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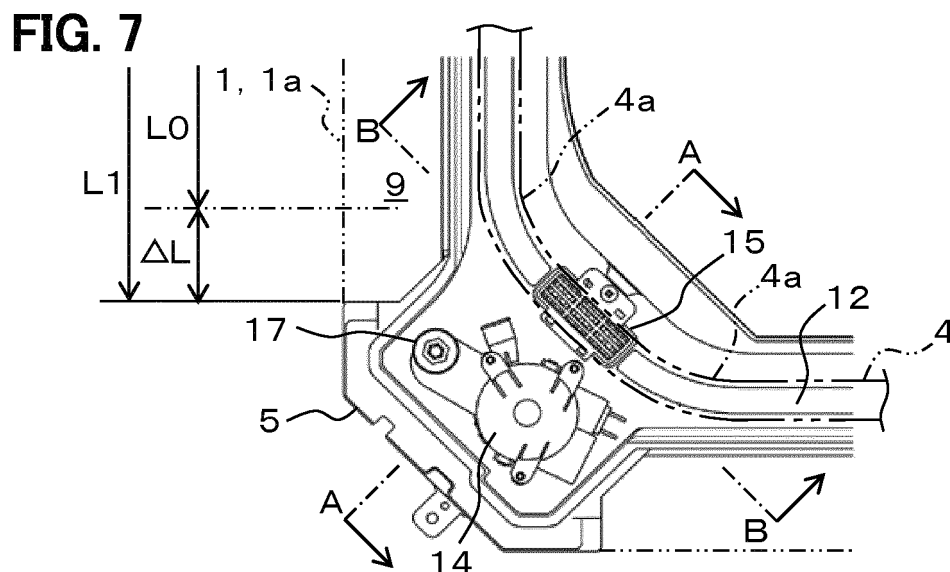
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(54) **INDOOR UNIT FOR AIR CONDITIONER**

(57) An indoor unit for an air conditioner includes: a blower fan that is arranged in a casing; a heat exchanger that encompasses all air flow directions from the blower fan; a drain pan that is arranged below the heat exchanger; and an antimicrobial unit that is installed on the drain pan and has an antimicrobial agent to sterilize drain wa-

ter. At least a part of the antimicrobial unit is arranged directly below the heat exchanger. The indoor unit has the antimicrobial agent arranged on the drain pan while a cross-sectional area of an outlet passage is prevented from being reduced.



Description

Technical Field

[0001] The present invention relates to an indoor unit for an air conditioner, and more particularly, to a ceiling-mounted indoor unit for an air conditioner.

Background Art

[0002] Indoor units for an air conditioner include one to be mounted in a ceiling (ceiling-mounted type). The ceiling-mounted indoor unit for an air conditioner sucks indoor air by rotating a centrifugal fan, cools the sucked air with a heat exchanger, and blows out the cooled air through air outlets for cooling a room.

[0003] In such an indoor unit for an air conditioner, during the cooling operation, drain water is generated in the heat exchanger. The drain water is accumulated in a drain pan so as to be drained out of the indoor unit with a drain pump. However, the drain pump does not drain the drain water below a suction limit level, so that a certain amount of the drain water remains in the drain pan after the operation is stopped. This leads to bacteria growing in the remaining drain water to generate muddy slime, causing a problem such as clogging in the drain pump.

[0004] To prevent such a problem, an antimicrobial agent is generally arranged inside the drain pan.

[0005] Conventionally, for example, an antimicrobial agent in liquid form is coated on an inner face of the drain pan, or an antimicrobial agent is kneaded in a resin drain pan sheet on a face of the drain pan, so that the antimicrobial agent is gradually dissolved in the drain water. However, in this approach, since the antimicrobial effect is reduced relatively quickly, the drain pan itself needs to be replaced to keep the antimicrobial effect.

[0006] Then, a solid antimicrobial agent is accommodated in a case to be set on a bottom face of the drain pan (see Patent Documents 1 and 2).

Prior Art Documents

Patent Documents

[0007]

Patent Document 1: Japanese Patent No. 4821342

Patent Document 2: Japanese Patent No. 4252530

Summary of Invention

Technical Problem

[0008] The antimicrobial agent is often arranged near the drain pump where the drain water is accumulated on the drain pan, to efficiently sterilize the drain water. Further, a float switch is arranged near the drain pump, to prevent overflow of the drain water from the drain pan.

Therefore, a space for arranging the antimicrobial agent is further needed at the space on the drain pan where such various components are arranged.

[0009] However, if the drain pan is expanded (enlarged) to provide a space for arranging the antimicrobial agent near the drain pump on the drain pan, a cross-sectional area of the outlet passage for cooling air formed between the drain pan and a body case is made smaller. This incurs an increase in noise and an increase in driving power of a fan. Especially, in a compact indoor unit, since a drain pump, a float switch and an antimicrobial agent as used in a standard indoor unit are commonly used, a ratio of the space occupied by these components increases with respect to an entire space of the drain pan. Therefore, the cross-sectional area of the outlet passage is further decreased.

[0010] The present invention has been made in view of the above circumstances and intends to provide an indoor unit for an air conditioner in which an antimicrobial agent is arranged on a drain pan while a cross-sectional area of an outlet passage is prevented from being reduced.

Solution to Problem

[0011] To solve the problem above, the present invention provides an indoor unit for an air conditioner having: a blower fan that is arranged in a casing; a heat exchanger that encompasses all air flow directions from the blower fan; a drain pan that is arranged below the heat exchanger; and an antimicrobial unit that is installed on the drain pan and has an antimicrobial agent to sterilize drain water, wherein at least a part of the antimicrobial unit is arranged directly below the heat exchanger.

Advantageous effects of the Invention

[0012] According to the present invention, an indoor unit for an air conditioner is provided in which an antimicrobial agent is arranged on a drain pan while a cross-sectional area of an outlet passage is prevented from being reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is a half cross-sectional view of an indoor unit for an air conditioner according to an embodiment of the present invention;

FIG. 2 is a cross-sectional perspective view of the indoor unit shown in FIG. 1 for describing an air flow therein;

FIG. 3 is a cross-sectional perspective view of a vicinity of a drain pump in the indoor unit shown in FIG. 1;

FIG. 4 is a perspective view of an antimicrobial unit on a drain pan for describing an installation state

thereof;

FIG. 5 is a plan view of the antimicrobial unit on the drain pan for describing the installation state thereof; FIG. 6 is a plan view of the antimicrobial unit as a comparative example to show an installation position thereof;

FIG. 7 is a plan view of the antimicrobial unit in the present embodiment to show an installation position thereof;

FIG. 8 is a cross-sectional view taken along a line A-A in FIG. 7;

FIG. 9 is a cross-sectional view taken along a line B-B in FIG. 7; and

FIG. 10 is a diagram illustrating a modification of the present embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] A description will be given in detail of an embodiment of the present invention with reference to the drawings as appropriate.

