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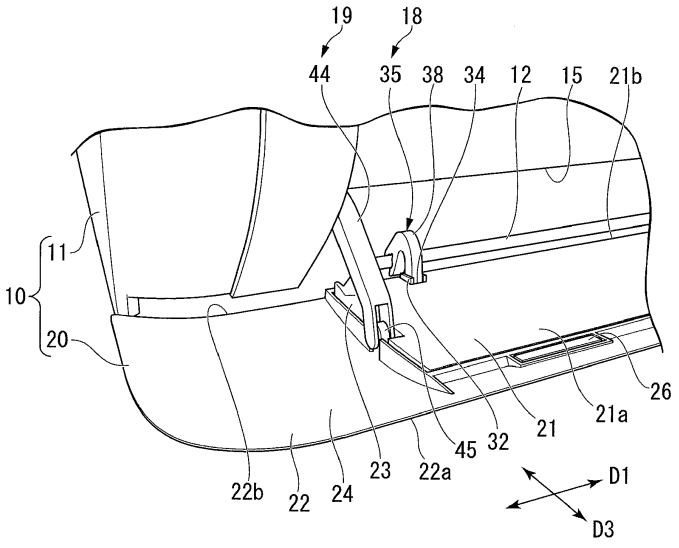
## (54) INDOOR UNIT OF AIR CONDITIONER

(57) The indoor unit (10) of an air conditioner (100) includes a laterally long outlet 15 which is provided in an air-conditioning main body 11 and a composite flap 20 which is disposed on a downstream side of the outlet 15 in a flow of air so as to open and close the outlet 15 by rotating around an axis extending in a lateral direction D1 and covers, in a closed state, the outlet 15 and a surface of the air-conditioning main body 11 around the outlet 15, in which the composite flap 20 includes an inner flap 21 which has a lateral width corresponding to the outlet 15 and is disposed on the outlet 15 side, an outer flap 22 which has a wider lateral width than that of the inner flap 21 and is disposed to overlap an outside of the inner flap 21, and a fin 23 which is provided to protrude inward to regulate the flow of the air from the outlet 15 at a boundary position between the inner flap 21 and the outer flap 22 in the lateral direction D1.

FIG. 3

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## Description

### BACKGROUND OF THE INVENTION

#### Field of the Invention

**[0001]** The present invention relates to an indoor unit of an air conditioner.

#### Description of Related Art

**[0002]** In the related art, as a flap which is disposed on a downstream side of an outlet of an air-conditioning main body in an indoor unit of an air conditioner, a flap having a composite structure is known, which includes an inner flap component member and an outer flap component member which is disposed to overlap an outside of the inner flap component member. For example, Patent Document 1 suggests a flap in which a hollow lid port disposed on the inside and a box portion disposed on the outside overlap each other to be joined to each other. In the flap having the composite structure, when cold air is blown from the outlet, even though an inner flap structure member comes into contact with the cold air from the outlet and is strongly cooled, heat is not easily transmitted to an outer surface of the outer flap component member, and thus, condensation can be suppressed.

**[0003]** [Patent Document 1] Japanese Unexamined Patent Application, First Publication No. 2009-63275

### SUMMARY OF THE INVENTION

**[0004]** However, in the air conditioner of the related art, if the flap is in a closed state during stopping of an operation, the outlet is covered by the flap. However, a step or the like of a housing (air-conditioning main body) around the outlet can be viewed from the outside. In addition, particularly, the flap of the composite structure is thick, and thus, a boundary between the flap and the housing is conspicuous, and it is difficult to improve an appearance quality.

**[0005]** Accordingly, the present invention provides an indoor unit of an air conditioner capable of suppressing condensation of an outer surface when cold air is blown from an outlet while improving aesthetic appearance.

**[0006]** According to a first aspect of the present invention, there is provided an indoor unit of an air conditioner, including: a laterally long outlet which is provided in an air-conditioning main body; and a composite flap which is disposed on a downstream side of the outlet in a flow of air so as to open and close the outlet by rotating around an axis extending in a lateral direction and covers, in a closed state, the outlet and a surface of the air-conditioning main body around the outlet, in which the composite flap includes an inner flap which has a lateral width corresponding to the outlet and is disposed on the outlet side, an outer flap which has a greater lateral width than the inner flap and is disposed to overlap an outside of the inner flap, and a fin which is provided to protrude inward to regulate the flow of the air from the outlet at a boundary position between the inner flap and the outer flap in the lateral direction.

**[0007]** According to the first aspect, the indoor unit includes the composite flap which covers the outlet and the surface of the air-conditioning main body around the outlet in the closed state. Accordingly, the composite flap is disposed in a wider range than that of the outlet, and thus, can cover the surface of the air-conditioning main body around the outlet. Accordingly, the shape of the air-conditioning main body around the outlet is not viewed from the outside, and it is possible to obtain a beautiful appearance in which appearances different from the shape of the outlet and the shape of the air-conditioning main body around the outlet, that is, streaks, boundaries, steps, or the like are not present by the surface of the composite flap.

**[0008]** In addition, in this composite flap, the inner flap having the lateral width corresponding to the outlet and the outer flap having a wider lateral width than that of the inner flap are disposed to overlap each other in the inside and the outside. Accordingly, heat is not easily transmitted from the inner surface becoming the outlet side to the interior side outer surface at a portion corresponding to the outlet of the composite flap, and when cold air is blown from the outlet, it is possible to suppress the outer surface from being excessively cooled.

**[0009]** In addition, the fin provided to protrude inward is provided at the boundary position between the inner flap and the outer flap in the lateral direction. Accordingly, the air which flows to spread in the lateral direction from the outlet can be regulated, the amount of air which is blown out from the outlet decreases on the end portion side from the fin in the lateral direction, and thus, a heat exchange amount can decrease. Moreover, the flow of the air is regulated by the fin, and thus, when cold air is blown from the outlet, it is possible to prevent the cold air from coming into contact with a portion at a location in which the inner flap does not exist on the end portion side of the composite flap in the lateral direction and a single structure configured of only the outer flap is formed, and the location is not excessively cooled.

**[0010]** In addition, in the air conditioner according to a second aspect of the present invention, in the first aspect, a tip locking piece which forms an insertion space in upstream and downstream directions may be provided on a tip portion on the downstream side of the outer flap, and a tip insertion portion which is inserted into the insertion space and is locked to both sides of the tip locking piece in the upstream and downstream directions may be provided on a tip portion on the downstream side of the inner flap.

**[0011]** In this way, the tip insertion portion is locked to both sides of the tip locking piece in the upstream and downstream directions, and thus, even if differences in the amounts of thermal expansion and contraction of the inner flap and the outer flap are generated due to a tem-

perature difference between the inner flap and the outer flap, a locked state between the tip insertion portion and the tip locking piece is easily maintained, and thus, it is possible to suppress a relative position between the tip portion of the outer flap and the tip portion of the inner flap from being displaced or dislocated.

