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(54) **Indoor unit with special blowout flap control for the prevention of dew formation**

Innenraumeinheit einer Klimaanlage mit spezieller Ansteuerung der Ausblasklappen zur Vermeidung von Taubildung

Unité d'intérieur de climatiseur avec contrôle spécial des volets de sortie pour éviter la formation de rosée

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Description

Technical Field

[0001] The present invention relates to an indoor unit of an air conditioner and, more specifically, to an indoor unit of an air conditioner having a wind direction plate at a blowout port.

Background Art

[0002] In the related art, an invention related to an indoor unit of an air conditioner in which a sufficient length of a blowout flow channel is secured so as to avoid dew condensation on an opening edge of a blowout port is disclosed (For example, seeJP-A-5-272 799).

[0003] Other documents of interest are JP 62 162 546 U, in which an air conditioner comprises a rotatable plurality of louvers which rotate independently out of a predetermined revolving range; and EP-1 707 892 A1, in which wind deflectors of an air conditioner provide an oblique stream path at the start-up of a heating and a narrower stream path when the heating operation has stabilized. EP 1 707 892 A1 thereby provides an indoor unit according to the preamble of claim 1.

Technical Problem

[0004] The indoor unit of the air conditioner disclosed in JP-A-5-272 799 is provided with a pair of blowout walls for opening and closing the blowout port, and the blowout walls are configured to be opened and closed in the vertical direction in a double-door system so as to meet at a midpoint of the opening height of the blowout port, whereby the dew condensation on the opening edge of the blowout port can be restrained.

[0005] However, during a cooling operation (when the blowout port is opened), a lower surface of the blowout wall arranged above and an upper surface of the blowout wall arranged below are substantially parallel to each other and define an air duct therebetween, and the blowout walls themselves are cooled. Accordingly, there arises a problem that the dew condensation is caused on an upper surface (back side of the air duct) of the blowout wall arranged above and a lower surface (back side of the air duct) of the blowout wall arranged below. Consequently, dew dropping in indoors occurs and hence impairment of comfort is resulted.

SUMMARY OF THE INVENTION

[0006] In order to solve the above-described problem, an object of the present invention is to provide an indoor unit of an air conditioner which is adapted to prevent dew condensation on a blowout port itself and blowout walls (wind direction plates) installed at the blowout port.

Solution to Problems

[0007] An indoor unit of an air conditioner according to the present invention is a box member having blowing means and heat exchanging means stored therein, including:

a main body, in which a blowout port is formed on a front surface of the box member in a range nearer a lower surface and on the lower surface of the box member in a range nearer the front surface;
a front flap tiltably arranged on the front surface side of the blowout port;
a lower flap tiltably arranged on the lower surface side of the blowout port;
a fan casing which defines a blowout air duct from the blowing means to the blowout port;
front tilting means configured to tilt the front flap;
lower tilting means configured to tilt the lower flap; and
characterized in that control means is configured during a cooling to control the front tilting means and the lower tilting means so that the front flap and the lower flap stop at positions to form a smoothly continuing surface in the blowout air duct at a predetermined distance from each other, and the front side and the back side of the front flap and the lower flap are all exposed to blown air. Preferred embodiments are defined in the dependent claims.

Advantageous Effect of the Invention

[0008] The indoor unit of the air conditioner according to the present invention is configured in such a manner that the control means controls the front tilting means and the lower lilting means to cause the front flap and the lower flap to stop at the positions to form the smoothly continuing surface in the blowout air duct at the predetermined distance from each other. Therefore, cooled air can be blown out in a predetermined direction (for example, substantially horizontal direction). At this time, since the front side and the back side of the front flap and the front side and the back side of the lower flap are all exposed to blown air (cold air), occurrence of the dew condensation is avoided.

Brief Description of Drawings

[0009]

Fig. 1 is an explanatory front view of an indoor unit of an air conditioner according to Embodiment 1 of the present invention.
Fig. 2 is a perspective view of the indoor unit shown in Fig. 1.
Fig. 3 is a side cross-sectional view of the indoor unit shown in Fig. 1.
Fig. 4 is a see-through perspective view illustrating

part of the indoor unit shown in Fig. 1.
Fig. 5 shows a flowchart showing actions of vertical wind direction plates during a cooling operation of the indoor unit shown in Fig. 1.
Fig. 6 shows side views illustrating the actions of the vertical wind direction plates when starting the cooling operation of the indoor unit shown in Fig. 1.
Fig. 7 shows side views illustrating the actions of the vertical wind direction plates when stopping the cooling operation of the indoor unit shown in Fig. 1.
Fig. 8 is a flowchart showing the actions of the vertical wind direction plates during a heating operation of the indoor unit shown in Fig. 1.
Fig. 9 shows side views illustrating the actions of the vertical wind direction plates when starting the heating operation of the indoor unit shown in Fig. 1.
Fig. 10 shows side views illustrating the actions of the vertical wind direction plates when stopping the heating operation of the indoor unit shown in Fig. 1.
Fig. 11 is an exploded perspective view illustrating components which constitute a first example of a tilting mechanism of the indoor unit shown in Fig. 1.
Fig. 12 is a side view showing the action of the components of the first example of the tilting mechanism shown in Fig. 11.
Fig. 13 is a side view showing the action of the components of the first example of the tilting mechanism shown in Fig. 11.
Fig. 14 is a side view showing the action of the components of the first example of the tilting mechanism shown in Fig. 11.
Fig. 15 is an exploded perspective view illustrating components which constitute a second example of a tilting mechanism of the indoor unit shown in Fig. 1.
Fig. 16 is a side view showing the action of the components of the second example of the tilting mechanism shown in Fig. 15.
Fig. 17 is a side view showing the action of the components of the second example of the tilting mechanism shown in Fig. 15.
Fig. 18 is a side view showing the action of the components of the second example of the tilting mechanism shown in Fig. 15.

Description of Embodiments

Embodiment 1

(Indoor Unit of Air Conditioner)

[0010] Fig. 1 to Fig. 10 are drawings for explaining an indoor unit of an air conditioner according to Embodiment 1 of the present invention. Fig. 1 is a front view, Fig. 2 is a perspective view, Fig. 3 is a side cross-sectional view, Fig. 4 is a partly see-through perspective view, Fig. 5 is a flowchart showing actions of vertical wind direction plates during a cooling operation, Fig. 6 shows side views schematically illustrating the actions of the vertical wind direction plates when starting the cooling operation, Fig. 7 shows side views schematically illustrating the actions of the vertical wind direction plates when stopping the cooling operation, Fig. 8 is a flowchart showing the actions of the vertical wind direction plates during a heating operation, Fig. 9 shows side views schematically illustrating the actions of the vertical wind direction plates when starting the heating operation, and Fig. 10 shows side views schematically illustrating the actions of the vertical wind direction plates when stopping the heating operation. The respective drawings are illustrated schematically, and the present invention is not limited to illustrated modes.

[0011] In Fig. 1 to Fig. 4, an indoor unit 1 of an air conditioner (hereinafter, referred to as "indoor unit") 1 includes a box-shaped main body 10, a blowing fan 20 stored in the interior of the main body 10, a heat exchanger 30 arranged so as to oppose part of the blowing fan 20, and a front panel (precisely, it is the same as a design panel which also covers part of side surfaces of the main body 10) 40 covering an opening on the front surface (the left side in Fig. 3) of the main body 10.

(Blowout Port)

[0012] The main body 10 is configured to be installed with a back surface (the right side in Fig. 3) thereof placed on an indoor wall or the like, and includes an inlet port 50 for sucking indoor air on an upper surface (the upper side in Fig. 3), and a fan casing 60 for defining a blowout air duct from the blowing fan 20 in the interior thereof.

[0013] The fan casing 60 is a space having a predetermined width and being surrounded by a front casing member (the same as a front casing panel) 61 arranged on the side of the opening on the front surface, a rear casing member (the same as a rear casing panel) 62 arranged on the back surface side, and a partition wall 80 which constitutes a side surface (see Fig. 11). Then, a space formed between a terminal end of the fan casing 60, that is, a side edge on the front surface side of the lower surface (the lower side in Fig. 3) and a side edge on the lower side of the front panel 40 corresponds to a blowout port 63.

(Vertical Wind direction plates)

[0014] Furthermore, a front flap 100 and a lower flap 200 are tiltably provided on the blowout port 63 on the front surface side and the rear surface side respectively as the vertical wind direction plates.

[0015] Front flap arms 101 are provided on a back side 100b of the front flap 100 at predetermined intervals, and a front flap revolving shaft 102 is provided on the front flap arms 101. On the other hand, the front casing member 61 is provided with casing flanges 64, and casing bearings 65 are provided on the casing flanges 64. The front flap revolving shaft 102 is rotatably supported by the casing bearings 65.

[0016] In the same manner, lower flap arms 201 are provided on a back side 200b of the lower flap 200 at predetermined intervals, and a lower flap revolving shaft 202 is provided on the lower flap arms 201. On the other hand, casing flanges, not shown, are provided at the blowout port 63, and a casing bearing is provided on the casing flanges. The lower flap revolving shaft 202 is rotatably supported by the casing bearings.

[0017] A front stopper 160 configured to limit a tilting range when the front flap 100 is tilted toward the inside of the fan casing 60 (counterclockwise), and a lower stopper 260 configured to limit a tilting range when the lower flap 200 is tilted toward the outside of the fan casing 60 (counterclockwise) are also provided. The structures of the front stopper 160 and the lower stopper 260 are not limited thereto, and a structure in which the front flap 100 and the lower flap 200 come into abutment with each other, or a structure in which a projection or a shoulder provided on the front flap revolving shaft 102 and a projection or a shoulder provided on the lower flap revolving shaft 202 come into abutment with the front flap 100 and the lower flap 200 respectively is also applicable.

[0018] For easier understanding, description will be given below by exemplifying the front stopper 160 provided on the front casing member 61 and configured to come into abutment with the front flap 100 being tilted to the maximum extent, and the lower stopper 260 provided on the rear casing member 62 and configured to come into abutment with the lower flap 200 being tilted to the maximum extent.

[0019] Control means, not shown, is configured to control a tilting mechanism (not shown) to cause the front flap 100 and the lower flap 200 to be tilted independently. The tilting mechanism will be described separately in detail.

(State When Operation is Stopped)

[0020] In Fig. 6(a), the control means, not shown, causes the front flap 100 to take a position substantially parallel to the front panel 40 when the operation is stopped. At this time, the back side 100b of the front flap 100 is positioned on the side of the fan casing 60, and the front side 100a of the front flap 100 is positioned outside (front side) so as to be visible from the indoor.

[0021] Also, the lower flap 200 takes a position substantially parallel to a lower surface 70, and the back side 200b of the lower flap 200 is positioned on the side of the fan casing 60 and the front side 200a of the lower flap 200 is positioned outside (lower side) so as to be visible from the indoor.

[0022] In the illustration of drawing (a) in Fig. 6, the sizes of the members are exaggerated, and hence there exists a gap between a lower edge of the front flap 100 and a front edge of the lower flap 200. However, this gap is small in actuality to an extent that they do not interfere with each other. Therefore, since the blowout port 63 is closed by the front flap 100 and the lower flap 200, a good appearance is maintained.

(Actions when Starting Cooling Operation)

[0023] Referring now to Fig. 5 and Fig. 6, actions to be taken when starting the cooling operation will be described.

[0024] In Fig. 6(b), when a signal indicating that the cooling operation is to be started is supplied to the control means (SS1 in Fig. 5), the control means firstly causes the lower flap revolving shaft 202 to tilt in a direction to bring the lower flap into abutment with the lower stopper 260 (counterclockwise in Fig. 6) and brings the lower flap into abutment with the lower stopper 260 (S1 in Fig. 5).

[0025] At this time, since the lower flap revolving shaft 202 is rotated via a clutch mechanism (slipping mechanism), it is not rotated excessively after the lower flap 200 has come into abutment with the lower stopper 260. Therefore, even thoutgh the position of the lower flap 200 is changed (such as slightly tilting) when the operation is stopped, accurate positioning is achieved by the abutment with the lower stopper 260.

[0026] Subsequently, as shown in Fig. 6(c), the control means causes the lower flap revolving shaft 202 to rotate in a direction to move the lower flap 200 away from the lower stopper 260 (clockwise) for a predetermined angle A2 and causes the lower flap 200 to stop in the fan casing 60 (S2 in Fig. 5).

[0027] At that time, the lower flap 200 is positioned substantially midway between the front casing member 61 and the rear casing member 62, and is fixed at a position with the lower flap surface 200a being at an upper location and inclined by a predetermined angle with respect to the horizontal direction.

[0028] In Fig. 6(d), the control means then causes the front flap revolving shaft 102 to rotate in a direction to bring the front flap 100 into abutment with the front stopper 160 (counterclockwise) and brings the front flap 100 into abutment with the front stopper 160 (S3 in Fig. 5).

[0029] At this time, since the front flap revolving shaft 102 is rotated via the clutch mechanism (slipping mechanism) in the same manner as the lower flap revolving shaft 202, it is not rotated excessively after the front flap 100 has come into abutment with the front stopper 160. Therefore, even though the position of the front flap 100 is changed (such as slightly tilting) when the operation is stopped, the accurate positioning is achieved by the abutment with the front stopper 160.

[0030] In Fig. 6(e), the control means further causes the front flap revolving shaft 102 to rotate in a direction to move the front flap 100 a predetermined angle A4 away from the front stopper 160 (clockwise) and causes the front flap 100 to stop in the fan casing 60 (S4 in Fig. 5).

