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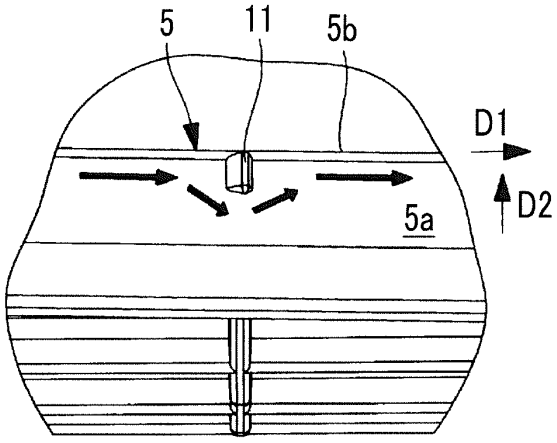
(54) INDOOR UNIT OF AIR CONDITIONER

(57) An indoor unit according to the present invention has a flowing water path (5) that receives drainage water condensed in a main body of the indoor unit and discharges the drainage water, wherein a bottom surface (5a) of the flowing water path (5) is provided with a rib (11) for blocking a part of the flowing water path (5). The entire bottom surface (5a) is inclined to one side in a longitudinal direction, as well as to one side in a width direction perpendicular to the longitudinal direction. The rib (11) is provided in contact with a wall portion (5b) located at one side in the width direction. The rib (11) extends in a direction perpendicular to an extending direction in which the wall portion (5b) extends.

FIG. 3A



EP 3 531 038 A1

Description

Technical Field

[0001] The present invention relates to an indoor unit of an air conditioner including a water passage that discharges drain water.

Background Art

[0002] A water passage for collecting and discharging drain water condensed by a heat exchanger or the like at the time of cooling to the outside is provided in an indoor unit of an air conditioner. In the following PTLs 1 and 2, inventions, in which a water passage is inclined to one direction and discharges drain water, are disclosed.

Citation List

Patent Literature

[0003]

[PTL 1] International Publication No. 2015/136711
[PTL 2] Japanese Unexamined Patent Application Publication No. 2015-102257

Summary of Invention

Technical Problem

[0004] However, when the indoor unit is inclined and fixed, the flow rate of drain water increases in a case where the inclination is steep, and a possibility that the drain water leaks from the water passage arises. In a case where the inclination is gentle, a possibility that water drainage is not smoothly performed arises.

[0005] In view of such circumstances, an object of the present invention is to provide an indoor unit of an air conditioner that can appropriately adjust the flow rate of condensed water flowing in a water passage.

Solution to Problem

[0006] In order to solve the problem, the indoor unit of an air conditioner of the present invention adopts the following means.

[0007] That is, according to an aspect of the present invention, there is provided an indoor unit of an air conditioner including a water passage that receives water condensed in a main body and discharges the condensed water. A protrusion that obstructs some part of the water passage is provided on a bottom surface of the water passage.

[0008] Water condensed inside the indoor unit is led to the water passage, and is discharged to the outside of the indoor unit. Since the protrusion that obstructs some part of the water passage is provided on the bottom surface of the water passage, the flow rate of water flowing in the water passage can be adjusted. For example, it can be prevented that the flow rate of the water becomes excessively high and the water goes over and leaks from the water passage.

[0009] It is preferable to provide a plurality of protrusions at a predetermined interval in a water flowing direction.

[0010] In the indoor unit of an air conditioner according to the aspect of the present invention, the bottom surface is inclined as a whole toward one direction of a longitudinal direction and is inclined as a whole toward one direction of a width direction orthogonal to the longitudinal direction.

[0011] Since the bottom surface of the water passage is inclined as a whole toward the one direction of the longitudinal direction and is inclined as a whole toward the one direction of the width direction, water flowing in the water passage is collected in the one direction of the longitudinal direction, and is collected in the one direction of the width direction. Therefore, an effective position for adjusting the flow rate of the water can be set when providing the protrusion on the bottom surface.

[0012] In the indoor unit of an air conditioner according to the aspect of the present invention, the protrusion is provided to be in contact with a wall portion positioned on a side in the one direction of the width direction.

