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(54) **AIR-CONDITIONING INDOOR EQUIPMENT**

(57) To provide, in an air conditioning indoor unit that rotatably supports a movable panel with a hinge system in the neighborhood of a suction port, an air conditioning indoor unit that is capable of setting the clearance between the movable panel and the periphery of the suction port small. In a ceiling-mounted air conditioning indoor unit (2), first pins (63) that are center-of-rotation shafts of a movable panel (24) are placed in a position away from the neighborhood of the boundary between a body (20) and the movable panel (24). When the movable panel (24) opens a suction port (20a), the movable panel (24) opens the suction port (20a) while widening the clearance between the body (20) and the movable panel (24), so the body (20) and the movable panel (24) do not interfere with each other. As a result, the clearance at the boundary between the body (20) and the movable panel (24) when the movable panel (24) is closing the suction port (20a) becomes set small, and the design improves.

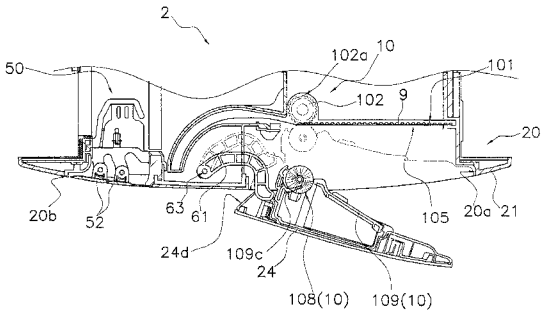

FIG. 7

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Description

TECHNICAL FIELD

[0001] The present invention relates to a ceiling-mounted air conditioning indoor unit.

BACKGROUND ART

[0002] Conventionally, as a ceiling-mounted air conditioning indoor unit, an air conditioning indoor unit that closes an opening in an ornamental panel with a movable panel capable of being raised and lowered has been widely known (e.g., see patent document 1). In that air conditioning indoor unit, the movable panel is hoisted by wires, the movable panel descends as a result of raising-and-lowering devices letting out those wires, and the movable panel ascends as a result of the raising-and-lowering devices taking up those wires.

[0003] The movable panel descends at a time of maintenance of filters, and the movable panel ascends and closes the opening at a time of operation and at a time of shutdown. In other words, the opening completely opens only at the time of maintenance of the filters, and in a usual state, the opening leaves a suction port on both sides and is always closed. In this air conditioning indoor unit, the suction port is always open, and the filters and the inside of the indoor unit are exposed through that suction port, so the design remarkably drops.

[0004] Thus, the applicant conducted a study of an air conditioning indoor unit that rotatably supports, with a hinge system in the neighborhood of the suction port, a movable panel capable of being raised and lowered and closes the suction port at a time when operation is stopped. However, the applicant found that in order to prevent interference with the periphery of the suction port when the movable panel opens the suction port while rotating, the clearance between the movable panel and the periphery of the suction port becomes set wide, and conversely that clearance lowers the design.

Patent Document 1: JP-ANo. 10-196999

DISCLOSURE OF THE INVENTION

<Technical Problem>

[0005] It is an object of the present invention to provide, in an air conditioning indoor unit that rotatably supports a movable panel with a hinge system in the neighborhood of a suction port, an air conditioning indoor unit that is capable of setting the clearance between the movable panel and the periphery of the suction port small.

<Solution to the Problem>

[0006] An air conditioning indoor unit pertaining to a first aspect of the present invention is a ceiling-mounted air conditioning indoor unit comprising a body that has an opening in its undersurface and a movable panel that opens and closes the opening by rotating. A center-of-rotation shaft of the movable panel is placed in a position away from the neighborhood of the boundary between the body and the movable panel.

[0007] In this air conditioning indoor unit, when the movable panel opens the opening, the movable panel opens the opening while widening the clearance between the body and the movable panel, so the body and the movable panel do not interfere with each other. As a result, the clearance between the body and the movable panel when the movable panel is closing the opening becomes set small, and the design improves.

[0008] An air conditioning indoor unit pertaining to a second aspect of the present invention is the air conditioning indoor unit pertaining to the first aspect of the present invention, further comprising a lever that is detachably mounted on the movable panel and couples together the movable panel and the center-of-rotation shaft. In this air conditioning indoor unit, it is not necessary for the center-of-rotation shaft, the lever, and the movable panel to be integrated, so the degree of freedom with which the center-of-rotation shaft and the lever may be designed increases.

[0009] An air conditioning indoor unit pertaining to a third aspect of the present invention is the air conditioning indoor unit pertaining to the first aspect or the second aspect of the present invention, wherein the movable panel has a slanted portion in a portion adjacent to the body.

[0010] In this air conditioning indoor unit, the clearance between the body and the movable panel when the movable panel is closing the opening is set such that the body and the movable panel do not interfere with each other when the movable panel opens the opening, and with a movable panel that has a slanted portion, the clearance is set smaller in comparison to a movable panel that does not have a slanted portion. As a result, the design improves.

[0011] An air conditioning indoor unit pertaining to a fourth aspect of the present invention is the air conditioning indoor unit pertaining to any one of the first aspect to the third aspect of the present invention, wherein when the movable panel opens the opening, the portion of the movable panel with the shortest moving distance moves below the portion that had been the boundary between the body and the movable panel when the movable panel had closed the opening.

[0012] In this air conditioning indoor unit, when the movable panel opens the opening, the movable panel covers part of the peripheral edge of the opening, so the clearance when seen from below is hidden, and the design improves.

[0013] An air conditioning indoor unit pertaining to a fifth aspect of the present invention is the air conditioning indoor unit pertaining to any one of the first aspect to the fourth aspect of the present invention, wherein the opening is a suction port for sucking in air. In this air condi-

tioning indoor unit, the clearance between the body and the movable panel when the movable panel is closing the suction opening becomes set small, and the design improves.

<Advantageous Effects of the Invention>

[0014] In the air conditioning indoor unit pertaining to the first aspect of the present invention, the clearance between the body and the movable panel when the movable panel is closing the opening becomes set small, and the design improves.

[0015] In the air conditioning indoor unit pertaining to the second aspect of the present invention, it is not necessary for the center-of-rotation shaft, the lever, and the movable panel to be integrated, so the degree of freedom with which the center-of-rotation shaft and the lever may be designed increases.

[0016] In the air conditioning indoor unit pertaining to the third aspect of the present invention, the slanted portion is disposed such that the body and the movable panel do not interfere with each other when the movable panel opens the opening, so the clearance between the body and the movable panel is set small and the design is good in comparison to a movable panel that does not have a slanted portion.

