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(54) INDOOR MACHINE OF AIR CONDITIONER

(57) To provide an indoor unit of an air conditioner that can reduce, over what has conventionally been the case, the potential to spoil the beauty inside a room. An indoor unit (2a) of an air conditioner (1) is disposed with a casing body (23) and a front panel (50). The casing body (23) includes a blowout opening (26) through which air blown out into a room passes and a first suction opening (27) through which air taken in from the room passes. The front panel (50) opens and closes at least one of the blowout opening (26) and the first suction opening (27). A middle portion (52) of the front panel (50) changes between two or more stationary states, and the degree of curvature of the cross-sectionally seen shape of the middle portion in a first state is different from the degree of curvature of the cross-sectionally seen shape of the middle portion in a second state.

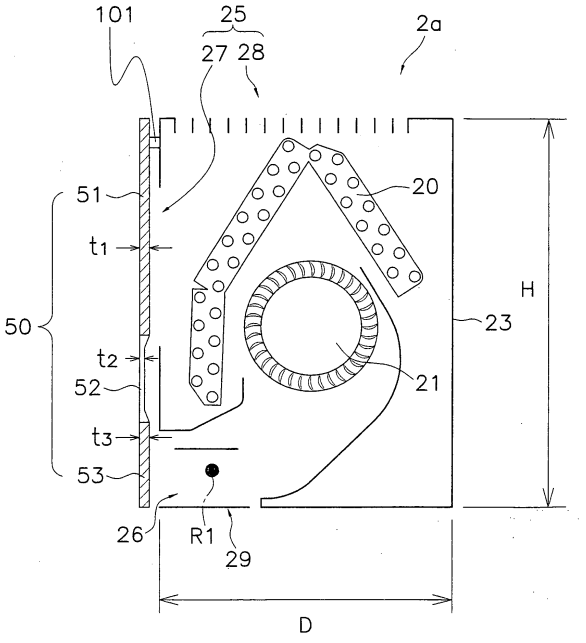

Fig. 3

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Description

FIELD OF THE INVENTION

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

BACKGROUND ART

[0002] In recent years, air conditioners that perform air conditioning inside rooms have been often utilized. Indoor units of these air conditioners are disposed inside rooms, and so they often enter the sight of residents and the like. For this reason, it is important that the indoor unit does not spoil the beauty inside the room. However, it is common for a suction opening through which air taken in from the room passes and a blowout opening through which air blown out into the room passes to be disposed in a casing of the indoor unit. The indoor unit performs air conditioning inside a room by taking in room air from the suction opening and blowing out conditioned air into the room from the blowout opening. The suction opening and the blowout opening are often disposed in the front surface of the casing of the indoor unit, so it is easy for them to be seen by residents and the like inside the room.

[0003] In indoor units of conventional air conditioners such as described above, often a horizontal flap that opens and closes the blowout opening is disposed (see Patent Document 1). The horizontal flap opens the blowout opening during operation of the indoor unit and guides the air blown out from the blowout opening. Additionally, when operation of the indoor unit is stopped, the horizontal flap closes the blowout opening. Thus, when operation of the indoor unit is stopped, the blowout opening is prevented from entering the sight of residents and the like, and the potential to spoil the beauty inside the room decreases.

[0004] Moreover, among indoor units of conventional air conditioners such as described above, there are also indoor units disposed with a panel that opens and closes the suction opening, so that the panel closes the suction opening when operation of the air conditioner is stopped. In the case of this indoor unit, when operation of the indoor unit is stopped, the suction opening is prevented from entering the sight of residents and the like, and the potential to spoil the beauty inside the room decreases. <Patent Document 1> Japanese Patent No. 3,334,688

DISCLOSURE OF THE INVENTION

PROBLEM THAT THE INVENTION IS TO SOLVE

[0005] However, with these indoor units of air conditioners, there is still the potential for the beauty inside the room to be spoiled. That is, even when a blowout opening 202 is closed by a horizontal flap 201 as in an indoor unit 200 shown in FIG. 34, a seam line often appears between the horizontal flap 201 and the blowout opening 202 when seen in front view. Further, even when a panel that opens and closes the suction opening is disposed to close the suction opening in the air conditioner, a seam line often appears between the suction opening and the panel when seen in front view.

[0006] It is an object of the present invention to provide an indoor unit of an air conditioner that can reduce, over what has conventionally been the case, the potential to spoil the beauty inside a room.

MEANS FOR SOLVING THE PROBLEM

[0007] An indoor unit of an air conditioner pertaining to a first invention is disposed with a casing and a front panel. The casing includes a blowout opening through which air blown out into a room passes and a suction opening through which air taken in from the room passes. The front panel opens and closes at least one of the blowout opening and the suction opening. A first portion of the front panel changes between two or more stationary states, and the degree of curvature of the cross-sectionally seen shape of the first portion in a first state is different from the degree of curvature of the cross-sectionally seen shape of the first portion in a second state.

[0008] In this indoor unit of an air conditioner, the first portion of the front panel changes between two or more stationary states, and the degree of curvature of the cross-sectionally seen shape of the first portion in a first state is different from the degree of curvature of the cross-sectionally seen shape of the first portion in a second state. That is, the front panel opens and closes at least one of the blowout opening and the suction opening by changing between the stationary states where the degrees of curvature of the cross-sectionally seen shape of the first portion are different. Consequently, the potential for a seam line to appear in the surface of the indoor unit can be reduced. Thus, in this indoor unit of an air conditioner, the potential to spoil the beauty inside the room can be reduced over what has conventionally been the case.

[0009] It will be noted that the instances where, in the first state or the second state, the degree of curvature of the first portion is zero - that is, where the first portion does not curve at all - are also included in the present invention.

[0010] An indoor unit of an air conditioner pertaining to a second invention is the indoor unit of an air conditioner

pertaining to the first invention, wherein the front panel is constituted of one panel member.

[0011] In this indoor unit of an air conditioner, the front panel is constituted of one panel member. Consequently, the potential for a seam line to appear in the surface of the indoor unit can be further reduced. Thus, in this indoor unit of an air conditioner, the potential to spoil the beauty inside the room can be further reduced.

[0012] An indoor unit of an air conditioner pertaining to a third invention is the indoor unit of an air conditioner pertaining to the first invention or the second invention, wherein the first state is a state where the front panel is open, and the first portion curves in an S shape in the first state.

[0013] In this indoor unit of an air conditioner, the first portion of the front panel curves in an S shape in the state where the front panel is open. Thus, the beauty inside the room can be improved.

[0014] An indoor unit of an air conditioner pertaining to a fourth invention is the indoor unit of an air conditioner pertaining to the first invention or the second invention, wherein the first state is a state where the front panel is open, and the first portion curves in a U shape in the first state.

[0015] In this indoor unit of an air conditioner, the first portion of the front panel curves in a U shape in the state where the front panel is open. Thus, the beauty inside the room can be improved.

[0016] An indoor unit of an air conditioner pertaining to a fifth invention is the indoor unit of an air conditioner of any one of the first invention to the fourth invention, wherein the flexibility of the first portion is higher than the flexibility of a second portion other than the first portion of the front panel.

[0017] In this indoor unit of an air conditioner, the flexibility of the first portion of the front panel is higher than the flexibility of the second portion other than the first portion of the front panel. For this reason, the difference in the flexibilities of the first portion and the second portion of the front panel can be utilized to cause just the first portion of the front panel to curve in a desired shape with a simple configuration.

[0018] An indoor unit of an air conditioner pertaining to a sixth invention is the indoor unit of an air conditioner pertaining to the fifth invention, wherein the first portion is thinner than the second portion.

[0019] In this indoor unit of an air conditioner, the first portion of the front panel is thinner than the second portion of the front panel. That is, the flexibility of the first portion can be made higher than the flexibility of the second portion with a simple configuration.

[0020] An indoor unit of an air conditioner pertaining to a seventh invention is the indoor unit of an air conditioner pertaining to the fifth invention, wherein the material of the first portion is different from the material of the second portion.

[0021] In this indoor unit of an air conditioner, the material of the first portion of the front panel is different from the material of the second portion of the front panel. That is, the flexibility of the first portion can be made higher than the flexibility of the second portion with a simple configuration.

[0022] An indoor unit of an air conditioner pertaining to an eighth invention is the indoor unit of an air conditioner pertaining to any one of the first invention to the seventh invention, wherein the first portion is formed by an elastomer.

[0023] In this indoor unit of an air conditioner, the first portion of the front panel is formed by an elastomer. For this reason, the design value born from the texture that an elastomer has, such as a warm feeling or a soft feeling, can be provided.

[0024] An indoor unit of an air conditioner pertaining to a ninth invention is the indoor unit of an air conditioner pertaining to any one of the first invention to the seventh invention, wherein the first portion is formed by a fabric-like member.

[0025] In this indoor unit of an air conditioner, the first portion of the front panel is formed by a fabric-like member. For this reason, the design value born from the texture that a fabric-like member has, such as a warm feeling or a soft feeling, can be provided.

[0026] An indoor unit of an air conditioner pertaining to a tenth invention is the indoor unit of an air conditioner pertaining to any one of the first invention to the ninth invention, wherein the degree of curvature of the vertical cross-sectionally seen shape of the first portion in the first state is different from the degree of curvature of the vertical cross-sectionally seen shape of the first portion in the second state.

[0027] In this indoor unit of an air conditioner, the degree of curvature of the vertical cross-sectionally seen shape of the first portion in the first state is different from the degree of curvature of the vertical cross-sectionally seen shape of the first portion in the second state. That is, when the front panel opens, the front panel curves when seen in side view.

[0028] An indoor unit of an air conditioner pertaining to an eleventh invention is the indoor unit of an air conditioner pertaining to any one of the first invention to the ninth invention, wherein the degree of curvature of the transverse cross-sectionally seen shape of the first portion in the first state is different from the degree of curvature of the transverse cross-sectionally seen shape of the first portion in the second state.

[0029] In this indoor unit of an air conditioner, the degree of curvature of the transverse cross-sectionally seen shape of the first portion in the first state is different from the degree of curvature of the transverse cross-sectionally seen shape of the first portion in the second state. That is, when the front panel opens, the front panel curves when seen in plan view.

[0030] An indoor unit of an air conditioner pertaining to a twelfth invention is the indoor unit of an air conditioner pertaining to the first invention, wherein the front panel includes an open portion. The casing includes a convex portion corresponding to the open portion. In the second state, the convex portion of the casing is inserted into the open portion.

[0031] In this indoor unit of an air conditioner, the front panel includes an open portion, the casing includes a convex portion corresponding to the open portion, and in the second state, the convex portion of the casing is inserted into the open portion in the front panel. That is, in the first state, a path through which the air sucked in from the room passes can be sufficiently secured by the open portion in the front panel, and in the second state, the convex portion of the casing is inserted into the open portion so that a surface that is generally continuous when seen in front view is formed, whereby the potential for the open portion to spoil the beauty inside the room can be minimized. Thus, in this indoor unit of an air conditioner, the potential to spoil the beauty inside the room can be reduced over what has conventionally been the case.

[0032] An indoor unit of an air conditioner pertaining to a thirteenth invention is the indoor unit of an air conditioner pertaining to the twelfth invention, wherein in the first state, the open portion is hidden when seen in front view.

[0033] In this indoor unit of an air conditioner, in the first state, the open portion in the front panel is hidden when seen in front view. That is, in this indoor unit of an air conditioner, in the first state, the open portion does not appear when seen in front view. Thus, in this indoor unit of an air conditioner, the potential to spoil the beauty inside the room in the first state can be further reduced.

[0034] An indoor unit of an air conditioner pertaining to a fourteenth invention is the indoor unit of an air conditioner pertaining to the twelfth invention or the thirteenth invention, wherein the first state is a state where the front panel is open. The open portion is formed in the first portion. The first portion curves in an S shape in the first state.

[0035] In this indoor unit of an air conditioner, the open portion in the front panel is formed in the first portion of the front panel, and the first portion of the front panel curves in an S shape when the front panel is in the open state. Thus, the beauty inside the room can be improved.

EFFECTS OF THE INVENTION

[0036] In the indoor unit of an air conditioner pertaining to the first invention, the front panel opens and closes at least one of the blowout opening and the suction opening by changing between the stationary states where the degrees of curvature of the cross-sectionally seen shape of the first portion are different. Consequently, the potential for a seam line to appear in the surface of the indoor unit can be reduced. Thus, in this indoor unit of an air conditioner, the potential to spoil the beauty inside the room can be reduced over what has conventionally been the case.

[0037] In the indoor unit of an air conditioner pertaining to the second invention, the front panel is constituted to one panel member. Consequently, the potential for a seam line to appear in the surface of the indoor unit can be further reduced. Thus, in this indoor unit of an air conditioner, the potential to spoil the beauty inside the room can be further reduced.

[0038] In the indoor unit of an air conditioner pertaining to the third invention, the first portion of the front panel curves in an S shape in the state where the front panel is open. Thus, the beauty inside the room can be improved.

[0039] In the indoor unit of an air conditioner pertaining to the fourth invention, the first portion of the front panel curves in a U shape in the state where the front panel is open. Thus, the beauty inside the room can be improved.

[0040] In the indoor unit of an air conditioner pertaining to the fifth invention, the flexibility of the first portion of the front panel is higher than the flexibility of the second portion other than the first portion of the front panel. The difference in the flexibilities of the first portion and the second portion of the front panel can be utilized to cause just the first portion of the front panel to curve in a desired shape with a simple configuration.

[0041] In the indoor unit of an air conditioner pertaining to the sixth invention, the first portion of the front panel is thinner than the second portion of the front panel. That is, the flexibility of the first portion can be made higher than the flexibility of the second portion with a simple configuration.

[0042] In the indoor unit of an air conditioner pertaining to the seventh invention, the material of the first portion of the front panel is different from the material of the second portion of the front panel. That is, the flexibility of the first portion can be made higher than the flexibility of the second portion with a simple configuration.

[0043] In the indoor unit of an air conditioner pertaining to the eighth invention, the first portion of the front panel is formed by an elastomer. For this reason, the design value born from the texture that an elastomer has, such as a warm feeling or a soft feeling, can be provided.

[0044] In the indoor unit of an air conditioner pertaining to the ninth invention, the first portion of the front panel is formed by a fabric-like member. For this reason, the design value born from the texture that a fabric-like member has, such as a warm feeling or a soft feeling, can be provided.

[0045] In the indoor unit of an air conditioner pertaining to the tenth invention, the degree of curvature of the vertical cross-sectionally seen shape of the first portion of the front panel in the first state is different from the degree of curvature of the vertical cross-sectionally seen shape of the first portion in the second state, so the indoor unit can adapt to an environment suited for a front panel that curves when seen in side view.

[0046] In the indoor unit of an air conditioner pertaining to the eleventh invention, the degree of curvature of the transverse cross-sectionally seen shape of the first portion of the front panel in the first state is different from the degree

of curvature of the transverse cross-sectionally seen shape of the first portion in the second state, so the indoor unit can adapt to an environment suited for a front panel that curves when seen in plan view.

[0047] In the indoor unit of an air conditioner pertaining to the twelfth invention, the front panel opens and closes at least one of the blowout opening and the suction opening, so the potential for a seam line to appear in the surface of the indoor unit can be reduced. Moreover, in this indoor unit of an air conditioner, in the first state, a path through which the air sucked in from the room passes can be sufficiently secured by the open portion in the front panel, and in the second state, the convex portion of the casing is inserted into the open portion so that a surface that is generally continuous when seen in front view is formed. Thus, in this indoor unit of an air conditioner, the potential to spoil the beauty inside the room can be reduced over what has conventionally been the case.

[0048] In the indoor unit of an air conditioner pertaining to the thirteenth invention, in the first state, the open portion in the front panel is hidden when seen in front view, so that open portion does not appear when seen in front view. Thus, in this indoor unit of an air conditioner, the potential to spoil the beauty inside the room in the first state can be further reduced.

[0049] In the indoor unit of an air conditioner pertaining to the fourteenth invention, the open portion in the front panel is formed in the first portion of the front panel, and the first portion of the front panel curves in an S shape when the front panel is in the open state. Thus, the beauty inside the room can be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0050]

FIG. 1 is a diagram showing the configuration of an air conditioner and the configuration of a refrigerant circuit pertaining to a first embodiment.
FIG. 2 is a front view, when operation is stopped, of an indoor unit pertaining to the first embodiment.
FIG. 3 is a cross-sectional view along III-III of FIG. 2.
FIG. 4 is a front view, during operation, of the indoor unit pertaining to the first embodiment.
FIG. 5 is a cross-sectional view along V-V of FIG. 4.
FIG. 6 is a vertical sectional view, when operation is stopped, of a modification of the indoor unit pertaining to the first embodiment.
FIG. 7 is a vertical sectional view, during operation, of the modification of the indoor unit pertaining to the first embodiment.
FIG. 8 is a front view, when operation is stopped, of an indoor unit pertaining to a second embodiment.
FIG. 9 is a cross-sectional view along IX-IX of FIG. 8.
FIG. 10 is a front view, during operation, of the indoor unit pertaining to the second embodiment.
FIG. 11 is a cross-sectional view along XI-XI of FIG. 10.
FIG. 12 is a front view, when operation is stopped, of a front panel pertaining to a third embodiment.
FIG. 13 is a cross-sectional view along XIII-XIII of FIG. 12.
FIG. 14 is a front view, during operation, of the front panel pertaining to the third embodiment.
FIG. 15 is a cross-sectional view along XV-XV of FIG. 14.
FIG. 16 is a front view, when operation is stopped, of an indoor unit pertaining to a fourth embodiment.
FIG. 17 is a cross-sectional view along XVII-XVII of FIG. 16.
FIG. 18 is a front view, during operation, of the indoor unit pertaining to the fourth embodiment.
FIG. 19 is a cross-sectional view along XIX-XIX of FIG. 18.
FIG. 20 is a front view, when operation is stopped, of an indoor unit pertaining to a fifth embodiment.
FIG. 21 is a cross-sectional view along XXI-XXI of FIG. 20.
FIG. 22 is a front view, during operation, of the indoor unit pertaining to the fifth embodiment.
FIG. 23 is a cross-sectional view along XXIII-XXIII of FIG. 22.
FIG. 24 is a front view, when operation is stopped, of a front panel pertaining to a sixth embodiment.
FIG. 25 is a cross-sectional view along XXV-XXV of FIG. 24.
FIG. 26 is a front view, during operation, of the front panel pertaining to the sixth embodiment.
FIG. 27 is a cross-sectional view along XXVII-XXVII of FIG. 26.
FIG. 28 is a vertical sectional view, when operation is stopped, of an indoor unit pertaining to another embodiment.
FIG. 29 is a vertical sectional view, when operation is stopped, of an indoor unit pertaining to another embodiment.
FIG. 30 is a transverse sectional view, when operation is stopped, of a front panel pertaining to another embodiment.
FIG. 31 is a vertical sectional view, when operation is stopped, of an indoor unit pertaining to another embodiment.
FIG. 32 is a vertical sectional view, when operation is stopped, of an indoor unit pertaining to another embodiment.
FIG. 33 is a transverse sectional view, when operation is stopped, of a front panel pertaining to another embodiment.
FIG. 34 is a front view of an indoor unit of a conventional air conditioner.

DESCRIPTION OF THE REFERENCE NUMERALS

[0051]

2a, 2b, 2c, 2d, 2e, 2f	Indoor Unit of Air Conditioner
23	Casing
26	Blowout Opening
27	First Suction Opening
50, 60, 90, 150, 160, 190	Front Panel
51, 151	Upper Portion (Second Portion)
52, 152	Middle Portion (First Portion)
53, 153	Lower Portion (Second Portion)
71, 171	Upper Portion (Second Portion)
72, 172	Middle Portion (First Portion)
73, 173	Lower Portion (Second Portion)
91, 191	Leftmost Portion (Second Portion)
92, 192	Left Portion (First Portion)
93, 193	Middle Portion (Second Portion)
94, 194	Right Portion (First Portion)
95, 195	Rightmost Portion (Second Portion)
500, 700, 900, 902	Open Portion
501, 701, 901, 903	Convex Portion

BEST MODE FOR CARRYING OUT THE INVENTION

<First Embodiment>

<Overall Configuration of Air Conditioner>

[0052] The configuration of an air conditioner 1 and the schematics of a refrigerant circuit pertaining to a first embodiment of the present invention will be described with reference to FIG. 1.

[0053] The air conditioner 1 is disposed with an indoor unit 2a that is attached to a wall surface or the like inside a room and an outdoor unit 3 that is installed outdoors.

[0054] The refrigerant circuit of the air conditioner 1 is mainly disposed with an indoor heat exchanger 20, an accumulator 31, a compressor 32, a four-way switch valve 33, an outdoor heat exchanger 30, and an electrically powered expansion valve 34.

[0055] The indoor heat exchanger 20 disposed in the indoor unit 2a performs heat exchange with air contacting the indoor heat exchanger 20. Further, an indoor fan 21 for sucking in room air and discharging, into the room, air with respect to which heat exchange has been performed through the indoor heat exchanger 20 is disposed in the indoor unit 2a. The indoor fan 21 is driven to rotate by an indoor fan motor 22 disposed inside the indoor unit 2a. The detailed configuration and operation of the indoor unit 2a will be described later.

[0056] Disposed in the outdoor unit 3 are the compressor 32, the four-way switch valve 33 connected to a discharge side of the compressor 32, the accumulator 31 connected to an intake side of the compressor 32, the outdoor heat exchanger 30 connected to the four-way switch valve 33, and the electrically powered expansion valve 34 connected to the outdoor heat exchanger 30. The electrically powered expansion valve 34 is connected to a pipe 41 via a filter 35 and a liquid close valve 36 and is connected to one end of the indoor heat exchanger 20 via the pipe 41. Further, the four-way switch valve 33 is connected to a pipe 42 via a gas close valve 37 and is connected to the other end of the indoor heat exchanger 20 via the pipe 42. Further, an outdoor fan 38 for discharging, to the outside, air after heat exchange in the outdoor heat exchanger 30 is disposed in the outdoor unit 3. The outdoor fan 38 is driven to rotate by an outdoor fan motor 39.

