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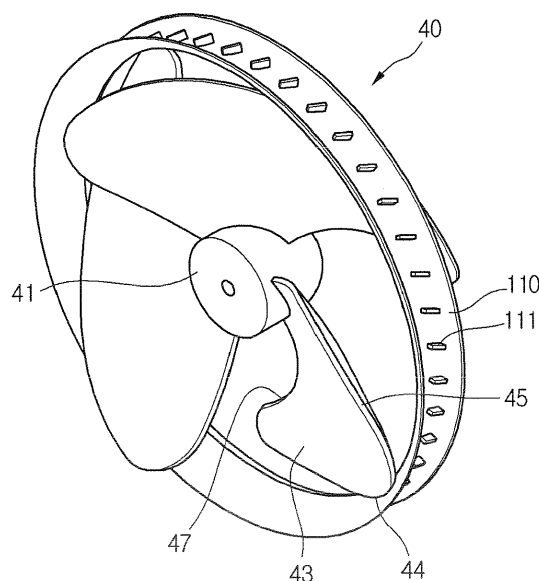
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(54) **Outdoor unit for air conditioner**

(57) An outdoor unit (1) of an air conditioner includes an axial flow fan (40) including a hub (41) and a plurality of blades (43) disposed on the hub (41), a rotation orifice (110) disposed to surround the axial flow fan (40), the rotation orifice (110) guiding air flowing by the axial flow fan (40), and a fixed orifice (120) having an orifice hole

(121) through which the air flowing by the axial flow fan (40) passes, the fixed orifice (120) being disposed outside the rotation orifice (110). At least one portion of each of the blades (43) and one surface of the rotation orifice (110) are coupled to each other and rotated together with each other.

Fig. 2



Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority under 35 U.S.C. 119 and 35 U.S.C. 365 to Korean Patent Application No. 10-2011-0002201 filed on January 10, 2011.

BACKGROUND

[0002] The present disclosure relates to an outdoor unit for an air conditioner.

[0003] Air conditioners are home appliances for cooling or/and heating an indoor space by heat-exchanging with a refrigerant circulating a heat exchange cycle. A split type air conditioner of the air conditioners includes an indoor unit and an outdoor unit. Parts constituting the heat exchange cycle such as an outdoor heat exchanger and a compressor are installed in the outdoor unit.

[0004] Also, a fan for generating an airflow for heat-exchange between the outdoor heat exchanger and outdoor air is installed in the outdoor unit. In general, an axial flow fan is used as the fan. An orifice for guiding air discharged from the fan is installed within the outdoor unit to increase a constant pressure of air flowing by the axial flow fan.

[0005] In case of the outdoor unit according to a related art, the fan and the orifice are spaced from each other to stably rotate the fan. However, when the fan and the orifice are spaced from each other, the air flowing by the axial flow fan may be leaked through a gap between the fan and the orifice. Also, the leakage of the air through the gap between the fan and the orifice may cause reduction of the performance of the fan and increase of noise when the fan is operated.

SUMMARY

[0006] Embodiments provide an outdoor unit of an air conditioner configured to allow air to efficiently flow.

[0007] Embodiments also provide an outdoor unit of an air conditioner configured to reduce noise.

[0008] In one embodiment, an outdoor unit of an air conditioner includes: an axial flow fan including a hub and a plurality of blades disposed on the hub; a rotation orifice disposed to surround the axial flow fan, the rotation orifice guiding air flowing by the axial flow fan; and a fixed orifice having an orifice hole through which the air flowing by the axial flow fan passes, the fixed orifice being disposed outside the rotation orifice, wherein at least one portion of each of the blades and one surface of the rotation orifice are coupled to each other and rotated together with each other.

