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(71) Applicant: **Mitsubishi Electric Corporation**
Chiyoda-ku
Tokyo 100-8310 (JP)

(72) Inventors:
- **Tazawa, Tetsuya**
  Tokyo, 102-0073 (JP)
- **Tomomura, Keisuke**
  Tokyo, 102-0073 (JP)
- **Yamaguchi, Koji**
  Tokyo, 100-8310 (JP)

(74) Representative: **Pfenning, Meinig & Partner GbR**
Patent- und Rechtsanwälte
Theresienhöhe 13
80339 München (DE)

(54) Floor-standing indoor unit of air-conditioning apparatus

(57) To provide a floor-standing indoor unit of an air-conditioning apparatus that includes a design panel that is removable from a casing with no part at the bottom of the front face thereof coming into contact with the floor surface.

A floor-standing indoor unit of an air-conditioning apparatus includes receiving cases 9 provided at two respective sides at the bottom of an opening of a casing 1 a design panel 3 configured to cover the opening of the casing 1 panel-supporting portions 6 provided on a back face of the design panel 3 and configured to support the design panel 3 while residing in the respective receiving cases 9 when the design panel 3 covers the opening of the casing 1 and to move in the receiving cases 9 when the design panel 3 is tilted with a lower-frame edge 3b of the design panel 3 that is in contact with a front-face bottom edge 1 b of the casing 1 being the center of rotation of the design panel 3, and guiding portions 10 provided in the respective receiving cases 9 and configured to guide the panel-supporting portions 6 to move in an oblique direction. Terminal points 11a of the respective guiding portions 10 up to which the panel-supporting portions 6 are guided are each set at such a position that, while the design panel 3 is being tilted, a part 3c at a front-face bottom edge of the design panel 3 resides at or above a level where a base 1 a of the casing 1 resides.

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Description

APPARATUS

[Technical Field]

[0001] The present invention relates to a floor-standing indoor unit of an air-conditioning apparatus, and more specifically, it relates to a casing of the floor-standing indoor unit and to a mechanism in which a design panel is attached to the casing.

[Background Art]

[0002] In a known indoor unit, a shaft that holds a design panel coincides with the center of rotation of the design panel that is opened or closed. In opening the design panel, the design panel is moved upward. Meanwhile, a securing portion has a shape that allows the design panel s to rotate (see Patent Literature 1, for example).

[Citation List]

[Patent Literature]

[0003]

[Patent Literature 1] Japanese Unexamined Patent Application Publication No. 2004-239601 (p. 4 and Fig. 8)

[Summary of Invention]

[Technical Problem]

[0004] In a floor-standing indoor unit, a design panel is removed from a casing by tilting the design panel downward about the bottom end thereof. In doing so, a part of the bottom end of the design panel comes into contact with the floor. Hence, the design panel cannot be provided in such a manner as to cover the bottom end of the casing. This may deteriorate the beauty of design.

[0005] The present invention is made to solve the above problem and to provide a floor-standing indoor unit of an air-conditioning apparatus that includes a design panel provided in such a manner as to extend over the bottom end of a casing and being removable from the casing with no part at the bottom end thereof coming into contact with the floor surface.

[Solution to Problem]

[0006] A floor-standing indoor unit of an air-conditioning apparatus according to the present invention includes a casing having an opening in a front face thereof and a base at a bottom thereof, receiving cases provided at two respective sides of a bottom edge of a front face of the casing, a design panel configured to cover the opening of the casing, panel-supporting portions provided on a back face of the design panel and configured to support the design panel while residing in the respective receiving cases when the design panel covers the opening of the casing and to move in the receiving cases when the design panel is tilted with a part being the center of rotation of the design panel, the part being a part of a bottom edge of a back face of the design panel that is in contact with the bottom edge of the front face of the casing, and guiding portions provided in the respective receiving cases and configured to guide the panel-supporting portions to move in an oblique direction. Terminal points of the respective guiding portions up to which the panel-supporting portions are guided are each set at such a position that, while the design panel is being tilted, a part at a bottom edge of a front face of the design panel resides at or above a level where a lower surface of the base of the casing resides.