[0013] Since the wall portion positioned on the side in the one direction of the width direction is the lowest position in a width direction of a bottom portion, the wall portion is at a position where water is collected. By providing the protrusion to be in contact with the wall portion, the flow rate of the water can be effectively adjusted.

[0014] The protrusion may be provided in a direction orthogonal to a direction where the wall portion extends. Alternatively, a protrusion portion may be provided to extend in a state of being inclined to the direction orthogonal to a direction where the wall portion extends at a predetermined angle. When the protrusion is inclined to face the water flowing direction, flow resistance increases due to the protrusion, and thus flow rate can be further reduced. In a case where an effect of reducing the flow rate of water is intended to be alleviated, the protrusion inclined along the water flowing direction may be provided.

[0015] In the indoor unit of an air conditioner according to the aspect of the present invention, a notch is formed in a middle position of the protrusion.

[0016] By forming the notch in the middle position of the protrusion, flow rate can be reduced when water passes through the notch. The flow rate of the water can be adjusted by changing the size of the notch as appropriate.

[0017] In the indoor unit of an air conditioner according to the aspect of the present invention, the protrusion is arranged in a tile pattern.

[0018] The flow rate of water flowing between the protrusions can be reduced by arranging the protrusions in

the tile pattern. The flow rate of the water can be adjusted by changing an interval between the protrusions as appropriate.

Advantageous Effects of Invention

[0019] Since the protrusion that obstructs some part of the water passage is provided on the bottom surface of the water passage, the flow rate of condensed water flowing in the water passage can be appropriately adjusted.

Brief Description of Drawings

[0020]

Fig. 1 is a perspective view illustrating an indoor unit of an air conditioner according to an embodiment of the present invention.
Fig. 2 is a perspective view illustrating an inside of the indoor unit of Fig. 1.
Fig. 3A is a plan view illustrating a partially enlarged water passage.
Fig. 3B is a perspective view illustrating the partially enlarged water passage.
Fig. 4A is a plan view illustrating a partially enlarged water passage of a first modification example.
Fig. 4B is a perspective view illustrating the partially enlarged water passage of the first modification example.
Fig. 5A is a plan view illustrating a partially enlarged water passage of a second modification example.
Fig. 5B is a perspective view illustrating the partially enlarged water passage of the second modification example.
Fig. 6A is a plan view illustrating a partially enlarged water passage of a third modification example.
Fig. 6B is a perspective view illustrating the partially enlarged water passage of the third modification example.

Description of Embodiments

[0021] Hereinafter, an embodiment according to the present invention will be described with reference to the drawings.

[0022] Fig. 1 illustrates an appearance of an indoor unit 1 of an air conditioner. The indoor unit 1 is a wall-hanging type, sucks indoor air from above, and blows air after air conditioning indoors from below. The indoor unit 1 is connected to an outdoor unit (not illustrated), receives supply of a refrigerant compressed by the outdoor unit, and adjusts indoor air so as to have a predetermined temperature by means of an indoor heat exchanger provided inside the indoor unit 1.

[0023] Fig. 2 illustrates an inside of a main body of the indoor unit 1. Fig. 2 illustrates a state where the indoor heat exchanger and a fan is removed. A water passage 5 that leads drain water condensed by the indoor heat exchanger or the like is formed in a base plate 3 mounted on an indoor wall portion. The water passage 5 is a groove portion extending in a right-and-left direction (horizontal direction) of the base plate 3.

[0024] The water passage 5 is formed to face downwards at a left end of the indoor unit 1. A drain pan 7 that receives drain water flowing down from a lower end of the water passage 5 is provided below the base plate 3. The drain pan 7 temporarily stores the drain water and discharges the drain water to the outside of the indoor unit 1.

[0025] A bottom surface of the water passage 5 is inclined as a whole in a longitudinal direction such that a left side thereof becomes a lower side, and is inclined as a whole in a width direction such that a front side (indoor unit front side) thereof becomes the lower side. Accordingly, the drain water is led to the left and the front side. It is evident that a direction where the water passage 5 is inclined may be the right and the back side (indoor unit back side).