[0015] In the drawings referenced below, the same members are denoted with the same reference numerals.

[0016] FIG. 1 is a half cross-sectional view of an indoor unit 100 for an air conditioner (hereinafter, simply referred to as an "indoor unit") according to an embodiment of the present invention. FIG. 2 is a cross-sectional perspective view of the indoor unit 100 shown in FIG. 1 for describing an air flow therein. In FIG. 2, a decorative panel 42 (see FIG. 1) is removed.

[0017] As shown in FIG. 1, the indoor unit 100 according to the present embodiment is a ceiling-mounted indoor unit that is mounted in a ceiling 41. The air conditioner according to the present embodiment includes the indoor unit 100 and an outdoor unit (not shown) connected to the indoor unit with a refrigerant pipe (not shown) to constitute a refrigeration cycle for air conditioning.

[0018] The indoor unit 100 has a body case 1 and a decorative panel 42. The lower face of the decorative panel 42 faces inside a room, and the body case 1 is mounted in the ceiling 41. The decorative panel 42 is attached to the lower part of the body case 1 so as to be substantially flush with the face of the ceiling 41. The body case 1 is mounted in a ceiling space (above the face of the ceiling 41) with hanging hooks and hanging bolts (not shown). The decorative panel 42 is fixed to the body case 1 with screws or the like (not shown).

[0019] The body case 1 includes a casing 1a and a heat insulating member 1b. The casing 1a is in a rectangular shape in a planar view and is formed of a metal plate in a bottomed box shape having an opening on the lower side. The "rectangular shape" here includes a "substantially rectangular shape" which has, for example, chamfered or rounded corners, in addition to a "literally rectangular shape." The casing 1a is formed of two or more sheet metals being pressed into a predetermined shape and joined together with screws, rivets, or the like.

In the body case 1, the heat insulating member 1b for heat insulation, dew prevention, sound insulation and the like is arranged inside the casing 1a with the opening side down.

[0020] The indoor unit 100 is provided with a blower fan 2 arranged in the casing 1a, a heat exchanger 4 that encompasses all air flow directions from the blower fan 2, and a drain pan 5 arranged below the heat exchanger 4. The blower fan 2 is, for example, a centrifugal fan, and turns the orientation of an air flow by approximately 90 degrees to send the air to the heat exchanger 4. The blower fan 2 is rotationally driven by a fan motor 3 arranged in the casing 1a. The fan motor 3 is fixed to a top plate of the casing 1a. The blower fan 2 and the fan motor 3 constitute a blower.

[0021] The drain pan 5 serves to accumulate drain water that is condensed on the face of the heat exchanger 4 to be dropped. The drain pan 5 is, for example, a styrene foam product, and is formed with a resin layer such as an ABS resin on the inner face thereof to be in contact with the drain water.

[0022] An air inlet 6 is arranged at the center of the lower face of the indoor unit 100. Further, air outlets 7 (at four positions in this case) are arranged on the peripheral edge in the lower face of the indoor unit 100. The blower fan 2 is arranged in an air passage in the casing 1a that connects the air inlet 6 to the air outlet 7. The heat exchanger 4 is arranged between the blower fan 2 and the air outlet 7. Further, a bell mouth 8 is arranged between the blower fan 2 and the air inlet 6.

[0023] As shown in FIG. 2, air 21 in a room is sucked from the air inlet 6 (see FIG. 1) by the rotation action of the blower fan 2 and is blown out toward the heat exchanger 4 through the blower fan 2. In cooling operation, the air 21 is cooled down through the heat exchanger 4. The air 21 cooled down through the heat exchanger 4 passes through an outlet passage 9 formed between the drain pan 5 and the heat insulating member 1b of the body case 1, and is blown out from the indoor unit 100 through the air outlet 7 (see FIG. 1) into the room.

[0024] FIG. 3 is a cross-sectional perspective view of a vicinity of the drain pump 14 in the indoor unit 100 shown in FIG. 1. FIG. 4 is a perspective view of an antimicrobial unit 15 on the drain pan 5 for describing an installation state thereof. FIG. 5 is a plan view of the antimicrobial unit 15 on the drain pan 5 for describing the installation state thereof. In FIG. 4, the heat exchanger 4 is omitted for the purpose of illustration.

[0025] As shown in FIGS. 3 and 4, the drain pan 5 includes a partition wall 12 that partitions a primary space on the upstream side (primary side) from a secondary space on the downstream side (secondary side) of the air 21 (see FIG. 2, the same applies hereinafter) blown through the heat exchanger 4 above the drain pan 5. Further, an opening groove 13 is formed in the partition wall 12 by cutting out a part thereof, allowing the primary space to communicate with the secondary space.

[0026] When the air 21 in the room is dehumidified by

the heat exchanger 4, the drain water is generated. The drain water drops into the primary space (drain water 10) and into the secondary space (drain water 11) above the drain pan 5.

[0027] The indoor unit 100 (see FIG. 1, the same applies hereinafter) is provided with a drain pump 14 that drains the drain water accumulated in the drain pan 5. The drain water 10 that drops into the primary space above the drain pan 5 is directed toward the drain pump 14 through the opening groove 13 formed in the partition wall 12. The drain water 10 is joined with the drain water 11 around the opening groove 13 formed in the partition wall 12, and is sucked by the drain pump 14 to be drained outside. The drain pump 14 is unable to drain the drain water below the suction limit level, to always cause a certain amount of drain water to remain in the drain pan 5 after the air conditioner is stopped. This leads to bacteria growing in the remaining drain water to generate muddy slime, causing a problem such as clogging in the drain pump 14.

[0028] To prevent the problem, the antimicrobial unit 15 with an antimicrobial agent to sterilize the drain water is installed on the drain pan 5. The antimicrobial unit 15 includes a resin case in which a solid antimicrobial agent is accommodated. A plurality of through holes is formed in a wall of the resin case to allow the drain water to pass through. The antimicrobial unit 15 is fixed to the drain pan 5, for example, with a screw 16.