<Configuration of Indoor Unit>

[0057] The configuration of the indoor unit 2a will be described with reference to FIG. 2 to FIG. 5.

[0058] The indoor unit 2a is a wall-hung indoor unit attached to a side wall inside a room and is disposed with a casing body 23 and a front panel 50.

(Casing Body)

[0059] The casing body 23 has a rectangular shape that is long in the width direction when seen in front view and has a rectangular shape that is long in the height direction when seen in side view. The casing body 23 has a width W, a height H, and a depth D. The aforementioned indoor heat exchanger 20, the indoor fan 21, the unillustrated indoor fan motor 22 and the like are disposed inside the casing body 23. As shown in FIG. 3, the indoor fan 21 is disposed in the center of the casing body 23 when seen in side view, and the indoor heat exchanger 20 that has an inverted V shape is disposed so as to surround the top half and front of the indoor fan 21 when seen in side view. Further, a suction opening 25 and a blowout opening 26 are disposed in the casing body 23.

[0060] The suction opening 25 is an opening through which air taken into the casing body 23 from the room by the indoor fan 21 passes, and comprises a first suction opening 27 and a second suction opening 28. The first suction opening 27 has a shape that is long in the width direction when seen in front view, and the length of the first suction opening 27 is slightly smaller than the width W of the casing body 23. As shown in FIG. 3, the first suction opening 27 is disposed in the front surface of the casing body 23 and faces the surface on the front side of the indoor heat exchanger 20. The second suction opening 28 is disposed as plural slits each of which is long in the width direction of the casing body 23 and is disposed in the top surface of the casing body 23.

[0061] The blowout opening 26 is an opening through which air that passes through the indoor heat exchanger 20 and is blown out into the room by the indoor fan 21 passes. As shown in FIG. 4, the blowout opening 26 has a shape that is long in the width direction, and the length of the blowout opening 26 is slightly smaller than the width W of the casing body 23. Further, the blowout opening 26 is disposed in the front surface of the casing body 23 in the vicinity of the lower portion of the casing body 23.

[0062] Further, a horizontal flap 29 is disposed in the vicinity of the blowout opening 26. The horizontal flap 29 is a plate-shaped member having a shape that is long in the width direction of the indoor unit 2a, and guides the air blown out from the blowout opening 26. The horizontal flap 29 has a rotational axis R1 that is parallel to the width direction of the indoor unit 2a, and changes the guiding direction of the air by rotating about the rotational axis R1 from the state shown in FIG. 3 to the state shown in FIG. 5.

(Front Panel)

[0063] The front panel 50 is constituted of one panel member and has a width that is substantially the same as the width W of the casing body 23 when seen in front view and a height that is substantially the same as the height H of the casing body 23. Further, when operation is stopped, the front panel 50 forms a substantially flat surface and covers the blowout opening 26 and the first suction opening 27 when seen in front view. Further, the front panel 50 is supported by moving mechanisms 100 and opens the blowout opening 26 and the first suction opening 27 during operation.

[0064] The front panel 50 includes an upper portion 51, a middle portion 52, and a lower portion 53 that are juxtaposed in order from top to bottom. The boundary between the upper portion 51 and the middle portion 52 is represented by a boundary line (two-dotted chain line) 54, and the boundary between the middle portion 52 and the lower portion 53 is represented by a boundary line (two-dotted chain line) 55. The middle portion 52 is a portion that curves when the front panel 50 is in an open state, and the upper portion 51 and the lower portion 53 are portions that virtually do not curve even when the front panel 50 is in an open state. The front panel 50 is formed by an elastomer and can produce a texture such as a warm feeling or a soft feeling. Further, the upper portion 51 and the lower portion 53 respectively have a thickness t1 and a thickness t3, and the middle portion 52 has a thickness t2 that is thinner than both the thickness t1 and the thickness t3. Consequently, the flexibility of the middle portion 52 is higher than the flexibilities of both the upper portion 51 and the lower portion 53. It will be noted that, in FIG. 2 to FIG. 5, the upper portion 51, the middle portion 52, and the lower portion 53 are shown as being distinguished by the boundary lines 54 and 55, but the upper portion 51, the middle portion 52, and the lower portion 53 are integrally formed by the same material so that those boundary lines cannot be distinguished when seen in front view. That is, seam lines do not appear between the upper portion 51 and the middle portion 52 and between the middle portion 52 and the lower portion 53.

[0065] The moving mechanisms 100 are configured by rods 101 fixed to the upper portion 51 of the front panel 50, unillustrated members fixed to the lower portion 53 of the front panel 50, an unillustrated motor and gear, and the like. The moving mechanisms 100 are represented by dotted lines in FIG. 2 and FIG. 4, but in actuality they cannot be seen because they are hidden by the front panel 50 when seen in front view. The moving mechanisms 100 cause the upper portion 51 of the front panel 50 to move frontward and backward and, in conjunction with that movement, cause the lower portion 53 of the front panel 50 to move up and down.

<Operation of Indoor Unit>

[0066] Next, operation when the indoor unit 2a of the air conditioner 1 performs air conditioning operation will be

described.

[0067] When the indoor unit 2a is stopped, the front panel 50 is in a state where it closes the blowout opening 26 and the first suction opening 27 as shown in FIG. 2 and FIG. 3. At this time, the middle portion 52 is in an uncurved stationary state.

[0068] When the indoor unit 2a performs operation, the front panel 50 moves so that the blowout opening 26 and the first suction opening 27 open. Thus, the air volume of the air taken into the indoor unit 2a is ensured and blowing out of the air is performed. In this case, as shown in FIG. 5, the lower portion 53 of the front panel 50 is moved upward by the moving mechanisms 100. Thus, the blowout opening 26 opens. Further, in conjunction with the movement of the lower portion 53, the upper portion 51 of the front panel 50 is evenly pushed out a distance d1 frontward by the moving mechanisms 100. Thus, the first suction opening 27 opens. At this time, the middle portion 52 curves in an S shape when seen in side view because the flexibility of the middle portion 52 is higher than the flexibilities of the upper portion 51 and the lower portion 53. That is, when the indoor unit 2a is performing operation, the middle portion 52 is in a stationary state where it is curved in an S shape.

[0069] After the front panel 50 moves so that the blowout opening 26 and the first suction opening 27 are open, the horizontal flap 29 rotates and moves so as to form a blowout angle corresponding to the operating mode that has been set.

[0070] During operation, as mentioned above, the front panel 50 of the indoor unit 2a opens.

[0071] When the indoor unit 2a stops operation, the front panel 50 moves and the indoor unit 2a returns to the state where the blowout opening 26 and the first suction opening 27 are closed. In this case, the upper portion 51 of the front panel 50 is evenly pushed the distance d1 backward by the moving mechanisms 100. Thus, the blowout opening 26 closes. Further, in conjunction with the movement of the upper portion 51, the lower portion 53 of the front panel 50 is moved downward by the moving mechanisms 100. Thus, the blowout opening 26 closes. At this time, the middle portion 52 that had been curved in an S shape during operation returns to a substantially flat surface.

[0072] When operation is stopped, as mentioned above, the front panel 50 of the indoor unit 2a closes.

<Characteristics>

[0073]

(1) In the indoor unit 2a of the air conditioner 1, when operation is stopped, the front panel 50 covers the entire front surface of the indoor unit 2a. Additionally, the front panel 50 forms a substantially flat surface. For this reason, when operation of the indoor unit 2a is stopped, just the substantially flat front panel 50 appears in the sight of residents and the like being in the front of the indoor unit 2a. Moreover, the front panel 50 is configured by one panel member so that seam lines do not appear when seen in front view. For this reason, in the indoor unit 2a of the air conditioner 1, high beauty in front view of just the indoor unit 2a can be ensured, the wall surface inside the room and the outer appearance of the indoor unit 2a when seen in front view and when operation is stopped are harmonious, and the beauty inside the room improves.

(2) Further, among conventional indoor units, there have been indoor units where, during operation, the front panel is divided into plural panels and seam lines arise as a result of the divided plural panels independently moving. In contrast, in the indoor unit 2a of the air conditioner 1, during operation, the front panel 50 curves to open and close the first suction opening 27 and the blowout opening 26. That is, in the indoor unit 2a of the air conditioner 1, seam lines do not appear during operation. Consequently, a smooth shadow resulting from the curvature can be provided to the sight of residents and the like instead of needless seam lines. For this reason, in the indoor unit 2a of the air conditioner 1, the sense of beauty improves during operation.

(3) In the indoor unit 2a of the air conditioner 1, an elastomer is used for the front panel 50. Consequently, when the indoor unit 2a is seen in front view, it becomes possible to provide design value born from the texture that the elastomer has, such as a warm feeling or a soft feeling.

(4) In the indoor unit 2a of the air conditioner 1, the flexibility of the middle portion 52 of the front panel 50 is higher than the flexibilities of the upper portion 51 and the lower portion 53. Consequently, during operation, the middle portion 52 naturally curves simply by moving the lower portion 53 upward and moving the upper portion 51 frontward. That is, in order to cause the front panel 50 to curve during operation, it suffices to perform simple movement such as parallel movement of the upper portion 51 and the lower portion 53. Thus, it becomes possible to simply design the moving mechanisms 100 that cause the front panel 50 to curve.

(5) Usually, it is easy for the front portion of a wall-hung indoor unit to enter the sight of residents and the like because a wall-hung indoor unit is disposed on a wall surface inside a room. Further, often the area of the front portion of the indoor unit is large. For this reason, the present invention, which improves beauty inside a room when seen in front view when operation is stopped and during operation, is particularly effective.

(6) In the indoor unit 2a of the air conditioner 1, during operation, the upper portion 51 and the lower portion 53 of the front panel 50 move so that the blowout opening 26 and the first suction opening 27 open. For this reason, it

becomes possible to sufficiently suck air into the indoor unit 2a and blow air out from the indoor unit 2a.
Further, when the blowout opening 26 and the first suction opening 27 open, it suffices for the lower portion 53 of the front panel 50 to move slightly upward and for the upper portion 51 to move slightly frontward. For this reason, the increased dimension (distance d1) of the thickness (see FIG. 5) of the indoor unit 2a during operation is small. For this reason, in the indoor unit 2a of the air conditioner 1, it becomes possible to compactly configure the indoor unit 2a during operation.

<Modifications>

[0074] As a modification of the first embodiment, the front panel 50 may be configured such that, during operation, the shape of the curvature of the middle portion 52 becomes a U shape. In this case, the front panel 50 curves like in FIG. 6 and FIG. 7.

[0075] Further, as another modification of the first embodiment, the front panel 50 may be configured from plural panels. However, it is preferable for the number of panels configuring the front panel 50 to be small because the smaller the number of panels configuring the front panel 50, the fewer the seam lines that appear in the front panel 50. Further, it is preferable for the plural panels configuring the front panel 50 to be disposed juxtaposed in the height direction. Thus, seam lines extending in the height direction when seen in front view do not appear, and the beauty inside the room usually improves.

<Second Embodiment>

[0076] An indoor unit 2b of the air conditioner 1 pertaining to a second embodiment of the present invention will be described with reference to FIG. 8 to FIG. 11.

[0077] A front panel 60 is constituted of a first panel 70 and a second panel 80. The first panel 70 opens and closes the first suction opening 27, and the second panel 80 opens and closes the blowout opening 26. The first panel 70 has a width that is substantially the same as the width W of the casing body 23 when seen in front view, the second panel 80 has a width that is substantially the same as the width W of the casing body 23 when seen in front view, and the sum of a height H1 of the first panel 70 and a height H2 of the second panel 80 is substantially the same as the height H of the casing body 23.

[0078] The first panel 70 is supported by unillustrated moving mechanisms 100 and opens and closes the first suction opening 27. The first panel 70 is constituted of one panel member and forms a substantially flat surface when operation is stopped. The first panel 70 includes an upper portion 71, a middle portion 72, and a lower portion 73 that are juxtaposed in order from top to bottom. The boundary between the upper portion 71 and the middle portion 72 is represented by a boundary line (two-dotted chain line) 74, and the boundary between the middle portion 72 and the lower portion 73 is represented by a boundary line (two-dotted chain line) 75. The middle portion 72 is a portion that curves when the first panel 70 is in an open state, and the upper portion 71 and the lower portion 73 are portions that virtually do not curve even when the first panel 70 is in an open state. The first panel 70 is formed by an elastomer and can produce a texture such as a warm feeling or a soft feeling. Further, the upper portion 71 and the lower portion 73 respectively have a thickness t1 and a thickness t3, and the middle portion 72 has a thickness t2 that is thinner than both the thickness t1 and the thickness t3. Consequently, the flexibility of the middle portion 72 is higher than the flexibilities of both the upper portion 71 and the lower portion 73.

[0079] The second panel 80 is supported by unillustrated moving mechanisms 100 and opens and closes the blowout opening 26. The second panel 80 is constituted of one panel member. The second panel 80 is formed from an elastomer in the same manner as the first panel 70. Consequently, the beauty inside the room improves as a result of the impression of the indoor unit 2b being unified when seen in front view.

[0080] Next, operation when the indoor unit 2b performs air conditioning operation will be described.

[0081] When the indoor unit 2b is stopped, the first panel 70 and the second panel 80 are in a state where the blowout opening 26 and the first suction opening 27 are closed as shown in FIG. 8 and FIG. 9. At this time, the middle portion 72 is in an uncurved stationary state.

[0082] When the indoor unit 2b performs operation, the first panel 70 and the second panel 80 move so that the blowout opening 26 and the first suction opening 27 open. Thus, the air volume of the air taken into the indoor unit 2b is ensured and blowing out of the air is performed. In this case, as shown in FIG. 11, the lower portion 73 of the first panel 70 is moved upward by the unillustrated moving mechanisms 100 and, in conjunction with the movement of the lower portion 73, the upper portion 71 of the first panel 70 is evenly pushed out a distance d1 frontward by the unillustrated moving mechanisms 100. Thus, the first suction opening 27 opens. At this time, the middle portion 72 curves in an S shape when seen in side view because the flexibility of the middle portion 72 is higher than the flexibilities of the upper portion 71 and the lower portion 73. That is, when the indoor unit 2b is performing operation, the middle portion 72 is in a stationary state where it is curved in an S shape. In conjunction with the movement of the first panel 70, the second

panel 80 rotates and moves so as to form a blowout angle corresponding to the operating mode that has been set. Thus, the blowout opening 26 opens.

[0083] When the indoor unit 2b stops operation, the first panel 70 and the second panel 80 move and the indoor unit 2b returns to the state where the blowout opening 26 and the first suction opening 27 are closed. In this case, the upper portion 71 of the first panel 70 is pushed the distance d1 backward by the unillustrated moving mechanisms 100. Further, in conjunction with the movement of the upper portion 71, the lower portion 73 of the first panel 70 is moved downward by the unillustrated moving mechanisms 100. At this time, the middle portion 72 that had been curved in an S shape during operation returns to a substantially flat surface. Thus, the first suction opening 27 is closed. Moreover, in conjunction with the movement of the first panel 70, the second panel 80 rotates and moves so that the blowout opening 26 is closed.

[0084] The remaining configuration and operation are the same as those of the indoor unit 2a pertaining to the first embodiment.

<Characteristics>

[0085] In the indoor unit 2b of the air conditioner 1, the first panel 70 that opens and closes the first suction opening 27 and the second panel 80 that opens and closes the blowout opening 26 move independently. For this reason, it is possible to allow the opened and closed states of the first suction opening 27 and the blowout opening 26 to be independent.

<Modifications>

[0086] As a modification of the second embodiment, the front panel 60 may be configured to include another panel other than the first panel 70 and the second panel 80. However, it is preferable for the number of panels configuring the front panel 60 to be small because the smaller the number of panels configuring the front panel 60, the fewer the seam lines that appear in the front panel 60. Further, it is preferable for the plural panels configuring the front panel 60 to be disposed juxtaposed in the height direction. Thus, seam lines extending in the height direction when seen in front view do not appear, and the beauty inside the room improves.

[0087] Further, as another modification of the second embodiment, the second panel 80 may be formed by a material different from that of the first panel 70.

<Third Embodiment>

[0088] An indoor unit 2c of the air conditioner 1 pertaining to a third embodiment of the present invention will be described with reference to FIG. 12 to FIG. 15.

[0089] A front panel 90 is constituted of one panel member and has a width that is substantially the same as the width W of the casing body 23 when seen in front view and a height that is substantially the same as the height H of the casing body 23. The first suction opening 27 and the blowout opening 26 disposed in the casing body 23 are represented by dotted lines in FIG. 12, but in actuality they cannot be seen because they are hidden by the front panel 90 when seen in front view. Further, the first suction opening 27 and the blowout opening 26 disposed in the casing body 23 have substantially the same width W1. Further, when operation is stopped, the front panel 90 forms a substantially flat surface and covers the blowout opening 26 and the first suction opening 27 when seen in front view. Further, the front panel 90 is supported by unillustrated moving mechanisms 100 and opens the blowout opening 26 and the first suction opening 27 during operation.

[0090] The front panel 90 includes a leftmost portion 91, a left portion 92, a middle portion 93, a right portion 94, and a rightmost portion 95 that are juxtaposed in order from left to right. The boundary between the leftmost portion 91 and the left portion 92 is represented by a boundary line (two-dotted chain line) 96, the boundary between the left portion 92 and the middle portion 93 is represented by a boundary line (two-dotted chain line) 97, the boundary between the middle portion 93 and the right portion 94 is represented by a boundary line (two-dotted chain line) 98, and the boundary between the right portion 94 and the rightmost portion 95 is represented by a boundary line (two-dotted chain line) 99. The middle portion 93 has a width that is substantially the same as the width W1 of the first suction opening 27 and the blowout opening 26 and covers the first suction opening 27 and the blowout opening 26 when operation is stopped. Turning now to FIG. 15, the left portion 92 and the right portion 94 are portions that curve when the front panel 90 is in an open state, and the leftmost portion 91, the middle portion 93, and the rightmost portion 95 are portions that virtually do not curve even when the front panel 90 is in an open state. The front panel 90 is formed by an elastomer and can produce a texture such as a warm feeling or a soft feeling. Further, the leftmost portion 91, the middle portion 93, and the rightmost portion 95 respectively have a thickness t1, a thickness t3, and a thickness t5, and the left portion 92 and the right portion 94 respectively have a thickness t2 and a thickness t4 that are thinner than any of the thickness t1, the thickness t3, and the thickness t5. Consequently, the flexibilities of the left portion 92 and the right portion 94 are higher

than the flexibility of any of the leftmost portion 91, the middle portion 93, and the rightmost portion 95.

[0091] Next, operation when the indoor unit 2c of the air conditioner 1 performs air conditioning operation will be described.

[0092] When the indoor unit 2c is stopped, the front panel 90 is in a state where it closes the blowout opening 26 and the first suction opening 27 as shown in FIG. 12 and FIG. 13. At this time, the left portion 92 and the right portion 94 are in an uncurved stationary state.

[0093] When the indoor unit 2c performs operation, the front panel 90 moves so that the blowout opening 26 and the first suction opening 27 open. Thus, the air volume of the air taken into the indoor unit 2c is ensured and blowing out of the air is performed. In this case, the leftmost portion 91 evenly moves to the right such that the boundary line 96 between the leftmost portion 91 and the left portion 92 of the front panel 90 approaches the boundary line left of the first suction opening 27 or the blowout opening 26. Moreover, the rightmost portion 95 evenly moves to the left such that the boundary line 99 between the right portion 94 and the rightmost portion 95 of the front panel 90 approaches the boundary line right of the first suction opening 27 and the blowout opening 26. In accompaniment with the movement of the leftmost portion 91 and the rightmost portion 95, the middle portion 93 evenly moves a distance d1 frontward. Thus, the first suction opening 27 and the blowout opening 26 open. At this time, the left portion 92 and the right portion 94 curve in S shapes when seen in plan view because the flexibilities of the left portion 92 and the right portion 94 are higher than the flexibilities of the leftmost portion 91, the middle portion 93, and the rightmost portion 95. That is, when the indoor unit 2c is performing operation, the left portion 92 and the right portion 94 are in a stationary state where they are curved in S shapes.

[0094] In this manner, operation of the indoor unit 2c is performed.

[0095] When the indoor unit 2c stops operation, the front panel 90 moves so that, as shown in FIG. 12 and FIG. 13, the blowout opening 26 and the first suction opening 27 return to a state where they are closed. In this case, the leftmost portion 91 evenly moves to the left such that the boundary line 96 between the leftmost portion 91 and the left portion 92 of the front panel 90 moves away from the boundary line left of the first suction opening 27 or the blowout opening 26. Moreover, the rightmost portion 95 evenly moves to the right such that the boundary line 99 between the right portion 94 and the rightmost portion 95 of the front panel 90 moves away from the boundary line right of the first suction opening 27 and the blowout opening 26. In accompaniment with the movement of the leftmost portion 91 and the rightmost portion 95, the middle portion 93 evenly moves the distance d1 backward. Thus, the blowout opening 26 and the first suction opening 27 close.

[0096] The remaining configuration and operation are the same as those of the indoor unit 2a pertaining to the first embodiment.

<Characteristics>

[0097] In the indoor unit 2c of the air conditioner 1, the front panel 90 curves when seen in plan view during operation. That is, in the indoor unit 2c of the air conditioner 1, the front panel 90 can adapt to an environment suited for a front panel that curves when seen in plan view.

<Modification>

[0098] As a modification of the third embodiment, the front panel 90 may be configured from plural panels. However, it is preferable for the number of panels configuring the front panel 90 to be small because the smaller the number of panels configuring the front panel 90, the fewer the seam lines that appear in the front panel 90. Further, it is preferable for the plural panels configuring the front panel 90 to be disposed juxtaposed in the width direction. Thus, seam lines extending in the height direction when seen in front view are reduced, and the beauty inside the room improves.