**[0012]** Moreover, in the air conditioner according to a third aspect of the present invention, in the first or second aspect, the composite flap may further include an arm which is rotatably supported on the air-conditioning main body, and the arm may include a rotation connection portion which is rotatably connected to the arm-conditioning main body and a fixing portion fixed to a rear end portion on an upstream side of the outer flap, at respective ends of the arm.

**[0013]** In this way, the arm which supports the composite flap on the air-conditioning main body includes the rotation connection portion which is rotatably connected to the air-conditioning main body and the fixing portion which is fixed to the rear end portion of the outer flap. That is, the arm is not fixed to the rear end portion of the inner flap and is fixed to the rear end portion of the outer flap. Accordingly, even when differences in the amounts of thermal expansion and contraction of the outer flap and the inner flap are generated and differences in the amounts of deflection between the outer flap and the inner flap are generated, the outer flap is less likely to fall off from the inner flap, and thus, it is possible to suppress deformation or damages of the composite flap.

**[0014]** Particularly, as described above, if the tip insertion portion of the inner flap is locked to both sides of the tip locking piece of the outer flap in the upstream and downstream directions, the inner flap can be held to the outer flap at a predetermined position, deformation of the composite flap can be reliably suppressed, and it is possible to secure an appearance quality.

**[0015]** In addition, in the air conditioner according to a fourth aspect of the present invention, in the third aspect, in the inner flap, an abutment rib which can abut on the fixing portion of the arm from the downstream side may be provided to protrude from a rear end portion on an upstream side of the inner flap.

**[0016]** In this way, if the abutment ribs which can abut on the fixing portion of the arm from the downstream side is provided to protrude from the rear end portion of the inner flap, after the arm is fixed to the outer flap, the inner flap is integrated with the outer flap and the rear end portion of the inner flap is disposed at a predetermined position with respect to the rear end portion of the outer flap, and thus, the abutment ribs abut on the fixing portion of the arm.

**[0017]** In addition, for example, in a case where fixing caused by fitting between the fixing portion of the arm and the rear end portion of the outer flap in the upstream and downstream directions is not sufficient and thus, the position of the fixing portion of the arm deviates toward the downstream side with respect to the outer flap, the fixing portion of the arm can be strongly pressed by the abutment ribs of the rear end portion of the inner flap. Accordingly, an insufficient fitting state between the arm and the outer flap can be completely removed, and thus, the fixing portion of the arm can be reliably fixed to the outer flap.

**[0018]** According to the indoor unit of an air conditioner, it is possible to suppress condensation of the outer surface when cold air is blown from the outlet while improving aesthetic appearance.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0019]**

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

FIG. 2 is a sectional view of the indoor unit of an air conditioner according to the embodiment of the present invention.

FIG. 3 is a lower perspective view of the indoor unit according to the embodiment of the present invention.

FIG. 4 is a perspective view of a composite flap of the indoor unit according to the embodiment of the present invention.

FIG. 5 is a sectional view of the composite flap of the indoor unit according to the embodiment of the present invention.

FIG. 6 is an enlarged perspective view of the composite flap and a fixing portion of an arm in the indoor unit according to the embodiment of the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

**[0020]** An air conditioner 100 includes an indoor unit 10 which is provided in a room and an outdoor unit (not shown) which is connected to the indoor unit 10 by a pipe and is provided outside the room.

**[0021]** The indoor unit 10 sucks air, adjusts a temperature or humidity of the air, and thereafter, blows out air A to perform air conditioning in a room.

**[0022]** Hereinafter, the indoor unit 10 according to an embodiment the present invention will be described.

**[0023]** The indoor unit 10 includes an air-conditioning main body 11 and a composite flap 20 which is provided in the air-conditioning main body 11.

**[0024]** As shown in FIGS. 1 and 2, the air-conditioning main body 11 is formed in a laterally long shape which is long in a lateral direction D1, and a heat exchanger 13, a blower fan 14, or the like is disposed inside the air-conditioning main body 11. In a lower portion of the air-conditioning main body 11, a laterally long outlet 15 for blowing the air A from the blower fan 14 into the room is provided to be opened downward, diagonally downward, or forward.

**[0025]** As shown in FIGS. 3 to 5, the composite flap 20

which covers the outlet 15 from the outside so as to open and close the outlet 15 is disposed on a downstream side of the outlet 15. When the air conditioner 100 is operated, the composite flap 20 is opened and adjusts a vertical direction of the air A from the outlet 15, and thus, an inclination angle of the composite flap 20 with respect to the air-conditioning main body 11 can be adjusted. When the operation of the air conditioner 100 stops, the composite flap 20 is in a closed state, and thus, can cover the outlet 15 and the surface of the air-conditioning main body 11 around the outlet 15 (refer to FIG. 1)

**[0026]** The composite flap 20 includes an inner flap 21 which configures an inner surface of the composite flap 20, an outer flap 22 which configures an outer surface thereof, joint structures 16 and 17 which join the inner flap 21 and the outer flap 22, a fin 23 which regulates the flow of the air A from the outlet 15, and support structures 18 and 19 which support the composite flap 20 on the air-conditioning main body 11.

**[0027]** The inner flap 21 is configured of a molded body formed in an approximately plate shape, is disposed on the inner side becoming the outlet 15 side of the composite flap 20, and configures the inner surface of the composite flap 20. The inner flap 21 has a lateral width corresponding to the outlet 15. The lateral width corresponding to the outlet 15 may be approximately the same as the lateral width of the outlet 15. However, the lateral width corresponding to the outlet 15 may have a width (a larger width or a smaller width) slightly different from the lateral width of the outlet 15 as long as effects by the fin 23 described later are obtained.

**[0028]** A length of the inner flap 21 in upstream and downstream directions D3 along the flow of the air A is not particularly limited. However, in the present embodiment, a tip portion 21a on the downstream side of the inner flap 21 is disposed on the upstream side of a tip portion 22a on the downstream side of the outer flap 22.

**[0029]** The outer flap 22 is configured of a molded body having a shape (curved shape) which slightly protrudes toward the outside. The outer flap 22 is disposed to overlap the outside of the inner flap 21 and configures an outer surface of the composite flap 20.

**[0030]** The outer flap 22 includes a plate portion 24 which is curved in the upstream and downstream directions D3, a rear end portion 22b which uprightly stands on a rear end on the upstream side of the plate portion 24, and a plurality of ribs 25 which uprightly stand on a surface of the plate portion 24. The inner flap 21 is supported by the rear end portion 22b, the plurality of ribs 25, or the like, and a space is provided between the inner flap 21 and the plate portion 24.

