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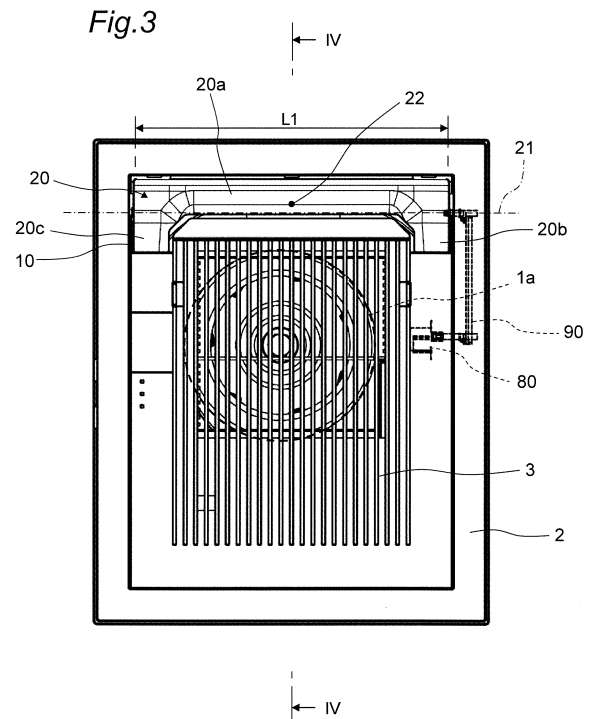
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(54) **INDOOR UNIT FOR AIR CONDITIONER**

(57) An indoor unit for an air conditioner includes: a casing (2, 3) having a blow-out port (10), the casing (2, 3) including a casing main body; a centrifugal fan disposed in the casing (2, 3); a heat exchanger disposed between the casing (2, 3) and the centrifugal fan (30); a turnable flap (20) configured to control a direction of air to be blown out through the blow-out port (10); and a driver (80) disposed in the casing (2, 3) and configured to generate a driving force for turning the flap (20). The driver (80) and the flap (20) are arranged in a direction perpendicular to a pivot axis of the flap (20).



Description

TECHNICAL FIELD

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

BACKGROUND ART

[0002] In some of conventional indoor units for an air conditioner, a casing includes a decorative panel having a quadrilateral shape and including four blow-out ports (see, for example, Japanese Patent No. 3,783,381 (Patent Literature 1)). The blow-out ports respectively extend along the four sides of the decorative panel. The casing also includes flaps pivotably mounted to the decorative panel to respectively open and close the blow-out ports. The casing houses therein drivers respectively disposed on four corners of the decorative panel. The drivers generate driving forces for turning the flaps. In other words, two of the drivers are respectively located on axially opposite sides of each flap.

CITATION LIST

PATENT LITERATURE

[0003] Patent Literature 1: Japanese Patent No. 3,783,381

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] According to the conventional indoor units for an air conditioner, since two of the drivers are respectively located on the axially opposite sides of each, the casing becomes longer in length along the pivot axis of each flap.

[0005] If the length of the casing is simply shortened, each blow-out port becomes shorter in length along the pivot axis of the corresponding blow-out port, which may cause degradation in performance, specifically reduction in amount of air to be blown out through each blow-out port.

[0006] Hence, the present invention provides an indoor unit for an air conditioner, the indoor unit being capable of reduction in size and improvement in performance.

SOLUTIONS TO PROBLEM

[0007] An aspect of the present invention provides an indoor unit for an air conditioner, the indoor unit including:

a casing having a blow-out port the casing including a casing main body;
a centrifugal fan disposed in the casing;

a heat exchanger disposed between the casing and the centrifugal fan;

a turnable flap configured to control a direction of air to be blown out through the blow-out port; and

a driver disposed in the casing and configured to generate a driving force for turning the flap, wherein

the driver and the flap are arranged in a direction perpendicular to a pivot axis of the flap.

[0008] According to the configuration described above, the driver is disposed in the casing so that the driver and the flap are arranged in the direction perpendicular to the pivot axis of the flap. Therefore, the driver does not adjoin the blow-out port along the pivot axis of the flap. An increased amount of air is thus blown out through the blow-out port in such a manner that a length of the blow-out port along the pivot axis of the flap is made longer even when a length of the casing along the pivot axis of the flap is made shorter. The indoor unit for an air conditioner is thus capable of reduction in size and improvement in performance.

[0009] In the indoor unit for an air conditioner according to an embodiment,

a length of the flap along the pivot axis of the flap is at least 85% of a length of the casing main body along the pivot axis of the flap.

[0010] According to the embodiment described above, the length of the flap along the pivot axis of the flap is at least 85% of the length of the casing main body along the pivot axis of the flap. This configuration therefore facilitates wind-direction control and improves air blowing performance.

[0011] In the indoor unit for an air conditioner according to an embodiment,

a length of the blow-out port along the pivot axis of the flap (20) is at least 85% of a length of the casing main body along the pivot axis of the flap (20).

[0012] According to the embodiment described above, the length of the blow-out port along the pivot axis of the flap is at least 85% of the length of the casing main body along the pivot axis of the flap. This configuration therefore ensures increase in amount of air to be blown out through the blow-out port.

[0013] In the indoor unit for an air conditioner according to an embodiment,

the flap includes:

a flap main body extending along the pivot axis;

a first auxiliary flap elongated from a first end of the flap main body and extending to an opposite side to a blow-out port side of the casing; and

a second auxiliary flap elongated from a second end of the flap main body and extending to an opposite side to the blow-out port side of the casing, and

the flap has a barycenter located closer to a blow-out port side of the casing than the pivot axis is, in a range

where the flap is turnable.

[0014] According to the embodiment described above, in the range where the flap is turnable, the barycenter of the flap is located closer to the blow-out port side than the pivot axis is. This configuration enables a smooth turn of the flap.

[0015] The indoor unit for an air conditioner according to an embodiment further includes:

a link mechanism configured to transmit the driving force from the driver to the flap such that the flap turns.

[0016] According to the embodiment described above, the link mechanism transmits the driving force from the driver to the flap. This configuration therefore improves the degree of freedom as to a place where the driver is disposed.

ADVANTAGEOUS EFFECT OF INVENTION

[0017] As will be clear from the foregoing description, the present invention provides an indoor unit for an air conditioner, the indoor unit being capable of reduction in size and improvement in performance.

BRIEF DESCRIPTION OF DRAWINGS

[0018]

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

FIG. 2 is another perspective view of the indoor unit.

FIG. 3 is a bottom view of the indoor unit.

FIG. 4 is a sectional view taken along line IV-IV in FIG. 3.

FIG. 5 is a bottom view of the indoor unit from which a panel, a drain pan, and the like are detached.

FIG. 6 is a bottom view of the indoor unit which is illustrated in FIG. 5 and to which a flap is attached.

FIG. 7 is a bottom view of the indoor unit from which the flap is detached.

FIG. 8 is a side view of the flap, a stepping motor, and a link mechanism.

FIG. 9 is a top view of a part of the flap.

FIG. 10 is a side view of the flap.

DESCRIPTION OF EMBODIMENTS

[0019] A specific description will be given of an indoor unit for an air conditioner according to the present invention, based on embodiments illustrated in the drawings.

[0020] FIG. 1 is a perspective view of an indoor unit for an air conditioner according to an embodiment of the present invention, the indoor unit being seen obliquely from below. FIG. 2 is a perspective view of the indoor unit seen obliquely from above.

[0021] As illustrated in FIGS. 1 and 2, the indoor unit according to this embodiment is designed to be embedded in a ceiling, and includes a casing main body 1, a

panel 2 having a quadrilateral shape, the panel 2 being mounted to a lower side of the casing main body 1, and a grille 3 detachably mounted to the panel 2. The casing main body 1, the panel 2, and the grille 3 constitute an example of a casing.

