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- **TAKAGI, Satoshi**
Osaka-shi
Osaka 530-8323 (JP)
- **IKEHARA, Kazuo**
Osaka-shi
Osaka 530-8323 (JP)

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(71) Applicant: **Daikin Industries, Ltd.**
Osaka 530-8323 (JP)

(74) Representative: **HOFFMANN EITLE**
Patent- und Rechtsanwälte
Arabellastrasse 4
81925 München (DE)

(72) Inventors:
• **KUIDA, Koutarou**
Osaka-shi
Osaka 530-8323 (JP)

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

(57) Provided is an air conditioning indoor unit capable of efficiently blowing air out in the desired direction when blowing out air to the left or right. In an air conditioning indoor unit (10), an upright vane (20) is disposed in a main body casing (13) and is capable of switching the blown state of air from a blow-out port (15) between a first state and a second state. The first state is a state of blowing air out to the front surface of the main body casing (13), and the second state is a state of blowing

air out to the side surfaces of the main body casing (13). When operation has stopped, a controller (40) stores auxiliary vanes (130) and puts a vertical airflow direction adjustment vane (30) in a closed state after putting the upright vane (20) in the second state. Therefore, the vertical airflow direction adjustment vane (30) and the auxiliary vanes (130) do not interfere with the upright vane (20), or, even if there is interference, the extent thereof is small.

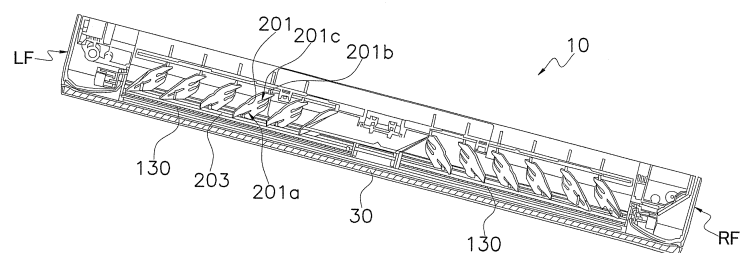


FIG. 7

Description

TECHNICAL FIELD

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

BACKGROUND ART

[0002] Air blown out from a blow-out port of an air conditioning indoor unit can be blown in different directions by a vertical airflow direction adjustment vane disposed in proximity to the blow-out port, and an upright vane disposed on the inner side of the blow-out port. In the indoor unit disclosed in Patent Document 1 (Japanese Laid-open Patent Application No. 2006-2984), for example, a vertical airflow direction plate and a plurality of left and right airflow direction plates (the upright vane) are provided in the blow-out port, the left-right orientation of the air blown out into the room is deviated by the left and right airflow direction plates, and the vertical orientation is varied by the vertical airflow direction plate.

SUMMARY OF THE INVENTION

<Technical Problem>

[0003] However, because the left and right airflow direction plates (the upright vane) disclosed in Patent Document 1 are housed at some point within a blowout flow channel leading from an indoor fan to the blow-out port, the air passing through the blowout flow channel can be deviated to the left and right, but it is doubtful that air coming out of the blow-out port could move in the desired direction.

[0004] An object of the present invention is to provide an air conditioning indoor unit capable of efficiently blowing air out in the desired direction when blowing out air to the left and right.

<Solution to Problem>

[0005] An air conditioning indoor unit according to a first aspect of the present invention is an air conditioning indoor unit capable of varying the direction at which air is blown from a blow-out port, comprising a casing, an upright vane, a vertical direction adjustment vane, and a controller. A blow-out port is formed in the casing. The upright vane is disposed in the casing and is capable of switching the state of air blown from the blow-out port to either a first state or a second state. The first state is a state of blowing the air out to the front surface of the casing. The second state is a state of blowing the air out to the side surfaces of the casing. The vertical airflow direction adjustment vane is in an open state of opening the blow-out port during operation and is in a closed state of closing the blow-out port when operation has stopped. The controller controls the actions of the upright vane

and the vertical airflow direction adjustment vane. The upright vane is set to a size that interferes with the closed vertical airflow direction adjustment vane when in the first state. The controller puts the vertical airflow direction adjustment vane into the closed state after putting the upright vane into the second state when operation has stopped.

[0006] In this air conditioning indoor unit, because the controller puts the vertical airflow direction adjustment vane into the closed state after putting the upright vane into the second state when operation has stopped, the upright vane and the vertical airflow direction adjustment vane do not interfere with each other, or, even if there is interference, the extent thereof is small. Therefore, the upright vane can be made long in the blow-out direction, air blown out transversely can therefore be directed in the desired direction, and it is possible to prevent plastic deformation of the upright vane caused by interference between the vertical airflow direction adjustment vane and the upright vane when operation has stopped.

[0007] An air conditioning indoor unit according to a second aspect of the present invention is the air conditioning indoor unit according to the first aspect, wherein the second state of the upright vane is the original position of the upright vane when the vertical airflow direction adjustment vane is in the closed state.

[0008] Conventional practice has been to return the upright vane to the original position with every operation restart, but with this air conditioning indoor unit, the return to the original point of the upright vane during an operation restart can be omitted by having the second state of the upright vane when the vertical airflow direction adjustment vane is in the closed state be the original position of the upright vane. As a result, it is possible to reduce the unpleasant feeling for a user who would feel that there is a long time required from the start of operation for the air blowing action to take effect.

[0009] An air conditioning indoor unit according to a third aspect of the present invention is the air conditioning indoor unit according to the second aspect, wherein the controller stores the position of the upright vane immediately preceding the stop of operation and returns the upright vane to this position when operation is restarted.

[0010] With this air conditioning indoor unit, returning the upright vane to the original position during an operation restart can be omitted, less time than in conventional practice is therefore needed to return the upright vane to the position at the time of the previous operation, and it is possible to proportionately reduce the unpleasant feeling for a user who would feel that there is a long time required from the start of operation for the air blowing action to take effect.

[0011] An air conditioning indoor unit according to a fourth aspect of the present invention is the air conditioning indoor unit according to the third aspect, wherein the upright vane has a plurality of upright vane pieces aligned at intervals. When operation has stopped, the controller orients the left half of the plurality of upright vane pieces

toward the left side surface of the casing and orients the right half toward the right side surface of the casing.

[0012] With this air conditioning indoor unit, and particularly with the type of air conditioning indoor unit that can separate the blown out air into left and right independent currents, returning the upright vane to the original position during an operation restart can be omitted, less time than in conventional practice is therefore needed following the start of operation to return the upright vane to the position at the time of the previous operation, and it is possible to proportionately reduce the unpleasant feeling for a user who would feel that there is a long time required from the start of operation for the air blowing action to take effect.

[0013] An air conditioning indoor unit according to a fifth aspect of the present invention is the air conditioning indoor unit according to the third aspect, wherein the upright vane has a plurality of upright vane pieces aligned at intervals. When operation has stopped, the controller orients all of the upright vane pieces to the right or left.

[0014] With this air conditioning indoor unit, and particularly with the type of air conditioning indoor unit that directs the blown out air to the left or right, returning the upright vane to the original position during an operation restart can be omitted, less time than in conventional practice is therefore needed following the start of operation to return the upright vane to the position at the time of the previous operation, and it is possible to proportionately reduce the unpleasant feeling for a user who would feel that there is a long time required from the start of operation for the air blowing action to take effect.