**[0031]** The outer flap 22 has a greater lateral width than that of the inner flap 21, and a length of the outer flap 22 in the upstream and downstream directions D3 is greater than that of the inner flap 21. In a state where the composite flap 20 is closed, in both end sides of the outlet 15 in the lateral direction D1 and the downstream side of the outlet 15 in the upstream and downstream directions D3, the outer flap 22 covers the periphery of the outlet 15 in the air-conditioning main body 11. More specifically, a width of the outer flap 22 in the lateral direction D1 is approximately the same as a width of the air-conditioning main body 11 in the lateral direction D1, and in the state where the composite flap 20 is closed, the position of the tip portion 22a of the outer flap 22 is disposed at a position which is approximately the same as that of a front end portion of the air-conditioning main body 11.

**[0032]** The inner flap 21 and the outer flap 22 are integrally joined to each other by the joint structures 16 and 17 which are provided on a tip side and a rear end side of the composite flap 20.

**[0033]** The joint structure 16 on the tip side of the composite flap 20 includes tip locking pieces 26 which are provided on the tip portion 22a on the downstream side of the outer flap 22 and tip insertion portions 27 which are provided on the tip portion 21a on the downstream side of the inner flap 21.

**[0034]** Each of the tip locking pieces 26 of the outer flap 22 is provided in a band plate shape. Each tip locking piece 26 is disposed to be separated from the plate portion 24 in a plate thickness direction, and thus, an insertion space 28 penetrating in the upstream and downstream directions D3 is formed between the tip locking piece 26 and the plate portion 24.

**[0035]** Each of the tip insertion portions 27 of the inner flap 21 is inserted into the insertion space 28 of the outer flap 22 and is configured to be locked to both sides in the upstream and downstream directions D3 from the inside of the tip locking piece 26. In the embodiment, locking recessed portions 29 which can be fitted to the tip locking pieces 26 are provided in the tip insertion portions 27. In a state where each tip insertion portion 27 is inserted into the insertion space 28 and is locked to the tip locking piece 26, the tip insertion portion 27 has a shape (abutment portion 46) in which a rear surface side (outer side) of the tip insertion portion 27 abuts on the plate portion 24 of the outer flap 22. In addition, in the tip insertion portion 27, a tip side is further separated from the plate portion 24 than the abutment portion 46.

**[0036]** The joint structure 17 on the rear end side of the composite flap 20 includes a plurality of rear end recessed portions 31 which are provided on the rear end portion 22b of the outer flap 22 and are recessed in a plate thickness direction and a plurality of pairs of rear end ribs 32 which protrudes from the rear end portion 22b in the plate thickness direction. In addition, the joint structure 17 includes a plurality of rear end protrusion portions 33 which are provided on the rear end portion 21b of the inner flap 21 and protrude to the upstream side and a plurality of rear end notch portions 34 which are recessed toward the downstream side from the rear end portion 21b.

**[0037]** A fixing portion 36 described later of the arm 35 can be disposed between the pair of rear end ribs 32 and each of the rear end ribs 32 is provided to extend from

the rear end portion 22b toward the downstream side.

**[0038]** Each of the rear end protrusion portions 33 is provided to be fitted to the rear end recessed portion 31 and the rear end notch portion 34 is provided to be fitted to the pair of rear end ribs 32. In addition, abutment ribs 37 described later which can abut on the fixing portion 36 of the arm 35 are provided to protrude from a bottom surface of the rear end notch portion 34 toward the upstream side.

**[0039]** The fin 23 is provided to vertically protrude at a boundary position between the inner flap 21 and the outer flap 22 of the composite flap 20 in the lateral direction D1. Here, the vertical direction may be a direction along a surface intersecting the lateral direction D1 or may be a direction along a surface orthogonal to the lateral direction D1. The fin 23 may be integrally formed with any one of the inner flap 21 and the outer flap 22 or may be provided to be separated from the flaps 21 and 22. In the present embodiment, the fin 23 is integrally provided with the inner flap 21.

**[0040]** The fin 23 is formed in a plate shape, an end surface 23a of the fin 23 facing the downstream side becomes a surface which extends in a flat surface shape such that a height of the end surface 23a gradually decreases toward the downstream side, and thereafter, has an inclination angle which is steep in the middle and is curved to protrude toward the inner flap 21 on the downstream side. In addition, an end surface 23b of the fin 23 facing the upstream side becomes a surface which straightly stands in a flat surface shape in a direction intersecting the lateral direction D1 and the upstream and downstream directions D3 from the inner flap 21 and thereafter, is curved to be recessed toward the downstream side.

**[0041]** The support structures 18 and 19 which support the composite flap 20 on the air-conditioning main body 11 are provided on the rear end side of the composite flap 20 and both end sides of the composite flap 20 in the lateral direction D1.

**[0042]** The support structure 18 on the rear end side of the composite flap 20 includes the arm 35 which rotatably supports the composite flap 20 on the air-conditioning main body 11. The arm 35 includes an arm body 38, a rotation connection portion 39 which is provided on one end of the arm body 38 and is rotatably connected to the air-conditioning main body 11, and the fixing portion 36 which is provided on the other end of the arm body 38 and is fixed to the rear end portion 22b of the outer flap 22.

**[0043]** The arm body 38 is formed to be largely curved in a semicircular shape when viewed in the lateral direction D1. The arm body 38 protrudes upward in a state where the air conditioner 100 is operated (in a state where the composite flap 20 is open).

**[0044]** The rotation connection portion 39 has a notch hole 39a having an approximately C shape which is opened to be fittable to a rotary shaft 12 which is provided on the lower portion of the air-conditioning main body 11 and has an axis extending in the lateral direction D1 as a center. The opening of the notch hole 39a of the rotation connection portion 39 faces the lower side in the state where the air conditioner 100 is operated (the state where the composite flap 20 is open)

**[0045]** The fixing portion 36 is provided to be fittable to the rear end portion 22b of the outer flap 22. Specifically, a plurality of fitting protrusion pieces 42 which can be engaged with and fitted to a plurality of protrusion pieces 41 protruding toward the downstream side are provided on the rear end portion 22b of the outer flap 22. More specifically, the plurality of protrusion pieces 41 are provided to be arranged at intervals in the direction orthogonal to the lateral direction D1 and the upstream and downstream directions, and similarly to the protrusion pieces 41, the plurality of fitting protrusion pieces 42 are provided to be arranged at intervals in the direction orthogonal to the lateral direction D1 and the upstream and downstream directions D3, and the protrusion pieces 41 are respectively fitted to the recessed portions 42a which are each formed between the plurality of fitting protrusion pieces 42.

**[0046]** In addition, the fixing portion 36 has an abutment surface 43 on which the abutment ribs 37 provided on the rear end portion 21b of the inner flap 21 can abut it from the downstream side.

**[0047]** Although the support structures 19 on both end sides of the composite flap 20 in the lateral direction D1 are not shown in detail, the support structures 19 includes links 44 which are provided to be vertically driven with respect to the air-conditioning main body 11 and connection bosses 45 which are provided on both end portions of the inner flap 21 in the lateral direction and at the outer flap 22 at positions adjacent to the downstream side of the fin 23 and are rotatably connected to links 44 around the axis extending in the lateral direction D1.