[0022] The indoor unit also includes a pipe connection part 5, a pipe connection part 6, and a drain socket 7 each protruding from a sidewall of the casing main body 1. In the casing main body 1, each of the pipe connection parts 5 and 6 is connected to an external refrigerant pipe (not illustrated). Also in the casing main body 1, the drain socket 7 is connected to an external drain hose (not illustrated).

[0023] The indoor unit also includes an electrical component 8 disposed on the sidewall of the casing main body 1 and juxtaposed with the pipe connection parts 5 and 6 and the drain socket 7.

[0024] The panel 2 has a blow-out port 10. The blow-out port 10 is located on one of longitudinally opposite sides of the grille 3 so as to extend along a shorter side of an outer edge of the panel 2. The panel 2 also has a flap 20 pivotably mounted thereto and configured to open and close the blow-out port 10. In FIG. 1, the flap 20 closes the blow-out port 10.

[0025] The indoor unit according to this embodiment also includes hanger fittings 101, 102, 103, and 104 (the hanger fitting 104 is illustrated in FIG. 5). The hanger fittings 101, 102, 103, and 104 are secured to hanger bolts (not illustrated) suspended from, for example, a framework in a roof-space. The indoor unit is thus suspended from a ceiling.

[0026] FIG. 3 is a bottom view of the indoor unit. In FIG. 3, the same constituent elements as those illustrated in FIGS. 1 and 2 are denoted with the same reference signs as those for the constituent elements illustrated in FIGS. 1 and 2.

[0027] The flap 20 has a U shape in plan view, and is configured to control a direction of air blown out through the blow-out port 10.

[0028] More specifically, the flap 20 includes a flap main body 20a extending along a pivot axis 21, a first auxiliary flap 20b elongated from a first end of the flap main body 20a, and a second auxiliary flap 20c elongated from a second end of the flap main body 20a.

[0029] The first auxiliary flap 20b is elongated from the first end of the flap main body 20a so as to extend to an opposite side to a blow-out port 10 side of the panel 2. The first auxiliary flap 20b is linked to a stepping motor 80 with a link mechanism 90. The stepping motor 80 is an example of a driver.

[0030] The second auxiliary flap 20c is elongated from the second end of the flap main body 20a so as to extend to the opposite side to the blow-out port 10 side of the panel 2. In other words, the second auxiliary flap 20c and the first auxiliary flap 20b extend in parallel.

[0031] In a direction parallel to the pivot axis 21 of the flap 20 (hereinafter, such a direction will be referred to as a "pivot axis direction"), a length L1 of the flap 20 is

at least 85% of a length L2 of the casing main body 1 (see FIG. 5). For example, the length L1 of the flap 20 is 280 mm when the length L2 of the casing main body 1 is 315 mm.

[0032] The flap 20 has a barycenter 22 set at the flap main body 20a so as to define a clearance between the flap main body 20a and the pivot axis 21. In other words, the flap 20 is disposed such that the barycenter 22 of the flap 20 is closer to a blow-out port 10 side of the casing main body 1 than the pivot axis 21 is.

[0033] The stepping motor 80 is disposed in a space defined by the casing main body 1, the panel 2, and the grille 3. The stepping motor 80 and the flap 20 are arranged adjacent to each other in a direction perpendicular to the pivot axis of the flap 20. The stepping motor 80 is located on a side opposite from the blow-out port 10 with respect of the pivot axis 21 in the casing main body 1. The stepping motor 80 generates a driving force for turning the flap 20. The flap 20 receives the driving force from the stepping motor 80 through the link mechanism 90 to turn about the pivot axis 21. In other words, the link mechanism 90 transmits the driving force from the stepping motor 80 to the flap 20 so that the flap 20 turns. The stepping motor 80 may be closer to the blow-out port 10 side than the pivot axis 21 is in the casing main body 1.

[0034] As illustrated in FIG. 3, the casing main body 1 (see FIGS. 1 and 2) has in its center a suction port 1a. A filter 4 (see FIG. 4) is disposed between the suction port 1a and the grille 3.

[0035] It should be noted that the blow-out port 10 in the casing main body 1 and a first wall 11 (see FIG. 5) of the casing main body 1 are on the same side.

[0036] FIG. 4 is a sectional view taken along line IV-IV in FIG. 3. In FIG. 4, the same constituent elements as those illustrated in FIGS. 1 to 3 are denoted with the same reference signs as those for the constituent elements illustrated in FIGS. 1 to 3.

[0037] The casing main body 1 houses therein a turbo fan 30. The turbo fan 30 is driven by a motor 31 to rotate in a predetermined rotation direction. The predetermined rotation direction corresponds to a counterclockwise direction when the turbo fan 30 is seen from below. The turbo fan 30 is an example of a centrifugal fan.

[0038] The casing main body 1 also houses therein a bell mouth 32 at a position between the suction port 1a and the turbo fan 30. The turbo fan 30 sucks in indoor air via a space inside the bell mouth 32.

[0039] The casing main body 1 also houses therein a heat exchanger 40 and a partition plate 50 at a position around the turbo fan 30. Air from the turbo fan 30 flows toward the blow-out port 10 via the heat exchanger 40. At this time, the partition plate 50 guides to the heat exchanger 40 the air from the turbo fan 30. The partition plate 50 is an example of a partition. The partition may constitute a part of the casing main body 1.

[0040] The casing main body 1 also houses therein a drain pan 60 at a position below the heat exchanger 40

and partition plate 50. The drain pan 60 thus receives dew condensation water caused by condensation at each of the heat exchanger 40 and the partition plate 50.

[0041] The casing main body 1 has an air flow path P for guiding air from the turbo fan 30 to the blow-out port 10 in the panel 2.

[0042] FIG. 5 is a bottom view of the indoor unit from which the panel 2, the drain pan 60, and the like are detached.

[0043] The casing main body 1 includes a first wall 11 located near the blow-out port 10, a second wall 12 opposite to the first wall 11, a third wall 13 connecting the first wall 11 and the second wall 12, and a fourth wall 14 connecting the first wall 11 and the second wall 12 and opposite to the third wall 13. Each of the third wall 13 and the fourth wall 14 has an end near the blow-out port 10, the end being elongated from the first wall 11. Each of the third wall 13 and the fourth wall 14 has an end opposite to the blow-out port 10, the end being elongated from the second wall 12.

[0044] The second wall 12 includes a third wall 13-side portion 12a and a fourth wall 14-side portion 12b. The fourth wall 14-side portion 12b is closer to the first wall 11 than the third wall 13-side portion 12a is. In the second wall 12, the fourth wall 14-side portion 12b where the pipe connection parts 5 and 6 are disposed is recessed toward the first wall 11. An intermediate portion 12c is located between the third wall 13-side portion 12a and the fourth wall 14-side portion 12b, and is tilted relative to each of the third wall 13-side portion 12a and the fourth wall 14-side portion 12b. The third wall 13-side portion 12a of the second wall 12 is an example of a portion of a second wall in a casing, the portion being located near a first extension part. The fourth wall 14-side portion 12b of the second wall 12 is an example of a portion of a second wall in a casing, the portion being located near a second extension part.

[0045] The heat exchanger 40 is disposed between the turbo fan 30 and the first wall 11, third wall 13, and fourth wall 14 of the casing main body 1.

[0046] More specifically, the heat exchanger 40 includes a first heat exchange part 41, a second heat exchange part 42, and a third heat exchange part 43. The first heat exchange part 41, the second heat exchange part 42, and the third heat exchange part 43 are formed integrally. The second heat exchange part 42 is an example of a first extension part. The third heat exchange part 43 is an example of a second extension part. The first heat exchange part 41, the second heat exchange part 42, and the third heat exchange part 43 may be formed separately. For example, the first heat exchange part 41, the second heat exchange part 42, and the third heat exchange part 43 may be spaced apart from one another.

[0047] The flap 20 is disposed near the first wall 11 of the casing main body 1. The flap 20 is located below a space near the first wall 11 of the casing main body 1.

[0048] The first heat exchange part 41 is disposed op-

posite the first wall 11 of the casing main body 1, and extends along the first wall 11.