<Fourth Embodiment>

[0099] An indoor unit 2d of the air conditioner 1 pertaining to a fourth embodiment of the present invention will be described with reference to FIG. 16 to FIG. 19.

[0100] The indoor unit 2d is a wall-hung indoor unit attached to a side wall inside a room and is disposed with a casing body 23 and a front panel 150.

(Casing Body)

[0101] The casing body 23 has a rectangular shape that is long in the width direction when seen in front view and has a rectangular shape that is long in the height direction when seen in side view. The casing body 23 has a width W, a height H, and a depth D. The aforementioned indoor heat exchanger 20, the indoor fan 21, the unillustrated indoor fan

motor 22 and the like are disposed inside the casing body 23. As shown in FIG. 17, the indoor fan 21 is disposed in the center of the casing body 23 when seen in side view, and the indoor heat exchanger 20 that has an inverted V shape is disposed so as to surround the top half and front of the indoor fan 21. Further, a suction opening 25 and a blowout opening 26 are disposed in the casing body 23.

[0102] The suction opening 25 is an opening through which air taken into the casing body 23 from the room by the indoor fan 21 passes, and comprises a first suction opening 27 and a second suction opening 28. The first suction opening 27 has a shape that is long in the width direction when seen in front view, and the length of the first suction opening 27 is slightly smaller than the width W of the casing body 23. As shown in FIG. 17, the first suction opening 27 is disposed in the front surface of the casing body 23 and faces the surface on the front side of the indoor heat exchanger 20. The second suction opening 28 is disposed as plural slits each of which is long in the width direction of the casing body 23 and is disposed in the top surface of the casing body 23.

[0103] The blowout opening 26 is an opening through which air that passes through the indoor heat exchanger 20 and is blown out into the room by the indoor fan 21 passes. As shown in FIG. 18, the blowout opening 26 has a shape that is long in the width direction, and the length of the blowout opening 26 is slightly smaller than the width W of the casing body 23. The blowout opening 26 is disposed in the front surface of the casing body 23 in the vicinity of the lower portion of the casing body 23.

[0104] A convex portion 501 having a shape that is long in the width direction is disposed between the first suction opening 27 and the blowout opening 26 in the front surface of the casing body 23.

[0105] Further, a horizontal flap 29 is disposed in the vicinity of the blowout opening 26. The horizontal flap 29 is a plate-shaped member having a shape that is long in the width direction of the indoor unit 2d, and guides the air blown out from the blowout opening 26. The horizontal flap 29 has a rotational axis R1 that is parallel to the width direction of the indoor unit 2d, and changes the guiding direction of the air by rotating about the rotational axis R1 from the state shown in FIG. 17 to the state shown in FIG. 19.

(Front Panel)

[0106] The front panel 150 is constituted of one panel member and has a width that is substantially the same as the width W of the casing body 23 when seen in front view and a height that is substantially the same as the height H of the casing body 23. Further, when operation is stopped, the front panel 150 forms a substantially flat surface and covers the blowout opening 26 and the first suction opening 27 when seen in front view. Further, the front panel 150 is supported by moving mechanisms 100 and opens the blowout opening 26 and the first suction opening 27 during operation.

[0107] The front panel 150 includes an upper portion 151, a middle portion 152, and a lower portion 153 that are juxtaposed in order from top to bottom. The boundary between the upper portion 151 and the middle portion 152 is represented by a boundary line (two-dotted chain line) 154, and the boundary between the middle portion 152 and the lower portion 153 is represented by a boundary line (two-dotted chain line) 155. The middle portion 152 is a portion that curves when the front panel 150 is in an open state, and the upper portion 151 and the lower portion 153 are portions that virtually do not curve even when the front panel 150 is in an open state. The front panel 150 is formed by an elastomer and can produce a texture such as a warm feeling or a soft feeling. Further, the upper portion 151 and the lower portion 153 respectively have a thickness t1 and a thickness t3, and the middle portion 152 has a thickness t2 that is thinner than both the thickness t1 and the thickness t3. Consequently, the flexibility of the middle portion 152 is higher than the flexibilities of both the upper portion 151 and the lower portion 153. It will be noted that, in FIG. 16 to FIG. 19, the upper portion 151, the middle portion 152, and the lower portion 153 are shown as being distinguished by the boundary lines 154 and 155, but the upper portion 151, the middle portion 152, and the lower portion 153 are integrally formed by the same material so that those boundary lines cannot be distinguished when seen in front view. That is, seam lines do not appear between the upper portion 151 and the middle portion 152 and between the middle portion 152 and the lower portion 153.

[0108] Further, an open portion 500 of a shape that is long in the width direction and larger all around than the convex portion 501 disposed in the casing body 23 is disposed in the middle portion 152. The open portion 500 serves as part of a path through which air sucked in from the room during operation of the front panel 150 passes. In a state where the front panel 150 is closed, the convex portion 501 disposed in the casing body 23 fits into the open portion 500 so that the front panel 150 and the convex portion 501 form a continuous surface. Further, in a state where the front panel 150 is open, the open portion 500 is hidden when the indoor unit 2d is seen in front view.

[0109] The moving mechanisms 100 are configured by rods 101 fixed to the upper portion 151 of the front panel 150, unillustrated members fixed to the lower portion 153 of the front panel 150, an unillustrated motor and gear, and the like. The moving mechanisms 100 are represented by dotted lines in FIG. 16 and FIG. 18, but in actuality they cannot be seen because they are hidden by the front panel 150 when seen in front view. The moving mechanisms 100 cause the upper portion 151 of the front panel 150 to move frontward and backward and, in conjunction with that movement, cause the lower portion 153 of the front panel 150 to move up and down. Further, it is also possible for the moving mechanisms

100 to cause the entire front panel 150 to move frontward and backward.

<Operation of Indoor Unit>

[0110] Next, operation when the indoor unit 2d of the air conditioner 1 performs air conditioning operation will be described.

[0111] When the indoor unit 2d is stopped, the front panel 150 is in a state where it closes the blowout opening 26 and the first suction opening 27 as shown in FIG. 16 and FIG. 17. That is, the middle portion 152 is in an uncurved stationary state. At this time, the convex portion 501 disposed in the casing body 23 fits into the open portion 500 disposed in the front panel 150 so that the front panel 150 and the convex portion 501 form a continuous surface.

[0112] When the indoor unit 2d performs operation, the front panel 150 moves so that the blowout opening 26 and the first suction opening 27 open. Thus, the air volume of the air taken into the indoor unit 2d is ensured and blowing out of the air is performed. In this case, the entire front panel 150 moves slightly frontward so that the convex portion 501 of the casing body 23 comes out of the open portion 500. Next, the lower portion 153 of the front panel 150 is moved upward by the moving mechanisms 100. Thus, the blowout opening 26 opens. Further, in conjunction with the movement of the lower portion 153, the upper portion 151 of the front panel 150 is further evenly pushed out a distance d1 frontward by the moving mechanisms 100. Thus, the first suction opening 27 opens. At this time, the middle portion 152 curves in an S shape when seen in side view because the flexibility of the middle portion 152 is higher than the flexibilities of the upper portion 151 and the lower portion 153. That is, when the indoor unit 2d is performing operation, the middle portion 152 is in a stationary state where it is curved in an S shape. Moreover, the open portion 500 disposed in the middle portion 152 moves to a position where it is hidden from front view. The air sucked in from the room passes through the first suction opening 27 from a gap formed between the upper end of the front panel 150 and the upper end of the casing body 23 as represented by arrow A1 in FIG. 19, passes through the second suction opening 28 in the top surface of the casing body 23 as represented by arrows A2, or passes through the first suction opening 27 from the open portion 500 in the front panel 150 as represented by arrow A3, and is then taken into the indoor unit 2d.

[0113] After the front panel 150 moves so that the blowout opening 26 and the first suction opening 27 open, the horizontal flap 29 rotates and moves so as to form a blowout angle corresponding to the operating mode that has been set.

[0114] During operation, as mentioned above, the front panel 150 of the indoor unit 2d opens.

[0115] When the indoor unit 2d stops operation, the front panel 150 moves and the indoor unit 2d returns to the state where the blowout opening 26 and the first suction opening 27 are closed. In this case, the upper portion 151 of the front panel 150 is evenly pushed the distance d1 backward by the moving mechanisms 100. In conjunction with the movement of the upper portion 151, the lower portion 153 of the front panel 150 is moved downward by the moving mechanisms 100. At this time, the middle portion 152 that had been curved in an S shape during operation returns to a substantially flat surface. Next, the entire front panel 150 is pushed backward so that the first suction opening 27 and the blowout opening 26 close. At this time, the convex portion 501 of the casing body 23 is fitted into the open portion 500 in the front panel 150 so that the front panel 150 and the convex portion 501 form a continuous surface.

[0116] When operation is stopped, as mentioned above, the front panel 150 of the indoor unit 2d closes.

[0117] The remaining configuration and operation are the same as those of the indoor unit 2a pertaining to the first embodiment.

<Characteristics>

[0118]

(1)
In the indoor unit 2d of the air conditioner 1, during operation, the open portion 500 in the front panel 150 serves as part of a path through which air taken in from the room passes. For this reason, it becomes possible to ensure sufficient air volume. Further, in the indoor unit 2d of the air conditioner 1, air can be sucked in from plural angles by disposing the open portion 500 in the front panel 150, so that bias of the flow of air with respect to the heat exchanger can be reduced. Moreover, the potential for the beauty inside the room to be spoiled is minimized because the open portion 500 is hidden when seen in front view during operation.

(2)
Further, in the indoor unit 2d of the air conditioner 1, when operation is stopped, the front panel 150 covers the entire front surface of the indoor unit 2d and forms a substantially flat surface. Moreover, when operation is stopped, the convex portion 501 of the casing body 23 fits into the open portion 500 in the front panel 150 so that the front panel 150 and the convex portion 501 form a continuous surface. Additionally, because the front panel 150 is configured by one panel member, seam lines other than the seam line between the open portion 500 and the convex portion

501 do not appear when the front panel 150 is seen in front view. For this reason, in the indoor unit 2d of the air conditioner 1, high beauty in front view of just the indoor unit 2d can be ensured, the wall surface inside the room and the outer appearance of the indoor unit 2d when seen in front view and when operation is stopped are harmonious, and the beauty inside the room improves.

(3) In the indoor unit 2d of the air conditioner 1, the flexibility of the middle portion 152 of the front panel 150 is higher than the flexibilities of the upper portion 151 and the lower portion 153. Consequently, during operation, after the entire front panel 150 has been moved frontward, the middle portion 152 naturally curves simply by moving the lower portion 153 upward and moving the upper portion 151 further frontward. That is, in order to cause the front panel 150 to curve during operation, it suffices to perform simple movement such as parallel movement of the upper portion 151 and the lower portion 153. Thus, it becomes possible to simply design the moving mechanisms 100 that cause the front panel 150 to curve.

(4) In the indoor unit 2d of the air conditioner 1, when the blowout opening 26 and the first suction opening 27 open, it suffices for the entire front panel 150 to move slightly frontward and then for the lower portion 153 of the front panel 150 to move slightly upward and for the upper portion 151 to move slightly further frontward. For this reason, the increased dimension (distance d1) of the thickness (see FIG. 19) of the indoor unit 2d during operation is small. For this reason, in the indoor unit 2d of the air conditioner 1, it becomes possible to compactly configure the indoor unit 2d during operation.

<Modifications>

[0119] As a modification of the fourth embodiment, the front panel 150 may be configured from plural panels. However, it is preferable for the number of panels configuring the front panel 150 to be small because the smaller the number of panels configuring the front panel 150, the fewer the seam lines that appear in the front panel 150. Further, it is preferable for the plural panels configuring the front panel 150 to be disposed juxtaposed in the height direction. Thus, seam lines extending in the height direction when seen in front view do not appear, and the beauty inside the room usually improves.

<Fifth Embodiment>

[0120] An indoor unit 2e of the air conditioner 1 pertaining to a fifth embodiment of the present invention will be described with reference to FIG. 20 to FIG. 24.

[0121] A front panel 160 is constituted of a first panel 170 and a second panel 180. The first panel 170 opens and closes the first suction opening 27, and the second panel 180 opens and closes the blowout opening 26. The first panel 170 has a width that is substantially the same as the width W of the casing body 23 when seen in front view, the second panel 180 has a width that is substantially the same as the width W of the casing body 23 when seen in front view, and the sum of a height H 1 of the first panel 170 and a height H2 of the second panel 180 is substantially the same as the height H of the casing body 23.

[0122] The first panel 170 is supported by unillustrated moving mechanisms 100 and opens and closes the first suction opening 27. The first panel 170 is constituted of one panel member and forms a substantially flat surface when operation is stopped. The first panel 170 includes an upper portion 171, a middle portion 172, and a lower portion 173 that are juxtaposed in order from top to bottom. The boundary between the upper portion 171 and the middle portion 172 is represented by a boundary line (two-dotted chain line) 174, and the boundary between the middle portion 172 and the lower portion 173 is represented by a boundary line (two-dotted chain line) 175. The middle portion 172 is a portion that curves when the first panel 170 is in an open state, and the upper portion 171 and the lower portion 173 are portions that virtually do not curve even when the first panel 170 is in an open state. The first panel 170 is formed by an elastomer and can produce a texture such as a warm feeling or a soft feeling.

[0123] Further, an open portion 700 having a shape that is long in the width direction and larger all around than a convex portion 701 disposed in the casing body 23 is disposed in the middle portion 172. The open portion 700 serves as part of a path through which air sucked in from the room during operation of the first panel 170 passes. In a state where the first panel 170 is closed, the convex portion 701 disposed in the casing body 23 fits into the open portion 700 so that the first panel 170 and the convex portion 701 form a continuous surface. Further, in a state where the first panel 170 is open, the open portion 700 is hidden when the indoor unit 2e is seen in front view.

[0124] Further, the upper portion 171 and the lower portion 173 respectively have a thickness t1 and a thickness t3, and the middle portion 172 has a thickness t2 that is thinner than both the thickness t1 and the thickness t3. Consequently, the flexibility of the middle portion 172 is higher than the flexibilities of both the upper portion 171 and the lower portion 173.

[0125] The second panel 180 is supported by unillustrated moving mechanisms 100 and opens and closes the blowout opening 26. The second panel 180 is constituted of one panel member. The second panel 180 is formed from an

elastomer in the same manner as the first panel 170. Consequently, the beauty inside the room improves as a result of the impression of the indoor unit 2e being unified when seen in front view.

[0126] Next, operation when the indoor unit 2e performs air conditioning operation will be described.

[0127] When the indoor unit 2e is stopped, the first panel 170 and the second panel 180 are in a state where the blowout opening 26 and the first suction opening 27 are closed as shown in FIG. 20 and FIG. 21. That is, the middle portion 172 is in an uncurved stationary state. At this time, the convex portion 701 disposed in the casing body 23 fits into the open portion 700 disposed in the first panel 170 so that the first panel 170 and the convex portion 701 form a continuous surface.

[0128] When the indoor unit 2e performs operation, the first panel 170 and the second panel 180 move so that the blowout opening 26 and the first suction opening 27 open. Thus, the air volume of the air taken into the indoor unit 2e is ensured and blowing out of the air is performed. In this case, the entire first panel 170 moves slightly frontward so that the convex portion 701 of the casing body 23 comes out of the open portion 700. Next, the lower portion 173 of the first panel 170 is moved upward by the unillustrated moving mechanisms 100 and, in conjunction with the movement of the lower portion 173, the upper portion 171 of the first panel 170 is evenly pushed out a distance d1 further frontward by the unillustrated moving mechanisms 100. Thus, the first suction opening 27 opens. At this time, the middle portion 172 curves in an S shape when seen in side view because the flexibility of the middle portion 172 is higher than the flexibilities of the upper portion 171 and the lower portion 173. That is, when the indoor unit 2e is performing operation, the middle portion 172 is in a stationary state where it is curved in an S shape. Moreover, the open portion 700 disposed in the middle portion 172 moves to a position where it is hidden from front view. The air sucked in from the room passes through the first suction opening 27 from a gap formed between the upper end of the first panel 170 and the upper end of the casing body 23 as represented by arrow A1 in FIG. 23, passes through the second suction opening 28 in the top surface of the casing body 23 as represented by arrows A2, or passes through the first suction opening 27 from the open portion 700 in the first panel 170 as represented by arrow A3, and is then taken into the indoor unit 2e. In conjunction with the movement of the first panel 170, the second panel 180 rotates and moves so as to form a blowout angle corresponding to the operating mode that has been set. Thus, the blowout opening 26 opens.

[0129] When the indoor unit 2e stops operation, the first panel 170 and the second panel 180 move and the indoor unit 2e returns to the state where the blowout opening 26 and the first suction opening 27 are closed. In this case, the upper portion 171 of the first panel 170 is pushed the distance d1 backward by the unillustrated moving mechanisms 100. In conjunction with the movement of the upper portion 171, the lower portion 173 of the first panel 170 is moved downward by the moving mechanisms 100. At this time, the middle portion 172 that had been curved in an S shape during operation returns to a substantially flat surface. Next, the entire first panel 170 is pushed backward so that the first suction opening 27 closes. At this time, the convex portion 701 in the casing body 23 is fitted into the open portion 700 in the first panel 170 so that the first panel 170 and the convex portion 701 form a continuous surface. In conjunction with the movement of the first panel 170, the second panel 180 rotates and moves so that the blowout opening 26 closes.

[0130] The remaining configuration and operation are the same as those of the indoor unit 2d pertaining to the fourth embodiment.

<Characteristics>

[0131] In the indoor unit 2e of the air conditioner 1, the first panel 170 that opens and closes the first suction opening 27 and the second panel 180 that opens and closes the blowout opening 26 move independently. For this reason, it is possible to allow the opened and closed states of the first suction opening 27 and the blowout opening 26 to be independent.

<Modifications>

[0132] As a modification of the fifth embodiment, the front panel 160 may be configured to include another panel other than the first panel 170 and the second panel 180. However, it is preferable for the number of panels configuring the front panel 160 to be small because the smaller the number of panels configuring the front panel 160, the fewer the seam lines that appear in the front panel 160. Further, it is preferable for the plural panels configuring the front panel 160 to be disposed juxtaposed in the height direction. Thus, seam lines extending in the height direction when seen in front view do not appear, and the beauty inside the room improves.

[0133] Further, as another modification of the fifth embodiment, the second panel 180 may be formed by a material different from that of the first panel 170.

<Sixth Embodiment>

[0134] An indoor unit 2f of the air conditioner 1 pertaining to a sixth embodiment of the present invention will be

described with reference to FIG. 24 to FIG. 27.

[0135] A front panel 190 is constituted of one panel member and has a width that is substantially the same as the width W of the casing body 23 when seen in front view and a height that is substantially the same as the height H of the casing body 23. The first suction opening 27 and the blowout opening 26 disposed in the casing body 23 are represented by dotted lines in FIG. 24, but in actuality they cannot be seen because they are hidden by the front panel 190 when seen in front view. Further, the first suction opening 27 and the blowout opening 26 disposed in the casing body 23 have substantially the same width W1. Further, when operation is stopped, the front panel 190 forms a substantially flat surface and covers the blowout opening 26 and the first suction opening 27 when seen in front view. Further, the front panel 190 is supported by unillustrated moving mechanisms 100 and opens the blowout opening 26 and the first suction opening 27 during operation.

[0136] The front panel 190 includes a leftmost portion 191, a left portion 192, a middle portion 193, a right portion 194, and a rightmost portion 195 that are juxtaposed in order from left to right. The boundary between the leftmost portion 191 and the left portion 192 is represented by a boundary line (two-dotted chain line) 196, the boundary between the left portion 192 and the middle portion 193 is represented by a boundary line (two-dotted chain line) 197, the boundary between the middle portion 193 and the right portion 194 is represented by a boundary line (two-dotted chain line) 198, and the boundary between the right portion 194 and the rightmost portion 195 is represented by a boundary line (two-dotted chain line) 199. The middle portion 193 has a width that is substantially the same as the width W1 of the first suction opening 27 and the blowout opening 26 and covers the first suction opening 27 and the blowout opening 26 when operation is stopped. Turning now to FIG. 27, the left portion 192 and the right portion 194 are portions that curve when the front panel 190 is in an open state, and the leftmost portion 191, the middle portion 193, and the rightmost portion 195 are portions that virtually do not curve even when the front panel 190 is in an open state. The front panel 190 is formed by an elastomer and can produce a texture such as a warm feeling or a soft feeling.

[0137] Convex portions 901 and 903 having shapes that are long in the height direction are disposed in the front surface of the casing body 23. An open portion 900 having a shape that is long in the height direction and larger all around than the convex portion 901 is disposed in the left portion 192 of the front panel 190, and an open portion 902 having a shape that is long in the height direction and larger all around than the convex portion 903 is disposed in the right portion 194 of the front panel 190. The open portions 900 and 902 serve as a path through which air sucked in from the room during operation of the front panel 190 passes. In a state where the front panel 190 is closed, the convex portions 901 and 903 disposed in the casing body 23 respectively fit into the open portions 900 and 902 so that the front panel 190 and the convex portions 901 and 903 form a continuous surface. Further, in a state where the front panel 190 is open, the open portions 900 and 902 are hidden when the indoor unit 2f is seen in front view.

[0138] Further, the leftmost portion 191, the middle portion 193, and the rightmost portion 195 respectively have a thickness t1, a thickness t3, and a thickness t5, and the left portion 192 and the right portion 194 respectively have a thickness t2 and a thickness t4 that are thinner than any of the thickness t1, the thickness t3, and the thickness t5. Consequently, the flexibilities of the left portion 192 and the right portion 194 is higher than the flexibility of any of the leftmost portion 191, the middle portion 193, and the rightmost portion 195.

[0139] Next, operation when the indoor unit 2f of the air conditioner 1 performs air conditioning operation will be described.