[0009] In another embodiment, an outdoor unit of an air conditioner including a compressor, an outdoor heat exchanger, and a fan which constitute a heat exchange cycle includes: an axial flow fan blowing air to heat-exchange the outdoor heat exchanger with outdoor air, the

axial flow fan including a hub and a plurality of blades disposed on the hub; a rotation orifice rotated together with the axial flow fan, the rotation orifice guiding air flowing by the axial flow fan; a fixed orifice disposed at an upstream side in a flow direction of the air flowing by the axial flow fan when compared to that of the rotation orifice; and a plurality of auxiliary blades disposed on an outer surface of the rotation orifice, the plurality of auxiliary blades blowing air in the same direction as that of the axial flow fan, wherein the air flowing by the rotation of the axial flow fan passes through one portion of the orifice hole, and the air flowing by the auxiliary blades passes through the other portion of the orifice hole.

[0010] The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other features will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Fig. 1 is a perspective view illustrating an outdoor unit of an air conditioner according to a first embodiment.

[0012] Fig. 2 is a perspective view illustrating a main part of the outdoor unit of the air conditioner according to the first embodiment.

[0013] Fig. 3 is a sectional view illustrating the main part of the outdoor unit of the air conditioner according to the first embodiment.

[0014] Fig. 4 is a sectional view illustrating a flow of air in the outdoor unit of the air conditioner according to the first embodiment.

[0015] Fig. 5 is a sectional view illustrating a main part of an outdoor unit of an air conditioner according to a second embodiment.

[0016] Fig. 6 is a sectional view illustrating a main part of an outdoor unit of an air conditioner according to a third embodiment.

[0017] Fig. 7 is a sectional view illustrating a main part of an outdoor unit of an air conditioner according to a fourth embodiment.

DETAILED OF THE EMBODIMENTS

[0018] Hereinafter, an outdoor unit of an air conditioner according to a first embodiment will be described in detail with reference to the accompanying drawings.

[0019] Fig. 1 is a perspective view illustrating an outdoor unit of an air conditioner according to a first embodiment. Fig. 2 is a perspective view illustrating a main part of the outdoor unit of the air conditioner according to the first embodiment. Fig. 3 is a sectional view illustrating the main part of the outdoor unit of the air conditioner according to the first embodiment.

[0020] Referring to Fig. 1, a casing 10 defines an outer appearance of an outdoor unit 1. An intake hole (not shown) for sucking indoor air and an exhaust hole 20 for discharging air within the casing 10 are defined in the

casing 10. A discharge grill 30 is disposed in the exhaust hole 20.

[0021] Various parts constituting a heat exchange cycle are installed within the casing 10. For example, an axial flow fan 40 (see Fig. 2), a fan motor (not shown), an outdoor heat exchanger (not shown), a compressor (not shown), and an accumulator (not shown) are installed within the casing 10.

[0022] The axial flow fan 40 forms a flow of air sucked or discharged into the inside and outside of the casing 10 through the intake hole and the exhaust hole 20. The fan motor provides a driving force for rotating the axial flow fan 40. The outdoor heat exchanger serves as a condenser during a cooling operation and an evaporator during a heating operation. A refrigerant circulating the heat exchanger cycle is heat-exchanged with the air flowing by the operation of the axial flow fan 40 while flowing into the outdoor heat exchanger. The compressor compresses the refrigerant circulating the heat exchange cycle.

[0023] Referring to Figs. 2 and 3, an axial flow fan including a hub 41 and a plurality of blades 43 is used as the axial flow fan 40. A rotation shaft is coupled to the hub 41. Also, a plurality of blades 43 are disposed on an outer surface of the hub 41.

[0024] Each of the blades 43 includes a tip 44 defined as an end of the blade 43 and a leading edge 45 and trailing edge 47 respectively defined as both ends connecting the hub 41 to the tip 44. A front end of the blade 43 may be called a leading edge 45, and a rear end of the blade 43 may be called a trailing edge 47 by a rotation direction of the blade 43.