[0031] At this time, the front flap 100 is positioned substantially midway between the front casing member 61 and the rear casing member 62, and is fixed at a position with the front side 100a faced downside and inclined at a smaller angle than the angle of the lower flap with re-

spect to the horizontal direction.

[0032] In other words, the lower flap 200 and the front flap 100 are arranged smoothly without a level difference so as to form a substantially identical curved surface (precisely, a slightly bent surface) even though there exists a gap between the terminal ends thereof. Therefore, air flowing along the front side 200a of the lower flap 200 continues to flow along the back side 100b of the front flap 100, and air flowing along the back side 200b of the lower flap 200 continues to flow along the front side 100a of the front flap 100.

[0033] Therefore, the front side 200a and the back side 200b of the lower flap 200 and the front side 100a and the back side 100b of the front flap 100 are all exposed to the cooled airflow, so that dew condensation thereon is avoided. Therefore, occurrence of dew dropping in indoors is avoided, and improvement of comfort is achieved.

[0034] Also, since the cooled air is blown out in the substantially horizontal direction by the lower flap 200 and the front flap 100 which form the substantially identical curved surface in the substantially horizontal direction, cold air reaches an area far from the indoor unit 1 without increasing a load of the blowing fan 20, so that a wide range in the indoors can be cooled.

[0035] Therefore, since temperature fluctuations in the indoors is alleviated, it is no longer necessary to excessively lower a set temperature and increase a burden of the blowing fan 20 or the heat exchanger 30 (more precisely, a freezing cycle for supplying cold heat to the heat exchanger 30) in order to lower the temperature of an area far from the indoor unit 1, so that an energy saving effect is achieved. On the other hand, since excessive lowering of the temperature of an area close to the indoor unit 1 is avoided, improvement of comfort is achieved.

[0036] In the description given above, the lower flap 200 is caused to stop in the blowout air duct after having brought into abutment with the lower stopper 260, and then the front flap 100 is caused to stop in the blowout air duct after having brought into abutment with the front stopper 160. However, the present invention is not limited thereto, and either one of operations may be implemented first. For example, bringing the lower flap 200 and the front flap 100 into abutment with the lower stopper 260 and the front stopper 160 respectively and then causing both to stop in the blowout air duct, and bringing the front flap 100 into abutment with the front stopper 160 and then bringing the lower flap 200 into abutment with the lower stopper 260 are both applicable.

[0037] Furthermore, if the position of the lower flap 200 and the front flap 100 do not vary when starting the operation, a step of bringing the lower flap 200 or the front flap 100 into abutment respectively with the lower stopper 260 and the front stopper 160 may be omitted.

(Actions When Ending Cooling Operation)

[0038] Subsequently, actions when ending the cooling operation will be described. The actions when ending the cooling operation are performed by reversing the actions when starting the cooling operation.

[0039] Fig. 7(a) is a drawing which is the same as Fig. 6(e), and shows a position immediately before ending the cooling operation.

[0040] In Fig. 7(b), when a signal indicating that the cooling operation is to be ended is supplied to the control means (SS2 in Fig. 5), the control means firstly causes the front flap revolving shaft 102 to rotate in a direction to bring the front flap 100 into abutment with the front stopper 160 (counterclockwise), and brings the front flap 100 into abutment with the front stopper 160 (S5 in Fig. 5) .

[0041] In Fig. 7(c), the control means causes the front flap revolving shaft 102 to rotate in a direction to move the front flap 100 a predetermined angle A6 away from the front stopper 160 (clockwise), and causes the front flap 100 to stop at a position parallel to the front panel 40 (S6 in Fig. 5).

[0042] In Fig. 7(d), the control means then causes the lower flap revolving shaft 202 to rotate in a direction to bring the lower flap 200 into abutment with the lower stopper 260, and brings the lower flap 200 into abutment with the lower stopper 260 (S7 in Fig. 5).

[0043] In Fig. 7(e), finally, the control means causes the lower flap revolving shaft 202 to rotate in a direction to move the lower flap 200 a predetermined angle A8 away from the lower stopper 260 (clockwise) and causes the lower flap 200 to stop at a position parallel to the lower surface 70 (S8 in Fig. 5).

[0044] At this time, since the front flap 100 and the lower flap 200 are tilted after having come into abutment with the front stopper 160 and the lower stopper 260 respectively in the same manner as the actions when starting the cooling operation, the front flap 100 and the lower flap 200 stop at proper positions when the operation is stopped (see Fig. 6(a)) even though their positions are changed (slightly tilting, etc.) during the operation. Therefore, the blowout port 63 of the indoor unit 1 is closed, and a good appearance is maintained.

[0045] The order of the respective steps is not limited, and the step of bringing the lower flap 200 or the front flap 100 into abutment with the lower stopper 260 or the front stopper 160 respectively may be omitted in the same manner as the actions when starting the cooling operation.

(Actions When Starting Heating Operation)

[0046] Referring now to Fig. 8 and Fig. 9, actions to be taken when starting a heating operation will be described.

[0047] Fig. 9(a) shows the state when the operation is stopped, and is the same as Fig. 6(a).

[0048] In Fig. 9(b), when a signal indicating that the heating operation is to be started is supplied to the control means (SS11 in Fig. 8), the control means firstly causes the lower flap revolving shaft 202 to tilt in a direction to

bring the lower flap into abutment with the lower stopper 260 (counterclockwise in Fig. 5), and brings the lower flap into abutment with the lower stopper 260 (S11 in Fig. 8).

[0049] In Fig. 9(c), subsequently, the control means causes the lower flap revolving shaft 202 to rotate in a direction to move the lower flap 200 away from the lower stopper 260 (clockwise) by a predetermined angle B2 and causes the lower flap 200 to stop at a position extending across the blowout port 63 (S12 in Fig. 8).

[0050] At this time, the lower flap 200 is substantially parallel with an imaginary plane formed by smoothly extending the rear casing member (inclined in such a way that the front side becomes downward) with the back side 200b of the lower flap 200 being located upward.

[0051] In Fig. 9(d), the control means causes the front flap revolving shaft 102 to tilt in a direction to bring the front flap 100 into abutment with the front stopper 160 (counterclockwise), and brings the front flap 100 into abutment with the front stopper 160 (S13 in Fig. 8).

[0052] In Fig. 9(e), the control means causes the front flap revolving shaft 102 to tilt in a direction to move the front flap 100 a predetermined angle B4 away from the front stopper 160 (clockwise) and causes the front flap 100 to stop at a position opposing the lower flap 200 and approaching thereto as it goes downstream of the airflow (S14 in Fig. 8).

[0053] At this time, the front flap 100 is inclined to a larger extent than the lower flap 200 (the same as the position closer to the perpendicular direction), and the front side 100a is positioned downside. Therefore, an air duct which becomes narrower as it goes downstream of the air flow is defined by the front side 100a of the front flap 100 and the back side 200b of the lower flap 200.

[0054] Therefore, a sharp blast of heated air is blown out downward from the indoor unit 1. Warm air is not held up on the ceiling side, and hence the indoor may be warmed up without the temperature fluctuations.

[0055] The values of the angles B2 and B4 of the lower flap 200 are not limited, and may be set as desired by a user or varied at a predetermined time cycle. Also, during the heating operation, the lower flap 200 may be kept in abutment with the lower stopper 260, that is, "B2=0°", or the front flap 100 may be kept in abutment with the front stopper 160, that is, "B4=0°".

[0056] The order of the respective steps is not limited, and the step of bringing the lower flap 200 or the front flap 100 into abutment with the lower stopper 260 or the front stopper 160 respectively may be omitted in the same manner as the actions when starting the cooling operation.

(Actions When Ending Heating Operation)

[0057] The actions when ending the heating operation are in conformity with the actions when ending the cooling operation (see Fig. 7).

[0058] Fig. 10(a) is a drawing which is the same as Fig. 9(e), and shows a position immediately before ending the heating operation.

[0059] In Fig. 10(b), when a signal indicating that the heating operation is to be ended is supplied to the control means (SS12 in Fig. 8), the control means firstly causes the front flap revolving shaft 102 to rotate in a direction to bring the front flap 100 into abutment with the front stopper 160 (counterclockwise), and brings the front flap 100 into abutment with the front stopper 160 (S15 in Fig. 8) .

[0060] In Fig. 10(c), the control means causes the front flap revolving shaft 102 to rotate in a direction to move the front flap 100 a predetermined angle B6 away from the front stopper 160 (clockwise) and cause the front flap 100 to stop at a position parallel to the front panel 40 (S16 in Fig. 8).

[0061] In Fig. 10(d), the control means then causes the lower flap revolving shaft 202 to rotate in a direction to bring the lower flap 200 into abutment with the lower stopper 260, and brings the lower flap 200 into abutment with the lower stopper 260 (S17 in Fig. 8).

[0062] In Fig. 10(e), finally, the control means causes the lower flap revolving shaft 202 to rotate in a direction to move the lower flap 200 a predetermined angle B8 away from the lower stopper 260 (clockwise) and causes the lower flap 200 to stop at a position parallel to the lower surface 70 (S18 in Fig. 8).

[0063] At this time, since the front flap 100 and the lower flap 200 are tilted after having come into abutment with the front stopper 160 and the lower stopper 260 respectively in the same manner as the actions when starting the heating operation, the front flap 100 and the lower flap 200 stop at proper positions when the operation is stopped (see Fig. 6(a)) even though their positions are changed (slightly tilting, etc.) during the operation. Therefore, the blowout port 63 of the indoor unit 1 is closed, and the good appearance is maintained.

[0064] The order of the respective steps is not limited, and the step of bringing the lower flap 200 or the front flap 100 into abutment with the lower stopper 260 or the front stopper 160 respectively may be omitted in the same manner as the actions when starting the cooling operation.

(First Example of Tilting Mechanism)

[0065] Referring now to Fig. 11 to Fig. 14, a first example of the tilting mechanism will be described.

[0066] Fig. 11 to Fig. 14 are drawings for explaining the first example of the tilting mechanism. Fig. 11 is an exploded perspective view showing components thereof, and Fig. 12 to Fig. 13 are side views showing actions of the components of the first example of the tilting mechanism. In Fig. 11 to Fig. 14, the front flap 100 and the lower flap 200 are tilted independently, and a first stepping motor 190 for tilting the front flap 100 and a second stepping motor 290 for tilting the lower flap 200 are stored in a motor case 90 provided on the partition wall 80 of

the main body 10. The tilting mechanism will be described in detail below.

(First Braking Member)

[0067] In Fig. 11, one of the front flap arms 101 provided on the front flap 100, which is positioned nearest to the partition wall 80, is provided with a first braking member 110 so as to tilt integrally therewith.

[0068] The first braking member 110 includes a shaft portion 111 having a circular shape in cross section, a disk portion 112 provided on the shaft portion 111, an arcuate-shaped recessed portion 113 formed on the disk portion 112, and an end portion 114 connected to a tilt shaft of the first stepping motor 190.

(Second Braking Member)

[0069] One of the lower flap arms 201 provided on the lower flap 200, which is positioned nearest to the partition wall 80, is provided with a second drive member 210 so as to tilt integrally therewith.

[0070] The second drive member 210 includes a shaft portion 211 having a circular shape in cross section, a drive flange 212 provided on the shaft portion 211, a drive pin 213 provided at a distal end of the drive flange 212, and an end portion 214 connected to a tilt shaft of the second stepping motor 290.

[0071] The second drive member 210 is connected to a second braking member 240 via a second coupling member 230. The second coupling member 230 includes a coupling arm 231, and coupling pin holes 233, 234 provided respectively at both end portions of the connecting arm 231.

[0072] The second braking member 240 includes a shaft portion 241, a fan-shaped portion 242 formed into a fan shape having a pivot at a center of the shaft portion 241, a braking flange 243 provided on the shaft portion 241, and a braking pin 244 provided at a distal end of the braking flange 243.

(Partition Wall Bearing)

[0073] In contrast, the partition wall 80 is provided with a partition wall bearing 81 configured to tiltably support the shaft portion 111 of the first braking member 110, a partition wall bearing 82 configured to tiltably support the shaft portion 211 of the second drive member 210 on the side of the partition wall 80, and a partition wall bearing 84 configured to tiltably support the shaft portion 241 of the second braking member 240. At this time, the partition wall bearing 84 is positioned between the partition wall bearing 81 and the partition wall bearing 82 so as to be arranged into a triangle shape.

(Motor Case)

[0074] The motor case 90 is provided with a bearing (not shown) configured to tiltably support the shaft portion 241 of the second braking member 240 on the side of the first stepping motor 190. However, one of this bearing and the partition wall bearing 84 may be omitted.

[0075] In addition, the motor case 90 is formed with a through hole 98 which allows a nut (not shown) for securing the same to the partition wall 80 to penetrate therethrough, and the partition wall 80 is formed with a partition wall female screw 89 at a position corresponding to the through hole 98. The first stepping motor 190 and the second stepping motor 290 are provided in the motor case 90 by a known measure.

[0076] The shaft portion 111 of the first braking member 110 connected to the front flap 100 is pivotably supported by the partition wall bearing 81, the shaft portion 211 of the second drive member 210 connected to the lower flap 200 is pivotably supported by the partition wall bearing 82, and the shaft portion 241 of the second braking member 240 is pivotably supported by the partition wall bearing 84 and a bearing (not shown) provided on the motor case 90, respectively.

[0077] The coupling pin hole 233 and the coupling pin hole 234 of the second coupling member 230 are pivotably engaged with the drive pin 213 of the second drive member 210 and the braking pin 244 of the second braking member 240, respectively.