[0140] When the indoor unit 2f is stopped, the front panel 190 is in a state where it closes the blowout opening 26 and the first suction opening 27 as shown in FIG. 24 and FIG. 25. That is, the left portion 192 and the right portion 194 are in an uncurved stationary state. At this time, the convex portions 901 and 903 disposed in the casing body 23 respectively fit into the open portions 900 and 902 disposed in the front panel 190 so that the front panel 190 and the convex portions 901 and 903 form a continuous surface.

[0141] When the indoor unit 2f performs operation, the front panel 190 moves so that the blowout opening 26 and the first suction opening 27 open. Thus, the air volume of the air taken into the indoor unit 2f is ensured and blowing out of the air is performed. In this case, the entire front panel 190 moves slightly frontward so that the convex portion 901 of the casing body 23 comes out of the open portion 900 in the front panel 190 and so that the convex portion 903 of the casing body 23 comes out of the open portion 902 in the front panel 190. Next, the leftmost portion 191 evenly moves to the right such that the boundary line 196 between the leftmost portion 191 and the left portion 192 of the front panel 190 approaches the boundary line left of the first suction opening 27 or the blowout opening 26. Moreover, the rightmost portion 195 evenly moves to the left such that the boundary line 199 between the right portion 194 and the rightmost portion 195 of the front panel 190 approaches the boundary line right of the first suction opening 27 and the blowout opening 26. In accompaniment with the movement of the leftmost portion 191 and the rightmost portion 195, the middle portion 193 evenly moves a distance d1 frontward. Thus, the first suction opening 27 and the blowout opening 26 open. At this time, the left portion 192 and the right portion 194 curve in S shapes when seen in plan view because the flexibilities of the left portion 192 and the right portion 194 is higher than the flexibilities of the leftmost portion 191, the middle portion 193, and the rightmost portion 195. That is, when the indoor unit 2f is performing operation, the left portion 192 and the right portion 194 are in a stationary state where they are curved in S shapes. Moreover, the open portion 900 disposed

in the left portion 192 and the open portion 902 disposed in the right portion 194 move to positions where they are hidden from front view. The air sucked in from the room passes through the first suction opening 27 from a gap formed between the upper end of the front panel 190 and the upper end of the casing body 23, passes through the second suction opening 28 in the top surface of the casing body 23, or passes through the first suction opening 27 from the open portions 900 and 902 in the front panel 190 as represented by arrows A3 in FIG. 27, and is then taken into the indoor unit 2f.

[0142] In this manner, operation of the indoor unit 2f is performed.

[0143] When the indoor unit 2f stops operation, the front panel 190 moves so that, as shown in FIG. 24 and FIG. 25, the blowout opening 26 and the first suction opening 27 return to a state where they are closed. In this case, the leftmost portion 191 evenly moves to the left such that the boundary line 196 between the leftmost portion 191 and the left portion 192 of the front panel 190 moves away from the boundary line left of the first suction opening 27 or the blowout opening 26. Moreover, the rightmost portion 195 evenly moves to the right such that the boundary line 199 between the right portion 194 and the rightmost portion 195 of the front panel 190 moves away from the boundary line right of the first suction opening 27 and the blowout opening 26. In accompaniment with the movement of the leftmost portion 191 and the rightmost portion 195, the middle portion 193 evenly moves the distance d1 backward. Next, the entire front panel 190 moves slightly backward so that the convex portion 901 of the casing body 23 fits into the open portion 900 in the front panel 190 and so that the convex portion 903 of the casing body 23 fits into the open portion 902 in the front panel 190. Thus, the blowout opening 26 and the first suction opening 27 close.

[0144] The remaining configuration and operation are the same as those of the indoor unit 2d pertaining to the fourth embodiment.

<Characteristics>

[0145] In the indoor unit 2f of the air conditioner 1, the front panel 190 curves when seen in plan view during operation. That is, in the indoor unit 2f of the air conditioner 1, the front panel 190 can adapt to an environment suited for a front panel that curves when seen in plan view.

<Modification>

[0146] As a modification of the sixth embodiment, the front panel 190 may be configured from plural panels. However, it is preferable for the number of panels configuring the front panel 190 to be small because the smaller the number of panels configuring the front panel 190, the fewer the seam lines that appear in the front panel 190. Further, it is preferable for the plural panels configuring the front panel 190 to be disposed juxtaposed in the width direction. Thus, seam lines extending in the height direction when seen in front view are reduced, and the beauty inside the room improves.

<Other Embodiments>

[0147]

(A) In the first embodiment to the sixth embodiment, an elastomer was used for the front panels 50, 60, 90, 150, 160, and 190, but a fabric-like member may also be used for the front panels 50, 60, 90, 150, 160, and 190 to produce a texture such as a warm feeling or a soft feeling. Further, a metal may also be used for the front panels 50, 60, 90, 150, 160, and 190 to make a cool impression on users. The front panels 50, 60, 90, 150, 160, and 190 can be formed by an arbitrary material with which the portions 52, 72, 92, 94, 152, 172, 192, and 194 that curve when the front panels 50, 60, 90, 150, 160, and 190 are in an open state can appropriately curve.

(B) In the first embodiment to the sixth embodiment, different materials may be used for the portions 52, 72, 92, 94, 152, 172, 192, and 194 that curve when the front panels 50, 60, 90, 150, 160, and 190 are in the open state and for the portions 51, 53, 71, 73, 91, 93, 95, 151, 153, 171, 173, 191, 193, and 195 that virtually do not curve in the open state, so that a difference in flexibility is disposed in the portions 52, 72, 92, 94, 152, 172, 192, and 194 that curve in the open state and in the portions 51, 53, 71, 73, 91, 93, 95, 151, 153, 171, 173, 191, 193, and 195 that virtually do not curve in the open state.

(C) In the first embodiment to the sixth embodiment, the front surface of the casing body 23 and the front panels 50, 60, 90, 150, 160, and 190 do not have to form a substantially flat surface when operation is stopped but may have a shape that is smoothly curved as shown in FIG 28 to FIG. 33.

(D) In the fourth embodiment to the sixth embodiment, more open portions may be disposed in the front panels 150, 160, and 190. In this case, the open portions may be disposed not only in the portions 152, 172, 192, and 194 that curve in the open state but also in the portions 151, 153, 171, 173, 191, 193, and 195 that virtually do not curve in the open state.

INDUSTRIAL APPLICABILITY

[0148] The present invention has the effect that it can reduce, over what has conventionally been the case, the potential to spoil the beauty inside a room and is useful as an indoor unit of an air conditioner.

Claims

1. An indoor unit (2a, 2b, 2c, 2d, 2e, 2f) of an air conditioner comprising:

a casing (23) that includes a blowout opening (26) through which air blown out into a room passes and a suction opening (27) through which air taken in from the room passes; and
a front panel (50, 60, 90, 150, 160, 190) that opens and closes at least one of the blowout opening (26) and the suction opening (27);

wherein a first portion (52, 72, 92, 94, 152, 172, 192, 194) of the front panel (50, 60, 90, 150, 160, 190) changes between two or more stationary states, and the degree of curvature of the cross-sectionally seen shape of the first portion in a first state is different from the degree of curvature of the cross-sectionally seen shape of the first portion in a second state.

2. The indoor unit (2a, 2c, 2d, 2f) of an air conditioner of claim 1, wherein the front panel (50, 90, 150, 190) is constituted of one panel member.

3. The indoor unit (2a, 2b, 2c, 2d, 2e, 2f) of an air conditioner of claim 1 or 2, wherein
the first state is a state where the front panel (50, 60, 90, 150, 160, 190) is open, and
the first portion (52, 72, 92, 94, 152, 172, 192, 194) curves in an S shape in the first state.

4. The indoor unit (2a, 2b, 2c) of an air conditioner of claim 1 or 2, wherein
the first state is a state where the front panel (50, 60, 90) is open, and
the first portion (52, 72, 92, 94) curves in a U shape in the first state.

5. The indoor unit (2a, 2b, 2c, 2d, 2e, 2f) of an air conditioner of any one of claims 1 to 4, wherein the flexibility of the first portion (52, 72, 92, 94, 152, 172, 192, 194) is higher than the flexibility of a second portion (51, 53, 71, 73, 91, 93, 95, 151, 153, 171, 173, 191, 193, 195) other than the first portion (52, 72, 92, 94, 152, 172, 192, 194) of the front panel (50, 60, 90, 150, 160, 190).

6. The indoor unit (2a, 2b, 2c, 2d, 2e, 2f) of an air conditioner of claim 5, wherein the first portion (52, 72, 92, 94, 152, 172, 192, 194) is thinner than the second portion (51, 53, 71, 73, 91, 93, 95, 151, 153, 171, 173, 191, 193, 195).

7. The indoor unit (2a, 2b, 2c, 2d, 2e, 2f) of an air conditioner of claim 5, wherein the material of the first portion (52, 72, 92, 94, 152, 172, 192, 194) is different from the material of the second portion (51, 53, 71, 73, 91, 93, 95, 151, 153, 171, 173, 191, 193, 195).

8. The indoor unit (2a, 2b, 2c, 2d, 2e, 2f) of an air conditioner of any one of claims 1 to 7, wherein the first portion (52, 72, 92, 94, 152, 172, 192, 194) is formed by an elastomer.

9. The indoor unit (2a, 2b, 2c, 2d, 2e, 2f) of an air conditioner of any one of claims 1 to 7, wherein the first portion (52, 72, 92, 94, 152, 172, 192, 194) is formed by a fabric-like member.

10. The indoor unit (2a, 2b, 2d, 2e) of an air conditioner of any one of claims 1 to 9, wherein the degree of curvature of the vertical cross-sectionally seen shape of the first portion (52, 72, 152, 172) in the first state is different from the degree of curvature of the vertical cross-sectionally seen shape of the first portion in the second state.

11. The indoor unit (2c, 2f) of an air conditioner of any one of claims 1 to 9, wherein the degree of curvature of the transverse cross-sectionally seen shape of the first portion (92, 94, 192, 194) in the first state is different from the degree of curvature of the transverse cross-sectionally seen shape of the first portion in the second state.

12. The indoor unit (2d, 2e, 2f) of an air conditioner of claim 1, wherein

the front panel (150, 160, 190) includes an open portion (500, 700, 900, 902),
the casing (23) includes a convex portion (501, 701, 901, 903) corresponding to the open portion (500, 700, 900, 902), and
in the second state, the convex portion (501, 701, 901, 903) of the casing (23) is inserted into the open portion (500, 700, 900, 902).

13. The indoor unit (2d, 2e, 2f) of an air conditioner of claim 12, wherein in the first state, the open portion (500, 700, 900, 902) is hidden when seen in front view.

14. The indoor unit (2d, 2e, 2f) of an air conditioner of claim 12 or 13, wherein
the first state is a state where the front panel (150, 160, 190) is open,
the open portion (500, 700, 900, 902) is formed in the first portion (152, 172, 192, 194), and
the first portion (152, 172, 192, 194) curves in an S shape in the first state.

