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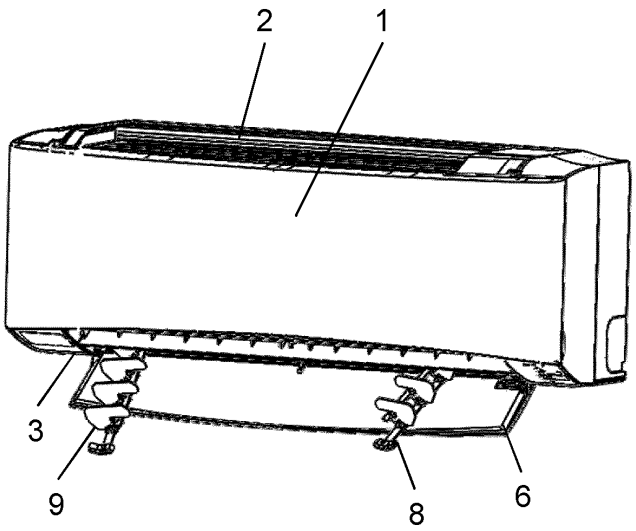
(54) **AIR CONDITIONER**

(57) An air conditioner includes vertical wind direction change blade (6, 7) provided to air outlet (3) of a main body, left-right wind direction change blade mechanism (8, 9) provide to air outlet (3) of main body. The left-right wind direction change blade mechanism has a plurality of blades (14), and vane base (13) that pivotally supports the plurality of blades (14). Vane base (13) has a first end portion that is pivotally supported to a right end portion or a left end portion of air outlet (3), and a second end portion that is a free end rotatable around the first end portion. Vertical wind direction change blade (7) is located above left-right wind direction change blade mechanism (8, 9). Uppermost ends of the plurality of blades (14) form plane (Z) when vane base (13) is rotated. Plane (Z) is located below lower surface (7a) of vertical wind direction change blade (7).

FIG. 1



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Description

BACKGROUND

1. Technical Field

[0001] The present disclosure relates to an air conditioner that facilitates cleaning the inside of an air outlet.

2. Description of the Related Art

[0002] PTL 1 discloses an air conditioner that facilitates cleaning the inside of an air outlet. As illustrated in FIGS. 9 and 10, the air conditioner includes left-right wind direction change blade mechanism 102 provided at air outlet 101. Left-right wind direction change blade mechanism 102 includes two vane bases 103. Air outlet 101 has a right end portion and a left end portion. One vane base 103 is pivotally supported at the right end portion to be rotatable. Another vane base 103 is pivotally supported at the left end portion to be rotatable. At the time of cleaning the inside of the air outlet, a user rotates vane bases 103 to the front side to open a front surface portion of the air outlet, and cleans dust and the like adhering to a ventilation path to air outlet 101, a wind direction change blade, and the like.

Citation List

Patent Literature

[0003] PTL 1: Unexamined Japanese Patent Publication No. 2001-324161

SUMMARY

[0004] The present disclosure provides an air conditioner that further facilitates cleaning an air outlet by enabling the rotation of the vane bases of the left-right wind direction change blade mechanism without time and effort.

[0005] An air conditioner according to an aspect of the present disclosure includes a main body that has a wind circuit; a heat exchanger provided in the wind circuit of the main body; a fan provided in the wind circuit of the main body; an air outlet provided to a front end portion of the wind circuit; a vertical wind direction change blade provided to the air outlet; and a left-right wind direction change blade mechanism provided to the air outlet, in which the left-right wind direction change blade mechanism has a plurality of blades, and a vane base that pivotally supports the plurality of blades, the vane base has a first end portion that is pivotally supported to a right end portion or a left end portion of the air outlet, and a second end portion that is a free end rotatable around the first end portion, the vertical wind direction change blade is located above the left-right wind direction change blade mechanism, uppermost ends of the plurality of blades form a plane when the vane base is rotated, and the plane is located below a lower surface of the vertical wind direction change blade.

[0006] In the air conditioner according to the present disclosure, the left-right wind direction change blade mechanism can be rotated from the air outlet toward the front side of the air outlet and opened without coming into contact with the vertical wind direction change blade. The user can simply and easily clean the inside of the air outlet by rotating the left-right wind direction change blade mechanism without detaching the vertical wind direction change blade from the air outlet.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007]

FIG. 1 is a perspective view of an air conditioner according to a first exemplary embodiment;
FIG. 2 is a perspective view illustrating a main part of an air outlet of the air conditioner;
FIG. 3 is a sectional view of a portion of the air outlet of the air conditioner;
FIG. 4 is an enlarged sectional view of a main part of the portion of the air outlet of the air conditioner;
FIG. 5 is a perspective view illustrating an installation state of a left-right wind direction change blade mechanism provided at the air outlet of the air conditioner;
FIG. 6 is a perspective view of the left-right wind direction change blade mechanism provided at the air outlet of the air conditioner;
FIG. 7 is a side view of the left-right wind direction change blade mechanism provided at the air outlet of the air conditioner;
FIG. 8 is a plan view of the left-right wind direction change blade mechanism provided at the air outlet of the air conditioner;
FIG. 9 is a sectional view of an air conditioner in the related art; and
FIG. 10 is a sectional view of a portion of an air outlet of the air conditioner in the related art.