(Tilting Mechanism When Operation is Stopped)

[0078] When the operation is stopped (suspended) as shown in Fig. 12, the front flap 100 stands upright substantially perpendicularly, and the lower flap 200 lies substantially horizontally (see Fig. 6(a)).

[0079] At this time, the arcuate-shaped recessed portion 113 of the first braking member 110 of the front flap 100 stands upright substantially perpendicularly. The drive flange 212 of the second drive member 210 of the first braking member 110 stands upright, and pushes the second coupling member 230 upward. Therefore, the fan-shaped portion 242 of the second braking member 240 lies substantially horizontally.

[0080] Then, an arcuate surface (depressed surface) of the arcuate-shaped depressed portion 113 and an arcuate surface (projected surface) of the fan-shaped portion 242 come into abutment with each other. Therefore, even when an attempt is made to tilt the front flap 100, the abutment prevents the tilting movement, and hence the front flap 100 cannot be tilted. In other words, the front flap 100 is brought into a locked state.

(Tilting Mechanism During Operation)

[0081] In Fig. 13, since the second stepping motor 290 tilts the second drive member 210 clockwise (tilts the same counterclockwise when viewed from the back side of the sheet of the drawing), the drive flange 212 lies down. Therefore, the second coupling member 230 is pulled downward, and the second braking member 240

is tilted clockwise. In other words, the fan-shaped portion 242 is inverted and the arcuate portion thereof is apart from the arcuate-shaped depressed portion 113 of the first braking member, whereby the front flap 100 is tiltable. In other words, a state in which the lock of the front flap 100 is released (it may be referred to as "unlock", hereinafter) is resulted (see Fig. 6(c)).

[0082] In Fig. 14, if the first stepping motor 190 is activated to tilt the front flap 100 counterclockwise, the front flap 100 can be lied down substantially horizontally. When an attempt is made in turn to tilt the lower flap 200 counterclockwise in this state, a distal end of the fan-shaped portion 242 of the second braking member 240 comes into abutment with the disk portion 112 of the first braking member 110, so that the tilting movement is prevented. Since a space is provided between the both in the drawing, the tilting movement is made by an amount corresponding to the space, precisely speaking (see Fig. 6(e)).

[0083] As described above, the indoor unit 1 includes the tilting mechanism, and the front flap 100 or the lower flap 200 is prevented from tilting inadvertently by locking or unlocking between the first braking member 110 and the second braking member 240. Therefore, even when the front flap 100 and the lower flap 200 are arranged in proximity, interference does not occur when the both are tilted.

[0084] Therefore, the blowout port 63 can be covered by the front flap 100 and the lower flap 200 with a relatively narrow gap formed therebetween. In other words, the design characteristics of the blowout port 63 is secured by the front side 100a of the front flap 100 and the front side 200a of the lower flap 200.

[0085] The respective drawings described above are illustrated schematically, and the relative positions and sizes are not limited to the illustration. Although the first braking member 110 and the second braking member 240 are in abutment with each other over a wide range of the arcuate abutment surface, it is also possible to form the arcuate-shaped depressed portion 113 of the first braking member 110 into a flat surface so that the first braking member 110 comes into partly abutment with the second braking member 240 only when the first braking member 110 is tilted at a predetermined angle. The disk portion 112 does not have to be circular because what is essential is just to have an abutment surface with respect to the second braking member 240.

(Second Example of Tilting Mechanism)

[0086] Since the present invention is not intended to limit the tilting mechanism, a second example of the tilting mechanism will be shown below.

[0087] Fig. 15 to Fig. 18 are drawings for explaining the second example of the tilting mechanism. Fig. 15 is an exploded perspective view showing components thereof, and Fig. 16 to Fig. 17 are side views showing the actions of the components of the second example of the tilting mechanism.

(First Braking Member)

[0088] In Fig. 15, one of the front flap arms 101 provided on the front flap 100, which is positioned nearest to the partition wall 80, is provided with a first braking member 120 so as to tilt integrally therewith.

[0089] The first braking member 120 includes a shaft portion 121 having a circular shape in cross section, a cam portion 122 provided on the shaft portion 121, and an end portion 124 coupled to a tilt shaft of the first stepping motor 190. The cam portion 122 in this example is an end surface cam formed with a shouldered portion 123, and has a large diameter portion 122a and a small diameter portion 122b having a smaller distance from a center of the shaft portion 121 than the large diameter portion 122a with the shouldered portion 123 interposed therebetween as a boundary.

(Second Braking Member)

[0090] One of the lower flap arms 201 provided on the lower flap 200, which is positioned nearest to the partition wall 80, is provided with a second braking member 220 so as to tilt integrally therewith.

[0091] The second braking member 220 includes a shaft portion 221 having a circular shape in cross section, a cam portion 222 provided on the shaft portion 221, and an end portion 224 coupled to a tilt shaft of the second stepping motor 290. The cam portion 222 in this example is an end surface cam where a shouldered portion 223 is formed, and has a large diameter portion 222a and a small diameter portion 222b having a smaller distance from a center of the shaft portion 221 than the large diameter portion 222a with the shouldered portion 223 being a boundary.

(Seesaw Member)

[0092] A seesaw member 300 has an arm portion 304 and a pivot shaft 303 provided at a center of the arm portion 304. Hereinafter, one of distal ends of the arm portion 304 is referred to as a first distal end 301, and the other end is referred to as a second distal end 302.

(Partition Wall Bearing)

[0093] In contrast, the partition wall 80 is provided with the partition wall bearing 81 configured to tiltably support the shaft portion 121 of the first braking member 120, the partition wall bearing 82 configured to tiltably support the shaft portion 221 of the second braking member 220, and a partition wall bearing 83 configured to tiltably support the pivot shaft 303 of the seesaw member 300 on the side of the partition wall 80.

[0094] Although the pivot shaft 303 of the seesaw member 300 on the side of the motor case 90 is tiltably

supported by a bearing (not shown) provided on the motor case 90, one of the bearing and the partition wall bearing 83 may be omitted.

(Tilting Mechanism When Operation is Stopped)

[0095] When the operation is stopped (suspended) as shown in Fig. 16(a), the front flap 100 stands upright substantially perpendicularly and, in contrast, the lower flap 200 lies down substantially horizontally (see Fig. 6(a)).

[0096] The small diameter portion 122b of the first braking member 120 connected integrally to the front flap 100 is positioned on the upper side, and the large diameter portion 222a of the second braking member 220 connected integrally to the lower flap 200 is positioned on the upper side, and the second distal end 302 of the seesaw member 300 comes into abutment with the large diameter portion 222a. Also, the first distal end 301 of the seesaw member 300 is in abutment with the small diameter portion 122b of the first braking member 120 or opposes the same with a small gap therebetween.

[0097] Therefore, when an attempt is made to tilt the front flap 100 counterclockwise, the shouldered portion 123 of the first braking member 120 comes into abutment with the first distal end 301 of the seesaw member 300 to cause the seesaw member 300 to tilt clockwise. However, since the second distal end 302 of the seesaw member 300 comes into abutment with the large diameter portion 222a of the second braking member 220, the front flap 100 cannot be tilted counterclockwise. In other words, the front flap 100 is brought into the locked state.

(Tilting Mechanism During Operation)

[0098] When starting the operation as shown in Fig. 17, since the second stepping motor 290 tilts the second drive member 210 clockwise (tilts counterclockwise when viewed from the back side of the sheet of this drawing), the small diameter portion 222b of the second braking member 220 is positioned on the upper side (see Fig. 6(c)).

[0099] Then, the second distal end 302 of the seesaw member 300 is allowed to tilt (pivot) until it comes into abutment with the small diameter portion 222b of the second braking member 220.

[0100] In Fig. 18, if the first stepping motor 190 is activated to tilt the front flap 100 counterclockwise, the front flap 100 takes a position lying down substantially horizontally (see Fig. 6(e)).

[0101] In other words, since the seesaw member 300 is allowed to tilt (pivot) as described above, when the first braking member 120 tilts counterclockwise, the large diameter portion 122a of the cam portion 122 comes into abutment with the second distal end 302 of the seesaw member 300 to tilt the seesaw member 300. In other words, a state in which the lock of the tilting movement of the front flap 100 is released (the same as "unlock") is resulted. At this time, the second distal end 302 of the seesaw member 300 is in abutment with the small diameter portion 222b of the second braking member 220 or opposes the same with a small gap therebetween.

[0102] Alternatively, when an attempt is made to tilt the lower flap 200 counterclockwise, the first distal end 301 of the seesaw member 300 comes into abutment with the shouldered portion 223 of the second braking member 220 to cause the seesaw member 300 to tilt counterclockwise. However, since the first distal end 301 of the seesaw member 300 comes into abutment with the large diameter portion 122a of the first braking member 120, the lower flap 200 cannot be tilted counterclockwise. In other words, the lower flap 200 is in the locked state.

Industrial Applicability

[0103] According to the present invention, since the dew condensation on the vertical wind direction plates can be prevented during the cooling operation, the indoor unit of the present invention can be widely used as the indoor unit of the various types of air conditioners for home use and commercial use.

Reference Sign List

[0104]

1 indoor unit, 10 main body, 20 blowing fan, 30 heat exchanger, 40 front panel, 50 suction port, 60 fan casing, 61 front casing member, 62 rear casing member, 63 blowout port, 64 casing flange, 65 casing bearing, 70 lower surface, 80 partition wall, 81 partition wall bearing, 82 partition wall bearing, 83 partition wall bearing, 84 partition wall bearing, 89 partition wall female screw, 90 motor case, 98 through hole, 100 front flap, 100a front side of front flap, 100b back side of front flap, 101 front flap arm, 102 front flap revolving shaft, 110 braking member, 111 shaft portion, 112 disk portion, 113 arcuate-shaped recessed portion, 114 end portion, 120 braking member, 121 shaft portion, 122 cam portion, 122a large diameter portion, 122b small diameter portion, 123 shouldered portion, 124 end portion, 160 front stopper, 190 stepping motor, 200 lower flap, 200a front side of the lower flap, 200b back side of the lower flap, 201 lower flap arm, 202 lower flap revolving shaft, 210 drive member, 211 shaft portion, 212 drive flange, 213 drive pin, 214 end portion, 220 braking member, 221 shaft portion, 222 cam portion, 222a large diameter portion, 222b small diameter portion, 223 shouldered portion, 224 end portion, 230 coupling member, 231 coupling arm, 233 coupling pin hole, 234 coupling pin hole, 240 braking member, 241 shaft portion, 242 fan-shaped portion, 243 braking flange, 244 braking pin, 260 lower stopper, 290 stepping motor, 300 seesaw member, 301 distal end, 302 distal end, 303 pivot shaft, 304 arm portion, A2 angle, A4 angle, A6 angle, A8 angle, B2

angle, B4 angle

Claims

1. An indoor unit of an air conditioner comprising:

   a main body (10), being a box member having blowing means (20) and heat exchanging means (30) stored therein, and including a blowout port (63) formed on a front surface thereof in a range nearer a lower surface (70) and on the lower surface (70) in a range nearer the front surface;
   a front flap (100) tiltably arranged on the front surface side of the blowout port (63);
   a lower flap (200) tiltably arranged on the lower surface side of the blowout port (63);
   a fan casing (60) which defines a blowout air duct from the blowing means (20) to the blowout port (63) ;
   front tilting means configured to tilt the front flap (100);
   lower tilting means configured to tilt the lower flap (200);
   characterized in that control means is configured during a cooling operation to control the front tilting means and the lower tilting means so that the front flap (100) and the lower flap (200) stop at positions to form a smoothly continuing surface in the blowout air duct at a predetermined distance from each other, and the front side and the back side of the front flap and the lower flap are all exposed to blown air.

2. The indoor unit of the air conditioner of claim 1, **characterized in that** it comprises:

   a front stopper (160) configured to limit a tilting range when the front flap (100) tilts inward of the fan casing (60);
   a lower stopper (260) configured to limit a tilting range when the lower flap (200) tilts outward of the fan casing (60);
   the control means causes the front flap (100) to take a position parallel to the front surface and the lower flap (200) to take a position parallel to the lower surface (70) when the operation is stopped, and
   the control means causes to execute:

      a first step of tilting the lower flap (200) in a direction to abut on the lower stopper (260) when starting a cooling operation;
      a second step of tilting the lower flap (200) in a direction to move away from the lower stopper (260), and stopping the same in the blowout air duct in succession to the first step;
      a third step of tilting the front flap (100) in a direction to abut on the front stopper (160) in succession to the second step; and
      a fourth step of tilting the front flap (100) in a direction to move away from the front stopper (160), and stopping the same to a position which forms a smoothly continuing surface against the lower flap (200) at a predetermined distance in succession to the third step.

3. The indoor unit of the air conditioner of claim 2, wherein
   a front flap arm (101) is fixed onto a back side (100b) of the front flap (100) which is positioned on the side of the blowout air duct of the front flap (100) when the operation is stopped, and a front flap revolving shaft (102) configured to rotatably support the front flap arm (101) provided at a distal end of the front flap arm (101) is provided,
   a lower flap arm (201) is fixed onto a back side (200b) of the lower flap (200) which is positioned on the side of the blowout air duct of the lower flap (200) when the operation is stopped, and a lower flap revolving shaft (202) configured to rotatably support the lower flap arm (201) provided at a distal end of the lower flap arm (201) is provided, and
   the back side (100b) of the front flap (100) is positioned downside and the back side (200b) of the lower flap (200) is positioned upper side in the fourth step.