[0015] An air conditioning indoor unit according to a sixth aspect of the present invention is the air conditioning indoor unit according to the first aspect, further provided with auxiliary vanes. The auxiliary vanes reduce the gap formed between the blow-out port and the rear end of the vertical airflow direction adjustment vane when the airflow direction adjustment vane takes a nearly horizontal orientation during operation. The auxiliary vanes are stored in a position nearer to the upright vane than the vertical airflow direction adjustment vane in a closed state when operation has stopped. The upright vane is set to a size that interferes with the stored auxiliary vanes when in the first state. The controller puts the auxiliary vanes into the stored state after putting the upright vane into the second state when operation has stopped.

[0016] In this air conditioning indoor unit, because the controller puts the auxiliary vanes into the stored state after putting the upright vane into the second state when operation has stopped, the upright vane and the auxiliary vanes do not interfere with each other, or, even if there is interference, the extent thereof is small. Therefore, the upright vane can be made long in the blow-out direction, air blown out transversely can therefore be directed in the desired direction, and it is possible to prevent plastic deformation of the upright vane caused by interference between the auxiliary vanes and the upright vane when operation has stopped.

<Advantageous Effects of Invention>

[0017] In the air conditioning indoor unit according to the first aspect of the present invention, the upright vane and the vertical airflow direction adjustment vane do not interfere with each other, or, even if there is interference, the extent thereof is small. Therefore, the upright vane can be made long in the blow-out direction, air blown out transversely can therefore be directed in the desired direction, and it is possible to prevent plastic deformation of the upright vane caused by interference between the vertical airflow direction adjustment vane and the upright vane when operation has stopped.

[0018] In the air conditioning indoor unit according to any of the second through fifth aspects, because less time than in conventional practice is needed to return the upright vane to the position at the time of the previous operation, it is possible to proportionately reduce the unpleasant feeling for a user who would feel that there is a long time required from the start of operation for the air blowing action to take effect.

[0019] In the air conditioning indoor unit according to the sixth aspect of the present invention, the upright vane and the auxiliary vanes do not interfere with each other, or, even if there is interference, the extent thereof is small. Therefore, the upright vane can be made long in the blow-out direction, air blown out transversely can be directed in the desired direction, and it is possible to prevent plastic deformation of the upright vane caused by interference between the auxiliary vanes and the upright vane when operation has stopped.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

FIG. 1 is a perspective view of an air conditioning indoor unit according to an embodiment of the present invention when the air conditioning indoor unit is in operation.

FIG. 2 is a cross-sectional view of the air conditioning indoor unit according to FIG. 1 when the air conditioning indoor unit is not in operation.

FIG. 3 is a side view of the bottom of the air conditioning indoor unit when the vertical airflow direction adjustment vane has left the blow-out port open.

FIG. 4 is a side view of the vertical airflow direction adjustment vane in a downward blowing orientation used during a heating operation.

FIG. 5 is a side view of the vertical airflow direction adjustment vane in an upward blowing orientation used during a heating operation.

FIG. 6 is a perspective view of the vane pieces in the second state and the periphery thereof.

FIG. 7 is a partial cross-sectional view of the air conditioning indoor unit along line A-A in FIG. 1.

DESCRIPTION OF EMBODIMENTS

[0021] Embodiments of the present invention are described below with reference to the drawings. The following embodiments are specific examples of the present invention, and these examples do not limit the technical scope of the present invention.

(1) Configuration of the air conditioning indoor unit 10

[0022] FIG. 1 is a perspective view of an air conditioning indoor unit 10 according to an embodiment of the present invention when the air conditioning indoor unit 10 is in operation. FIG. 2 is a cross-sectional view of the air conditioning indoor unit 10 according to FIG. 1 when the air conditioning indoor unit is not in operation.

[0023] In FIGS. 1 and 2, the air conditioning indoor unit 10 is a wall-mounted indoor unit, equipped with an indoor heat exchanger 11, an indoor fan 12, a main body casing 13, a bottom frame 17, a filter 25, and a controller 40.

[0024] In the main body casing 13, a three-dimensional space is formed by a front surface grill 13a, a front surface panel 13b, and a rear surface plate 13c, and the indoor heat exchanger 11, the indoor fan 12, the bottom frame 17, the filter 25, and the controller 40 are accommodated in this three-dimensional space. The front surface panel 13b covers the front surface of the front surface grill 13a, the top end is pivotably supported on the front surface grill 13a, and the front surface panel can be hinged. The main body casing 13 is mounted to a wall via an attachment plate (not shown).

[0025] The indoor heat exchanger 11 and the indoor fan 12 are attached to the bottom frame 17. The indoor heat exchanger 11 conducts heat exchange with the air passing through. Seen from the side, the indoor heat exchanger 11 has an inverse V shape bent downward at both ends, below which the indoor fan 12 is positioned. The indoor fan 12, which is a cross flow fan, blows air taken in from the room back out into the room after the air has passed through the indoor heat exchanger 11.

[0026] A blow-out port 15 is provided to the bottom surface of the main body casing 13. A vertical airflow direction adjustment vane 30 for guiding the air blown out from the blow-out port 15 is attached to the blow-out port 15 in a pivotable manner. The vertical airflow direction adjustment vane 30, which is driven by a motor (not shown), is capable not only of varying the blow-out direction of the air, but also of opening and closing the blow-out port 15. The blow-out port 15 is joined to the interior of the main body casing 13 by a blow-out flow channel 18, and the blow-out flow channel 18 is formed from the blow-out port 15 along the bottom frame 17.

[0027] An upright vane 20 is disposed in the blow-out flow channel 18 as shown in FIG. 2. The upright vane 20 can direct the blown-out air at least toward either the front surface or the side surfaces of the main body casing 13.

[0028] The filter 25 is disposed between the indoor heat exchanger 11 and the front surface grill 13a of the

main body casing 13. The filter 25 removes dust in the air flowing into the indoor heat exchanger 11.

[0029] An intake port 22 is provided to the front top part of the front surface grill 13a. Indoor air near the intake port 22 is drawn into the indoor fan 12 through the intake port 22, the filter 25 and the indoor heat exchanger 11 by the operation of the indoor fan 12, and is blown through the blow-out flow channel 18 and out of the blow-out port 15 by the indoor fan 12.

[0030] The controller 40, which is accommodated in the front portion of the main body casing 13, performs actions such as controlling the rotating speed of the indoor fan 12 and adjusting the opening degree of the blow-out port 15. The opening degree of the blow-out port 15 is adjusted via the vertical airflow direction adjustment vane 30 and an auxiliary vane 130.

(2) Detailed configuration

(2-1) Vertical airflow direction adjustment vane 30

[0031] The vertical airflow direction adjustment vane 30, which is a plate-shaped member having a substantially rectangular shape as shown in FIGS. 1 and 2, waits in a position covering the opening of the blow-out port 15 (referred to as the closed position hereinafter) when the air conditioning indoor unit 10 stops operating. A first surface 30a, which can be seen from the exterior in the closed position of the vertical airflow direction adjustment vane 30, supports part of the bottom surface of the main body casing 13.

[0032] Provided to a second surface 30b, which is on the back of the first surface 30a of the vertical airflow direction adjustment vane 30, are a first front linking part 311, a second front linking part 312, and a third front linking part 313 (see FIG. 1). The first front linking part 311, the second front linking part 312, and the third front linking part 313 are disposed on the front end side of the second surface 30b in the closed position of the vertical airflow direction adjustment vane 30, at substantially equal intervals along the longitudinal direction of the second surface 30b.