[0025] A rotation orifice 110 is coupled to the outside of the axial flow fan 40. The rotation orifice 110 may guide air flowing by rotation of the axial flow fan 40 to increase a constant pressure of the air flowing by the axial flow fan 40. The rotation orifice 110 may have a ring shape surrounding the axial flow fan 40. At least one portion of the plurality of blades 43 is fixed to an inner surface of the rotation orifice 110. Thus, the axial flow fan 40 and the rotation orifice 110 may be integrated with each other.

[0026] In detail, the rotation orifice 110 may be fixed to a position adjacent to the tip 44 of the blade 43. The rotation orifice 110 fixed to the blade 43 may be parallel to or inclined at an angle less than an acute angle with respect to a flow direction of the air flowing by the axial flow fan 40.

[0027] In the current embodiment, a plurality of auxiliary blades 111 are disposed on an outer surface of the rotation orifice 110. The plurality of auxiliary blades 111 may be disposed at the approximately same interval along the outer surface of the rotation orifice 110.

[0028] Each of the auxiliary blades 111 allows air to flow in the same direction as the flow direction of the air flowing by the rotation of the axial flow fan 40 when the rotation orifice 110 is rotated together with the axial flow fan 40.

[0029] A fixed orifice 120 is installed within the casing

10. Also, the fixed orifice 120 may guide the air flowing by the axial flow fan 40 to increase the constant pressure, like the rotation orifice 110. The fixed orifice 120 is not a separate member. For example, a member for fixing the discharge grill 30 may serve as the fixed orifice 120.

[0030] An orifice hole 121 is defined in the fixed orifice 120. The orifice hole 121 may have a circular shape having a diameter greater than the trace defined by at least the rotation orifice 110. That is, the axial flow fan 40 and the rotation orifice 110 may be disposed inside the orifice hole 121.

[0031] Thus, an inner circumference of the orifice hole 121, i.e., a front end of the fixed orifice 120 may be spaced from the outer surface of the rotation orifice 110 in a direction perpendicular to the flow direction of the air flowing by the axial flow fan 40.

[0032] Substantially, the auxiliary blade 111 is disposed in a space between the rotation orifice 110 and the fixed orifice 120. Here, the auxiliary blade 111 is disposed at a relatively upstream side with respect to the orifice hole 121 in the flow direction of the air flowing by the axial flow fan 40.

[0033] A front end of the auxiliary blade 111 is spaced from the inner circumference of the orifice hole 121 in the direction perpendicular to the flow direction of the air flowing by the axial flow fan 40.

[0034] Hereinafter, an operation of the outdoor unit of the air conditioner according to the first embodiment will be described in detail with reference to the accompanying drawings.

[0035] Fig. 4 is a sectional view illustrating a flow of air in the outdoor unit of the air conditioner according to the first embodiment.

[0036] When the axial flow fan 40 is rotated, air sucked into the casing 10 through the intake hole is heat-exchanged with the refrigerant flowing into the outdoor heat exchanger while passing through the outdoor heat exchanger. The air passing through the outdoor heat exchanger is discharged to the outside the casing 10, i.e., the outdoor unit by the continuous rotation of the axial flow fan 40.

[0037] Referring to Fig. 4, when the axial flow fan 40 is rotated, air flows from an upstream to a downstream, i.e., in an upward direction when viewed in Fig. 4 such as an arrow A direction. The air flowing in the arrow A direction passes through at least one portion of the orifice hole 121.

[0038] A portion of the air flowing by the rotation of the axial flow fan 40 may flow from the upstream to the downstream (see an arrow B) in the flow direction of the air flowing by the axial flow fan 40 through the gap between the rotation orifice 110 and the fixed orifice 120. It may be understood that the flow in the arrow B direction is generated by the rotation of the auxiliary blade 111 to flow from a side of the auxiliary blade 111 toward the orifice hole 121.

[0039] When the axial flow fan 40 and the rotation orifice 110 are rotated together with each other, a returning

wind (see an arrow C) may occur through the orifice hole 121. Since a flow direction of the returning wind is opposite to the flow direction of the air flowing by the rotation of the axial flow fan 40, the air may be leaked.