[Advantageous Effects of Invention]

[0007] In the present invention, while the design panel is being tilted, the part at the front-face bottom edge of the design panel resides at or above the level where the base of the casing resides. Hence, the design panel is removable from the casing in such a manner as to avoid the contact between the bottom edge thereof and the floor surface. Therefore, the casing can be provided with the design panel extending over the bottom edge of the front face of the casing. Accordingly, a floor-standing indoor unit having excellent design is provided.

[Brief Description of Drawings]

[0008]

[Fig. 1] Fig. 1 is a perspective view illustrating an appearance of a floor-standing indoor unit of an air-conditioning apparatus according to Embodiment.
[Fig. 2] Fig. 2 is a perspective view illustrating a design panel of the floor-standing indoor unit illustrated in Fig. 1 that is seen from the back side.
[Fig. 3] Fig. 3 is an enlarged perspective view of the design panel according to Embodiment illustrating one of panel-supporting portions.
[Fig. 4] Fig. 4 is a sectional view illustrating the panel-supporting portion of the design panel and a corresponding one of receiving cases provided to a casing according to Embodiment.
[Fig. 5] Fig. 5 is a perspective view of the floor-standing indoor unit illustrated in Fig. 1 with the design panel tilted toward the near side.
[Fig. 6] Fig. 6 is a sectional view illustrating a relationship between the panel-supporting portion and the receiving case that is established when the design panel is tilted.
[Fig. 7] Fig. 7 is a perspective view of the floor-stand-

ing indoor unit with the design panel removed from the casing.

[Fig. 8] Fig. 8 is a sectional view illustrating the panel-supporting portion and the receiving case with the design panel removed from the casing.

[Fig. 9] Fig. 9 is an exploded perspective view of a floor-standing indoor unit according to a modification of Embodiment.

[Description of Embodiments]

[0009] Fig. 1 is a perspective view illustrating an appearance of a floor-standing indoor unit of an air-conditioning apparatus according to Embodiment. Fig. 2 is a perspective view of a design panel of the floor-standing indoor unit illustrated in Fig. 1 that is seen from the back side.

[0010] Referring to Figs. 1 and 2, the floor-standing indoor unit includes a rectangular-parallelpiped casing 1 having an opening in the front face thereof and a base 1a at the bottom thereof, an air outlet 2 provided at the top of the casing 1, an air-sending device and a heat exchanger provided in the casing 1, a design panel 3 covering the opening provided in the front face of the casing 1, an air inlet 4 provided in the design panel 3, and so forth. As illustrated in Fig. 2, the design panel 3 has catch-receiving portions 5b on two respective sides at the top of the back face thereof. The catch-receiving portions 5b engage with respective catches 5a that are provided on the casing 1. The design panel 3 also has panel-supporting portions 6, to be described below, provided on two respective sides at the bottom of the back face thereof.

[0011] The floor-standing indoor unit is connected to an outdoor unit, which is provided outdoor, by a refrigerant pipe. The heat exchanger included in the floor-standing indoor unit functions as a condenser in a heating operation and as an evaporator in a cooling operation. For example, in the cooling operation, the air-sending device is activated, and air in the room is taken into the indoor unit through the air inlet 4. The air thus taken is made to flow through the heat exchanger, where the air undergoes heat exchange. Consequently, cooling air is blown from the air outlet 2 into the room.

[0012] Fig. 3 is an enlarged perspective view of the design panel 3 according to Embodiment illustrating one of the panel-supporting portions 6. Fig. 4 is a sectional view illustrating the panel-supporting portion 6 of the design panel 3 and a corresponding one of receiving cases 9 provided to the casing 1 according to Embodiment.

[0013] As illustrated in Fig. 3, each panel-supporting portion 6 is secured to a corresponding one of side frames 3a provided on the right and left sides of the design panel 3 and to a portion of a frame 4a of the air inlet 4 that faces the side frame 3a. The panel-supporting portion 6 includes an arm portion 7 having a plate shape, for example, and a shaft member 8 having a cylindrical shape, for example. The arm portion 7 projects from the back face of the design panel 3 toward the inner side of the casing 1 and extends obliquely downward. The shaft member 8 is provided at the tip of the arm portion 7 and on a side face of the arm portion 7 that faces the air inlet 4. The shaft member 8 may have a columnar shape instead of the cylindrical shape.

