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(54) **Indoor unit of air conditioner**

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(73) Proprietor: **Mitsubishi Electric Corporation
Chiyoda-ku
Tokyo 100-8310 (JP)**

(72) Inventors:
• **Nakagawa, Yoshiyuki
Tokyo 102-0073 (JP)**
• **Yamashita, Tetsuo
Tokyo 100-8310 (JP)**

(74) Representative: **Ilgart, Jean-Christophe et al
BREVALEX
95, rue d'Amsterdam
75378 Paris Cedex 8 (FR)**

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**WO-A1-98/11392 JP-A- 1 217 148
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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 an airflow direction plate at a blowout port.

Background Art

[0002] In the related art, an indoor unit of an air conditioner performs fine airflow direction control in the vertical direction by providing a pair of vertical airflow direction plates at a blowout port and rotating the same by separate motors respectively. An invention in which a stopper member for positioning the reference positions of the vertical airflow direction plates is reinforced at this time is disclosed (for example, see Patent Literature 1).

Citation List

Patent Literature

[0003] A relevant prior art is : JP-A-10-103751 (pp. 4-5, Fig. 1) . And WO-A-98/11392 recites an indoor unit of an air conditioner according to the preamble of claim 1.

Summary of Invention

Technical Problem

[0004] In an indoor unit of an air conditioner disclosed in JP-A-10-103751, a pair of vertical airflow direction plates are provided apart from each other so as to avoid mutual interference when rotating independently. Therefore, when operation is stopped (suspended), since a large clearance is formed between the pair of vertical airflow direction plates and hence a blowout port is not closed, there arises a problem that design characteristics of the indoor unit are impaired.

[0005] In contrast, if the pair of vertical airflow direction plates are provided close to each other to narrow the clearance therebetween in order to avoid the impairment of the design characteristics of the indoor unit, there arises a problem that these airflow direction plates interfere with each other and are brought into a non-rotatable state. In particular, when the vertical airflow direction plates are rotated by cleaning or the like while operation is stopped, that is, when they start rotation from a non-reference position, one of the vertical airflow direction plates might act as a stopper of the other, thereby locking the other airflow direction plate.

[0006] In order to solve the above-described problems, it is an object of the present invention to provide the indoor unit of the air conditioner in which a pair of vertical airflow direction plates are prevented from being brought into a non-rotatable state while narrowing the clearance ther-

ebetween when operation is stopped (suspended).

Solution to Problems

[0007] An indoor unit of an air conditioner according to the present invention is defined in claim 1. A preferred embodiment is defined in claim 2.

[0008] Such an indoor unit includes:

a main body including a blower and a heat exchanger stored therein, with a blowout port being formed on a front surface in a range nearer a lower surface and on the lower surface in a range nearer the front surface;

a first vertical airflow direction plate rotatably arranged at the blowout port on the front surface side of the main body;

a second vertical airflow direction plate rotatably arranged at the blowout port on a lower surface side of the main body;

a rear surface, opposite the front surface, of the main body for being attached to a vertical wall; characterized by:

a first braking member provided on a revolving shaft of the first vertical airflow direction plate and including a large diameter portion and a small diameter portion;

a second braking member provided on a revolving shaft of the second vertical airflow direction plate and including a large diameter portion and a small diameter portion; and

a seesaw member provided pivotably on the main body and configured in such a manner that the seesaw member has an arm portion with one end and an other end and a swing shaft provided at a center of the arm portion, wherein

when the indoor unit assumes a position attached to the vertical wall, the first vertical airflow direction plate assumes a substantially vertical position and the second vertical airflow direction plate assumes a substantially horizontal position, the one end of the seesaw member abuts on the small diameter portion of the first braking member or opposes the same with a slight clearance therebetween, and the other end of the seesaw member abuts on the large diameter portion of the second braking member to constrain a counter-clockwise rotation of the first vertical airflow direction plate in side view with the back face being at a right-hand side,

and when the first vertical airflow direction plate assumes a substantially vertical position and the second vertical airflow direction plate assumes the substantially vertical position, the one end of the seesaw member abuts on the large diameter portion of the first braking member to allow the counter-clockwise rotation of the first vertical airflow direction plate once the other end of the seesaw

member comes into abutment with the small diameter portion of the second braking member.

[0009] Since the indoor unit of the air conditioner according to the invention has a configuration as described above, the pair of vertical airflow direction plates are prevented from being interfered and brought into a non-rotatable state while narrowing the clearance therebetween when operation is stopped. In other words, when the phase of the first braking member provided on the first vertical airflow direction plate and the phase of the second braking member provided on the second vertical airflow direction plate are in a predetermined relation, one constrains the rotation of the other and disables the rotation of the other, and hence inadvertent rotation is prevented.

Brief Description of Drawings

[0010]

Fig. 1 is a front view illustrating an indoor unit of an air conditioner according to an example not covered by this invention.

Fig. 2 is a perspective view illustrating 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 is an exploded perspective view illustrating components which constitute a rotating mechanism of the indoor unit shown in Fig. 1.

Fig. 6 is a side view illustrating actions of the components of the rotating mechanism shown in Fig. 5.

Fig. 7 is a side view illustrating the actions of the components of the rotating mechanism shown in Fig. 5.

Fig. 8 is a side view illustrating the actions of the components of the rotating mechanism shown in Fig. 5.

Fig. 9 shows side cross-sectional views illustrating the actions of vertical airflow direction plates of the indoor unit shown in Fig. 1.

Fig. 10 shows side cross-sectional views illustrating the actions of the vertical airflow direction plates of the indoor unit shown in Fig. 1.

Fig. 11 is an exploded perspective view illustrating components which constitute a rotating mechanism of an indoor unit of an air conditioner according to an embodiment of the invention.

Fig. 12 is a side view illustrating the actions of the components of the rotating mechanism shown in Fig. 11.

Fig. 13 is a side view illustrating the actions of the components of the rotating mechanism shown in Fig. 11.

Fig. 14 is a side view illustrating the actions of the components of the rotating mechanism shown in Fig.

11.

Description of the example and the embodiment of the invention

Example of an indoor unit of air conditioner

[0011] Fig. 1 to Fig. 10 are drawings for explaining an indoor unit of an air conditioner according to an example not covered by the 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 an exploded perspective view illustrating components which constitute an rotating mechanism, Fig. 6 to Fig. 8 are side views illustrating actions of the components of the rotating mechanism, and Fig. 9 and Fig. 10 are side cross-sectional views illustrating actions of vertical airflow direction plates. Fig. 1 to Fig. 10 are illustrated schematically.

[0012] In Fig. 1 to Fig. 5, an indoor unit 1 of an air conditioner (hereinafter, referred to as "indoor unit") 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 speaking, it is the same as a design panel which also covers parts of side surfaces of the main body 10) 40 covering an opening on a front surface of the main body 10 (a left side in Fig. 3).

(Blowout port)

[0013] The main body 10 is configured to be mounted with a rear surface (a right side in Fig. 3) thereof placed on a wall or the like of a room, and includes an inlet port 50 for sucking indoor air on an upper surface (an upper side in Fig. 3), and a fan casing 60 for defining an air duct from the blowing fan 20 in the interior thereof.

[0014] The fan casing 60 is a space having a predetermined width and being surrounded by a casing rear member (the same as a casing rear panel) 61 arranged on the rear surface side, a casing front member 62 arranged on an opening side on the front surface, and a partition wall 80 (see Fig. 5) which constitutes side surfaces. Then, a clearance defined between a terminal end of the fan casing 60, that is, a side edge on the front surface side of a lower surface (a 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 Airflow direction plates)

[0015] Furthermore, a first vertical airflow direction plate 100 and a second vertical airflow direction plate 200 are rotatably provided at the blowout port 63 at a position closer to the front face side and at a position closer to a rear face side, respectively.

[0016] A back side 100b of the first vertical airflow direction plate 100 is provided with airflow direction plate

flanges 101 at a predetermined interval, and an airflow direction plate revolving shaft 102 is provided therethrough. In contrast, the casing front member 62 is provided with a casing flange 64, and a casing bearing 65 is provided thereon. The airflow direction plate revolving shaft 102 is rotatably supported by the casing bearing 65.

[0017] In the same manner, at a back side 200b of the second vertical airflow direction plate 200, the airflow direction plate flange 201 is provided at a predetermined interval, and an airflow direction plate revolving shaft 202 is provided therethrough. In contrast, a casing flange, not shown, is provided at the blowout port 63, and a casing bearing 67 is provided thereon. The airflow direction plate revolving shaft 202 is rotatably supported by the casing bearing 67.

[0018] The first vertical airflow direction plate 100 and the second vertical airflow direction plate 200 are configured to be rotated independently, and a first stepping motor 190 configured to rotate the first vertical airflow direction plate 100 and a second stepping motor 290 configured to rotate the second vertical airflow direction plate 200 are stored in a motor case 90 provided on the partition wall 80 of the main body 10. The rotating mechanism will be described in detail below.

(First Braking Member)

[0019] One of the airflow direction plate flanges 101 provided on the first vertical airflow direction plate 100, which is located at a position nearest to the partition wall 80, is provided with a first braking member 110 so as to rotate integrally therewith.

[0020] 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 depressed portion 113 formed on the disk portion 112, and an end portion 114 connected to a revolving shaft of the first stepping motor 190.

(Second Braking Member)

[0021] One of the airflow direction plate flanges 201 provided on the second vertical airflow direction plate 200, which is located at a position nearest to the partition wall 80, is provided with a second drive member 210 so as to rotate integrally therewith.

[0022] The second drive member 210 includes a shaft portion 211 having a circular-shaped cross section, a drive flange 212 provided on the shaft portion 211, a drive pin 213 provided at an end of the drive flange 212, and an end portion 214 connected to a revolving shaft of the second stepping motor 290.