[0033] Furthermore, a first rear linking part 321 and a second rear linking part 322 are provided on the second surface 30b of the vertical airflow direction adjustment vane 30. The first rear linking part 321 and the second rear linking part 322 are disposed on the rear end side of the second surface 30b in the closed position of the vertical airflow direction adjustment vane 30, in the longitudinal middle of the second surface 30b.

[0034] The ends of arcuate rack members 46 are linked respectively to the first front linking part 311, the second front linking part 312, and the third front linking part 313. The racks 46a of rack and pinion mechanisms are formed in the convex surfaces of the rack members 46, and the rack members 46 are oriented with the racks 46a facing at an upward incline of the blow-out port 15.

[0035] The ends of foldable link members 47 are linked

respectively to the first rear linking part 321 and the second rear linking part 322 as shown in FIG. 1. The link members 47 are configured by two pairs of rod-shaped members rotatably coupled to each other at the ends. The two rod-shaped link members 47 above a joint 47c are referred to as top links 47a and the members below the joint are referred to as bottom links 47b.

[0036] FIG. 3 is a side view of the bottom of the air conditioning indoor unit 10 when the vertical airflow direction adjustment vane 30 has left the blow-out port 15 open. In FIG. 3, a first stepper motor 51 is installed inside the main body casing 13, and a pinion gear 51a is attached to a rotating shaft of the first stepper motor 51. The pinion gear 51a meshes with the racks 46a and the first stepper motor 51 rotates the pinion gear 51a clockwise as seen from the front of FIG. 3, whereby the rack members 46 move to the front of the blow-out port 15 and the front part of the vertical airflow direction adjustment vane 30 approaches the front of the blow-out port 15. This is referred to as the first action of the first stepper motor 51.

[0037] Conversely, the rack members 46 are retracted into the back of the main body casing 13 by the first stepper motor 51 rotating the pinion gear 51a counterclockwise as seen from the front of FIG. 3. This is referred to as the second action of the first stepper motor 51.

[0038] Furthermore, a second stepper motor 52 is installed inside the main body casing 13, and a drive gear 52a is attached to a rotating shaft of the second stepper motor 52. A driven gear 48 is provided to the ends of the top links 47a of the link members 47, and the second stepper motor 52 rotates the driven gear 48 clockwise as seen from the front of FIG. 3 via the drive gear 52a, thereby enlarging the center angle formed by the top links 47a and the bottom links 47b about the joint 47c and causing the rear part of the vertical airflow direction adjustment vane 30 to approach the front of the blow-out port 15. This is referred to as the first action of the second stepper motor 52.

[0039] Conversely, the center angle formed by the top links 47a and the bottom links 47b about the joint 47c is reduced by the drive gear 52a rotating the driven gear 48 counterclockwise as seen from the front of FIG. 3, and the rear part of the vertical airflow direction adjustment vane 30 retracts into the blow-out port 15. This is referred to as the second action of the second stepper motor 52.

[0040] Therefore, the vertical airflow direction adjustment vane 30 approaches the front of the blow-out port 15 due to the first action of the first stepper motor 51 and the first action of the second stepper motor 52 being performed simultaneously or continuously. The vertical airflow direction adjustment vane 30 retracts into the blow-out port 15 due to the second action of the first stepper motor 51 and the second action of the second stepper motor 52 being performed simultaneously or continuously.

[0041] The orientation of the vertical airflow direction adjustment vane 30 shown in FIG. 3 is a vertical blowing

orientation used during a dehumidifying operation or the like, but the vane can take various other orientations through a combination of the first and second actions of the first stepper motor 51 and the first and second actions of the second stepper motor 52. Typical orientations are described below with reference to the drawings.

[0042] FIG. 4 is a side view of the vertical airflow direction adjustment vane 30 in a downward blowing orientation used during a heating operation. FIG. 5 is a side view of the vertical airflow direction adjustment vane 30 in an upward blowing orientation used during a heating operation. In FIG. 4, the downward blowing orientation of the vertical airflow direction adjustment vane 30 during the heating operation is achieved due to the first stepper motor 51 rotating the pinion gear 51a by an angle A1 clockwise as seen from the front of FIG. 3, and the second stepper motor 52 rotating the driven gear 48 by an angle B1 clockwise as seen from the front of FIG. 3, using the closed position as a reference.

[0043] In FIG. 5, the upward blowing orientation of the vertical airflow direction adjustment vane 30 during the heating operation is achieved due to the first stepper motor 51 rotating the pinion gear 51a by an angle A1 clockwise as seen from the front of FIG. 3, and the second stepper motor 52 rotating the driven gear 48 by an angle B2 clockwise as seen from the front of FIG. 3, using the closed position as a reference. The angle B2 is greater than or equal to the angle B1.

(2-2) Auxiliary vane 130

[0044] In FIG. 1, two auxiliary vanes 130 having pivot shafts parallel to the lengthwise edge of the blow-out port 15 are provided in the rear part of the blow-out port 15. The two auxiliary vanes 130 are adjacent to each other along the longitudinal direction of the blow-out port 15.

[0045] Two middle support parts 131, each supporting an end of a pivot shaft of an auxiliary vane 130, are provided to the main body casing 13 in positions facing the middle part of the blow-out port 15. In the rear corners of the blow-out port 15 in the main body casing 13, side support parts 132 are provided for supporting the other ends of pivot shafts of auxiliary vanes 130.

[0046] When the vertical airflow direction adjustment vane 30 is in the closed position as shown in FIG. 2, the auxiliary vanes 130 are stored above the vertical airflow direction adjustment vane 30 in an orientation substantially parallel to the vertical airflow direction adjustment vane 30, and cannot be seen from the exterior. At this time, the auxiliary vanes 130 draw near so as to overlap the second surface 30b of the vertical airflow direction adjustment vane 30, the auxiliary vanes 130 therefore occupy only a small space of the blow-out flow channel 18, and there is minimal interference with other members (e.g. the upright vane 20) disposed in the periphery of the blow-out port 15 and in the blow-out flow channel 18.

[0047] When the vertical airflow direction adjustment vane 30 adopts a vertical blowing orientation during a

dehumidifying operation or the like as shown in FIG. 3, the distal ends of the auxiliary vanes 130 pivot so as to face the rear end of the vertical airflow direction adjustment vane 30. When the vertical airflow direction adjustment vane 30 adopts the vertical blowing orientation, air blown out from the blow-out port 15 strikes the second surface 30b of the vertical airflow direction adjustment vane 30 to be divided into air moving at an upward incline and air moving at a downward incline. Because of the large space between the blow-out port 15 and the rear end of the vertical airflow direction adjustment vane 30, some of the air moving at a downward incline flows to the rear wall of the blow-out port 15 (the wall to which the air conditioning indoor unit 10 is attached), causing the wall surface to become dirty.

[0048] In the present embodiment, because the auxiliary vanes 130 are interposed in the space between the blow-out port 15 and the rear end of the vertical airflow direction adjustment vane 30, the auxiliary vanes 130 block air that would otherwise pass through this space and leak out to the rear. As a result, fouling of the wall surface by the blown out air is prevented.

[0049] When the vertical airflow direction adjustment vane 30 adopts the downward blowing orientation during the heating operation as shown in FIG. 4, or when the vane adopts the upward blowing orientation during the heating operation as shown in FIG. 5, the auxiliary vanes 130 pivot so as to be substantially parallel with the vertical airflow direction adjustment vane 30. In this case, the auxiliary vanes 130 not only block blown out air that would otherwise leak out to the rear, but also lead this blown out air in a direction parallel with the vertical airflow direction adjustment vane 30.