DETAILED DESCRIPTION

(Knowledge and the like on which the present disclosure is based)

[0008] At the time when the inventors have conceived the present disclosure, an air conditioner that facilitates cleaning the inside of an air outlet has been proposed. For example, as disclosed in PTL 1, an air conditioner includes left-right wind direction change blade mechanism 102 and vertical wind direction change blade 104 located above left-right wind direction change blade mechanism 102. Left-right wind direction change blade mechanism 102 includes two vane bases 103. Air outlet 101 has two end portions in a left-right direction. Each of

vane bases 103 is pivotally supported at a corresponding end portion of air outlet 101 to be rotatable. The user opens vane bases 103 by rotating vane bases 103 left and right on the front side from the substantially central portion, and performs cleaning by opening the front surface of the air outlet. However, when vane bases 103 are rotated, the uppermost end of left-right wind direction change blade mechanism 102 comes into contact with the lower surface of vertical wind direction change blade 104, and left-right wind direction change blade mechanism 102 is not rotated forward from the air outlet as it is. The user has to remove vertical wind direction change blade 104 from air outlet 101, which has a problem of taking time and effort.

[0009] The present inventors have found such a problem, and have made the subject matter of the present disclosure to solve the problem.

[0010] Therefore, the present disclosure provides an air conditioner that further facilitates cleaning of the inside of the air outlet by rotating the vane bases of the left-right wind direction change blade mechanism toward the front side without removing the vertical wind direction change blade.

[0011] Hereinafter, an exemplary embodiment will be described in detail with reference to the drawings. It is noted that a more detailed description than need may be omitted. For example, the detailed description of already well-known matters and the redundant description of substantially same configurations may be omitted. This is to prevent the following description from becoming unnecessarily redundant, and to facilitate understanding of those skilled in the art.

[0012] Note that the attached drawings and the following description are provided for those skilled in the art to fully understand the present disclosure, and are not intended to limit the subject matter as described in the appended claims.

(First exemplary embodiment)

[0013] A first exemplary embodiment will be described below with reference to FIGS. 1 to 8.

[1-1. Configuration]

[0014] An air conditioner of the first exemplary embodiment is a separate-type air conditioner in which an indoor unit and an outdoor unit are connected to each other by refrigerant piping, control wiring, and the like. In this air conditioner, the outdoor unit and the indoor unit constitute a heat pump, and the outdoor unit is provided with a compressor.

[0015] The indoor unit is a wall-mounted type that is attached to a wall surface in the room. As illustrated in FIG. 1, the indoor unit includes main body 1. Main body 1 has air inlet 2 on an upper surface, and air outlet 3 on a lower portion of a front surface, and has wind circuit 4 (refer to FIG. 3) between air inlet 2 and air outlet 3. A heat exchanger (not illustrated) that converts indoor air sucked from air inlet 2 into cold air or hot air, fan 5 (refer to FIG. 3) that blows the cold air or the hot air converted by the heat exchanger from air outlet 3 of wind circuit 4, and the like are incorporated in wind circuit 4.

[0016] As illustrated in FIGS. 3 and 4, air outlet 3 includes two vertical wind direction change blades 6, 7 that change the direction of the wind in the vertical direction, and a pair of left-right wind direction change blade mechanisms 8, 9 that are provided at substantially the center of air outlet 3 to be divided into two on the left and right sides.

[0017] Of vertical wind direction change blades 6, 7, vertical wind direction change blade 6 on the lower side is formed in a wide shape that opens and closes air outlet 3. Vertical wind direction change blade 6 is disposed so as to be substantially flush with the upper surface of rear casing 10 forming wind circuit 4. Vertical wind direction change blade 6 is pivotally supported by vertical wind direction change blade shaft support portion 11, at a lower opening edge of air outlet 3, and is rotatable vertically. Another vertical wind direction change blade 7 is pivotally supported by vertical wind direction change blade shaft support portion 12, at a position above vertical wind direction change blade 6 and inward from the opening surface of air outlet 3, and is rotatable vertically. Vertical wind direction change blade 6 closes air outlet 3 at the time of the operation stop. At this time, vertical wind direction change blade 7 is covered with vertical wind direction change blade 6.