[0023] 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 and 234 provided respectively at both end portions of the coupling arm 231.

[0024] 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 brake flange 243 provided on the shaft portion 241, and a brake pin 244 provided at an end of the brake flange 243.

(Partition Wall Bearing)

[0025] On the other hand, the partition wall 80 is provided with a partition wall bearing 81 configured to rotatably support the shaft portion 111 of the first braking member 110, a partition wall bearing 82 configured to rotatably 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 rotatably support the shaft portion 241 of the second braking member 240. The partition wall bearing 84 is positioned between the partition wall bearing 81 and the partition wall bearing 82 so as to have a triangle relation in position.

(Motor Case)

[0026] The motor case 90 is provided with a bearing (not shown) for rotatably supporting 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.

[0027] In addition, the motor case 90 is formed with a through hole 98 which allows a nut (not shown) for mounting 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.

[0028] The shaft portion 111 of the first braking member 110 connected to the first vertical airflow direction plate 100 is rotatably supported by the partition wall bearing 81, the shaft portion 211 of the second drive member 210 connected to the second vertical airflow direction plate 200 is rotatably supported by the partition wall bearing 82, and the shaft portion 241 of the second braking member 240 is rotatably supported by the partition wall bearing 84 and a bearing (not shown) provided on the motor case 90, respectively.

[0029] The coupling pin hole 233 and the coupling pin hole 234 of the second coupling member 230 are rotatably fitted to the drive pin 213 of the second drive member 210 and the brake pin 244 of the second braking member 240, respectively.

(Rotating Mechanism when Operation is Stopped)

[0030] When operation is stopped (suspended) as shown in Fig. 6, the first vertical airflow direction plate 100 stands upright substantially perpendicularly, and the second vertical airflow direction plate 200 is tilted sub-

stantially horizontally.

[0031] At this time, the arcuate-shaped depressed portion 113 of the first braking member 110 of the first vertical airflow direction plate 100 stands upright substantially perpendicularly. The drive flange 212 of the second drive member 210 stands upright, and pushes the second coupling member 230 upward. Therefore, the fan-shaped portion 242 of the second braking member 240 is tilted substantially horizontally.

[0032] Then, an arcuate surface (depressed surface) of the arcuate-shaped depressed portion 113 and an arcuate surface (projecting surface) of the fan-shaped portion 242 come into abutment with each other. Therefore, even when an attempt is made to rotate the first vertical airflow direction plate 100, the abutment prevents the rotation, and hence the first vertical airflow direction plate 100 cannot be rotated. In other words, the first vertical airflow direction plate 100 assumes a locked state.

(Rotating Mechanism when Operation is Started)

[0033] When operation is started as shown in Fig. 7, since the second stepping motor 290 rotates the second drive member 210 clockwise (rotates counterclockwise when viewed from the back side of the sheet of this drawing), the drive flange 212 is tilted down. Therefore, the second coupling member 230 is pulled downward, and the second braking member 240 rotates clockwise. In other words, the fan-shaped portion 242 is inverted and the arcuate portion is apart from the arcuate-shaped depressed portion 113 of the first braking member, whereby the first vertical airflow direction plate 100 is freely rotatable. In other words, a state in which the lock of the first vertical airflow direction plate 100 is released (hereinafter, it may be referred to as "unlock") is assumed.

[0034] If the first stepping motor 190 is activated and the first vertical airflow direction plate 100 is rotated counterclockwise in the unlock state shown in Fig. 8, the first vertical airflow direction plate 100 can be tilted substantially horizontally. When an attempt is made to rotate, in turn, the second vertical airflow direction plate 200 counterclockwise in this state, an end of the fan-shaped portion 242 of the second braking member 240 abuts on the disk portion 112 of the first braking member 110, so that the rotation is prevented. Since a clearance is provided between the both in the drawing, the rotation is made by an amount corresponding to the clearance, to be exact.

(Action when Operation is Started)

[0035] A control unit, not shown, for controlling rotations of the first stepping motor 190 and the second stepping motor 290 performs the following control.

[0036] In a drawing (a) in Fig. 9, the first vertical airflow direction plate 100 assumes a substantially perpendicular position, and the second vertical airflow direction plate 200 stays standstill in a substantially horizontal position and covers the blowout port 63 when operation is

stopped. At this time, as shown in Fig. 6, the rotating mechanism assumes a state in which the first braking member 110 and the second braking member 240 are locked.

[0037] In a drawing (b) in Fig. 9, when operation is started, the second vertical airflow direction plate 200 firstly rotates clockwise (the second stepping motor 290 rotates prior to the first stepping motor 190). Then, as shown in Fig. 7, the first braking member 110 and the second braking member 240 assume an unlocked state.

[0038] In a drawing (c) in Fig. 9, after having the unlocked state is assumed, the first vertical airflow direction plate 100 then rotates counterclockwise (the first stepping motor 190 rotates). Then, as shown in Fig. 8, since the first braking member 110 constrains the counterclockwise rotation of the second braking member 240, the second vertical airflow direction plate 200 cannot rotate counterclockwise.

(Action when Operation is Stopped)

[0039] In a drawing (a) in Fig. 10, when operation is stopped, the first vertical airflow direction plate 100 rotates clockwise from the state shown in the drawing (c) in Fig. 9 (the first stepping motor 190 rotates prior to the second stepping motor 290) and stops in the substantially horizontal state. Then, as shown in Fig. 7, the first braking member 110 and the second braking member 240 assume an unlocked state.

[0040] In a drawing (b) in Fig. 10, subsequently, the second vertical airflow direction plate 200 rotates counterclockwise (the second stepping motor 290 rotates) and stops in the substantially horizontal state. Then, the blow-out port 63 is covered by the first vertical airflow direction plate 100 and the second vertical airflow direction plate 200.

[0041] As described above, in the indoor unit 1, since the first vertical airflow direction plate 100 or the second vertical airflow direction plate 200 is prevented from rotating inadvertently by locking or unlocking between the first braking member 110 and the second braking member 240, even when the first vertical airflow direction plate 100 and the second vertical airflow direction plate 200 are arranged in proximity, interference does not occur when the both rotate.

[0042] Therefore, the clearance of the blowout port 63 may be narrowed comparatively to cover the blowout port 63 by the first vertical airflow direction plate 100 and the second vertical airflow direction plate 200. In other words, the design characteristics of the blowout port 63 is secured by a front side 100a of the first vertical airflow direction plate 100 and a front side 200a of the second vertical airflow direction plate 200.

[0043] The respective drawings described above are illustrated diagrammatically, and the relative position and the relative size are not limited thereto. Although the first braking member 110 and the second braking member 240 are in abutment with each other over a wide range

of an arcuate abutment surface, it is also possible to form the arcuate shaped depressed portion 113 of the first braking member 110 into a flat face so that the first braking member 110 comes into partly abutment with the second braking member 240 only when the first braking member 110 rotates a predetermined angle. The disk portion 112 does not have to be circular because an abutment surface with the second braking member 240 may be formed.

Embodiment of the invention (Indoor Unit of Air Conditioner)

[0044] Fig. 11 to Fig. 14 are drawings for explaining an indoor unit of an air conditioner according to an embodiment of the invention. Fig. 11 is an exploded perspective view illustrating the components which constitute the rotating mechanism and Fig. 12 to Fig. 14 are side views illustrating actions of the components of the rotating mechanism.

[0045] In Fig. 11 to Fig. 14, an indoor unit 2 of the air conditioner (hereinafter, referred to as "indoor unit") is different from the indoor unit 1 (Example) only in configuration of the rotating mechanism, and other parts of the configuration are the same as the indoor unit 1. Therefore, portions which are the same as or corresponding to the indoor unit 1 are designated by the same reference numerals and the description is partly omitted.

(First Braking Member)

[0046] One of the airflow direction plate flanges 101 provided on the first vertical airflow direction plate 100, which is located at a position nearest to the partition wall 80, is provided with a first braking member 120 so as to rotate integrally therewith.

[0047] 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 connected to a revolving shaft of the first stepping motor 190.

[0048] The cam portion 122 is an end 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 as a boundary.

(Second Braking Member)

[0049] One of the airflow direction plate flanges 201 provided on the second vertical airflow direction plate 200, which is located at a position nearest to the partition wall 80, is provided with a second braking member 220 so as to rotate integrally therewith.

[0050] 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 connected to a revolving shaft of the second stepping motor 290.

[0051] The cam portion 222 is an end cam formed with a shouldered portion 223 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 as a boundary.

10 (Seesaw member)

[0052] A seesaw member 300 has an arm portion 304 and a swinging shaft 303 provided at a center of the arm portion 304. Hereinafter, one of ends of the arm portion 304 is referred to as a first end 301, and the other end is referred to as a second end 302.

(Partition Wall Bearing)

20 **[0053]** In contrast, the partition wall 80 is provided with the partition wall bearing 81 configured to rotatably support the shaft portion 121 of the first braking member 120, the partition wall bearing 82 configured to rotatably support the shaft portion 221 of the second braking member 220, and a partition wall bearing 83 configured to rotatably support the swinging shaft 303 of the seesaw member 300 on the side of the partition wall 80.

25 **[0054]** Although the swinging shaft 303 of the seesaw member 300 on the side of the motor case 90 is rotatably supported by a bearing (not shown) provided on the motor case 90, one of the bearing or the partition wall bearing 83 may be omitted.

(Rotating Mechanism when Operation is Stopped)

30 **[0055]** When operation is stopped (suspended) as shown in Fig. 12, the first vertical airflow direction plate 100 stands upright substantially perpendicularly and, in contrast, the second vertical airflow direction plate 200 is collapsed substantially horizontally.