(2-3) Upright vane 20

[0050] The upright vane 20 has a plurality of vane pieces 201, and a linking rod 203 for linking the plurality of vane pieces 201, as shown in FIG. 1. The upright vane 20 is disposed in the blow-out flow channel 18, nearer to the indoor fan 12 than the second surface 30b of the vertical airflow direction adjustment vane 30 in the closed position, as shown in FIG. 2.

[0051] The vane pieces 201 are plate pieces that gradually increase in surface area from the indoor fan 12 side of the blow-out flow channel 18 toward the blow-out port 15 side. Slit holes 201a where the linking rod 203 is inserted are formed in the blow-out port 15 sides, and support parts 201b supported inside the main body casing 13 are formed in the ends on the indoor fan 12 sides. In each vane piece 201 are formed two slits 201c extending from the middle toward the support part 201b.

[0052] The plurality of vane pieces 201 swing to the left and right about a state of being perpendicular to the longitudinal direction of the main body casing 13, due to the linking rod 203 moving horizontally back and forth along the longitudinal direction of the blow-out port 15. The linking rod 203 is moved horizontally back and forth

by a motor (not shown).

[0053] Not only do the vane pieces 201 swing, but they can also be stopped at any desired angle after swinging by stopping the motor. Therefore, the vane pieces 201 can be switched between a first state (see FIG. 1) of blowing the air from the blow-out port 15 out to the front surface of the main body casing 13, and a second state of blowing the air out to the side surfaces of the main body casing 13.

[0054] FIG. 6 is a perspective view of the vane pieces 201 in the second state and the periphery thereof. In FIG. 6, when the linking rod 203 has moved to the farthest limit along the longitudinal direction of the blow-out port 15, for example, each of the vane pieces 201 bends with the portion between the two slits 201c as a cantilever, the support part 201b being the fixed end. Therefore, the distal ends of the vane pieces 201 face the side surface of the main body casing 13, which is the second state.

[0055] A longer blow-out direction length of the vane pieces 201 of the upright vane 20 corresponds to an increasing capability of the air blown out laterally being directed in the desired direction. Therefore, in the present embodiment, the vane pieces 201 in the first state are set to a size at which there will be interference with the vertical airflow direction adjustment vane 30 in the closed state.

[0056] FIG. 7 is a partial cross-sectional view of the air conditioning indoor unit 10 along line A-A in FIG. 1. In FIG. 7, the vane pieces 201 to the right of the middle of the upright vane 20 adopt an orientation in which the distal ends face the right side surface RF, and the vane pieces 201 to the left of the middle of the upright vane 20 adopt an orientation in which the distal ends face the left side surface LF. In other words, the controller 40 stores the auxiliary vanes 130 and returns the vertical airflow direction adjustment vane 30 to the closed position after having switched to the second state of blowing the air from the blow-out port 15 out to the side surfaces of the main body casing 13.

[0057] When the controller 40 has stopped the operation of the air conditioning indoor unit 10 and returned the vertical airflow direction adjustment vane 30 to the closed position, the vane pieces 201 remain in the first state and the distal ends of the vane pieces 201 and the vertical airflow direction adjustment vane 30 interfere with each other. Furthermore, there is also interference with the auxiliary vanes 130 because the auxiliary vanes 130 are stored above the vertical airflow direction adjustment vane 30. Such interference can not only cause creaking sounds, but can also cause the vane pieces 201 to deform.

[0058] In view of this, in the present embodiment, the vane pieces 201 are in the second state as shown in FIG. 7 when the controller 40 stops the operation of the air conditioning indoor unit 10, therefore preventing interference between the auxiliary vanes 130 stored in the blow-out port 15 and the vertical airflow direction adjustment

vane 30 returned to the closed position. Even if there is interference, the extent of the interference is small, and the occurrence of creaking sounds and/or deformation of the vane pieces 201 are therefore prevented.

[0059] In the air conditioning indoor unit 10, the linking rod 203 of the upright vane 20 is driven by a stepper motor, and when the vertical airflow direction adjustment vane 30 is in the closed position, the second state of the vane pieces 201 is the original position of the upright vane 20. At the start of operation, the controller 40 must temporarily move the upright vane 20 to the original position and then return the upright vane 20 to the stored position that immediately preceded the previous stop, but because the upright vane 20 is already in the original position (the vane pieces 201 are in the second state) at the time of the stop, the time to the original position is omitted. Therefore, less time is needed than conventionally from the start of operation to return the upright vane 20 to the position that immediately preceded the previous stop, and it is possible to proportionately reduce the unpleasant feeling for a user who would feel that there is a long time required from the start of operation for the air blowing action to take effect.

[0060] In FIG. 7, the distal ends of half of the plurality of vane pieces 201 face the right side surface RF, and those of the other half face the left side surface LF, but the present invention is not limited to this arrangement, and the same effect is achieved even if the distal ends of all of the vane pieces 201 face either the right side surface RF or the left side surface LF.

(3) Characteristics

(3-1)

[0061] In the air conditioning indoor unit 10, the upright vane 20 is disposed in the main body casing 13, and is capable of switching the state of air blown out from the blow-out port 15 to the first state and the second state. The first state is a state of blowing air out to the front surface of the main body casing 13, and the second state is a state of blowing air out to the side surfaces of the main body casing 13. Because the controller 40 stores the auxiliary vanes 130 and puts the vertical airflow direction adjustment vane 30 in the closed state after putting the upright vane 20 in the second state when operation has stopped, the vertical airflow direction adjustment vane 30 and the auxiliary vanes 130 do not interfere with the upright vane 20, or, even if there is interference, the extent thereof is small. Therefore, the upright vane 20 can be made long in the blow-out direction, air blown out transversely can be directed in the desired direction, and it is possible to prevent plastic deformation of the upright vane caused by interference between the vertical airflow direction adjustment vane and the upright vane when operation has stopped.

(3-2)

[0062] When the vertical airflow direction adjustment vane 30 is in the closed state, the second state of the upright vane 20 is the original position of the upright vane 20. The process of returning the upright vane 20 to the original position when operation restarts is omitted compared with a conventional air conditioning indoor unit in which the upright vane is returned to the original position with every operation restart. As a result, it is possible to reduce the unpleasant feeling for a user who would feel that there is a long time required from the start of operation for the air blowing action to take effect.

(3-3)

[0063] In the air conditioning indoor unit 10, the controller 40 stores the position of the upright vane 20 immediately preceding the stop of operation, and returns the upright vane to this position when operation is restarted. In this air conditioning indoor unit, the time needed for the upright vane 20 to return to the position immediately preceding the previous stop is less than in conventional practice because the upright vane 20 is already in the original position when operation is started. Therefore, it is possible to reduce the unpleasant feeling for a user who would feel that there is a long time required from the start of operation for the air blowing action to take effect.

INDUSTRIAL APPLICABILITY

[0064] As described above, according to the present invention, the length of the upright vane along the air blow-out direction is greater than in conventional practice, and air can be efficiently blown out in the desired direction. Consequently, the present invention is useful as the type of air conditioning indoor unit in which the intake port automatically opens and closes.