[0049] The second heat exchange part 42 is disposed opposite the third wall 13 of the casing main body 1, and extends from the first wall 11 toward the second wall 12. The second heat exchange part 42 is located upstream of the first heat exchange part 41 in the rotation direction of the turbo fan 30. The drain pump 70 is disposed between a distal end, or tip, of the second heat exchange part 42 and the third wall 13-side portion of the second wall 12.

[0050] The drain pump 70 sucks in dew condensation water and the like retained in the drain pan 60, and discharges the sucked dew condensation water and the like toward the drain socket 7. In other words, the drain pump 70 is a pump for discharging, from the casing main body 1, dew condensation water and the like in the casing main body 1.

[0051] The third heat exchange part 43 is disposed opposite the fourth wall 14 of the casing main body 1, and extends from the first wall 11 toward the second wall 12. The third heat exchange part 43 is located downstream of the first heat exchange part 41 in the rotation direction of the turbo fan 30. The distal end of the second heat exchange part 42 is closer to the second wall 12 than a distal end, or tip, of the third heat exchange part 43 is. In other words, the distal end of the second heat exchange part 42 is located at a place that is relatively far from the blow-out port 10, and the distal end of the third heat exchange part 43 is located at a place that is relatively close to the blow-out port 10.

[0052] The distal end of the third heat exchange part 43 is connected to the pipe connection part 5 with a refrigerant pipe 85. The distal end of the third heat exchange part 43 is connected to the pipe connection part 6 with a refrigerant pipe 86.

[0053] The pipe connection parts 5 and 6 respectively connect the refrigerant pipes 85 and 86 inside the casing main body 1 to refrigerant pipes outside the casing main body 1. The pipe connection parts 5 and 6 allow a refrigerant to flow into the heat exchanger 40.

[0054] A distance between the second heat exchange part 42 and the third heat exchange part 43 gradually increases from the blow-out port 10 in a direction away from the blow-out port 10. Specifically, the heat exchanger 40 has a U shape in plan view. The distance between the second heat exchange part 42 and the third heat exchange part 43 may be fixed or may be substantially fixed. The heat exchanger 40 may have, for example, a V shape or a circular shape in plan view.

[0055] The partition plate 50 and the heat exchanger 40 surround the turbo fan 30. The partition plate 50 is connected to the distal end of the second heat exchange part 42 in the heat exchanger 40 and the distal end of the third heat exchange part 43 in the heat exchanger 40.

[0056] FIG. 6 illustrates the indoor unit which is illustrated in FIG. 5 and to which the flap 20 (diagonally shaded) is attached. FIG. 7 illustrates the indoor unit from

which the flap 20 is detached. In FIGS. 6 and 7, the same constituent elements as those illustrated in FIGS. 1 to 5 are denoted with the same reference signs as those for the constituent elements illustrated in FIGS. 1 to 5.

[0057] As illustrated in FIG. 6, the flap main body 20a, the first auxiliary flap 20b, and the second auxiliary flap 20c are located so as not to overlap the heat exchanger 40 in plan view. The flap main body 20a, the first auxiliary flap 20b, and the second auxiliary flap 20c are located between the first wall 11 of the casing main body 1 and the second wall 12 of the casing main body 1 in plan view. The flap main body 20a extends along the first wall 11 of the casing main body 1. The first auxiliary flap 20b extends along the third wall 13 of the casing main body 1. The second auxiliary flap 20c extends along the fourth wall 14 of the casing main body 1. Each of the first auxiliary flap 20b and the second auxiliary flap 20c has a distal end, or tip, that is closer to the second wall 12 of the casing main body 1 than the flap main body 20a is in plan view.

[0058] As illustrated in FIGS. 6 and 7, the blow-out port 10 includes a first blow-out port part 10a having a rectangular shape and extending along the first wall 11 of the casing main body 1, a second blow-out port part 10b, and a third blow-out port part 10c. The second blow-out port part 10b is elongated from a first end of the first blow-out port part 10a, and extends toward the third wall 13 of the casing main body 1. The second blow-out port part 10b is then bent to extend toward the second wall 12 of the casing main body 1. The third blow-out port part 10c is elongated from a second end of the first blow-out port part 10a, and extends toward the fourth wall 14 of the casing main body 1. The third blow-out port part 10c is then bent to extend toward the second wall 12 of the casing main body 1.

[0059] In the pivot axis direction of the flap 20, a length L3 of the blow-out port 10 is at least 85% of the length L2 of the casing main body 1. For example, the length L3 of the blow-out port 10 is 283 mm when the length L2 of the casing main body 1 is 315 mm.

[0060] FIG. 8 is a side view of the flap 20, the stepping motor 80, and the link mechanism 90.

[0061] The link mechanism 90 includes a first link 90a, a second link 90b having a first end connected to a first end of the first link 90a, and a third link 90c having a first end connected to a second end of the first link 90a. The second link 90b has a second end connected to a rotation shaft of the stepping motor 80. The third link 90c has a second end connected to the first auxiliary flap 20b.

[0062] The flap 20 receives the driving force from the stepping motor 80 through the link mechanism 90 to turn in a direction indicated by an arrow R1 or in a direction indicated by an arrow R2.

[0063] FIG. 9 is a top view of a part of the flap 20. FIG. 10 is a side view of the flap 20.

[0064] As illustrated in FIGS. 9 and 10, in closing the blow-out port 10, the first and second auxiliary flaps 20b and 20c of the flap 20 are tilted such that the ends of the

first and second auxiliary flaps 20b and 20c, the ends being farther from the flap main body 20a, become lower than the ends of the first and second auxiliary flaps 20b and 20c, the ends being nearer to the flap main body 20a.

[0065] When the turbo fan 30 is driven to blow out air through the blow-out port 10, the flap 20 turns within a range between an upper-limit position 23 indicated by a chain double-dashed line and a lower-limit position 24 indicated by a chain double-dashed line. At this time, the barycenter of the flap 20 moves while describing an arc about the pivot axis 21. The barycenter of the flap 20 is thus located on the right side of FIG. 10 with respect to a vertical plane including the pivot axis 21. Specifically, in the range where the flap 20 is turnable, the barycenter 22 of the flap 20 is located closer to the blow-out port 10 side of the panel 2 than the pivot axis 21 is. In feeding air blown out through the blow-out port 10 to a farther place, the flap 20 takes the upper-limit position 23. In feeding air blown out through the blow-out port 10 to a nearer place, the flap 20 takes the lower-limit position 24.

[0066] When the flap 20 turns in the range between the upper-limit position 23 and the lower-limit position 24, the first and second auxiliary flaps 20b are moved more inward than the blow-out port 10.

[0067] According to the indoor unit having the configuration described above, the stepping motor 80 and the flap 20 are arranged in the direction perpendicular to the pivot axis direction of the flap 20. Therefore, the stepping motor 80 and blow-out port 10 are not arranged in the pivot axis direction of the flap 20. An increased amount of air is thus blown out through the blow-out port 10 in such a manner that the length L3 of the blow-out port 10 is made longer even when the length L2 of the casing main body 1 is made shorter. The indoor unit is thus capable of reduction in size and improvement in performance.

[0068] The length L1 of the flap 20 is at least 85% of the length L2 of the casing main body 1. This configuration therefore facilitates wind-direction control and improves air blowing performance.

[0069] The length L3 of the blow-out port 10 is at least 85% of the length L2 of the casing main body 1. This configuration therefore ensures increase in amount of air to be blown out through the blow-out port 10.

[0070] In the range where the flap 20 is turnable, the barycenter 22 of the flap 20 is located closer to the blow-out port 10 side of the panel 2 than the pivot axis 21 is. This configuration enables a smooth turn of the flap 20.

[0071] If the barycenter 22 of the flap 20 is located closer to the blow-out port 10 side of the panel 2 than the pivot axis 21 is, at a part of the range where the flap 20 is turnable, and the barycenter 22 of the flap 20 is located farther from the blow-out port 10 side of the panel 2 than the pivot axis 21 is, at another part of the range where the flap 20 is turnable, the flap 20 does not turn smoothly.