35 **[0056]** The small diameter portion 122b of the first braking member 120 connected integrally to the first vertical airflow direction plate 100 is positioned on the upper side, the large diameter portion 222a of the second braking member 220 connected integrally to the second vertical airflow direction plate 200 is positioned on the upper side, and the second end 302 of the seesaw member 300 abuts on the large diameter portion 222a. Also, the first 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 slight clearance therebetween.

40 **[0057]** Therefore, when an attempt is made to rotate the first vertical airflow direction plate 100 counterclockwise viewed from the front of the sheet, the shouldered portion 123 of the first braking member 120 comes into abutment with the first end 301 of the seesaw member 300 to cause the seesaw member 300 to rotate clock-

wise. However, since the second end 302 of the seesaw member 300 comes into abutment with the large diameter portion 222a of the second braking member 220, the first vertical airflow direction plate 100 cannot be rotated counterclockwise.

[0058] In other words, the first vertical airflow direction plate 100 assumes a locked state.

(Rotating Mechanism when Operation is Started)

[0059] When operation is started as shown in Fig. 13, since the second stepping motor 290 rotates the second drive member 210 clockwise (rotates 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.

[0060] Then, the second end 302 of the seesaw member 300 is allowed to rotate (pivot) until it comes into abutment with the small diameter portion 222b of the second braking member 220.

[0061] As shown in Fig. 14, if the first stepping motor 190 is activated and the first vertical airflow direction plate 100 is rotated counterclockwise in a state shown in Fig. 13, the first vertical airflow direction plate 100 is tilted substantially horizontally.

[0062] In other words, since the seesaw member 300 is allowed to rotate (pivot) as described above, when the first braking member 120 rotates counterclockwise, the large diameter portion 122a of the cam portion 122 comes into abutment with the second end 302 of the seesaw member 300 to rotate the seesaw member 300. In other words, a state in which the lock of the first vertical airflow direction plate 100 is released (the same as "unlock") is assumed. At this time, the second 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 slight clearance therebetween.

[0063] When an attempt is made to rotate the second vertical airflow direction plate 200 counterclockwise, the second end 302 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 rotate counterclockwise. However, since the first end 301 of the seesaw member 300 comes into abutment with the large diameter portion 122a of the first braking member 120, the second vertical airflow direction plate 200 cannot be rotated counterclockwise. In other words, the second vertical airflow direction plate 200 assumes a locked state.

(Action)

[0064] Since the actions in the indoor unit 2 when operation is started and when operation is stopped are the same as the indoor unit 1 (Example), description will be omitted. Since the rotating mechanism of the indoor unit 2 has locking and unlocking functions as described above, the same effects and advantages as in the indoor

unit 1 are achieved.

[0065] The respective drawings described above are illustrated diagrammatically, and the relative position and the relative size are not limited thereto. The seesaw member 300 is not limited to a V-shape, and may be a rectangular shape (rod shape).

[0066] The shapes of the cam portions 122 and 222 are not limited to the illustrated shape. In other words, they may be of any shape as long as a projection which only abuts on the second end 302 of the seesaw member 300 is provided on the cam portion 222 of the second braking member 220, a depressed portion which allows entry of the first end 301 into the seesaw member 300 is provided on the cam portion 122 of the first braking member 120 for the period when operation is stopped, a projection which only abuts on the first end 301 of the seesaw member 300 is provided on the cam portion 122 of the first braking member 120, and the depressed portion which allows entry of the second end 302 of the seesaw member 300 is provided on the cam portion 222 of the second braking member 220 during operation is stopped.

[0067] In other words, if the first end 301 and the second end 302 of the seesaw member 300 come into abutment with the cam portion 122 of the first braking member 120 and the cam portion 222 of the second braking member 220 simultaneously, the locking and unlocking cannot be performed.

Industrial Applicability

[0068] Since the vertical airflow direction plates are prevented from being brought into a non-rotatable state while narrowing the clearance between the vertical airflow direction plates when operation is stopped (suspended), and the design characteristics and the operation reliability are superior, the indoor unit according to the invention can be widely used as the indoor units of a variety of air conditioners both for home use and business use.

Reference Signs List

[0069] 1: indoor unit (Example), 2: indoor unit (Embodiment of the invention), 10: main body, 20: blowing fan, 22: coupling member, 30: heat exchanger, 40: front panel, 50: inlet port, 60: fan casing, 61: casing rear member, 62: casing front member, 63: blowout port, 64: casing flange, 65: casing bearing, 67: casing bearing, 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: first vertical airflow direction plate, 100a: front side, 100b: back side, 101: airflow direction plate flange, 102: airflow direction plate revolving shaft, 110: first braking member (Example), 111: shaft portion, 112: disk portion, 113: arcuate-shaped depressed portion, 114: end portion, 120: first braking member (Embodiment), 121: shaft portion, 122: cam portion, 122a:

large diameter portion, 122b: small diameter portion, 123: shouldered portion, 124: end portion, 190: first stepping motor, 200: second vertical airflow direction plate, 200a: front side, 200b: back side, 201: airflow direction plate flange, 202: airflow direction plate revolving shaft, 210: second drive member (Embodiment), 211: shaft portion, 212: drive flange, 213: drive pin, 214: end portion, 220: second braking member (Embodiment), 221: shaft portion, 222: cam portion, 222a: large diameter portion, 222b: small diameter portion, 223: shouldered portion, 224: end portion, 230: second coupling member (Embodiment), 231: coupling arm, 233: coupling pin hole, 234: coupling pin hole, 240: second braking member (Embodiment), 241: shaft portion, 242: fan-shaped portion, 243: brake flange, 244: brake pin, 290: stepping motor, 300: seesaw member, 301: first end, 302: second end, 303: swinging shaft, 304: arm portion.

Claims

1. An indoor unit (2) of an air conditioner comprising:

a main body (10) including a blower (20) and a heat exchanger (30) stored therein, with a blow-out port (63) being formed on a front surface in a range nearer a lower surface and on the lower surface in a range nearer the front surface;
a first vertical airflow direction plate (100) rotatably arranged at the blowout port (63) on the front surface side of the main body (10);
a second vertical airflow direction plate (200) rotatably arranged at the blowout port (63) on a lower surface side of the main body (10);
a rear face, opposite the front surface, of the main body (10) for being attached to a vertical wall; **characterized by:**

a first braking member (120) provided on a revolving shaft of the first vertical airflow direction plate (100) and including a large diameter portion and a small diameter portion;
a second braking member (220) provided on a revolving shaft of the second vertical airflow direction plate (200) and including a large diameter portion and a small diameter portion; and
a seesaw member (300) provided pivotably on the main body (10) and configured in such a manner that the seesaw member (300) has an arm portion (304) with a first end (301) and a second end (302) and a swing shaft (303) provided at a center of the arm portion (304), wherein
when the indoor unit assumes a position attached to the vertical wall, the first vertical airflow direction plate (100) assumes a sub-

stantially vertical position and the second vertical airflow direction plate (200) assumes a substantially horizontal position, the first end (301) of the seesaw member (300) abuts on the small diameter portion (122b) of the first braking member (120) or opposes the same with a slight clearance therebetween, and the second end of the seesaw member (300) abuts on the large diameter portion (222a) of the second braking member (220) to constrain a counter-clockwise rotation of the first vertical airflow direction plate (100) in side view with the rear surface being at a right-hand side, and when the first vertical airflow direction plate (100) assumes a substantially vertical position and the second vertical airflow direction plate (200) assumes the substantially vertical position, the first end (301) of the seesaw member (300) abuts on the large diameter portion (122a) of the first braking member (120) to allow the counter-clockwise rotation of the first vertical airflow direction plate (100) once the second end (302) of the seesaw member (300) comes into abutment with the small diameter portion (222b) of the second braking member (220).

2. The indoor unit (2) of an air conditioner of claim 1, comprising:

a first stepping motor (190) configured to rotate the first braking member (120);
a second stepping motor (290) configured to rotate the second braking member (220); and
a controller configured to control the rotation of the first stepping motor (190) and the second stepping motor (290), wherein
when the first vertical airflow direction plate (100) assumes a substantially vertical position and the second vertical airflow direction plate (200) assumes a substantially horizontal position, the controller rotates the second stepping motor (290) to bring the second vertical airflow direction plate (200) to the substantially vertical position and brings the large diameter portion (222a) of the second braking member (220) to a phase not abutting on the second end (302) of the seesaw member (300), and then rotates the first stepping motor (190) to bring the first vertical airflow direction plate (100) to a substantially horizontal position, and
when the first vertical airflow direction plate (100) assumes the substantially horizontal position and the second vertical airflow direction plate (200) assumes the substantially vertical position, the controller rotates the first stepping motor (190) to bring the first vertical airflow di-

rection plate (100) to the substantially vertical position and brings the large diameter portion (122a) of the first braking member (120) to a phase not abutting on the first end (301) of the seesaw member (300), and then rotates the second stepping motor (290) to bring the second vertical airflow direction plate (200) to the substantially horizontal position.