[0029] The antimicrobial unit 15 is preferably installed on the drain pan 5 near the drain pump 14. The bottom face of the drain pan 5 to face a suction port 14a of the drain pump 14 is formed lower than the peripheral portion thereof, so that the drain water is easily accumulated toward the drain pump 14.

[0030] As shown in FIG. 5, the drain pan 5 is in a rectangular frame shape in a planar view. The "rectangular frame shape" here includes a "substantially rectangular frame shape" which has, for example, chamfered or rounded corners, in addition to a "literally rectangular frame shape." The drain pump 14 is usually installed in a corner of the drain pan 5, together with a float switch 17.

[0031] The outlet passage 9 defined between the drain pan 5 and the heat insulating member 1b (see FIG. 2) of the body case 1 in the radial direction about the rotation axis of the blower fan 2 is circumferentially defined between the adjacent corners of the drain pan 5 in a rectangular frame shape. Four outlet passages 9 are defined in this case. Reference numerals L1 to L4 in FIG. 5 each indicate a circumferential length (hereinafter, referred to as a "circumferential dimension in a cross section of a passage) of a cross section that is orthogonal to the air flow direction in each outlet passage 9.

[0032] The float switch 17 detects that the drain water accumulated in the drain pan 5 is equal to or more than a predetermined amount. When the float switch 17 detects that the drain water accumulated in the drain pan 5 is equal to or more than the predetermined amount, the air conditioner is stopped. Accordingly, the overflow

of the drain water from the drain pan 5 is prevented.

[0033] Especially, in the indoor unit 100 for a small ceiling-mounted air conditioner, an installation space for components is small in the corner of the drain pan 5, which makes it difficult to install the drain pump 14, the float switch 17 and the antimicrobial unit 15 in the same corner of the drain pan 5.

[0034] FIG. 6 is a plan view of the antimicrobial unit 15 as a comparative example to show an installation position thereof. The comparative example in FIG. 6 shows an expanded (enlarged) installation space in the corner of the drain pan 5. However, in the comparative example, the circumferential dimension L0 in the cross-section of the passage is shortened by the amount of the expanded installation space in the corner of the drain pan 5. Therefore, the cross-sectional area of the outlet passage 9 is reduced, to potentially cause an increase in noise and an increase in driving power of a fan.

[0035] The drain water 10 (see FIG. 3) is generated more than the drain water 11 (see FIG. 3). This is because, in the heat exchanger 4, refrigerant pipes in the first column with respect to the primary side (upstream side of the air flow) and its vicinity have the most heat exchange amount. As shown in FIG. 6, the drain water 10, 11 (see FIG. 3) accumulated toward the drain pump 14 flows as drain water 10a, 10b, 11a, 11b along the four passages, respectively. However, in the comparative example shown in FIG. 6, the drain water 10a, 10b, 11b flow away from the antimicrobial unit 15, and thus are hardly sterilized with the antimicrobial unit 15. Therefore, the antimicrobial effect may not be sufficiently exhibited.

[0036] FIG. 7 is a plan view of the antimicrobial unit 15 in the present embodiment to show an installation position thereof.

[0037] As shown in FIG. 7, in the present embodiment, the antimicrobial unit 15 is installed directly below the heat exchanger 4 (also see FIG. 3). Although almost entire antimicrobial unit 15 is installed directly below the heat exchanger 4 in this case, a part of the antimicrobial unit 15 may be installed directly below the heat exchanger 4.

[0038] In more detail, the antimicrobial unit 15 is installed in the opening groove 13 formed in the partition wall 12 of the drain pan 5. The opening groove 13 is formed in a size to accommodate the antimicrobial unit 15, so that the antimicrobial unit 15 is fitted into the opening groove 13. Thus, the circumferential dimension L1 in the cross section of the passage in the present embodiment only needs the same dimension as in the case where the antimicrobial unit 15 is not installed. That is, according to the present embodiment, the circumferential direction L1 does not need to be shortened by the dimension ΔL to the circumferential dimension L0 in the cross section of the passage in the comparative example where the antimicrobial unit 15 is installed on the expanded space.

[0039] As shown in FIGS. 5 and 7, the drain pump 14, the antimicrobial unit 15 and the float switch 17 are in-

stalled in the same corner of the drain pan 5 having a rectangular frame shape in a planar view, that is, in the same corner among the four corners in the casing 1a having a rectangular shape in a planar view.

[0040] The heat exchanger 4 has two bent portions 4a, in one corner of the casing 1a, specifically, in the corner where the drain pump 14 is installed. The antimicrobial unit 15 is installed between the bent portions 4a in a planar view. Further, the antimicrobial unit 15 is installed so that the longitudinal direction of the antimicrobial unit 15 in a planar view is along the extending direction of the heat exchanger 4 in a planar view.

[0041] FIG. 8 is a cross-sectional view taken along the line A-A in FIG. 7, and FIG. 9 is a cross-sectional view taken along the line B-B in FIG. 7. As shown in FIG. 8, the bottom face of the opening groove 13 is set to have the same height as the bottom face in the primary space (space on the upstream side of the heat exchanger 4) and the bottom face in the secondary space (space on the downstream side of the heat exchanger 4) of the drain pan 5.

[0042] The partition wall 12 serves to prevent the air 21 (see FIG. 2, the same applies hereinafter) from passing through the secondary side (downstream side) of the heat exchanger 4, without passing through the heat exchanger 4. A resistive element 30 against the air is installed on the partition wall 12 to fill in a gap between the partition wall 12 and the heat exchanger 4. The opening groove 13 formed in the partition wall 12 preferably passes the drain water but blocks the air 21. Therefore, as shown in FIG. 9, a resistive element 31 against the air is installed on the antimicrobial unit 15 to fill in a gap between the antimicrobial unit 15 and the heat exchanger 4 (and the resistive element 30). As a material of the resistive elements 30 and 31, a material such as foam rubber may be used. Note that, for the purpose of illustration, the resistive elements 30 and 31 are not shown in other figures such as FIG. 1.

[0043] As described above, the indoor unit 100 for an air conditioner according to the present embodiment is provided with the heat exchanger 4 that encompasses all air flow directions from the blower fan 2, the drain pan 5 that is arranged below the heat exchanger 4, and the antimicrobial unit 15 that is installed on the drain pan 5 and has the antimicrobial agent to sterilize drain water, wherein at least a part of the antimicrobial unit 15 is arranged directly below the heat exchanger 4.