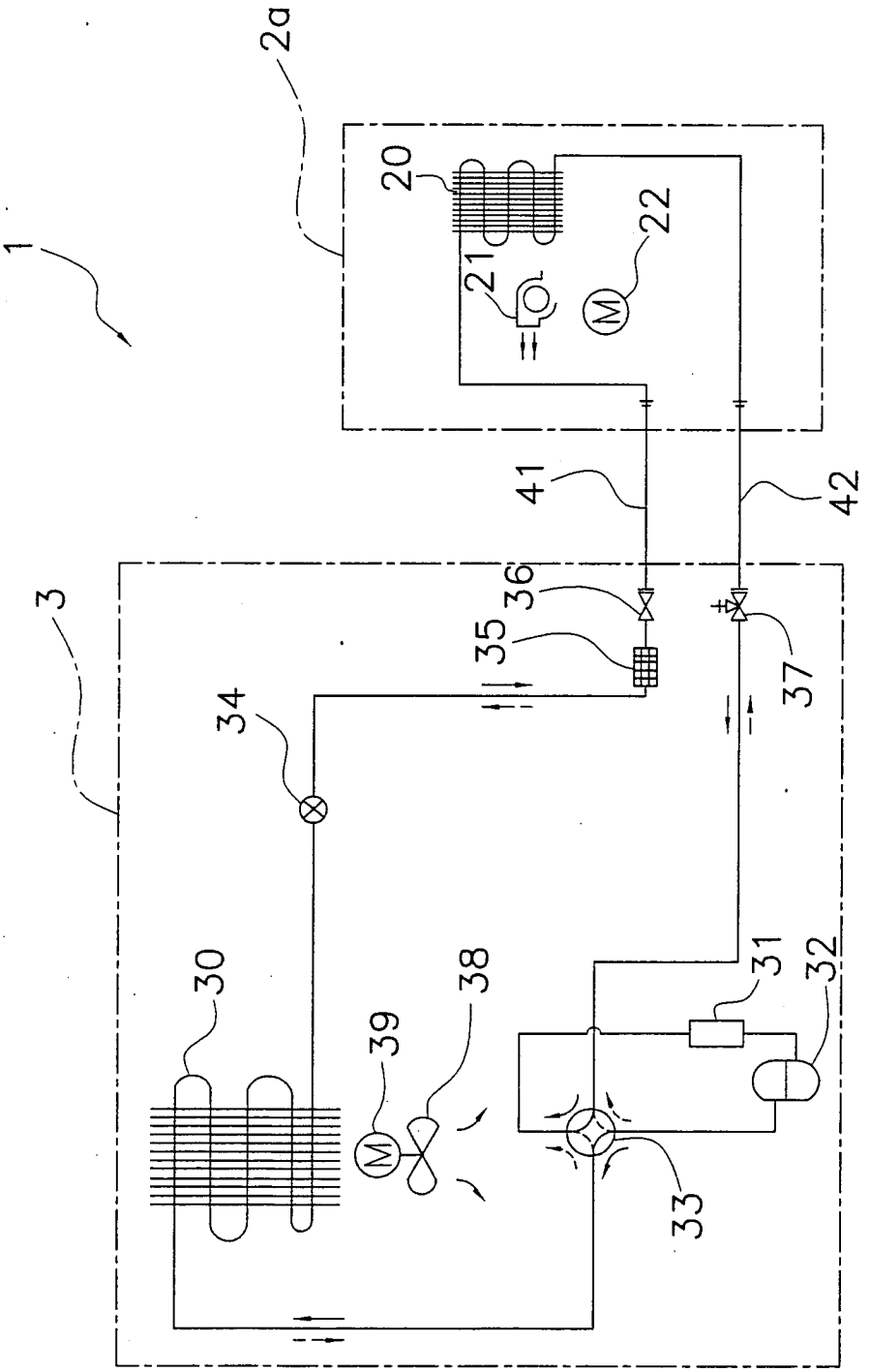

Fig. 1

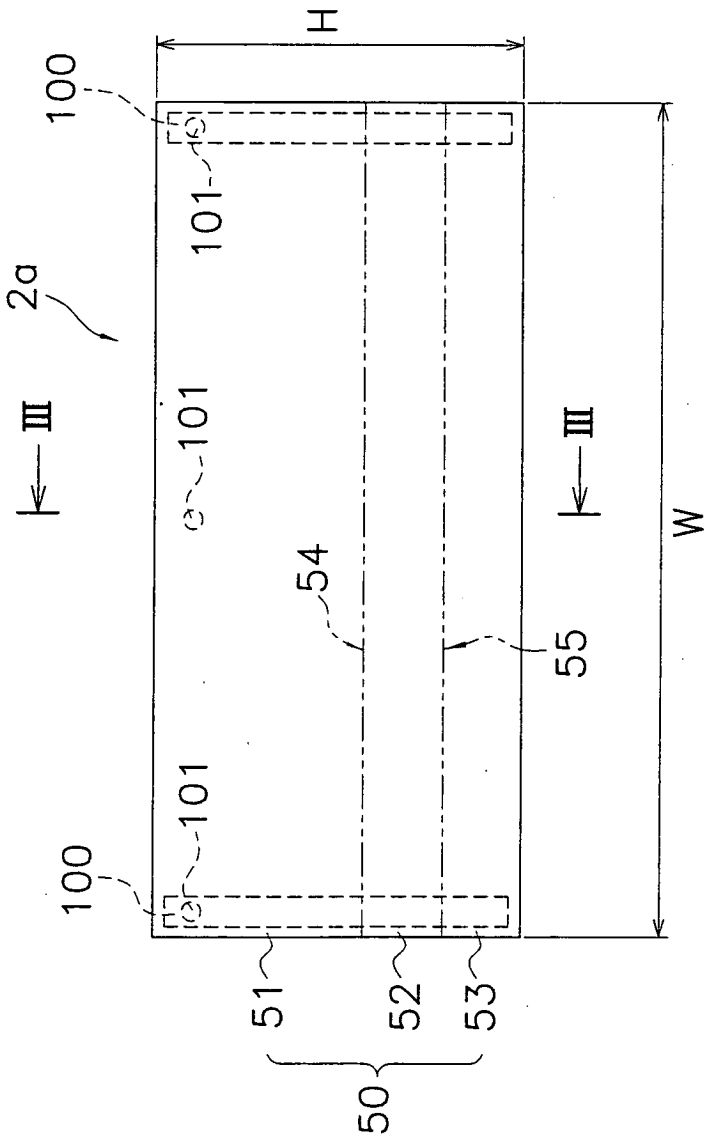

Fig. 2

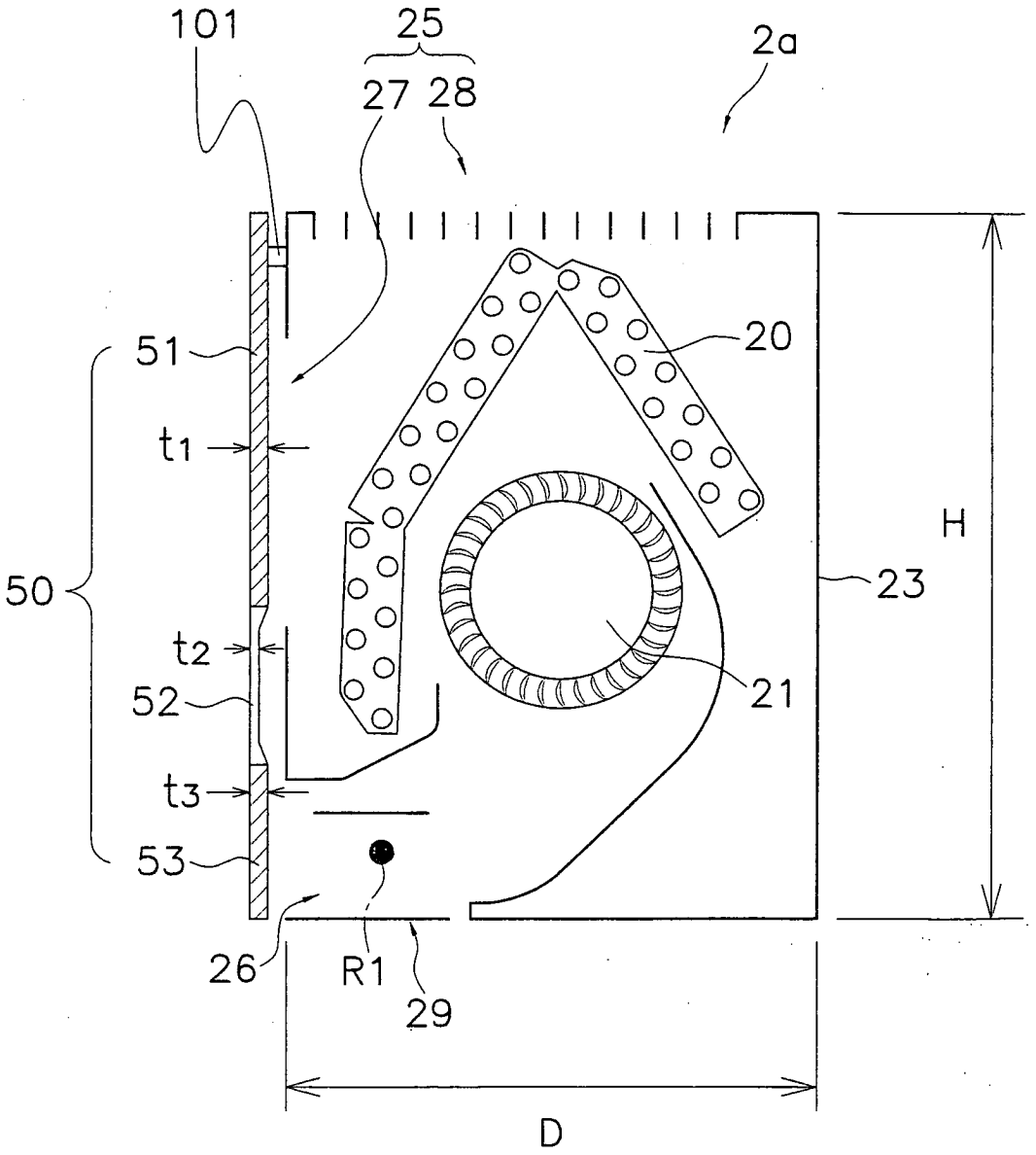

Fig. 3

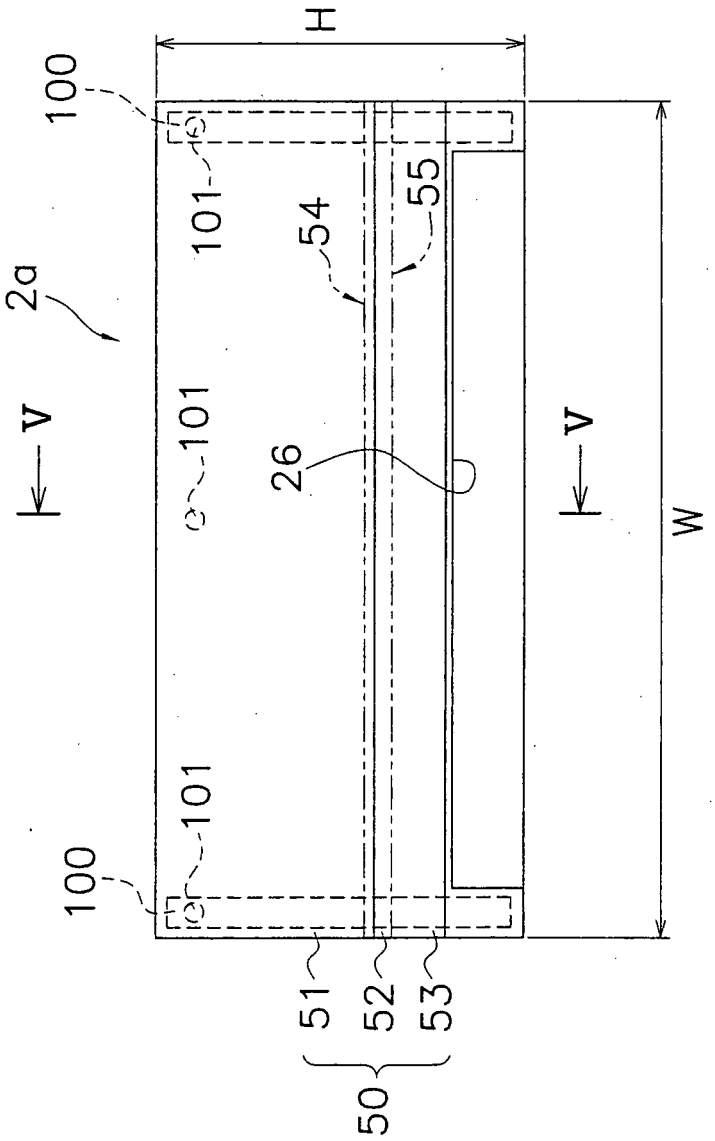

Fig. 4

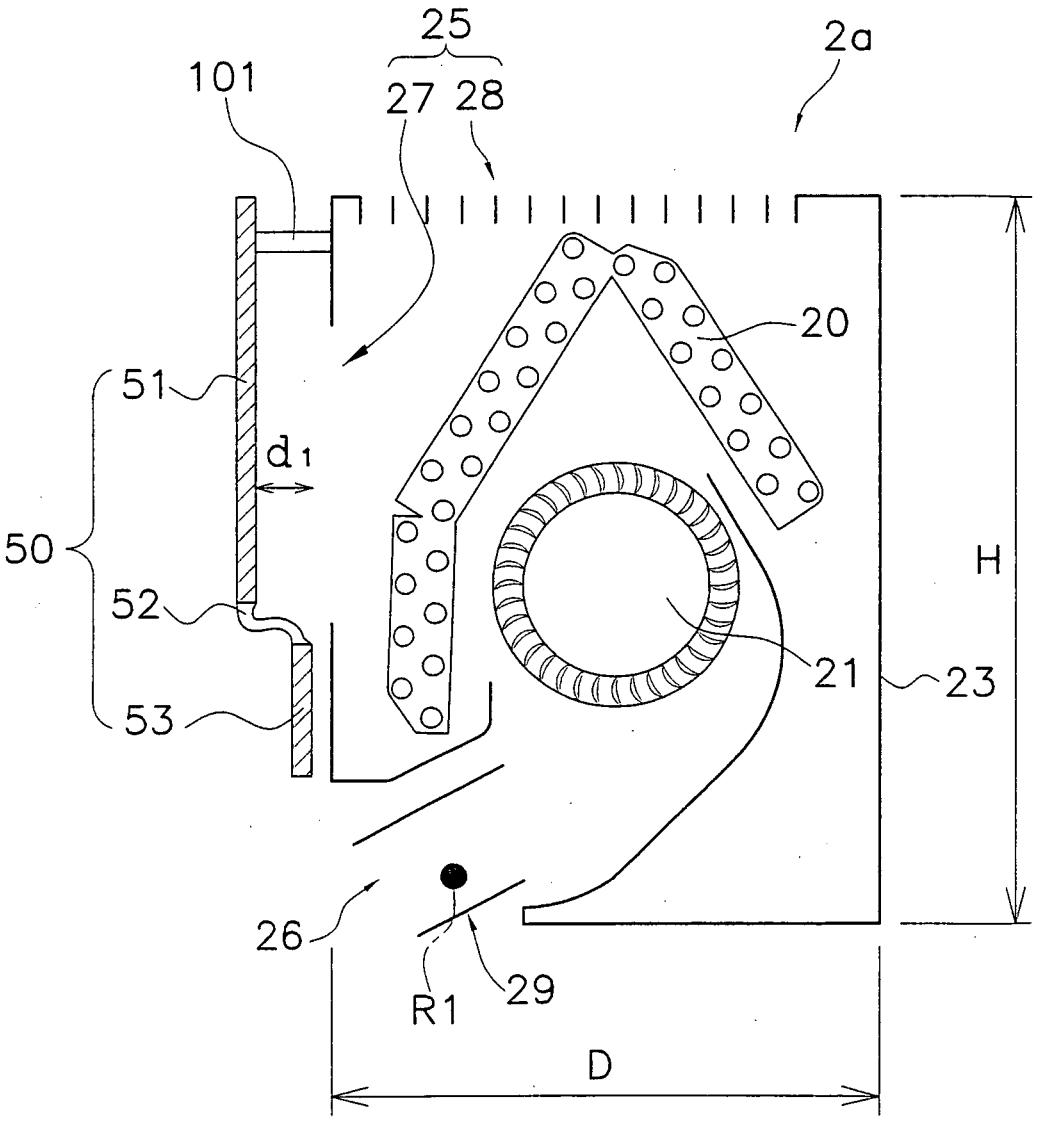

Fig. 5

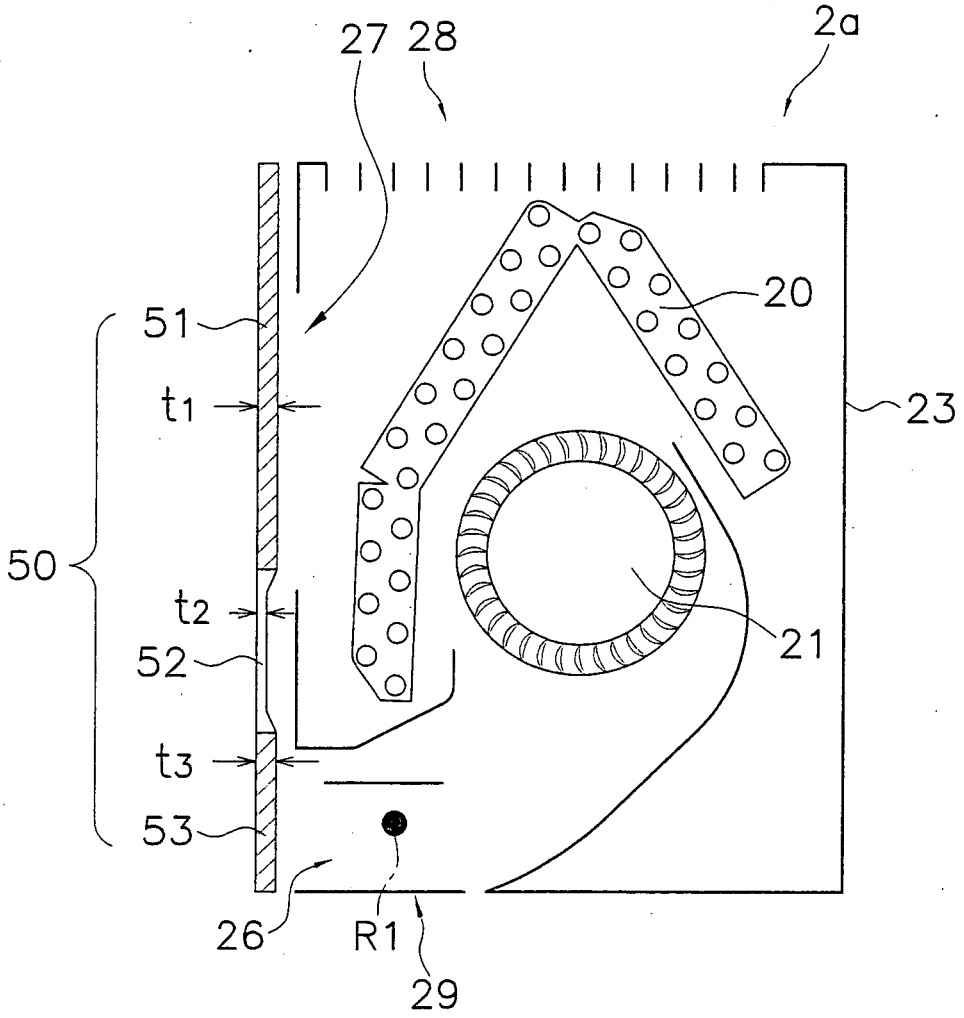

Fig. 6

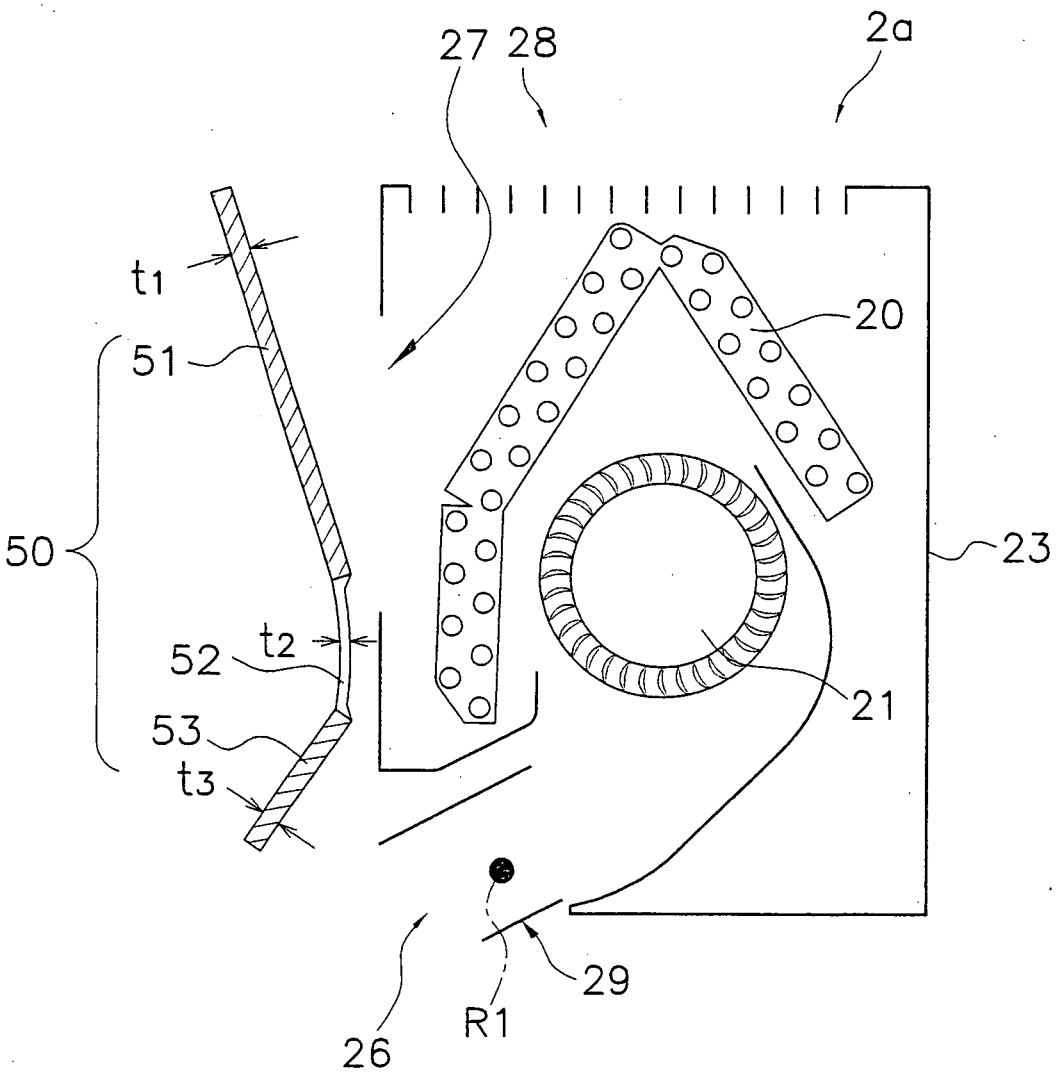

Fig. 7

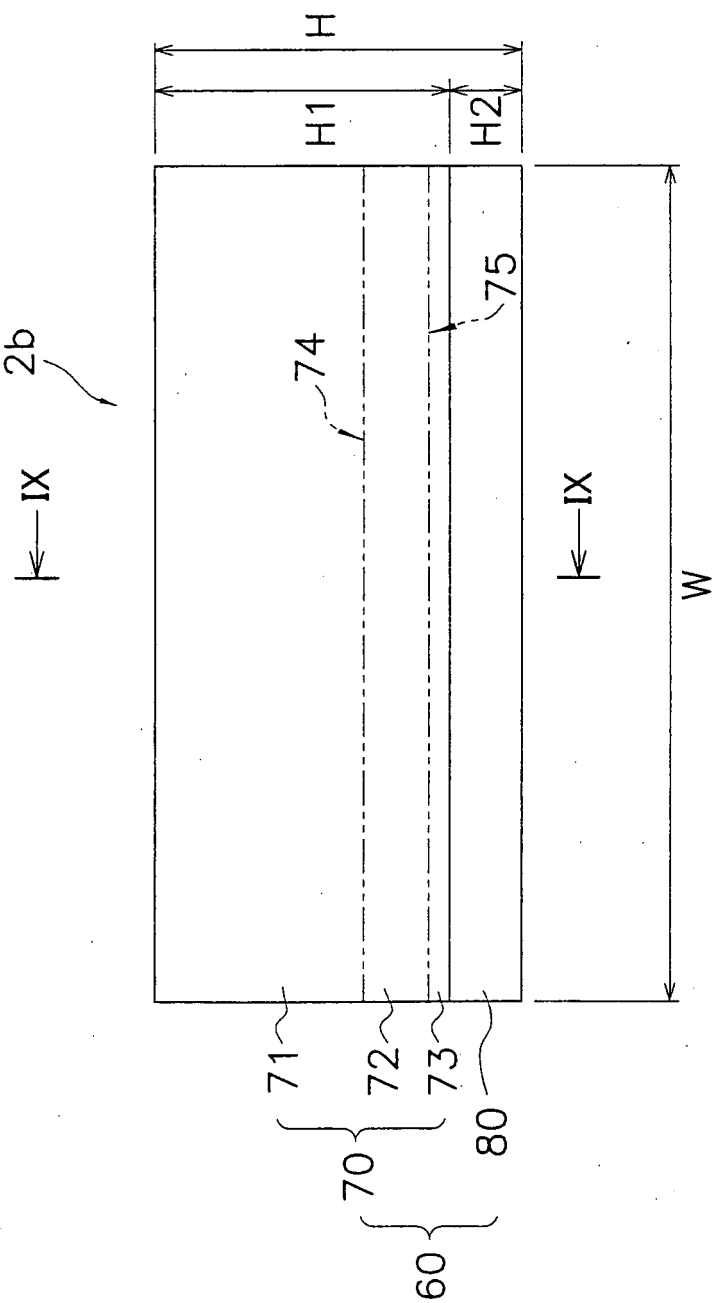

Fig. 8

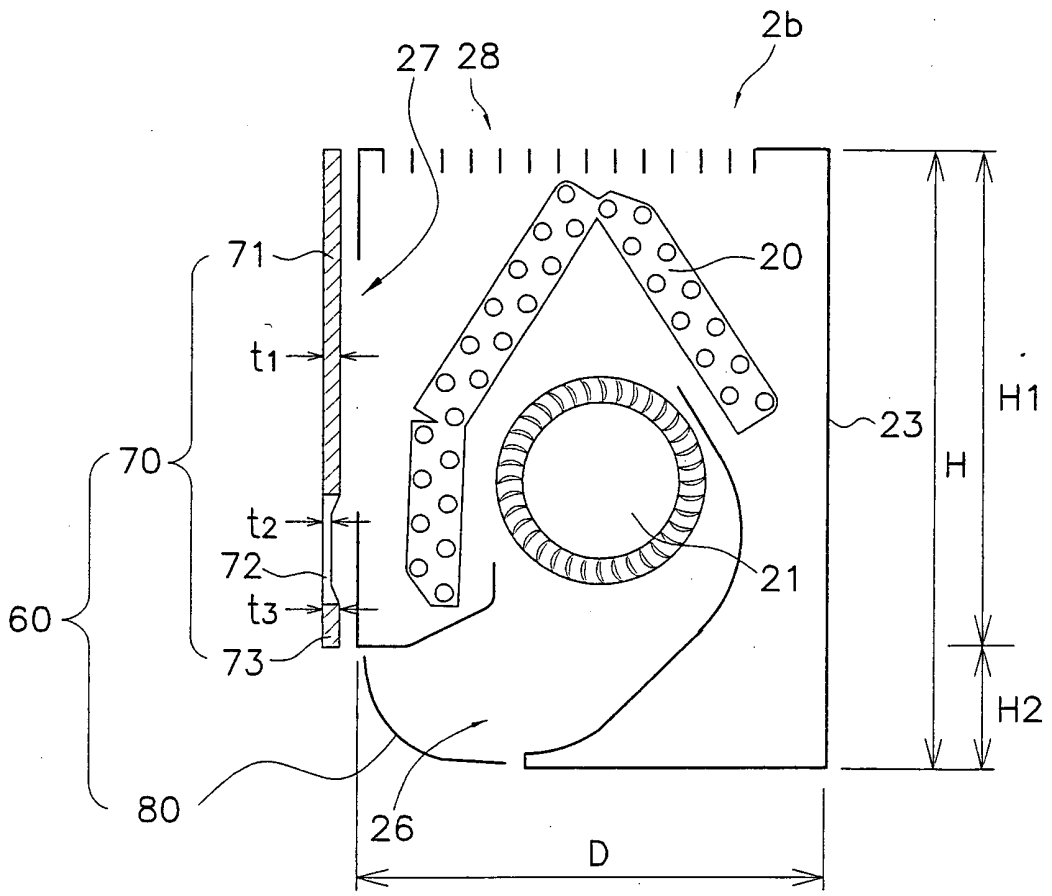