[0017] In the air conditioning indoor unit pertaining to the fourth aspect of the present invention, when the movable panel opens the opening, the movable panel covers part of the peripheral edge of the opening, so the clearance when seen from below is hidden, and the design improves.

[0018] In the air conditioning indoor unit pertaining to the fifth aspect of the present invention, the clearance between the body and the movable panel when the movable panel is closing the suction opening becomes set small, and the design improves.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

FIG. 1 is an exterior perspective view of an air conditioning indoor unit pertaining to an embodiment of the present invention.

FIG. 2(a) is a side view of the air conditioning indoor unit at a time when operation is stopped, FIG. 2(b) is a side view of the air conditioning indoor unit at a time of operation, and FIG. 2(c) is a side view of the air conditioning indoor unit at a time of maintenance.

FIG. 3 is a cross-sectional view of the air conditioning indoor unit.

FIG. 4 is a perspective view of an ornamental panel.

FIG. 5 is an exploded perspective view of a hinge coupling device.

FIG. 6 is a view of the layout of parts inside a raising-and-lowering device.

FIG. 7 is a partial cross-sectional view of the air conditioning indoor unit when a movable panel has opened a suction port.

EXPLANATION OF THE REFERENCE NUMERALS

[0020]

2	Air Conditioning Indoor Unit
20	Body
20a	Suction Port
24	Movable Panel
24d	Slanted Surface
61	Rotating Levers
63	First Pins (Center-of-Rotation Shafts)

BEST MODE FOR CARRYING OUT THE INVENTION

[0021] An embodiment of the present invention will be described below with reference to the drawings. The embodiment below is a specific example of the present invention and is not intended to limit the technical scope of the present invention.

<Configuration of Air Conditioning Indoor Unit 2>

[0022]

FIG. 1 is an exterior perspective view of an air conditioning indoor unit pertaining to the embodiment of the present invention. In FIG. 1, an air conditioning indoor unit 2 is equipped with a body 20 that has a suction port 20a and a blowout port 20b in its undersurface, a movable panel 24 that opens and closes the suction port 20a, and a first blowing direction adjusting blade 52 that opens and closes the blowout port 20b. The suction port 20a and the blowout port 20b are adjacent but spaced a certain distance apart from each other to ensure that so-called short-circuiting-or a phenomenon where air that has been blown out from the blowout port 20b is sucked back into the suction port 20a-does not occur. The undersurface of the body 20 is covered by an ornamental panel 21 so that what is actually exposed to the ceiling surface is the ornamental panel 21, and the outlines of the suction port 20a and the blowout port 20b are formed by the ornamental panel 21. Here, the ornamental panel 21 is also included in the body 20. FIG. 2(a) is a side view of the air conditioning indoor unit at a time when operation is stopped, FIG. 2(b) is a side view of the air conditioning indoor unit at a time of operation, and FIG. 2(c) is a side view of the air conditioning indoor unit at a time of maintenance. In FIGS. 2(a), 2(b), and 2(c), when the air conditioning indoor unit 2 is stopped, the movable panel 24 looks as if it is integrated with the ornamental panel 21. In FIG. 2(b), when the air conditioning indoor unit 2 runs, the movable panel 24 opens the suction port 20a, and the first blowing direction adjusting blade

52 opens the blowout port 20b. One end of the movable panel 24 is supported on the body 20 by hinges, and the movable panel 24 rotates and opens the suction port 20a.

[0023] Further, in FIG. 2(c), the movable panel 24 can descend to a maintenance position that the user can reach by hand in a state where the movable panel 24 is hung on wires 71 extending from the body 20. However, the movable panel 24 cannot descend to the maintenance position in a state where its one end is being supported on the body 20 by the hinges, so the movable panel 24 first closes the suction port 20a and then descends to the maintenance position after the support by the body 20 has been released.

[0024] FIG. 3 is a cross-sectional view of the air conditioning indoor unit. In FIG. 3, the air conditioning indoor unit 2 is further equipped with filters 9, a filter cleaning mechanism 10, an indoor heat exchanger 12, an indoor fan 13, a drain pan 14, and a blowout port module 50. At the time of operation of the air conditioning indoor unit 2, the suction port 20a and the blowout port 20b open, the indoor fan 13 rotates, and air is sucked in from the suction port 20a.

(Indoor Heat Exchanger 12)

[0025] The indoor heat exchanger 12 has a shape where two heat exchangers are adjacent in different slanting postures; for convenience of description, the heat exchanger on the upper side will be called an upper heat exchanger 12a and the heat exchanger on the lower side will be called a lower heat exchanger 12b.

[0026] The upper end of the upper heat exchanger 12a is positioned in the upper portion of the inside of the body 20, and the angle at which the upper heat exchanger 12a slants from its upper end toward its lower end is set to be equal to or greater than 45° and equal to or less than 60° (and preferably 55°) with respect to a horizontal line, so that condensation water reliably travels through the upper heat exchanger 12a toward the drain pan 14. For this reason, it is not necessary for the drain pan 14 to be placed below the entire upper heat exchanger 12a, and the drain pan 14 is placed only below the neighborhood of the lower end of the upper heat exchanger 12a.

[0027] The upper end of the lower heat exchanger 12b is placed in proximity to the lower end of the upper heat exchanger 12a, and the angle at which the lower heat exchanger 12b slants from its upper end toward its lower end is less than 45° with respect to a horizontal line. For this reason, there is the potential for condensation water to fall directly therefrom, so the drain pan 14 is placed below the entire lower heat exchanger 12b.

(Indoor Fan 13)

[0028] The indoor fan 13 is a cross-flow fan, has a width dimension that is longer than its diameter, and sucks in air from a direction perpendicular to its axis of rotation, so the indoor fan 13 can suck in air from the single suction port 20a and blow out air to the single blowout port 20b. The air that has been sucked in passes through the filters 9 and the indoor heat exchanger 12 and enters the indoor fan 13.

[0029] The air that has been blown out from the indoor fan 13 passes through the blowout port module 50 and is blown out from the blowout port 20b. In the blowout port 20b, there is placed the first blowing direction adjusting blade 52 that is a component of the blowout port module 50; the angle of inclination of the first blowing direction adjusting blade 52 is adjustable by a motor, and at the time when operation is stopped, the first blowing direction adjusting blade 52 closes the blowout port 20b. Between the indoor fan 13 and the drain pan 14 and on a blowout flow path 41 a side, there is disposed a tongue portion 15, and this tongue portion 15 prevents leakage of the blowout air and improves performance.