**[0048]** For example, the composite flap 20 may be mounted on the air-conditioning main body 11 as follows. First, the plurality of arms 35 are fixed to the rear end portion 22b of the outer flap 22. The plurality of pairs of rear end ribs 32 are provided at the fixed positions of the arms 35 in the rear end portion 22b of the outer flap 22, and the fixing portion 36 is disposed to be interposed between the rear end ribs 32 of each pair. In addition, the plurality of fitting protrusion pieces 42 provided in the fixing portion 36 of the arm 35 and the plurality of protrusion pieces 41 provided in the rear end portion 22b of the outer flap 22 are fitted to each other.

**[0049]** Next, the outer flap 22 and the inner flap 21 are integrated with each other by the joint structures 16 and 17 on the tip side and the rear end side.

**[0050]** Specifically, the tip insertion portion 27 of the tip portion 21a of the inner flap 21 is inserted into the insertion space 28 of the tip portion 22a of the outer flap 22, and each of the locking recessed portions 29 is locked to the tip locking piece 26. The inner flap 21 is supported by the ribs 25 of the outer flap 22, and thus, the rear end portion 21b of the inner flap 21 is disposed at a prede-

termined position with respect to the rear end portion 22b of the outer flap 22. At this time, the abutment surface 43 of the fixing portion 36 of the arm 35 abuts on the abutment ribs 37 of the rear end portion 21b of the inner flap 21 to be pressed, and thus, the abutment surface 43 is fixed.

**[0051]** In addition, the rear end recessed portion 31 of the rear end portion 22b of the outer flap 22 and the rear end protrusion portion 33 of the rear end portion 21b of the inner flap 21 are fitted to each other, and the pair of rear end ribs 32 and the rear end notch portion 34 are fitted to each other. Accordingly, the outer flap 22 and the inner flap 21 are integrated with each other to configure the composite flap 20.

**[0052]** Thereafter, the rotation connection portion 39 of the arm 35 is fitted to the rotary shaft 12 of the air-conditioning main body 11. In addition, the link 44 which is vertically driven is connected to each connection boss 45 provided in the outer flap 22.

**[0053]** Accordingly, the composite flap 20 is mounted on the air-conditioning main body 11.

**[0054]** According to the indoor unit 10 of the above-described present embodiment, in the closed state where the outlet 15 is closed, the composite flap 20 can cover the surface of the air-conditioning main body 11 in a wider range than the outlet 15.

**[0055]** In addition, the inner flap 21 does not exist on both end portions in the lateral direction D1, and thus, the composite flap 20 is thinned. Accordingly, a volume inside the air-conditioning main body 11 is saved on both end portions in the lateral direction D1, and thus, the conditioning main body 11 can have a shape protruding to the composite flap 20 side. In addition, also in this case, if the composite flap 20 is in a closed state, the protrusion shape of the air-conditioning main body 11 is not viewed. Accordingly, it is possible to obtain a beautiful appearance in which appearances different from the shape of the outlet 15 and the shape of the air-conditioning main body 11 around the outlet 15, that is, streaks, boundaries, steps, or the like are not present by the surface of the composite flap 20.

**[0056]** In this composite flap 20, the inner flap 21 having the lateral width corresponding to the outlet 15 and the outer flap 22 having a greater lateral width than that of the inner flap 21 are disposed to overlap each other in the inside and the outside. Accordingly, heat is not easily transmitted from the inner surface becoming the outlet 15 side to the outer surface at the portion corresponding to the outlet 15 of the composite flap 20. Therefore, when cold air is blown from the outlet 15, the outer surface is not excessively cooled, and thus, it is possible to suppress condensation or the like from being generated on the outer surface of the composite flap 20.

**[0057]** In addition, the fin 23 provided to protrude inward is provided at the boundary position between the inner flap 21 and the outer flap 22 in the lateral direction D1. Accordingly, the air A which flows to spread in the lateral direction D1 from the outlet 15 can be regulated, the amount of air A which is blown out from the outlet 15 decreases on the end portion side from the fin 23 in the lateral direction D1, and thus, a heat exchange amount of the air A at the heat exchanger 13 can decrease.

**[0058]** In addition, when cold air is blown from the outlet 15, the flow of the cold air is regulated by the fin 23. Accordingly, it is possible to prevent the cold air from the outlet 15 from coming into contact with the portion at the position in which the inner flap 21 does not exist on the end portion side from the portion of the composite flap corresponding to the outlet 15 in the lateral direction D1, that is, the portion at the position in which the inner flap does not exist in the composite flap 20 and a single structure configured of only the outer flap is formed. Accordingly, it is possible to suppress condensation or the like from being generated on the outer surface of the composite flap 20.

**[0059]** In addition, the tip locking piece 26 forming the insertion space 28 in the upstream and downstream directions D3 is provided in the tip portion 22a of the outer flap 22, and the tip insertion portion 27 which is inserted into the insertion space 28 and is locked to both sides of the tip locking piece 26 in the upstream and downstream directions D3 is provided in the tip portion 21a of the inner flap 21. Accordingly, by moving the tip portion 22a of the outer flap 22 and the tip portion 21a of the inner flap 21 relative to each other in the upstream and downstream directions D3, it is possible to easily lock the tip insertion portion 27 to the tip locking piece 26.

**[0060]** Moreover, the tip insertion portion 27 is locked to both sides of the tip locking piece 26 in the upstream and downstream directions D3, and thus, even if differences in the amounts of thermal expansion and contraction of the inner flap 21 and the outer flap 22 are generated due to a temperature difference between the inner flap 21 and the outer flap 22, a locked state between the tip insertion portion 27 and the tip locking piece 26 is easily maintained, and thus, it is possible to suppress a relative position between the tip portion 22a of the outer flap 22 and the tip portion 21a of the inner flap 21 from being displaced or dislocated.

**[0061]** In addition, the tip insertion portion 27 inserted into the insertion space 28 abuts on the plate portion 24, and thus, even when the composite flap 20 is deformed, it is possible to suppress the tip insertion portion 27 from being displaced in a direction separated from the tip locking piece 26, and the locked state between the tip insertion portion 27 and the tip locking piece 26 can be maintained.

**[0062]** Moreover, in the tip insertion portion 27, the tip side is further separated from the plate portion 24 than the abutment portion 46, and thus, the tip side of the tip insertion portion 27 is pressed. Accordingly, the tip insertion portion 27 can be elastically deformed with the abutment portion 46 as a supporting point, and the tip insertion portion 27 can be easily locked to and disengaged from the tip locking piece 26.