Patentansprüche

1. Eine Innenraumeinheit (2) einer Klimaanlage mit:

einem Hauptkörper (10) mit einem Gebläse (20) und einem Wärmetauscher (30), die darin aufgenommen sind, mit einem Ausblasanschluss (63), der an einer vorderen Oberfläche in einem Bereich näher bei einer unteren Oberfläche und an der unteren Oberfläche in einem Bereich näher bei der vorderen Oberfläche ausgebildet ist, einer ersten Vertikalluftströmungs-Richtungsplatte (100), die drehbar an dem Ausblasanschluss (63) an der Seite der vorderen Oberfläche des Hauptkörpers (10) angeordnet ist, einer zweiten Vertikalluftströmungs-Richtungsplatte (200), die drehbar an dem Ausblasanschluss (63) an einer Seite der unteren Oberfläche des Hauptkörpers (10) angeordnet ist, einer hinteren Oberfläche, gegenüber der vorderen Oberfläche, des Hauptkörpers (10), die an einer vertikalen Wand anzubringen ist;

gekennzeichnet durch:

eine erste Bremskammer (120), die an einem sich drehenden Schaft der ersten Vertikalluftströmungs-Richtungsplatte (100) vorgesehen ist und einen Abschnitt mit großem Durchmesser und einen Abschnitt mit kleinem Durchmesser aufweist, eine zweite Bremskammer (220), die an einem sich drehenden Schaft der zweiten Vertikalluftströmungs-Richtungsplatte (200) vorgesehen ist und einen Abschnitt mit großem Durchmesser und einen Abschnitt mit kleinem Durchmesser aufweist, und ein Wippenelement (300), das schwenkbar an dem Hauptkörper (10) vorgesehen ist und auf solche Weise konfiguriert ist, dass das Wippenelement (300) einen Armabschnitt (304) mit einem ersten Ende (301) und einem zweiten Ende (302) und einen Schwenkschaft (303), der an einer Mitte des Armabschnitts (304) vorgesehen ist, besitzt, wobei wenn die Innenraumeinheit eine an der vertikalen Wand angebracht Position ein-

nimmt, die erste Vertikalluftströmungs-Richtungsplatte (100) eine im Wesentlichen vertikale Position einnimmt und die zweite Vertikalluftströmungs-Richtungsplatte (200) eine im Wesentlichen horizontale Position einnimmt, wobei das erste Ende (301) des Wippenelements (300) an dem Abschnitt mit kleinem Durchmesser (122b) des ersten Bremslements (120) anliegt oder demselben mit einem kleinem Zwischenraum dazwischen gegenüberliegt, und das zweite Ende (302) des Wippenelements (300) an dem Abschnitt mit großem Durchmesser (222a) des zweiten Bremslements (220) anliegt, um eine Rotation der ersten Vertikalluftströmungs-Richtungsplatte (100) im Gegenuhrzeigersinn in einer Seitenansicht zu begrenzen, wobei sich die hintere Oberfläche an einer rechten Seite befindet, und, wenn die erste Vertikalluftströmungs-Richtungsplatte (100) eine im Wesentlichen vertikale Position einnimmt und die zweite Vertikalluftströmungs-Richtungsplatte (200) die im Wesentlichen vertikale Position einnimmt, das erste Ende (301) des Wippenelements (300) an dem Abschnitt mit großem Durchmesser (122a) des ersten Bremslements (120) anliegt, um die Rotation der ersten Vertikalluftströmungs-Richtungsplatte (100) im Gegenuhrzeigersinn zuzulassen, sobald das zweite Ende (302) des Wippenelements (300) in Anlage mit dem Abschnitt mit kleinem Durchmesser (222b) des zweiten Bremslements (220) gelangt.

2. Die Innenraumeinheit (2) einer Klimaanlage gemäß Anspruch 1, mit:

einem ersten Schrittmotor (190), der konfiguriert ist, um das erste Bremslement (120) zu drehen, einem zweiten Schrittmotor (290), der konfiguriert ist, um das zweite Bremslement (220) zu drehen, und einem Controller, der konfiguriert ist, um die Drehung des ersten Schrittmotors (190) und des zweiten Schrittmotors (290) zu steuern, wobei wenn die erste Vertikalluftströmungs-Richtungsplatte (100) eine im Wesentlichen vertikale Position einnimmt und die zweite Vertikalluftströmungs-Richtungsplatte (200) eine im Wesentlichen horizontale Position einnimmt, der Controller den zweiten Schrittmotor (290) dreht, um die zweite Vertikalluftströmungs-Richtungsplatte (200) in die im Wesentlichen vertikale Position zu bringen und er den Abschnitt mit gro-

ßem Durchmesser (222a) des zweiten Brems-
 elements (220) in eine Phase bringt, in der er
 nicht an dem zweiten Ende (302) des Wippen-
 elements (300) anliegt, und er dann den ersten
 Schrittmotor (190) dreht, um die erste Vertikal-
 luftströmungs-Richtungsplatte (100) in eine im
 Wesentlichen horizontale Position zu bringen,
 und,
 wenn die erste Vertikalluftströmungs-Rich-
 tungsplatte (100) die im Wesentlichen horizon-
 tale Position einnimmt und die zweite Vertikal-
 luftströmungs-Richtungsplatte (200) die im We-
 sentlichen vertikale Position einnimmt, der Kon-
 troller den ersten Schrittmotor (190) dreht, um
 die erste Vertikalluftströmungs-Richtungsplatte
 (100) in die im Wesentlichen vertikale Position
 zu bringen und er den Abschnitt mit großem
 Durchmesser (122a) des ersten Bremssele-
 ments (120) in eine Phase bringt, in der er nicht
 an dem ersten Ende (301) des Wippenelements
 (300) anliegt, und er dann den zweiten Schrit-
 tmotor (290) dreht, um die zweite Vertikalluftströ-
 mungs-Richtungsplatte (200) in die im Wesent-
 lichen horizontale Position zu bringen.

Revendications

1. Unité intérieure (2) d'un climatiseur comprenant :

un corps principal (10) incluant une soufflante
 (20) et un échangeur de chaleur (30) stockés à
 l'intérieur, avec un orifice de purge (63) formé
 sur une surface avant dans une région plus près
 d'une surface inférieure et sur la surface infé-
 rieure dans une région plus près de la surface
 avant ;
 une première plaque d'orientation de flux d'air
 verticale (100) agencée en rotation à l'orifice de
 purge (63) sur le côté de surface avant du corps
 principal (10) ;
 une seconde plaque d'orientation de flux d'air
 verticale (200) agencée en rotation à l'orifice de
 purge (63) sur un côté de surface inférieure du
 corps principal (10) ;
 une surface arrière, opposée à la surface avant,
 du corps principal (10) pour être fixée à une paroi
 verticale ; **caractérisée par** :

un premier organe de freinage (120) prévu
 sur un arbre tournant de la première plaque
 d'orientation de flux d'air verticale (100) et
 incluant une portion de grand diamètre et
 une portion de petit diamètre ;
 un second organe de freinage (220) prévu
 sur un arbre tournant de la seconde plaque
 d'orientation de flux d'air verticale (200) et
 incluant une portion de grand diamètre et

une portion de petit diamètre ; et
 un organe de bascule (300) prévu en pivo-
 tement sur le corps principal (10) et confi-
 guré de manière que l'organe de bascule
 (300) ait une portion de bras (304) avec une
 première extrémité (301) et une seconde
 extrémité (302) et un arbre oscillant (303)
 prévu au centre de la portion de bras (304),
 dans laquelle
 lorsque l'unité intérieure adopte une posi-
 tion fixée à la paroi verticale, la première
 plaque d'orientation de flux d'air verticale
 (100) adopte une position sensiblement
 verticale et la seconde plaque d'orientation
 de flux d'air verticale (200) adopte une po-
 sition sensiblement horizontale, la première
 extrémité (301) de l'organe de bascule
 (300) bute sur la portion de petit diamètre
 (122b) du premier organe de freinage (120)
 ou s'oppose à celle-ci avec un léger débat-
 tement entre elles, et la seconde extrémité
 (302) de l'organe de bascule (300) bute sur
 la portion de grand diamètre (222a) du se-
 cond organe de freinage (220) pour con-
 traindre une rotation antihoraire de la pre-
 mière plaque d'orientation de flux d'air ver-
 ticale (100) en vue de profil, la surface ar-
 rière étant à droite,
 et lorsque la première plaque d'orientation
 de flux d'air verticale (100) adopte une po-
 sition sensiblement verticale et la seconde
 plaque d'orientation de flux d'air verticale
 (200) adopte la position sensiblement ver-
 ticale, la première extrémité (301) de l'or-
 gane de bascule (300) bute sur la portion
 de grand diamètre (122a) du premier orga-
 ne de freinage (120) pour permettre la ro-
 tation antihoraire de la première plaque
 d'orientation de flux d'air verticale (100) une
 fois que la seconde extrémité (302) de l'or-
 gane de bascule (300) vient en butée avec
 la portion de petit diamètre (222b) du se-
 cond organe de freinage (220).

2. Unité intérieure (2) d'un climatiseur selon la reven- dication 1, comprenant :

un premier moteur pas à pas (190) configuré
 pour mettre en rotation le premier organe de frei-
 nage (120) ;
 un second moteur pas à pas (290) configuré
 pour mettre en rotation le second organe de frei-
 nage (220) ; et
 un dispositif de commande configuré pour com-
 mander la rotation du premier moteur pas à pas
 (190) et du second moteur pas à pas (290), dans
 laquelle
 lorsque la première plaque d'orientation de flux

d'air verticale (100) adopte une position sensiblement verticale et la seconde plaque d'orientation de flux d'air verticale (200) adopte une position sensiblement horizontale, le dispositif de commande met en rotation le second moteur pas à pas (290) pour amener la seconde plaque d'orientation de flux d'air verticale (200) à la position sensiblement verticale et amène la portion de grand diamètre (222a) du second organe de freinage (220) à une phase ne butant pas sur la seconde extrémité (302) de l'organe de bascule (300), puis met en rotation le premier moteur pas à pas (190) pour amener la première plaque d'orientation de flux d'air verticale (100) à une position sensiblement horizontale, et lorsque la première plaque d'orientation de flux d'air verticale (100) adopte la position sensiblement horizontale et la seconde plaque d'orientation de flux d'air verticale (200) adopte la position sensiblement verticale, le dispositif de commande met en rotation le premier moteur pas à pas (190) pour amener la première plaque d'orientation de flux d'air verticale (100) à la position sensiblement verticale et amène la portion de grand diamètre (122a) du premier organe de freinage (120) à une phase ne butant pas sur la première extrémité (301) de l'organe de bascule (300), puis met en rotation le second moteur pas à pas (290) pour amener la seconde plaque d'orientation de flux d'air verticale (200) à la position sensiblement horizontale.