[0014] The casing 1 also has receiving cases 9 provided on two respective sides at the bottom of the front face thereof. The receiving cases 9 receive the respective panel-supporting portions 6. As illustrated in Fig. 4, the receiving cases 9 each have a box shape with an opening in the front face thereof. A guiding portion 10 is provided in the receiving case 9 and extends rearward. The guiding portion 10 is a plate having a quadrilateral shape in side view, with an upper side 10a among the four sides thereof being parallel to the bottom surface of the receiving case 9 and another side thereof facing the rear side of the receiving case 9 being formed into an oblique side 10b sloping upward in a direction toward the opening of the receiving case 9.

[0015] The oblique side 10b forms a rail 11 that guides the shaft member 8 of the panel-supporting portion 6 to move in accordance with the angle of tilt of the design panel 3. The rail 11 has a rail terminal point 11a where the rail 11 intersects the upper side 10a of the guiding portion 10. The rail terminal point 11a is set at such a position that, while the design panel 3 is being tilted, a part 3c (edge) of the design panel 3 that is at a front-face bottom edge (a bottom edge of the front face) of the design panel 3 resides at or above a level where the base 1a of the casing 1 resides. That is, when the shaft member 8 of the panel-supporting portion 6 reaches the rail terminal point 11a while the design panel 3 is being tilted, the part 3c at the front-face bottom edge of the design panel 3 does not come into contact with a floor surface 20. When the shaft member 8 of the panel-supporting portion 6 goes over the rail terminal point 11a, the design panel 3 is removed from the casing 1.

[0016] Referring now to Figs. 5 to 8, how the panel-supporting portion 6 behaves when the design panel 3 is being removed from the casing 1 will be described. Fig. 5 is a perspective view of the floor-standing indoor unit illustrated in Fig. 1 with the design panel 3 tilted toward the near side. Fig. 6 is a sectional view illustrating a relationship between the panel-supporting portion 6 and the receiving case 9 that is established when the design panel 3 is tilted. Fig. 7 is a perspective view of the floor-standing indoor unit with the design panel 3 removed from the casing 1. Fig. 8 is a sectional view illustrating the panel-supporting portion 6 and the receiving case 9 with the design panel 3 removed from the casing 1.

[0017] The catch-receiving portions 5b provided on the two respective sides at the top of the back face of the design panel 3 engage with the respective catches 5a provided on the casing 1, whereby the upper part of the design panel 3 is attached to the casing 1. Meanwhile, the lower part of the design panel 3 is supported by the panel-supporting portions 6 received in the respective

receiving cases 9 provided on the casing 1. To disengage the design panel 3 from the casing 1 and tilt the design panel 3 toward the near side, the design panel 3 is rotated about a lower-frame edge 3b (part at a back-face bottom edge (bottom edge of the back face)) of the design panel 3 that is in contact with a front-face bottom edge (bottom edge of the front face) 1b of the casing 1. As illustrated in Figs. 5 and 6, when the design panel 3 is gradually tilted toward the near side, the shaft members 8 of the panel-supporting portions 6 move upward along the respective rails 11 of the guiding portions 10, with the radius of rotation being the distance between the center of rotation of the design panel 3 and the center of each of the shaft members 8.

[0018] If the tilting of the design panel 3 is stopped before the shaft members 8 of the panel-supporting portions 6 reach the respective rail terminal points 11a of the rails 11 provided by the guiding portions 10, the shaft members 8 of the panel-supporting portions 6 are locked on the rails 11 of the guiding portions 10 with the lower-frame edge 3b that is in contact with the front-face bottom edge 1b of the casing 1 functioning as a support. This is because the weight of the design panel 3 that is supported at its center of rotation is applied to the shaft members 8 of the panel-supporting portions 6.

[0019] When the design panel 3 is further tilted, the shaft members 8 of the panel-supporting portions 6 move upward along the rails 11 of the guiding portions 10 in accordance with the angle of tilt of the design panel 3. Subsequently, as illustrated in Fig. 6, the shaft members 8 of the panel-supporting portions 6 go over the respective rail terminal points 11a, whereby the design panel 3 is removed from the casing 1 (see Figs. 7 and 8).