REFERENCE SIGNS LIST

[0065]

10	Air conditioning indoor unit
13	Main body casing
15	Blow-out port
20	Upright vane
30	Vertical airflow direction adjustment vane
40	Controller
130	Auxiliary vane
201	Vane piece

CITATION LIST

PATENT LITERATURE

[0066] <Patent Document 1> Japanese Laid-open Patent Application No. 2006-2984

Claims

1. An air conditioning indoor unit capable of varying the direction at which air is blown from a blow-out port (15), comprising:

a casing (13) in which the blow-out port (15) is formed;

an upright vane (20) disposed in the casing (13) and capable of switching the state of air blown from the blow-out port (15) to either a first state of blowing the air out to the front surface of the casing (13), or a second state of blowing the air out to a side surface of the casing (13);

a vertical airflow direction adjustment vane (30) that is in an open state of opening the blow-out port (15) during operation and that is in a closed state of closing the blow-out port (15) when operation has stopped; and

a controller (40) for controlling the actions of the upright vane (20) and the vertical airflow direction adjustment vane (30);

the upright vane (20) being set to a size that interferes with the closed vertical airflow direction adjustment vane (30) when in the first state; and

the controller (40) putting the vertical airflow direction adjustment vane (30) into the closed state after putting the upright vane (20) into the second state when operation has stopped.

2. The air conditioning indoor unit (10) according to claim 1, wherein

the second state of the upright vane (20) is the original position of the upright vane (20) when the vertical airflow direction adjustment vane (30) is in the closed state.

3. The air conditioning indoor unit (10) according to claim 2, wherein

the controller (40) stores the position of the upright vane (20) immediately preceding the stop of operation and returns the upright vane to said position when operation is restarted.

4. The air conditioning indoor unit (10) according to claim 3, wherein

the upright vane (20) has a plurality of upright vane pieces (201) aligned at intervals; and

when operation has stopped, the controller (40) orients the left half of the plurality of upright vane pieces (201) toward the left side surface of the casing (13) and orients the right half toward the right side surface of the casing (13).

5. The air conditioning indoor unit (10) according to claim 3, wherein

the upright vane (20) has a plurality of upright vane

pieces (201) aligned at intervals; and

when operation has stopped, the controller (40) orients the upright vane pieces (201) to either the right or left.

6. The air conditioning indoor unit (10) according to claim 1, further comprising:

an auxiliary vane (130) for reducing the gap formed between the blow-out port (15) and the rear end of the vertical airflow direction adjustment vane (30) taking a nearly horizontal orientation during operation;

the auxiliary vane (130) being stored in a position nearer to the upright vane (20) than the vertical airflow direction adjustment vane (30) in a closed state when operation has stopped;

the upright vane (20) being set to a size that interferes with the stored auxiliary vane (130) when in the first state; and

the controller (40) putting the auxiliary vane (130) into the stored state after putting the upright vane (20) into the second state when operation has stopped.