[0072] When the flap 20 turns in the range between the upper-limit position 23 and the lower-limit position 24, the first and second auxiliary flaps 20b are moved more

inward than the blow-out port 10. With this configuration, air from the air flow path P is blown out through the blow-out port 10 with good controllability.

[0073] The link mechanism 90 transmits a driving force from the stepping motor 80 to the flap 20. This configuration therefore improves the degree of freedom as to a place where the stepping motor 80 is disposed.

[0074] In this embodiment, the casing of the indoor unit has a rectangular parallelepiped shape and is constituted of the casing main body 1, the panel 2, and the grille 3; however, the shape of the casing is not limited thereto.

[0075] Also in this embodiment, the indoor unit is designed to be embedded in a ceiling; however, the indoor unit is not limited thereto. Alternatively, the present invention is also applicable to an indoor unit designed to be suspended from a ceiling.

[0076] Also in this embodiment, the indoor unit has the blow-out port 10 through which air is blown out in one direction via the heat exchanger 40. Alternatively, the indoor unit may have blow-out ports through which air is blown out in two directions or in three directions via the heat exchanger 40.

[0077] Also in this embodiment, the link mechanism serves as a transmission mechanism configured to transmit a driving force from a driver to a flap. Examples of the link mechanism may include a mechanism including a rack gear and a pinion gear, a mechanism including a belt and a pulley, and a mechanism including a gear train.

[0078] The foregoing description concerns specific embodiments of the present invention; however, the present invention is not limited to the foregoing embodiment, and various modifications and variations may be made within the scope of the present invention. For example, an appropriate combination of the configurations described in the foregoing embodiment may be regarded as an embodiment of the present invention.

REFERENCE SIGNS LIST

[0079]

1	casing main body
1a	suction port
2	panel
3	grille
4	filter
5, 6	pipe connection part
7	drain socket
8	electrical component
10	blow-out port
11	first wall
12	second wall
13	third wall
14	fourth wall
20	flap
20a	flap main body
20b	first auxiliary flap
20c	second auxiliary flap

21 pivot axis
 22 barycenter
 30 turbo fan
 31 motor
 32 bell mouth
 40 heat exchanger
 41 first heat exchange part
 42 second heat exchange part
 43 third heat exchange part
 50 partition plate
 60 drain pan
 70 drain pump
 80 stepping motor
 90 link mechanism

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end of the flap main body (20a) and extending to an opposite side to a blow-out port (10) side of the casing (1, 2, 3); and
 a second auxiliary flap (20c) elongated from a second end of the flap main body (20a) and extending to the opposite side of the blow-out port (10) side of the casing (1, 2, 3), and

the flap (20) has a barycenter (22) located closer to the blow-out port (10) side of the casing (1, 2, 3) than the pivot axis (21) is, in a range where the flap (20) is turnable.

5. The indoor unit for an air conditioner according to any one of claims 1 to 4, further comprising:
 a link mechanism (90) configured to transmit the driving force from the driver (80) to the flap (20) such that the flap (20) turns.

Claims

1. An indoor unit for an air conditioner, comprising:

a casing (1, 2, 3) having a blow-out port (10), the casing (1, 2, 3) including a casing main body (1);
 a centrifugal fan (30) disposed in the casing (1, 2, 3);
 a heat exchanger (40) disposed between the casing (1, 2, 3) and the centrifugal fan (30);
 a turnable flap (20) configured to control a direction of air to be blown out through the blow-out port (10); and
 a driver (80) disposed in the casing (1, 2, 3) and configured to generate a driving force for turning the flap (20),
 wherein
 the driver (80) the flap (20) are arranged in a direction perpendicular to a pivot axis of the flap (20).

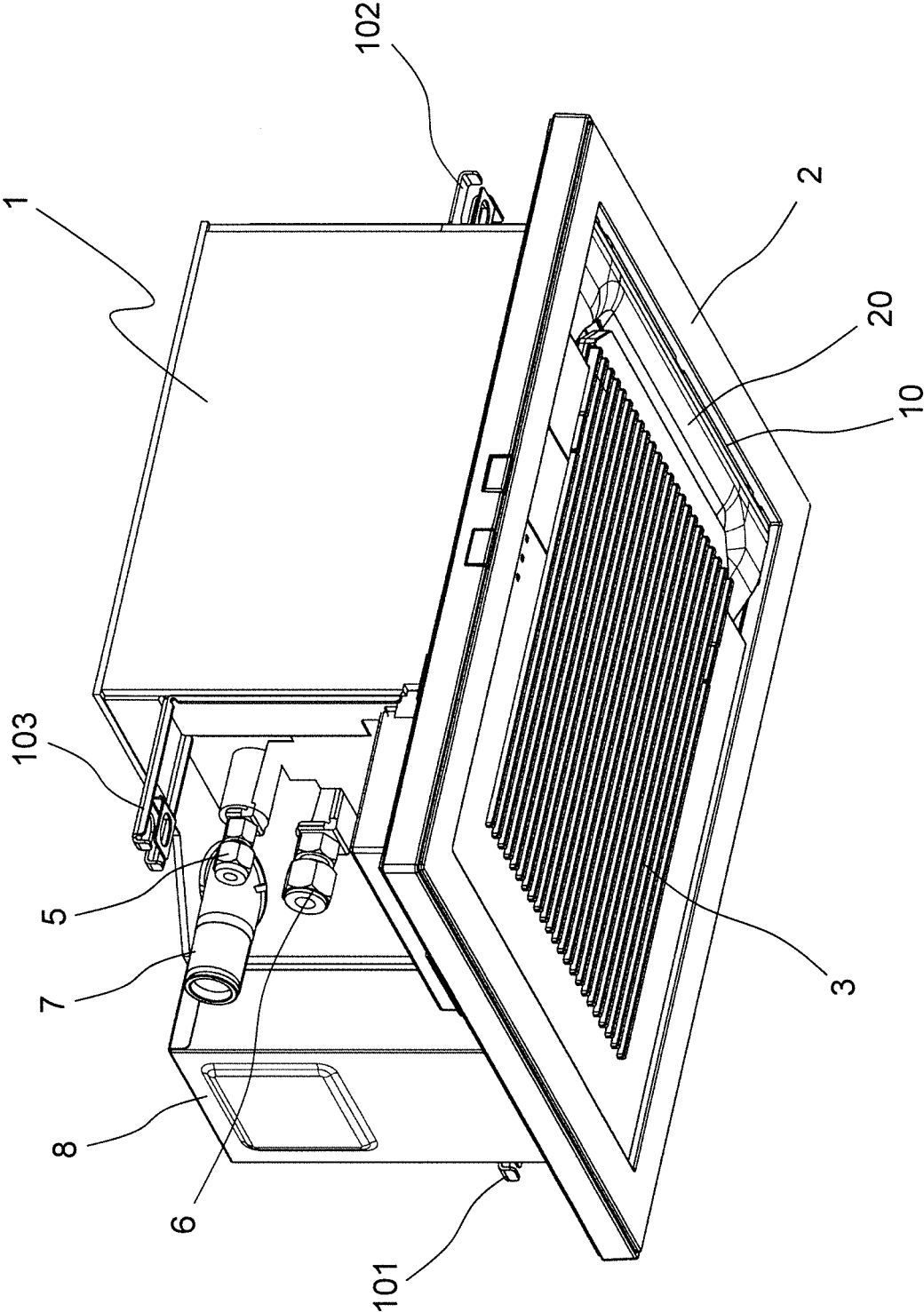
2. The indoor unit for an air conditioner according to claim 1, wherein
 a length of the flap (20) along the pivot axis of the flap (20) is at least 85% of a length (L2) of the casing main body (1) along the pivot axis of the flap (20).