[0020] In a state where the shaft members 8 of the panel-supporting portions 6 have reached the respective rail terminal points 11a, the part 3c at the front-face bottom edge of the design panel 3 resides at or above the level where the base 1a of the casing 1 resides (see Fig. 6). Hence, the design panel 3 is removable from the casing 1 in such a manner as to avoid the contact with the floor surface 20. The locus along which each shaft member 8 moves toward and goes over a corresponding one of the rail terminal points 11a forms an arc shape with the lower-frame edge 3b of the design panel 3 that is in contact with the front-face bottom edge 1b of the casing 1 being the center of rotation and the radius of rotation being the distance between the foregoing center of rotation and the center of the shaft member 8, as described above.

[0021] To summarize, according to Embodiment, each of the rail terminal points 11a with respect to a corresponding one of the shaft members 8 of the panel-supporting portions 6 is set at such a position that, while the design panel 3 is being tilted, the part 3c at the front-face bottom edge of the design panel 3 resides at or above the level where the base 1a of the casing 1 resides. Hence, the design panel 3 is removable from the casing 1 in such a manner as to avoid the contact between the part 3c at the front-face bottom edge thereof and the floor surface 20. Therefore, the casing 1 can be provided with the design panel 3 extending over the front-face bottom edge 1b of the casing 1. Accordingly, a floor-standing indoor unit having excellent design is provided.

[0022] In Embodiment, the receiving cases 9 having the respective guiding portions 10 are integrally provided to the casing 1 as parts thereof on the two respective sides at the bottom of the front face of the casing 1. Alternatively, as illustrated in Fig. 9, the receiving cases 9 may be fabricated separately from the casing 1 and may be later attached to the two respective sides at the bottom of the front face of the casing 1.

[0023] In Embodiment, the shaft members 8 of the panel-supporting portions 6 are each provided at the tip of a corresponding one of the arm portions 7 and on the side face of the arm portion 7 that faces the air inlet 4. Alternatively, each shaft member 8 may be provided on the other side face of the corresponding arm portion 7.

[Reference Signs List]

[0024]

1: casing, 1a: base, 1b: front-face bottom edge, 2: air outlet, 3: design panel, 3a: side frame, 3b: lower-frame edge (part at back-face bottom edge), 3c: part at front-face bottom edge of design panel, 4: air inlet, 4a: frame of air inlet, 5a: catch, 5b: catch-receiving portion, 6: panel-supporting portion, 7: arm portion, 8: shaft member, 9: receiving case, 10: guiding portion, 10a: upper side, 10b: oblique side, 11: rail, 11a: rail terminal point, 20: floor surface

Claims

1. A floor-standing indoor unit of an air-conditioning apparatus comprising:

a casing (1) having an opening in a front face thereof and a base (1a) at a bottom thereof;
receiving cases (9) provided at two respective sides of a bottom edge of the front face of the casing (1);
a design panel (3) configured to cover the opening of the casing (1);
panel-supporting portions (6) provided on a back face of the design panel (3) and configured to support the design panel (3) while residing in the respective receiving cases (9) when the design panel (3) covers the opening of the casing (1) and to move in the receiving cases (9) when the design panel (3) is tilted with a part (3c) being the center of rotation of the design panel (3), the part (3c) being a part of a bottom edge of a back face of the design panel (3) that is in contact with the bottom edge of the front face of the casing

(1); and
guiding portions (10) provided in the respective receiving cases (9) and configured to guide the panel-supporting portions (6) to move in an oblique direction,
wherein terminal points (11a) of the respective guiding portions (10) up to which the panel-supporting portions (6) are guided are each set at such a position that, while the design panel (3) is being tilted, a part (3c) at a bottom edge of a front face of the design panel (3) resides at or above a level where a lower surface of the base (1a) of the casing (1) resides.

2. The floor-standing indoor unit of an air-conditioning apparatus of claim 1, wherein the panel-supporting portions (6) each include a shaft member (8) provided on a side face at a tip thereof, the shaft member (8) being configured to move along a corresponding one of the guiding portions (10).

3. The floor-standing indoor unit of an air-conditioning apparatus of claim 1 or 2,
wherein the guiding portions (10) each comprise a plate having a quadrilateral shape in side view,
one of four sides of the quadrilateral shape that faces a rear side of a corresponding one of the receiving cases (9) is formed into an oblique side (10b) sloping obliquely upward in a direction from the rear side toward a front side of the receiving case, and
a part where the oblique side (10b) and an upper side (11) of the guiding portion intersect each other is defined as the terminal point (11a).