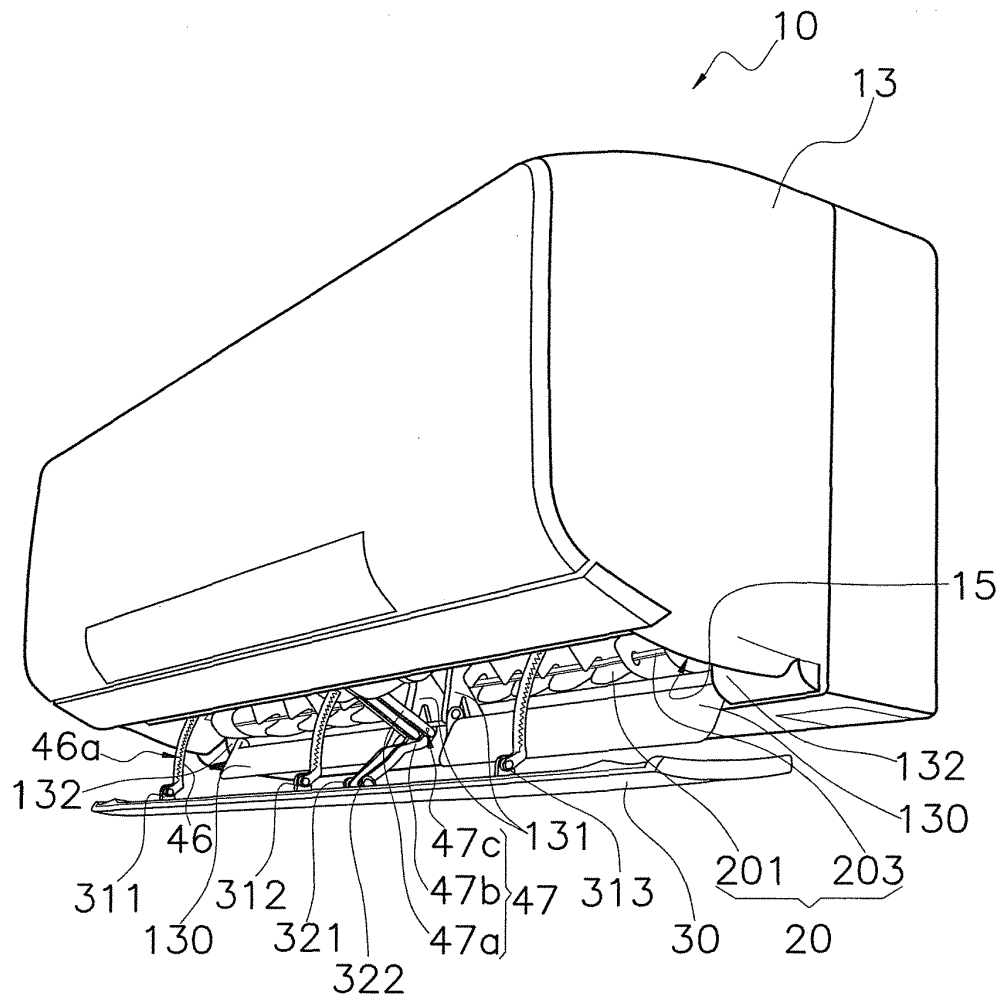


FIG. 1

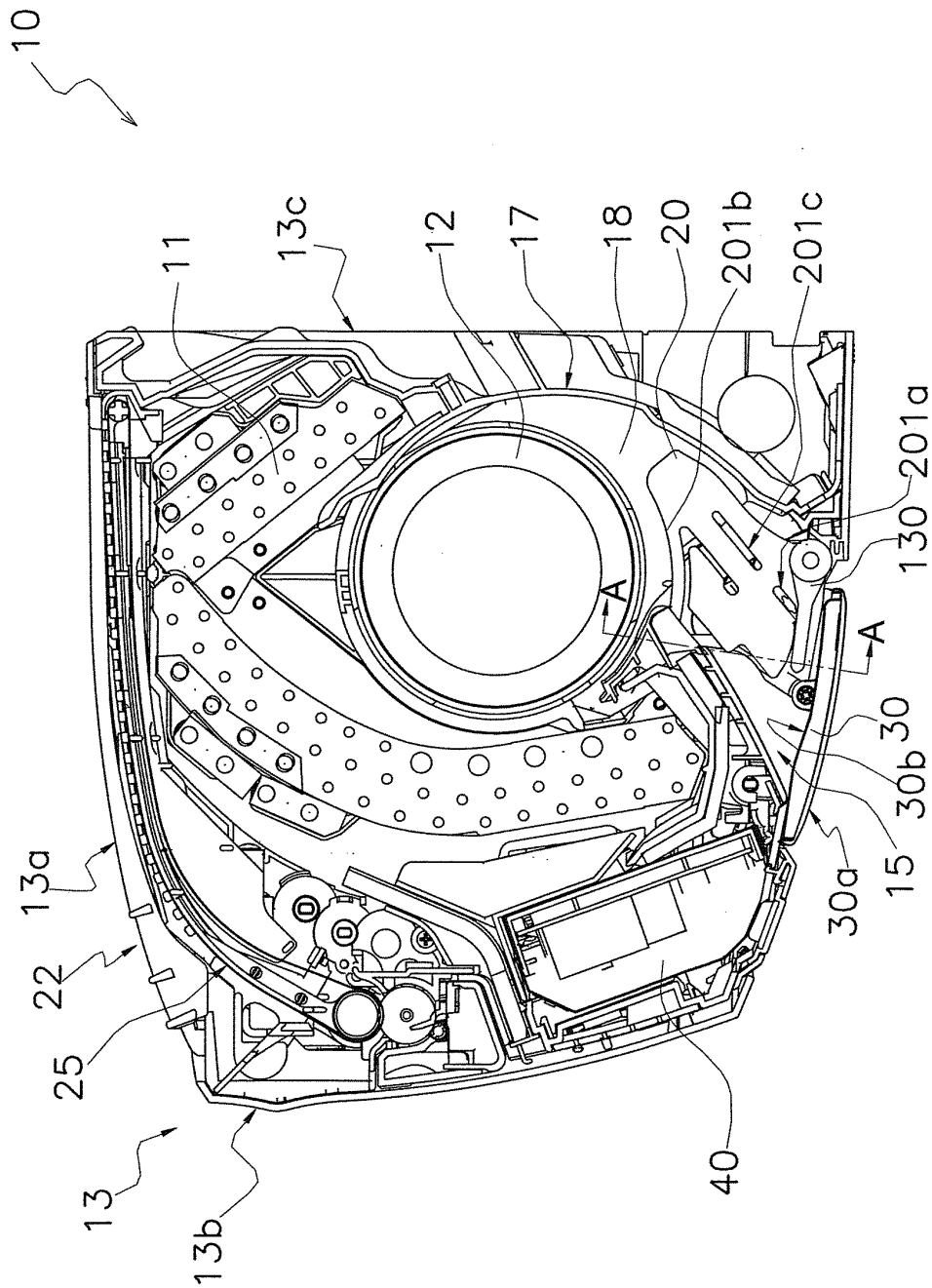


FIG. 2

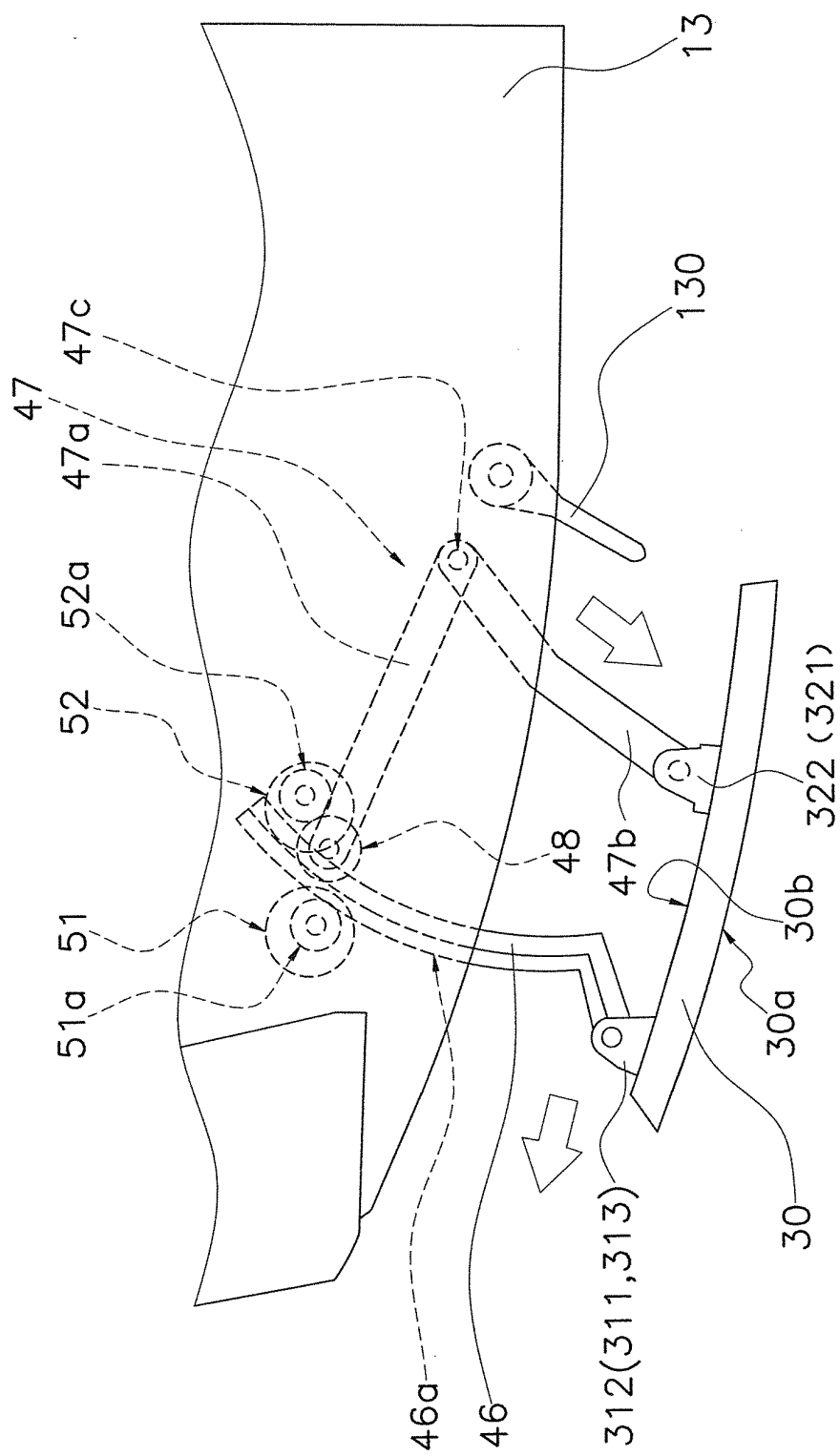


FIG. 3

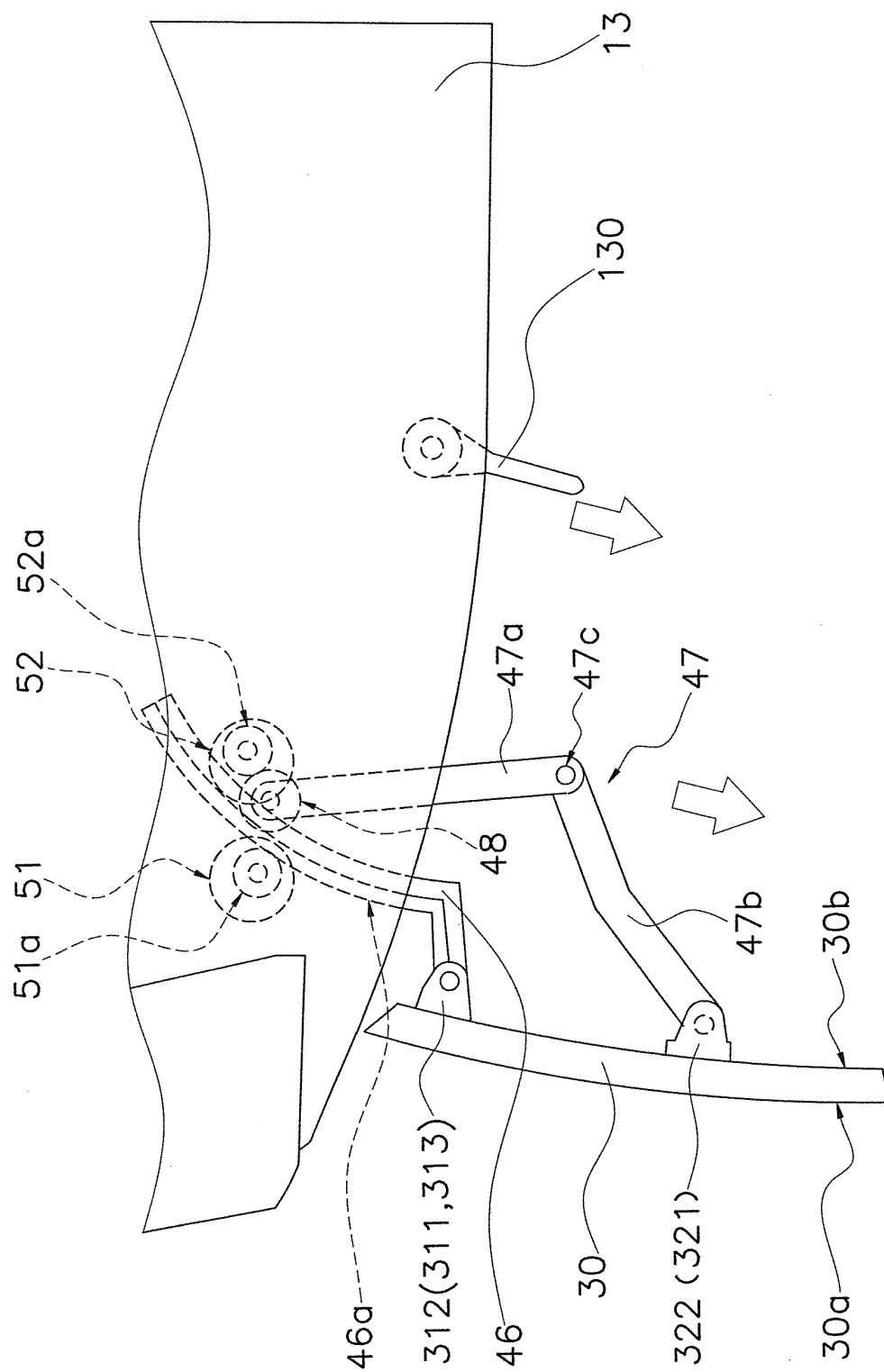


FIG. 4

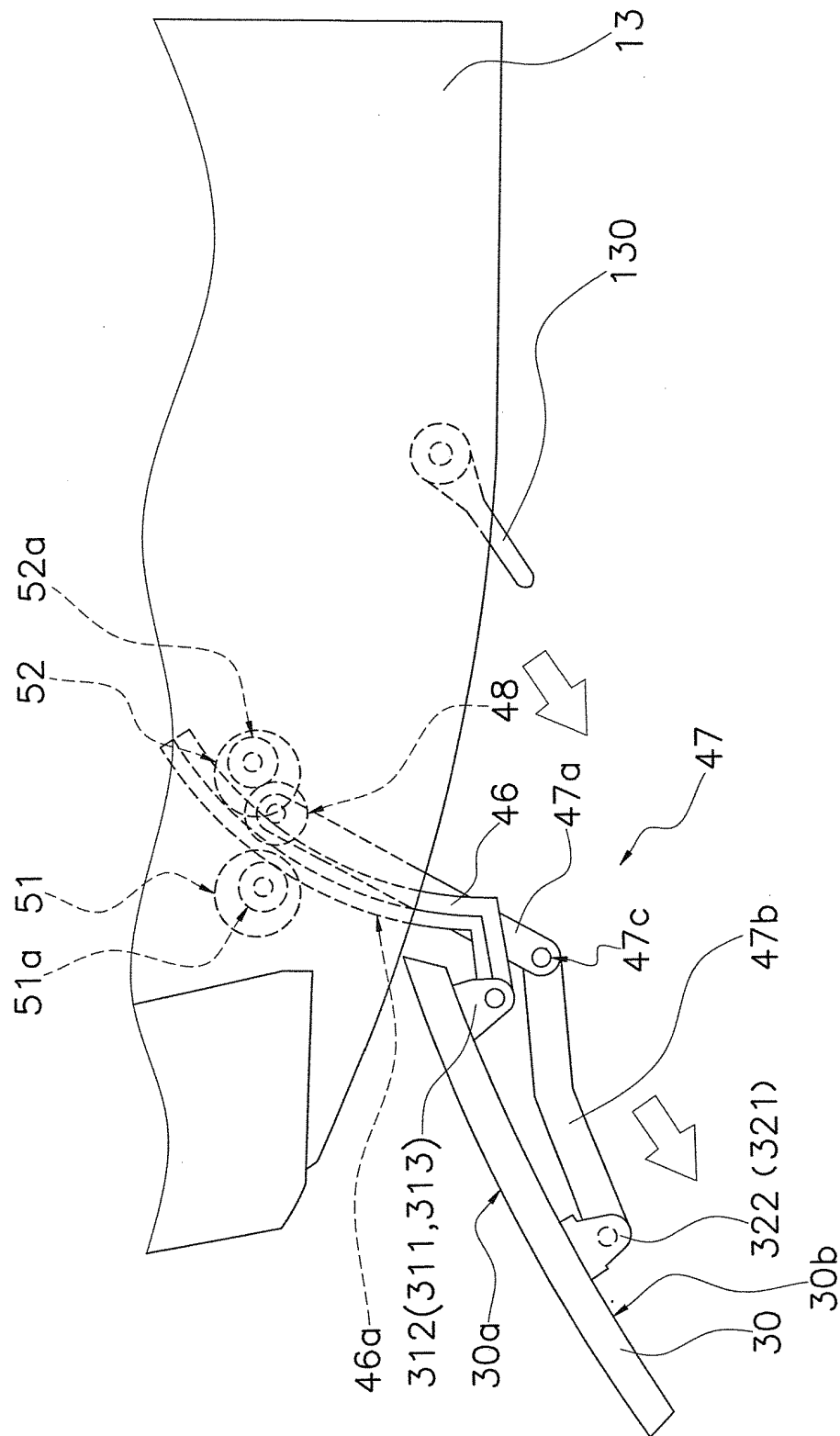


FIG. 5

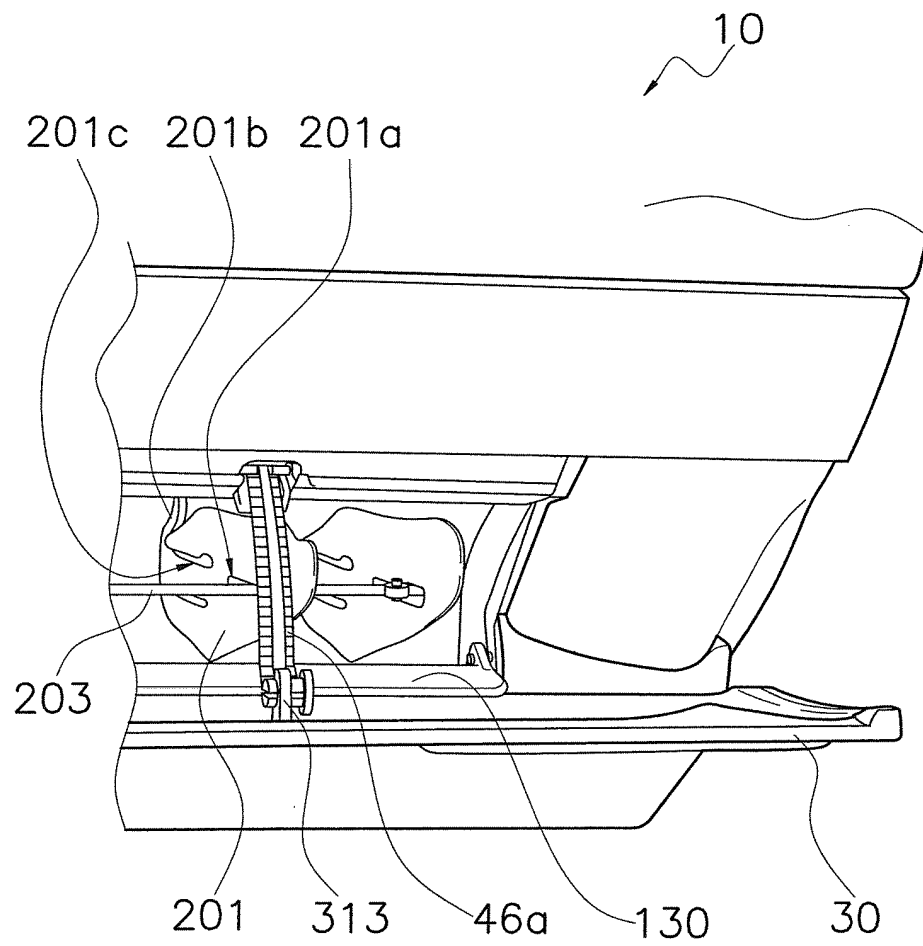


FIG. 6

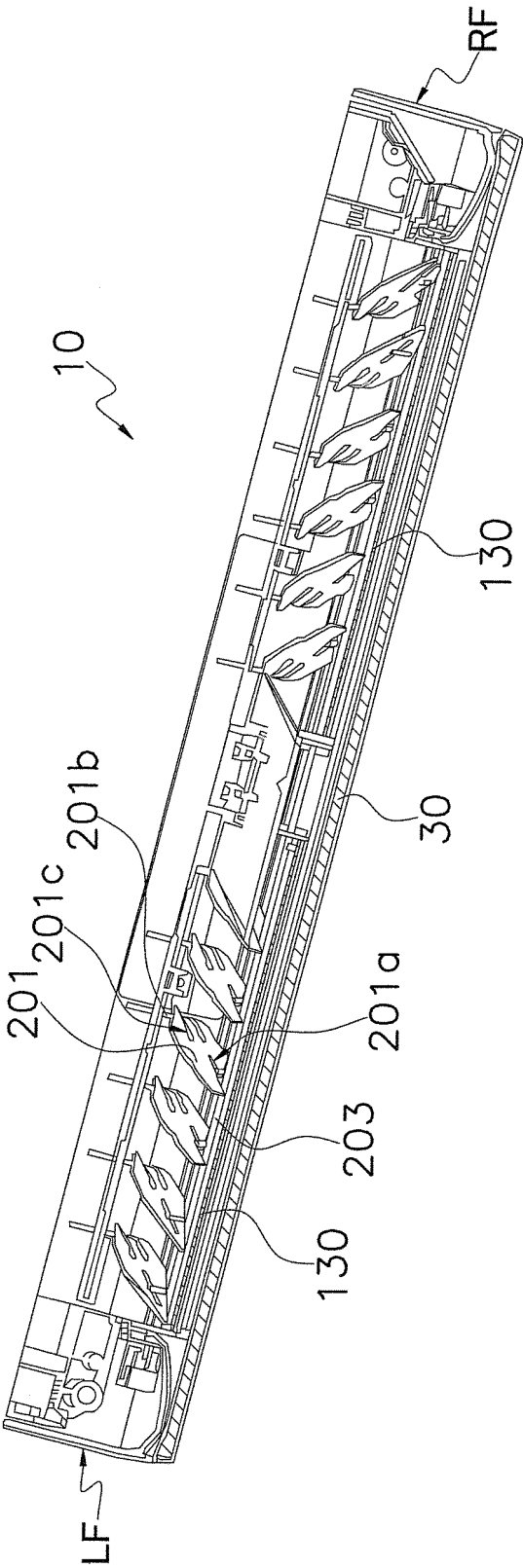


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/062915

A. CLASSIFICATION OF SUBJECT MATTER

F24F13/14(2006.01)i, F24F11/02(2006.01)i, F24F13/15(2006.01)i, F24F13/20(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24F13/14, F24F11/02, F24F13/15, F24F13/20

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

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2012
Kokai Jitsuyo Shinan Koho	1971-2012	Toroku Jitsuyo Shinan Koho	1994-2012

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E, X E, Y	JP 4945678 B1 (Panasonic Corp.), 06 June 2012 (06.06.2012), claims 1 to 5; paragraphs [0022] to [0055]; fig. 8 to 11 (Family: none)	1 2-5
