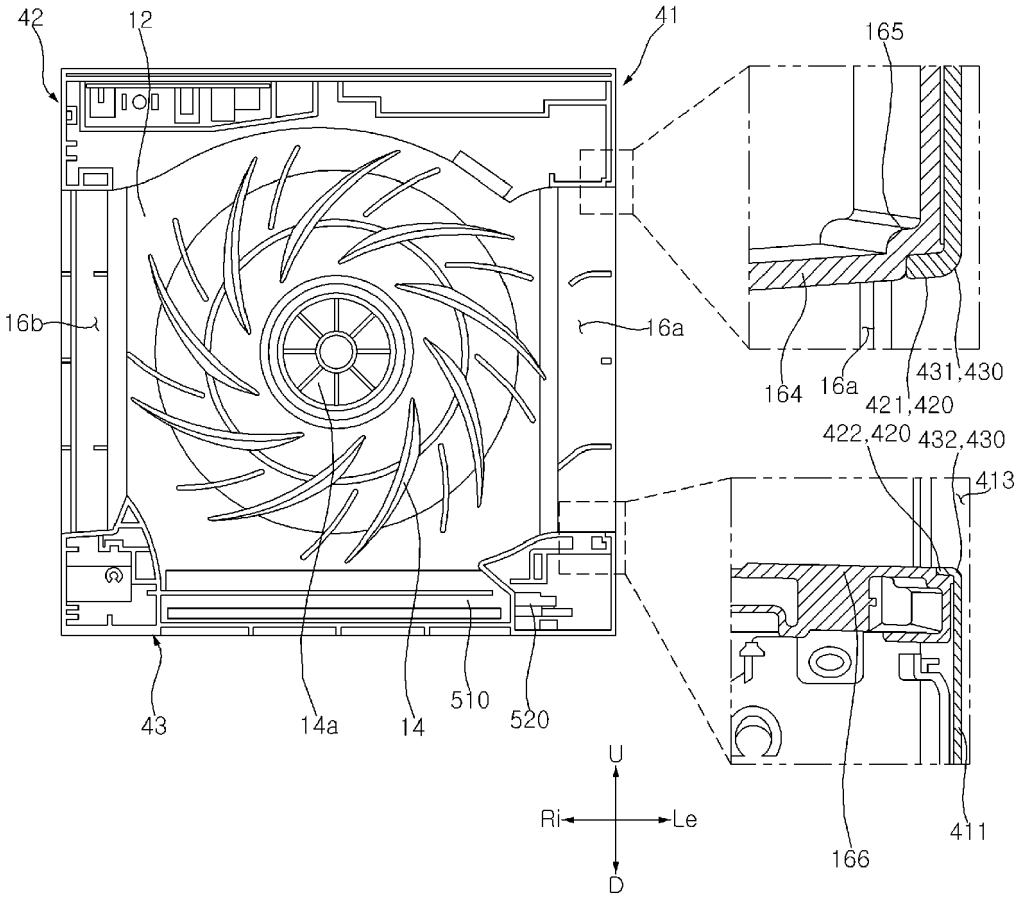

42
12
41
165
16b
16a
164
16a
431,430
421,420
422,420
432,430
413
43
14a
14
510
520
U
Ri
Le
D
166
411