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FIG. 1

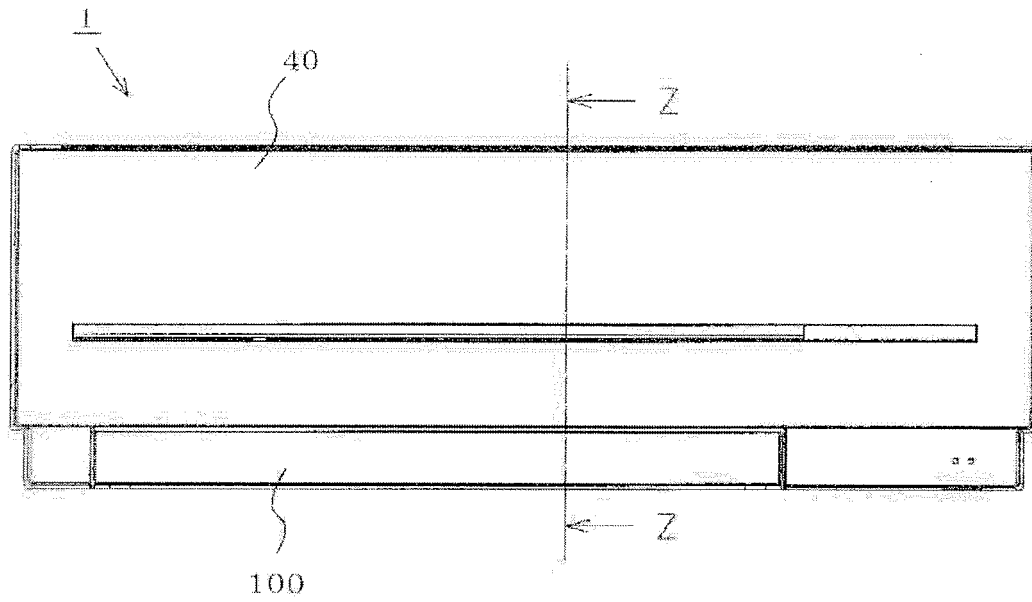


FIG. 2

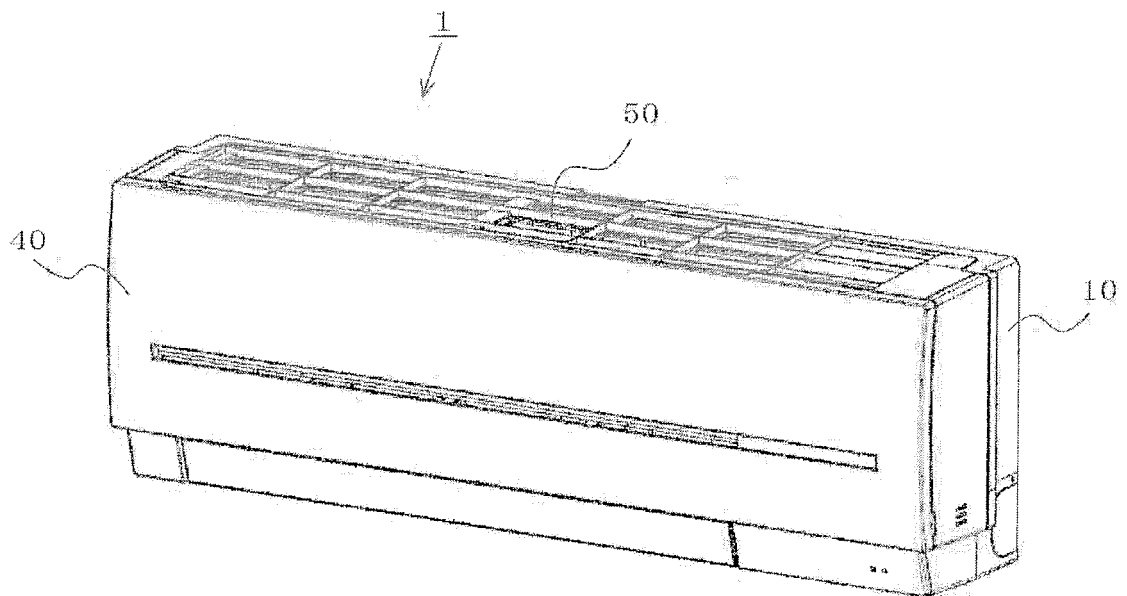


FIG. 3

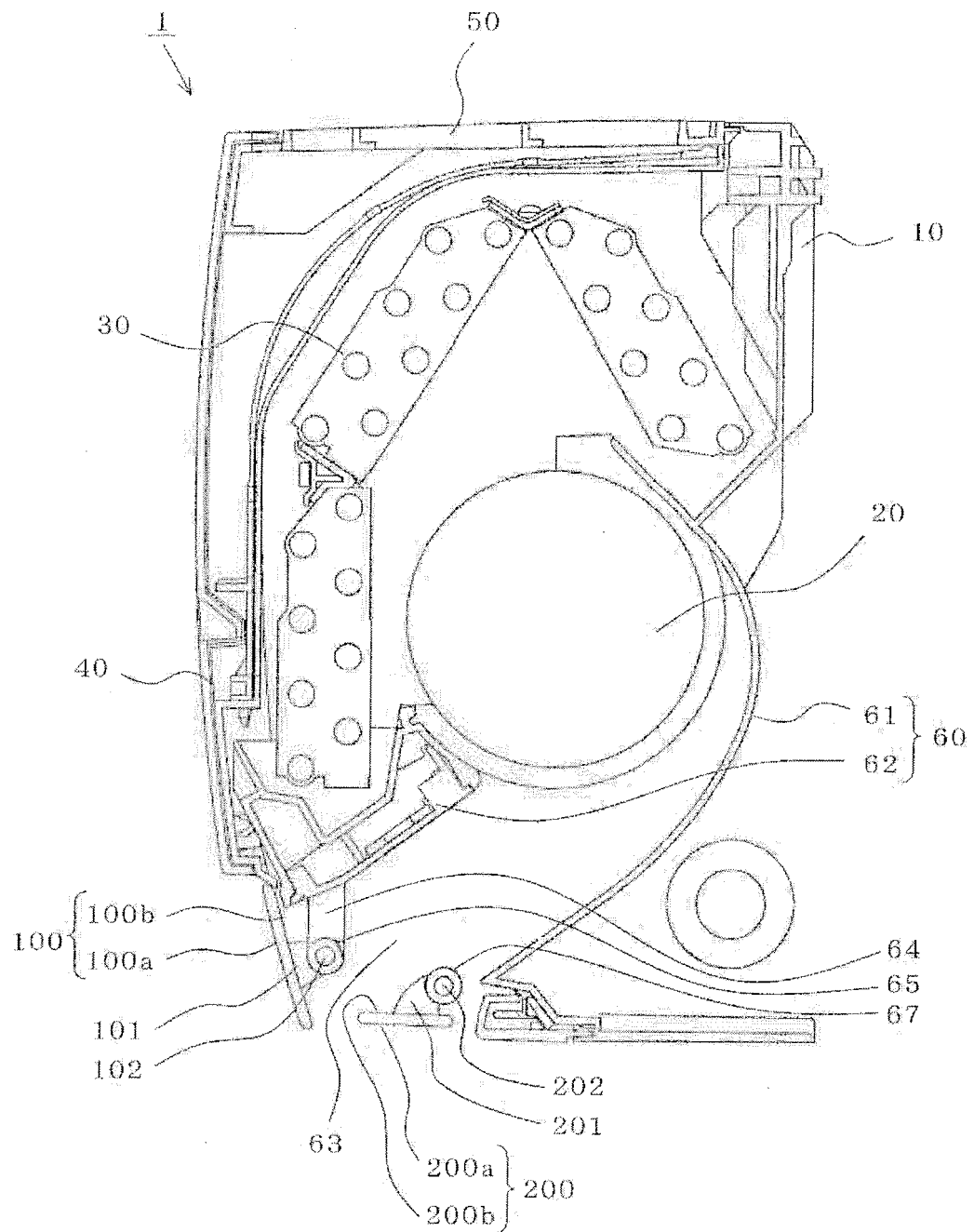


FIG. 4