[0026] Figs. 3A and 3B are partially enlarged views of the water passage 5. The water passage 5 has a wall portion 5b formed on the front side of the indoor unit 1 (an upper side in Figs. 3A and 3B), and drain water flows along the wall portion 5b from the left to the right. That is, a bottom surface 5a of the water passage 5 is inclined downwards in a D1-direction from the left to the right, and is inclined downwards in a D2-direction toward the front side of the indoor unit 1.

[0027] Ribs (protrusions) 11 protruding upwards are provided on the bottom surface of the water passage 5. The plurality of ribs 11 are provided at a predetermined interval in a longitudinal direction of the wall portion 5b. The ribs 11 are in contact with the wall portion 5b, and extend in a direction orthogonal to a direction where the wall portion 5b extends. A length of each of the ribs 11 in an extending direction thereof is smaller than a width of the water passage 5, and each rib obstructs some part of the water passage 5. Due to the ribs 11, drain water flows such that the drain water bypasses the ribs 11 as shown with arrows. Accordingly, the flow rate of the drain water flowing in the water passage 5 reduces.

[0028] In the aforementioned indoor unit 1, the following operation effects can be achieved.

[0029] Since the ribs 11 that obstruct some part of the water passage 5 are provided on the bottom surface 5a of the water passage 5, the flow rate of drain water flowing in the water passage 5 can be adjusted. Accordingly, even in a case where the indoor unit 1 is mounted with the inclination of the bottom surface 5a being equal to or larger than an assumption, it can be prevented that the flow rate of the drain water becomes excessively high and the drain water goes over and leaks from the water passage 5.

[0030] Since the bottom surface 5a of the water passage 5 is inclined as a whole toward one direction of the longitudinal direction and is inclined as a whole toward

one direction of the width direction, drain water flowing in the water passage 5 is collected in the one direction of the longitudinal direction, and is collected on a wall portion 5b side of the width direction. Therefore, effective positions for adjusting the flow rate of the drain water can be set when providing the ribs 11 on the bottom surface 5a.

[0031] Since the wall portion 5b is at the lowest position in a width direction of the bottom surface 5a, the wall portion is at a position where drain water is collected. By providing the ribs 11 to be in contact with the wall portion 5b, the flow rate of water can be effectively adjusted.

[0032] In addition, the flow rate of drain water can be adjusted by changing the lengths or heights of the ribs 11.

[0033] The shapes of the ribs 11 of the embodiment can be modified as follows.

[First Modification Example]

[0034] As illustrated in Figs. 4A and 4B, a rib 12 may be mounted such that the rib is inclined at a predetermined angle θ with respect to the direction orthogonal to the direction where the wall portion 5b extends. When a protrusion is provided by inclining the rib 12 along a water flowing direction as illustrated in Figs. 4A and 4B, an effect of reducing the flow rate of drain water can be suppressed.

[0035] In addition, when the rib is inclined to an opposite direction to a direction shown in Figs. 4A and 4B to face the water flowing direction, flow resistance increases due to the rib, and thus flow rate can be further reduced.

[Second Modification Example]

[0036] As illustrated in Figs. 5A and 5B, a notch 13a may be formed in a middle position of a rib 13.

[0037] When drain water passes through the notch 13a, flow rate can be reduced. The flow rate of the drain water can be adjusted by changing the size of the notch 13a as appropriate.

[Third Modification Example]

[0038] As illustrated in Figs. 6A and 6B, ribs 14 may be arranged in a tile pattern.

[0039] The flow rate of drain water flowing between the ribs 14 can be reduced by arranging the ribs 14 in the tile pattern. An effect of further reducing the flow rate of the drain water can be obtained by arranging the ribs 14 in a zigzag pattern as illustrated in Figs. 6A and 6B.

[0040] In addition, the flow rate of water can be adjusted by changing intervals between the ribs 14 as appropriate. The shape of each of the ribs 14 is not limited to a case where the shape is a rectangle in plan view as illustrated in Figs. 6A and 6B. The shape may be a polygon such as a triangle and a polygon with five or more sides, or may be a circle or an ellipse.

Reference Signs List

[0041]

1:	indoor unit
3:	base plate
5:	water passage
5a:	bottom surface
5b:	wall portion
7:	drain pan
11, 12, 13, 14:	rib (protrusion)
13a:	notch

Claims

1. An indoor unit of an air conditioner, comprising:

a water passage that receives water condensed in a main body and discharges the condensed water,
wherein a protrusion that obstructs some part of the water passage is provided on a bottom surface of the water passage.