[0018] As illustrated in FIGS. 5 to 8, the pair of left-right wind direction change blade mechanisms 8, 9 includes vane base 13 and a plurality of blades 14 pivotally supported at vane base 13. Vane base 13 includes main vane base 13a, and sub vane base 13b that is arranged in parallel with main vane base 13a. Blades 14 are engaged with main vane base 13a and sub vane base 13b. Specifically, blade 14 is pivotally supported on main vane base 13a at a first position of a root portion of blade 14 by left-right wind direction change blade shaft support portion 15a, and is pivotally supported on sub vane base 13b at a second position of the root portion of blade 14 by left-right wind direction change blade shaft support portion 15b. Sub vane base 13b is linked to stepped drive arm 19 driven by rotating arm 17 of motor 16 via drive blades 14a located on both end portion sides of the air outlet among the plurality of blades 14 engaged with sub vane base 13b (refer to left-right wind direction change blade shaft support portion 18 in FIG. 8). As a result, stepped drive arm 19 rotates drive blade 14a by the rotation of motor 16, sub vane base 13b slides in the left-right direction of air outlet 3 as indicated by arrow X by the rotation of drive blade 14a, and thereby the plurality of blades 14 change the direction in conjunction with each other.

[0019] Vane base shaft support portion 15 pivotally supports drive blade 14a at an air outlet end portion of main vane base 13a. As illustrated in FIGS. 2 and 5, vane

base shaft support portion 15 also serves to pivotally support main vane base 13a at air outlet frame plate 20. Vane base shaft support portion 15 allows free end portions of left-right wind direction change blade mechanisms 8, 9, that is, air outlet central end portions, to be rotated left and right on the front side of air outlet 3. Vertical wind direction change blade 7 is located above left-right wind direction change blade mechanisms 8, 9. As illustrated in FIG. 4, in left-right wind direction change blade mechanisms 8, 9, uppermost ends 14b of blades 14 form plane Z when main vane base 13a is rotated toward the front side. Plane Z is located at least below lower surface 7a of vertical wind direction change blade 7. In other words, lower surface 7a of vertical wind direction change blade 7 is located only above plane Z formed by the rotation of uppermost ends 14b of blades 14 in a plane normal to the vane base rotation shaft of main vane base 13a.

[0020] As illustrated in FIG. 2, air outlet 3 has a vane base end holding portion 22 at a substantially central portion of air outlet 3. A central end portion of main vane base 13a has engagement piece 21 that can be fitted to vane base end holding portion 22. When engagement piece 21 is fitted to vane base end holding portion 22, left-right wind direction change blade mechanisms 8, 9 are detachably fixed to main body 1.

[0021] As illustrated in FIGS. 2 and 5, motor 16 that drives main vane base 13a of each of left-right wind direction change blade mechanisms 8, 9 is attached and fixed to side plate portion 23 forming air outlet 3. As illustrated in FIGS. 5 and 6, stepped drive arm 19 is slidably supported by guide 24.

[1-2. Operation]

[0022] Next, the operation of the air conditioner will be described.

[0023] When the air conditioning operation is started, the air conditioner according to the present exemplary embodiment opens vertical wind direction change blades 6, 7 to open air outlet 3. When fan 5 is driven in this state, the indoor air is taken into the inside of the indoor unit through air inlet 2. The taken indoor air is subjected to heat exchange by the heat exchanger, passes through fan 5, passes through wind circuit 4, and is blown out from air outlet 3. The direction of the air blown out from air outlet 3 is changed by vertical wind direction change blades 6, 7 and left-right wind direction change blade mechanisms 8, 9 to cool or heat the room.

[0024] Left-right wind direction change blade mechanism 8 is rotatable toward the front right side. On the other hand, left-right wind direction change blade mechanism 9 is rotatable toward the front left side. As illustrated in FIGS. 1 and 2, the air conditioner can open air outlet 3 by rotating left-right wind direction change blade mechanisms 8, 9 left and right on the front side. The user can clean dust and the like adhering to wind circuit 4, vertical wind direction change blades 6, 7, and the like from the open portion to air outlet 3.

[0025] As described above, plane Z is located below lower surface 7a of vertical wind direction change blade 7. Therefore, uppermost ends 14b of blades 14 do not hit lower surface 7a of vertical wind direction change blade 7 regardless of the positions where blades 14 are rotated when vane base 13 is rotated toward the front side. Accordingly, the user can open air outlet 3 by rotating left-right wind direction change blade mechanisms 8, 9 without detaching vertical wind direction change blade 7 from air outlet 3. The user can easily clean dust and the like adhering to vertical wind direction change blade 7 in wind circuit 4, the inner surface of wind circuit 4, and the like.

[0026] The user places his/her hand on the free ends (central end portions) of left-right wind direction change blade mechanisms 8, 9 to rotate left-right wind direction change blade mechanisms 8, 9. The free ends of left-right wind direction change blade mechanisms 8, 9 are disposed substantially at the center of air outlet 3. As compared with the case where the free ends are disposed at both ends of air outlet 3, the user can easily clean the inside of air outlet 3 by rotating left-right wind direction change blade mechanisms 8, 9.