<Filter Cleaning Mechanism 10>

[0030] As shown in FIG. 3, the air conditioning indoor unit 2 is equipped with the filter cleaning mechanism 10 above the movable panel 24. The configural members of the filter cleaning mechanism 10 will be described below.

(Filters 9)

[0031] The filters 9 are placed on the front surface side of the indoor heat exchanger 12 and remove dust from the air that has been taken in from the indoors. Thus, the filters 9 prevent dust floating in the air from contaminating the surface of the indoor heat exchanger 12. In edge portions of the filters 9, there are formed racks 101 that mesh with pinion gears 102a.

(Roller 102)

[0032] A roller 102 has the pinion gears 102a. The pinion gears 102a mesh with the racks 101 of the filters 9 and rotate to thereby cause the filters 9 to move horizontally.

(Position Detection Switches 107)

[0033] The positions where the filters 9 stop are detected by position detection switches 107. The position detection switches 107 are placed in the neighborhood of the terminal end of a front housing portion 105 and in the neighborhood of the terminal end of a rear housing portion 106. On the outer sides of the position detection switches 107, levers are mounted by hinges, and when external force is applied, the levers rotate and push buttons of the position detection switches 107.

(Brush 108 and Dust Box 109)

[0034] A brush 108 is positioned on the opposite side of the roller 102 across the filters 9 and touches the filters 9 A dust box 109 has a dust intake port 109a in its upper portion on the side toward the blowout port 20b and supports a rotating shaft of the brush 108 via bearings on both ends in the lengthwise direction of the dust intake port. Moreover, a comb portion 109c that knocks the dust that the brush 108 has scraped off of the filters 9 off of the brush 108 is attached to the dust intake port.

(Operation of Cleaning the Filters)

[0035] In the air conditioning indoor unit 2, the filters 9 are automatically cleaned periodically by a control unit or by a remote controller when the user deems it necessary. The mechanism thereof will be described below.

[0036] In FIG. 3, the racks 101 of the filters 9 fit in the front housing portion 105, and one end of each of the racks 101 (hereinafter called first end portions) meshes with the pinion gears 102a. When the roller 102 rotates, the rotation is transmitted from the pinion gears 102a to the racks 101, and the racks 101 of the filters 9 are conveyed toward the rear housing portion 106 by the roller 102. The roller 102 continues rotating, whereby the first end portions of the racks 101 reach the terminal end of the rear housing portion 106.

[0037] When the filters 9 move, the dust that had adhered to the surfaces of the filters 9 is scraped off by the brush 108 and collected in the dust box 109. The brush 108 rotates at least during the period when the filters 9 are moving from the front housing portion 105 to the rear housing portion 106, and the direction of rotation thereof is a direction counter to the traveling direction of the filters 9.

[0038] When the filters 9 move from the front housing portion 105 to the rear housing portion 106 and removal of the dust ends, the control unit causes the roller 102 to reversely rotate. The other end portions (hereinafter called second end portions) of the racks 101 of the filters 9 mesh with the pinion gears 102a, so the rotation is transmitted from the pinion gears 102a to the racks 101 and the filters 9 are conveyed toward the front housing portion 105 by the roller 102. The roller 102 continues reversely rotating, whereby the second end portions of the racks 101 reach the terminal end of the front housing portion 105.

<Devices Associated with Operation of the Movable Panel 24>

[0039] FIG. 4 is a perspective view of the ornamental panel. As shown in FIG. 4, on the surface on the ceiling side of the ornamental panel 21, there are placed hinge coupling devices 6 and the raising-and-lowering devices 7.

(Hinge Coupling Devices 6)

[0040] The hinge coupling devices 6 rotatably support one end of the movable panel 24 when the air conditioning indoor unit 2 runs and release the support of the one end of the movable panel 24 when the movable panel 24 is lowered to the maintenance position.

[0041] FIG. 5 is an exploded perspective diagram of the hinge coupling devices. In FIG. 5, each of the hinge coupling devices 6 has a rotating lever 61, a slide member 62, a first pin 63, a pinion gear 64, a motor 65, a fixing member 66, a second pin 67, and screws 68. The rotating lever 61 is a U-shaped member, and a rod-shaped support shaft 6 la projects outward from an end surface. Moreover, a shaft hole 61b is formed in one end portion of the rotating lever 61.

[0042] In the slide member 62, there are formed a rack 62a that meshes with the pinion gear 64 and arms 62b that sandwich both ends of the shaft hole 61b in the rotating lever 61. Moreover, in the arms 62b, there is formed a first slide hole 62c, and in the neighborhood of the base of the rack 62a, there is formed a second slide hole 62d. The motor 65 is a stepping motor and causes the pinion gear 64 to rotate. The motor 65 has through holes 65a through which the screws 68 pass.

[0043] In the fixing member 66, there are formed a slide space 66a that slidably holds the slide member 62, a gear space 66b into which the pinion gear 64 is inserted, and screw holes 66c into which the screws 68 are screwed. Moreover, in the walls that form the slide space 66a, there are formed a first through hole 66d and a second through hole 66e.

[0044] The slide member 62 is placed in the slide space 66a in the fixing member 66, and the rotating lever 61 is placed in the slide member 62 such that the shaft hole 6 1 b in the rotating lever 61 is sandwiched between the arms 62b of the slide member 62. The first pin 63 is inserted from one end of the first through hole 66d in the fixing member 66, passes through the first slide hole 62c in the slide member 62 and the shaft hole 61b in the rotating lever 61, and reaches the other end of the first through hole 66d.

[0045] The second pin 67 is inserted from one end of the second through hole 66e, passes through the second slide hole 62d in the slide member 62, and reaches the other end of the second through hole 66e. As a result, the slide member 62 can move horizontally in the slide space along the first pin 63 and the second pin 67, and the rotating lever 61 can rotate about the first pin 63.

(Operation of the Hinge Coupling Devices 6)

[0046] In FIG. 4 and FIG. 5, when the motors 65 cause the pinion gears 64 to rotate, motive force is transmitted to the racks 62a meshing with the pinion gears 64, the slide members 62 slide along the first pins 63, and the rotating levers 61 move in the direction of the movable panel 24 or in the opposite direction in accompaniment

with the movement of the slide members 62. Here, for convenience of description, rotation of the motors 65 to move the rotating levers 61 in the direction where the rotating levers 61 become coupled to the movable panel 24 will be called forward rotation, and rotation of the motors 65 to move the rotating levers 61 in the direction where the coupling between the rotating levers 61 and the movable panel 24 becomes released will be called reverse rotation.