[0040] However, as described above, since the air flows from the upstream to the downstream by the auxiliary blade 111, the returning wind may be offset. Thus, the air leakage in the arrow C direction may be reduced.

[0041] Hereinafter, an air conditioner according to a second embodiment will be described in detail with reference to the accompanying drawings.

[0042] Fig. 5 is a sectional view illustrating a main part of an outdoor unit of an air conditioner according to a second embodiment. The same components as those of the first embodiment will be derived from reference numerals of Figs. 1 to 4, and thus their detailed descriptions will be omitted.

[0043] Referring to Fig. 5, in the current embodiment, an extension part 211 (hereinafter, for convenience of description, referred to as a "first end") is disposed on one end of both ends of a rotation orifice 210 corresponding to a relatively upstream side in a flow direction of air flowing by an axial flow fan 40.

[0044] The extension part 211 extends outside the rotation orifice 210. Here, at least one portion of a front end of the extension part 211 overlaps a fixed orifice 220 with respect to the flow direction of the air flowing by the axial flow fan 40. That is, when a virtual straight line extends vertically (when viewed in Fig. 5) from the extension part 211, the straight line meets the fixed orifice 220. The extension part 211 may be disposed at a relatively upstream side in the flow direction of the air flowing by the axial flow fan 40 when compared to that of the fixed orifice 220.

[0045] Accordingly, at least one portion of the orifice hole 221 may be shielded by the extension part 211 in the flow direction of the air flowing by the axial flow fan 40. According to the current embodiment, it may substantially prevent the air from being leaked through the orifice hole 221 corresponding to the outside of the rotation orifice 210 by the extension part 211.

[0046] Hereinafter, a main part of an outdoor unit of an air conditioner according to a third embodiment will be described in detail with reference to the accompanying drawings.

[0047] Fig. 6 is a sectional view illustrating a main part of an outdoor unit of an air conditioner according to a third embodiment. The same components as those of the first embodiment will be derived from reference numerals of Figs. 1 to 4, and thus their detailed descriptions will be omitted.

[0048] Referring to Fig. 6, in the current embodiment, an extension part 311 (hereinafter, for convenience of description, referred to as a "second end") is disposed on one end of both ends of a rotation orifice 310 corresponding to a relatively downstream side in a flow direction of air flowing by an axial flow fan 40. The extension part 311 extends outside the rotation orifice 310.

[0049] Substantially, like the extension part 211 of the second embodiment, the extension part 311 may shield at least one portion of an orifice hole 321 in the flow direction of the air flowing by the axial flow fan 40. That is, at least one portion of the extension part 311 overlaps a fixed orifice 320 with respect to the flow direction of the air flowing by the axial flow fan 40.

[0050] In the current embodiment, the extension part 311 may be disposed at a relatively downstream side in the flow direction of the air flowing by the axial flow fan 40 when compared to that of the fixed orifice 320.

[0051] Hereinafter, a main part of an outdoor unit of an air conditioner according to a fourth embodiment will be described in detail with reference to the accompanying drawings.

[0052] Fig. 7 is a sectional view illustrating a main part of an outdoor unit of an air conditioner according to a fourth embodiment. The same components as those of the first to third embodiments will be derived from reference numerals of Figs. 1 to 5, and thus their detailed descriptions will be omitted.

[0053] In the current embodiment, first and second extension parts 411 and 413 are disposed on first and second ends of a rotation orifice 410. Here, it may be understood that the first extension part 411 may be the same component as that 211 of the second embodiment. Also, it may be understood that the second extension part 413 may be the same component as that 313 of the third embodiment.

[0054] According to the current embodiment, the air leakage through an orifice hole 421 of a fixed orifice 420 corresponding to the relative outside of the rotation orifice 410 when compared to those of the second and third embodiments may be efficiently reduced.

[0055] It should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims.