[0027] In the present exemplary embodiment, vane base 13 has an end-portion-side end portion pivotally supported at the end portion of air outlet 3, and a central end portion as a free end rotatable around the end-portion-side end portion. The user can access the substantially central portion of air outlet 3 without being disturbed by the both end portions of air outlet 3, and place his/her hand on the central end portion of vane base 13. The user can easily rotate vane base 13 to the front side. Therefore, cleaning the inside of wind circuit 4 becomes easier.

[0028] Further, the central end portion of vane base 13 has engagement piece 21. The user may place a finger on engagement piece 21 and pull engagement piece 21 toward the front side, and thereby vane base 13 itself can be easily rotated.

[0029] The air conditioner may include only one left-right wind direction change blade mechanism instead of two left-right wind direction change blade mechanisms 8, 9. The left-right wind direction change blade mechanism may have a first end portion pivotally supported to vertical wind direction change blade 7 or the end portion of air outlet 3, and a second end portion as a free end rotatable around the first end portion. In this case, a number of components is reduced, and the cost can be suppressed.

[1-3. Effects and the like]

[0030] As described above, the air conditioner according to the present disclosure includes main body 1 that has wind circuit 4; a heat exchanger provided in wind circuit 4 of main body 1; fan 5 provided in wind circuit 4 of main body 1; air outlet 3 provided to a front end portion

of wind circuit 4; vertical wind direction change blade 6, 7 provided to air outlet 3; and left-right wind direction change blade mechanism 8, 9, in which left-right wind direction change blade mechanism 8, 9 has a plurality of blades 14, and vane base 13 that pivotally supports the plurality of blades 14, vane base 13 has a first end portion that is pivotally supported to a right end portion or a left end portion of air outlet 3, and a second end portion that is a free end rotatable around the first end portion, vertical wind direction change blade 7 is located above left-right wind direction change blade mechanism 8, 9, uppermost ends of the plurality of blades 14 form plane Z when vane base 13 is rotated, and plane Z is located below lower surface 7a of vertical wind direction change blade 7.

[0031] As a result, left-right wind direction change blade mechanisms 8, 9 in air outlet 3 can be rotated toward the front side of the air outlet and opened without coming into contact with vertical wind direction change blade 7. Accordingly, the user can simply and easily clean the inside of air outlet 3 by rotating left-right wind direction change blade mechanisms 8, 9 without detaching vertical wind direction change blade 7 from air outlet 3.

[0032] Further, left-right wind direction change blade mechanism 8, 9 includes a first left-right wind direction change blade mechanism (for example, left-right wind direction change blade mechanism 8) and a second left-right wind direction change blade mechanism (for example, left-right wind direction change blade mechanism 9). In the first left-right wind direction change blade mechanism, the first end portion of vane base 13 is pivotally supported to the right end portion of air outlet 3, and the second end portion of vane base 13 is located at a substantially central portion of the air outlet and is rotatable toward a front right side. In the second left-right wind direction change blade mechanism, the first end portion of vane base 13 is pivotally supported to the left end portion of air outlet 3, and the second end portion of vane base 13 is located at a substantially central portion of air outlet 3 and is rotatable toward a front left side.

[0033] As a result, the user can perform a rotation operation of vane base 13 to the left and right on the front side at the substantially central portion of air outlet 3, and can further easily perform cleaning.

[0034] The air conditioner according to the present disclosure may further include engagement piece 21 provided at a free end of vane base 13.

[0035] As a result, the user can easily rotate vane base 13 by placing his/her hand on engagement piece 21 and pulling engagement piece 21 toward the front side, and thereby cleaning the inside of wind circuit 4 becomes easier.

[0036] Although the air conditioner according to the present disclosure has been described with reference to the above exemplary embodiment, the present disclosure is not limited thereto. For example, in the present exemplary embodiment, the separate-type air conditioner in which the indoor unit and the outdoor unit are separated has been described as an example, but the air conditioner may be an air conditioner in which the indoor unit and the outdoor unit are integrated. In the above exemplary embodiment, main body 1 of the air conditioner includes left-right wind direction change blade mechanisms 8, 9. However, the present disclosure is not limited thereto, and the air conditioner may include only one left-right wind direction change blade mechanism. In this case, the left-right wind direction change blade mechanism may have a length substantially equal to the length of air outlet 3 in the left-right direction. That is, the scope of the present disclosure is defined by the claims, and includes all modifications within the meaning and scope equivalent to the claims.

[0037] As described above, the present disclosure provides an air conditioner that allows a user to rotate a left-right wind direction change blade mechanism toward the front side without detaching a vertical wind direction change blade from an air outlet. Therefore, the user can simply and easily clean the inside of the air outlet. The present disclosure can be widely applied to air conditioners for home use and business use.