**[0063]** In addition, the arm 35 which supports the com-

posite flap 20 on the air-conditioning main body 11 includes the rotation connection portion 39 which is rotatably connected to the air-conditioning main body 11 and the fixing portion 36 which is fixed to the rear end portion 22b of the outer flap 22. The arm 35 is not fixed to the rear end portion 21b of the inner flap 21 and is fixed to the rear end portion 22b of the outer flap 22. Accordingly, even when differences in the amounts of thermal expansion and contraction of the outer flap 22 and the inner flap 21 are generated and the amounts of deflection between the outer flap 22 and the inner flap 21 are different from each other, the outer flap 22 is less likely to fall off from the inner flap 21, and thus, it is possible to suppress deformation or damages of the composite flap 20.

**[0064]** Particularly, the tip insertion portion 27 of the inner flap 21 is locked to both sides of the tip locking piece 26 of the outer flap 22 in the upstream and downstream directions D3, and thus, the inner flap 21 can be held to the outer flap 22 at a predetermined position, deformation of the composite flap 20 can be reliably suppressed, and it is possible to secure an appearance quality.

**[0065]** In addition, in the arm 35, the rotation connection portion 39 having the approximately C-shaped notch hole 39a is provided in the arm body 38 which is largely curved. Accordingly, the arm 35 fixed to the composite flap 20 is fitted to the rotary shaft 12 of the air-conditioning main body 11 from above and is connected to the rotary shaft 12, and thus, the composite flap 20 can be supported on the air-conditioning main body 11. Accordingly, it is possible to easily mount the composite flap 20 on the air-conditioning main body 11.

**[0066]** In addition, a load of the composite flap 20 is applied to the connection portion between the air-conditioning main body 11 and the rotary shaft 12 from above, and thus, the rotation connection portion 39 of the arm 35 can be stably supported by the rotary shaft 12, and it is difficult for the composite flap 20 to come off from the air-conditioning main body 11.

**[0067]** In addition, the connection boss 45 connected to the link 44 which is provided in the air-conditioning main body 11 and is driven to be lifted and lowered is provided in the outer flap 22. Accordingly, the arm 35 and the link 44 which connect the composite flap 20 to the air-conditioning main body 11 are connected to the outer flap 22, and thus, the inner flap 21 is not directly connected to the air-conditioning main body 11. Accordingly, even when differences in the amounts of thermal expansion and contraction between the inner flap 21 and the outer flap 22 are generated, it is possible to prevent the inner flap 21 from falling off from the air-conditioning main body 11.

**[0068]** In addition, the abutment ribs 37 which can abut on the fixing portion 36 of the arm 35 from the downstream side is provided to protruded from the upstream rear end portion 21b of the inner flap 21. Accordingly, after the arm 35 is fixed to the outer flap 22, if the inner flap 21 is integrated with the outer flap 22 and the rear end portion 21b of the inner flap 21 is disposed at a predetermined position with respect to the rear end portion 22b of the outer flap 22, the abutment ribs 37 abut on the fixing portion 36 of the arm 35.

**[0069]** In this case, in a case where the fitting between the fitting protrusion pieces 42 of the arm 35 and the protrusion pieces 41 of the outer flap 22 is not sufficient, the position of the fixing portion 36 of the arm 35 may deviate toward the downstream side with respect to the outer flap 22. Even in such a case, if the rear end portion 21b of the inner flap 21 is disposed at a predetermined position with respect to the rear end portion 22b of the outer flap 22, the fixing portion 36 of the arm 35 can be strongly pressed by the abutment ribs 37 of the inner flap 21.

**[0070]** Accordingly, an insufficient fitting state between the fitting protrusion pieces 42 of the arm 35 and the protrusion pieces 41 of the outer flap 22 can be completely removed, and thus, the fixing portion 36 of the arm 35 can be reliably fixed to the outer flap 22.

**[0071]** Hereinbefore, the embodiment of the present invention is described in detail. However, some design changes can be performed within a range which does not depart from the technical idea of the present invention.

**[0072]** For example, in the embodiment, in the joint structure 16, the outer flap 22 and the inner flap 21 are joined to each other by the tip locking pieces 26 and the locking recessed portions 29 provided in the tip portions 21a and 22a of the inner flap 21 and the outer flap 22. However, the present invention is not particularly limited to this, and for example, the present invention can be applied by other joint structures such as a fastener of a screw or the like. This is similarly applied to the joint structure 17.

**[0073]** In addition, the shape of the fin 23 is not limited to the above-described case. For example, the fin 23 may be formed in a rectangular plate shape.

**[0074]** In addition, various configurations of the air-conditioning main body 11 are not limited to the above-described case, and the various configurations may be appropriately changed.

**[0075]** While preferred embodiments of the invention have been described and illustrated above, it should be understood that these are exemplary of the invention and are not to be considered as limiting. Additions, omissions, substitutions, and other modifications can be made without departing from the scope of the present invention. Accordingly, the invention is not to be considered as being limited by the foregoing description, and is only limited by the scope of the appended claims.

EXPLANATION OF REFERENCES

**[0076]**

D1: lateral direction
D3: upstream and downstream directions

10: indoor unit
11: air-conditioning main body
12: rotary shaft
13: heat exchanger
14: blower fan
15: outlet
16, 17: joint structure
18, 19: support structure
20: composite flap
21: inner flap
21a: tip portion
21b: rear end portion
22: outer flap
22a: tip portion
22b: rear end portion
23: fin
23a, 23b: end surface
24: plate portion
25: rib
26: tip locking piece
27: tip insertion portion
28: insertion space
29: locking recessed portion
31: rear end recessed portion
32: rear end rib
33: rear end protrusion portion
34: rear end notch portion
35: arm
36: fixing portion
37: abutment rib
38: arm body
39: rotation connection portion
39a: notch hole
41: protrusion piece
42: fitting protrusion piece
42a: recessed portion
43: abutment surface
44: link
45: connection boss
46: abutment portion
100: air conditioner
A: air

## Claims

**1.** An indoor unit (10) of an air conditioner (100), comprising:

an air-conditioning main body (11) provided with a laterally long outlet (15); and
a composite flap (20) which is disposed on a downstream side of the outlet (15) in a flow of air so as to open and close the outlet (15) by rotating around an axis extending in a lateral direction (D1) and cover the outlet (15) and a surface of the air-conditioning main body (11) around the outlet (15) in a closed state,
wherein the composite flap (20) includes
an inner flap (21) which has a lateral width corresponding to the outlet (15) and is disposed on the outlet side,
an outer flap (22) which has a greater lateral width than the inner flap and is disposed to overlap an outside of the inner flap (21), and
a fin (23) which is provided to protrude inward to regulate the flow of the air from the outlet (15) at a boundary position between the inner flap (21) and the outer flap (22) in the lateral direction (D1).

**2.** The indoor unit (10) of an air conditioner (100) according to claim 1,
wherein a tip locking piece (26) which forms an insertion space in upstream and downstream directions is provided on a tip portion (22a) on the downstream side of the outer flap (22), and
wherein a tip insertion portion (27) which is inserted into the insertion space and is locked to both sides of the tip locking piece (26) in the upstream and downstream directions is provided on a tip portion (21a) on the downstream side of the inner flap (21).