Fig. 7

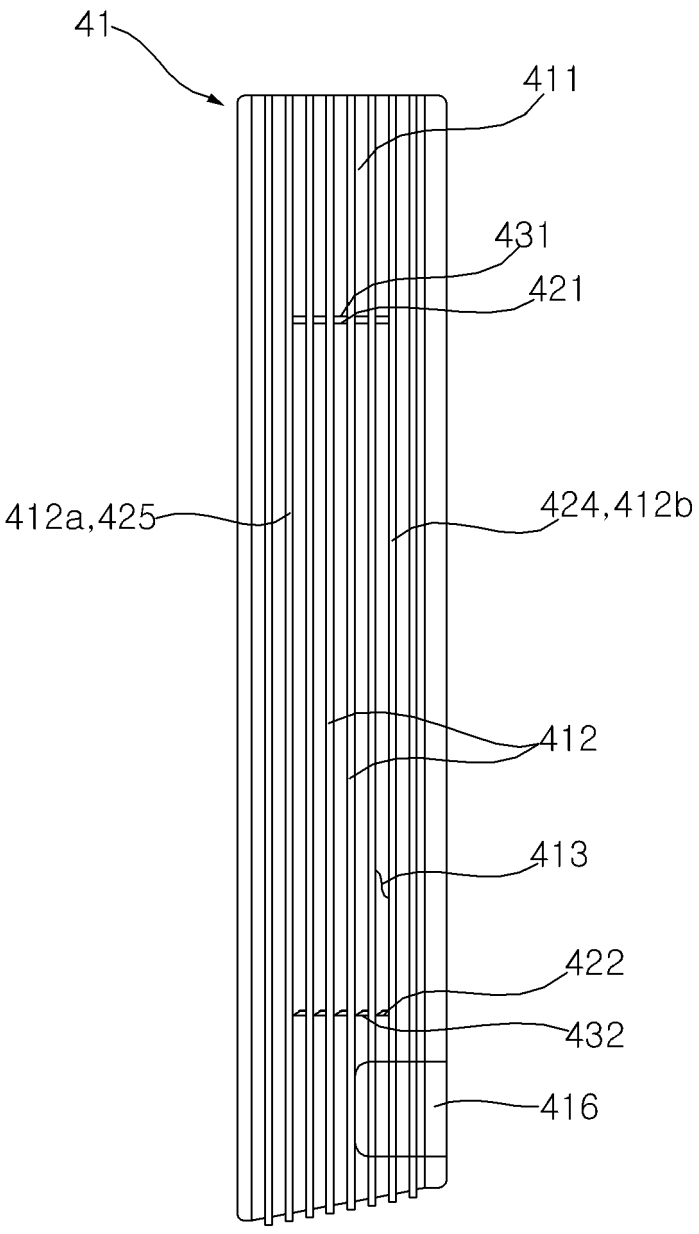


Fig. 8

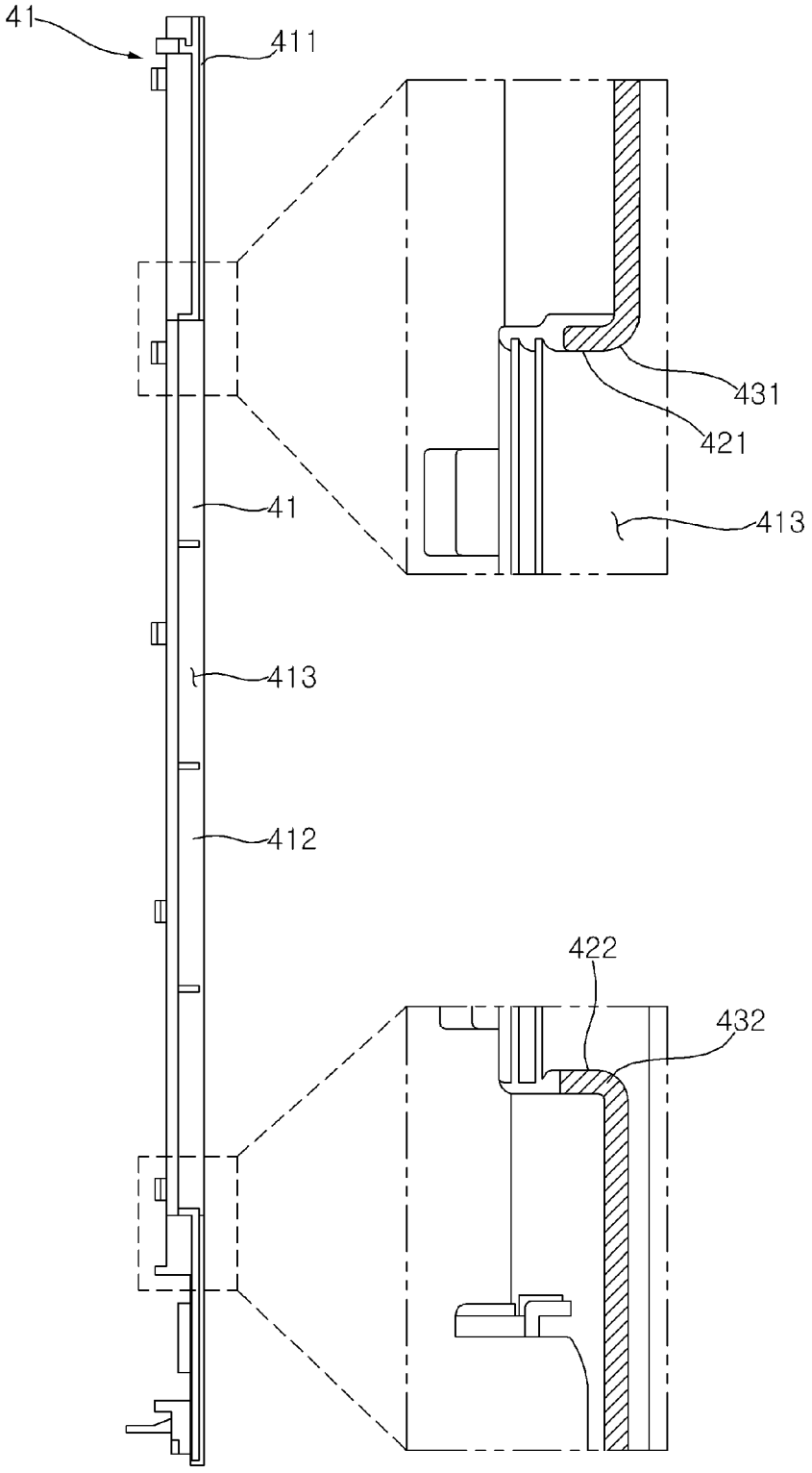


Fig. 9

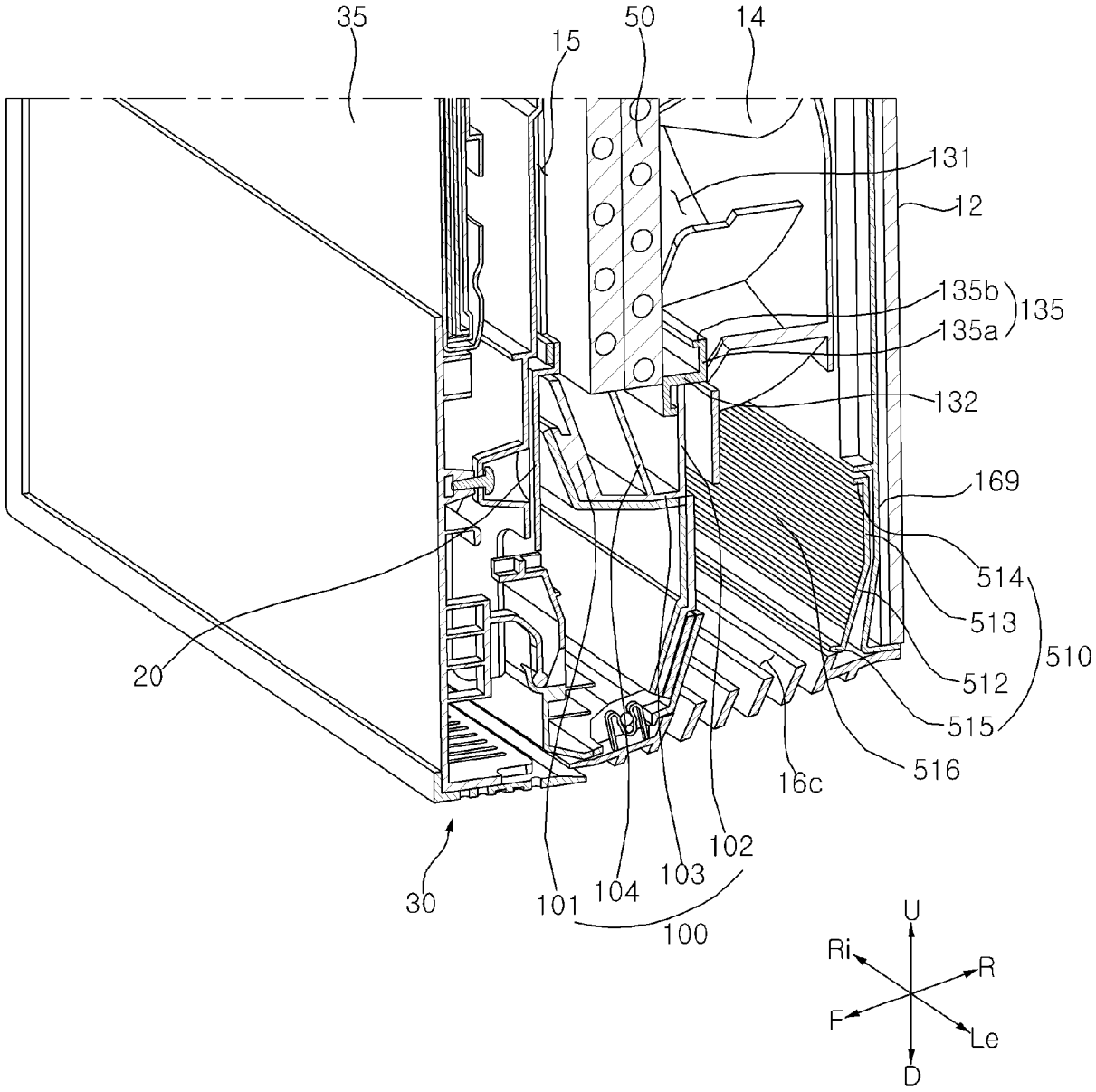

35
15
50
14
131
12
135b
135
135a
132
169
514
513
510
512
515
516
16c
20
30
101
104
103
102
100
U
Ri
R
F
Le
D