FIG. 1

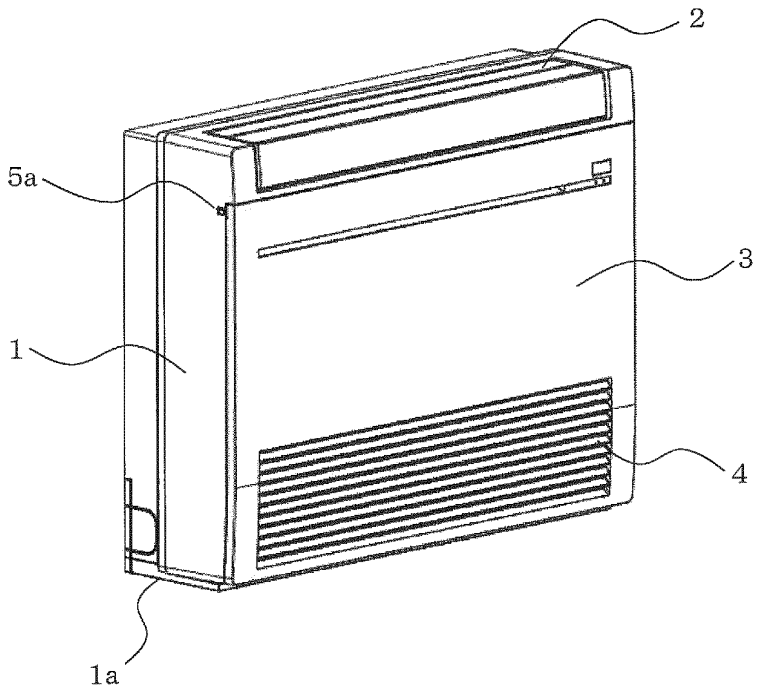


FIG. 2

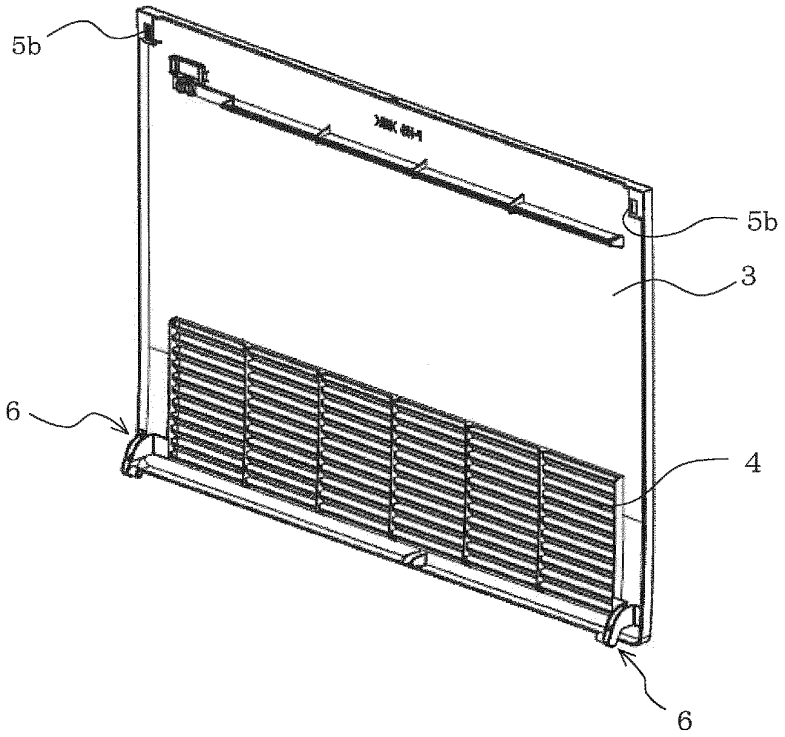


FIG. 3

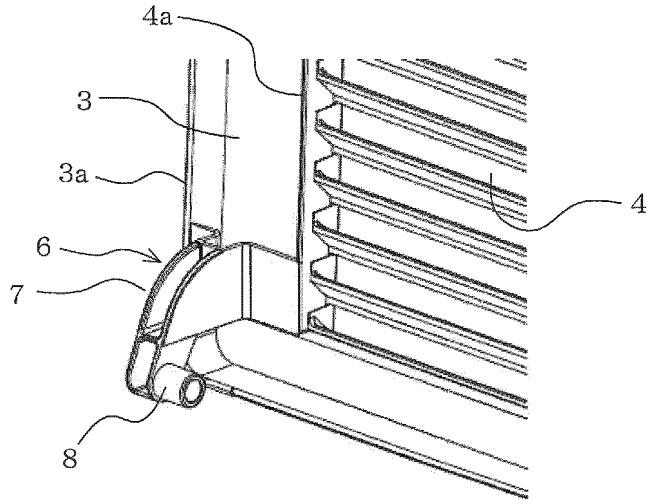


FIG. 4

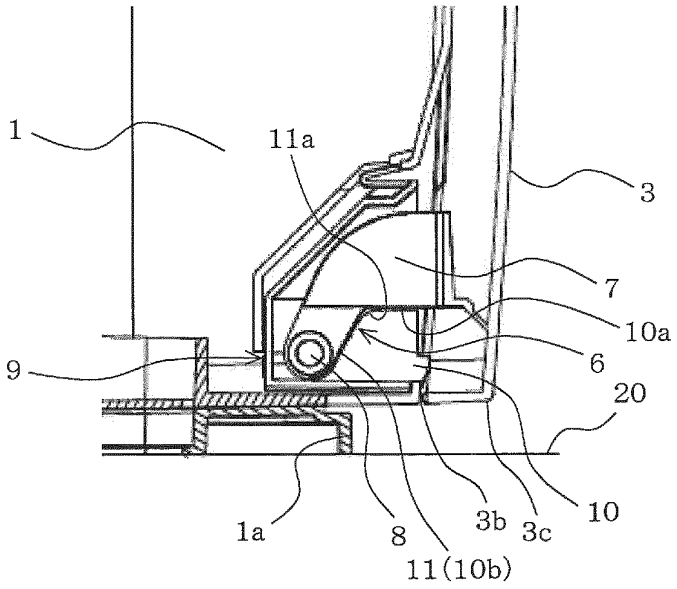


FIG. 5