**3.** The indoor unit (10) of an air conditioner (100) according to claim 1 or 2,
wherein the composite flap (20) further includes an arm (35) which is rotatably supported on the air-conditioning main body (11), and
wherein the arm (35) includes a rotation connection portion (39) which is rotatably connected to the air-conditioning main body (11) and a fixing portion (36) fixed to a rear end portion (22b) on an upstream side of the outer flap (22), at respective ends of the arm (35).

**4.** The indoor unit (10) of an air conditioner (100) according to claim 3,
wherein in the inner flap (21), an abutment rib (37) which can abut on the fixing portion (36) of the arm (35) from the downstream side is provided to protrude from a rear end portion (21b) on an upstream side of the inner flap (21).

FIG. 1

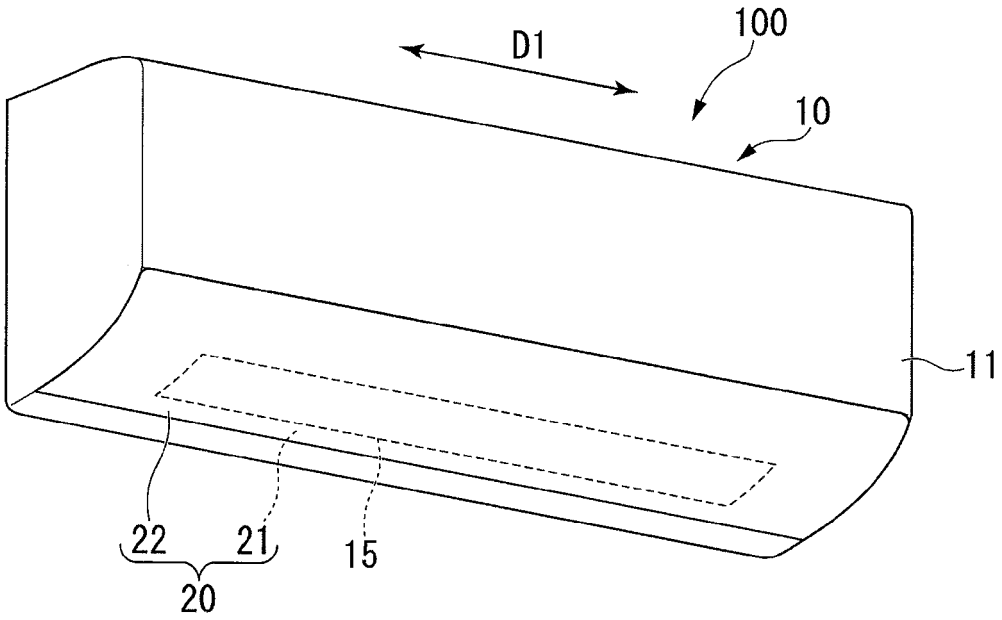



FIG. 2

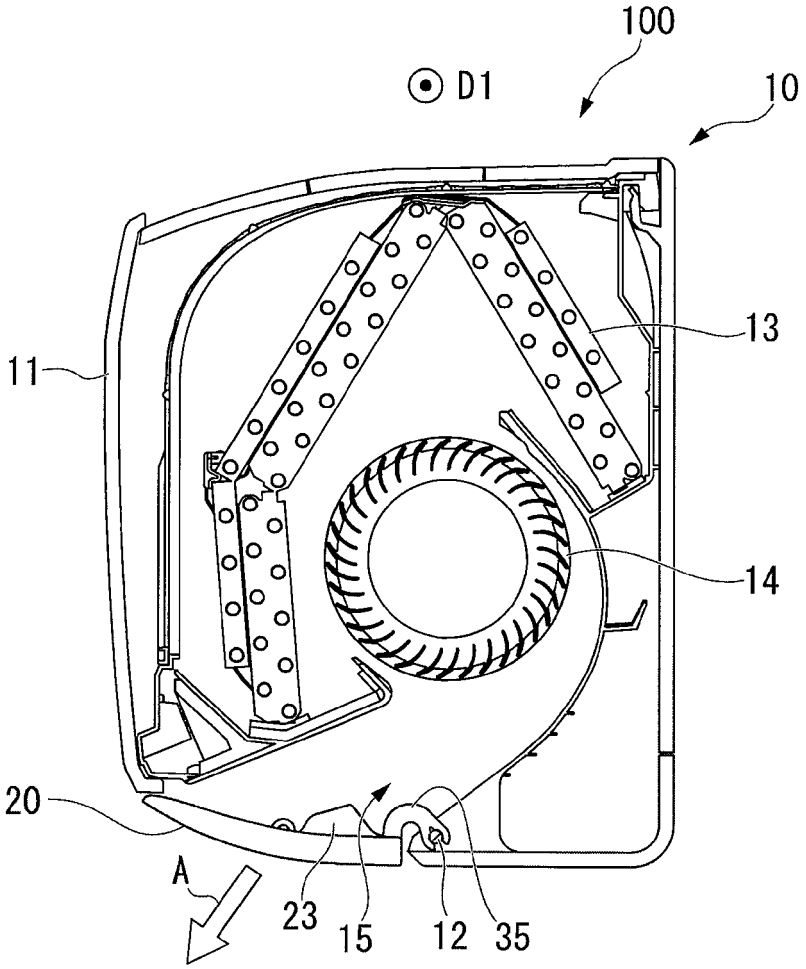
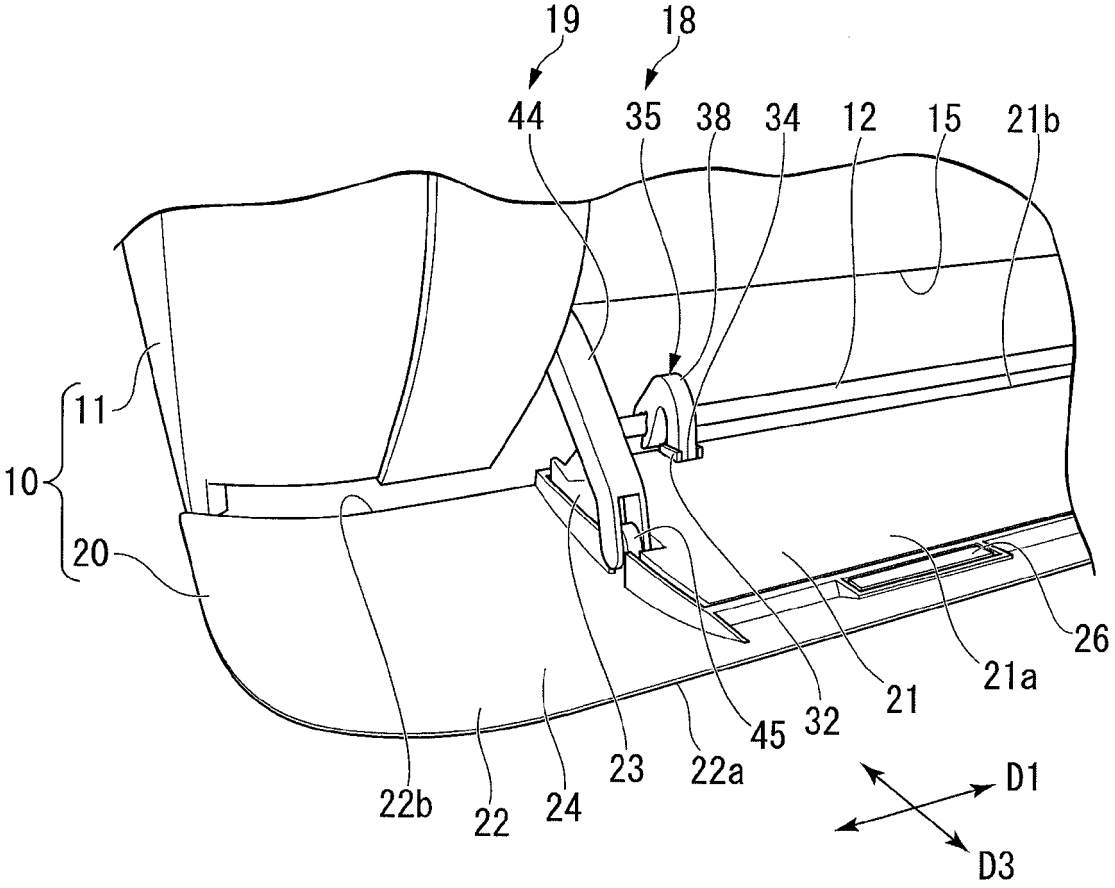