3. The indoor unit for an air conditioner according to claim 1 or 2, wherein
 a length (L3) of the blow-out port (10) along the pivot axis of the flap (20) is at least 85% of a length (L2) of the casing main body (1) along the pivot axis of the flap (20).

4. The indoor unit for an air conditioner according to any one of claims 1 to 3, wherein
 the flap (20) includes:

a flap main body (20a) extending along the pivot axis;
 a first auxiliary flap (20b) elongated from a first

Fig.1



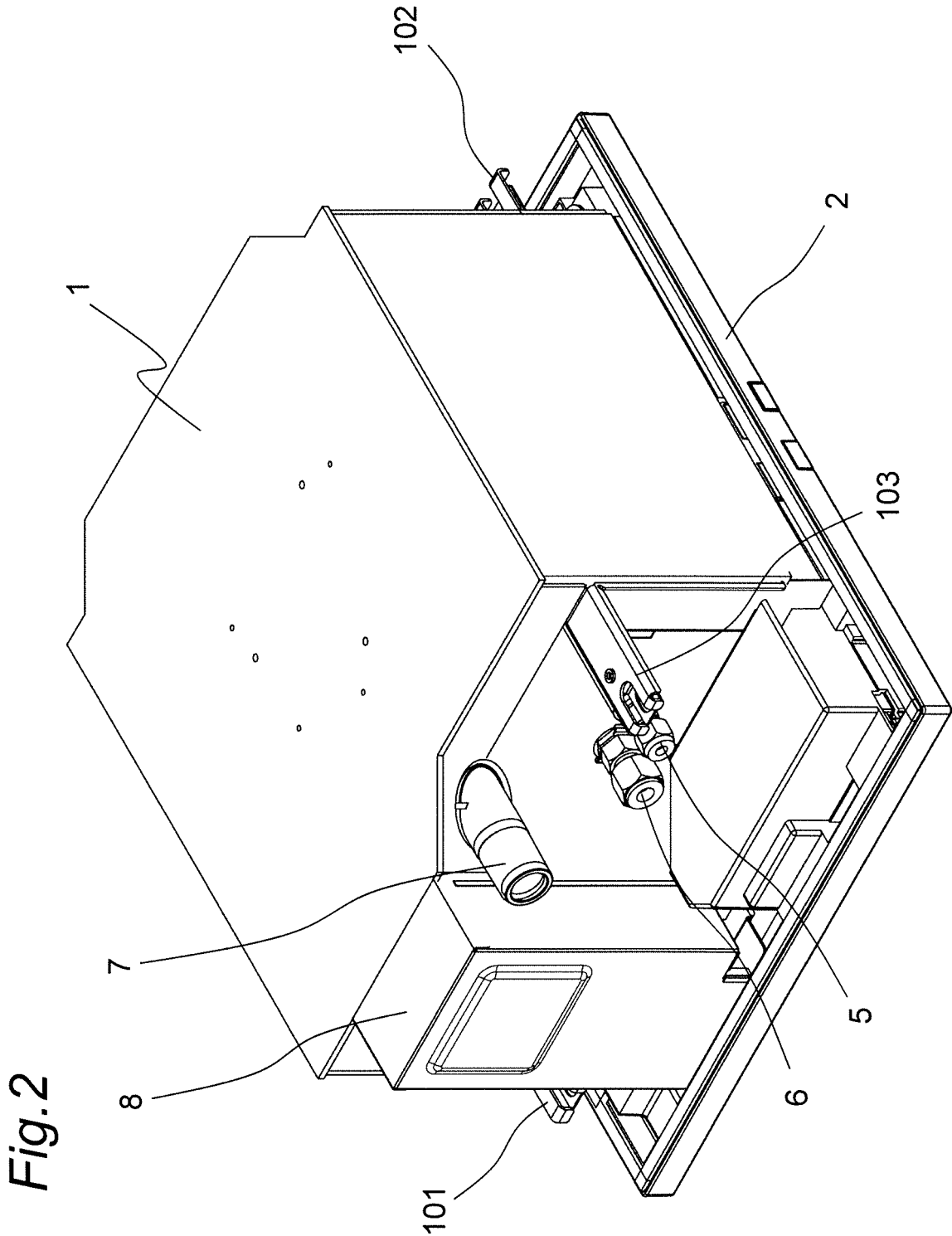


Fig.3

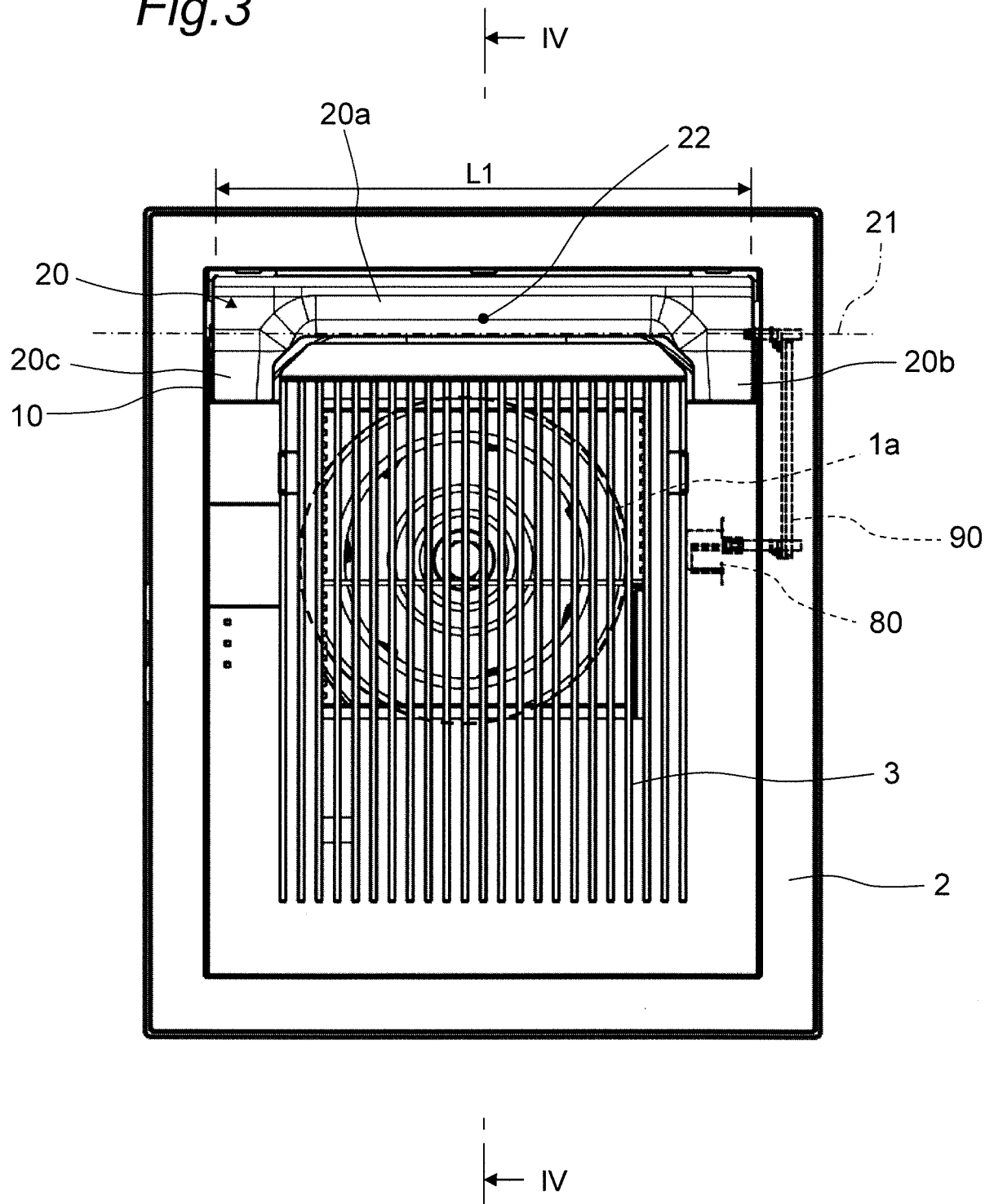


Fig.4

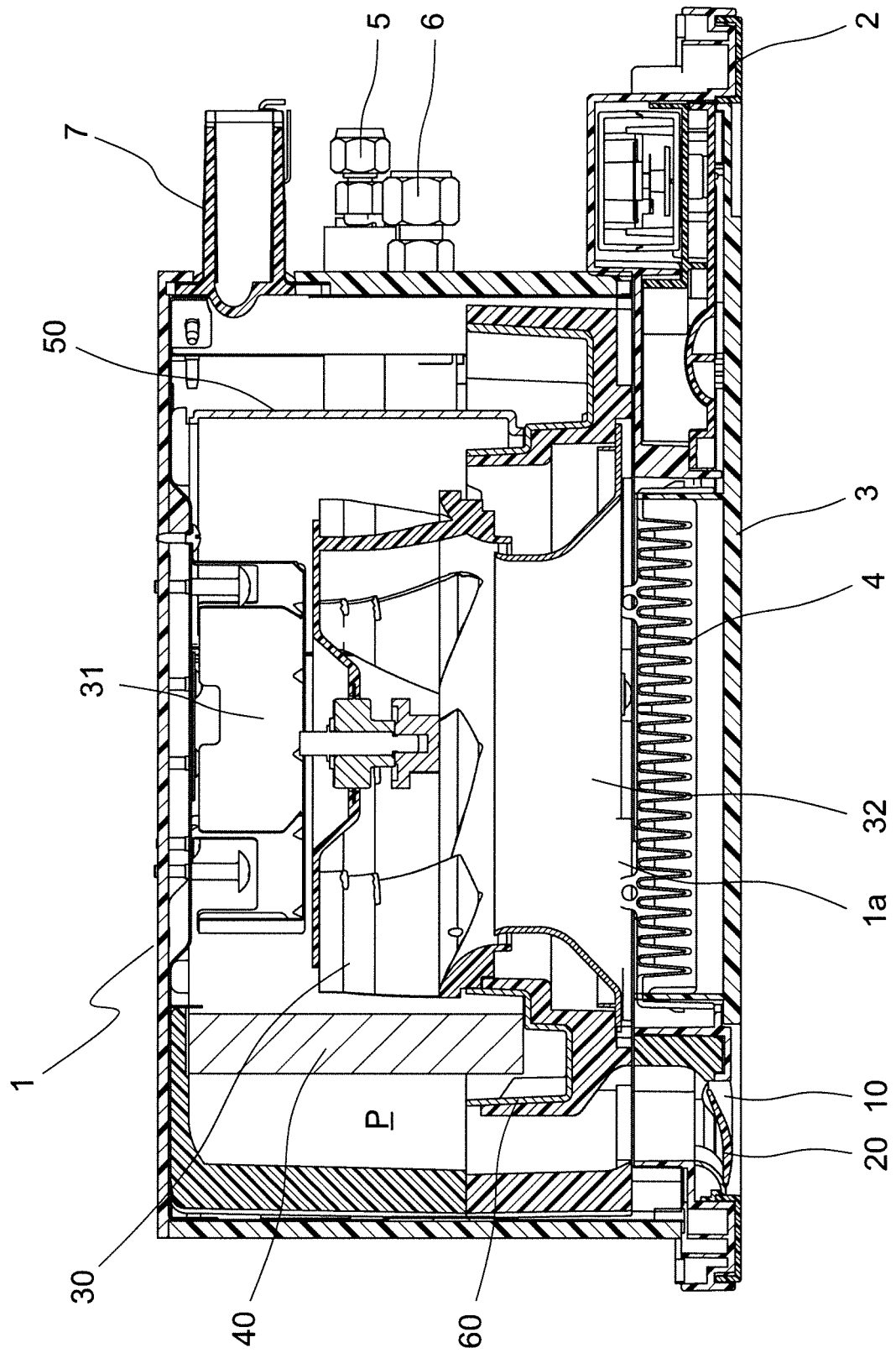