[0047] In the end portion of the movable panel 24, there are disposed support holes that confront the support shafts 61 a of the rotating levers 61, and when the motors 65 forwardly rotate such that the support shafts 61a are inserted in the support holes in the movable panel 24, coupling between the rotating levers 61 and the movable panel 24 becomes established, and the movable panel 24 can rotate about the first pins 63.

[0048] On the other hand, when the motor 65 reversely rotates such that the support shafts 61a come out of the support holes in the movable panel 24, the coupling between the rotating levers 61 and the movable panel 24 is released, and the movable panel 24 cannot rotate about the first pins 63.

(Raising-and-Lowering Devices 7)

[0049] FIG. 6 is a view of the layout of parts inside each of the raising-and-lowering devices. In FIG. 6, each of the raising-and-lowering devices 7 has a wire 71, a pulley 72, a bobbin 73, a take-up gear 74, a drive gear 75, a raising-and-lowering motor 76, and a switch 77.

[0050] The pulley 72 comprises a pulley portion 72a and a cam portion 72b that are integrally molded, and the pulley portion 72a supports the wire 71 and rotates in accompaniment with the movement of the wire 71. The cam portion 72b comprises a small diameter curved surface, a large diameter curved surface, and a flat surface that interconnects both of those curved surfaces.

[0051] The bobbin 73 takes up the wire 71. The take-up gear 74 is coaxially coupled to and integrally rotates with the bobbin 73. The drive gear 75 meshes with the take-up gear 74 and causes the bobbin 73 to rotate.

[0052] The raising-and-lowering motor 76 is a stepping motor and causes the drive gear 75 to rotate. The speed of the raising-and-lowering motor 76 is controlled by a number of pulses supplied from the control unit. The control unit has a built-in CPU, memory, and motor drive circuit and is placed in another position away from the raising-and-lowering device 7. The control unit is electrically connected to the raising-and-lowering motor 76 by a wire harness.

[0053] The switch 77 is a micro switch having a lever 77a and is switched ON as a result of the lever 77a being pushed. The lever 77a always touches the cam portion 72b of the pulley 72 and is pushed when it confronts the large diameter curved surface of the cam portion 72b. The switch 77 is also electrically connected to the control unit by a wire harness.

(Operation of the Raising-and-Lowering Devices 7)

[0054] In FIG. 6, when the raising-and-lowering devices 7 let out the wires 71, the raising-and-lowenng motors 76 cause the drive gears 75 to rotate in direction CCW and cause the take-up gears 74 to rotate in direction CW. Thus, the bobbins 73 rotate in the direction where they let out the wires 71.

[0055] On the other hand, when the raising-and-lowering devices 7 take up the wires 71, the raising-and-lowering motors 76 cause the drive gears 75 to rotate in direction CW and cause the take-up gears 74 to rotate in direction CCW. Thus, the bobbins 73 rotate in the direction where they take up the wires 71. The let-out amount and the take-up amount of the wires are proportional to the amount of rotation of the raising-and-lowering motors 76, and the let-out amount and the take-up amount of the wires 71 are controlled as a result of the control unit controlling the number of pulses it supplies to the raising-and-lowering motors 76.

[0056] The movable panel 24 is coupled to the distal ends of the wires 71, so there is always tension in the wires 71, and when the wires 71 are let out or when the wires 71 are taken up, the pulley portions 72a rotate because of frictional force with the wires 71. At this time, the cam portions 72b also rotate, so the switches 77 issue ON signals when the levers 77a confront the large diameter curved surfaces of the cam portions 72b and issue OFF signals when the levers 77a confront the small diameter curved surfaces. While the pulleys 72 are rotating, the ON signals and the OFF signals are alternately generated, and these signals are all inputted to the control unit.

(Opening and Closing Operation of the Movable Panel)

[0057] FIG. 7 is a partial cross-sectional view of the air conditioning indoor unit when the movable panel has opened the suction opening. In FIG. 7, when the raising-and-lowering devices 7 let out the wires 71 in a state where the hinge coupling devices 6 couple the movable panel 24, the movable panel 24 descends because of its own weight. However, because the end portion of the movable panel 24 is coupled to the hinge coupling devices 6, the movable panel 24 rotates about the first pins 63 in the direction where it opens the suction opening 20a.

[0058] The first pins 63 are position in the space sandwiched between the suction port 20a and the blowout port 20b in the body 20, and the end portion of the movable panel 24 that is nearest to the body 20 rotates while drawing a large circular arc, so the movable panel 24 does not interfere with the peripheral edge of the suction port 20a. Further, the surface of the movable panel 24 on the side near the center of rotation is configured as a slanted surface 24d and slanted upward away from the center of rotation, so when the movable panel 24 rotates, the movable panel 24 does not interfere with the periph-

eral edge of the suction port 20a.

[0059] Further, when the movable panel 24 opens the suction port 20a, the portion of the movable panel 24 with the shortest moving distance-that is, the undersurface edge on the side near the center of rotation of the movable panel 24-moves below the portion that had been the boundary between the body 20 and the movable panel 24 when the movable panel 24 had closed the suction port 20a, so the clearance at the boundary between the body 20 and the movable panel 24 when seen from below is hidden. As a result, the design of the air conditioning indoor unit 2 improves.

[0060] When the raising-and-lowering devices 7 take up the wires 71, the movable panel 24 ascends, but because the end portion of the movable panel 24 is coupled to the hinge coupling devices 6, the movable panel 24 rotates about the first pins 63 in the direction where it closes the suction port 20a.

(Operation of Raising and Lowering the Movable Panel)

[0061] When the hinge coupling devices 6 release their coupling with the movable panel 24 and the raising-and-lowering devices 7 let out the wires 71, the movable panel 24 descends because of its own weight. When the raising-and-lowering devices 7 take up the wires 71, the movable panel 24 ascends and closes the suction port 20a.

<Characteristics>

(1)

[0062] In the air conditioning indoor unit 2, the first pins 63 that are center-of-rotation shafts of the movable panel 24 are placed in a position away from the neighborhood of the boundary between the body 20 and the movable panel 24. When the movable panel 24 opens the suction port 20a, the movable panel 24 opens the suction port 20a while widening the clearance between the body 20 and the movable panel 24, so the body 20 and the movable panel 24 do not interfere with each other. As a result, the clearance at the boundary between the body 20 and the movable panel 24 when the movable panel 24 is closing the suction port 20a becomes set small, and the design improves.