4. The indoor unit of the air conditioner of claim 2 or 3, wherein
   the control means causes to execute:

      a fifth step of tilting the front flap (100) in a direction to abut on the front stopper (160) to abut on the front stopper (160) when ending the cooling operation;
      a sixth step of tilting the front flap (100) in a direction to move away from the front stopper (160), and stopping the same at a position parallel to the front surface in succession to the fifth step;
      a seventh step of tilting the lower flap (200) in a direction to abut on the lower stopper (260) to abut on the lower stopper (260) in succession to the sixth step; and
      an eighth step of tilting the lower flap (200) in a direction to move away from the lower stopper (260), and stopping the lower flap (200) to a position parallel to the lower surface (70) in succession to the seventh step.

Patentansprüche

1. Eine Innenraumeinheit einer Klimaanlage mit:

einem Hauptkörper (i.0), der ein Kastenelement ist, das ein darin aufgenommenes Gebläsemittel (20) und ein Wärmeaustauschmittel (30) aufweist und einen Ausblasanschluss (63) enthält, der an einer vorderen Oberfläche davon in einem Bereich näher bei einer unteren Oberfläche (70) und an der unteren Oberfläche (70) in einem Bereich näher bei der vorderen Oberfläche ausgebildet ist,
einer vorderen Klappe (100), die schwenkbar an der Seite der vorderen Oberfläche des Ausblasanschlusses (63) angeordnet ist,
einer unteren Klappe (200), die schwenkbar an der Seite der unteren Oberfläche des Ausblasanschlusses (63) angeordnet ist,
einem Lüftergehäuse (60), das einen Ausblasluftkanal von dem Gebläsemittel (20) zu dem Ausblasanschluss (63) definiert,
einem vorderen Schwenkmittel, das konfiguriert ist, um die vordere Klappe (100) zu schwenken,
einem unteren Schwenkmittel, das konfiguriert ist, um die untere Klappe (200) zu schwenken,
dadurch gekennzeichnet, das ein Steuermittel konfiguriert ist, um während eines Kühlbetriebs das vordere Schwenkmittel und das untere Schwenkmittel so zu steuern, dass die vordere Klappe (100) und die untere Klappe (200) an Positionen stoppen, um eine sich gleichmäßig fortsetzende Oberfläche in dem Ausblasluftkanal in einer vorbestimmten Distanz voneinander zu bilden, und dass die vordere Seite und die hintere Seite der vorderen Klappe und der unteren Klappe alle zu ausgeblasener Luft freiliegen.

2. Die Innenraumeinheit der Klimaanlage gemäß Anspruch 1, **dadurch gekennzeichnet, dass** sie aufweist:

einen vorderen Stopper (160), der konfiguriert ist, um einen Schwenkbereich zu begrenzen, wenn die vordere Klappe (100) zum Inneren des Lüftergehäuses (60) schwenkt,
einen unteren Stopper (260), der konfiguriert ist, um einen Schwenkbereich zu begrenzen, wenn die untere Klappe (200) zum Äußeren des Lüftergehäuses (60) schwenkt,
wobei das Steuermittel die vordere Klappe (100) in eine Position parallel zu der vorderen Oberfläche bringt und die untere Klappe (200) in eine Position parallel zu der unteren Oberfläche (70) bringt, wenn der Betrieb gestoppt wird bzw. ist, und
wobei das Steuermittel die folgende Ausführung bewirkt:

einen Schritt des Schwenkens der unteren Klappe (200) in einer Richtung zur Anlage an dem unteren Stopper (260), wenn ein Kühlbetrieb gestartet wird bzw. ist,
einen zweiten Schritt des Schwenkens der unteren Klappe (200) in einer Richtung zur Bewegung weg von dem unteren Stopper (260), und des Stoppens derselben in dem Ausblasluftkanal nachfolgend zu dem ersten Schritt,
einen dritten Schritt des Schwenkens der vorderen Klappe (100) in einer Richtung zur Anlage an dem vorderen Stopper (160) nachfolgend zu dem zweiten Schritt, und
einen vierten Schritt des Schwenkens der vorderen Klappe (100) in einer Richtung zur Bewegung weg von dem vorderen Stopper (160), und des Stoppens derselben an einer Position, die eine sanft fortgesetzte Fläche gegen die untere Klappe (200) in einer vorbestimmten Entfernung bildet, nachfolgend zu dem dritten Schritt.

3. Die Innenraumeinheit der Klimaanlage gemäß Anspruch 2, wobei
ein vorderer Klappenarm (101) an einer Rückseite (100b) der vorderen Klappe (100) befestigt ist, welche an der Seite des Ausblasluftkanals der vorderen Klappe (100) positioniert ist, wenn der Betrieb gestoppt ist, und wobei eine Drehwelle der vorderen Klappe (102) vorgesehen ist, die konfiguriert ist, um den vorderen Klappenarm (101) drehbar zu tragen und die an einem distalen Ende des vorderen Klappenarms (101) vorgesehen ist,
ein unterer Klappenarm (201) an einer Rückseite (200b) der unteren Klappe (200) befestigt ist, welche an der Seite des Ausblasluftkanals der unteren Klappe (200) positioniert ist, wenn der Betrieb gestoppt ist, und eine Drehwelle der unteren Klappe (201) vorgesehen ist, die konfiguriert ist, um den unteren Klappenarm (201) drehbar zu tragen und die an einem distalen Ende des unteren Klappenarms (201) vorgesehen ist, und
in dem vierten Schritt die Rückseite (100b) der vorderen Klappe (100) zur Unterseite hin positioniert ist und die Rückseite (200b) der unteren Klappe (200) zur Oberseite hin positioniert ist.

4. Die Innenraumeinheit der Klimaanlage gemäß Anspruch 2 oder 3, wobei
das Steuermittel folgende Ausführung bewirkt:

einen fünften Schritt des Schwenkens der vorderen Klappe (100) in einer Richtung zur Anlage an dem vorderen Stopper (160), um an dem vorderen Stopper (160) anzuliegen, wenn der Kühl-

betrieb beendet wird bzw. ist,
einen sechsten Schritt des Schwenkens der vorderen Klappe (100) in einer Richtung zur Bewegung weg von dem vorderen Stopper (160) und des Stoppens derselben an einer Position parallel zu der vorderen Fläche nachfolgend zu dem fünften Schritt,
einen siebten Schritte des Schwenkens der unteren Klappe (200) in einer Richtung zur Anlage an dem unteren Stopper (260), um an dem unteren Stopper (260) anzuliegen, nachfolgend zu dem sechsten Schritt, und
einen achten Schritt des Schwenkens der unteren Klappe (200) in einer Richtung zur Bewegung weg von dem unteren Stopper (260), und des Stoppens der unteren Klappe (200) an einer Position parallel zu der unteren Oberfläche (70) nachfolgend zu dem siebten Schritt.

Revendications

1. Unité d'intérieur d'un climatiseur comprenant :

un corps principal (10), qui un élément de boîte ayant un moyen de soufflage (20) et un moyen d'échange de chaleur (30) stocké en lui, et incluant un orifice de surpression (63) formé sur sa surface avant dans une zone plus proche d'une surface inférieure (70) et sur la surface inférieure (70) dans une zone plus proche de la surface avant ;
un volet avant (100) agencé d'une manière inclinable sur le côté de surface avant de l'orifice de surpression (63) ;
un volet inférieur (200) agencé d'une manière inclinable sur le côté de surface inférieure de l'orifice de surpression (63) ;
un carter de ventilateur (60) qui définit un conduit d'air de surpression du moyen de soufflage (20) à l'orifice de surpression (63) ;
un moyen d'inclinaison avant configuré pour incliner le volet avant (100) ;
un moyen d'inclinaison inférieur configuré pour incliner le volet inférieur (200) ;
caractérisée en ce qu'un moyen de commande est configuré au cours d'une opération de refroidissement pour commander le moyen d'inclinaison avant et le moyen d'inclinaison inférieur de telle sorte que le volet avant (100) et le volet inférieur (200) s'arrêtent à des positions pour former une surface continue régulière dans le conduit d'air de surpression à une distance prédéterminée l'un de l'autre, et que le côté avant et le côté arrière du volet avant et du volet inférieur soient tous exposés à l'air soufflé.

2. Unité d'intérieur du climatiseur selon la revendication 1, **caractérisée en ce qu'**elle comprend :

une butée avant (160) configurée pour limiter une plage d'inclinaison lorsque le volet avant (100) s'incline vers l'intérieur du carter de ventilateur (60) ;
une butée inférieure (260) configurée pour limiter une plage d'inclinaison lorsque le volet inférieur (200) s'incline vers l'extérieur du carter de ventilateur (60) ;
le moyen de commande amène le volet avant (100) à prendre une position parallèle à la surface avant et le volet inférieur (200) à prendre une position parallèle à la surface inférieure (70) lorsque l'opération est arrêtée, et
le moyen de commande amène à exécuter :

une première étape d'inclinaison du volet inférieur (200) dans une direction pour le faire buter sur la butée inférieure (260) lors du démarrage d'une opération de refroidissement ;
une deuxième étape d'inclinaison du volet inférieur (200) dans une direction pour l'éloigner de la butée inférieure (260), et l'arrêter dans le conduit d'air de surpression après la première étape ;
une troisième étape d'inclinaison du volet avant (100) dans une direction pour le faire buter sur la butée avant (160) après la deuxième étape ; et
une quatrième étape d'inclinaison du volet avant (100) dans une direction pour éloigner de la butée avant (160), et l'arrêter à une position qui forme une surface continue régulière contre le volet inférieur (200) à une distance prédéterminée après la troisième étape.

3. Unité d'intérieur du climatiseur selon la revendication 2, dans laquelle
un bras de volet avant (101) est fixé sur un côté arrière (100b) du volet avant (100) qui est positionné sur le côté du conduit d'air de surpression du volet avant (100) lorsque l'opération est arrêtée, et un arbre tournant de volet avant (102) configuré pour supporter de manière rotative le bras de volet avant (101) prévu à une extrémité distale du bras de volet avant (101) est prévu,
un bras de volet inférieur (201) est fixé sur un côté arrière (200b) du volet inférieur (200) qui est positionné sur le côté du conduit d'air de surpression du volet inférieur (200) lorsque l'opération est arrêtée, et un arbre tournant de volet inférieur (202) configuré pour supporter de manière rotative le bras de volet inférieur (201) prévu à une extrémité distale du bras de volet inférieur (201) est prévu, et
le côté arrière (100b) du volet avant (100) est posi-

tionné vers le bas et le côté arrière (200b) du volet inférieur (200) est positionné vers le haut dans la quatrième étape.

4. Unité d'intérieur du climatiseur selon la revendication 2 ou 3, dans laquelle
le moyen de commande amène à exécuter :

une cinquième étape d'inclinaison du volet avant (100) dans une direction de butée sur la butée avant (160) pour le faire buter sur la butée avant (160) au terme de l'opération de refroidissement ;
une sixième étape d'inclinaison du volet avant (100) dans une direction pour l'éloigner de la butée avant (160), et l'arrêter à une position parallèle à la surface avant après la cinquième étape ;
une septième étape d'inclinaison du volet inférieur (200) dans une direction de butée sur la butée inférieure (260) pour le faire buter sur la butée inférieure (260) après la sixième étape ; et
une huitième étape d'inclinaison du volet inférieur (200) dans une direction pour l'éloigner de la butée inférieure (260), et d'arrêt du volet inférieur (200) à une position parallèle à la surface inférieure (70) après la septième étape.