[0056] In the third embodiment, although only the extension part or the first and second extension parts is/are provided on the rotation orifice, the present disclosure is not limited thereto. That is, the auxiliary blade may be disposed on the outer surface of the rotation orifice.

[0057] In the outdoor unit of the air conditioner according to the embodiments, the following effects may be expected.

[0058] First, the air leakage through a gap between the first orifice fixed to the fan and the second orifice installed inside the outdoor unit may be minimized. Thus, an air flow amount of the fan may be secured to substantially improve efficiency of the air conditioner.

[0059] Also, since the air leakage through the gap between the first and second orifices is minimized, the noise generated during the operation of the fan may be re-

duced. Thus, more silent products may be provided.

[0060] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims. Therefore, the preferred embodiments should be considered in descriptive sense only and not for purposes of limitation, and also the technical scope of the invention is not limited to the embodiments. Furthermore, is defined not by the detailed description of the invention but by the appended claims, and all differences within the scope will be construed as being comprised in the present disclosure.

Claims

1. An outdoor unit of an air conditioner, the outdoor unit comprising:
 - an axial flow fan comprising a hub and a plurality of blades disposed on the hub;
 - a rotation orifice disposed to surround the axial flow fan, the rotation orifice guiding air flowing by the axial flow fan; and
 - a fixed orifice having an orifice hole through which the air flowing by the axial flow fan passes, the fixed orifice being disposed outside the rotation orifice,
 - wherein at least one portion of each of the blades and one surface of the rotation orifice are coupled to rotate together with each other.
2. The outdoor unit of an air conditioner according to claim 1, further comprising an extension part extending from the rotation orifice in one direction to shield at least one portion of the orifice hole.
3. The outdoor unit of an air conditioner according to claim 2, wherein the extension part is disposed on at least one of one end and the other end of the rotation orifice.
4. The outdoor unit of an air conditioner according to claim 2, wherein the extension part extends from the rotation orifice in a direction perpendicular to a flow direction of the air flowing by the axial flow fan.
5. The outdoor unit of an air conditioner according to claims 2 to 4, wherein the extension part comprises:
 - a first extension part extending from one end of the rotation orifice corresponding to a relatively upstream side in a flow direction of the air flowing by the axial flow fan; and
 - a second extension part extending from the other end of the rotation orifice corresponding to a
6. The outdoor unit of an air conditioner according to claims 2 to 5, wherein, when a virtual straight line extends from at least one extension part in the flow direction of the air flowing by the axial flow fan, the straight line meets the fixed orifice.
7. The outdoor unit of an air conditioner according to claims 1 to 6, further comprising an auxiliary blade protruding from one surface of the rotation orifice.
8. The outdoor unit of an air conditioner according to claim 7, wherein the auxiliary blade is disposed in a space between the rotation orifice and the fixed orifice.
9. The outdoor unit of an air conditioner according to claims 7 and 8, wherein the auxiliary blade is provided in plurality on an outer surface of the rotation orifice.
10. The outdoor unit of an air conditioner according to claims 7 to 9, wherein a flow generated from one side of the auxiliary blade toward the orifice hole offsets a returning wind flowing through the orifice hole.
11. The outdoor unit of an air conditioner according to claims 1 to 10, further comprising a tip defining an end of each of the blades, wherein the tip is integrated with the rotation orifice.
12. The outdoor unit of an air conditioner according to claims 1 to 10, wherein each of the blades is coupled to an inner surface of the rotation orifice.
13. The outdoor unit of an air conditioner according to claims 1 to 12, wherein the axial flow fan and the rotation orifice are disposed inside the orifice hole.
14. A method for generating an airflow for heat exchange between an outdoor heat exchanger and outdoor air in an outdoor unit of a split type air conditioner preferably using an outdoor unit of one of the preceding claims.