Fig. 9

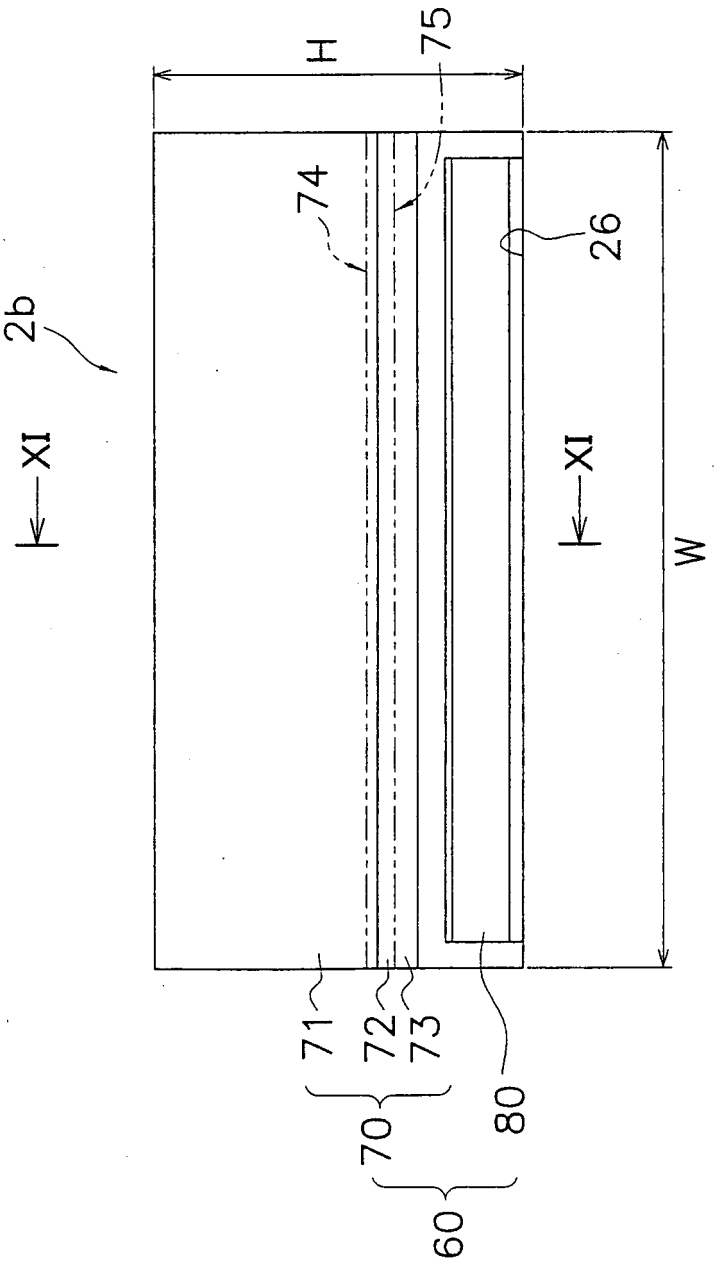

Fig. 10

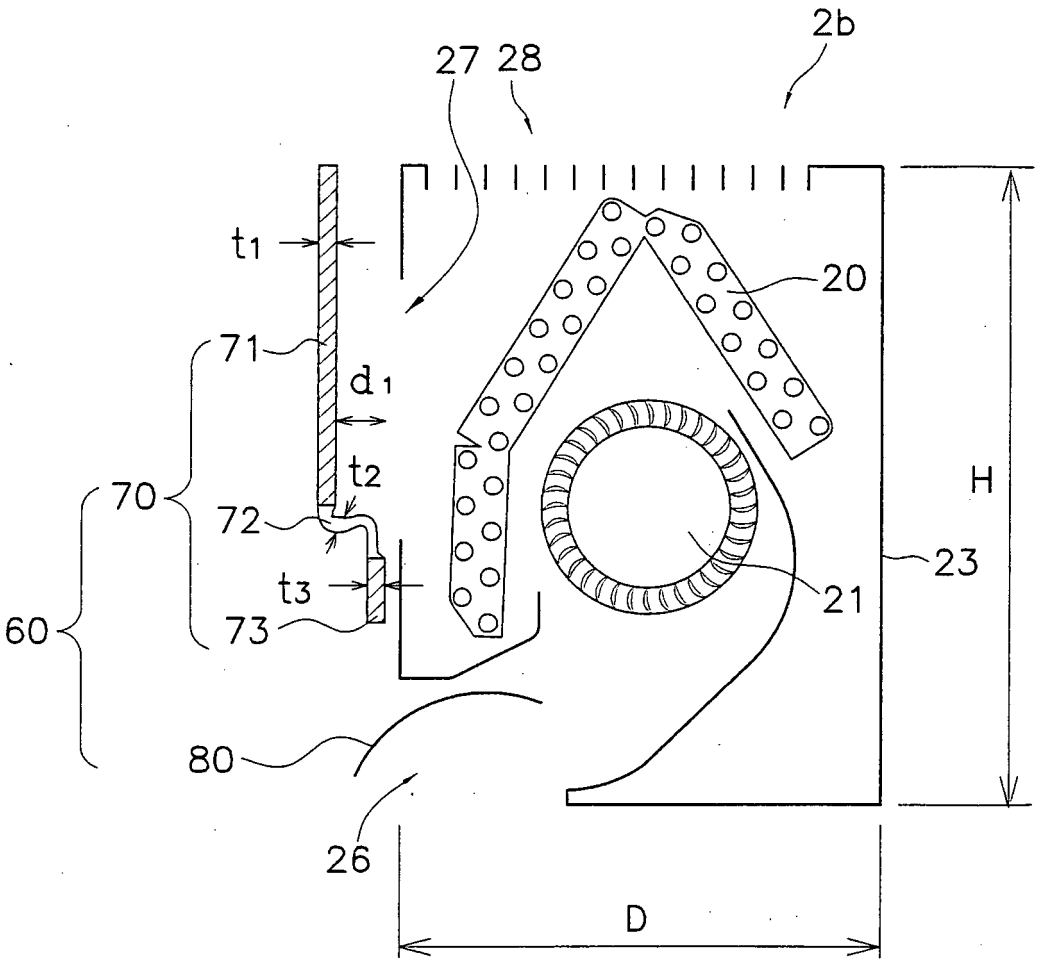

Fig. 11

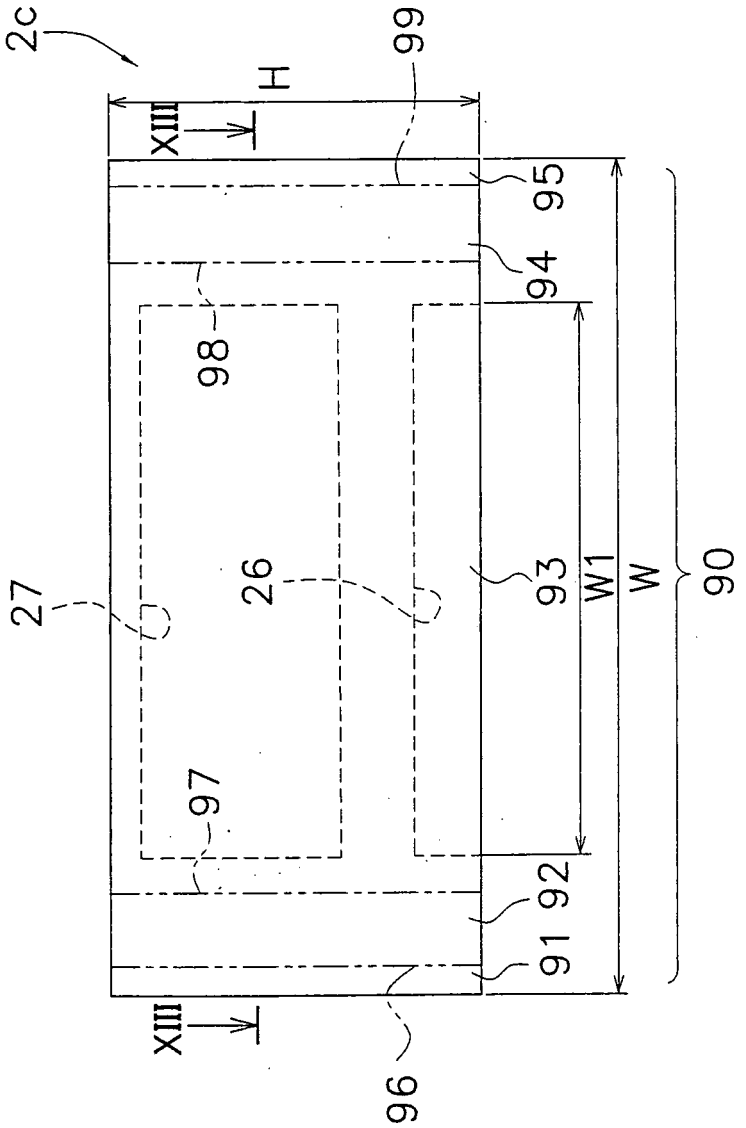

Fig. 12

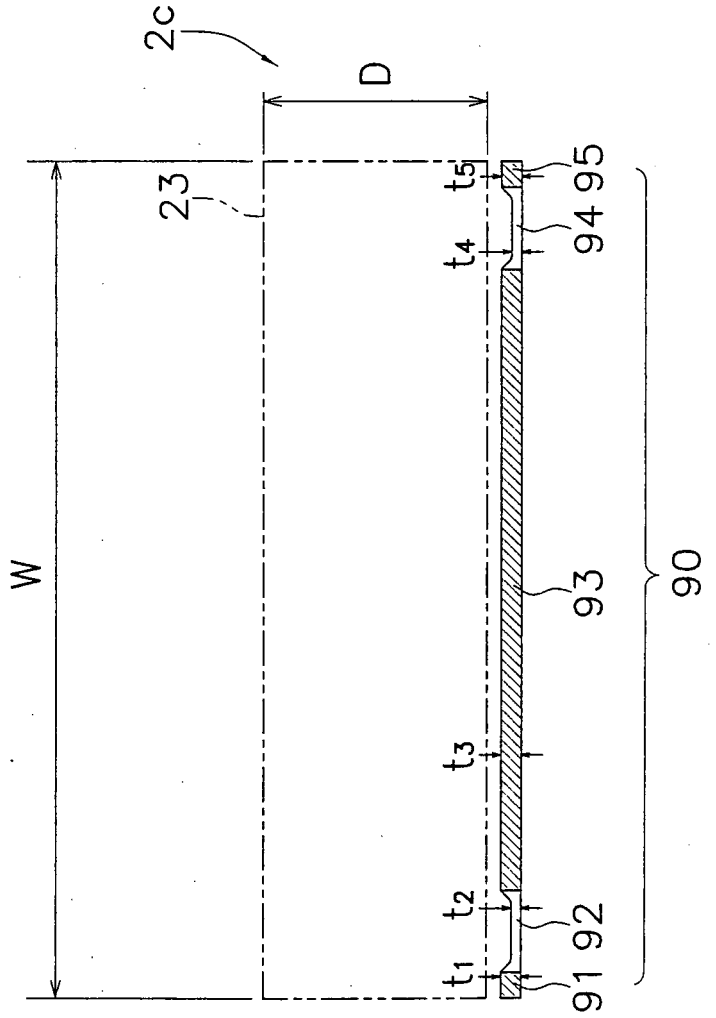

Fig. 13

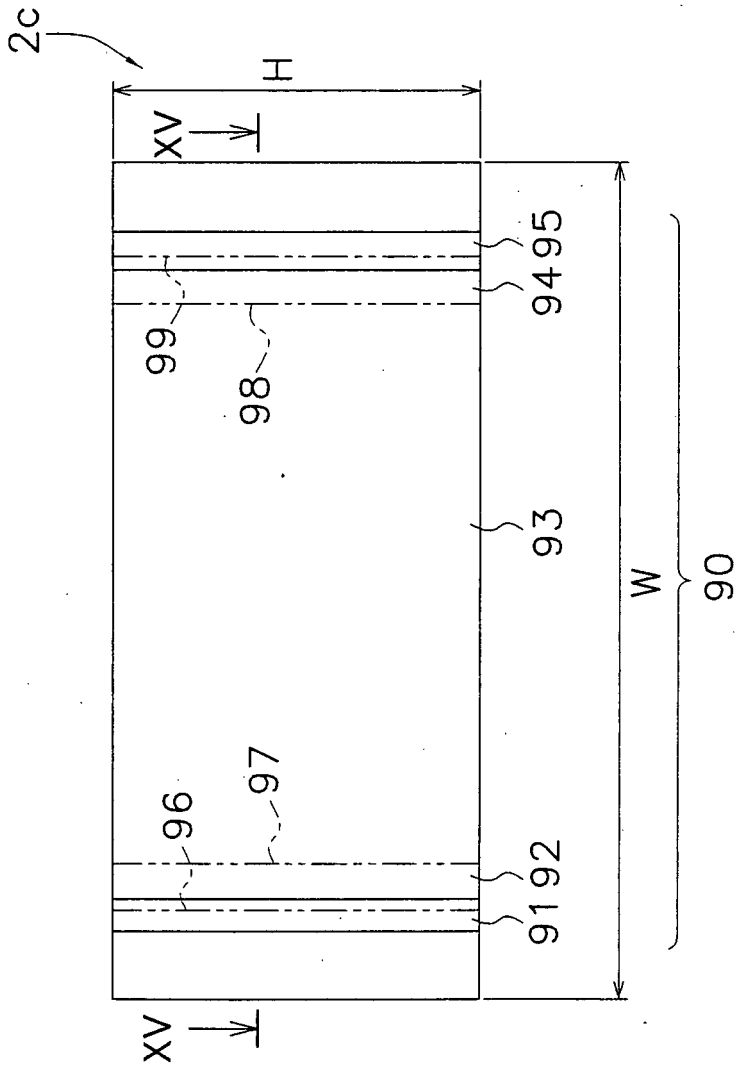

Fig. 14

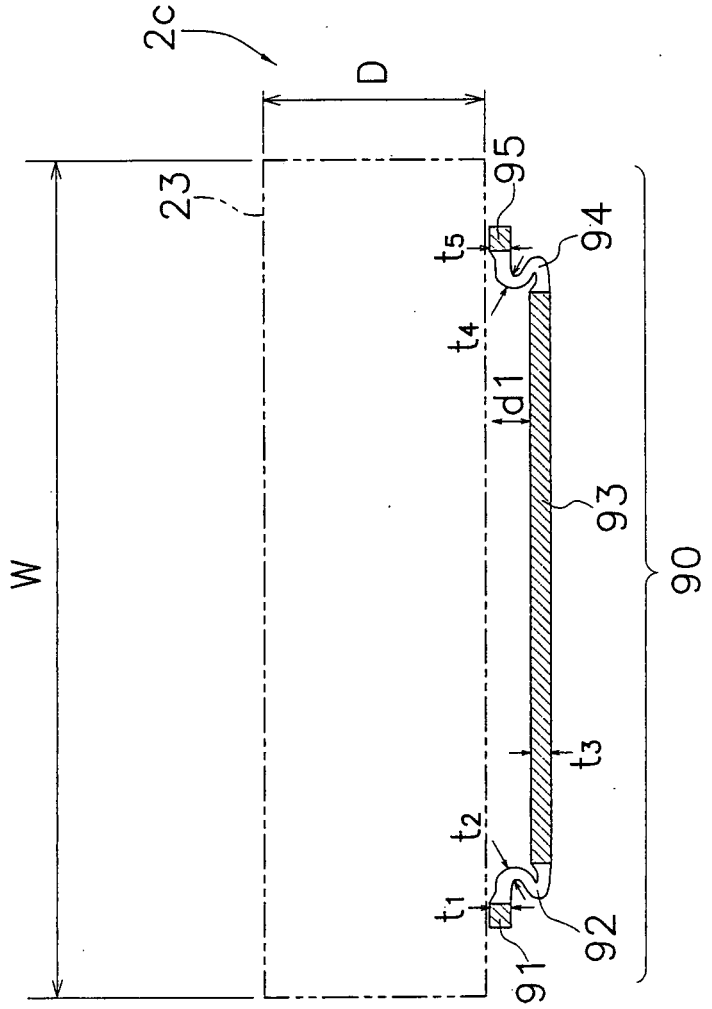

Fig. 15

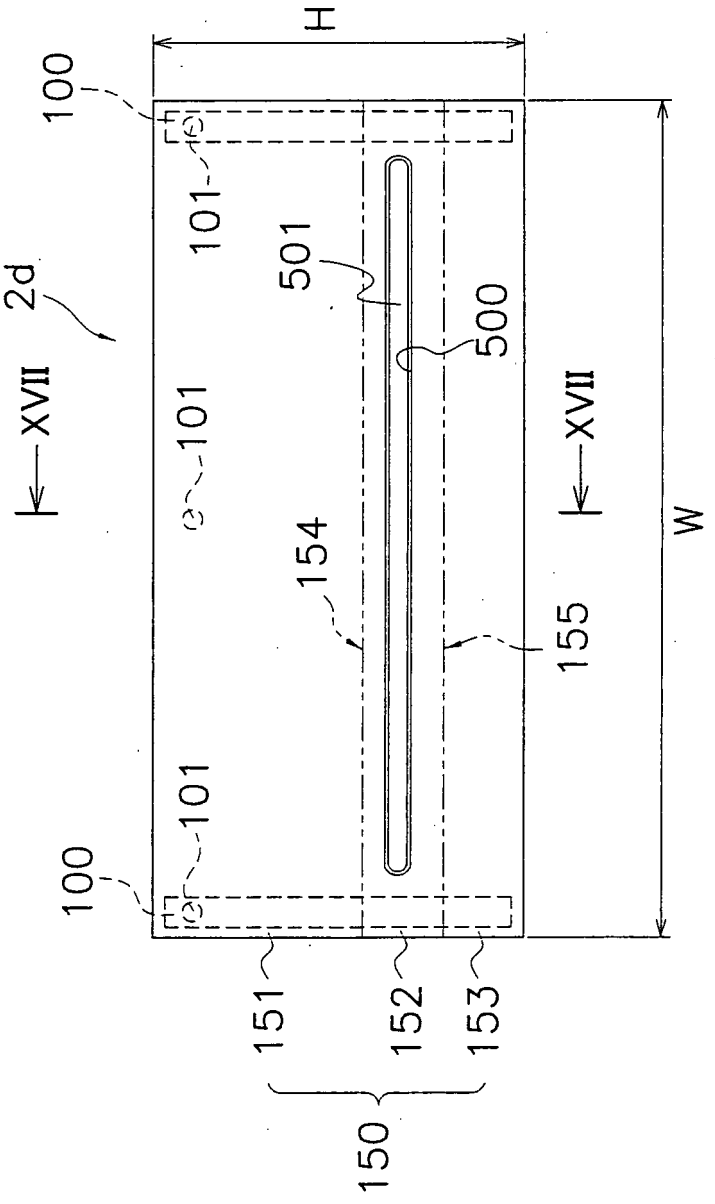
H
100
101
501
2d
500
XVII
101
XVII
154
155
W
101
100
151
152
153
150