FIG. 1

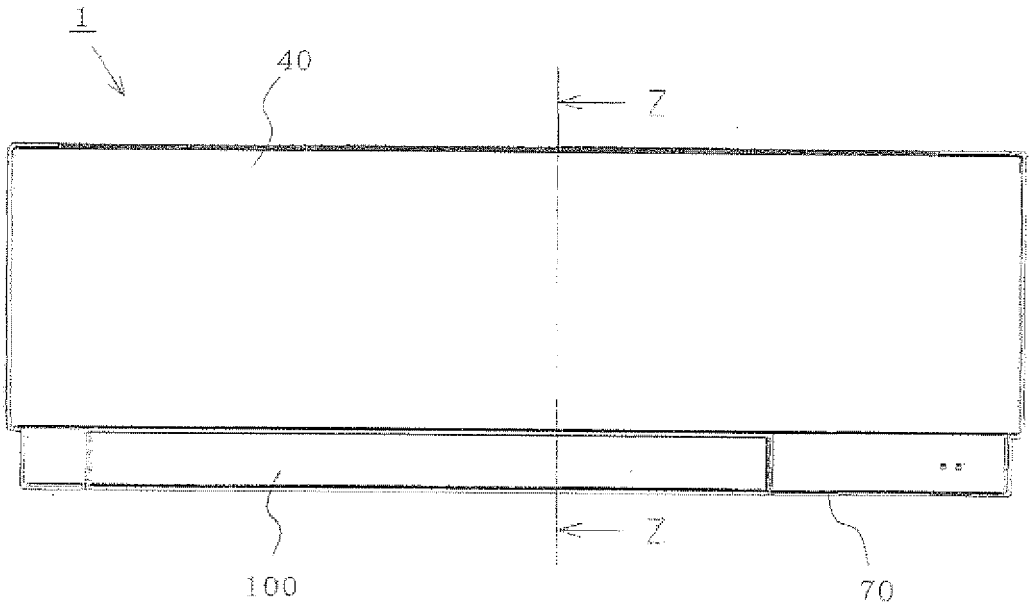


FIG. 2

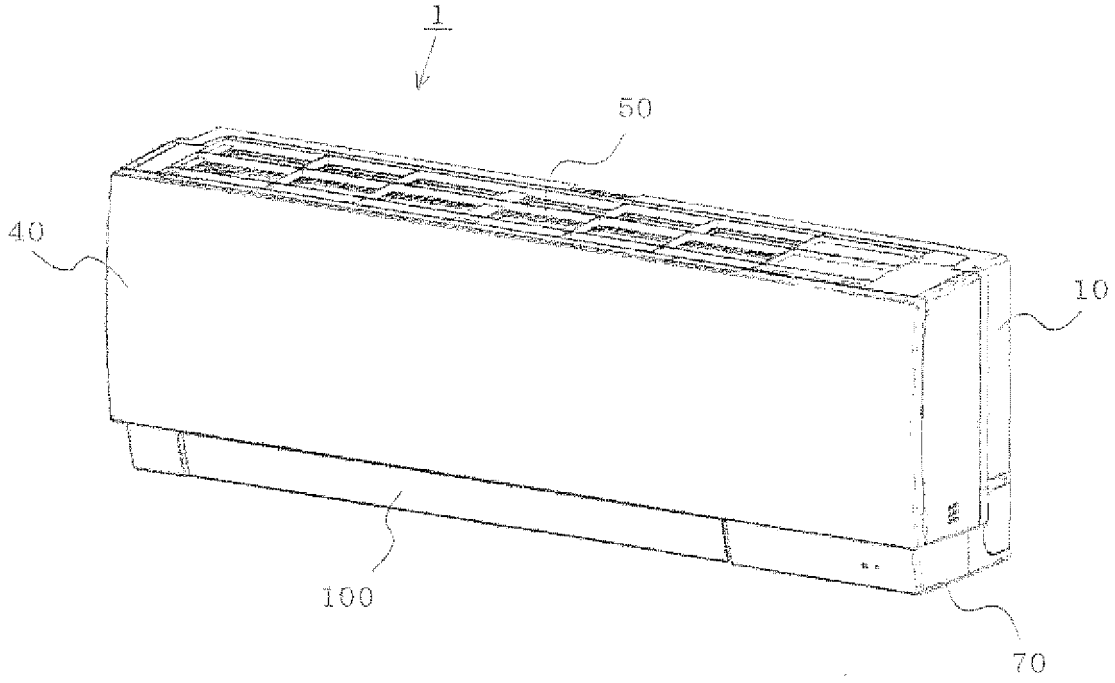


FIG. 3

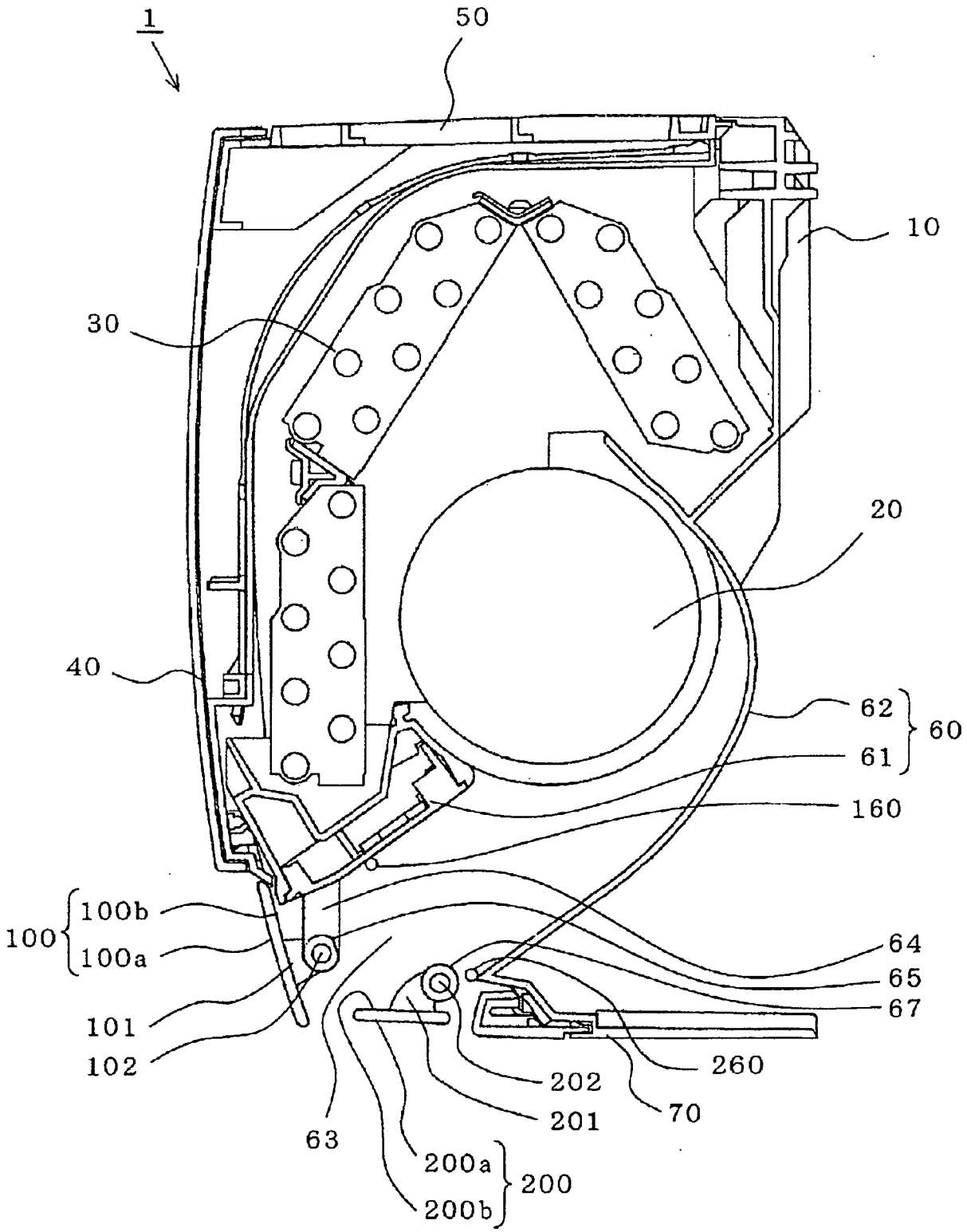

1
50
10
30
20
40
62
60
61
160
100b
100
100a
64
65
67
101
102
260
202
201
70
63
200a
200
200b

FIG. 4

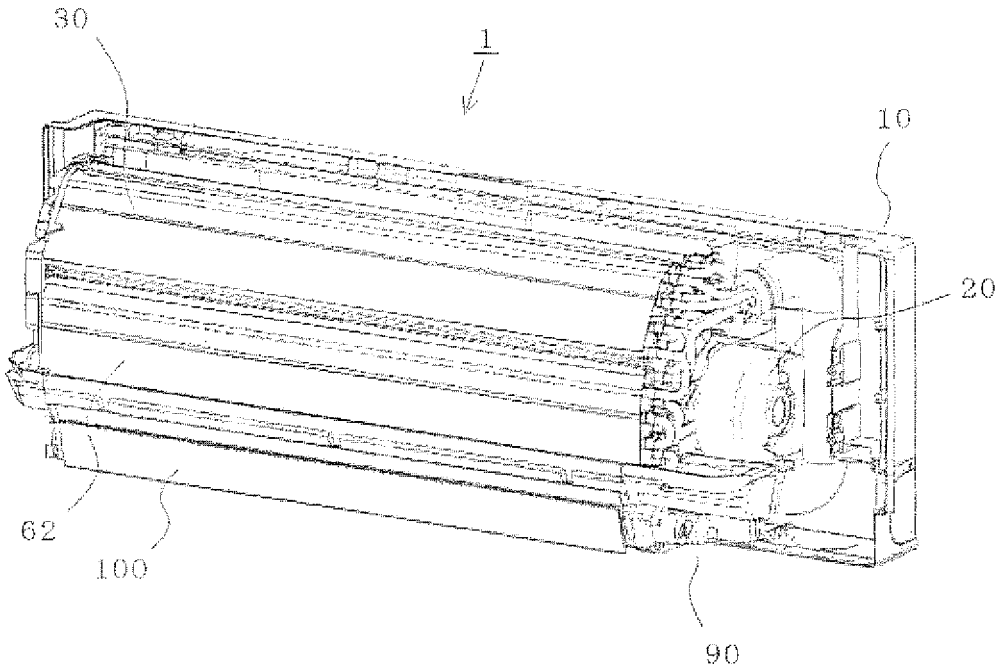


FIG. 5

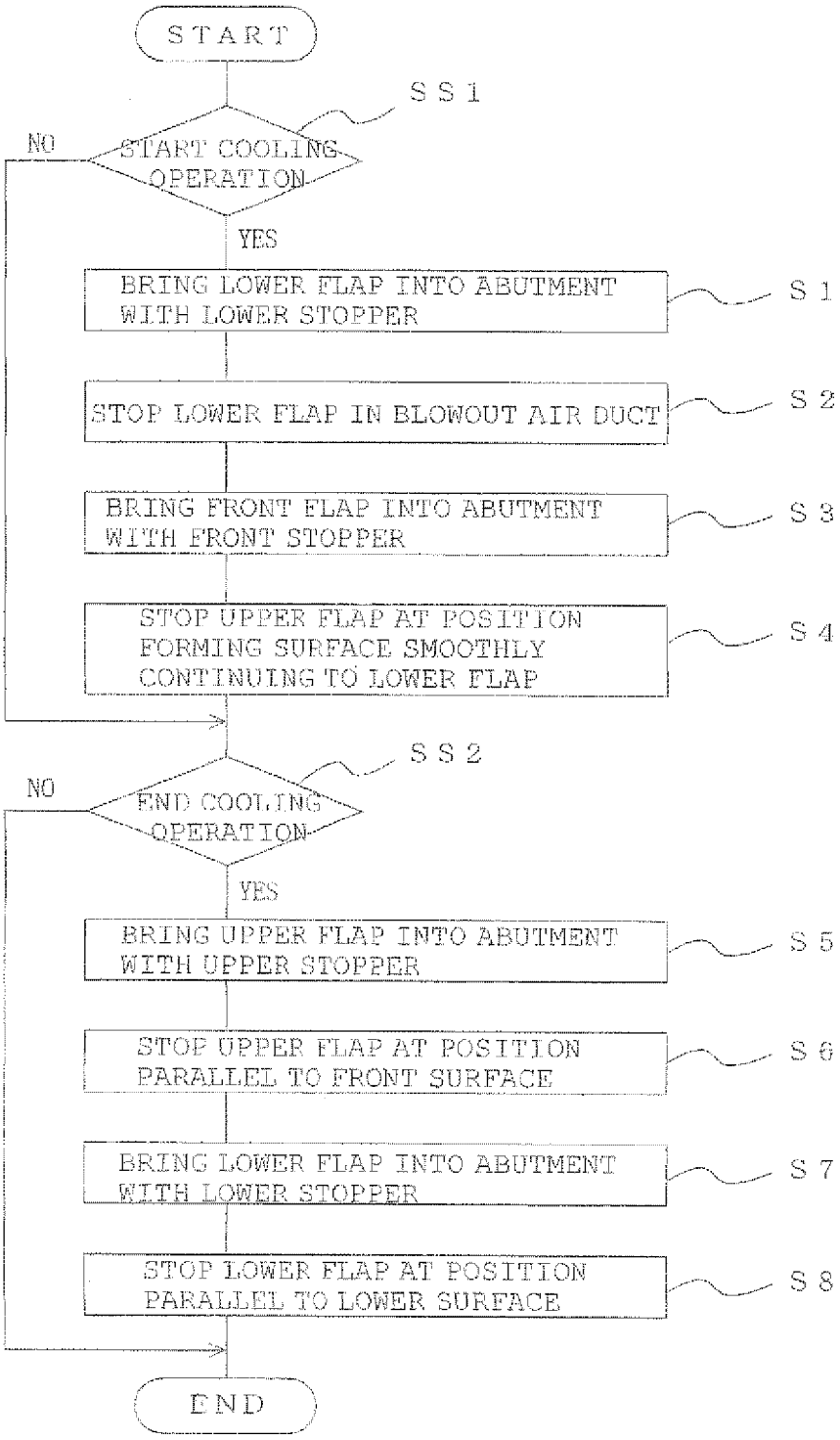
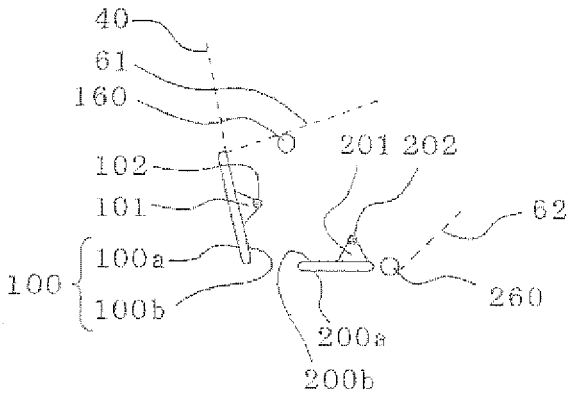
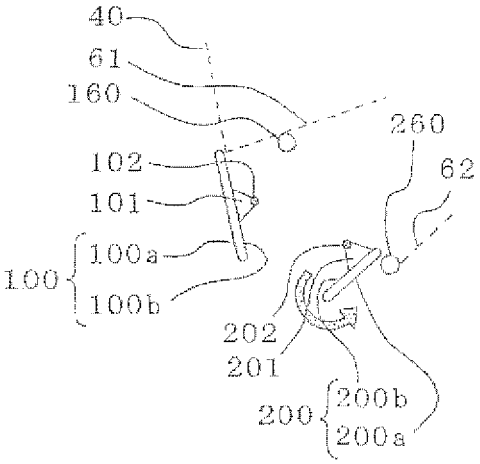