2. The indoor unit of an air conditioner according to Claim 1,
wherein the bottom surface is inclined as a whole toward one direction of a longitudinal direction and is inclined as a whole toward one direction of a width direction orthogonal to the longitudinal direction.

3. The indoor unit of an air conditioner according to Claim 2,
wherein the protrusion is provided to be in contact with a wall portion positioned on a side in the one direction of the width direction.

4. The indoor unit of an air conditioner according to Claim 3,
wherein a notch is formed in a middle position of the protrusion.

5. The indoor unit of an air conditioner according to Claim 2,
wherein the protrusion is arranged in a tile pattern.

Amended claims under Art. 19.1 PCT

1. (Amended) An indoor unit of an air conditioner, comprising:

a water passage that receives water condensed in a main body and discharges the condensed water,
wherein a protrusion that obstructs some part of the water passage is provided on a bottom sur-

face of the water passage,
the bottom surface is inclined as a whole toward one direction of a longitudinal direction and is inclined as a whole toward one direction of a width direction orthogonal to the longitudinal direction,
the protrusion is provided to be in contact with a wall portion positioned on a side in the one direction of the width direction and to extend in the width direction, and
a length of the protrusion in the width direction is smaller than a length of the bottom surface in the width direction such that water flows to bypass the protrusion.

2. (Canceled)

3. (Canceled)

4. (Amended) The indoor unit of an air conditioner according to Claim 1,
wherein a notch is formed in a middle position of the protrusion.

5. (Canceled)