Fig. 16

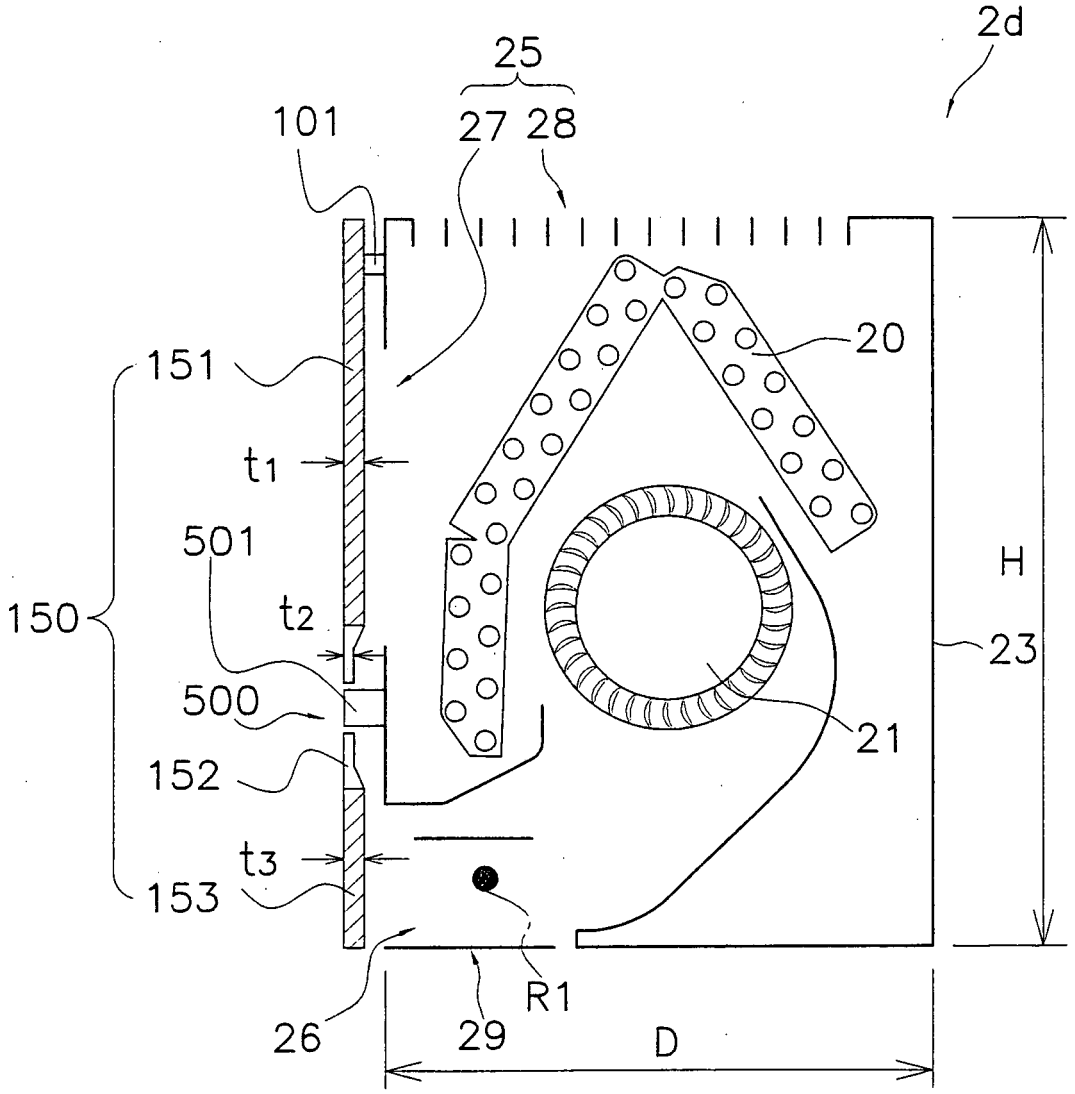

Fig. 17

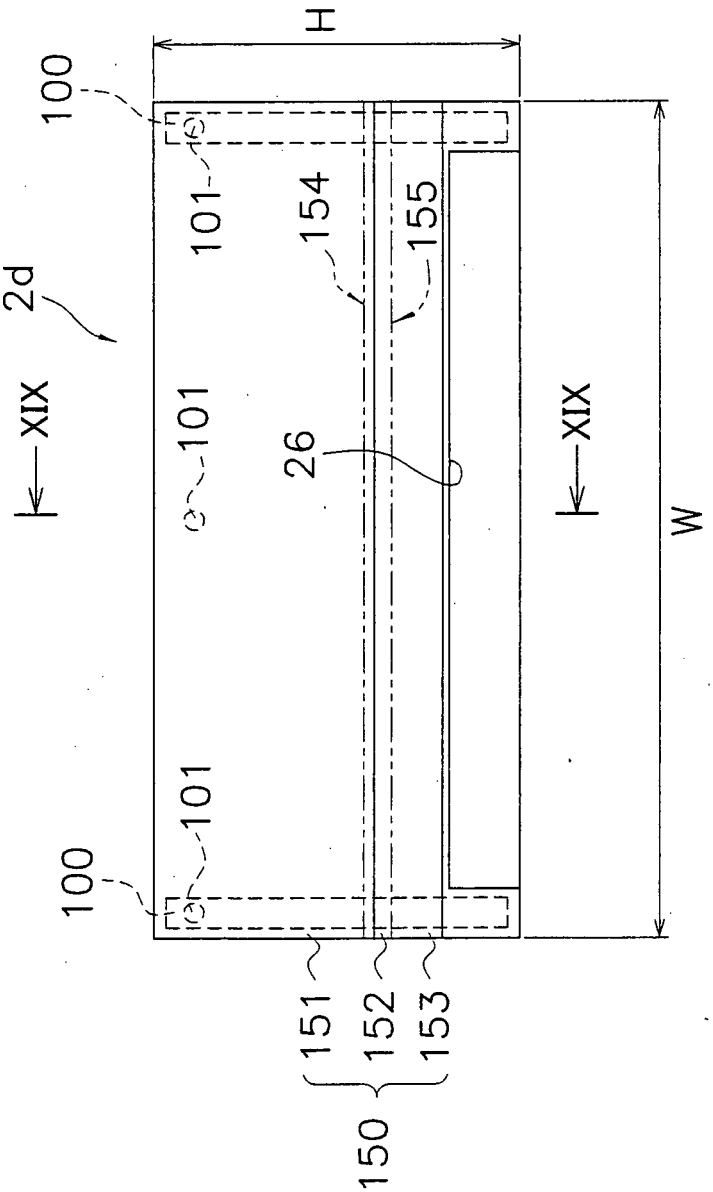

Fig. 18

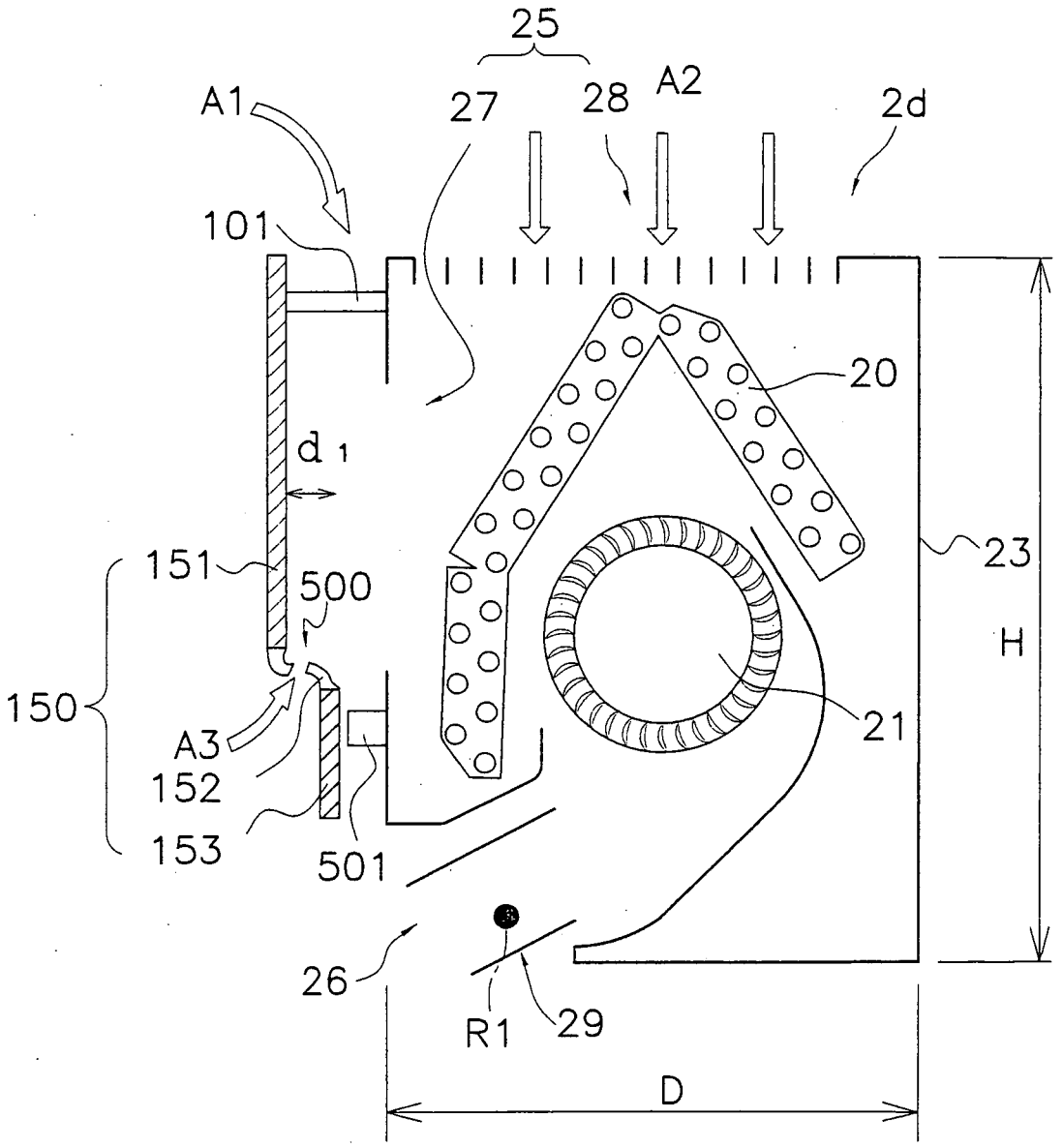
25
A1
27
28
A2
2d
101
20
d 1
151
500
23
H
150
21
A3
152
153
501
26
R1
29
D

Fig. 19

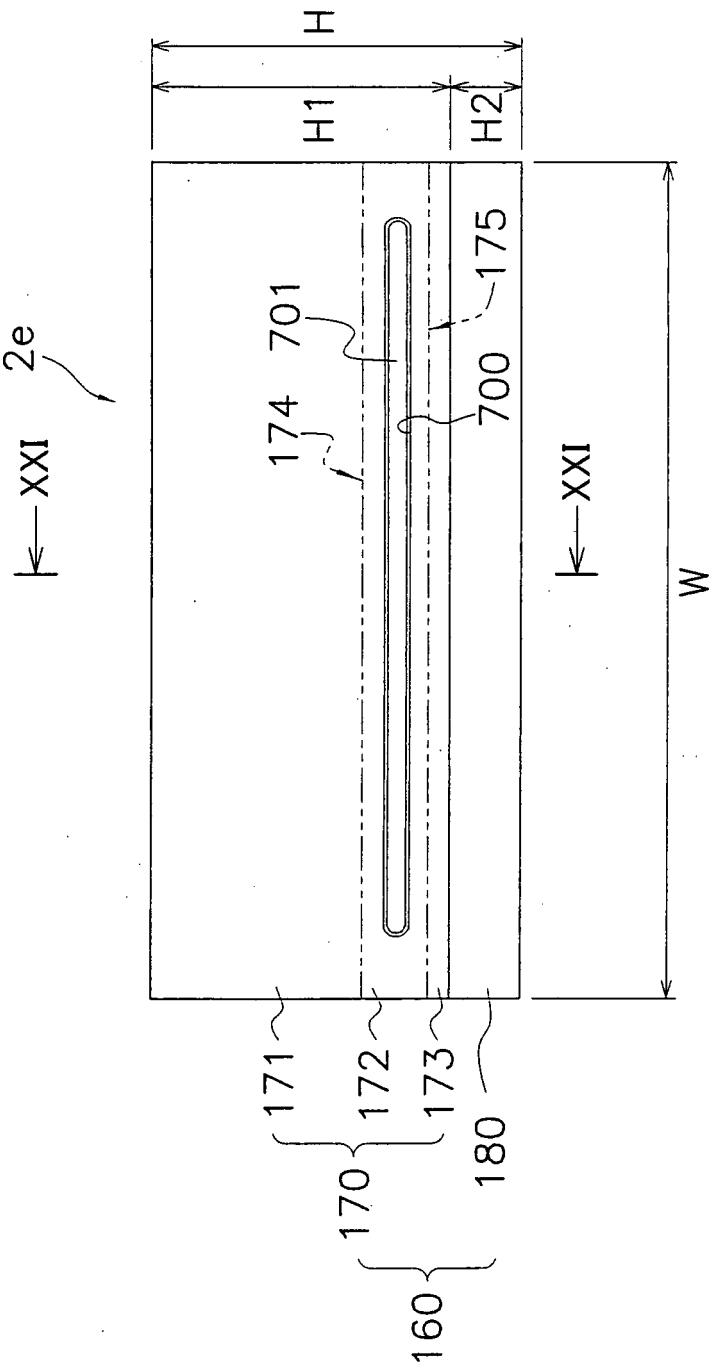

Fig. 20

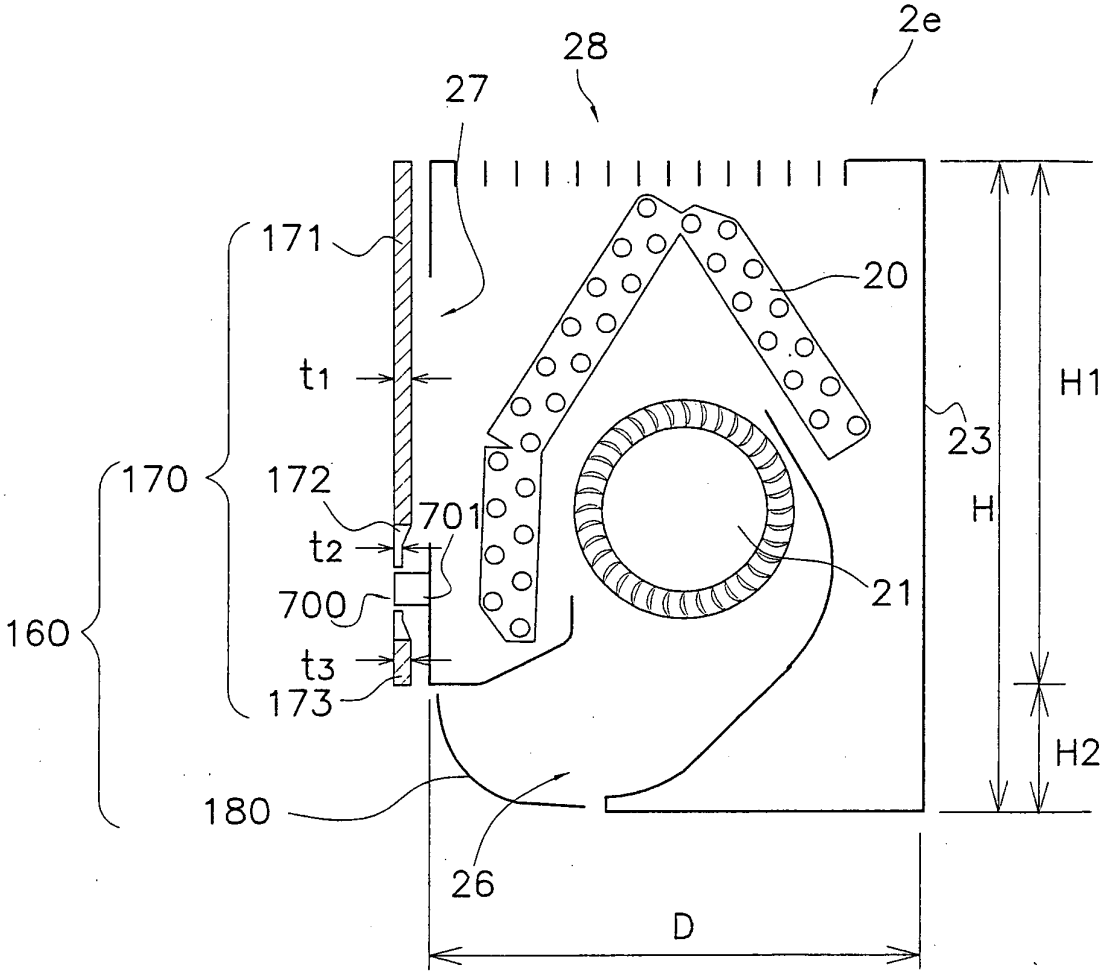
2e
28
27
171
20
t1
H1
23
170
172
701
H
t2
21
700
160
t3
173
H2
180
26
D

Fig. 21

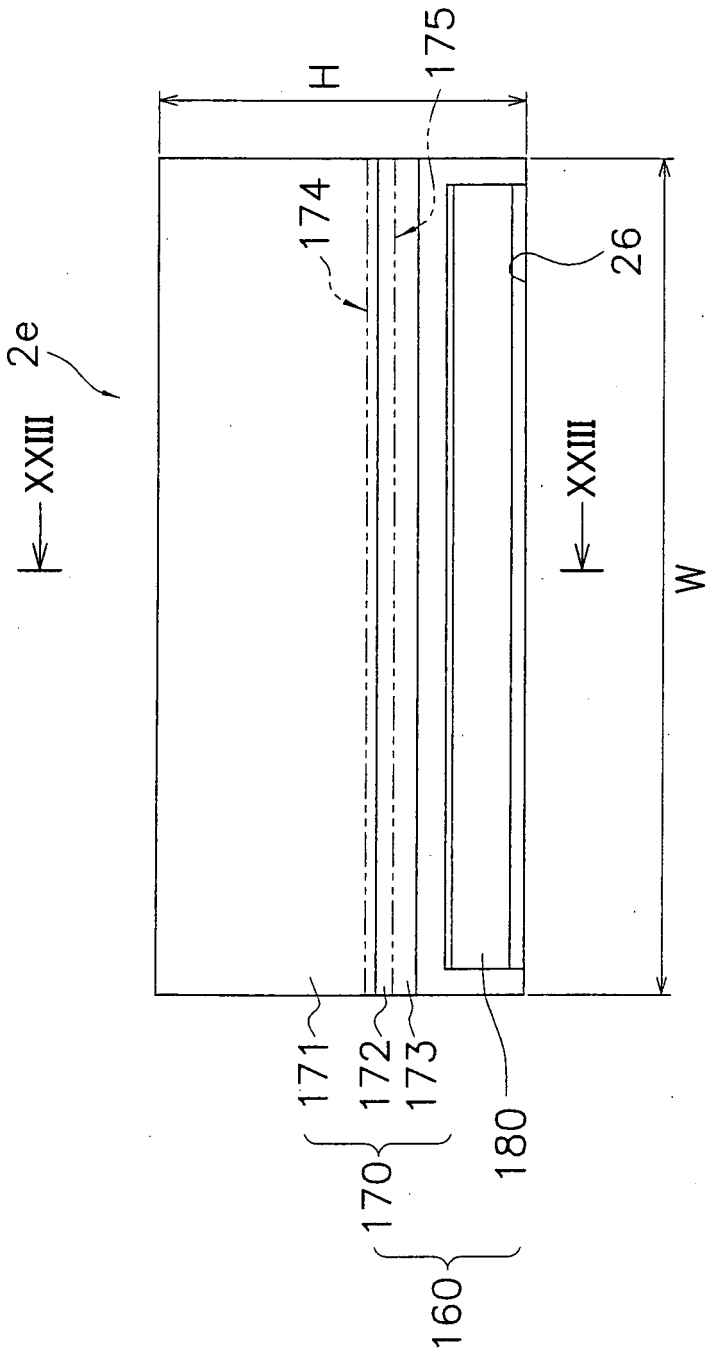

Fig. 22

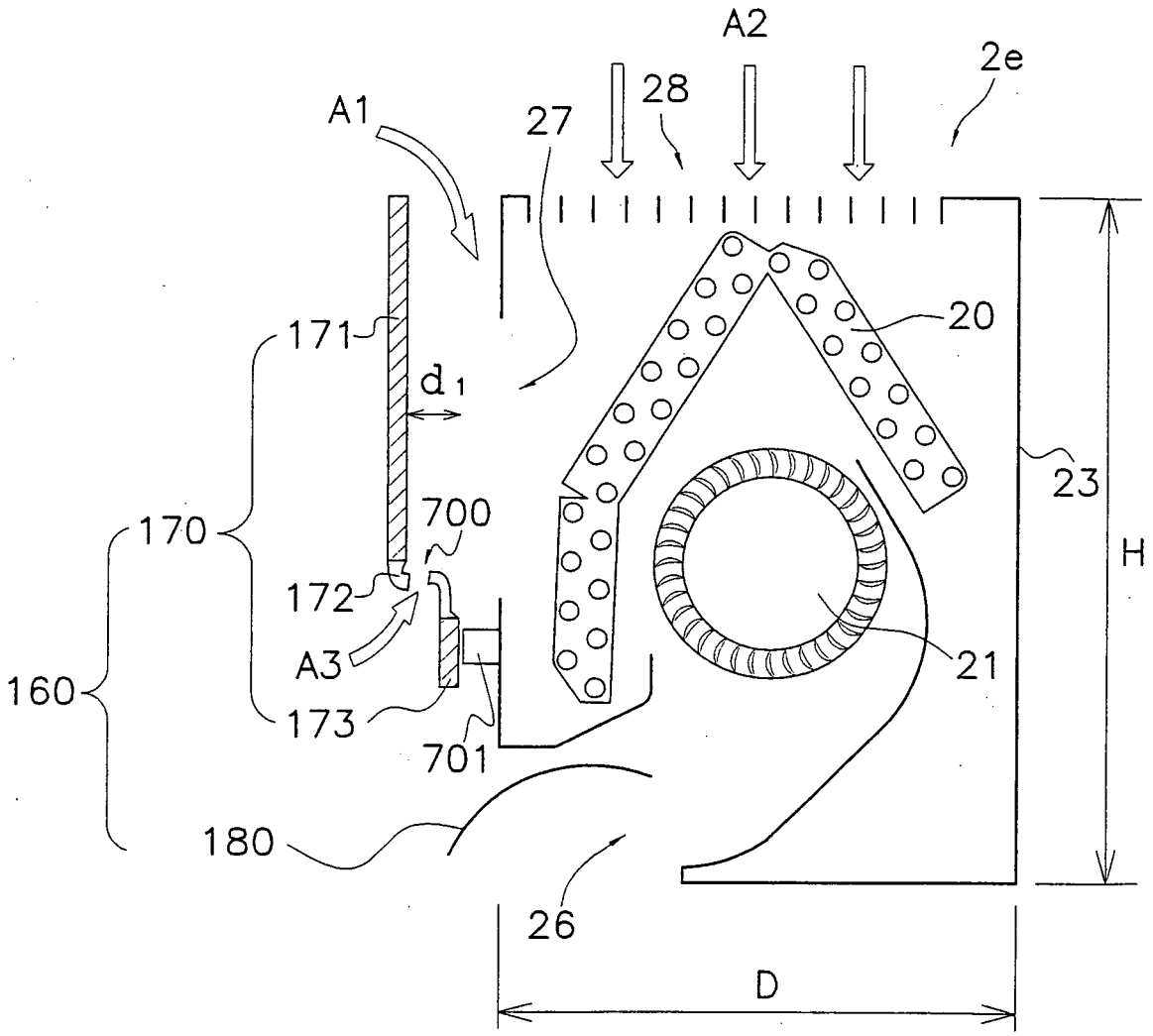

Fig. 23

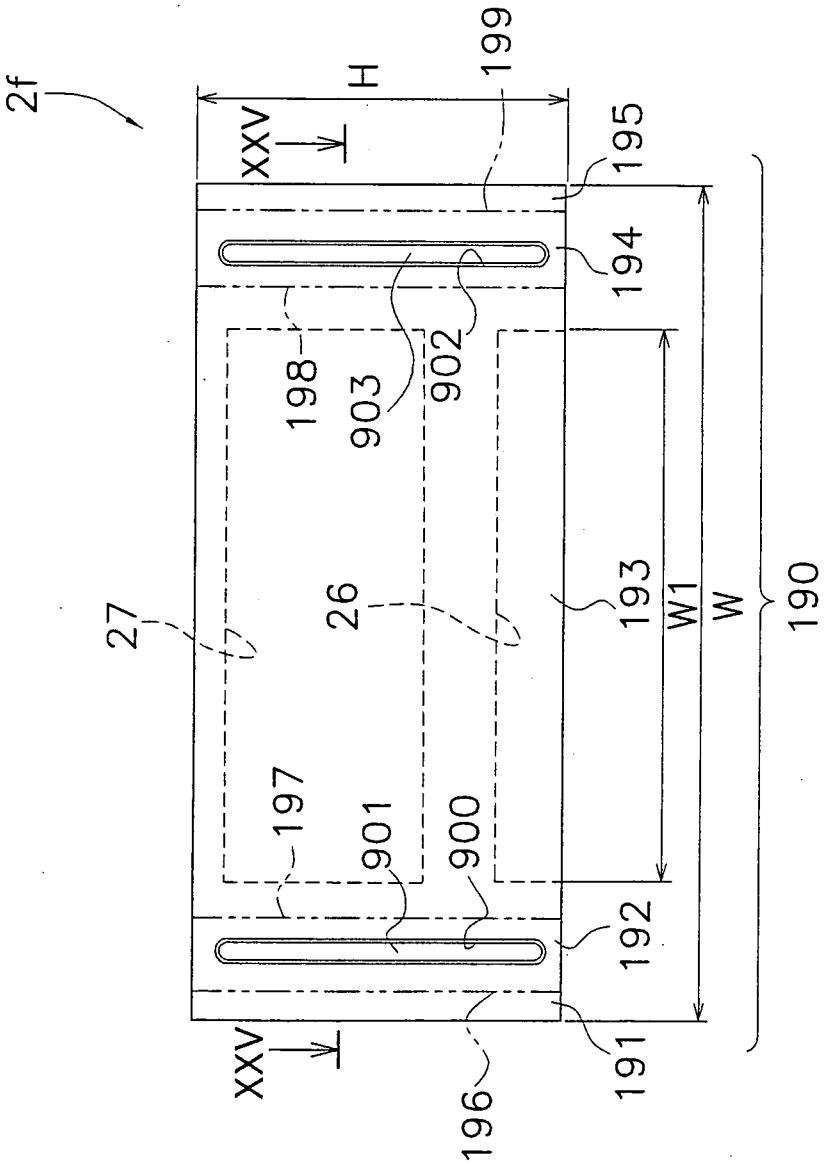
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Fig. 24