[0044] According to the present embodiment, the indoor unit 100 for an air conditioner is provided in which the antimicrobial agent is arranged on the drain pan 5 while the cross-sectional area of the outlet passage 9 is prevented from being reduced. Therefore, the increase in noise and the increase in fan power caused by the decrease in the cross-sectional area of the outlet passage are prevented.

[0045] Further, in the present embodiment, the antimicrobial unit 15 is installed in the opening groove 13 formed in the partition wall 12 of the drain pan 5. In this

configuration, the opening groove 13 that corresponds to the antimicrobial unit 15 is formed in the partition wall 12 of the drain pan 5 to allow the antimicrobial unit 15 to be installed on the drain pan 5 efficiently. Further, since the antimicrobial unit 15 is installed in the opening groove 13 where the drain water flowing on the drain pan 5 passes or joins, the antimicrobial effects of the antimicrobial unit 15 is sufficiently exerted.

[0046] Further, in the present embodiment, the drain pump 14, the antimicrobial unit 15 and the float switch 17 are installed in the same corner of the casing 1a. Therefore, the antimicrobial unit 15 is installed in the small space close to the drain pump 14 and the float switch 17 on the drain pan 5. Further, since the drain water is accumulated toward the drain pump 14, the drain water around the drain pump 14 is sterilized efficiently so as to more effectively prevent slime from being generated.

[0047] Further, in the present embodiment, the bottom face of the opening groove 13 has the same height as the the bottom faces in the primary space and the secondary space of the drain pan 5, to avoid the flow of the drain water from being inhibited. This prevents the drain water from remaining and bacteria from growing.

[0048] Further, in the present embodiment, the antimicrobial unit 15 is installed between the two bent portions 4a of the heat exchanger 4 in one corner of the casing 1a. Accordingly, a space for installing the drain pump 14 is secured in a corner of the casing 1a, and the antimicrobial unit 15 is efficiently installed near the drain pump 14.

[0049] Further, in the present embodiment, the longitudinal direction of the antimicrobial unit 15 in a planar view approximately runs along the extending direction of the heat exchanger 4 in a planar view. Therefore, a large part of the antimicrobial unit 15 is positioned directly below the heat exchanger 4, to prevent the cross-sectional area of the outlet passage 9 from being reduced.

[0050] Further, in the present embodiment, the resistive element 31 against the air is installed on the antimicrobial unit 15. In the configuration, the gap between the antimicrobial unit 15 and the heat exchanger 4 in the opening groove 13 of the partition wall 12 is filled by the resistive element 3 to allow only the drain water to pass through but disallow the air 21 to pass through. Still further, in a case where the drain water remains to the height of the antimicrobial unit 15 during cooling operation of the indoor unit 100, the air 21 is prevented from flowing into the secondary side of the heat exchanger 4.

[0051] The present invention has been described above based on the embodiment, but is not limited to the embodiment and includes various modifications. For example, the above-described embodiment has been described in detail in order to better illustrate the present invention and are not necessarily limited to the one having an entire configuration as described above. A part of the configuration of the embodiment may be deleted, added or replaced with another configuration.

[0052] FIG. 10 is a diagram illustrating a modification of the present embodiment.

[0053] In the embodiment described above, the antimicrobial unit 15 is installed in the opening groove 13 formed in the partition wall 12 of the drain pan 5, but the present invention is not limited thereto. For example, as shown in FIG. 10, a drain pan 5a may have a step formed with a first bottom face 12a and a second bottom face 12b that is lower than the first bottom face 12a. In this case, a recess 13a is preferably formed in a portion below the heat exchanger 4 in the first bottom surface 12a to allow the antimicrobial unit 15 to be installed therein.

DESCRIPTION OF REFERENCE NUMERALS

[0054]

- 1: body case
- 1a: casing
- 2: blower fan
- 3: fan motor
- 4: heat exchanger
- 4a: bent portion
- 5, 5a: drain pan
- 6: air inlet
- 7: air outlet
- 8: bell mouth
- 9: outlet passage
- 10, 11: drain water
- 12: partition wall
- 13: opening groove
- 14: drain pump
- 15: antimicrobial unit
- 17: float switch
- 21: air
- 30, 31: resistive element
- 100: indoor unit

Claims

1. An indoor unit for an air conditioner comprising:

a blower fan that is arranged in a casing;
 a heat exchanger that encompasses all air flow directions from the blower fan;
 a drain pan that is arranged below the heat exchanger; and
 an antimicrobial unit that is installed on the drain pan and has an antimicrobial agent to sterilize drain water,
 wherein at least a part of the antimicrobial unit is arranged directly below the heat exchanger.

2. The indoor unit for an air conditioner according to claim 1, wherein the drain pan has a partition wall that partitions a primary space on an upstream side from a

secondary space on a downstream side of an air flow through the heat exchanger above the drain pan, an opening groove is formed in the partition wall by cutting out a part thereof, allowing the primary space to communicate with the secondary space, and the antimicrobial unit is installed in the opening groove formed in the partition wall.

3. The indoor unit for an air conditioner according to claim 1 or 2 further comprising:

a drain pump that drains drain water accumulated in the drain pan,
 wherein the drain pump and the antimicrobial unit are installed in one corner of the casing having a rectangular shape in a planar view.

4. The indoor unit for an air conditioner according to claim 2, wherein a bottom face of the opening groove is set to have the same height as that of a bottom face in the primary space and a bottom face in the secondary space of the drain pan.

5. The indoor unit for an air conditioner according to claim 1 or 2, wherein the heat exchanger has two bent portions in one corner of the casing having a rectangular shape in a planar view, and the antimicrobial unit is installed between the two bent portions in a planar view.

6. The indoor unit for an air conditioner according to claim 1 or 2, wherein the antimicrobial unit is installed so as to longitudinally, in a planar view, run along an extending direction of the heat exchanger in a planar view.

7. The indoor unit for an air conditioner according to claim 1 or 2, wherein a resistive element against air is installed on the antimicrobial unit to fill in a gap between the antimicrobial unit and the heat exchanger.