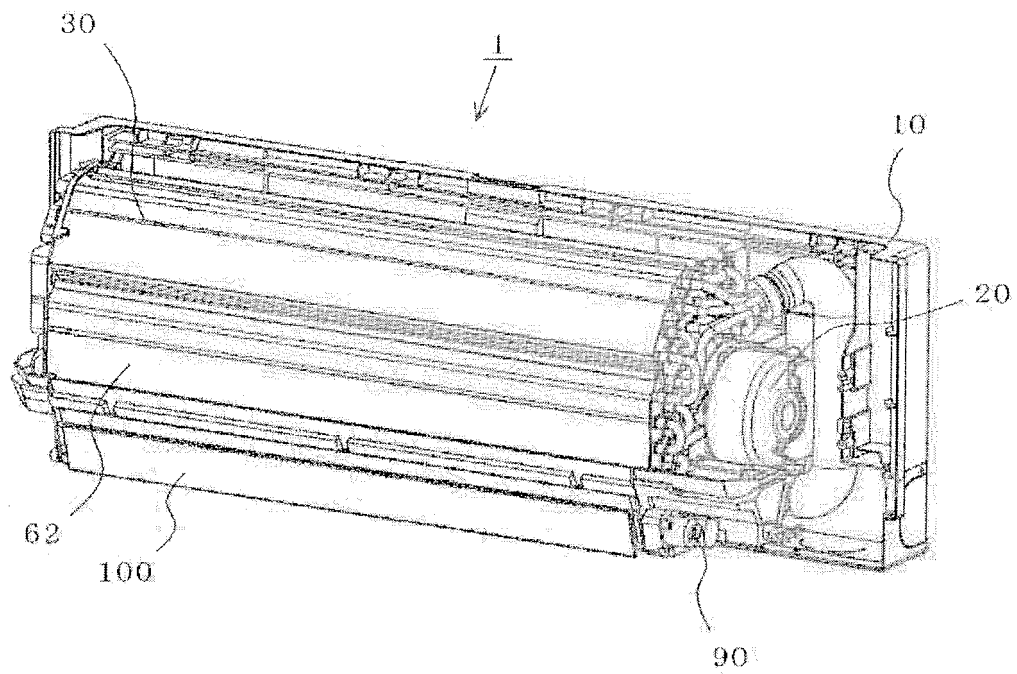


FIG. 5

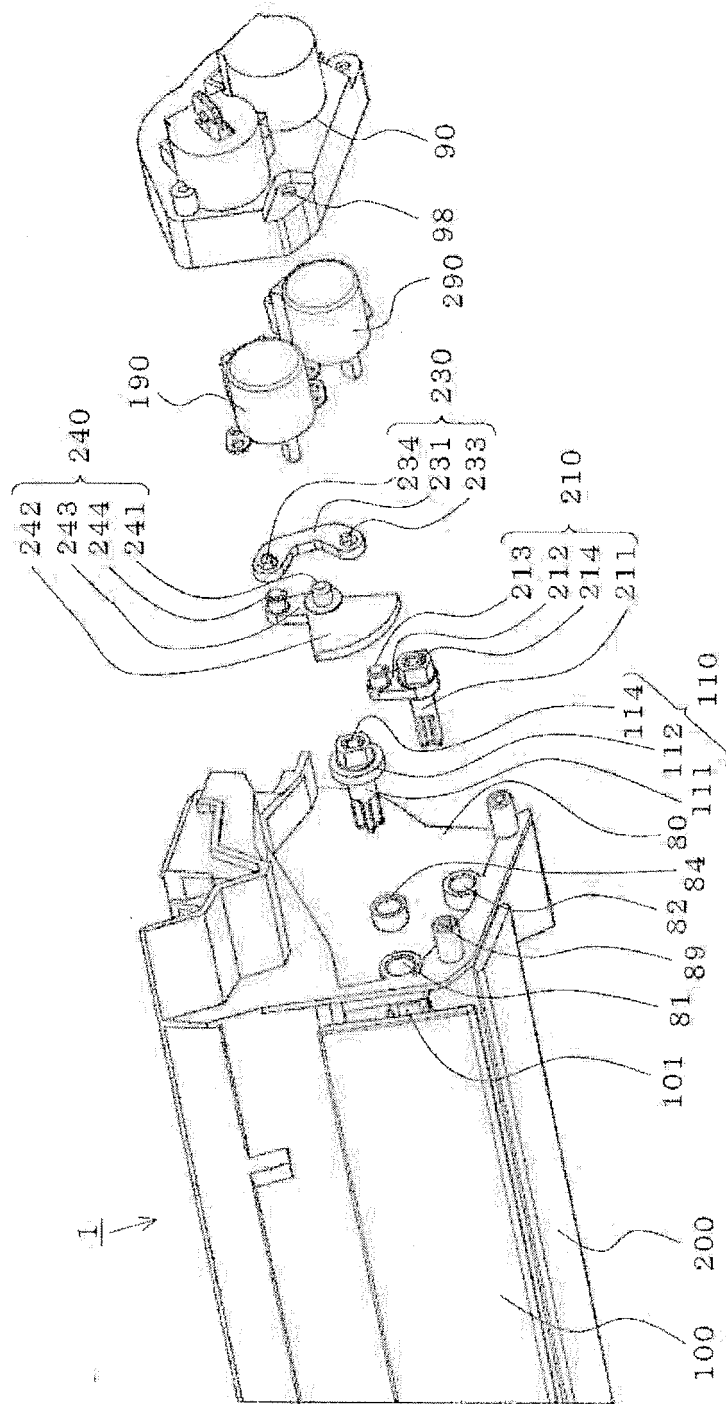


FIG. 6

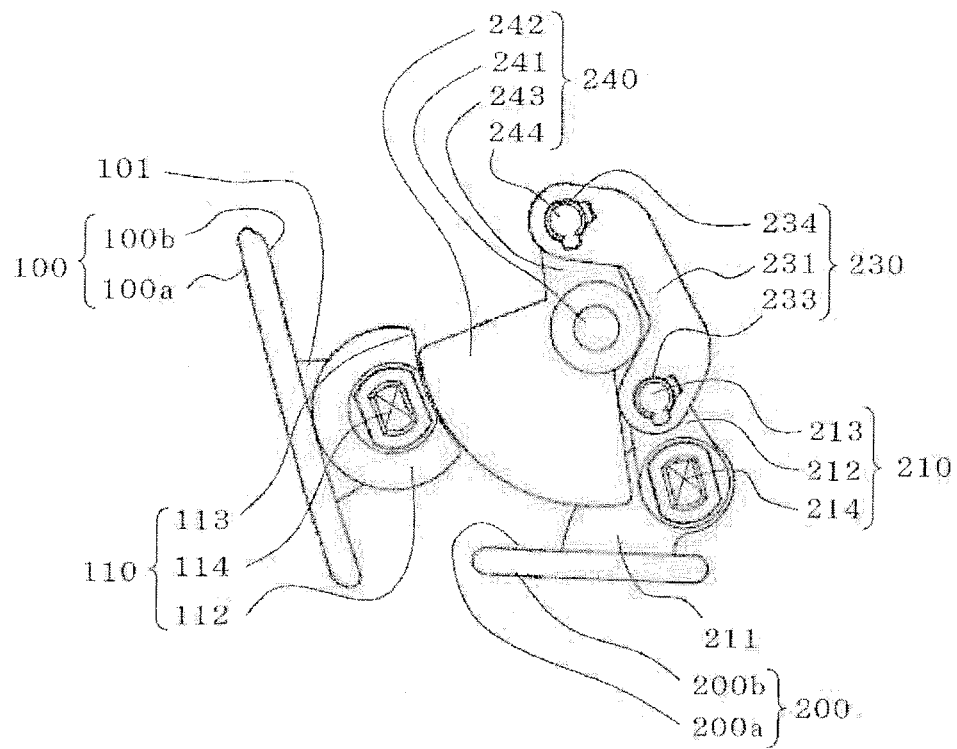


FIG. 7

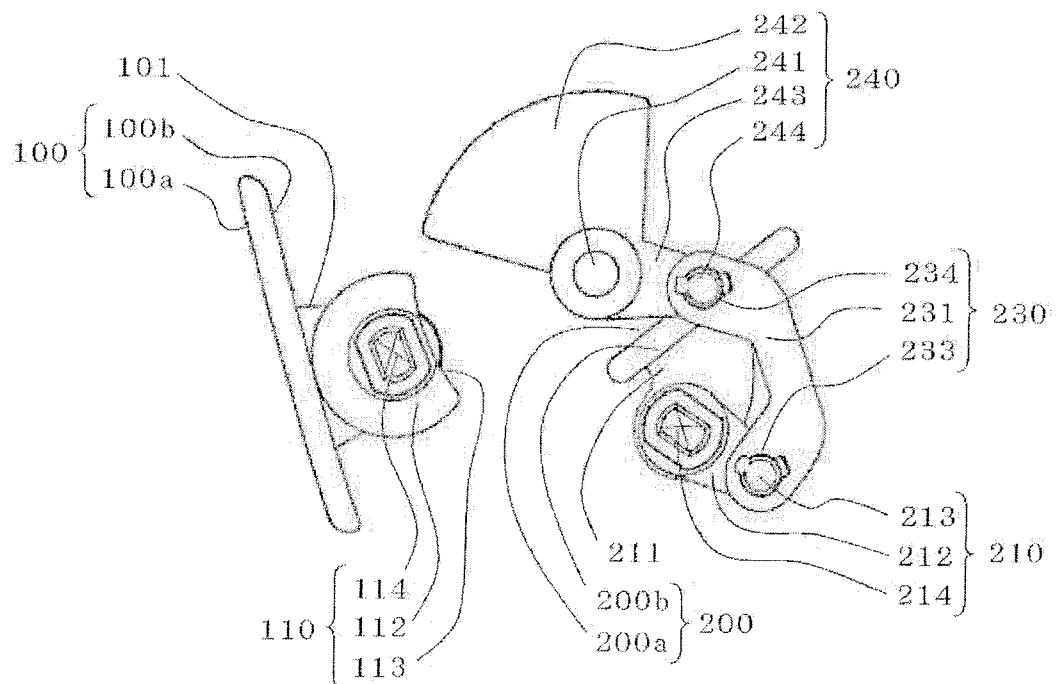


FIG. 8

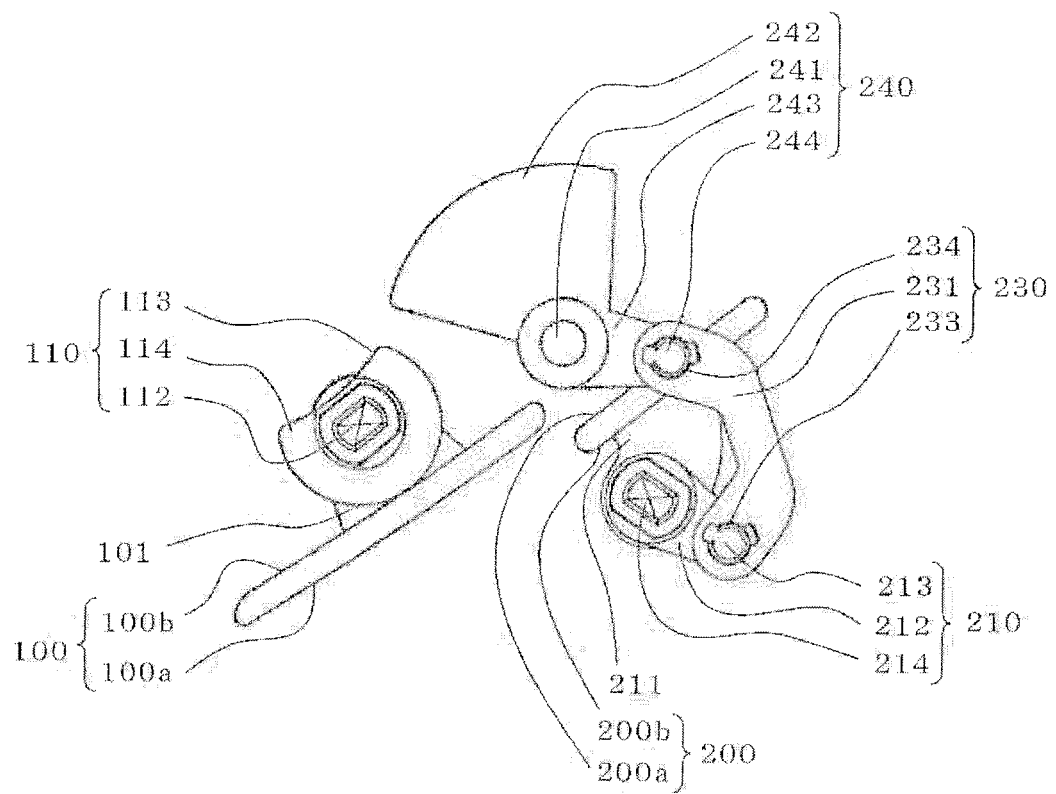