Claims

1. An air conditioner comprising:

a main body that has a wind circuit;
a heat exchanger provided in the wind circuit of the main body;
a fan provided in the wind circuit of the main body;
an air outlet provided to a front end portion of the wind circuit;
a vertical wind direction change blade provided to the air outlet; and
a left-right wind direction change blade mechanism provided to the air outlet,
wherein

the left-right wind direction change blade mechanism has

a plurality of blades, and
a vane base that pivotally supports the plurality of blades,

the vane base has

a first end portion that is pivotally supported to a right end portion or a left end portion of the air outlet, and
a second end portion that is a free end rotatable around the first end portion,

the vertical wind direction change blade is located above the left-right wind direction change blade mechanism,

uppermost ends of the plurality of blades form a plane when the vane base is rotated, and
the plane is located below a lower surface of the vertical wind direction change blade.

2. The air conditioner according to claim 1, wherein

the left-right wind direction change blade mechanism includes a first left-right wind direction change blade mechanism and a second left-right wind direction change blade mechanism,
in the first left-right wind direction change blade mechanism, the first end portion of the vane base is pivotally supported to the right end portion of the air outlet, and the second end portion of the vane base is located at a substantially central portion of the air outlet and is rotatable toward a front right side, and
in the second left-right wind direction change blade mechanism, the first end portion of the vane base is pivotally supported to the left end portion of the air outlet, and the second end portion of the vane base is located at a substantially central portion of the air outlet and is rotatable toward a front left side.

3. The air conditioner according to claim 1 or 2, wherein the left-right wind direction change blade mechanism further includes an engagement piece provided to the free end.