Amended claims under Art. 19.1 PCT

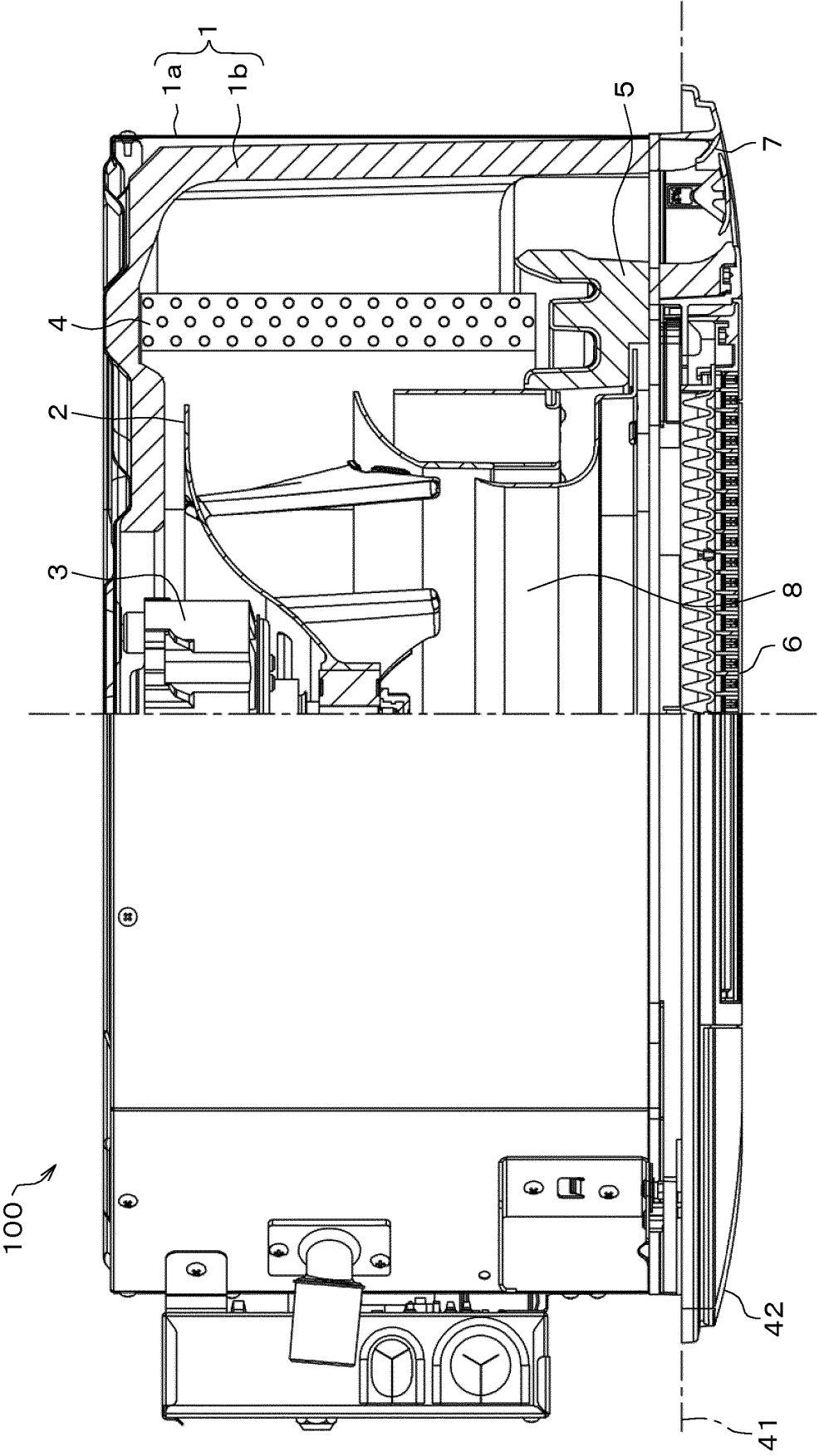
1. (amended) An indoor unit for an air conditioner comprising:

a blower fan that is arranged in a casing;
 a heat exchanger that encompasses all air flow directions from the blower fan;
 a drain pan that is arranged below the heat exchanger; and
 an antimicrobial unit that is installed on the drain pan and has an antimicrobial agent to sterilize drain water,

- wherein at least a part of the antimicrobial unit is arranged directly below the heat exchanger, the drain pan has a partition wall that partitions a primary space at an upstream side from a secondary space on a downstream side of an air flow through the heat exchanger above the drain pan, an opening groove is formed in the partition wall to allow the primary space to communicate with the secondary space, and the antimicrobial unit is installed in the opening groove formed in the partition wall. 5
2. (canceled) 15
3. (amended) The indoor unit for an air conditioner according to claim 1 further comprising:
- a drain pump that drains drain water accumulated in the drain pan, 20
- wherein the drain pump and the antimicrobial unit are installed in one corner of the casing having a rectangular shape in a planar view.
4. (amended) The indoor unit for an air conditioner according to claim 1, 25
- wherein a bottom face of the opening groove is set to have the same height as that of a bottom face in the primary space and a bottom face in the secondary space of the drain pan. 30
5. (amended) The indoor unit for an air conditioner according to claim 1, 35
- wherein the heat exchanger has two bent portions in one corner of the casing having a rectangular shape in a planar view, and the antimicrobial unit is installed between the two bent portions in a planar view.
6. (amended) The indoor unit for an air conditioner according to claim 1, 40
- wherein the antimicrobial unit is installed so as to longitudinally, in a planar view, run along an extending direction of the heat exchanger in a planar view. 45
7. (amended) The indoor unit for an air conditioner according to claim 1, 50
- wherein a resistive element against air is installed on the antimicrobial unit to fill in a gap between the antimicrobial unit and the heat exchanger. 55
- (1) Claim 1 has been amended to define the configuration that the the drain pan has a partition wall that partitions a primary space on an upstream side from a secondary space on a downstream side of an air flow through the heat exchanger above the drain pan, an opening groove is formed in the partition wall to allow the primary

space to communicate with the secondary space, and the antimicrobial unit is installed in the opening groove formed in the partition wall. (2) None of the cited documents discloses the above-described configuration. (3) The invention according to the amended claim 1 has remarkable advantageous effects that the antimicrobial unit is installed on the drain pan efficiently by forming the opening groove in the partition wall on the drain pan to accommodate the antimicrobial unit, and the antimicrobial effect by the antimicrobial unit is sufficiently exercised by installing the antimicrobial unit in the opening groove where the drain water flowing on the drain pan passes or joins. (4) Claim 2 has been canceled. (5) Claim numbers have been amended from which claims 3 to 7 depend.