FIG. 9

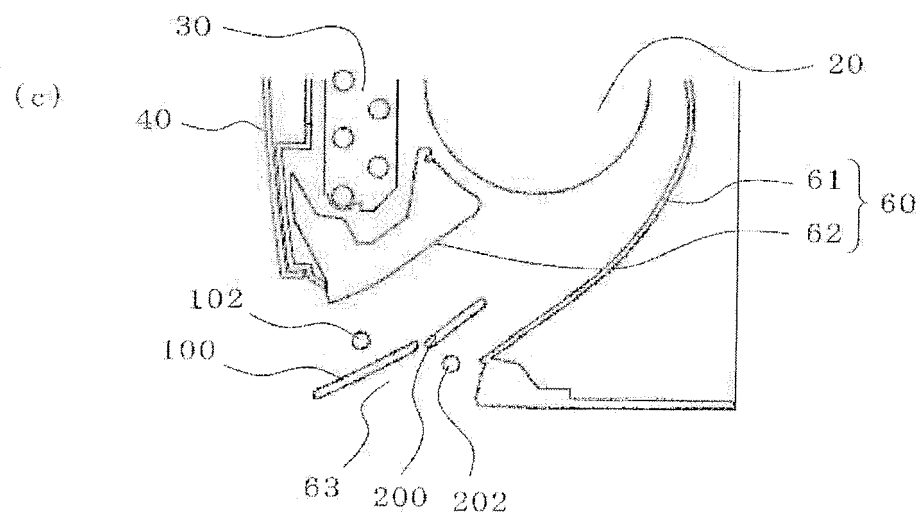
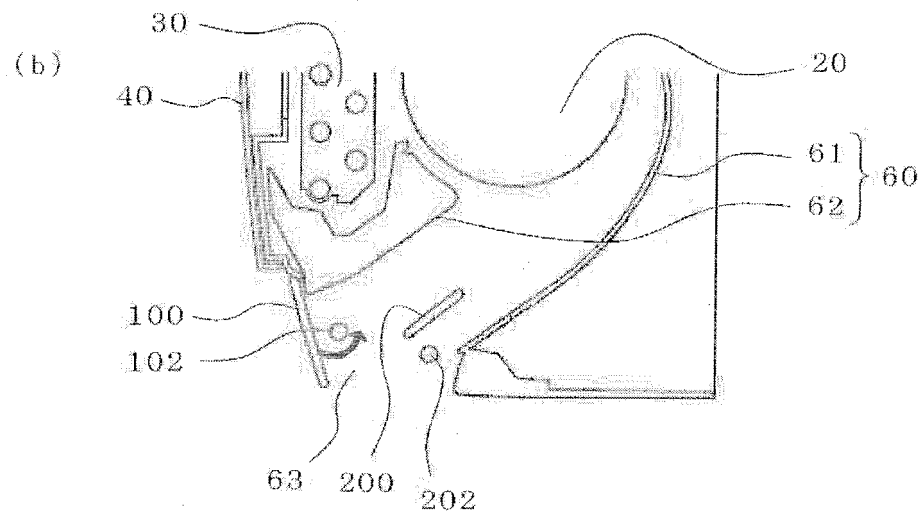
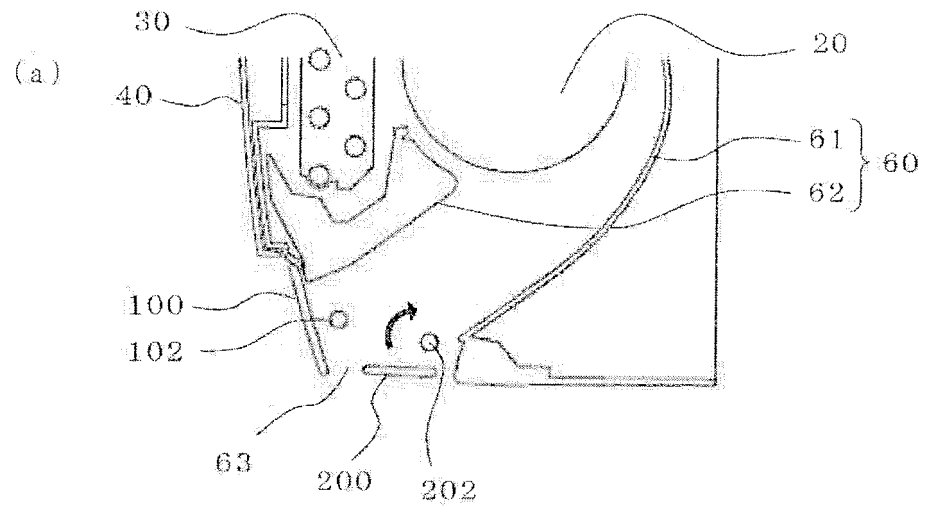


FIG. 10

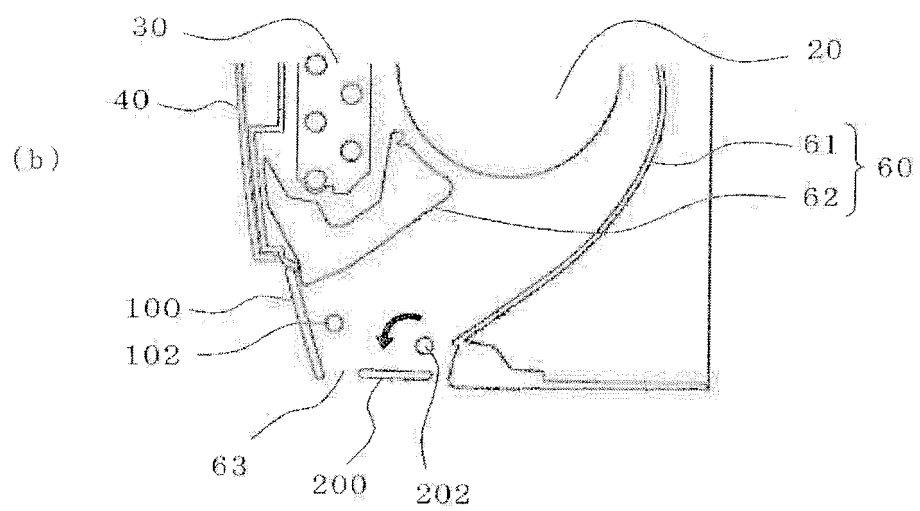
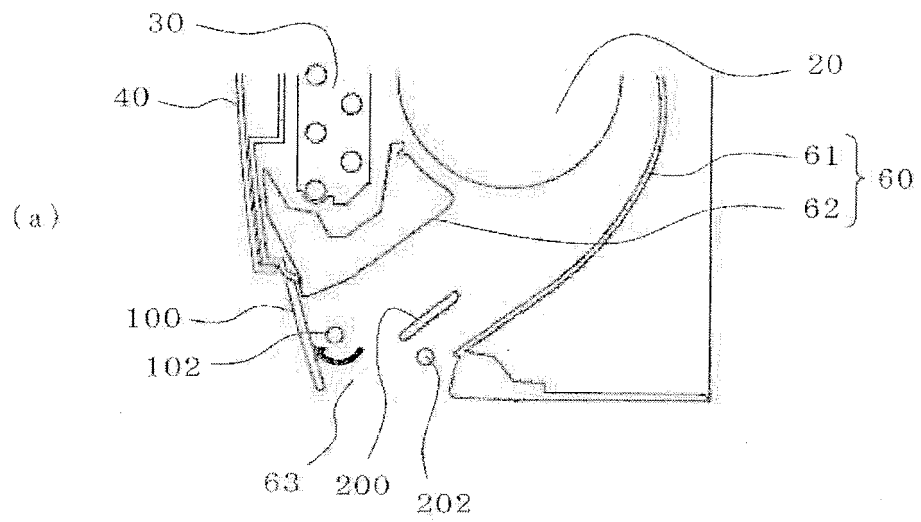