(2)

[0063] The movable panel 24 and the first pins 63 are coupled together by the rotating levers 61, but the rotating levers 61 and the movable panel 24 are detachable. In other words, it is not necessary for the first pins 63, the rotating levers 61, and the movable body 24 to be integrated, so the degree of freedom of design increases.

INDUSTRIAL APPLICABILITY

[0064] As described above, the present invention is useful in an air conditioning indoor unit that rotatably supports, with a hinge system in the neighborhood of a suction port, a movable panel capable of being raised and lowered and which closes the suction port at a time when operation is stopped.

Claims

1. A ceiling-mounted air conditioning indoor unit (2) comprising:

   a body (20) that has an opening (20a) in its undersurface; and
   a movable panel (24) that opens and closes the opening (20a) by rotating,
   wherein a center-of-rotation shaft (63) of the movable panel (24) is placed in a position away from the neighborhood of the boundary between the body (20) and the movable panel (24).

2. The air conditioning indoor unit (2) according to claim 1, further comprising a lever (61) that is detachably mounted on the movable panel (24) and couples together the movable panel (24) and the center-of-rotation shaft (63).

3. The air conditioning indoor unit (2) according to claim 1 or claim 2, wherein the movable panel (24) has a slanted portion (24d) in a portion adjacent to the body (20).

4. The air conditioning indoor unit (2) according to any one of claim 1 to claim 3, wherein when the movable panel (24) opens the opening (20a), the portion of the movable panel (24) with the shortest moving distance moves below the portion that had been the boundary between the body (20) and the movable panel (24) when the movable panel (24) had closed the opening (20a).

5. The air conditioning indoor unit (2) according to any one of claim 1 to claim 4, wherein the opening (20a) is a suction port for sucking in air.

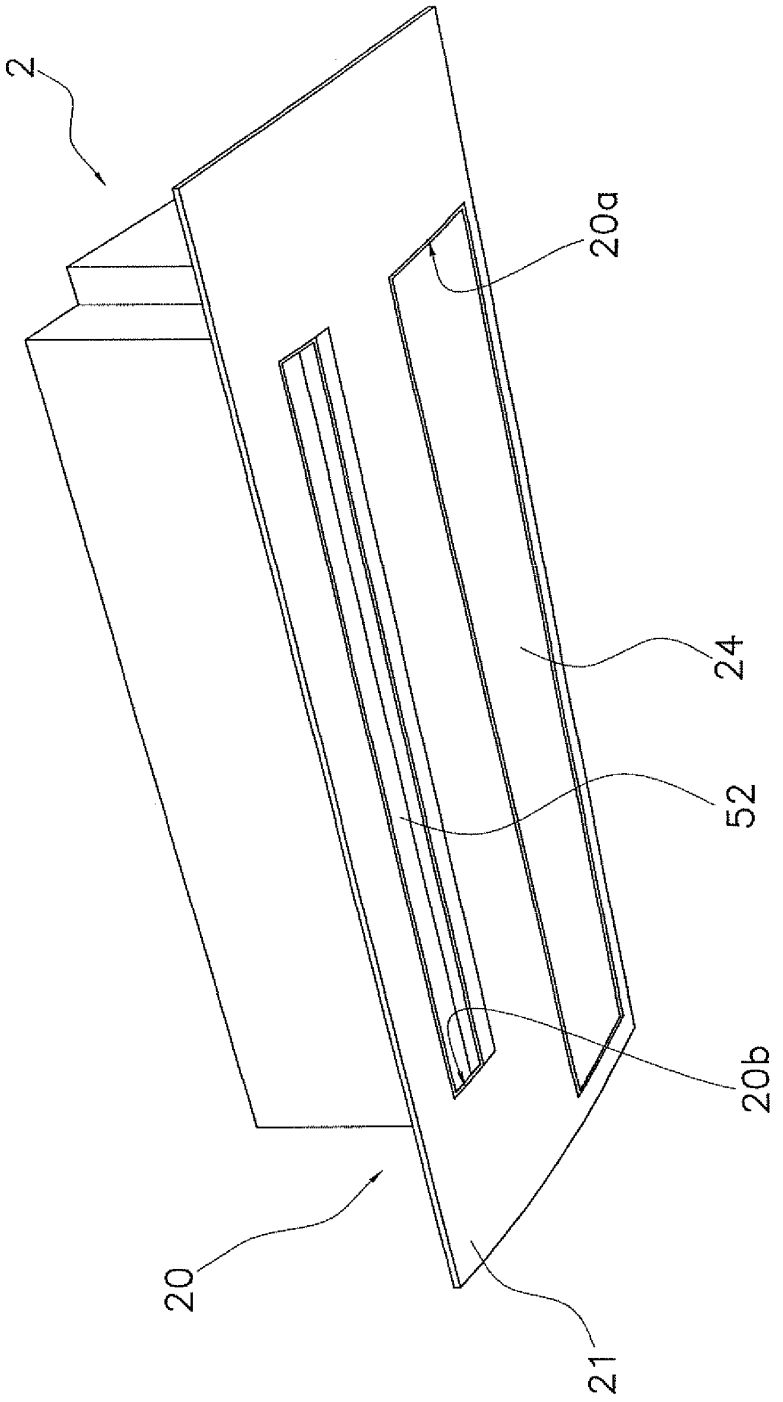
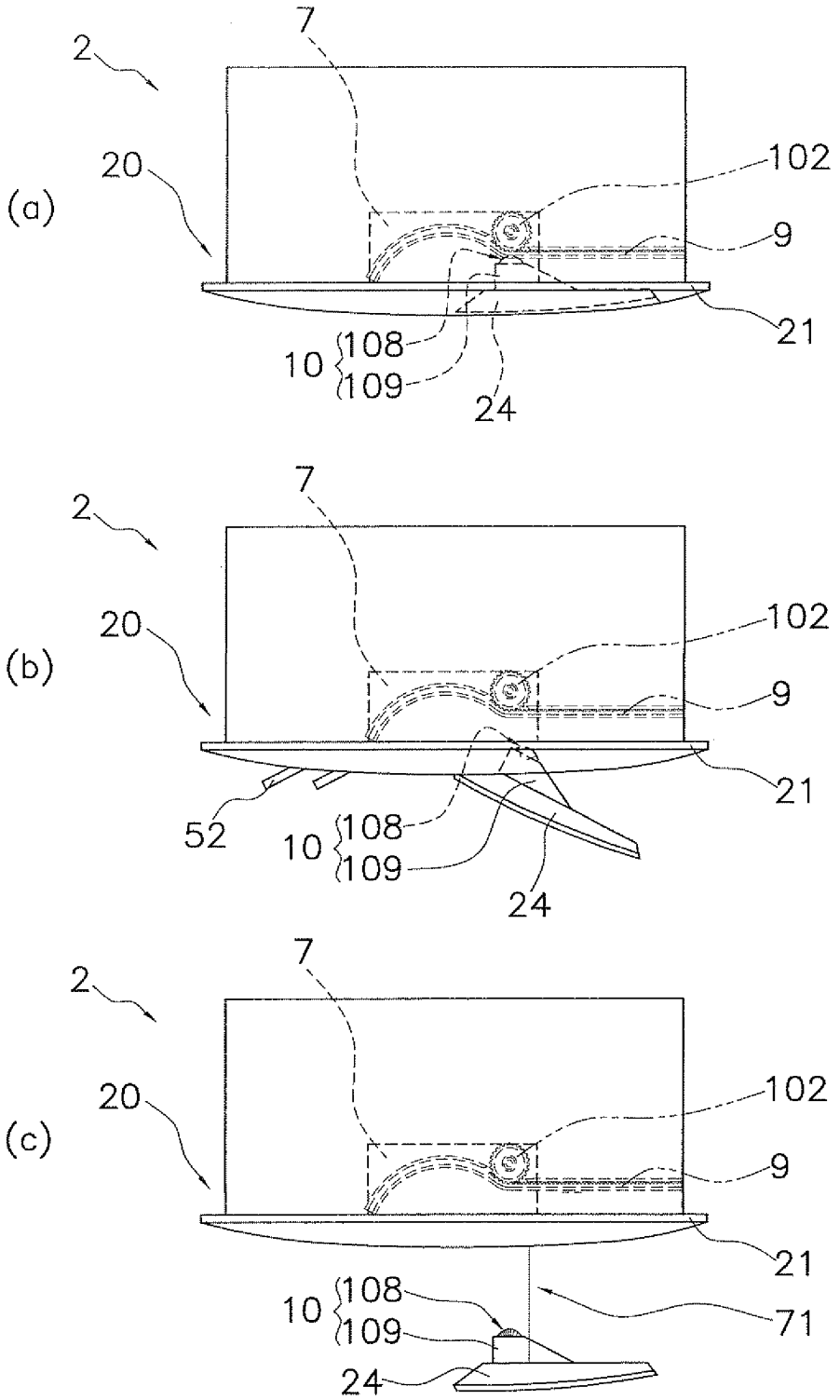