FIG. 1



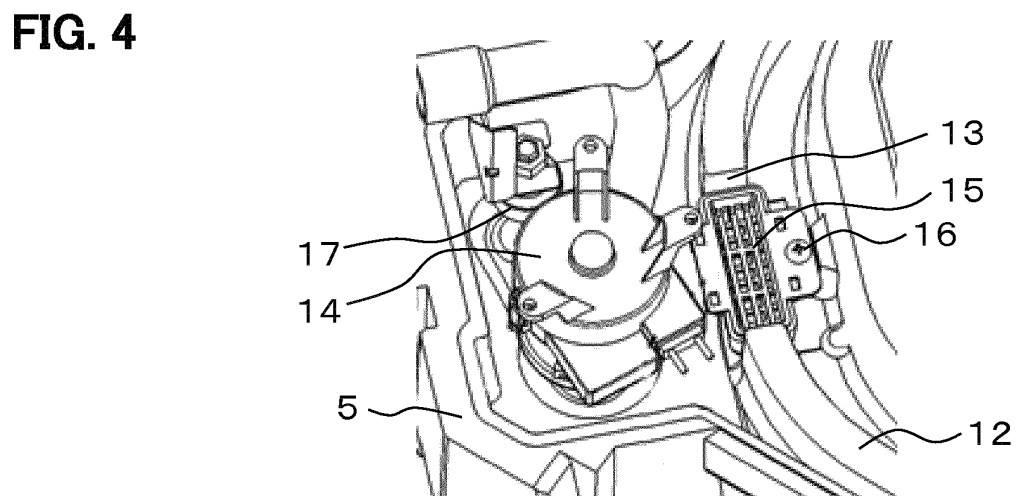
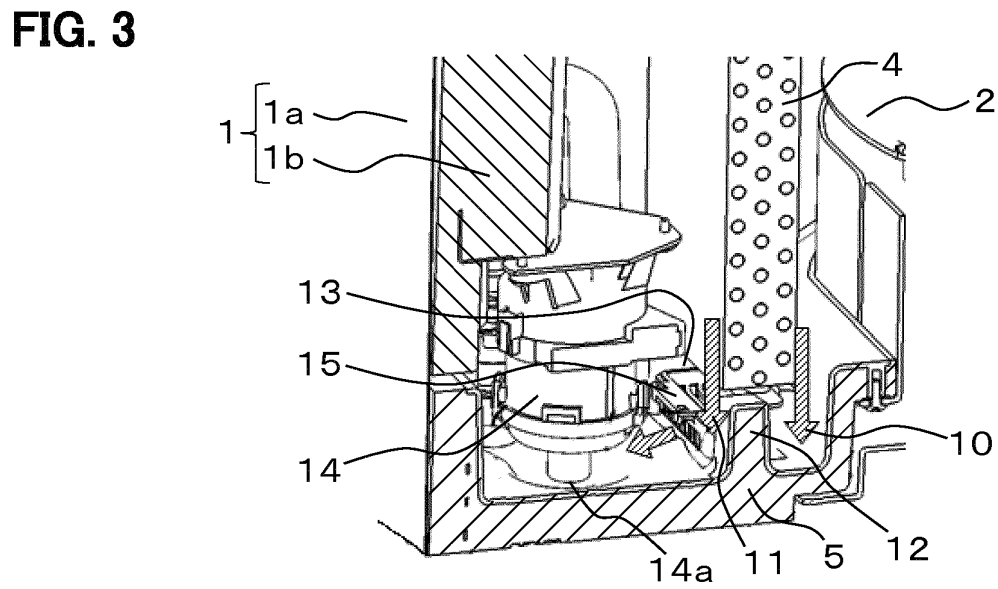
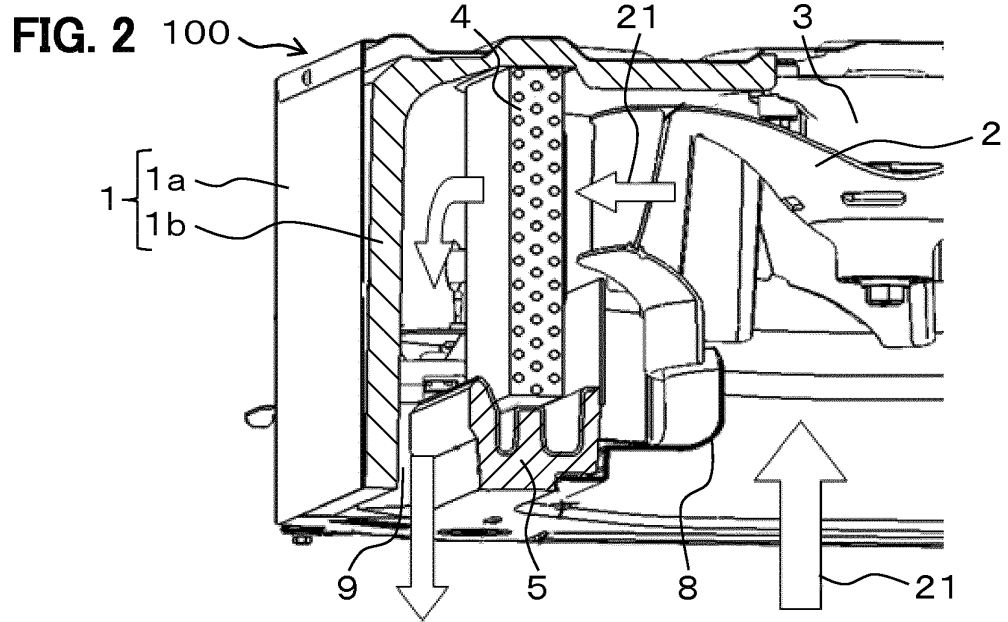