FIG. 1

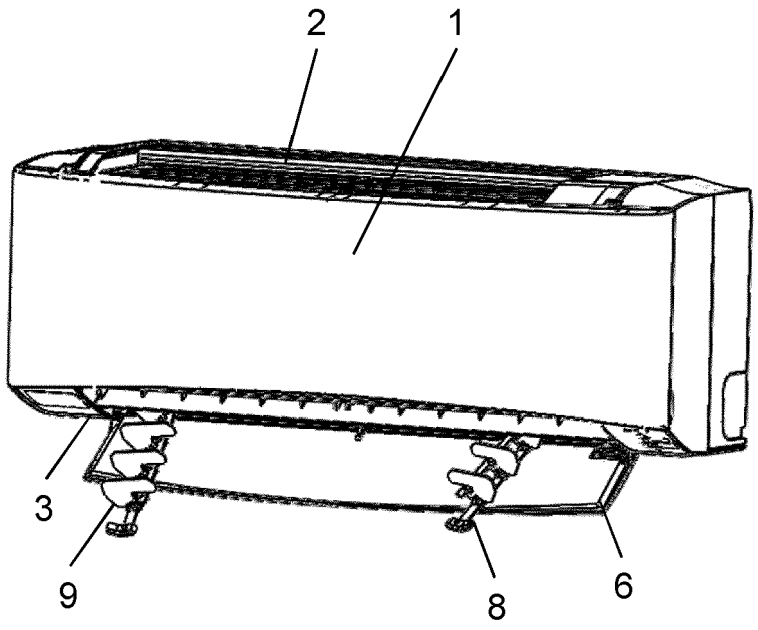

FIG. 2

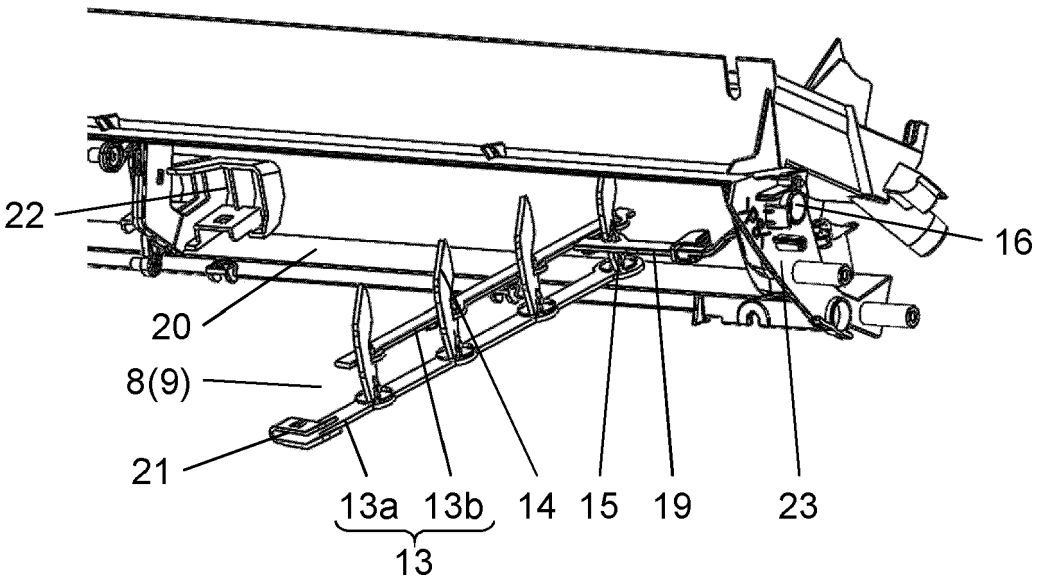

FIG. 3

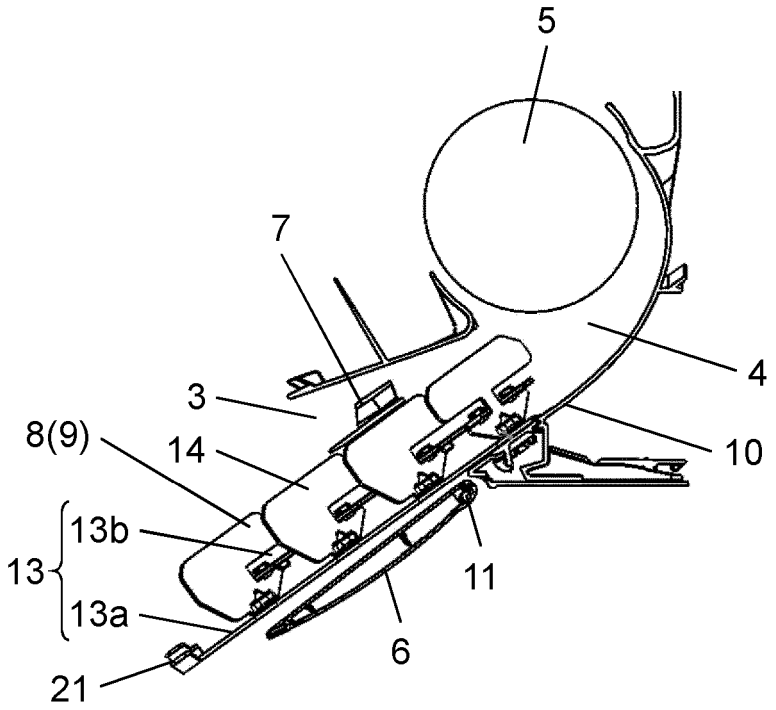

FIG. 4

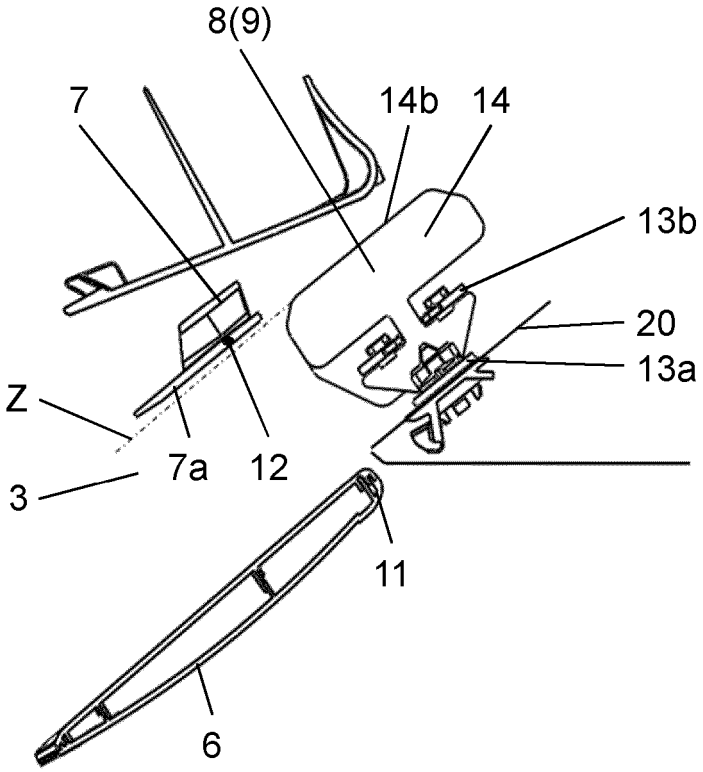

FIG. 5

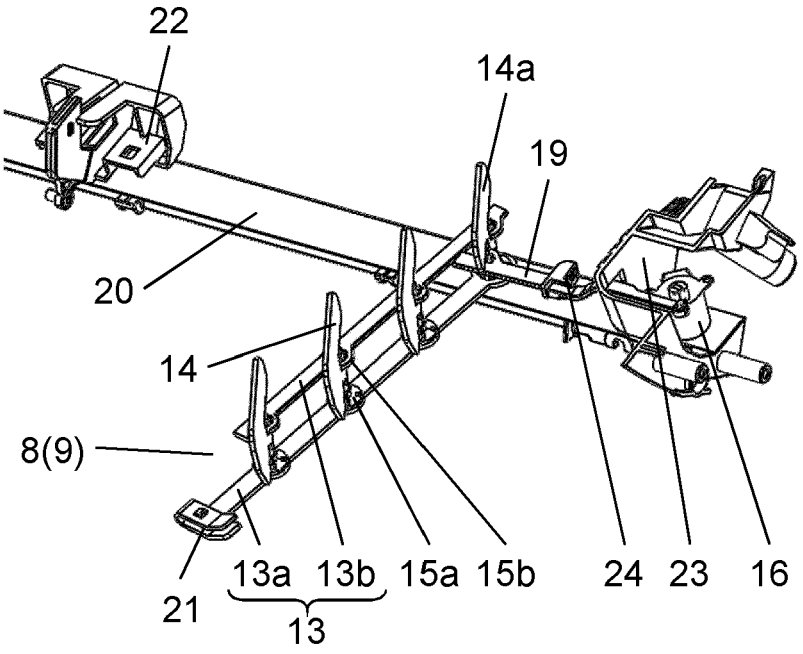
22
14a
19