FIG. 1

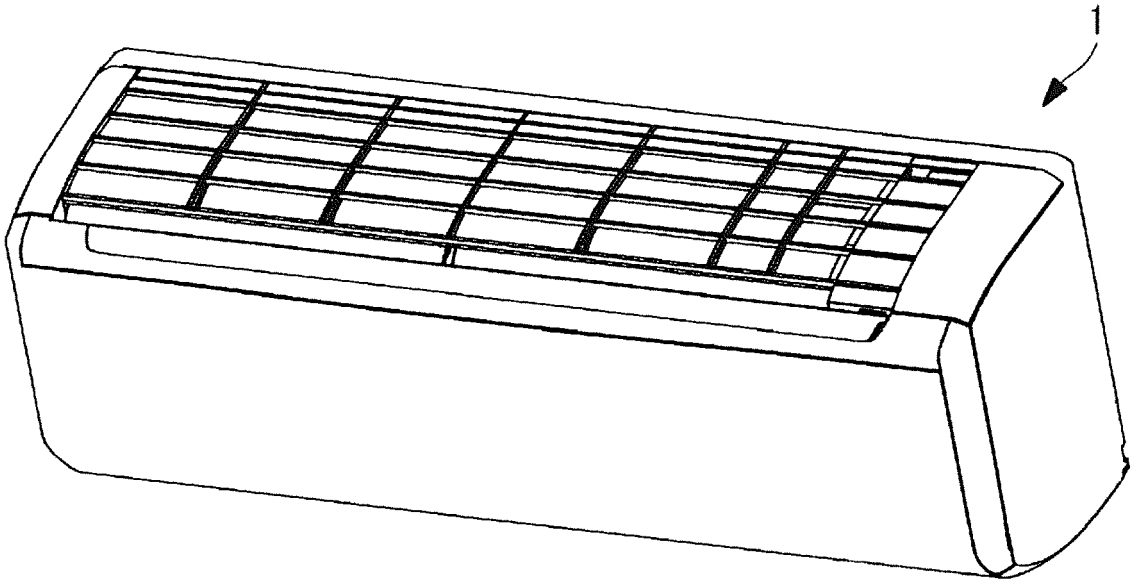


FIG. 2

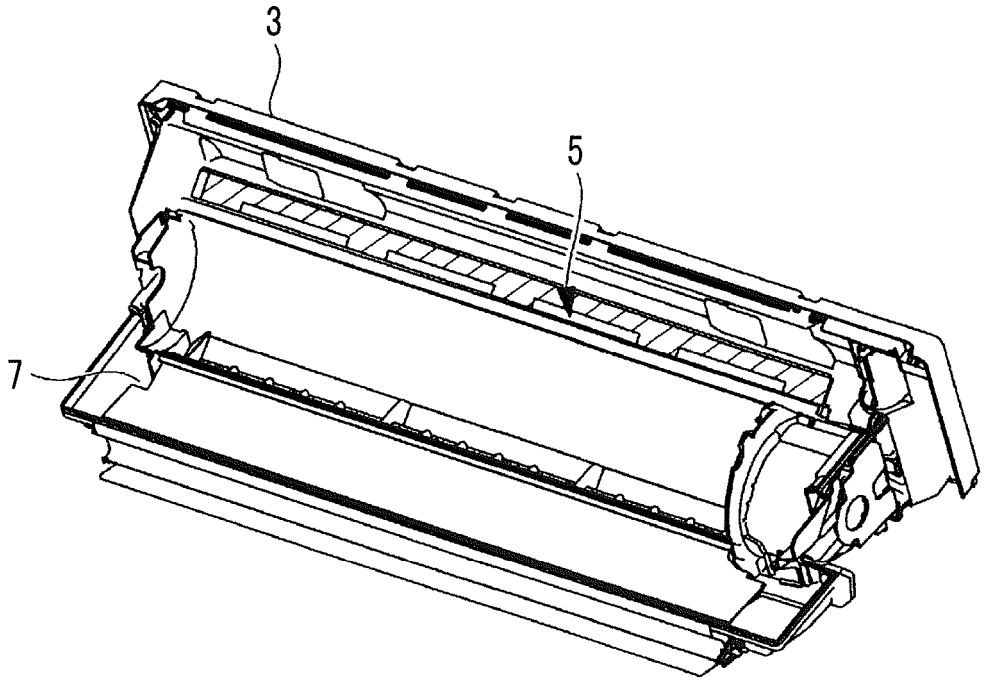


FIG. 3A

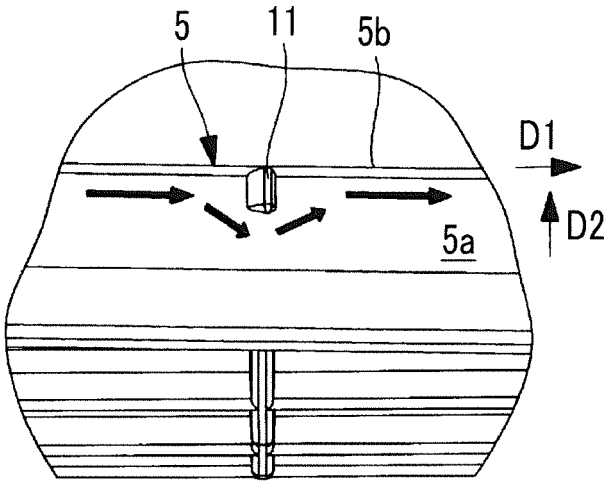


FIG. 3B

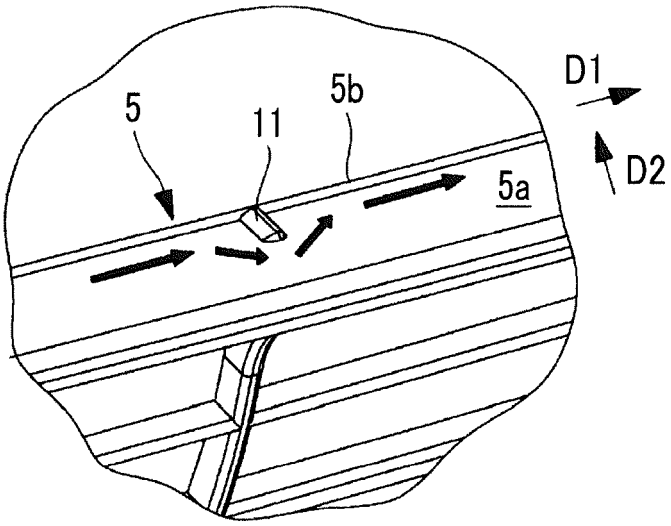


FIG. 4A

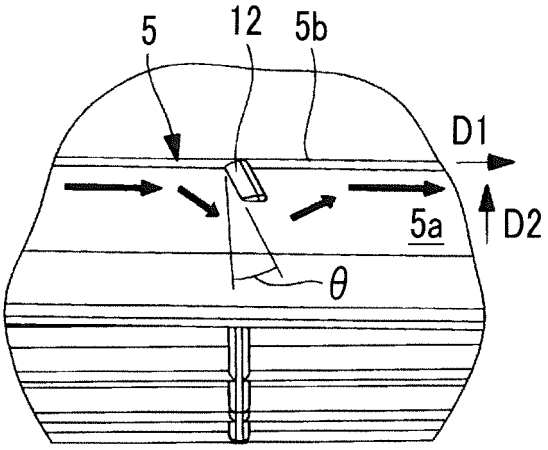


FIG. 4B

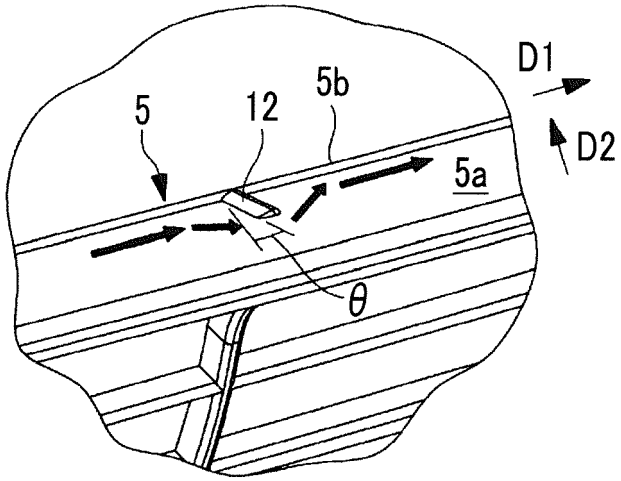


FIG. 5A

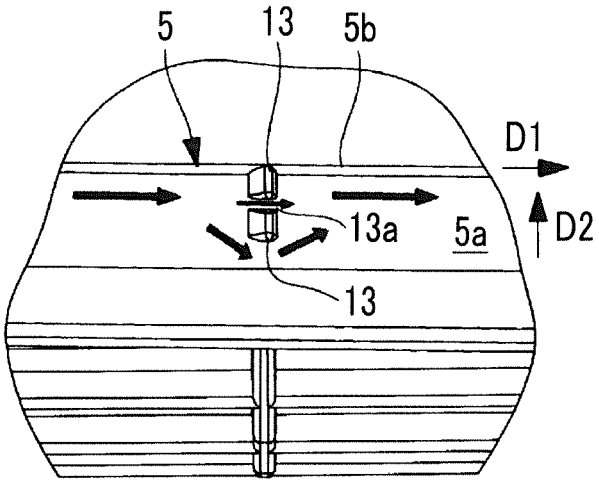


FIG. 5B

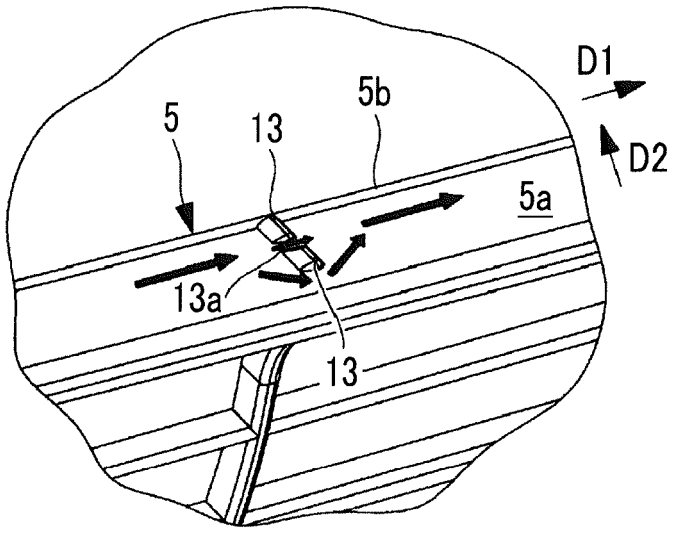


FIG. 6A

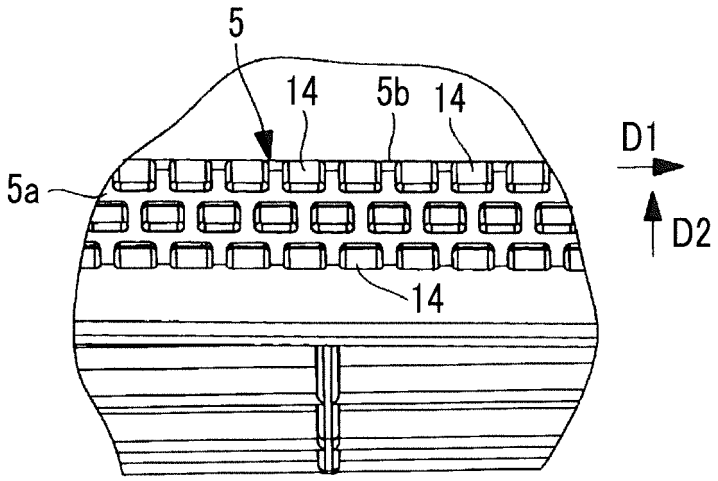
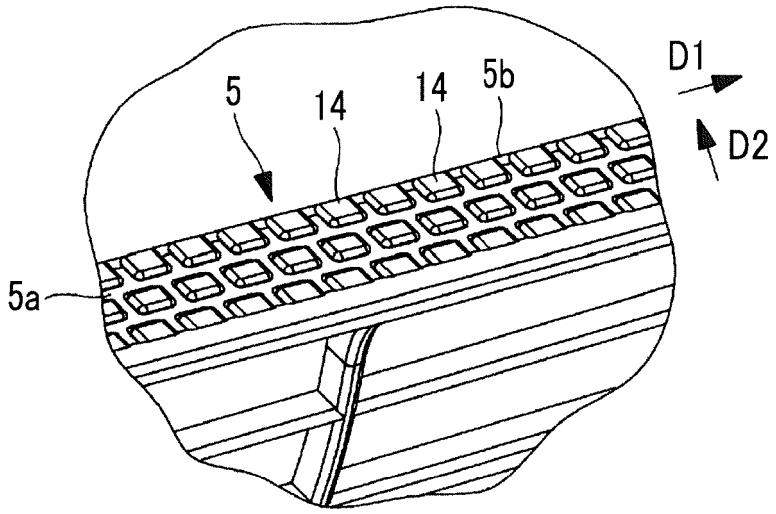


FIG. 6B



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/010370

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl. 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)
Int.Cl. F24F13/22

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