FIG. 3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18
44
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38
34
12
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21b
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21a
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22b
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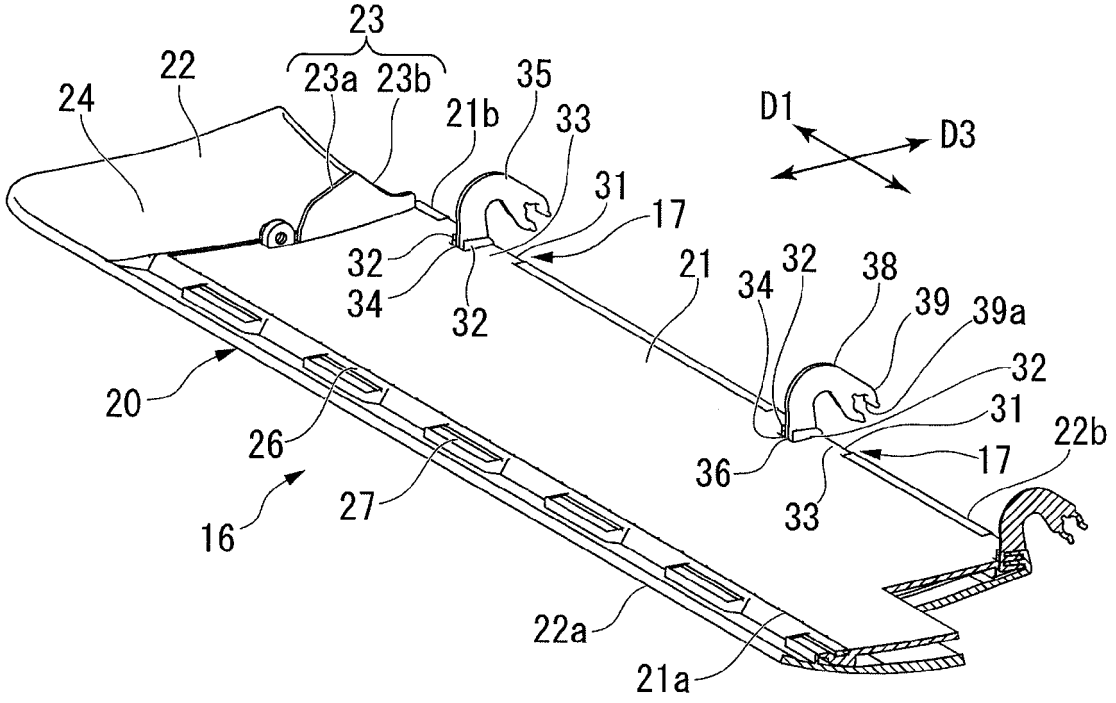
23
22a
D1
D3

FIG. 4


23
22
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23a
23b
21b
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D1
D3
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39a
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22b
17
36
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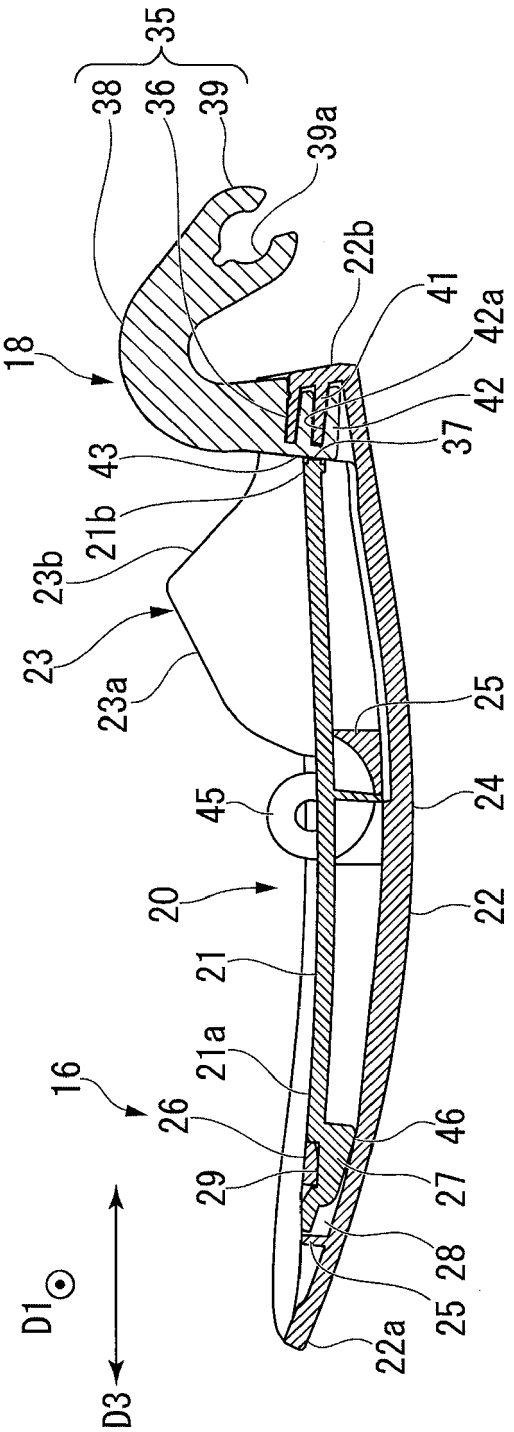
26
27
16
22a
21a

