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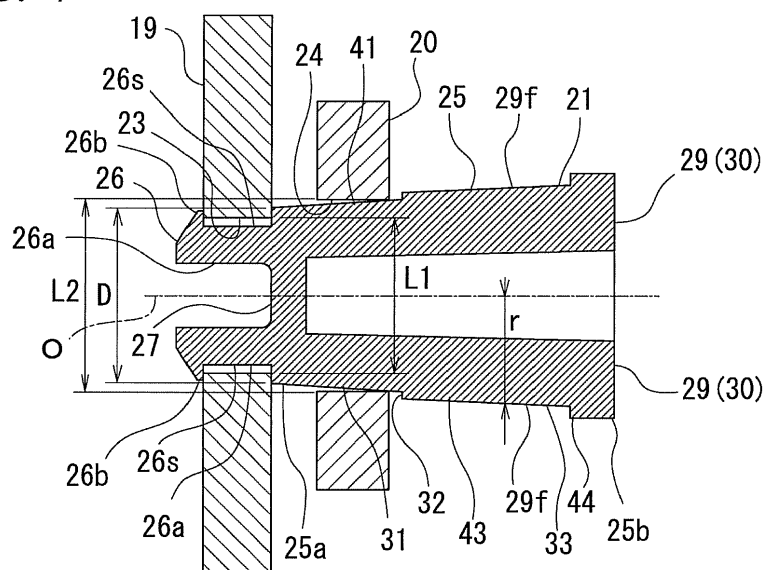
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(54) **AIR CONDITIONER**

(57) An air conditioner includes a main body portion in which an air outlet is formed and a main body side mounting hole (24) is formed; a flap which changes a blowing direction of air; and a connecting member (21) which rotatably connects the flap with respect to the main body portion. The connecting member (21) has a mounting hole insertion portion (25) which is inserted into the main body side mounting hole (24). The mounting hole inserting portion (25) has an insertion main body portion

(27) formed so that a total circumferential length of an outer circumferential surface is smaller than that of the main body side mounting hole (24), and an enlarged diameter portion (30) which is elastically deformable inward. The enlarged diameter portion (30) is formed so that a total circumferential length of the outer circumferential surface is larger than the circumferential length of the inner circumferential surface of the main body side mounting hole (24).

FIG. 7



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an air conditioner.

Description of Related Art

[0002] Conventionally, air conditioners with a blower, a heat exchanger which are housed inside a housing have been known. The air conditioners perform indoor air conditioning by suctioning indoor air, adjusting the temperature and humidity thereof, and discharging the indoor air from an air outlet.

[0003] Patent Document 1 discloses an air conditioner equipped with a flap which changes an air direction of the air discharged from the air outlet. The air conditioner includes, as a configuration which changes the direction of the flap, a bearing formed in the flap, an intermediate shaft body having an intermediate shaft fitted to the bearing to rotatably support the flap, and a main body side support fixed to the main body side of the air conditioner to support the intermediate shaft body.

[0004] In such a configuration, when excessive force is applied to the flap, the intermediate shaft exits the bearing, and the flap may be detached. Therefore, in the configuration disclosed in Japanese Unexamined Patent Application, First Publication No. 2008-261564, in order to regulate displacement of the intermediate shaft of the intermediate shaft body in a direction of exiting the bearing, a regulation plate is provided in the flap.

Prior Art Document

Patent Document

[0005] Patent Document 1: Japanese Unexamined Patent Application, First Publication No. 2008-261564

[0006] However, when the regulation plate is provided in the flap, the shape of the flap becomes complicated which leads to an increase in manufacturing cost. Further, besides the flap, it is also considered to prevent the intermediate shaft from exiting the bearing by screws or clips and the like. However, even in such a configuration, an increase in the number of components, and an increase in cost due to deterioration of ease of assembly are caused.

[0007] The present invention provides an air conditioner that is capable of preventing an inadvertent detachment of the flap, while suppressing an increase in cost.

SUMMARY OF THE INVENTION

[0008] The present invention adopts the following means to solve the aforementioned problems.

[0009] According to a first aspect of the present invention, an air conditioner includes: a main body portion in which an air outlet is formed and a main body side mounting hole is formed; a flap which is provided in the air outlet to change a blowing direction of air blown from the air outlet; and a connecting member which rotatably connects the flap to the main body portion. The connecting member has a mounting hole insertion portion which is inserted into the main body side mounting hole, and a flap connecting portion which is formed at one end portion of the mounting hole insertion portion and is connected to the flap. The mounting hole inserting portion has an insertion main body portion formed so that a total circumferential length of an outer circumferential surface is smaller than a circumferential length of an inner circumferential surface of the main body side mounting hole, and an enlarged diameter portion which is elastically deformable inward relative to the insertion main body portion as a base. The enlarged diameter portion is formed so that a total circumferential length of an outer circumferential surface at a side closer to the other end portion of the mounting hole inserting portion than the main body side mounting hole is larger than the circumferential length of the inner circumferential surface of the main body side mounting hole.

[0010] According to such a configuration, the enlarged diameter portion is elastically deformable. Therefore, the enlarged diameter portion is fitted to the main body side mounting hole without a gap. As a result, it is possible to rotatably connect the flap to the main body portion, while suppressing the rattling between the main body side mounting hole and the connecting member. Further, the enlarged diameter portion is formed so that the total circumferential length of the outer circumferential surface is larger than the circumferential length of the main body side mounting hole. Therefore, it is not possible for the enlarged diameter portion to enter the main body side mounting hole. That is, the enlarged diameter portion may not pass through the main body side mounting hole, and the movement of the connecting member is regulated. As a result, the displacement of the connecting member in a direction of exiting the main body side mounting hole is regulated, and it is possible to prevent the connecting member from being detached. Further, the enlarged diameter portion can integrally form the insertion main body portion and the flap connecting portion, as the connecting member. Therefore, it is possible to prevent the occurrence of complication of the shape of the flap, an increase in number of components, and deterioration of the ease of assembly associated therewith. Accordingly, it is possible to suppress an increase in manufacturing cost.

[0011] According to a second aspect of the invention, in the air conditioner according to the first aspect of the invention, the enlarged diameter portion may have a tapered portion in which an outer diameter is enlarged from the insertion main body portion toward the other end portion side.

[0012] With such a configuration, the circumferential length of the tapered portion of the enlarged diameter portion becomes gradually larger from the mounting hole inserting portion side toward the other end portion side. Therefore, the portion larger than the circumferential length of the inner circumferential surface of the main body side mounting hole can be formed in a simple structure.

[0013] According to a third aspect of the invention, in the air conditioner according to the first or second aspect of the invention, the enlarged diameter portion may have a flange portion that bulges to the outer circumferential side at the other end portion.

[0014] According to such a configuration, the flange portion bulging to the outer circumferential side further than the enlarged diameter portion is formed. Therefore, the portion larger than the circumferential length of the inner circumferential surface of the main body side mounting hole can be formed in a simpler structure.

[0015] According to a fourth aspect of the invention, in the air conditioner according to any one of the first to third aspects of the invention, the enlarged diameter portion may have a plurality of elastic deformation pieces which extend toward the other end portion side from the insertion main body portion at intervals in the circumferential direction.

[0016] According to such a configuration, the enlarged diameter portion is formed by a plurality of elastic deformation pieces which extend toward the other end portion side from the insertion main body portion. Thus, the enlarged diameter portion can be easily elastically deformed. Therefore, it is possible to effectively generate an elastic force in the enlarged diameter portion.

[0017] According to the air conditioner of the present invention, it is possible to prevent an inadvertent detachment of the flap by the enlarged diameter portion, while suppressing an increase in cost.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

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

FIG. 2 is a cross-sectional view of the air conditioner according to an embodiment of the present invention taken along the line II-II of FIG. 1.