FIG. 1


(a)
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109
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(c)
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109
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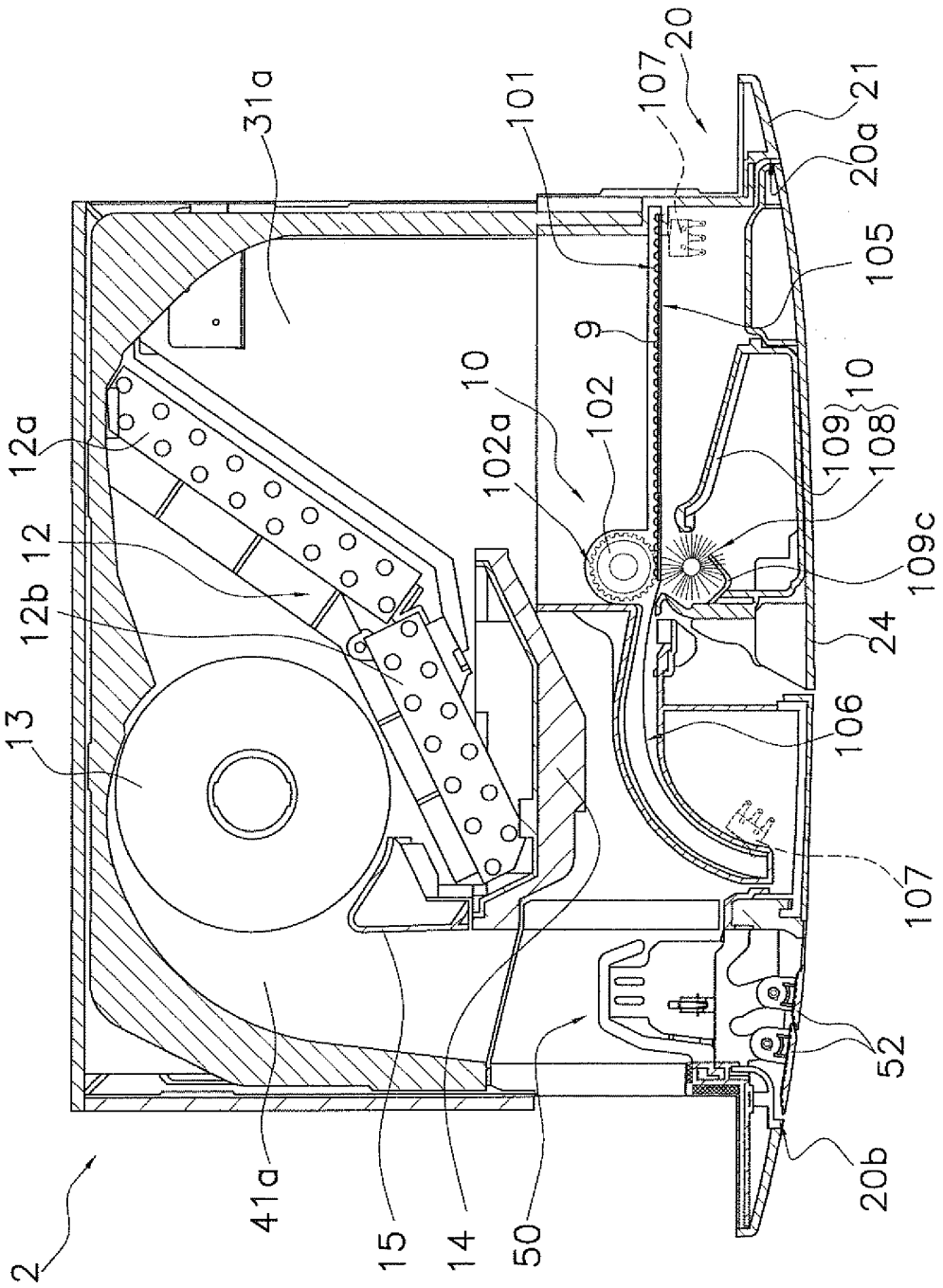
24