Fig. 10

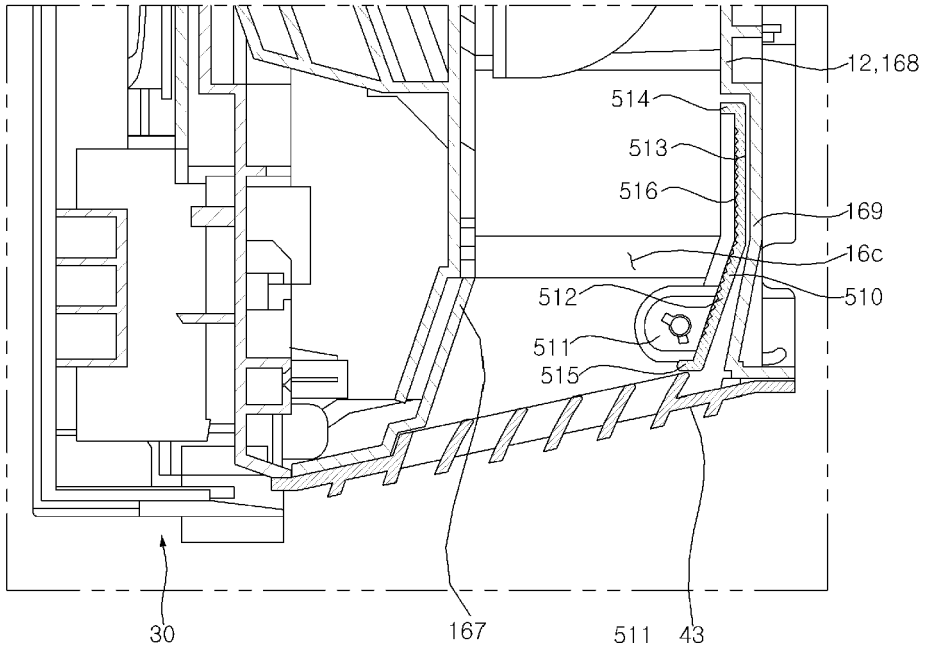

12,168
514
513
516
169
16c
512
510
511
515
30
167
511
43

Fig. 11

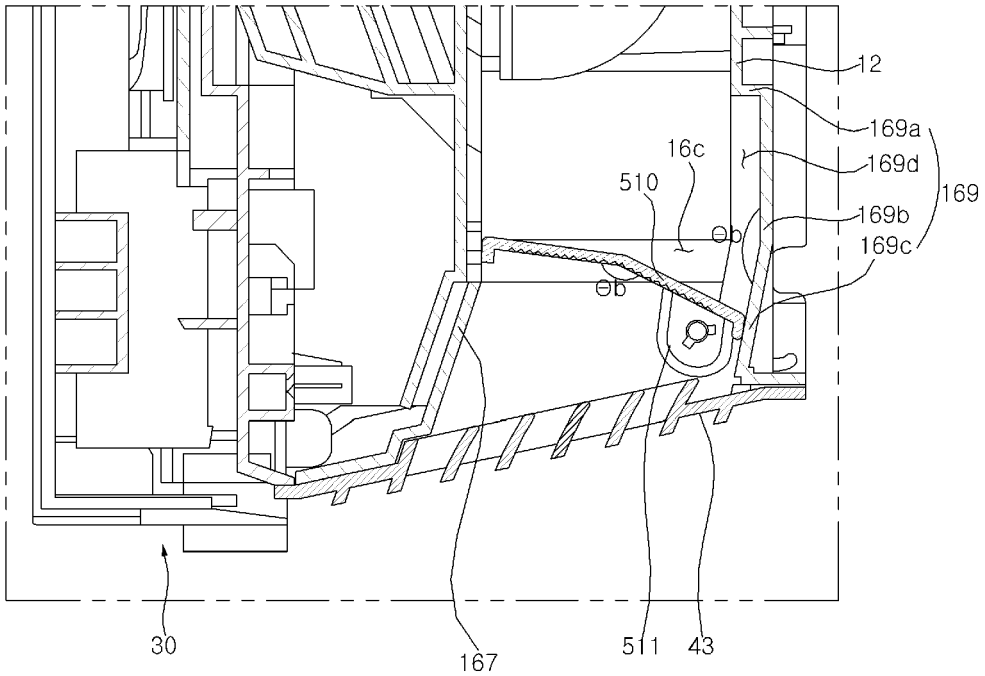

12
169a
16c
169d
510
169
169b
Θb
169c
Θb
30
167
511
43

Fig. 12

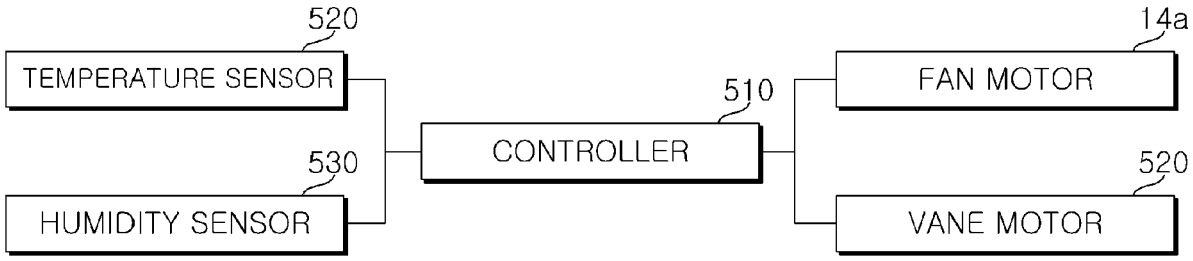

520
TEMPERATURE SENSOR
530
HUMIDITY SENSOR
510
CONTROLLER
14a
FAN MOTOR
520
VANE MOTOR

Fig. 13

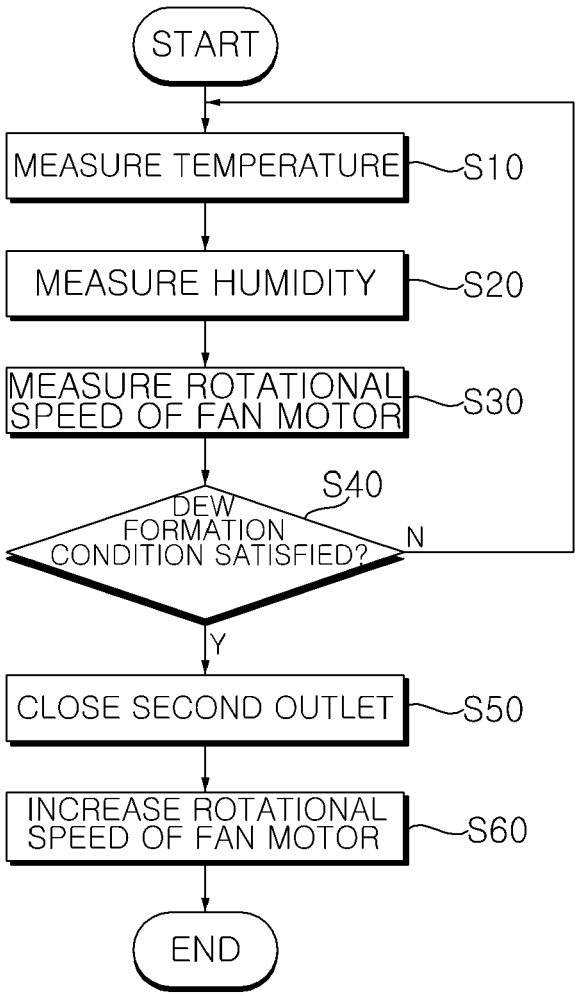
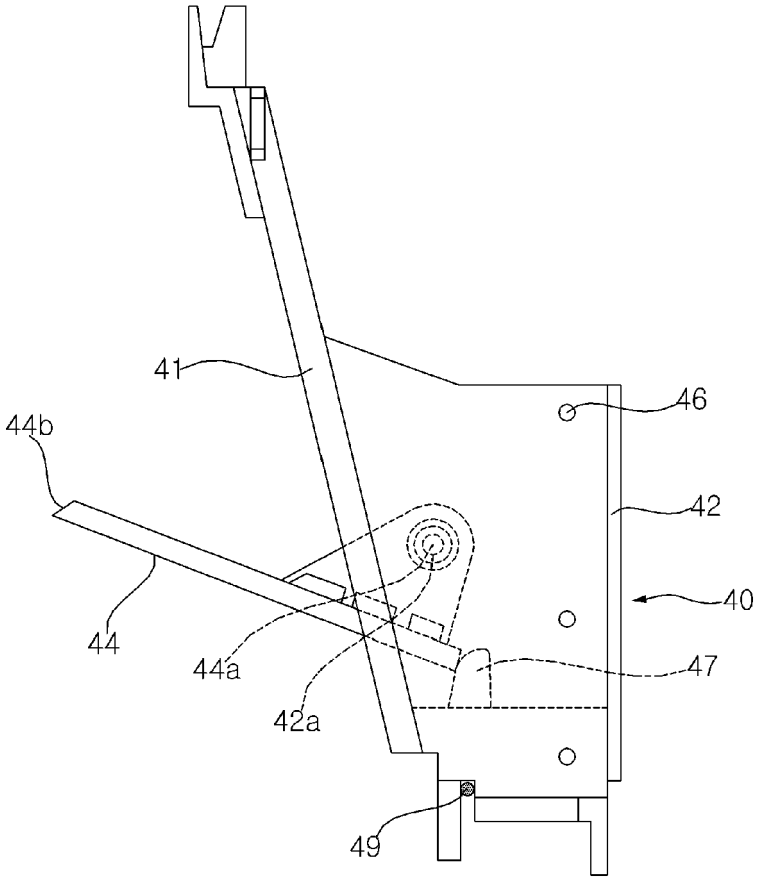

START
MEASURE TEMPERATURE
S10
MEASURE HUMIDITY
S20
MEASURE ROTATIONAL SPEED OF FAN MOTOR
S30
S40
DEW FORMATION CONDITION SATISFIED?
N
Y
CLOSE SECOND OUTLET
S50
INCREASE ROTATIONAL SPEED OF FAN MOTOR
S60
END

Fig. 14



Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 23 22 0339

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2020/284441 A1 (CHOI SUNG GYU [KR] ET AL) 10 September 2020 (2020-09-10) * paragraphs [0003] - [0449]; figures 1-22 * -----	1-15	INV. F24F1/0011 F24F1/0014 F24F1/0057 F24F13/20
A	CN 114 763 930 A (LG ELECTRONICS INC) 19 July 2022 (2022-07-19) * figures 4,5 * -----	1-15	
A	EP 2 918 930 A1 (DAIKIN IND LTD [JP]) 16 September 2015 (2015-09-16) * figures 1-4 * -----	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 April 2024	Ismail, Youssef

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 22 0339

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-04-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2020284441 A1	10-09-2020	CN 111649393 A	11-09-2020
		CN 114353185 A	15-04-2022
		CN 114353186 A	15-04-2022
		KR 20200106417 A	14-09-2020
		US 2020284441 A1	10-09-2020
		US 2023272926 A1	31-08-2023
CN 114763930 A	19-07-2022	CN 114763930 A	19-07-2022
		KR 20220102478 A	20-07-2022
EP 2918930 A1	16-09-2015	CN 104620058 A	13-05-2015
		EP 2918930 A1	16-09-2015
		ES 2807904 T3	24-02-2021
		JP 5408318 B1	05-02-2014
		JP 2014055746 A	27-03-2014
		WO 2014042012 A1	20-03-2014

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- KR 20060011656 **[0010]**
- KR 20160085355 **[0010]**