Fig. 1

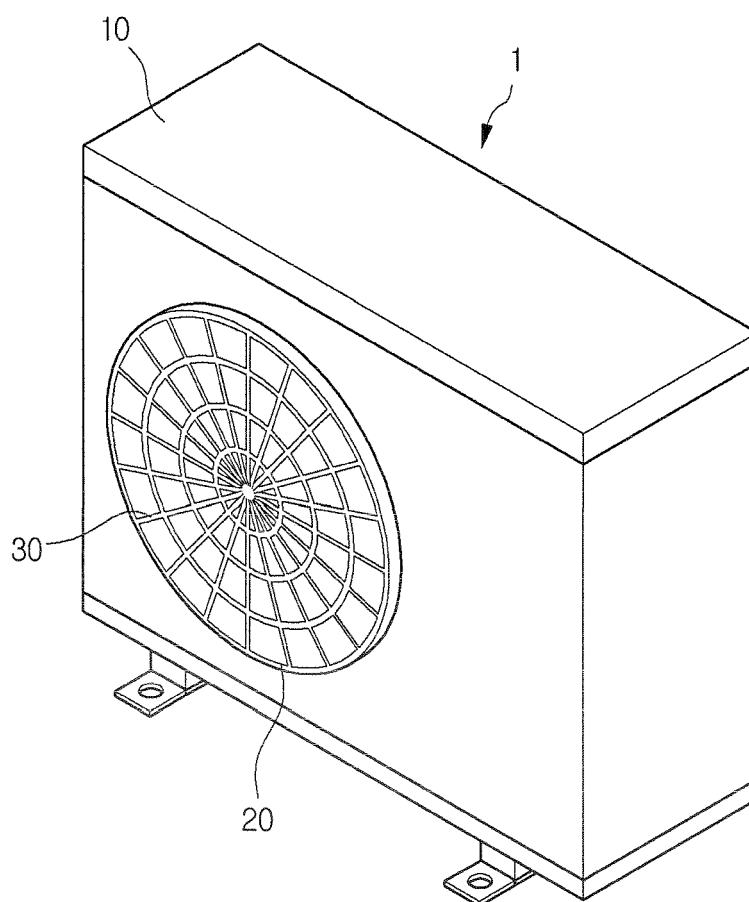


Fig. 2

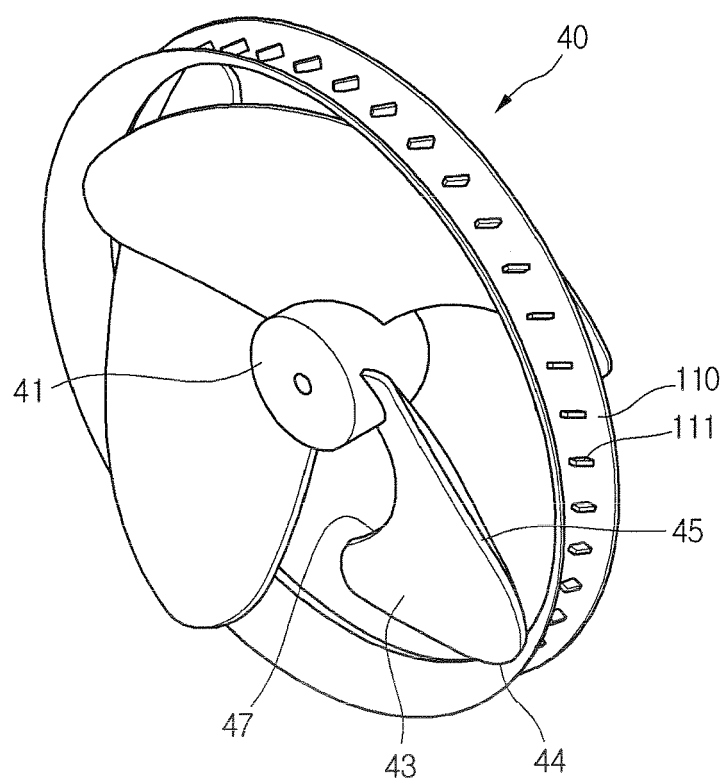


Fig. 3

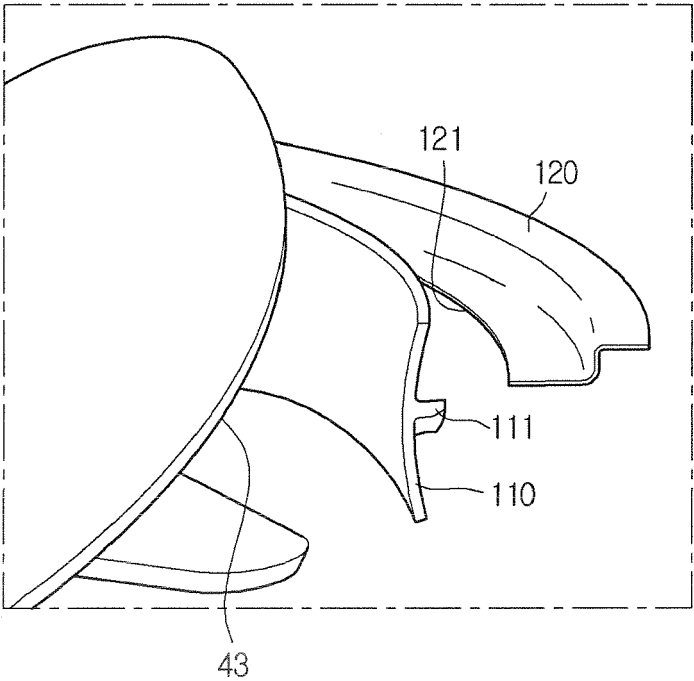