START
SS1
START COOLING OPERATION
NO
YES
BRING LOWER FLAP INTO ABUTMENT WITH LOWER STOPPER
S1
STOP LOWER FLAP IN BLOWOUT AIR DUCT
S2
BRING FRONT FLAP INTO ABUTMENT WITH FRONT STOPPER
S3
STOP UPPER FLAP AT POSITION FORMING SURFACE SMOOTHLY CONTINUING TO LOWER FLAP
S4
SS2
END COOLING OPERATION
NO
YES
BRING UPPER FLAP INTO ABUTMENT WITH UPPER STOPPER
S5
STOP UPPER FLAP AT POSITION PARALLEL TO FRONT SURFACE
S6
BRING LOWER FLAP INTO ABUTMENT WITH LOWER STOPPER
S7
STOP LOWER FLAP AT POSITION PARALLEL TO LOWER SURFACE
S8
END

FIG. 6

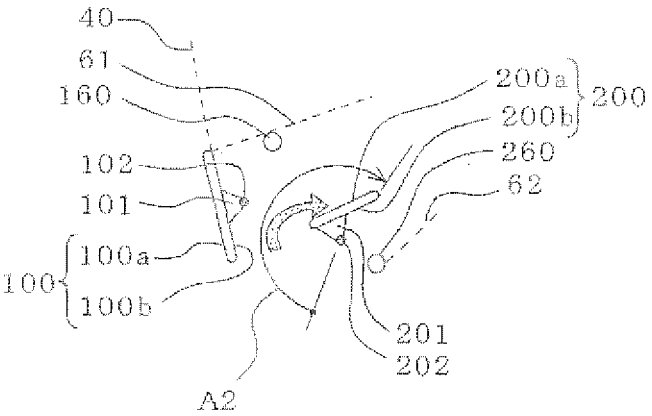
(a) STOPPED STATE



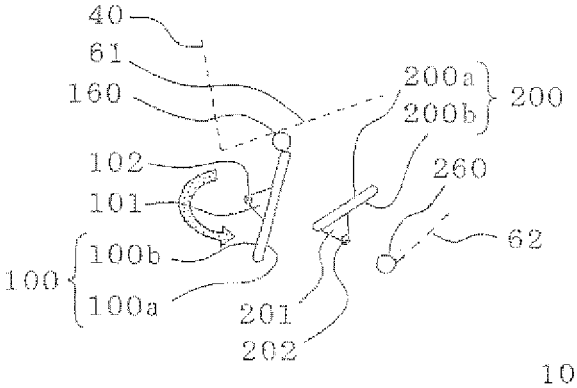
(b) POSITIONING OF LOWER FLAP



(c) LOWER FLAP AT POSITION FOR COOLING OPERATION



(d) POSITIONING OF FRONT FLAP



(e) FRONT FLAP AT POSITION FOR COOLING OPERATION

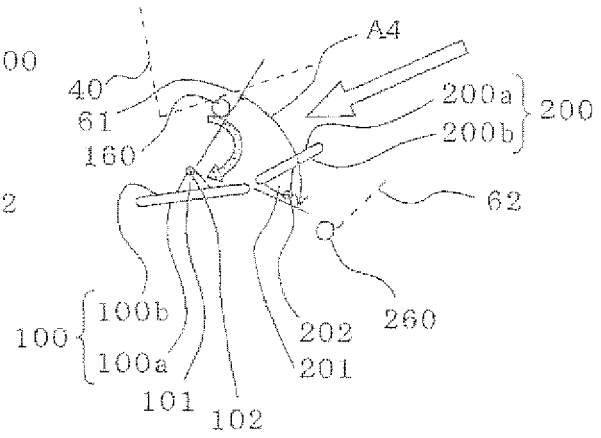
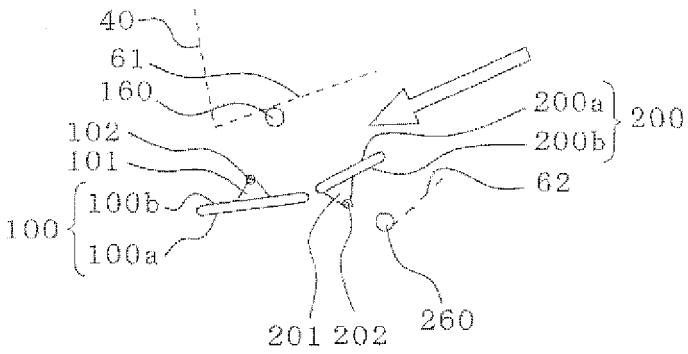
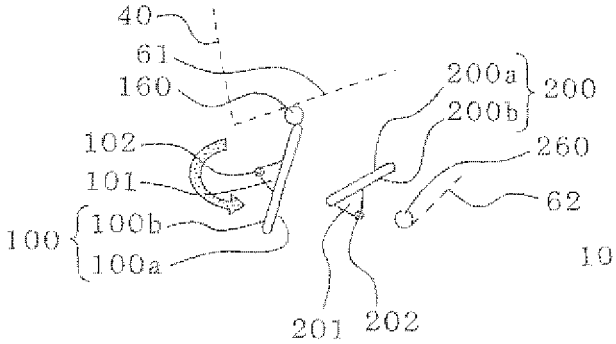


FIG. 7

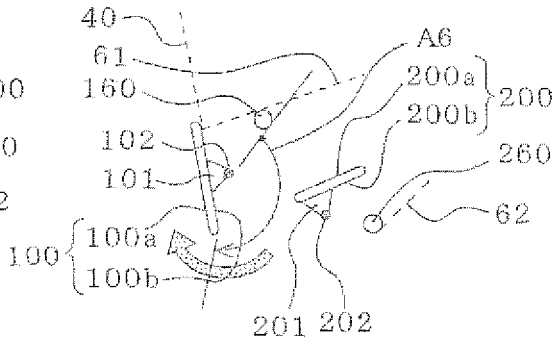
(a) STATE OF COOLING OPERATION



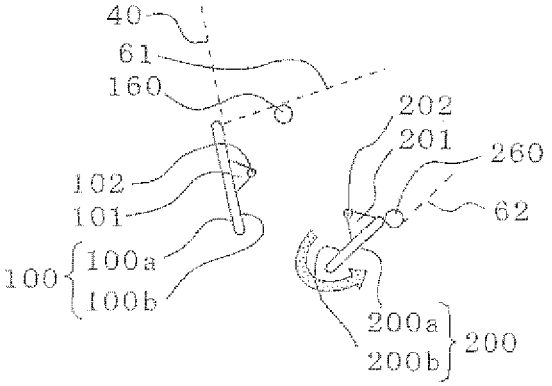
(b) POSITIONING OF FRONT FLAP



(c) FRONT FLAP IN STOPPED STATE



(d) POSITIONING OF LOWER FLAP



(e) LOWER FLAP IN STOPPED STATE

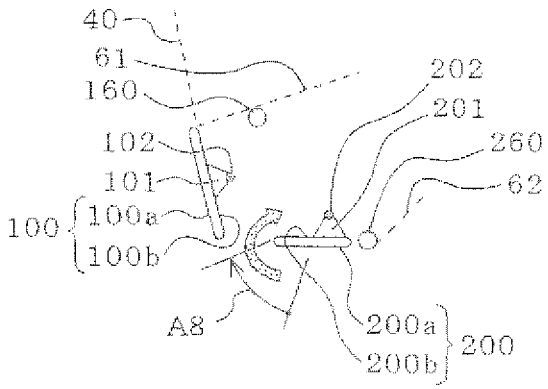


FIG. 8

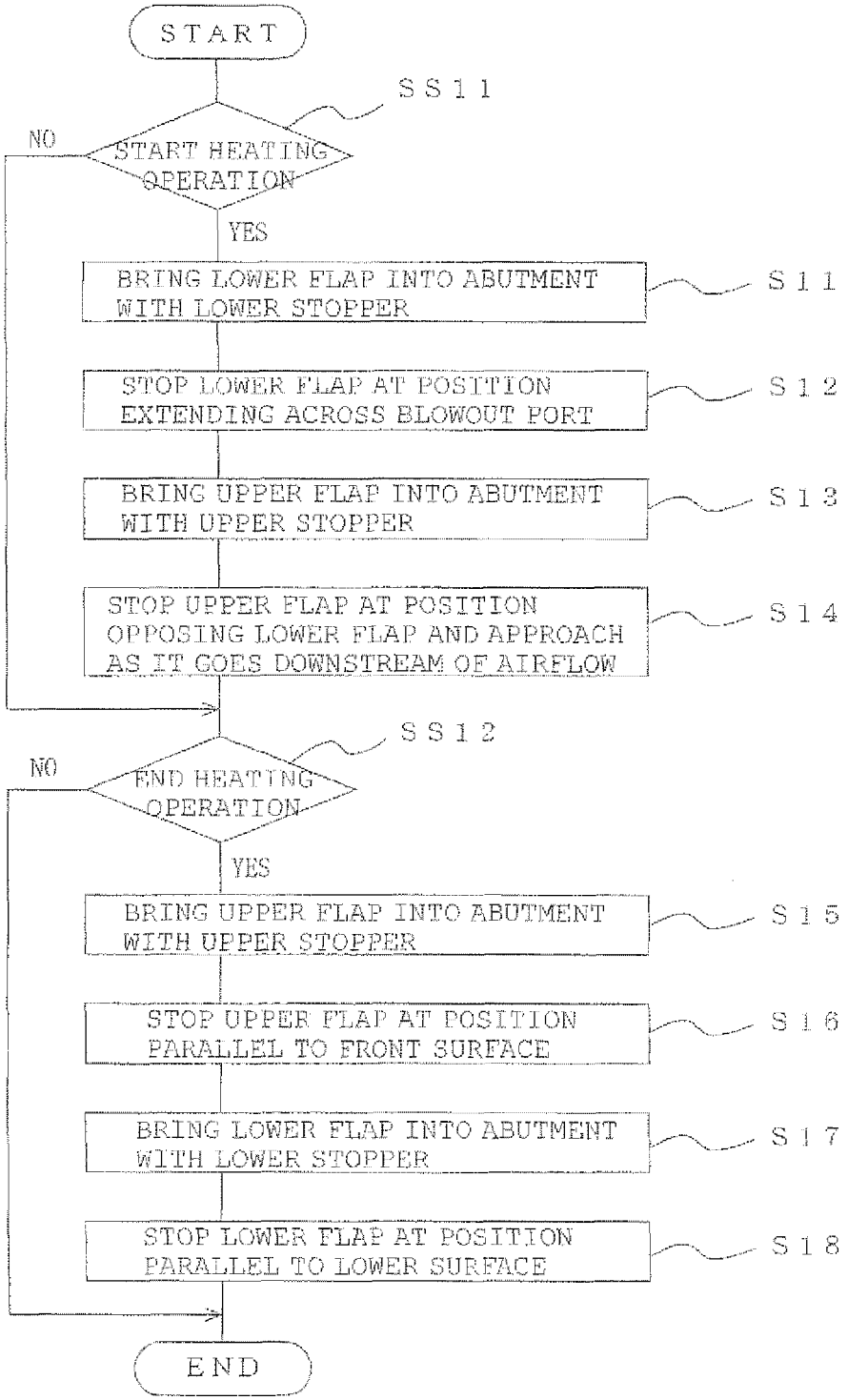
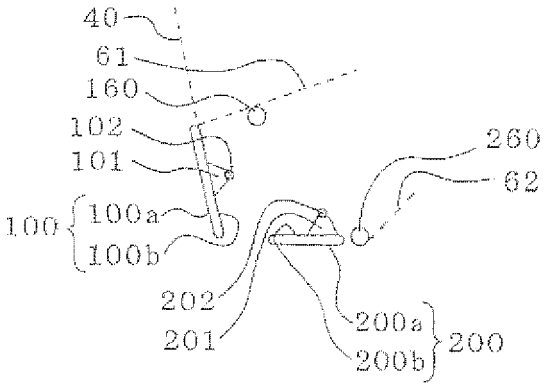
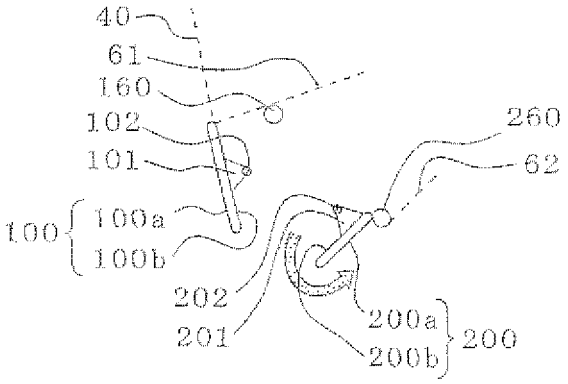

START
SS11
START HEATING OPERATION
NO
YES
BRING LOWER FLAP INTO ABUTMENT WITH LOWER STOPPER
S11
STOP LOWER FLAP AT POSITION EXTENDING ACROSS BLOWOUT PORT
S12
BRING UPPER FLAP INTO ABUTMENT WITH UPPER STOPPER
S13
STOP UPPER FLAP AT POSITION OPPOSING LOWER FLAP AND APPROACH AS IT GOES DOWNSTREAM OF AIRFLOW
S14
SS12
END HEATING OPERATION
NO
YES
BRING UPPER FLAP INTO ABUTMENT WITH UPPER STOPPER
S15
STOP UPPER FLAP AT POSITION PARALLEL TO FRONT SURFACE
S16
BRING LOWER FLAP INTO ABUTMENT WITH LOWER STOPPER
S17
STOP LOWER FLAP AT POSITION PARALLEL TO LOWER SURFACE
S18
END