Fig.5

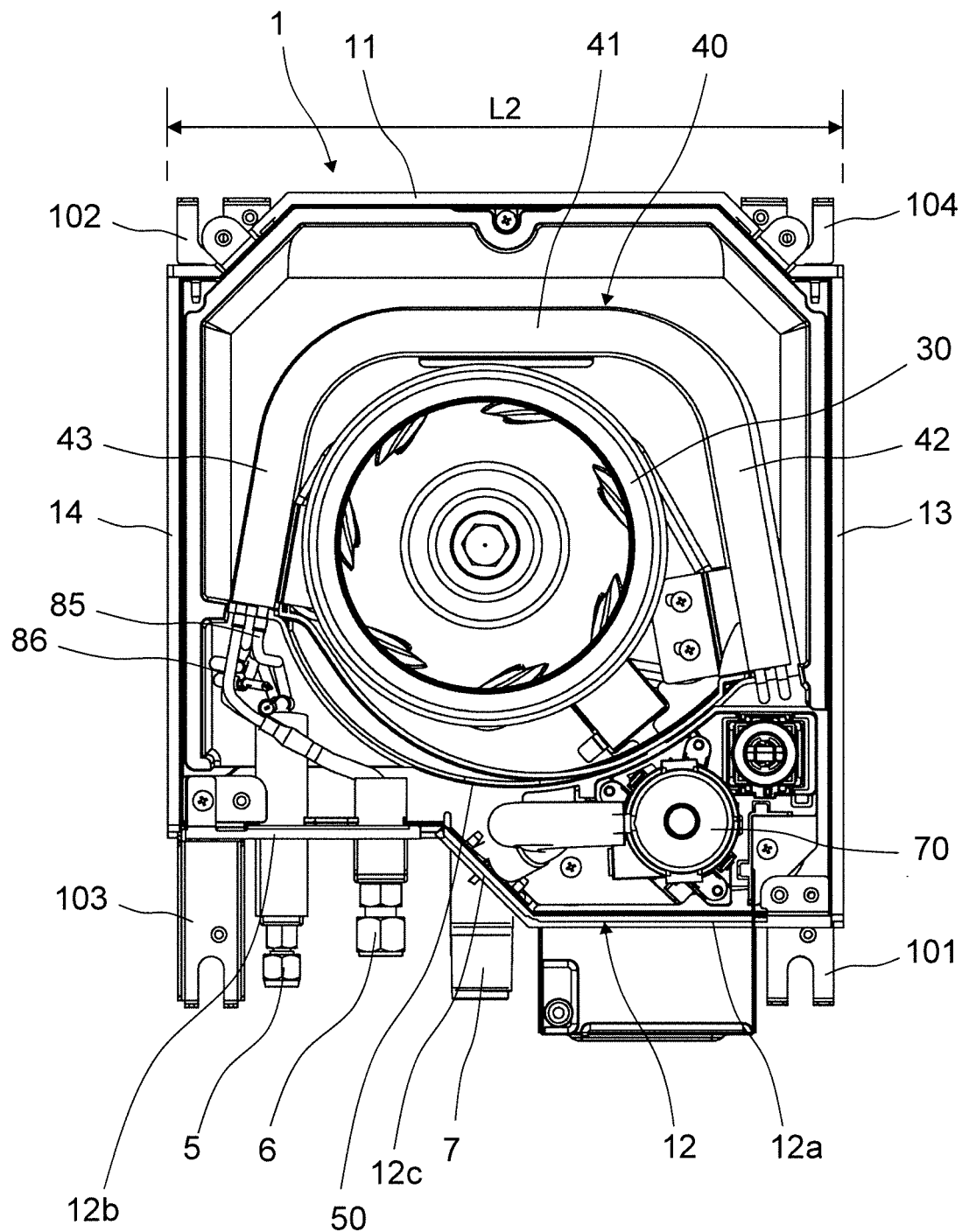


Fig.6

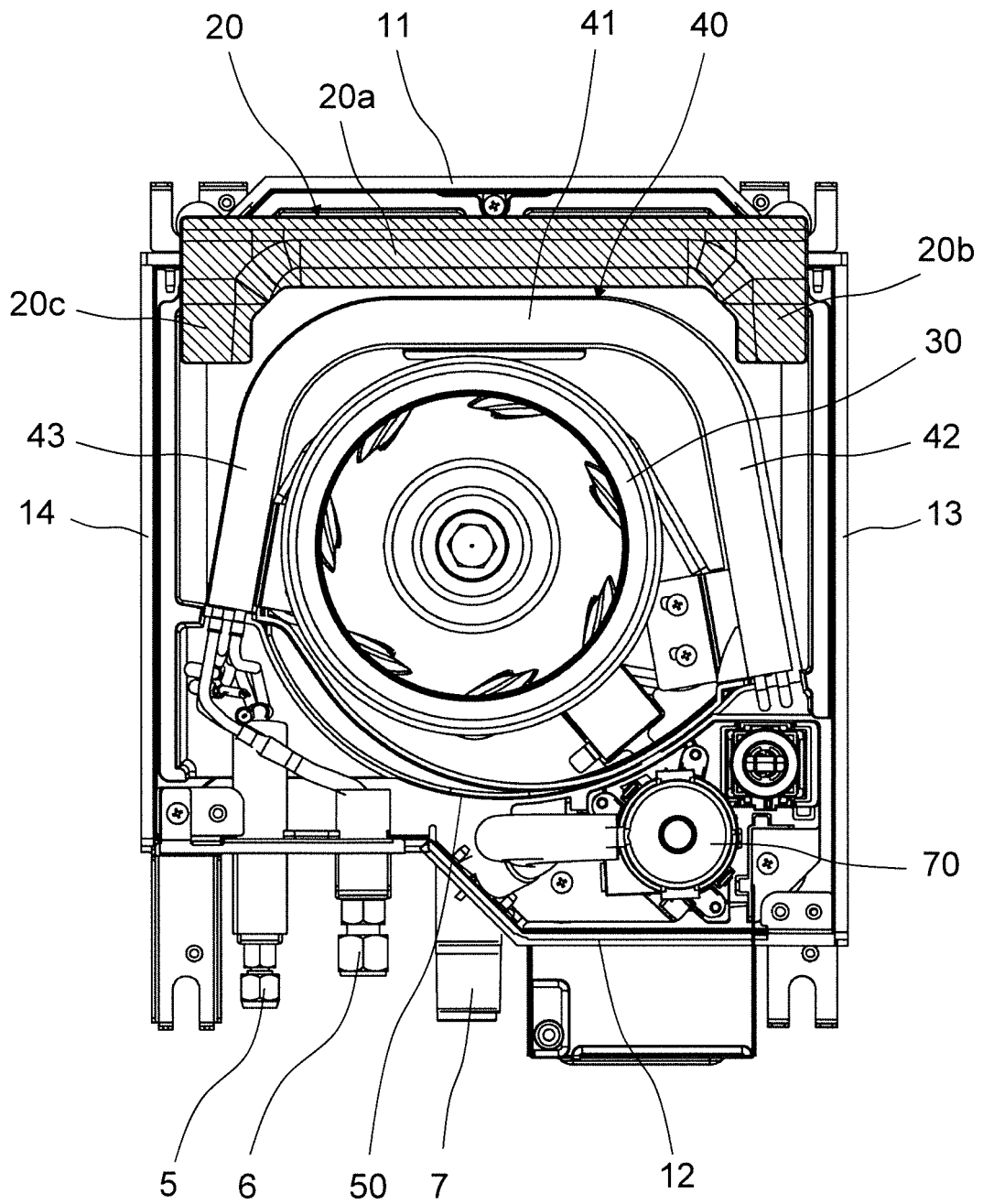


Fig.7

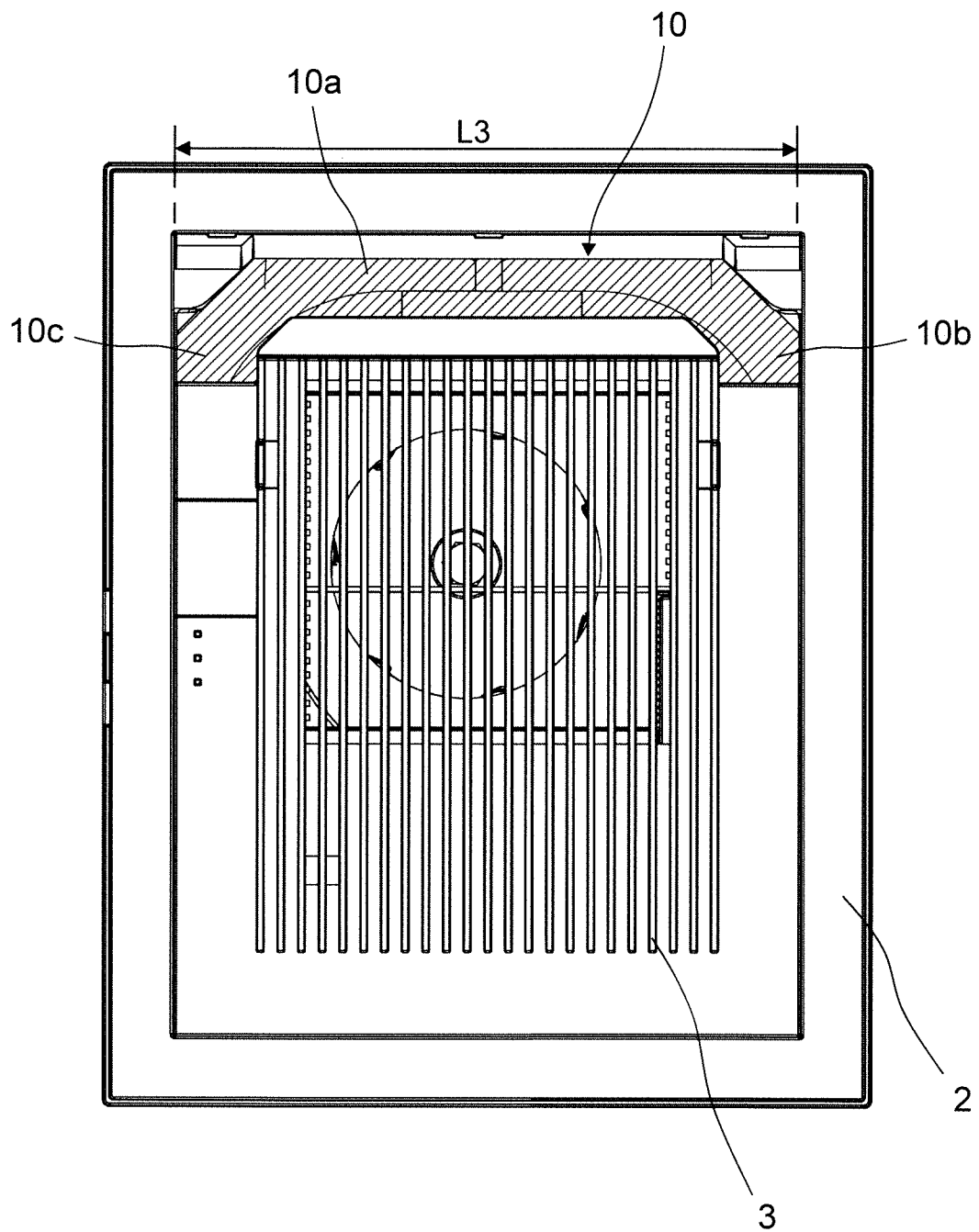


Fig. 8

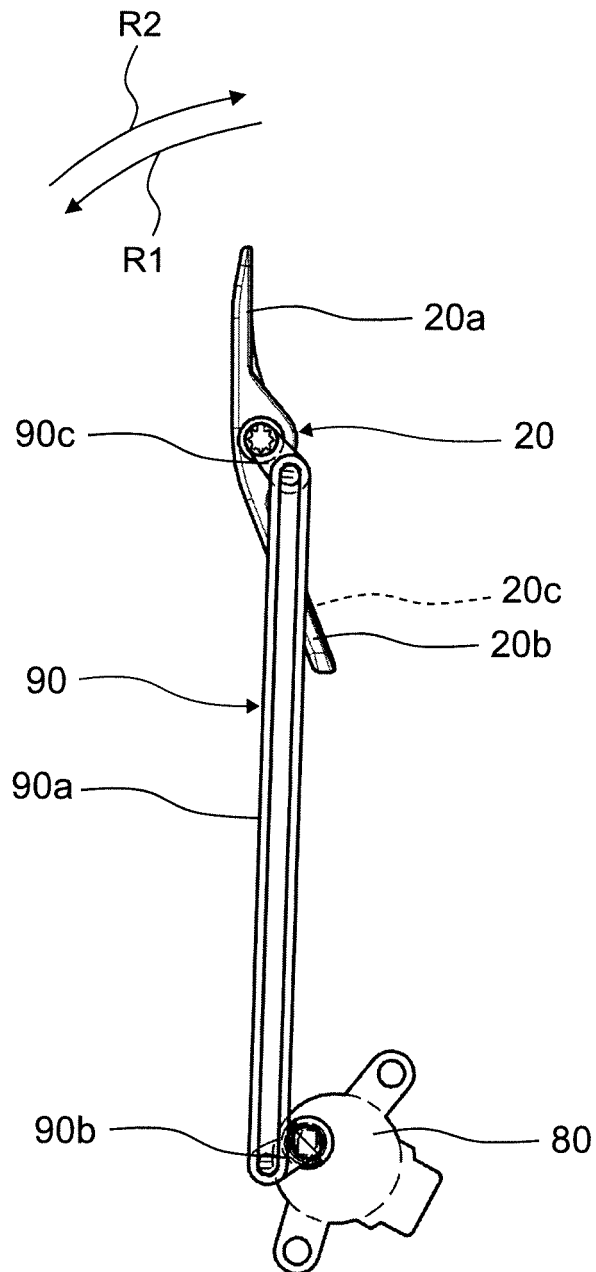


Fig.9

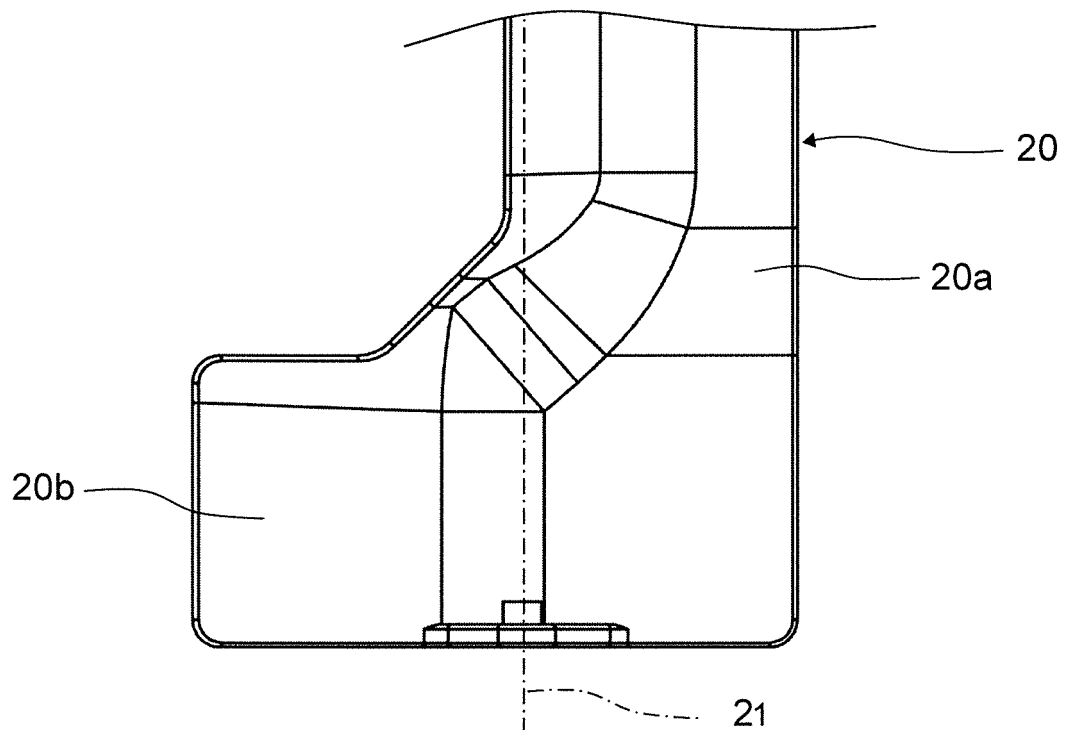
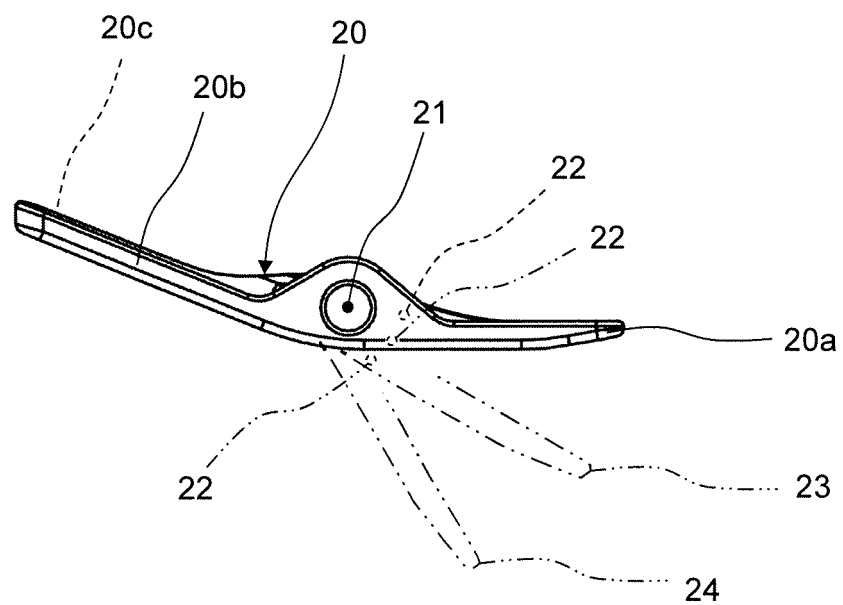


Fig.10



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/016493

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. F24F13/20 (2006.01)i, F24F1/00 (2011.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. F24F13/20, F24F1/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2018