Fig. 4

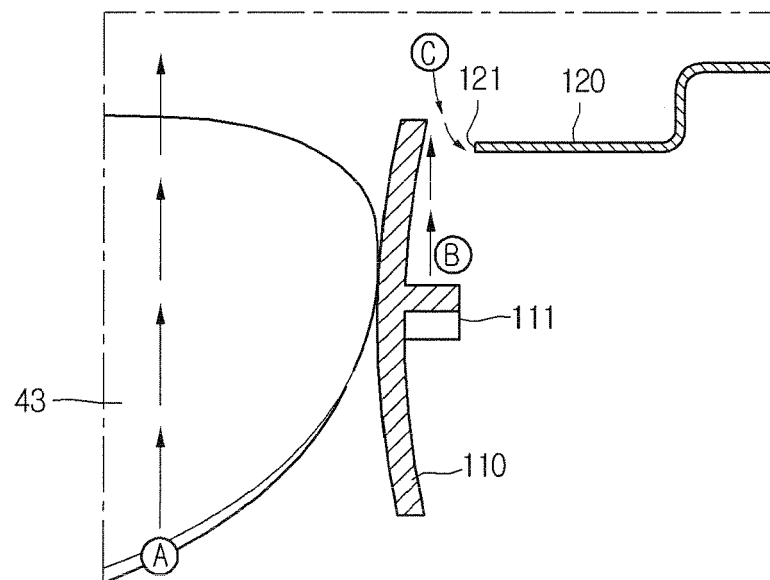


Fig. 5

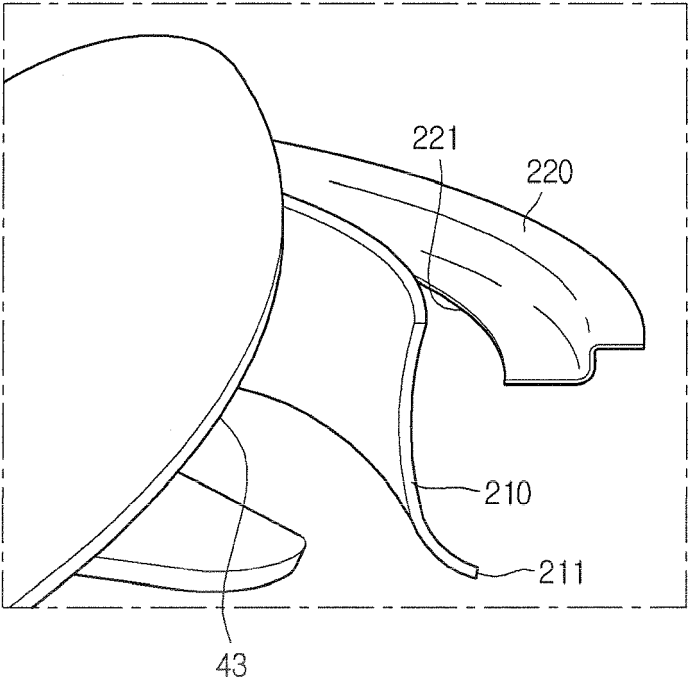


Fig. 6

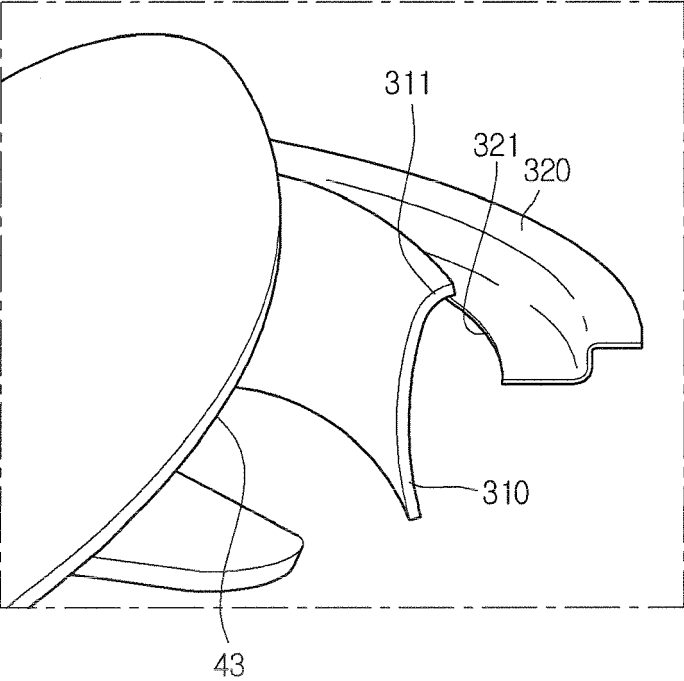