FIG. 3 is a front view of the air conditioner according to an embodiment of the present invention, illustrating a state in which a front suction panel is removed.

FIG. 4 is a perspective view of a mounting portion according to the embodiment of the present invention.

FIG. 5 is an exploded perspective view of the mounting portion according to the embodiment of the present invention.

FIG. 6 is a perspective view illustrating an exterior

of a connecting member of the mounting portion of the embodiment of the present invention.

FIG. 7 is a cross-sectional view of the connecting member of the mounting portion of the embodiment of the present invention taken along a central axis.

FIG. 8 is a side view in which the connecting member of the mounting portion of the embodiment of the present invention is viewed from the direction of central axis.

FIG. 9 is a cross-sectional view illustrating a state in which, in the mounting portion of the embodiment of the present invention, part of the enlarged diameter portion of the connecting member is inserted into the main body side mounting hole, and the elastic deformation piece is elastically deformed inward in the radial direction.

FIG. 10 is a side view in which the connecting member in the mounting portion of the embodiment of the present invention is viewed from the direction of central axis, in the state in which, part of the enlarged diameter portion of the connecting member is inserted into the main body side mounting hole, and the elastic deformation piece is elastically deformed inward in the radial direction.

DETAILED DESCRIPTION OF THE INVENTION

[0019] Hereinafter, an air conditioner 1 of the embodiment of the present invention will be described with reference to the accompanying drawings.

[0020] FIG. 1 is a perspective view of an air conditioner according to an embodiment of the present invention. FIG. 2 is a cross-sectional view of the air conditioner according to an embodiment of the present invention taken along the line II-II of FIG. 1. FIG. 3 is a front view of the air conditioner according to an embodiment of the present invention, illustrating a state in which a front suction panel is removed.

[0021] As illustrated in FIGS. 1, 2 and 3, the air conditioner 1 includes a housing 2 and an air conditioning device (a main body portion) 3. The housing 2 has a laterally long rectangular shape in a direction which is a horizontal direction at the time of installation. The air conditioning device (the main body portion) 3 is housed inside the housing 2. The air conditioner 1 is an indoor unit provided indoors. The air conditioner 1 is a device that suctions air A, adjusts the temperature and humidity thereof to discharge the air A from an air outlet 4 and performs indoor air conditioning. The air conditioner 1 of the present embodiment is provided with a flap 8 which changes the blowing direction of the air A.

[0022] Hereinafter, the direction which is the horizontal direction at the time of installation is referred to as a lateral direction. The direction which is a vertical direction at the time of installation is simply referred to as a vertical direction. A direction orthogonal to the lateral direction and the vertical direction is referred to as a front-rear direction. Further, a front side at the time of installation is a front

side in the front-rear direction.

[0023] As illustrated in FIG. 2, the air conditioning device 3 includes a heat exchanger 5, a blower fan 6, a filter 7, a flap 8 and a control box 9. The blower fan 6 is provided so as to be covered by the heat exchanger 5. The filter 7 is provided on the suction port of the air A. The flap 8 is provided in the air outlet 4 of the air A. The control box 9 is provided on one end side in the lateral direction to control the air conditioning.

[0024] The housing 2 includes a front panel 10, a top panel 11 and a housing main body 12. The front panel 10 is disposed on the front side which is the front side at the time of installation. The top panel 11 is integrally connected to the front panel 10 and is disposed at the top at the time of installation. The housing main body 12, the front panel 10 and the top panel 11 form a space S that houses the air conditioning device 3 therein.

[0025] The housing 2 has a suction panel 13 that covers the front panel 10 from the front.

[0026] The housing main body 12 has side panels 14, a back panel 15 and a bottom panel 16. A pair of side panels 14 is disposed in the lateral direction. The back panel 15 is integrally connected to the pair of side panels 14 and faces an installation surface. The bottom panel 16 supports the pair of side panels 14 and the back panel 15 and is disposed at the bottom.

[0027] The housing main body 12 forms the space S that houses the air conditioning device 3 which is surrounded by the pair of side panels 14, the back panel 15 and the bottom panel 16. The housing main body 12 is opened at the front and the top of the space S. That is, the housing main body 12 is formed with a front opening portion OP1 that passes through the housing 2 in the front-rear direction, and a top opening portion OP2 that passes through the housing 2 in the vertical direction.

[0028] Air A is taken into the space S of the housing 2 from the top opening portion OP2.

[0029] The front panel 10 is formed in a lattice shape. The front panel 10 is provided integrally with the housing main body 12 on the front side of the front opening portion OP1. The top panel 11 is formed in a lattice shape. The top panel 11 is provided integrally with the housing main body 12 on the top side of the top opening portion OP 2.

[0030] The suction panel 13 is disposed on the further front side of the front panel 10 to cover the front opening portion OP1 and the front panel 10. The suction panel 13 is attachable and detachable to and from the housing main body 12, thereby enabling the front opening portion OP1 to be opened and closed.

[0031] The flap 8 provided in the air outlet 4 is an air direction adjusting plate that changes the direction of the vertical direction of the air A from the air outlet 4. The air conditioner 1 is provided with two flaps 8. The two flaps 8 can be disposed to block the air outlet 4. The two flaps 8 can be turned around the axis O in accordance with the flow of air A discharged by the blower fan 6.

[0032] The mounting structure of the flaps 8 will be described below. Here, among the two flaps 8, the mount-

ing structure of the flap 8 disposed at the rear will be described. Among the two flaps 8, since the mounting structure of the flap 8 disposed at the front is substantially the same as the mounting structure of the flap 8 disposed at the rear, its description will not be provided.

[0033] As illustrated in FIG. 3, the flaps 8 are connected to the housing 2 to be turnable around the axis O extending in the lateral direction via a mounting portion 17, at a plurality of positions spaced apart in the lateral direction. The flaps 8 are driven to turn around the axis O, by a drive motor (not illustrated) provided at one end side in the direction of the axis O (the lateral direction). Therefore, a pin 35 extending in the direction of the axis O is provided at one end portion of the flap 8. The pin 35 is connected to the drive motor (not illustrated).

[0034] FIG. 4 is a perspective view of the mounting portion of an embodiment of the present invention. FIG. 5 is an exploded perspective view of the mounting portion of an embodiment of the present invention. FIG. 6 is a perspective view illustrating the exterior of the connecting member of the mounting portion of the embodiment of the present invention. FIG. 7 is a cross-sectional view of the connecting member of the mounting portion according to the embodiment of the present invention taken along the central axis. FIG. 8 is a side view in which the connecting member of the mounting portion of the embodiment of the present invention is viewed from the direction of central axis. FIG. 9 is a cross-sectional view illustrating a state in which, in the mounting portion of the embodiment of the present invention, part of the enlarged diameter portion of the connecting member is inserted into the main body side mounting hole, and the elastic deformation piece is elastically deformed inward in the radial direction. FIG. 10 is a side view in which the connecting member in the mounting portion of the embodiment of the present invention is viewed from the direction of central axis, in the state in which, part of the enlarged diameter portion of the connecting member is inserted into the main body side mounting hole, and the elastic deformation piece is elastically deformed inward in the radial direction.

[0035] As illustrated in FIGS. 4 and 5, the mounting portion 17 includes a flap side bracket 19, a housing side bracket 20, and a connecting shaft (a connecting member) 21. The flap side bracket 19 is provided integrally with a flap main body 18 of the flap 8. The housing side bracket 20 is provided in the housing 2. The connecting shaft (the connecting member) 21 connects the flap side bracket 19 and the housing side bracket 20.

[0036] The flap 8 includes the flap main body 18 having a laterally long plate shape, and the flap side bracket 19 provided on the flap main body 18 at a position corresponding to the mounting portion 17.