Registered utility model specifications of Japan 1996-2018

Published registered utility model applications of Japan 1994-2018

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2003-254554 A (SANYO ELECTRIC CO., LTD.) 10 September 2003, paragraphs [0010]-[0020], fig. 1-4 (Family: none)	1-3
Y		4-5
Y	JP 2001-304609 A (HITACHI, LTD.) 31 October 2001, paragraphs [0003]-[0018], [0024], [0026], fig. 13 (Family: none)	4-5
Y	JP 9-196459 A (DAIKIN INDUSTRIES, LTD.) 31 July 1997, paragraphs [0001]-[0026], fig. 1, 3 (Family: none)	4-5
A	JP 2002-276989 A (MITSUBISHI HEAVY INDUSTRIES, LTD.) 25 September 2002, entire text, all drawings (Family: none)	1-5
A	JP 2016-153717 A (SAMSUNG ELECTRONICS CO., LTD.) 25 August 2016, entire text, all drawings & WO 2016/133261 A1 & KR 10-2016-0101848 A & CN 107250674 A	1-5

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"&" document member of the same patent family

Date of the actual completion of the international search
30 May 2018 (30.05.2018)Date of mailing of the international search report
12 June 2018 (12.06.2018)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

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Patent documents cited in the description

- JP 3783381 B [0002] [0003]