20
14
8(9)
21
13a
13b
13
15a
15b
24
23
16

FIG. 6

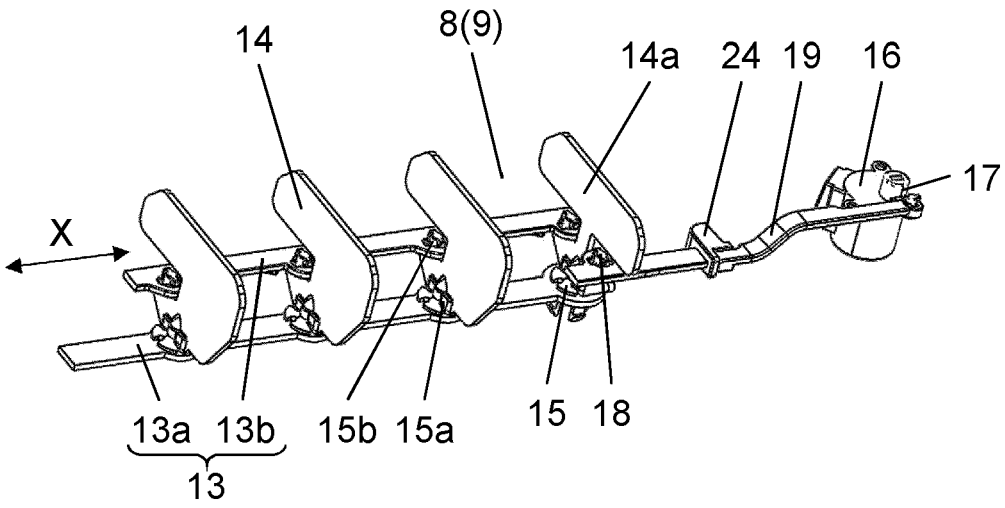
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FIG. 7

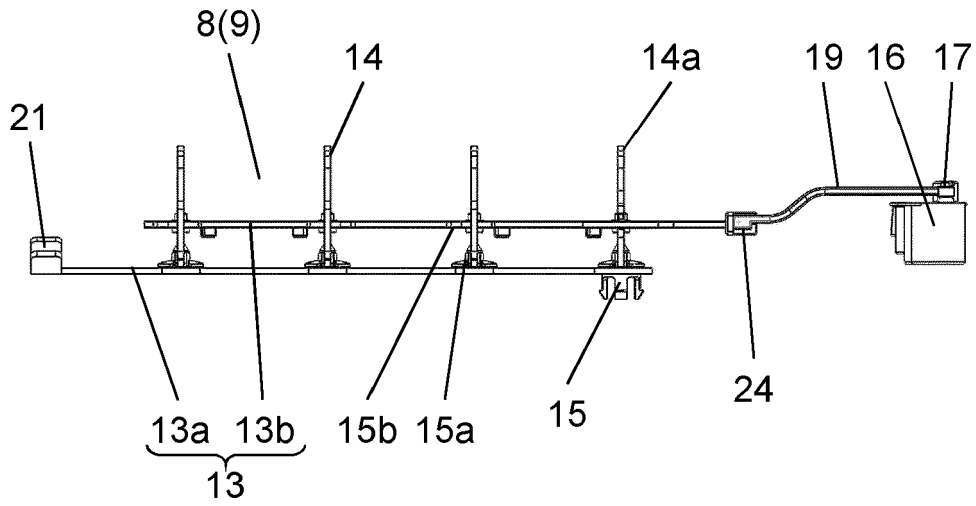
8(9)
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FIG. 8