FIG. 9

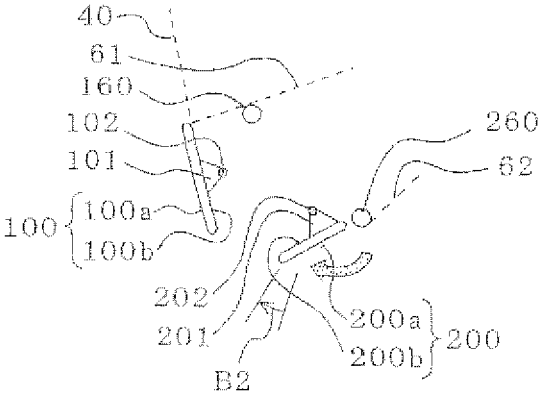
(a) STOPPED STATE



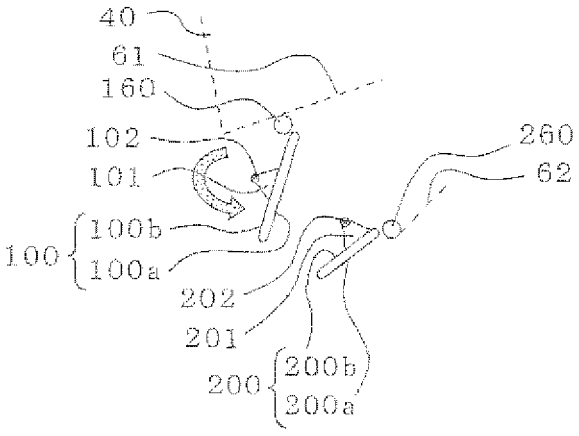
(b) POSITIONING OF LOWER FLAP



(c) LOWER FLAP AT POSITION FOR HEATING OPERATION



(d) POSITIONING OF FRONT FLAP



(e) FRONT FLAP AT POSITION FOR HEATING OPERATION

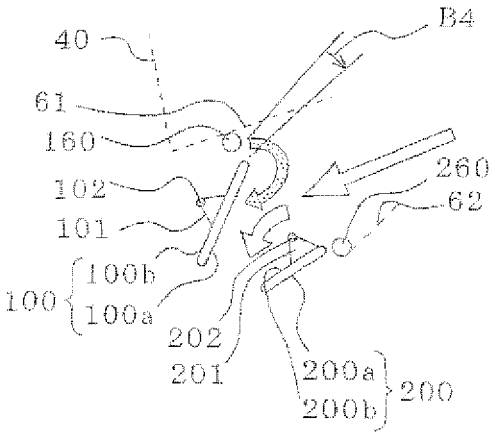
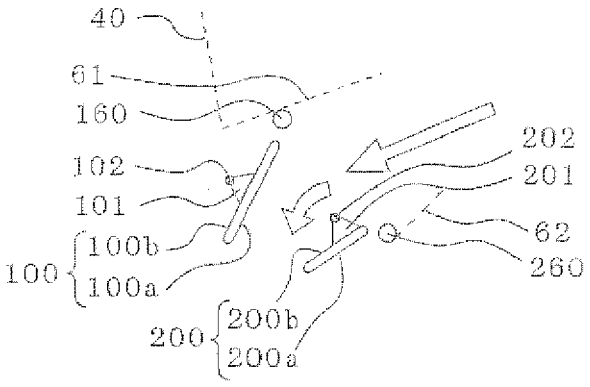
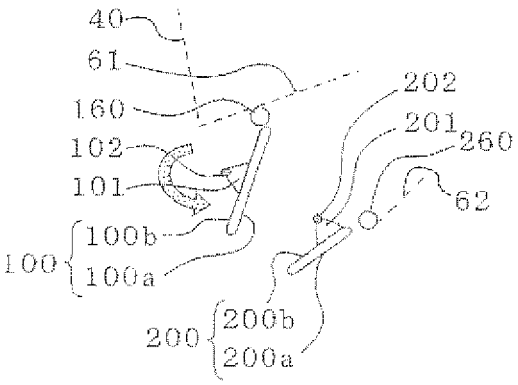


FIG. 10

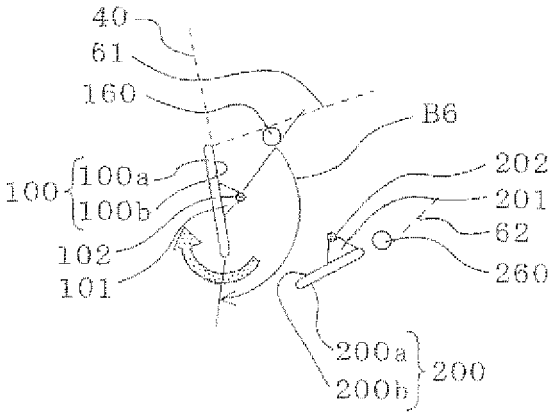
(a) POSITION OF HEATING OPERATION



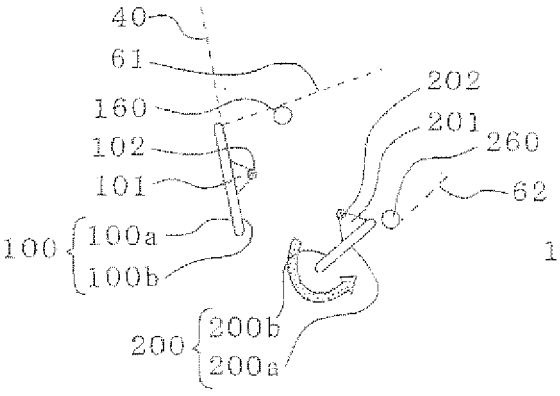
(b) POSITIONING OF FRONT FLAP



(c) FRONT FLAP IN STOPPED STATE



(d) POSITIONING OF LOWER FLAP



(e) LOWER FLAP IN STOPPED STATE

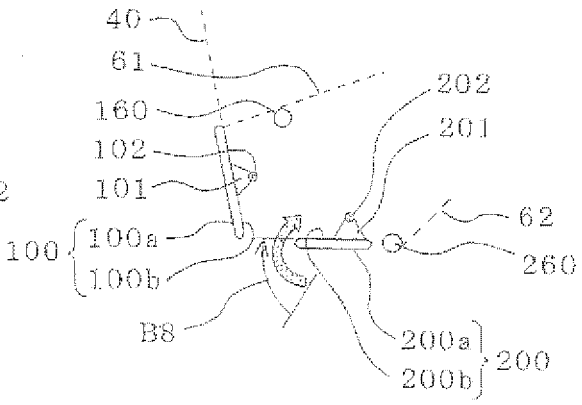
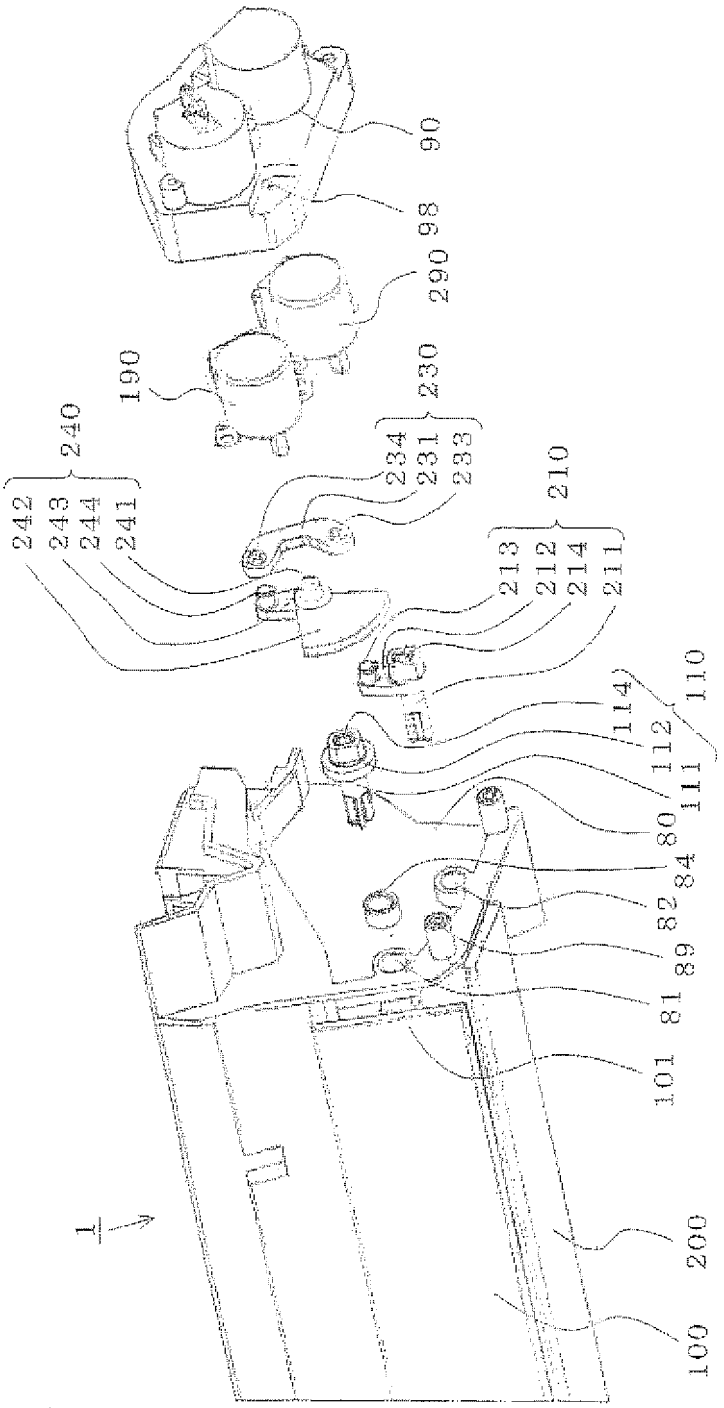


FIG. 11


90
98
290
230
190
240
234
231
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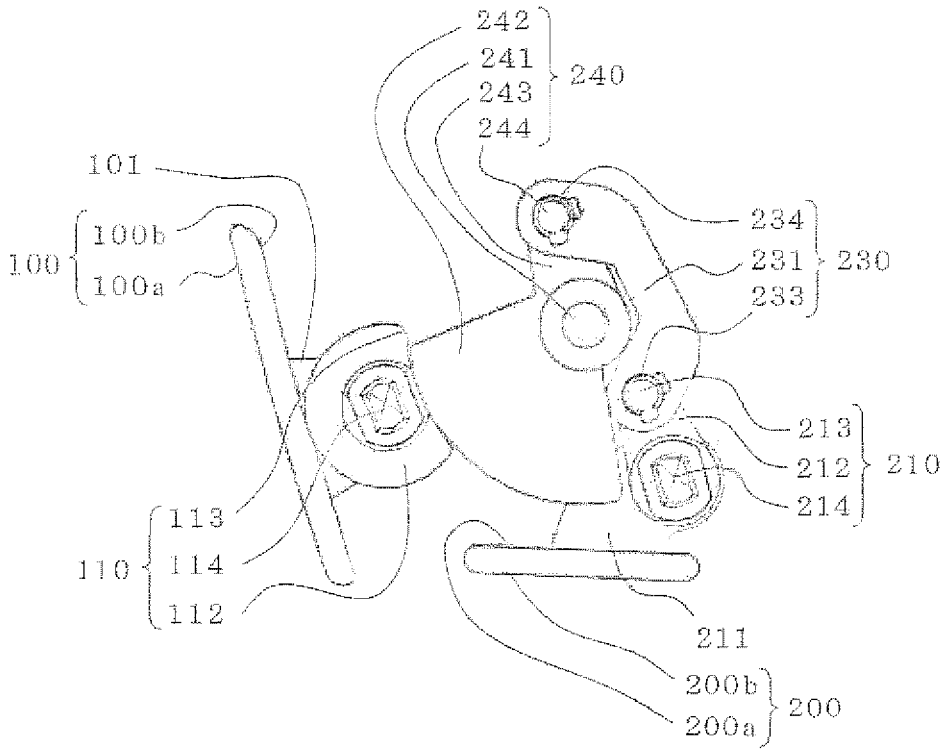
242
243
244
241
210
213
212
214
211
110
114
112
111
80
84
82
89
81
101
1
200
100