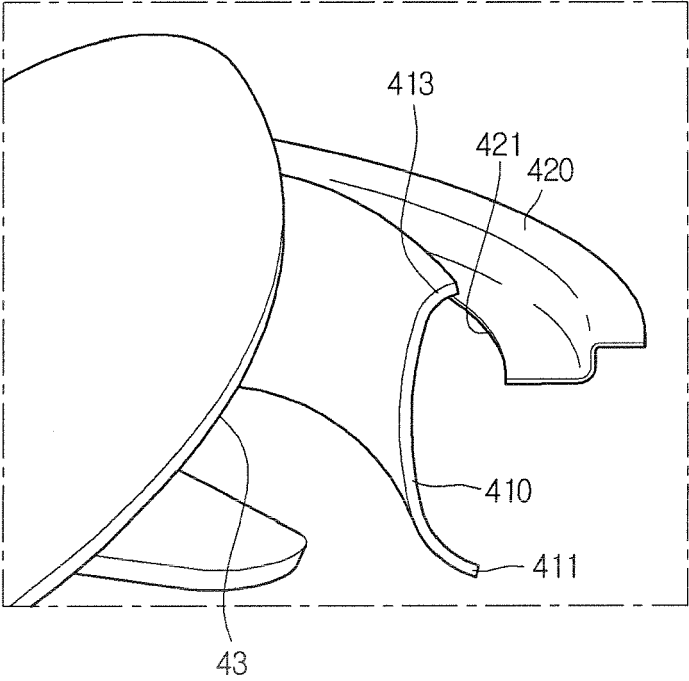


Fig. 7



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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