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2018
Registered utility model specifications of Japan	1996-2018
Published registered utility model applications of Japan	1994-2018

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
F24F13/22

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2008-202829 A (SHARP CORP.) 04 September 2008, paragraphs [0001], [0016]-[0023], fig. 1-4	1-5
X A	JP 2010-255983 A (DAIKIN INDUSTRIES, LTD.) 11 November 2010, paragraphs [0001], [0006], [0018]-[0037], fig. 1-4	1 2-5
X A	US 6868689 B1 (MCNEIL, Donald A.) 22 March 2005, column 3, line 66 to column 5, line 40, fig. 1-4	1 2-5
X A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 110673/1972 (Laid-open No. 68252/1974)(DAIKIN INDUSTRIES, LTD.) 14 June 1974, page 3, line 3 to page 6, line 6, fig. 1-3	1 2-5
A	CN 106016670 A (GREE ELECTRIC APPLIANCES INC ZHUHAI) 12 October 2016, entire text, all drawings	1-5

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 April 2018 (11.04.2018)	24 April 2018 (24.04.2018)

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2018/010370

JP 2008-202829 A	04 September 2008	Family: none
JP 2010-255983 A	11 November 2010	Family: none
US 6868689 B1	22 March 2005	CA 2369876 A1
Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 110673/1972 (Laid-open No. 68252/1974)	14 June 1974	Family: none
CN 106016670 A	12 October 2016	Family: none

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2015136711 A **[0003]**
- JP 2015102257 A **[0003]**