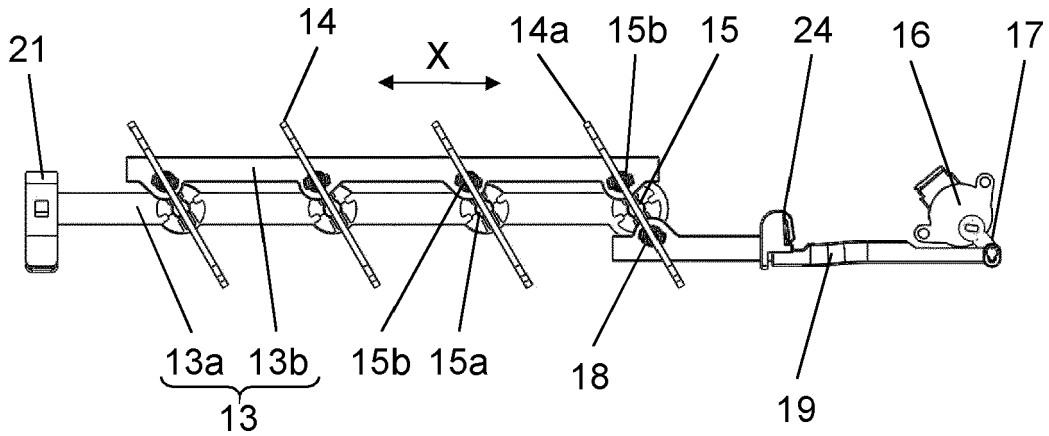
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FIG. 9

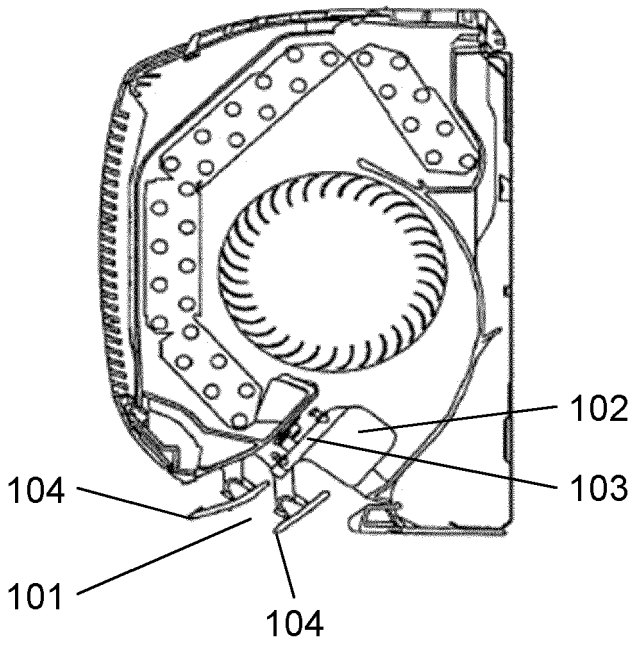
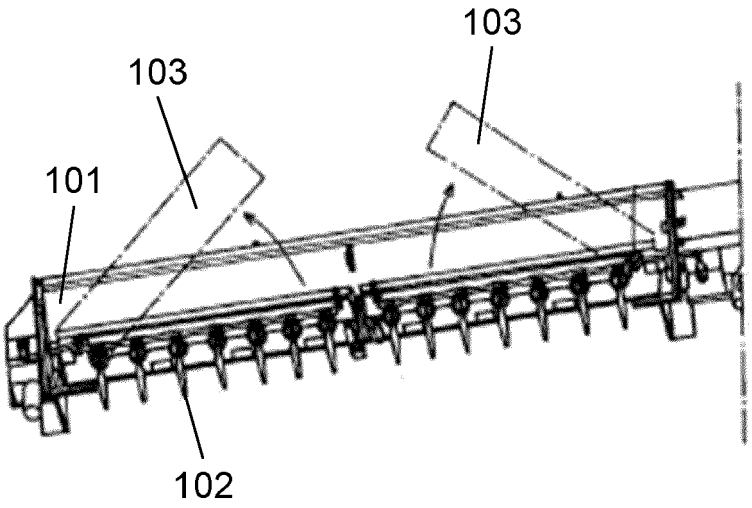


FIG. 10



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EUROPEAN SEARCH REPORT

Application Number
EP 21 20 3565

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	JP 2020 094770 A (PANASONIC IP MAN CORP) 18 June 2020 (2020-06-18) * paragraphs [0025] - [0057]; figures 1-11 *	1-3	INV. F24F1/0011 F24F13/14 F24F13/15
A	JP 2005 147436 A (MITSUBISHI ELECTRIC CORP) 9 June 2005 (2005-06-09) * abstract; figures 6-8 *	1-3	
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TECHNICAL FIELDS SEARCHED (IPC)
F24F

1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 March 2022	Valenza, Davide

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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09-03-2022

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2001324161 A **[0003]**