FIG. 12


242
241
243
244
240
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100
100b
100a
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233
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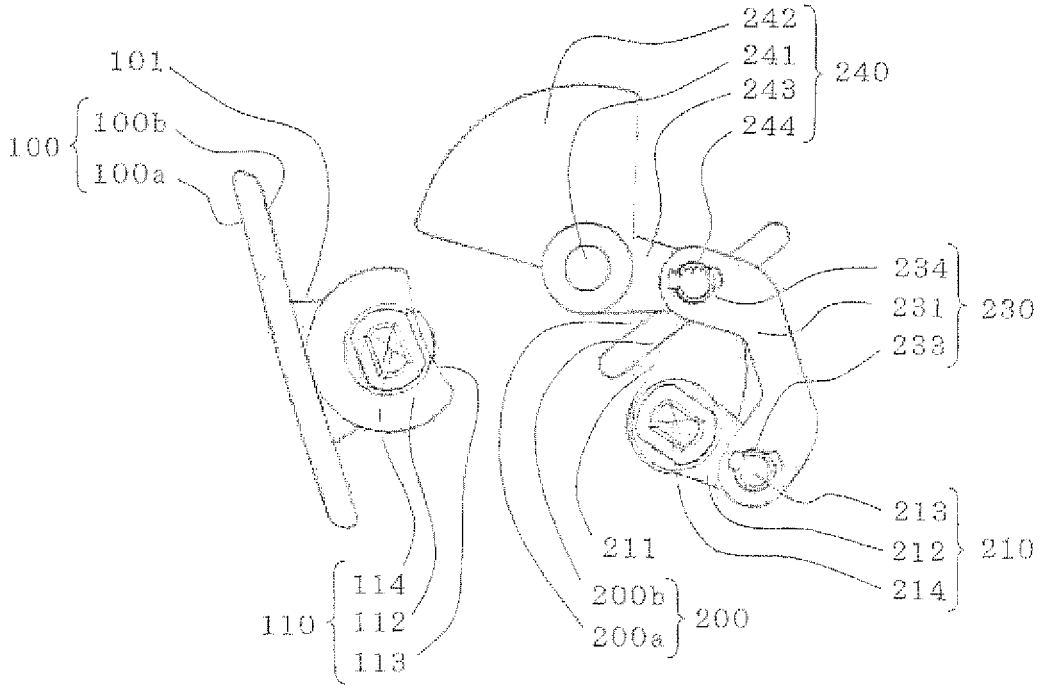
212
214
210
113
114
112
110
211
200b
200a
200

FIG. 13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100a
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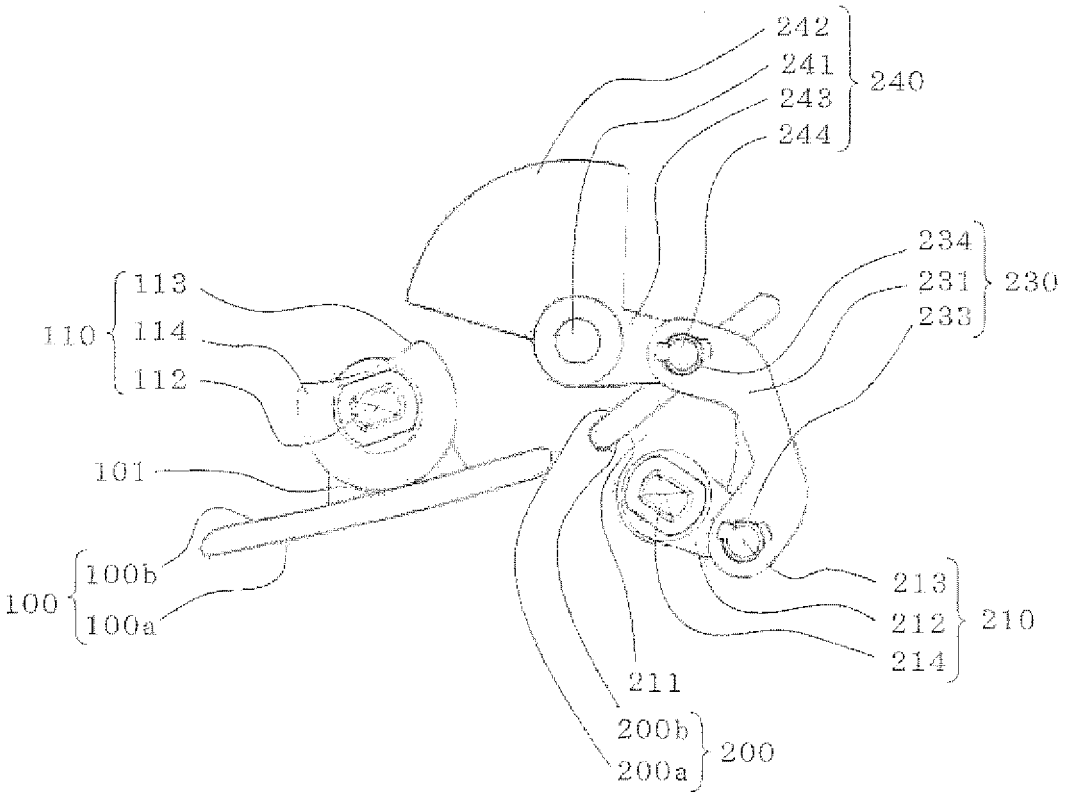
214
210
211
114
112
113
110
200b
200a
200

FIG. 14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100a
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213
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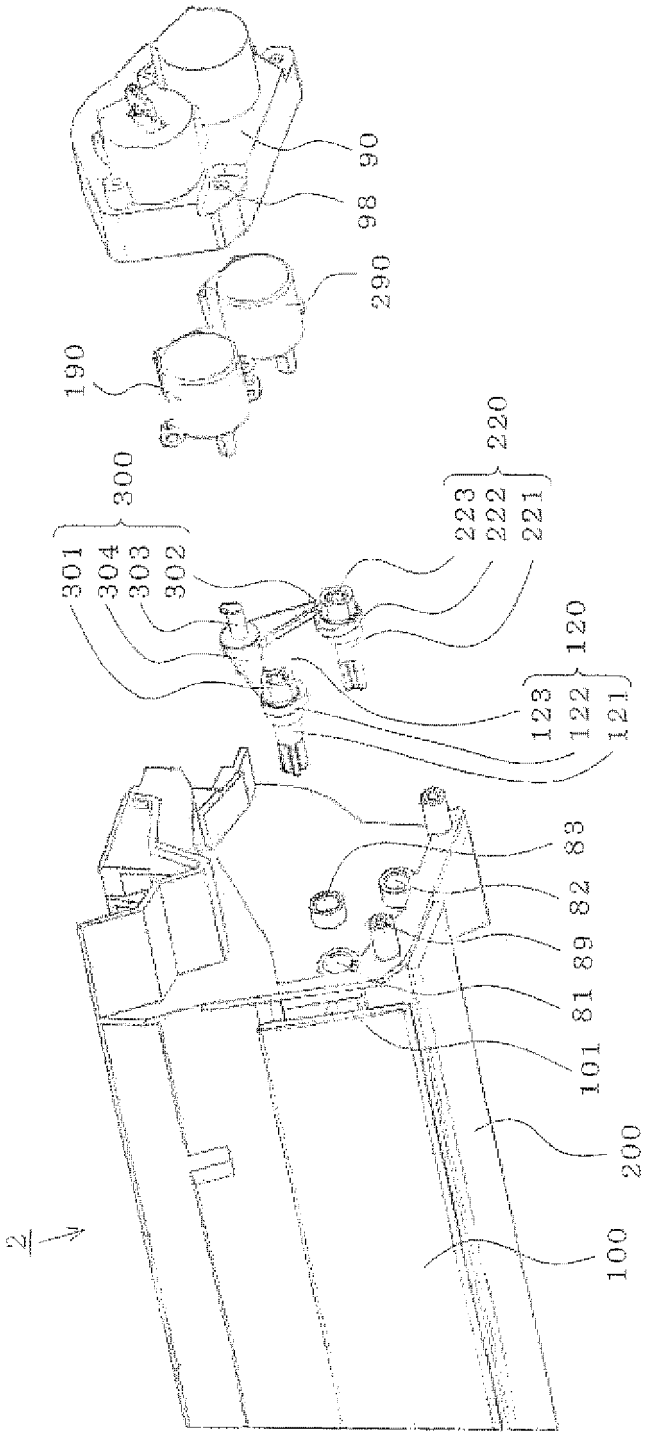
200b
200a
200

FIG. 15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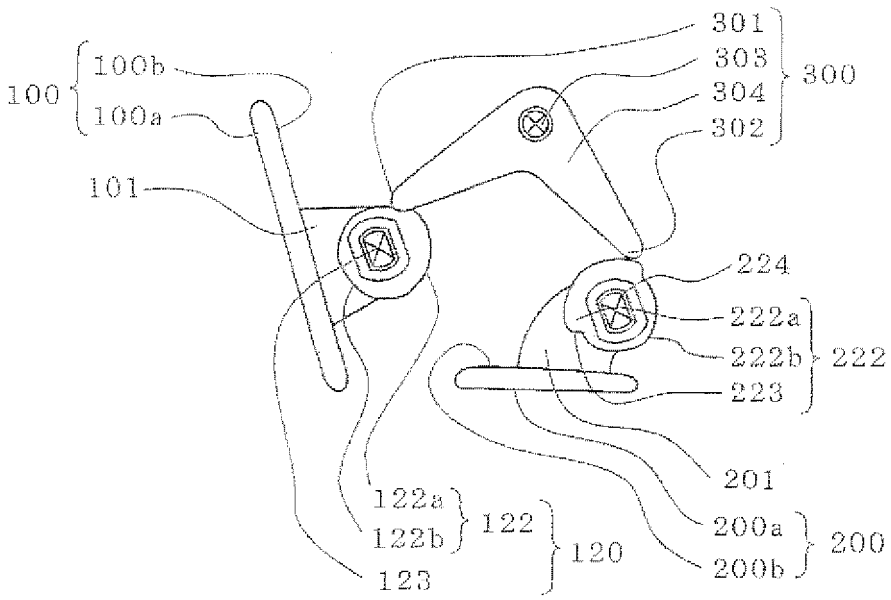
2

FIG. 16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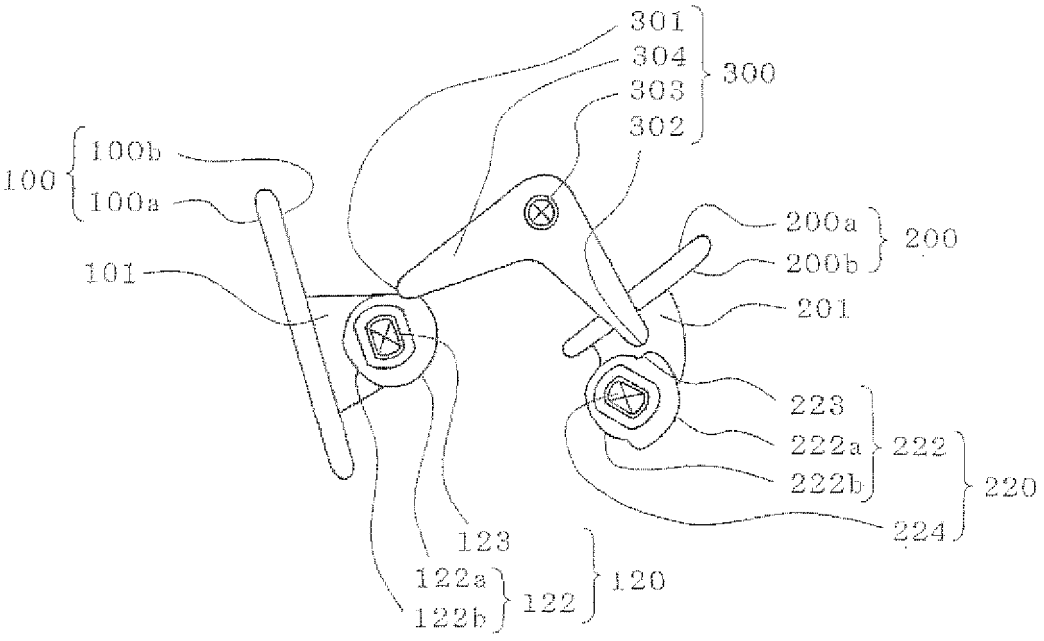
123
200a
200b
200

FIG. 17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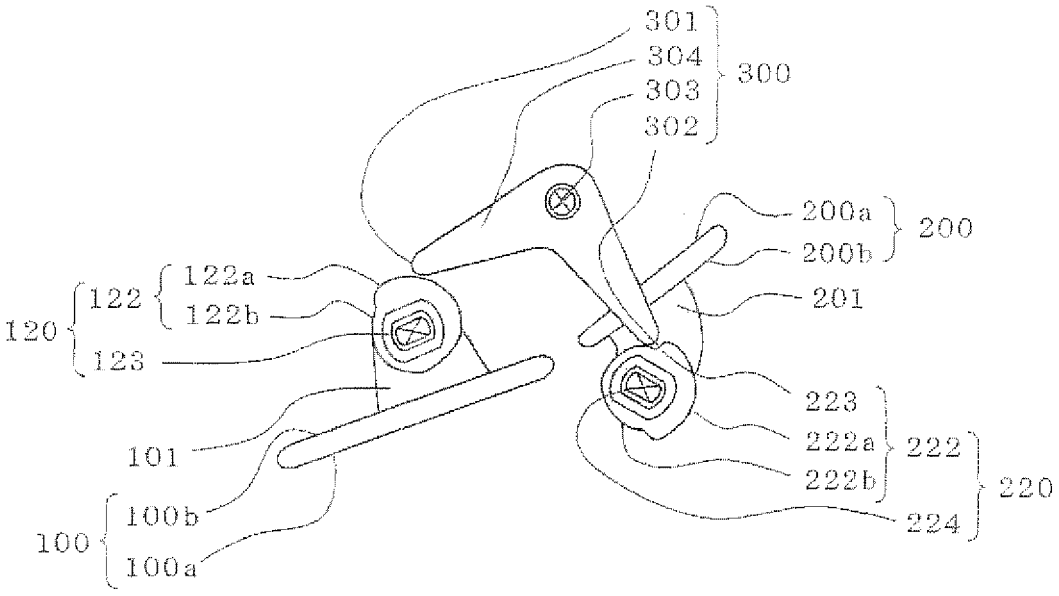
122b
122
120

FIG. 18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224
100
100b
100a

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 62162546 U **[0003]**
- EP 1707892 A1 **[0003]**
- JP 5272799 A **[0004]**