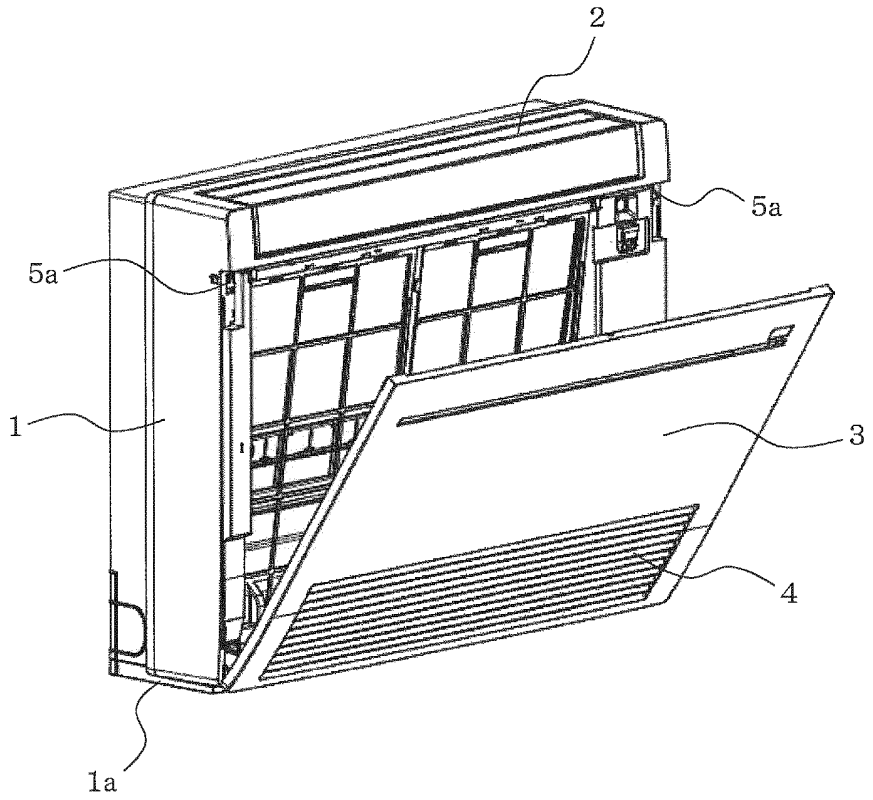


FIG. 6

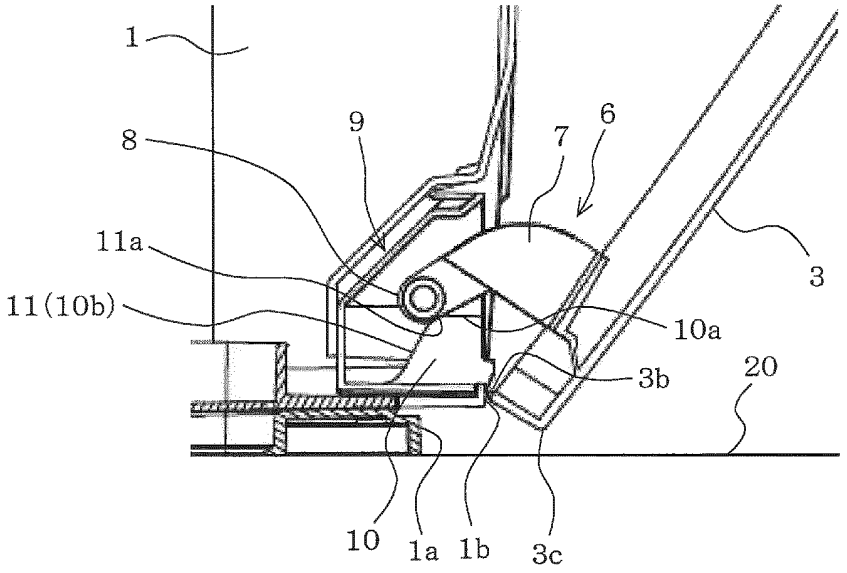


FIG. 7

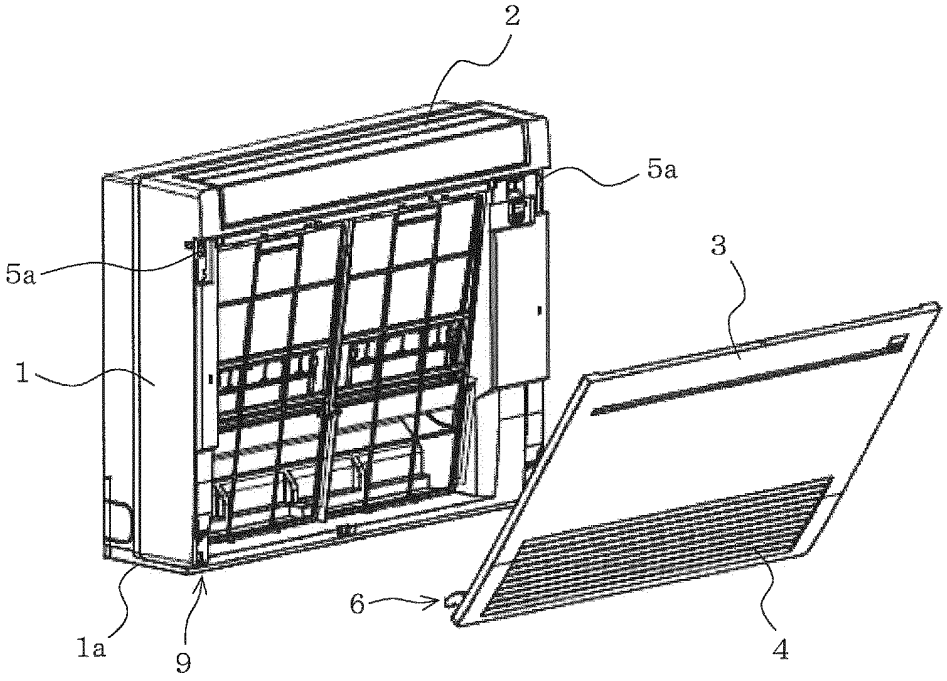


FIG. 8

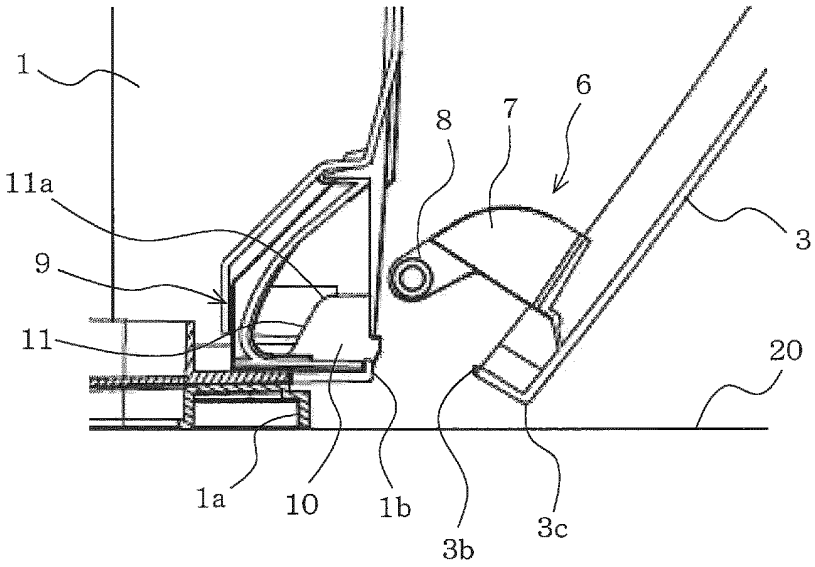
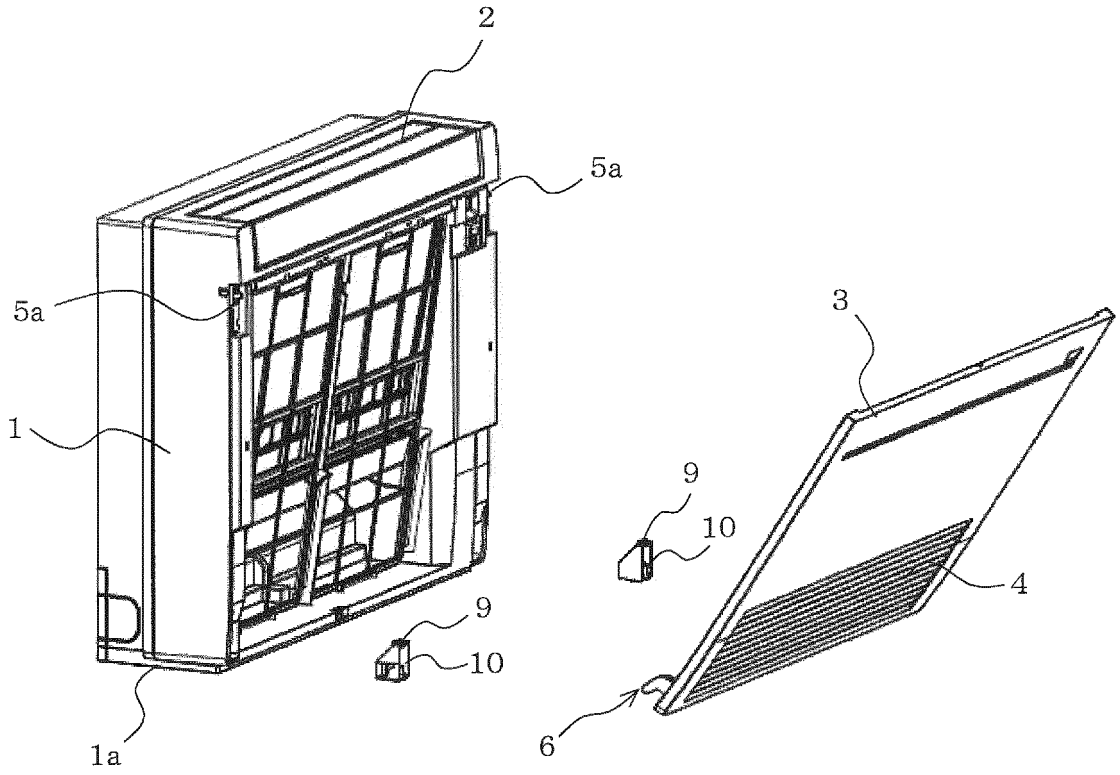


FIG. 9



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EUROPEAN SEARCH REPORT

Application Number
EP 13 19 0967

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			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	8 January 2014	Decking, Oliver

CATEGORY OF CITED DOCUMENTS

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08-01-2014

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