[0037] The flap side bracket 19 is formed integrally with one surface 18f of the flap main body 18 to extend in an orthogonal direction from the surface 18f of the flap main body 18. The flap side bracket 19 has a plate shape. A main surface orthogonal to the axis O is formed on the

flap side bracket 19.

[0038] The shape of the flap side bracket 19 viewed from the direction of the axis O is a triangular shape. The flap side bracket 19 is formed with a rectangular shaft engaging hole 23 that passes therethrough in the direction of the axis O (see FIG. 5).

[0039] The housing side bracket 20 has a plate shape. On the housing side bracket 20, a main surface orthogonal to the direction of the axis O is formed so as not to inhibit the flow of air A that is blown out of the air outlet 4. A shaft insertion hole (a main body side mounting hole) 24 passing therethrough in the direction of the axis O is formed in the housing side bracket 20. The shaft insertion hole 24, for example, has a circular shape.

[0040] As illustrated in FIGS. 6 and 7, the connecting shaft 21 includes a substantially cylindrical shaft main body (a mounting hole insertion portion) 25, and an engaging claw portion (a flap connecting portion) 26 provided at a one end 25a side that is one end portion in the extending direction of the shaft main body 25.

[0041] As illustrated in FIGS. 4, 5 and 7, the engaging claw portion 26 of the connecting shaft 21 is engaged with the shaft engaging hole 23 of the flap side bracket 19 in a state in which the one end 25a side of the shaft main body 25 is inserted into the shaft insertion hole 24 formed in the housing side bracket 20.

[0042] The shaft main body 25 of the present embodiment has a cylindrical shape centered on the central axis, that is, the axis O. The shaft main body 25 has an insertion main body portion 27 having an outer diameter smaller than an inner diameter of the shaft insertion hole 24, and an enlarged diameter portion 30 having an outer diameter larger than the inner diameter of the shaft insertion hole 24.

[0043] The insertion main body portion 27 is formed so that a total circumferential length of the outer circumferential surface is smaller than the circumferential length of the inner circumferential surface of the shaft insertion hole 24. As illustrated in FIGS. 6 and 7, the insertion main body portion 27 has a disk-like shape that is formed with a main surface orthogonal to the central axis (the axis O) of the shaft main body 25, on the one end 25a side of the shaft main body 25. That is, the insertion main body portion 27 closes the one end 25a of the enlarged diameter portion 30 to be described below. As illustrated in FIG. 7, an outer diameter dimension D of the one end 25a side of the insertion main body portion 27 is formed to be larger than an opening dimension L1 of the rectangular shaft engaging hole 23 formed in the flap side bracket 19. The outer diameter dimension D of the insertion main body portion 27 is formed to be smaller than an opening dimension L2 that is an inner diameter of the shaft insertion hole 24.

[0044] The enlarged diameter portion 30 is elastically deformable toward the inside having the central axis (the axis O), relative to the insertion main body portion 27 as a base. At least part of the enlarged diameter portion 30 is formed so that the total circumferential length of the

outer circumferential surface on the side closer to the other end 25b of the insertion main body portion 27 than the shaft insertion hole 24 is larger than the circumferential length of the inner circumferential surface of the shaft insertion hole 24. The enlarged diameter portion 30 has a cylindrical shape in which the diameter increases toward the other end 25b side from the one end 25a side. As illustrated in FIGS. 6 and 8, slits 28 are formed at a plurality of positions (four positions in this embodiment) in the circumferential direction of the enlarged diameter portion 30. The slits 28 extend to the insertion main body portion 27 in the direction of the central axis (the axis O) of the shaft main body 25 from the other end 25b toward the one end 25a side of the shaft main body 25. Due to the slits 28, a plurality of elastic deformation pieces 29 are formed in the enlarged diameter portion 30, at intervals in the circumferential direction.

[0045] The elastic deformation pieces 29 extend from the insertion main body portion 27 toward the other end 25b side. That is, the elastic deformation pieces 29 of the present embodiment has a cantilever shape in which the insertion main body portion 27 is set as a fixed end, and a distal end portion of the other end 25b side is set as a free end. Thus, the distal end portions of the elastic deformation pieces 29 are elastically deformable to approach the central axis (the axis O).

[0046] Here, in each of the elastic deformation pieces 29, an outer circumferential surface 29f facing the outside in the radial direction of the shaft main body 25 is formed into an arc shape centered on the central axis (the axis O) when viewed from the direction of the axis O along the central axis (the axis O) of the shaft main body 25. That is, the elastic deformation pieces 29 of the present embodiment are plate-shaped members that are curved around the central axis (the axis O).

[0047] Further, as illustrated in FIG. 7, the outer circumferential surface 29f of each elastic deformation piece 29 has a first tapered surface 31, a second tapered surface 33 and an orthogonal surface 32.

[0048] The first tapered surface is formed so that a separation dimension r in the radial direction from the central axis (the axis O) is gradually enlarged toward the other end 25b side of the shaft main body 25 from the insertion main body portion 27.

[0049] The orthogonal surface 32 is continuously formed at the end portion of the other side of the first tapered surface 31. The orthogonal surface 32 is formed so as to bulge radially outward with respect to the first tapered surface 31, orthogonally to the central axis of the shaft main body 25.

[0050] The second tapered surface 33 is continuously formed at the radially outer end portion of the orthogonal surface 32. The second tapered surface 33 is formed so that the separation dimension r in the radial direction from the central axis (the axis O) is gradually enlarged than the first tapered surface 31, toward the other end 25b side of the shaft main body 25 from the orthogonal surface 32.

[0051] The outer circumferential surface 29f of the elastic deformation piece 29 has the first tapered surface 31, the orthogonal surface 32 and the second tapered surface 33 as described above. Thus, a first tapered portion 41 and a second tapered portion 43 are formed in the enlarged diameter portion 30.

[0052] The first tapered portion 41 is a region in which the first tapered surface 31 is formed in the enlarged diameter portion 30. The first tapered portion 41 extends from the insertion main body portion 27 toward the other end 25b side. The first tapered portion 41 and the insertion main body portion 27 are inserted into the shaft insertion hole 24.

[0053] The second tapered portion 43 is a region in which the orthogonal surface 32 and the second tapered surface 33 are formed in the enlarged diameter portion 30. The second tapered portion 43 bulges radially outward from the end portion of the other end 25b side of the first tapered portion 41. An outer diameter of the second tapered portion 43 is gradually enlarged from the orthogonal surface 32 toward the other end 25b. The second tapered portion 43 is disposed on the opposite side of the flap side bracket 19 with respect to the housing side bracket 20, in a state in which the shaft main body 25 is inserted into the shaft insertion hole 24.

[0054] The enlarged diameter portion 30 is formed with a flange portion 44 protruding radially outward at the other end 25b of the shaft main body 25. The flange portion 44 protrudes radially outward from the second tapered surface 33 at the other end 25b of the shaft main body 25. The flange portion 44 has the largest outer diameter in the shaft main body 25.

[0055] Here, as illustrated in FIG. 8, a circumferential length of the outer circumferential surface of each of the elastic deformation pieces 29 is set as L_r . In the present embodiment, the circumferential length L_r of each elastic deformation piece 29 is set so that the total ($L_r \times 4$) circumferential length L_r of the outer circumferential surface of the enlarged diameter portion 30 on the side nearest to the other end 25b of the flange portion 44 is larger than the circumferential length of the inner circumferential surface of the shaft insertion hole 24. That is, the enlarged diameter portion 30 is formed so that the total circumferential length is larger than that of the shaft insertion hole 24, at least in the flange portion 44.

[0056] As illustrated in FIGS. 6 and 7, the engaging claw portion 26 has a pair of beam portions 26a protruding from the end surface of the one end 25a side of the insertion main body portion 27 in the direction of the axis O, and flange portions 26b protruding from the distal ends of the beam portions 26a.