FIG. 5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39a
22b
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42a
18
42
37
43
21b
23b
23
23a
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22
21
21a
16
26
46
29
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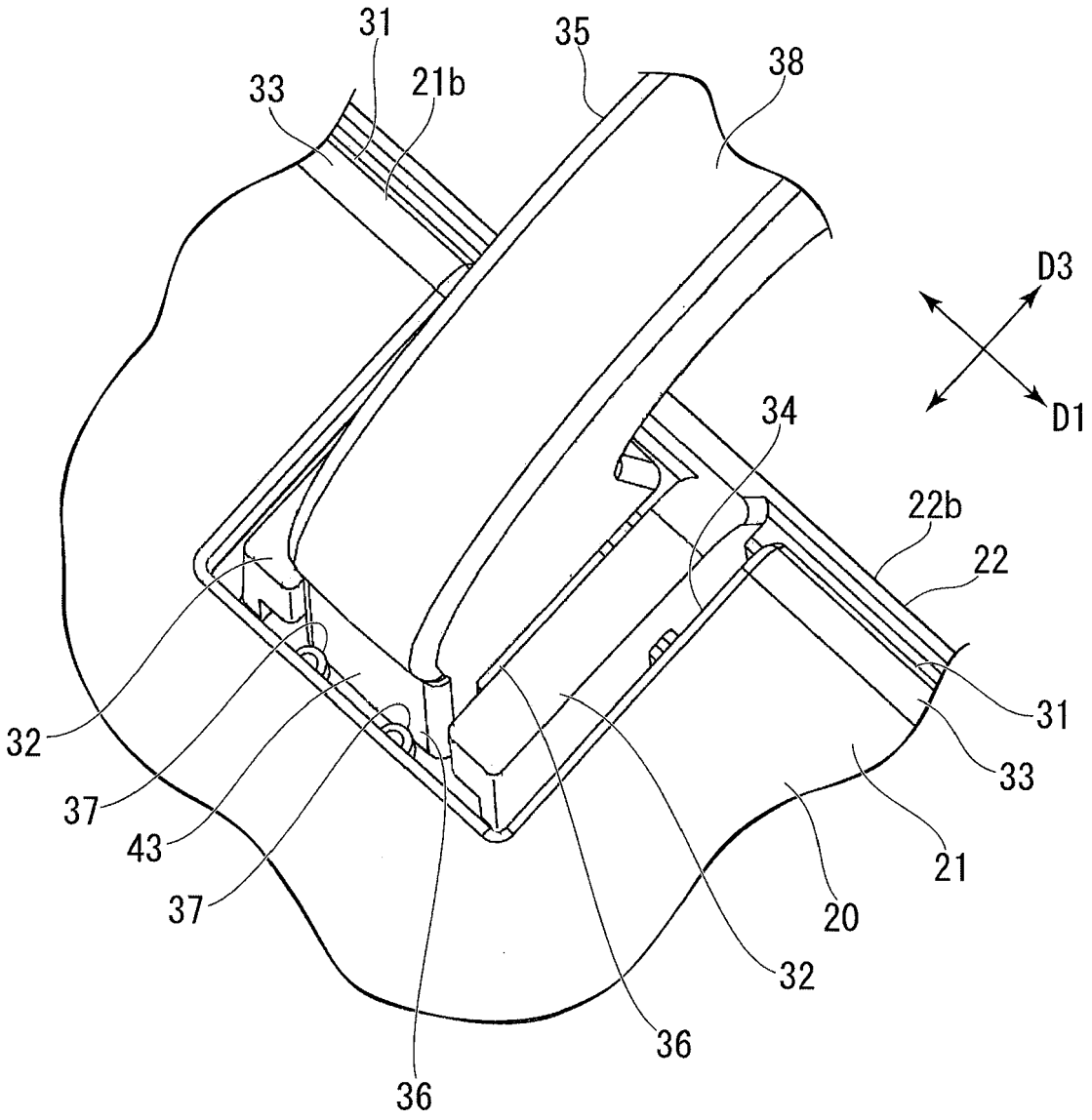
28
25
22a
D1
D3

FIG. 6



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# EUROPEAN SEARCH REPORT

Application Number
EP 17 20 4526

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| A,D | JP 2009 063275 A (PANASONIC CORP)<br>26 March 2009 (2009-03-26)<br>* the whole document * | 1-4 | INV.<br>F24F1/00<br>F24F13/14 |
| A | JP 2016 003807 A (KYOTO PLATEC KK)<br>12 January 2016 (2016-01-12)<br>* the whole document * | 1,2 | |
| A | WO 2014/017220 A1 (DAIKIN IND LTD [JP])<br>30 January 2014 (2014-01-30)<br>* figure 6 * | 1 | |
| A | JP 2016 153722 A (PANASONIC IP MAN CORP)<br>25 August 2016 (2016-08-25)<br>* paragraphs [0026] - [0029]; figures 3,4 * | 1 | |
| A | JP H08 285303 A (DAIKIN IND LTD)<br>1 November 1996 (1996-11-01)<br>* the whole document * | 1 | |
| A | AU 2014 379 851 A1 (TOSHIBA CARRIER CORP)<br>25 August 2016 (2016-08-25)<br>* page 6, line 9 - page 15, line 30; figures 1-4 * | 1 | TECHNICAL FIELDS SEARCHED (IPC)<br>F24F |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 6 April 2018 | Lienhard, Dominique |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 20 4526

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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06-04-2018

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| JP 2009063275 A | 26-03-2009 | NONE | |
| JP 2016003807 A | 12-01-2016 | NONE | |
| WO 2014017220 A1 | 30-01-2014 | CN 104487779 A | 01-04-2015 |
| | | CN 105627437 A | 01-06-2016 |
| | | JP 5516666 B2 | 11-06-2014 |
| | | JP 2014025629 A | 06-02-2014 |
| | | WO 2014017220 A1 | 30-01-2014 |
| JP 2016153722 A | 25-08-2016 | JP 6213853 B2 | 18-10-2017 |
| | | JP 2016153722 A | 25-08-2016 |
| JP H08285303 A | 01-11-1996 | JP 3019743 B2 | 13-03-2000 |
| | | JP H08285303 A | 01-11-1996 |
| AU 2014379851 A1 | 25-08-2016 | AU 2014379851 A1 | 25-08-2016 |
| | | CN 105829808 A | 03-08-2016 |
| | | JP 6195391 B2 | 13-09-2017 |
| | | JP WO2015111281 A1 | 23-03-2017 |
| | | WO 2015111281 A1 | 30-07-2015 |

EPO FORM P0459

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

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- JP 2009063275 A **[0003]**