FIG. 11

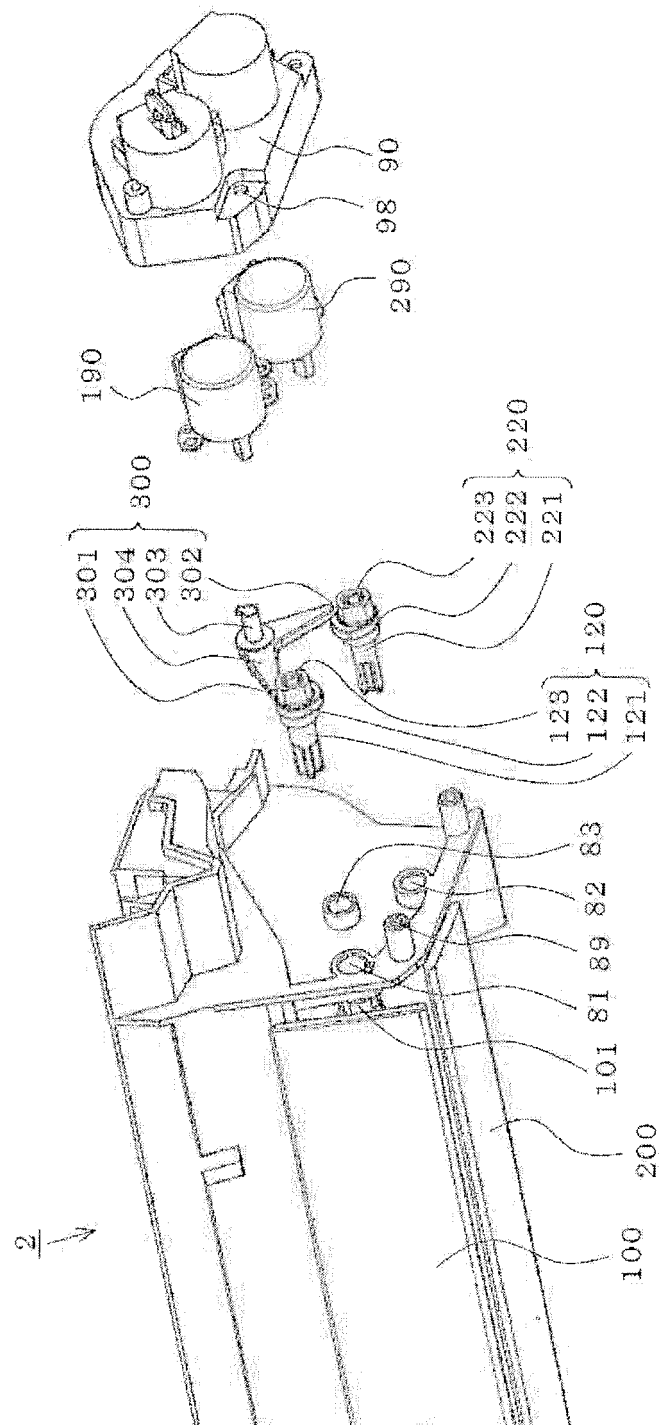


FIG. 12

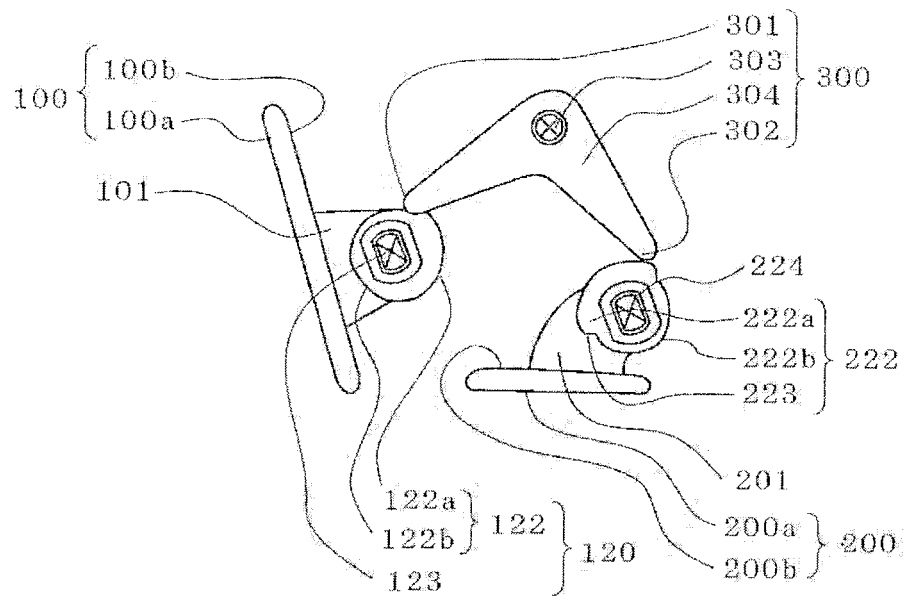


FIG. 13

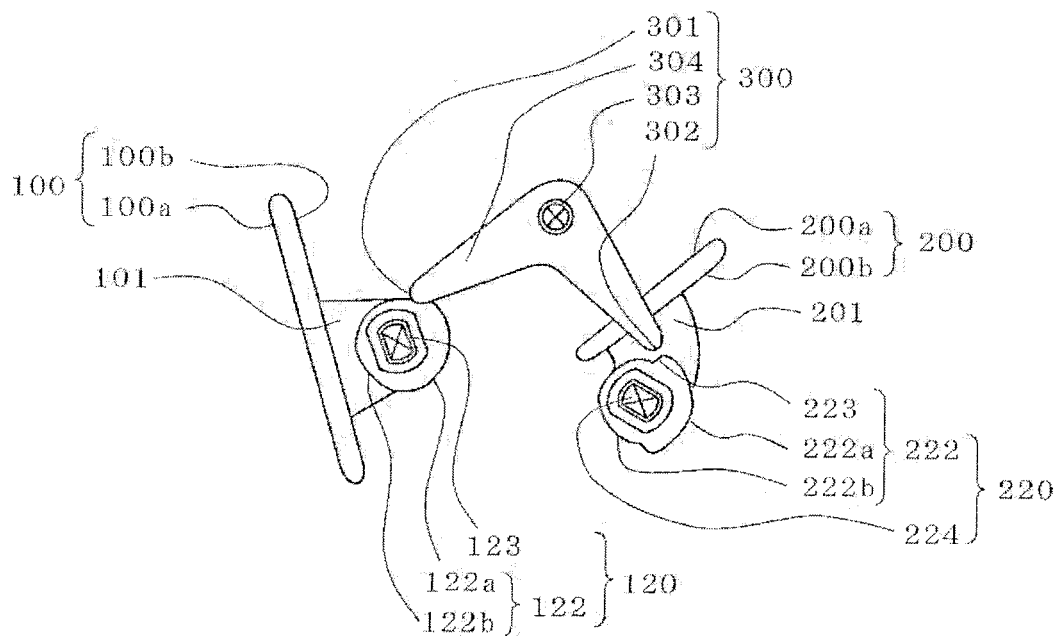
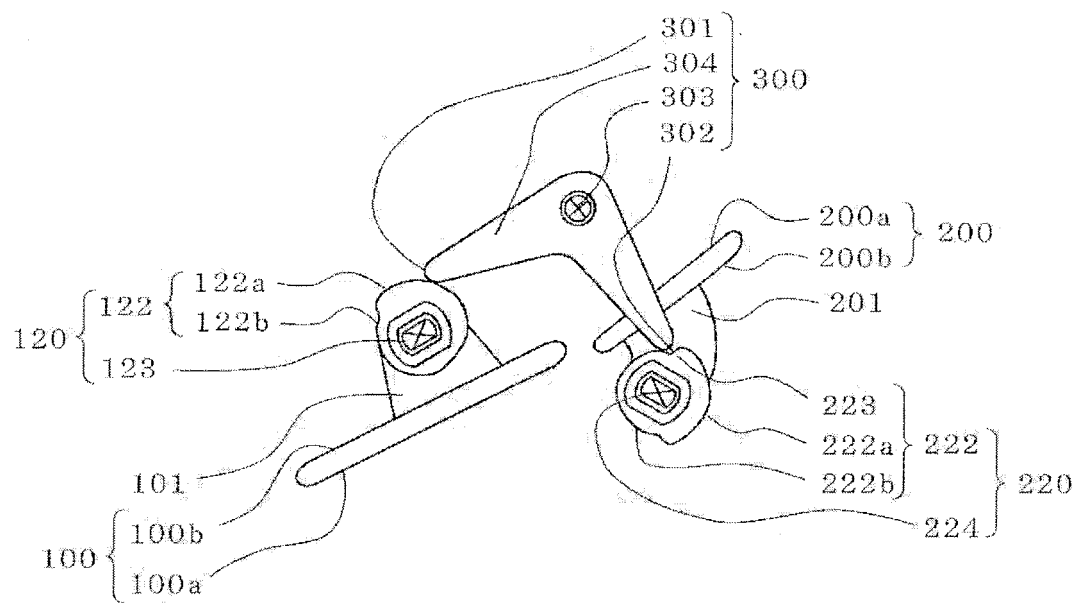


FIG. 14



REFERENCES CITED IN THE DESCRIPTION

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- WO 9811392 A [0003]