[0057] The beam portions 26a extend to be parallel to each other from the insertion main body portion 27 of the one end 25a of the shaft main body 25 in the extending direction of the central axis (the axis O) of the shaft main body 25. Each of the pair of beam portions 26a has a rectangular cross-section. Outer surfaces 26s of the pair of beam portions 26a, which are surfaces of an opposite

side to the surface of the side on which the beam portions 26a face each other, are formed to be parallel to each other.

[0058] The flange portions 26b are formed integrally with the beam portions 26a at the distal end portions of the beam portions 26a. The flange portions 26b protrude toward the outside of the side opposite to the direction in which the beam portions 26a face each other. As illustrated in FIG. 7, in the engaging claw portion 26, a gap between the outer surfaces 26s of the pair of beam portions 26a is formed to be slightly smaller than the opening dimension L1 in the longitudinal direction of the rectangular shaft engaging hole 23 formed in the flap side bracket 19.

[0059] Here, at least the engaging claw portion 26 of the connecting shaft 21 is formed of a flexible material (an elastically deformable material). As the flexible material, for example, it is possible to adopt engineering plastic such as a polyacetal resin (POM). Accordingly, the pair of beam portions 26a constituting the engaging claw portion 26 can be elastically deformed in the direction of approaching the central axis (the axis O) of the shaft main body 25 so that the distal end sides formed with the flange portions 26b with respect to the insertion main body portion 27 approach each other.

[0060] The engaging claw portion 26 is engaged with the rectangular shaft engaging hole 23 formed in the flap side bracket 19. The engaging claw portion 26 is inserted into the engaging hole 23, while elastically deforming the pair of beam portions 26a of the engaging claw portion 26 in the direction in which the flange portions 26b of the distal end portion approach each other. When the flange portions 26b have passed through the shaft engaging hole 23, the elastically deformed beam portions 26a are restored, and the flange portions 26b are engaged with the shaft engaging hole 23. In this state, the one end 25a of the insertion main body portion 27 of the connecting shaft 21 abuts against the surface of the flap side bracket 19 facing the other end 25b side. In this way, the connecting shaft 21 is non-rotatably and non-movably fixed to the flap side bracket 19 in the direction of the axis O.

[0061] In the air conditioner 1 of the present embodiment, the shaft main body 25 is inserted into the shaft insertion hole 24 of the housing side bracket 20. As a result, the flap 8 is attached to the housing 2 via the connecting shaft 21. The outer diameter of the shaft main body 25 is formed to be slightly smaller than the inner diameter of the shaft insertion hole 24. Thus, the shaft main body 25 is rotatably supported around the axis O within the shaft insertion hole 24 of the housing side bracket 20.

[0062] According to the embodiment, in the shaft main body 25, the enlarged diameter portion 30 is elastically deformable radially inward. Therefore, in the state in which the first tapered portion 41 of the shaft main body 25 is inserted into the shaft insertion hole 24, the elastic deformation piece 29 comes into sliding contact with the inner circumferential surface of the shaft insertion hole

24, while being pressed against the inner circumferential surface. Thus, the first tapered portion 41 is fitted to the shaft insertion hole 24 without a gap. As a result, it is possible to rotatably connect the flap 8 to the air conditioning device 3, while suppressing the rattling between the shaft insertion hole 24 and the connecting shaft 21.

[0063] As illustrated in FIG. 9, in the air conditioner 1, in some cases, due to a factor such as a movement of the flap 8 in the direction of axis O, the connecting shaft 21 may be pushed into the shaft insertion hole 24 in the direction of axis O with excessive force. At this time, beyond the orthogonal surface 32, the second tapered portion 43 of the shaft main body 25 may also be inserted into the shaft insertion hole 24.

[0064] Since the total circumferential length of the outer circumferential surface of the elastically deformable enlarged diameter portion 30 is formed to be larger than the circumferential length of the inner circumferential surface of the shaft insertion hole 24, it is possible to regulate the displacement in the direction of axis O of the connecting shaft 21.

[0065] Specifically, in a state in which the second tapered portion 43 is inserted into the shaft insertion hole 24, as illustrated in FIGS. 9 and 10, the second tapered surface 33 is pressed radially inward toward the central axis by the inner circumferential surface of the shaft insertion hole 24. Therefore, the elastic deformation pieces 29 are elastically deformed. When each of the plurality of elastic deformation pieces 29 is pressed radially inward by the shaft insertion hole 24, consequentially, the plurality of elastic deformation pieces 29 abut each other in the circumferential direction. Even in this state, the shaft main body 25 is formed so that the sum of the circumferential length L_r of the elastic deformation pieces 29 in the flange portion 44 is larger than the circumferential length of the shaft insertion hole 24. Therefore, in the state in which the plurality of elastic deformation pieces 29 abut against each other in the circumferential direction, the enlarged diameter portion 30 of the connecting shaft 21 cannot enter the shaft insertion hole 24 any further. That is, the flange portion 44 may not pass through the shaft insertion hole 24 and comes into contact with the housing side bracket 20. Thus, the movement of the connecting shaft 21 in the direction of the central axis (the axis O) is regulated. As a result, the displacement of the connecting shaft 21 in a direction of exiting the shaft insertion hole 24 is regulated, and it is possible to prevent the connecting shaft 21 from being detached.

[0066] Such an enlarged diameter portion 30 having the elastic deformation pieces 29 can be formed integrally with the shaft main body 25 and the engaging claw portion 26 as the connecting shaft 21. Therefore, it is possible to prevent the complication of the shape of the flap 8, an increase in the number of components, and deterioration of the ease of assembly associated therewith. Accordingly, it is possible to suppress an increase in the manufacturing cost.

[0067] According to the aforementioned air conditioner

1, it is possible to suppress the cost increase and inadvertent detachment of the flap 8.

[0068] Due to the second tapered portion 43 of the enlarged diameter portion 30, it is possible to reliably suppress the displacement of the connecting shaft 21 in the direction of exiting the shaft insertion hole 24. Moreover, the circumferential length of the outer circumferential surface becomes gradually larger from the insertion main body portion 27 toward the first tapered portion 41, the second tapered portion 43 and the other end 25b side. Therefore, a portion larger than the circumferential length of the inner circumferential surface of the shaft insertion hole 24 can be formed in a simple structure.

[0069] The enlarged diameter portion 30 has the flange portion 44 that further bulges to the side closer to the outer circumference than the second tapered portion 43. Therefore, the portion larger than the circumferential length of the inner circumferential surface of the shaft insertion hole 24 can be formed in a simpler structure.

[0070] Because the orthogonal surface 32 formed on the second tapered portion 43 abuts against the circumference of the shaft insertion hole 24, it is possible to reliably suppress the displacement of the connecting shaft 21 in the direction of exiting the shaft insertion hole 24. This can also prevent the inadvertent detachment of the flap 8.

[0071] By providing the elastic deformation pieces 29, the enlarged diameter portion 30 can be easily elastically deformed. Therefore, it is possible to effectively generate an elastic force in the enlarged diameter portion 30. Thus, it is possible to stably suppress an increase in friction between the shaft insertion hole 24 and the shaft main body 25 caused by the enlarged diameter portion 30 being pressed against the inner circumferential surface of the shaft insertion hole 24 with an excessive force. Further, it is possible to effectively perform the suppression of rattling between the connecting shaft 21 and the shaft insertion hole 24 and the suppression of vibration of the connecting shaft 21.

[0072] While the embodiments of the present invention have been described in detail above, it is also possible to slightly change the design within the scope that does not depart from the technical idea of the present invention.