FIG. 2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107
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102
102a
10
109
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109c
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13
106
107
52
2
41a
15
14
50
20b

FIG. 3

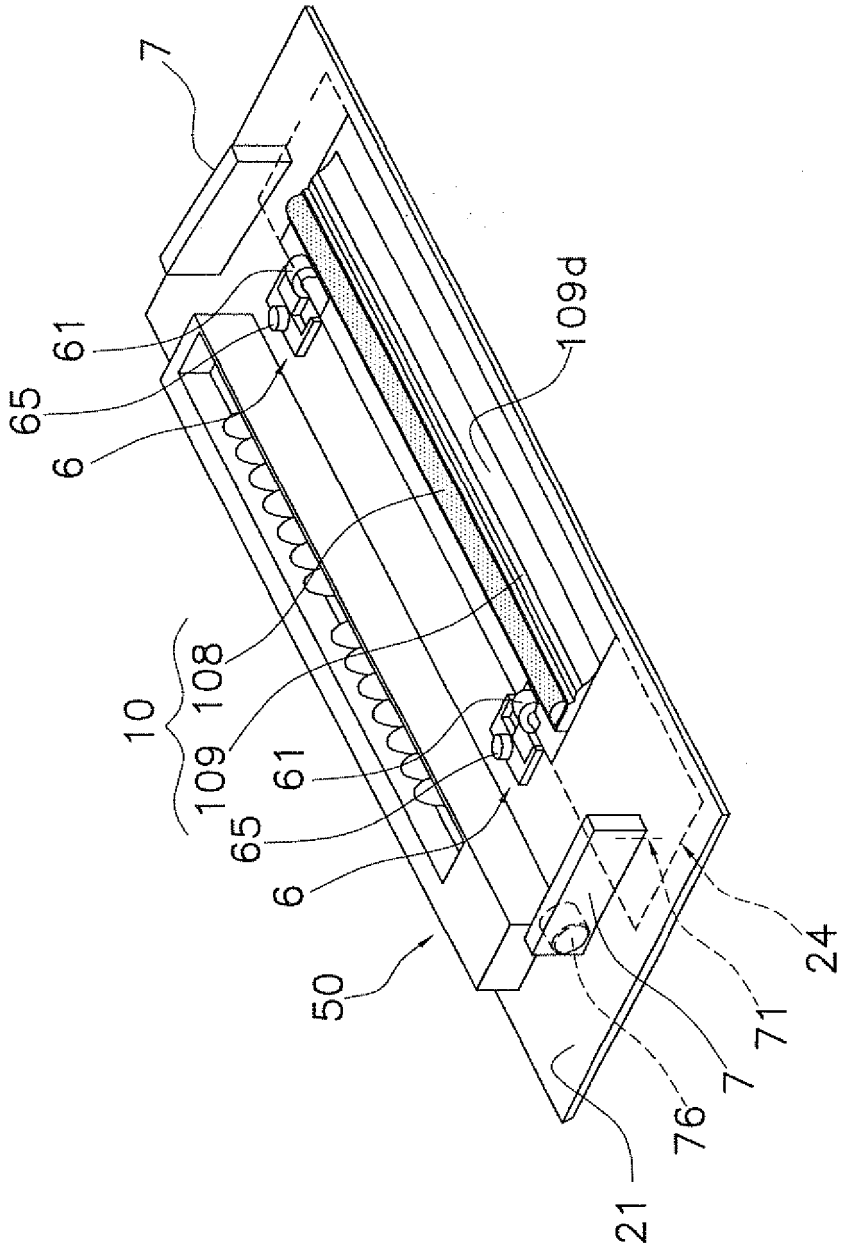
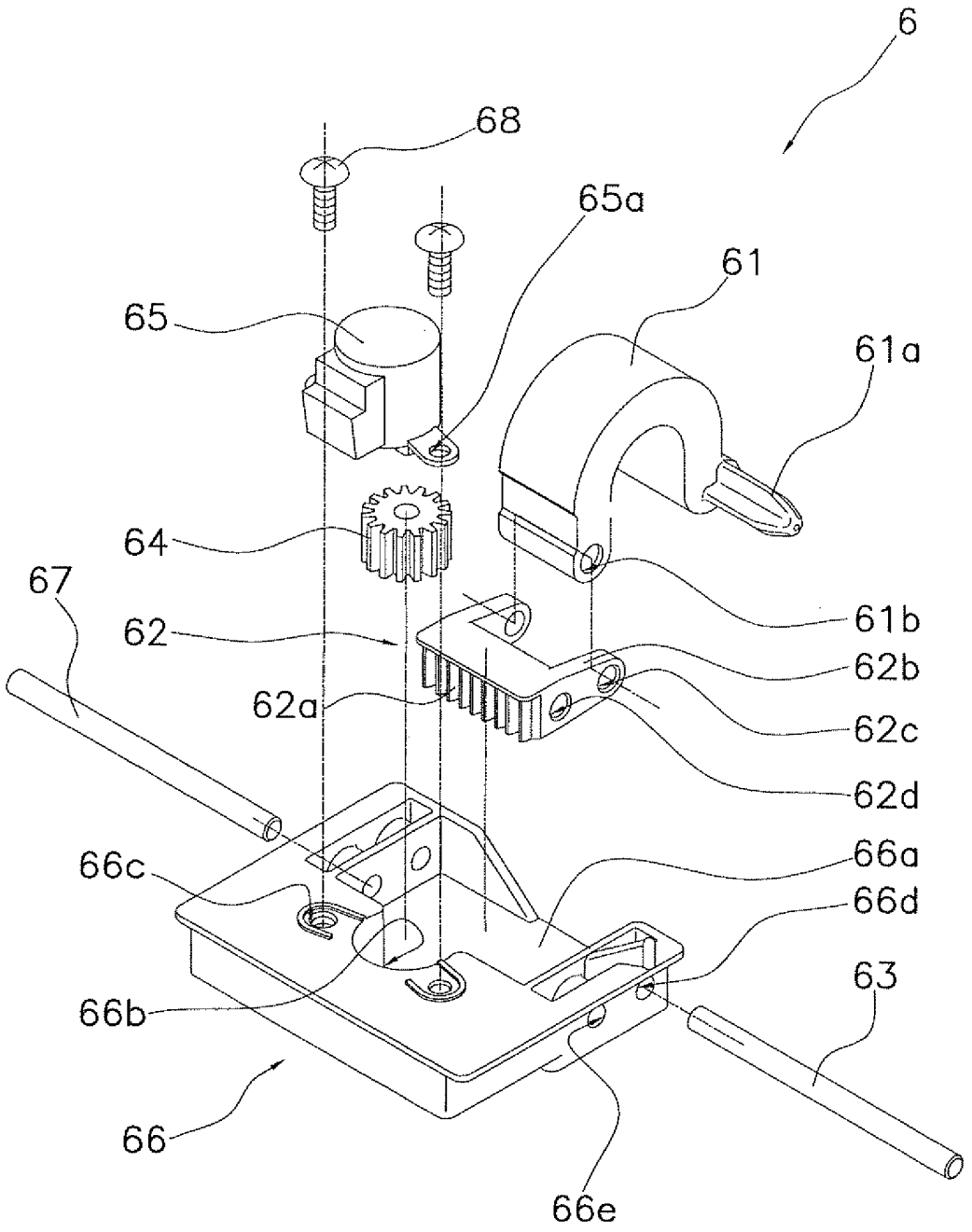