FIG. 5

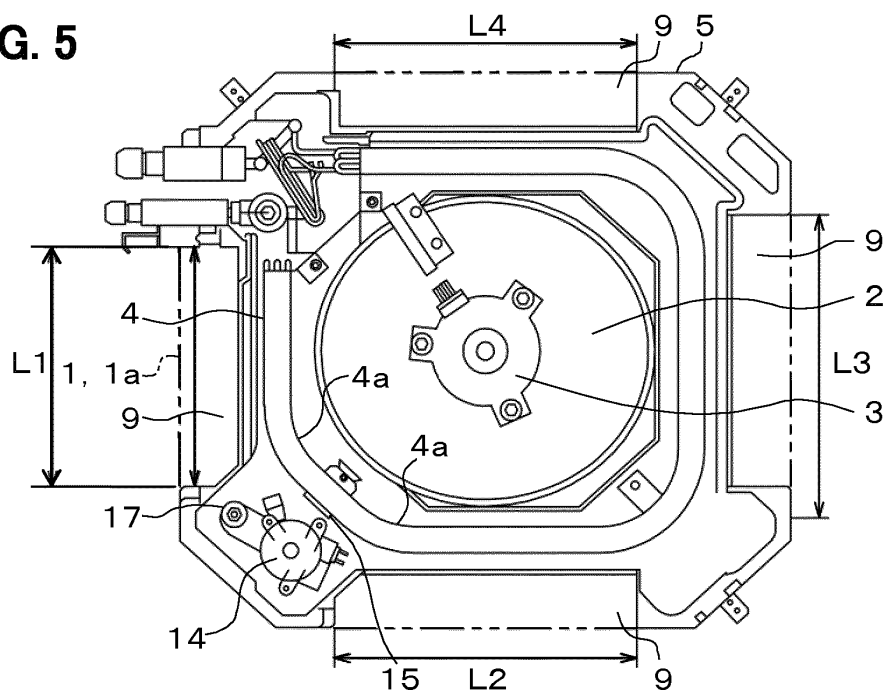


FIG. 6

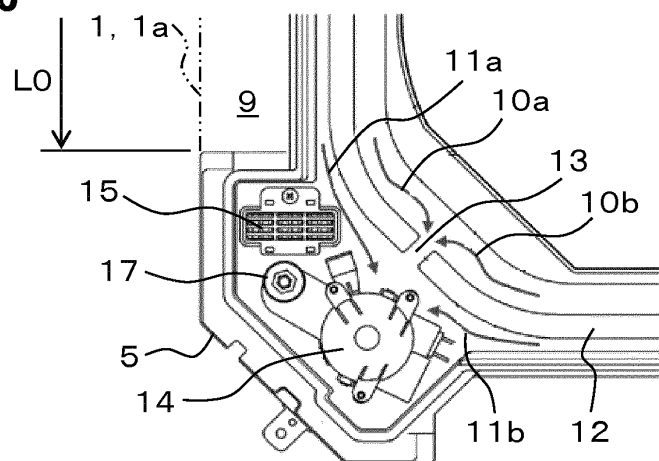


FIG. 7

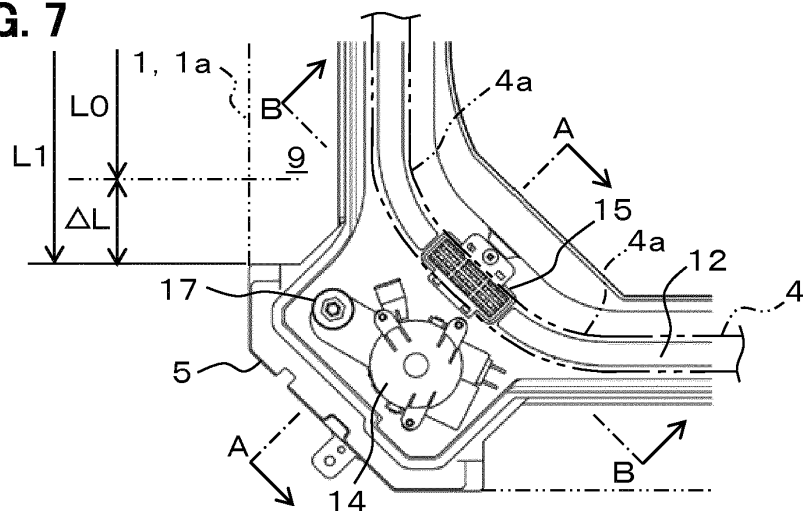


FIG. 8

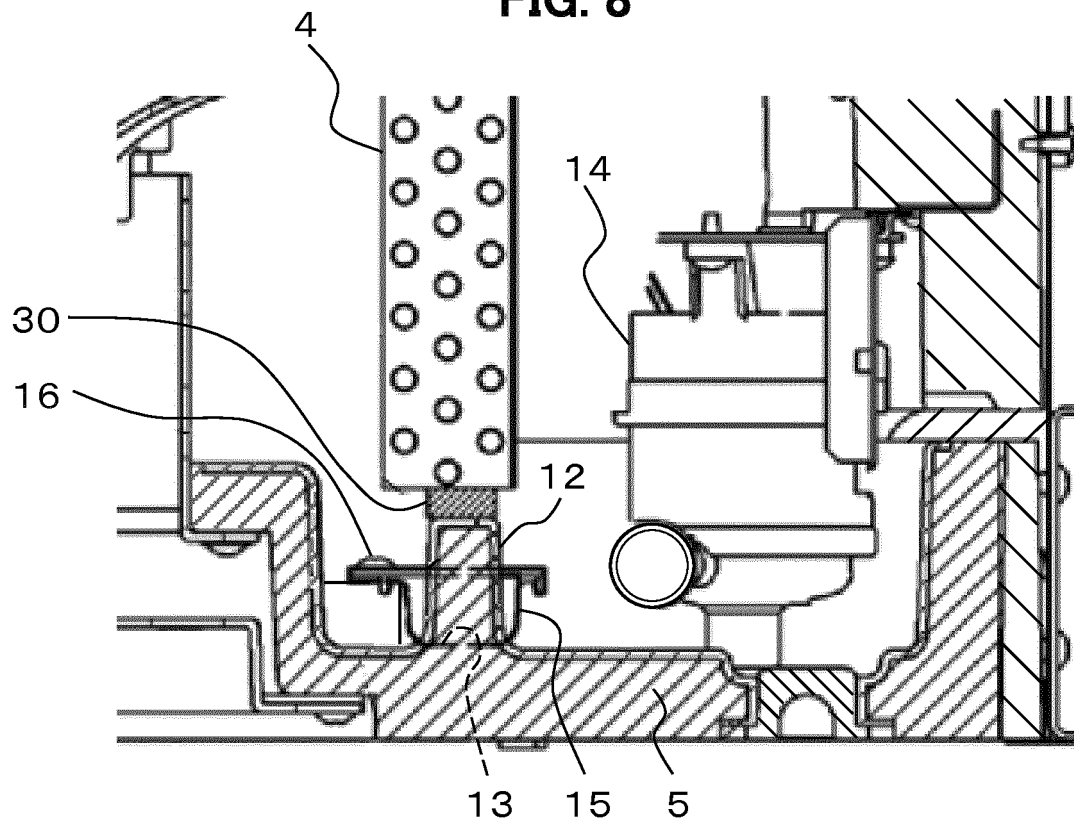


FIG. 9

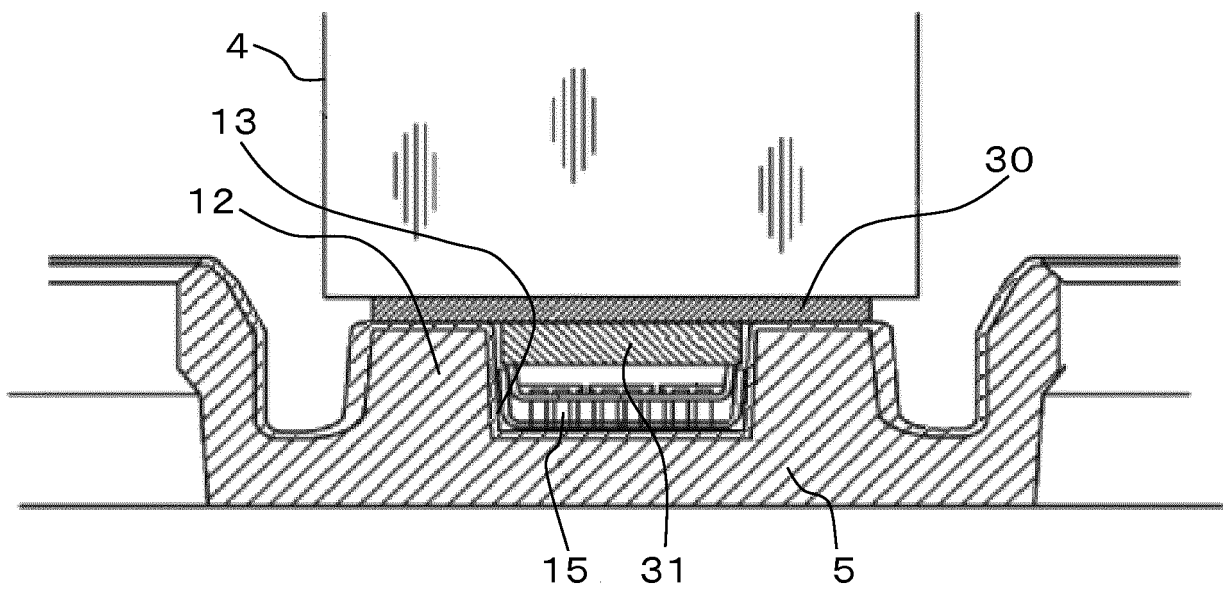
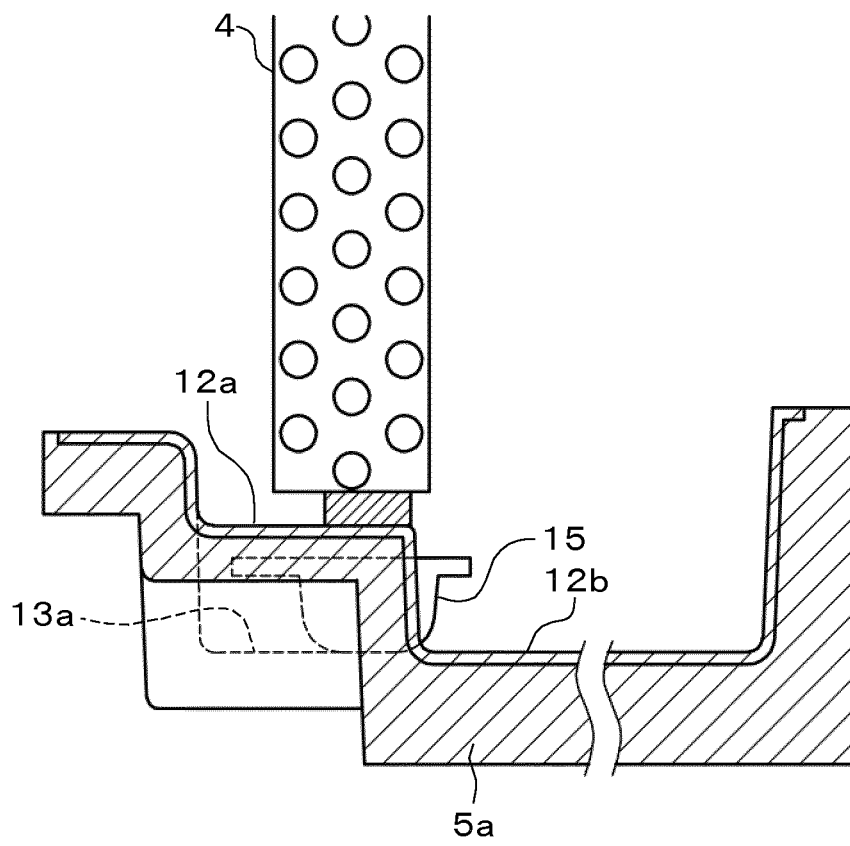


FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/069687

A. CLASSIFICATION OF SUBJECT MATTER

F24F13/22(2006.01) i

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)

F24F13/22

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

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2015

Kokai Jitsuyo Shinan Koho 1971-2015 Toroku Jitsuyo Shinan Koho 1994-2015

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 A	JP 2010-65931 A (Mitsubishi Heavy Industries, Ltd.), 25 March 2010 (25.03.2010), paragraphs [0026] to [0038]; fig. 5 to 10 (Family: none)	1, 6-7 2-5
X Y A	JP 2007-240113 A (Daikin Industries, Ltd.), 20 September 2007 (20.09.2007), paragraphs [0012] to [0024]; fig. 1 to 5 (Family: none)	1, 3, 5-6 2, 4 7
Y	JP 2013-76518 A (Mitsubishi Electric Corp.), 25 April 2013 (25.04.2013), paragraphs [0023] to [0036], [0042] (Family: none)	2, 4

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

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16 September 2015 (16.09.15)Date of mailing of the international search report
06 October 2015 (06.10.15)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2011-12850 A (Daikin Industries, Ltd.), 20 January 2011 (20.01.2011), paragraphs [0031] to [0053]; fig. 1 to 6 & WO 2011/001804 A1 & EP 2450643 A1 & CN 102439373 A	1-7

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 4821342 B [0007]
- JP 4252530 B [0007]