[0073] For example, the enlarged diameter portion 30 is configured to include the first tapered portion 41, the second tapered portion 43 and the flange portion 44, but is not limited to such a configuration. For example, the enlarged diameter portion 30 may have at least one of the first tapered portion 41, the second tapered portion 43 and the flange portion 44, as long as the enlarged diameter portion 30 has a portion in which the total circumferential length L_r of the outer circumferential surface is larger than the circumferential length of the inner circumferential surface of the shaft insertion hole 24.

[0074] Further, the number of elastic deformation pieces 29 formed on the shaft main body 25, i.e., the number and arrangement of the slits 28 may be appropriately

changed to configurations other than mentioned above.

[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 spirit or 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.

Industrial Applicability

[0076] According to the air conditioner, due to the enlarged diameter portion, it is possible to prevent an inadvertent detachment of the flap, while suppressing an increase in cost.

Reference Signs List

[0077]

1	air conditioner
2	housing
3	air conditioning device (main body portion)
4	air outlet
5	heat exchanger
6	blower fan
7	filter
8	flap
9	control box
10	front panel
11	top panel
12	housing main body
13	suction panel
14	side panel
15	back panel
16	bottom panel
17	mounting portion
18	flap main body
18f	surface
19	flap side bracket
20	housing side bracket
21	connecting shaft (connecting member)
23	shaft engaging hole
24	shaft insertion hole (main body side mounting hole)
25	shaft main body (mounting hole insertion portion)
25a	one end
25b	other end
26	engaging claw portion (flap connecting portion)
26a	beam portion
26b	flange portion
26s	Outer surface
27	insertion main body portion
28	slit
29	elastic deformation piece
29f	outer circumferential surface

30	enlarged diameter portion
31	first tapered surface
32	orthogonal surface
33	second tapered surface
5 35	pin
41	first tapered portion
43	second tapered surface
44	flange portion
A	air
10 O	axis
OP1	front opening portion
OP2	top opening portion
S	space

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Claims

1. An air conditioner (1) comprising:

- 20 a main body portion (3) in which an air outlet (4) is formed and a main body side mounting hole (24) is formed;
a flap (8) which is provided in the air outlet to change a blowing direction of air blown from the air outlet; and
25 a connecting member (21) which rotatably connects the flap to the main body portion (24), wherein the connecting member (21) has a mounting hole insertion portion (25) which is inserted into the main body side mounting hole (24), and
30 a flap connecting portion (26) which is formed at one end portion of the mounting hole insertion portion and is connected to the flap,
35 the mounting hole inserting portion (25) has an insertion main body portion (27) formed so that a total circumferential length of an outer circumferential surface is smaller than a circumferential length of an inner circumferential surface of the main body side mounting hole (24), and
40 an enlarged diameter portion (30) which is elastically deformable inward relative to the insertion main body portion as a base, and
45 the enlarged diameter portion is formed so that a total circumferential length of an outer circumferential surface at a side closer to the other end portion of the mounting hole inserting portion than the main body side mounting hole is larger than the circumferential length of the inner circumferential surface of the main body side mounting hole.
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2. The air conditioner (1) of claim 1, wherein the enlarged diameter portion has a tapered portion (41, 43) in which an outer diameter is enlarged from the insertion main body portion toward the other end portion side.
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3. The air conditioner (1) of claim 1 or 2, wherein the enlarged diameter portion has a flange portion (44) that bulges to the outer circumferential side at the other end portion.

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4. The air conditioner (1) of any one of claims 1 to 3, wherein the enlarged diameter portion (30) has a plurality of elastic deformation pieces (29) which extend toward the other end portion side from the insertion main body portion at intervals in the circumferential direction.

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FIG. 1

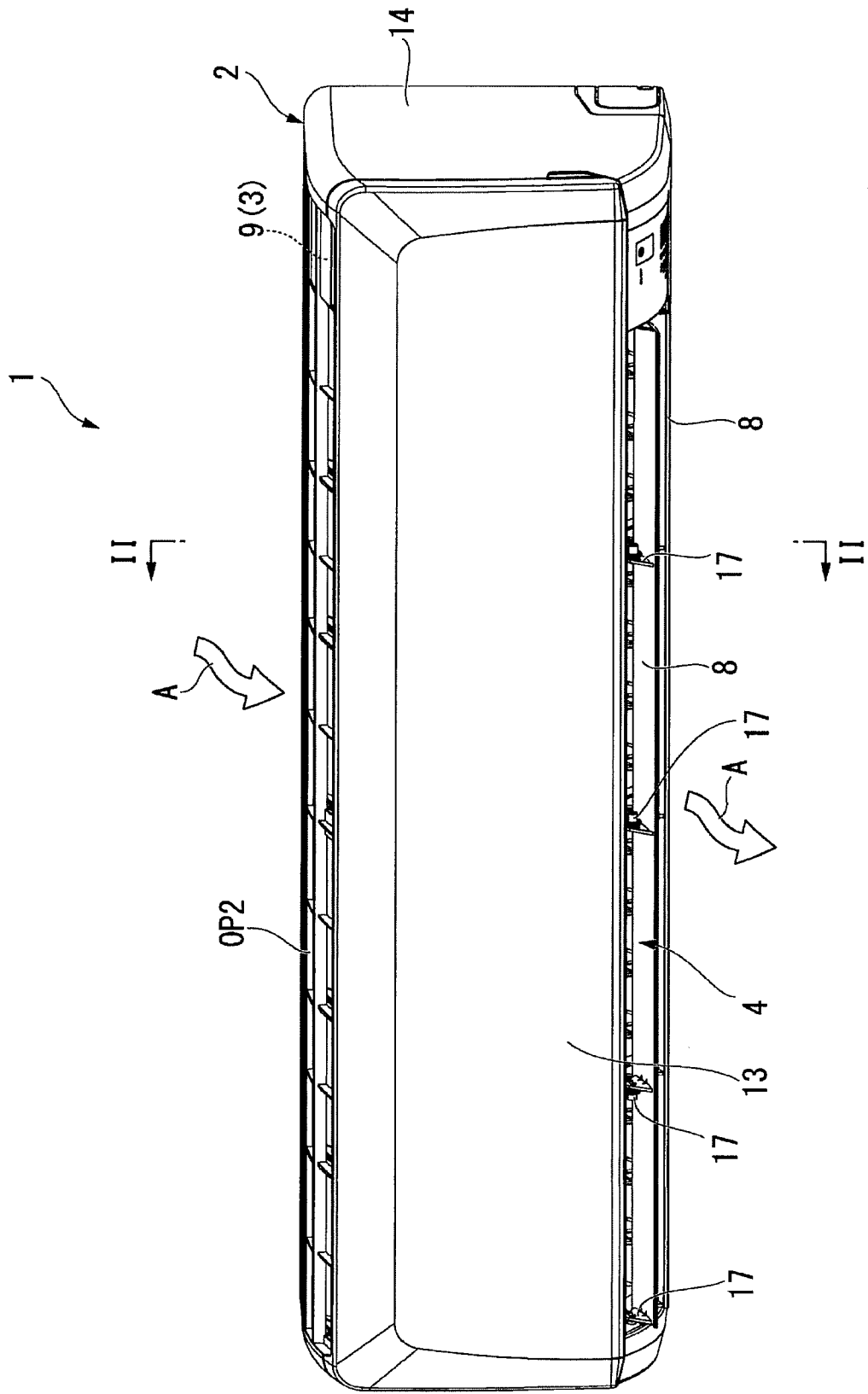
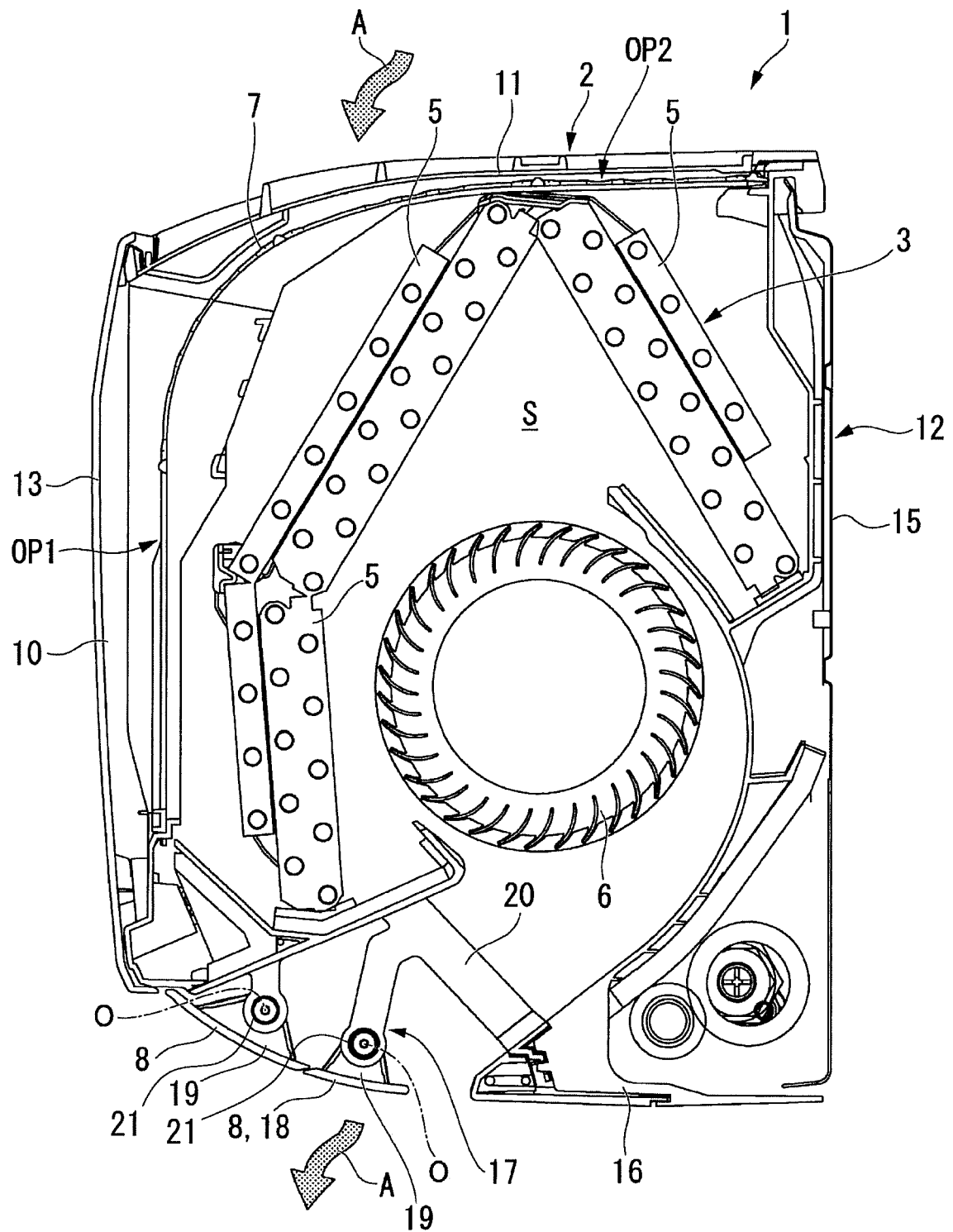