FIG. 4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66b
66
66e

FIG. 5

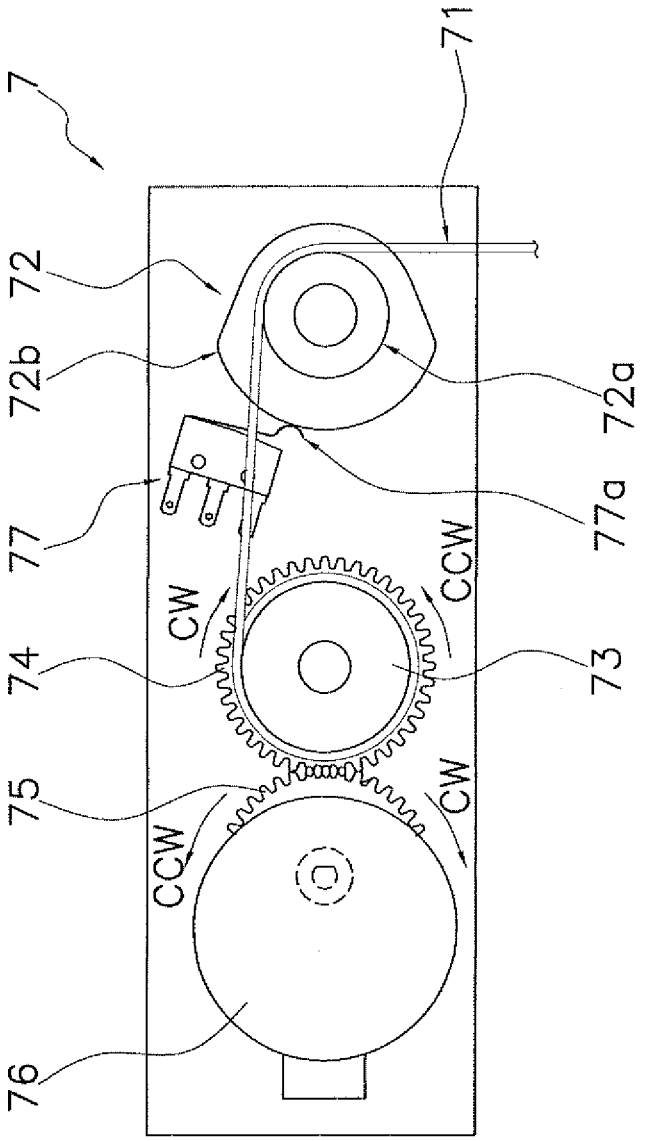
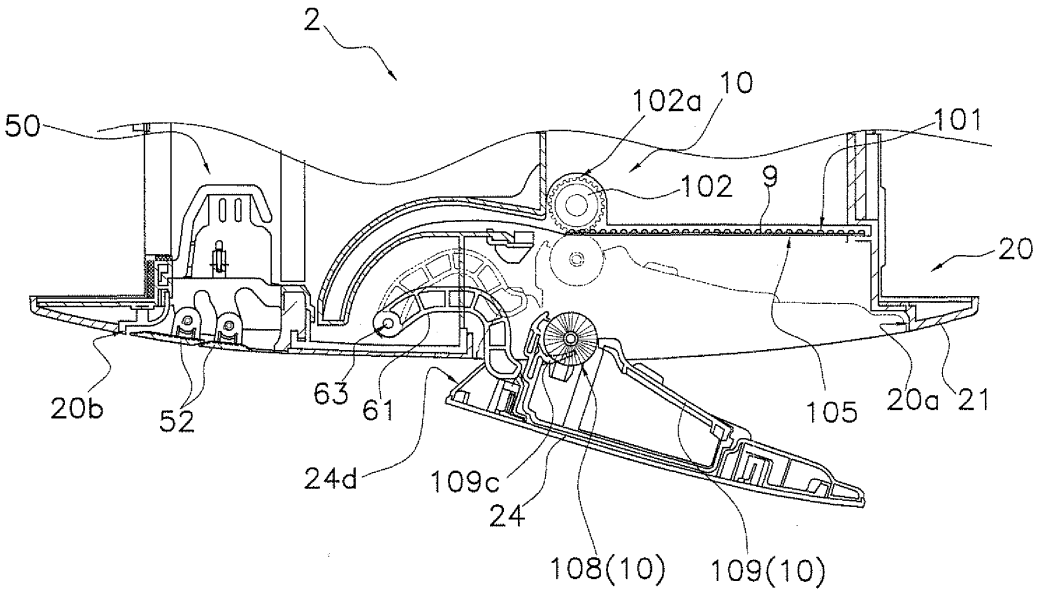


FIG. 6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101
102
9
20
20b
52
63
61
105
20a
21
24d
109c
24
108(10)
109(10)

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2009/000206

A. CLASSIFICATION OF SUBJECT MATTER
F24F13/28(2006.01)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)
F24F13/28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2009
Kokai Jitsuyo Shinan Koho 1971-2009 Toroku Jitsuyo Shinan Koho 1994-2009

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.
Y	JP 9-196407 A (Daikin Industries, Ltd.), 31 July, 1997 (31.07.97), Full text; all drawings (Family: none)	1-5
Y	JP 6-74552 A (Toshiba Corp.), 15 March, 1994 (15.03.94), Par. Nos. [0011] to [0021]; Fig. 1 & JP 6-74552 A & US 5388426 A & GB 2270154 A & GB 9314256 D0	1-5

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 April, 2009 (08.04.09)	21 April, 2009 (21.04.09)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2007)

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Patent documents cited in the description

- JP 10196999 A **[0004]**