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 105778/1990 (Laid-open No. 64044/1992) (Hitachi Hometec, Ltd.), 01 June 1992 (01.06.1992), page 3, lines 14 to 17; page 6, line 18 to page 7, line 14; fig. 5 (Family: none)	2-5

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

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Date of the actual completion of the international search
02 August, 2012 (02.08.12)Date of mailing of the international search report
14 August, 2012 (14.08.12)Name and mailing address of the ISA/
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/062915

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 10-103742 A (Samsung Electronics Co., Ltd.), 21 April 1998 (21.04.1998), paragraphs [0029] to [0033] & US 5899807 A & IT RM970499 A1 & ID 18743 A & KR 10-0244330 B1 & CN 1176366 A	2-5
Y	JP 10-89746 A (Samsung Electronics Co., Ltd.), 10 April 1998 (10.04.1998), claim 1; paragraphs [0001], [0027], [0028], [0042], [0043] & US 5788570 A & KR 10-0168265 B1 & IT RM970523 A1 & ID 18097 A & CN 1175672 A	3-5
A	JP 2004-232943 A (Fujitsu General Ltd.), 19 August 2004 (19.08.2004), paragraphs [0015] to [0018]; fig. 6 (Family: none)	1
A	WO 2011/043153 A1 (Daikin Industries, Ltd.), 14 April 2011 (14.04.2011), paragraphs [0005], [0006] & JP 2011-80646 A	1
A	JP 2010-85070 A (Hitachi Appliances, Inc.), 15 April 2010 (15.04.2010), paragraph [0020]; fig. 2, 4 (Family: none)	1
A	JP 10-274433 A (Fujitsu General Ltd.), 13 October 1998 (13.10.1998), paragraphs [0030], [0031], [0052]; fig. 3(b) (Family: none)	6
A	JP 2002-340393 A (Sanyo Electric Co., Ltd.), 27 November 2002 (27.11.2002), paragraphs [0025], [0026], [0029], [0030] (Family: none)	6

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2006002984 A [0002] [0066]