FIG. 2



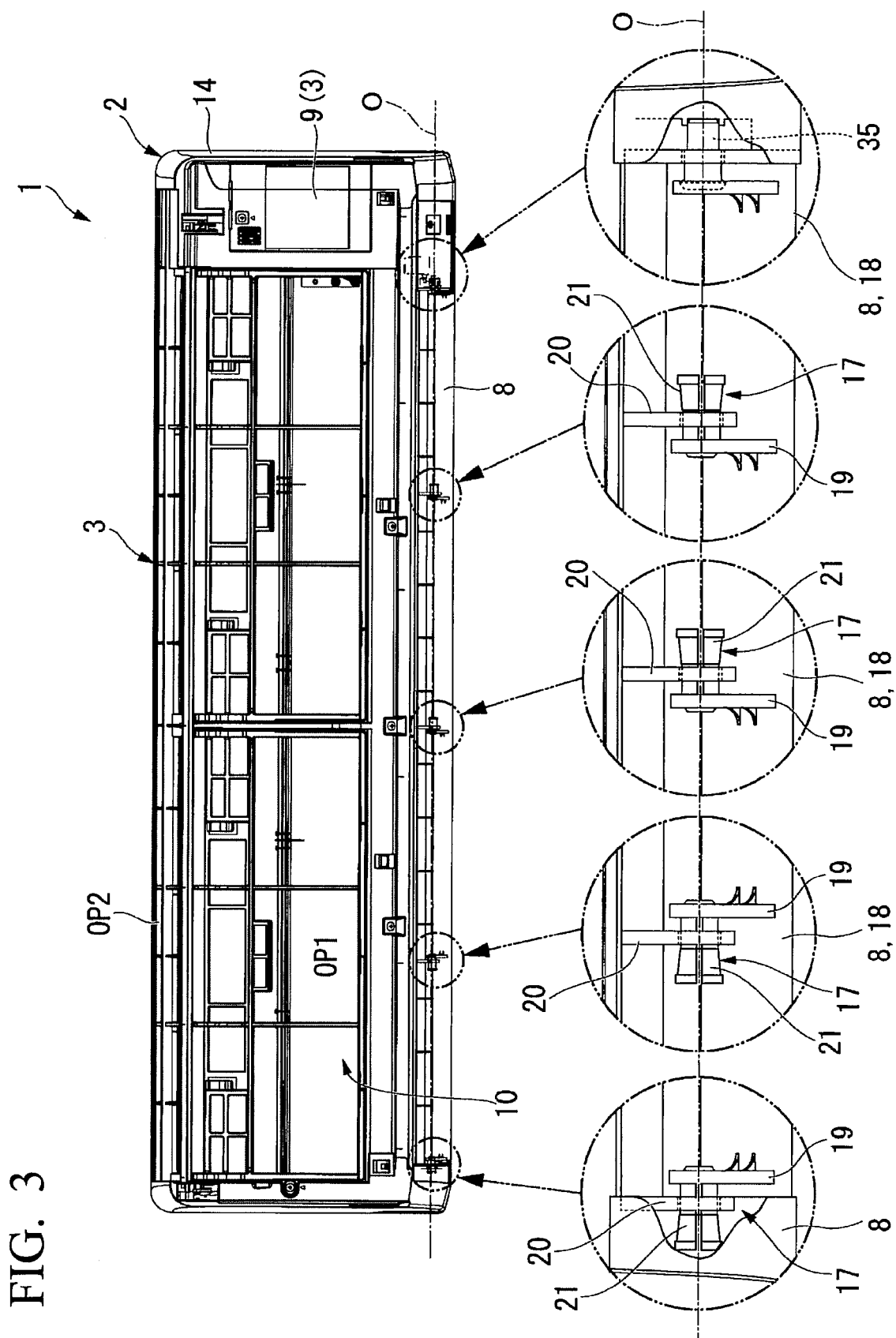


FIG. 4

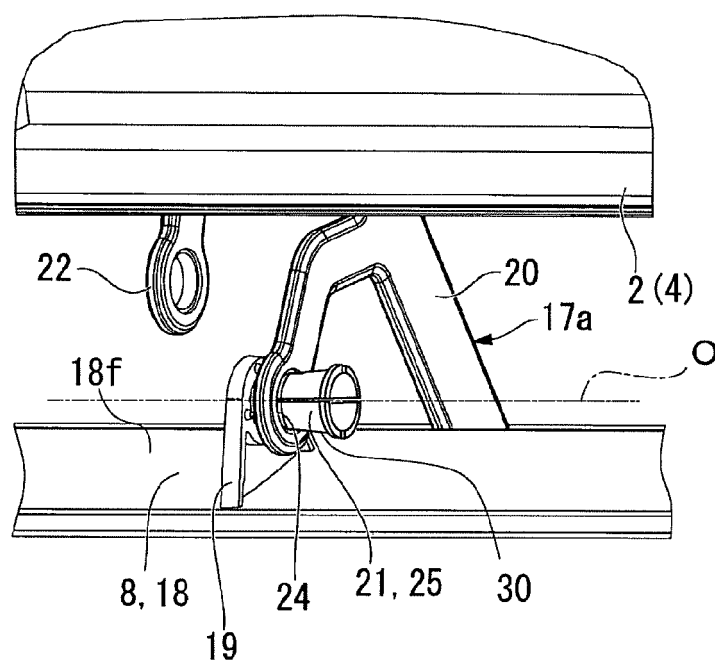


FIG. 5

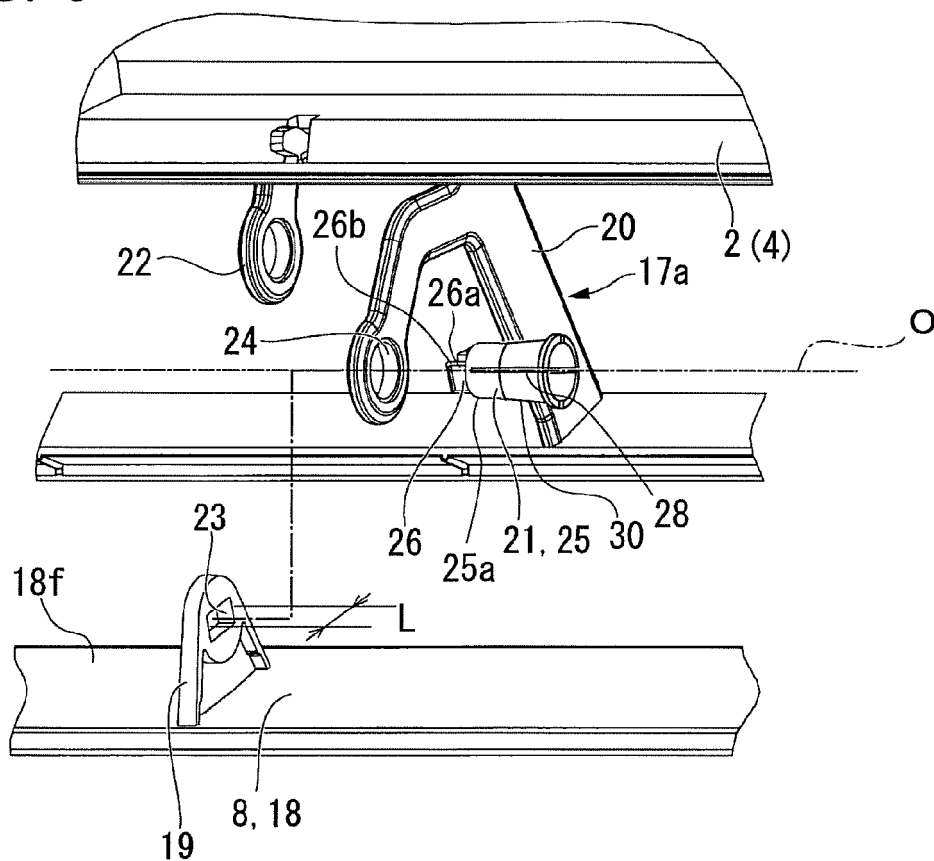


FIG. 6

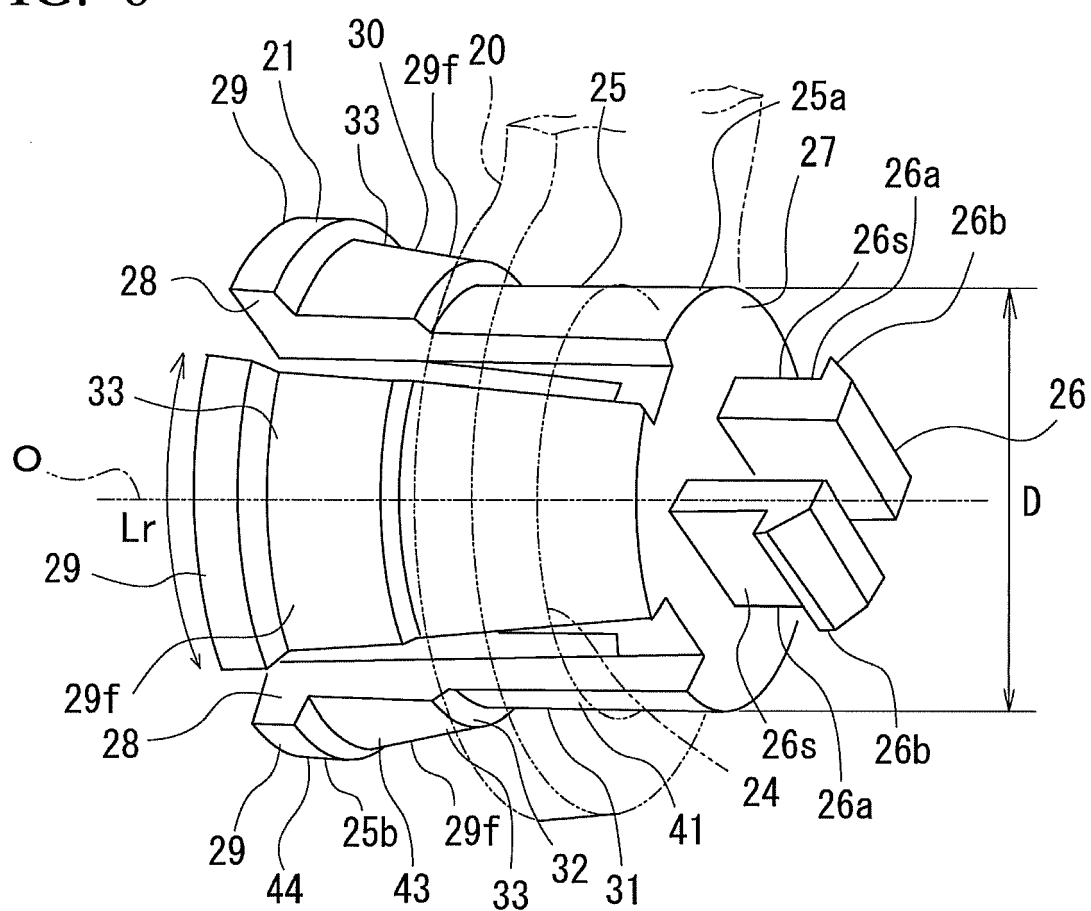


FIG. 7

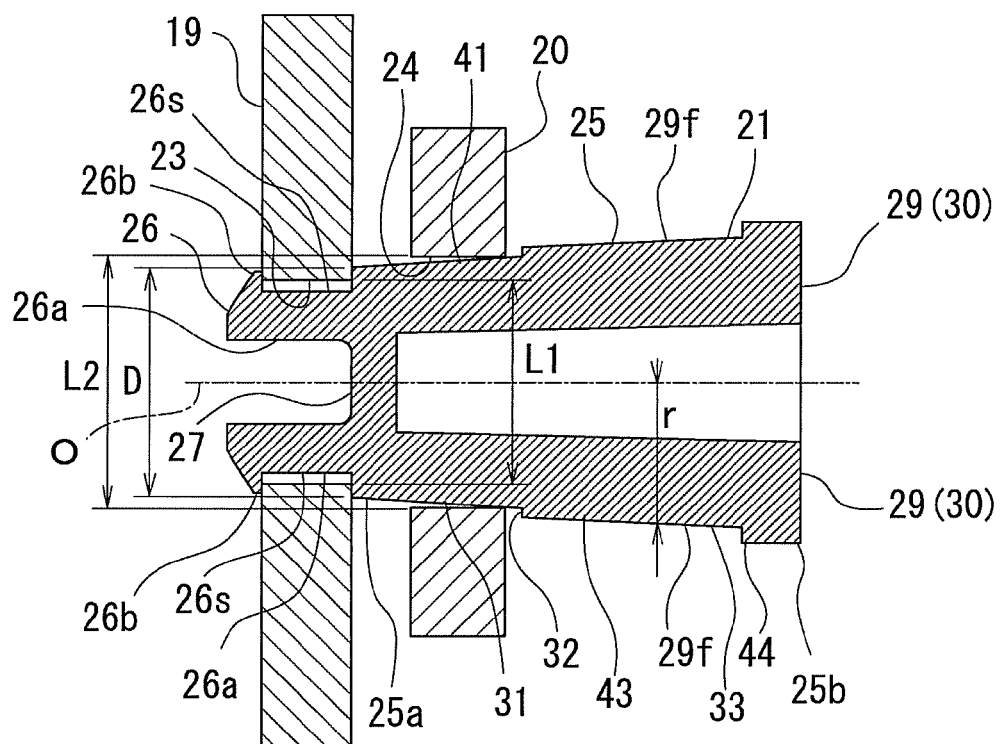


FIG. 8

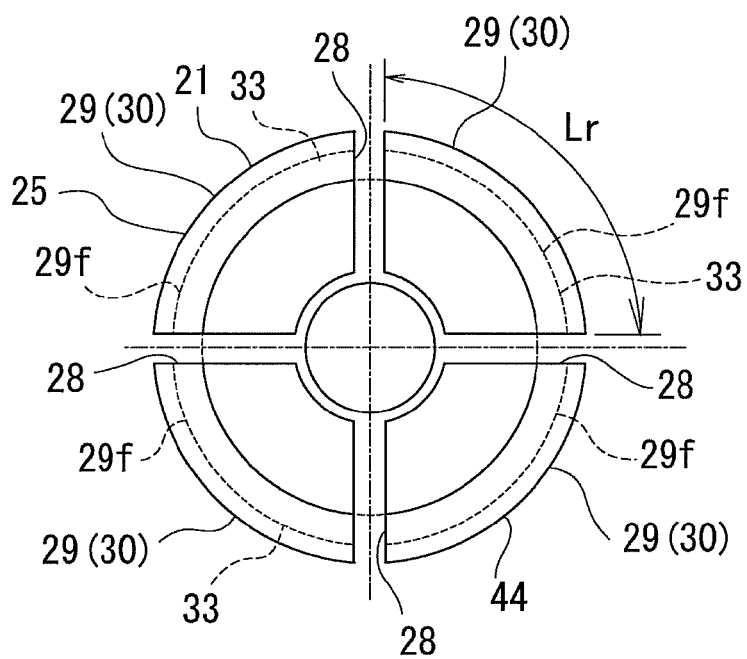


FIG. 9

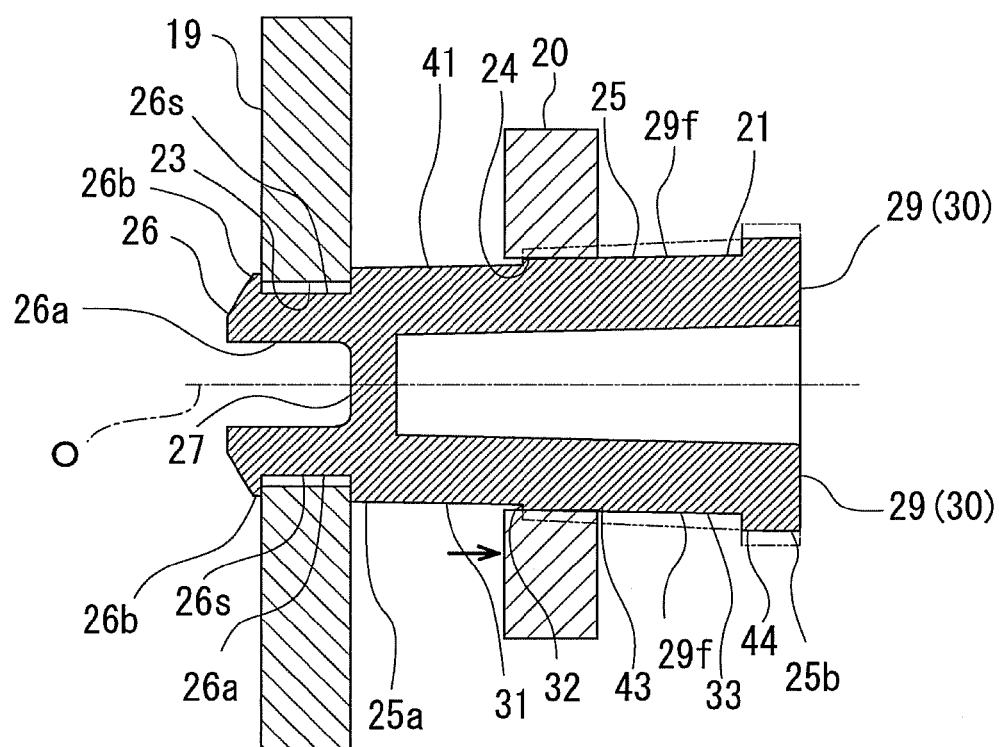
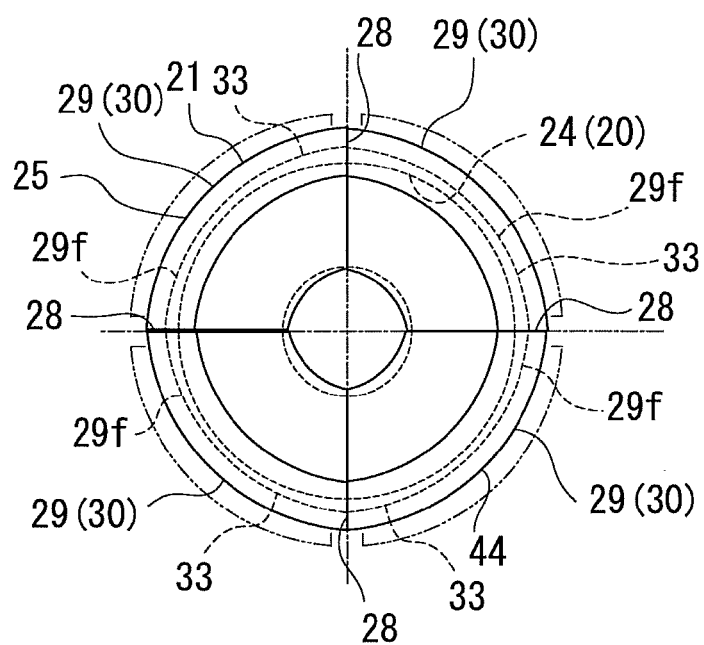


FIG. 10





EUROPEAN SEARCH REPORT

Application Number
EP 16 18 5792

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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A	* abstract; figures 1,4 * * paragraph [0034]; figure 5 *	2,4	
X	CN 203 928 319 U (GUANGDONG MEDIA REFRIGERATION EQUIPMENT CO LTD; MIDEA GROUP CO LTD) 5 November 2014 (2014-11-05)	1,4	
A	* abstract; figures 1,8,9 *	2,3	
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			TECHNICAL FIELDS SEARCHED (IPC)
			F24F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 17 January 2017	Examiner Degen, Marcello
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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17-01-2017

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JP 2002277039	A	25-09-2002	NONE	

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

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