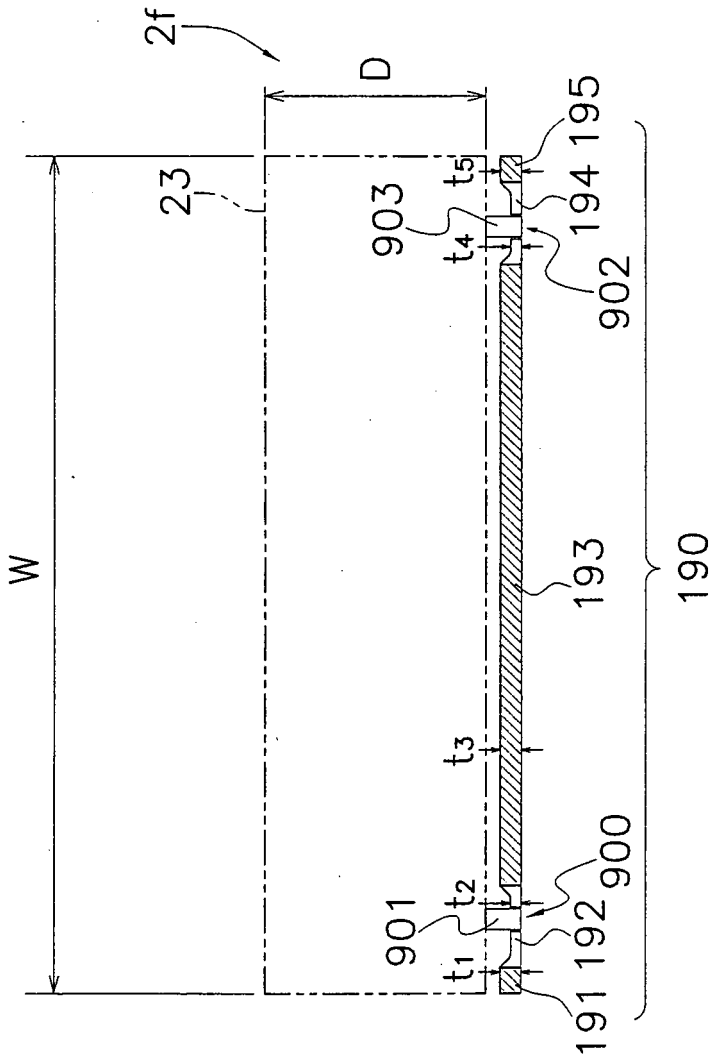

Fig. 25

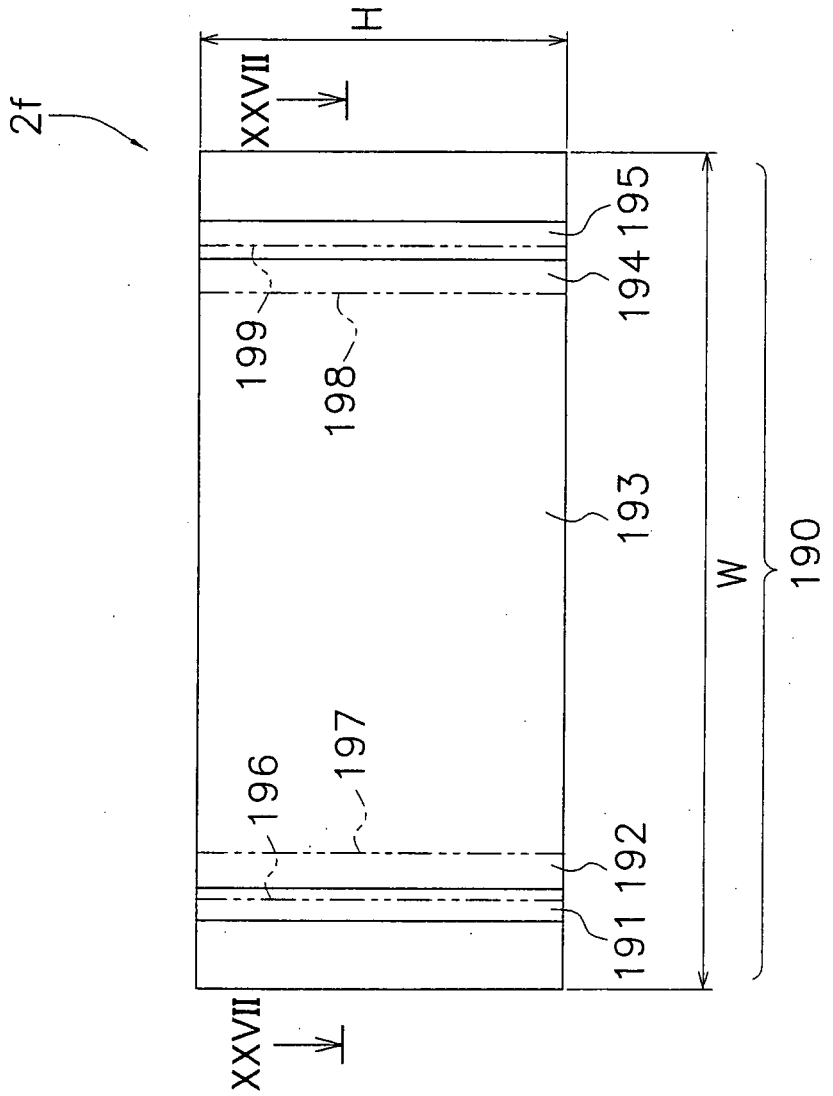

Fig. 26

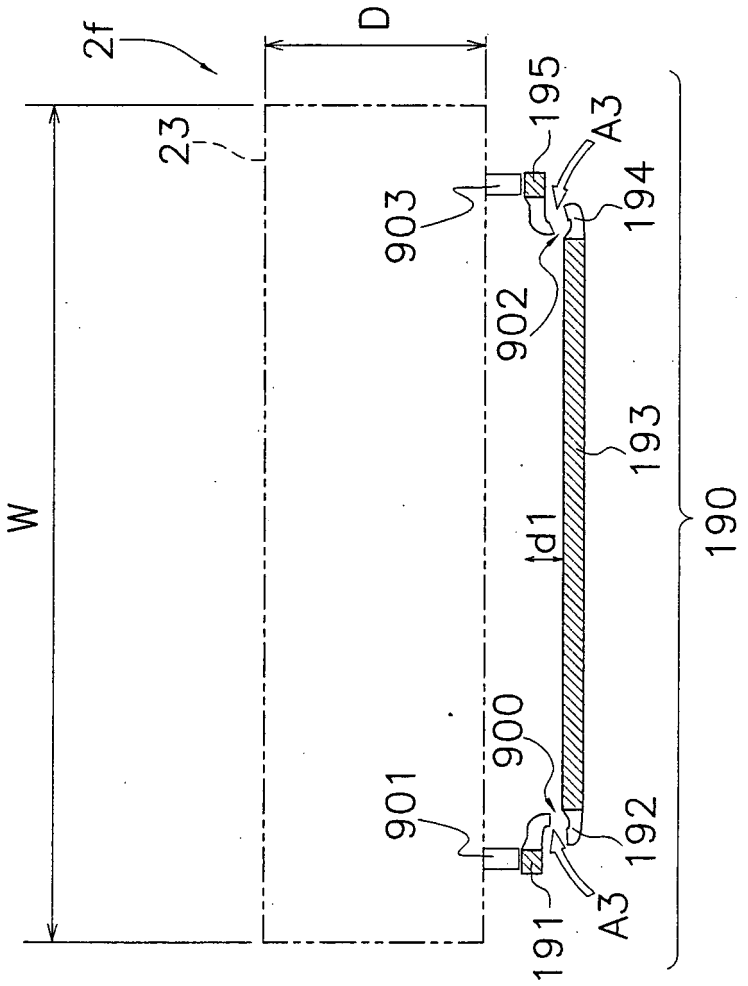

Fig. 27

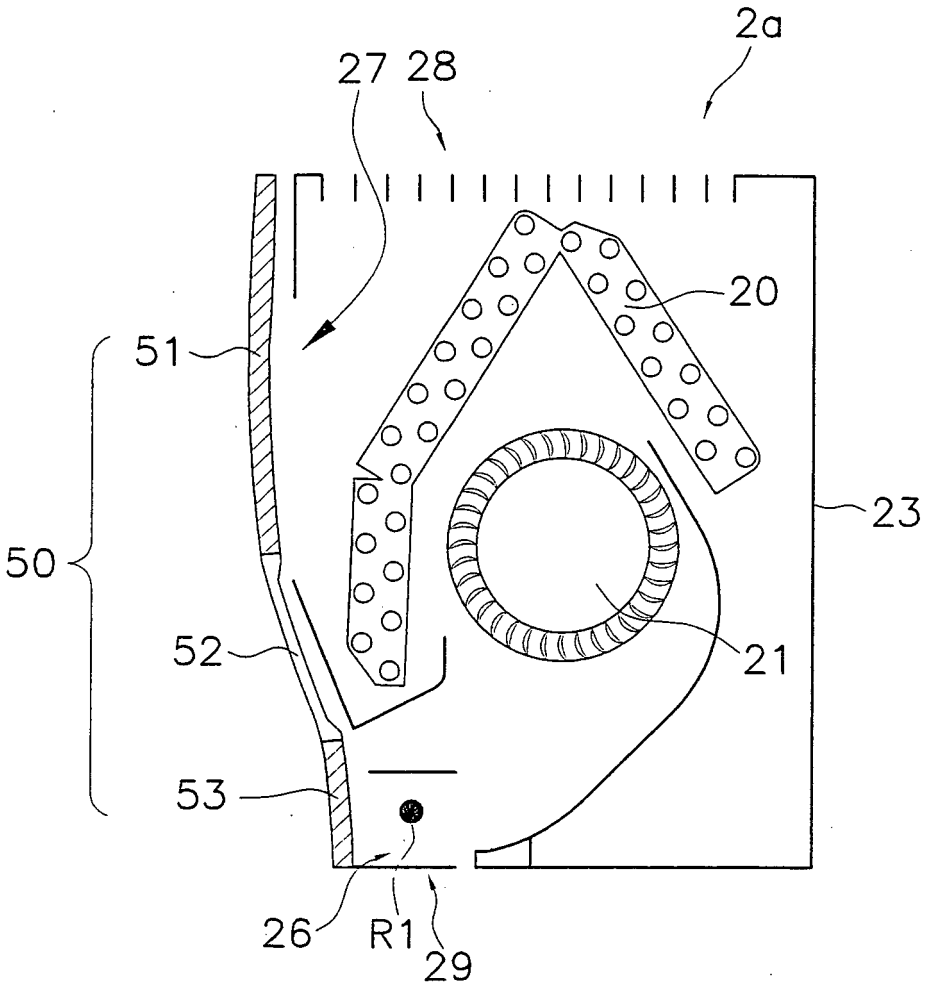

Fig. 28

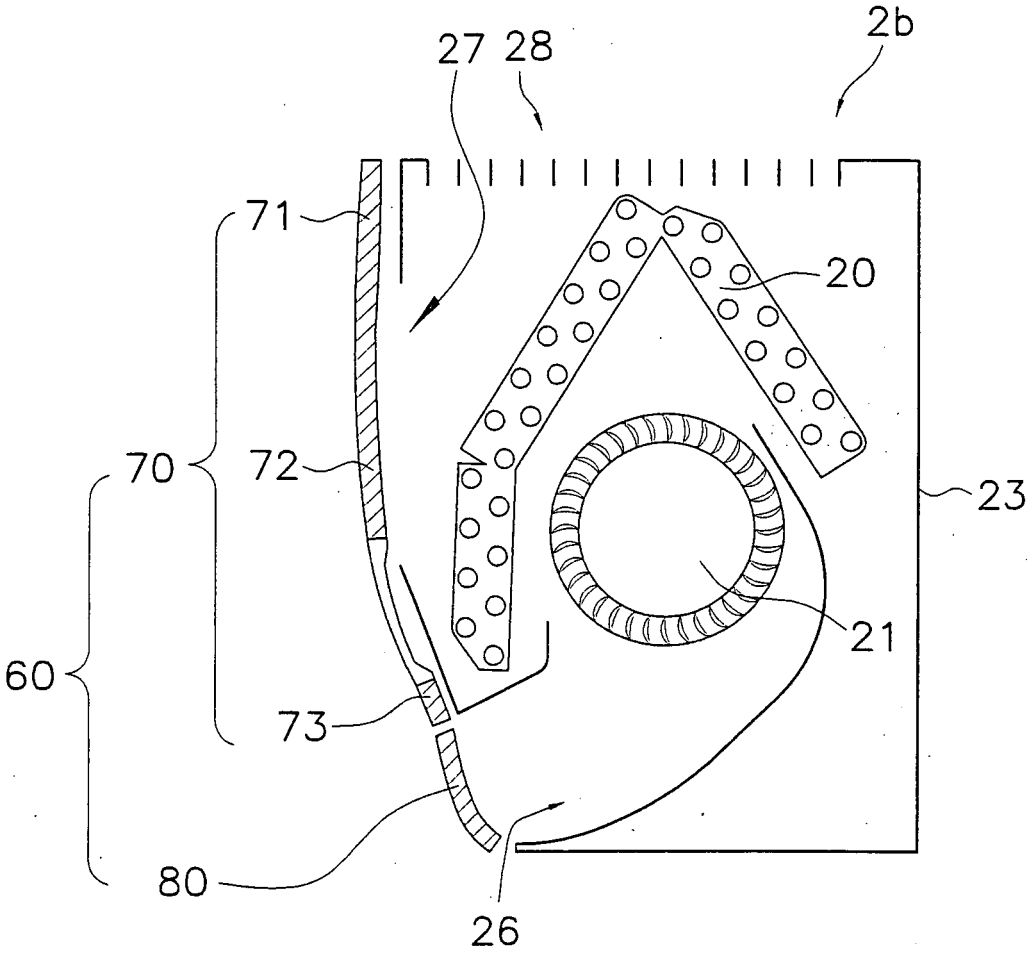

Fig.29

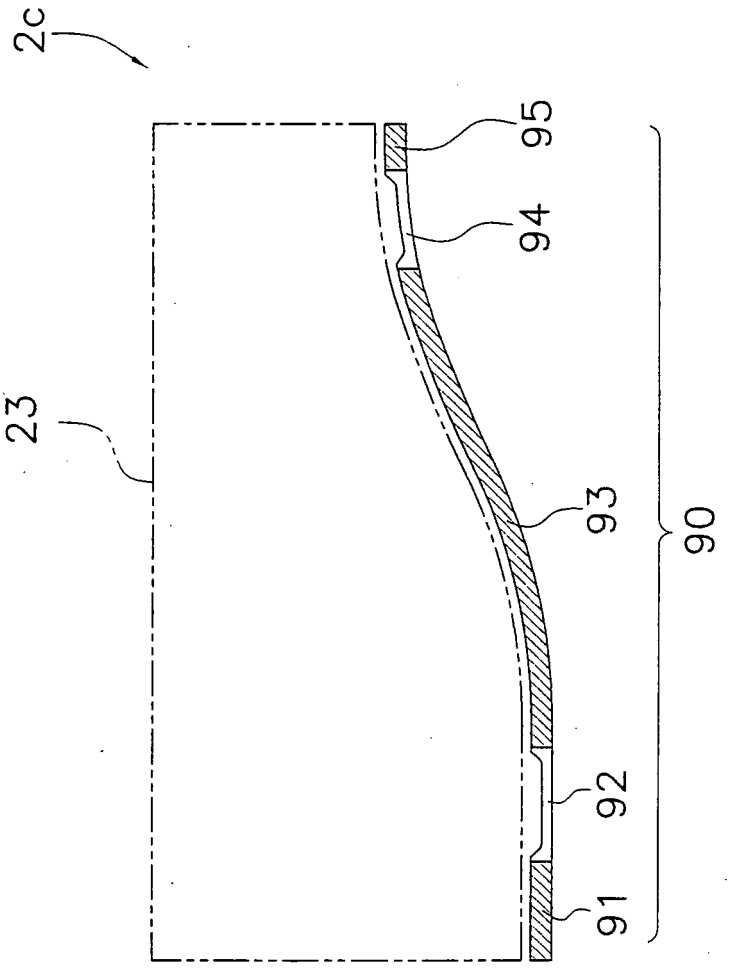

Fig. 30

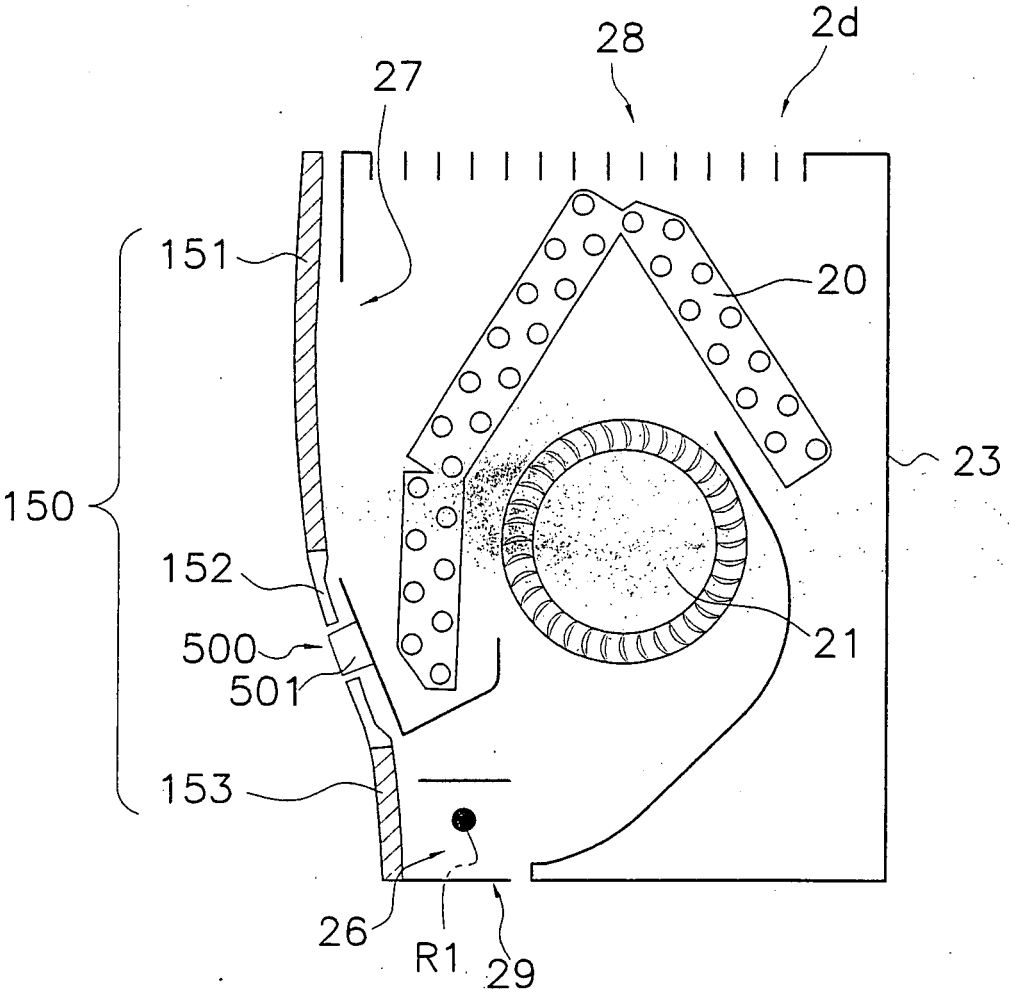

Fig. 31

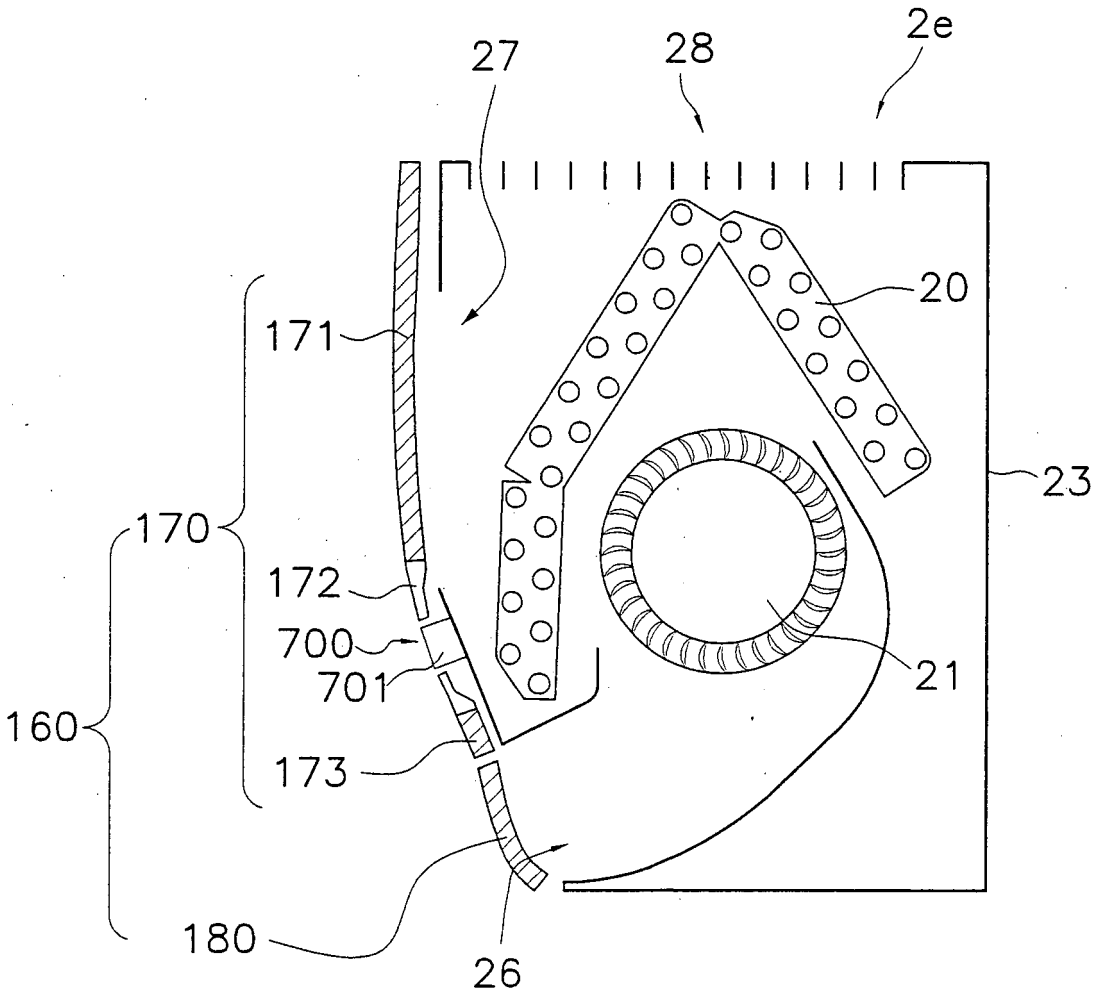

Fig. 32

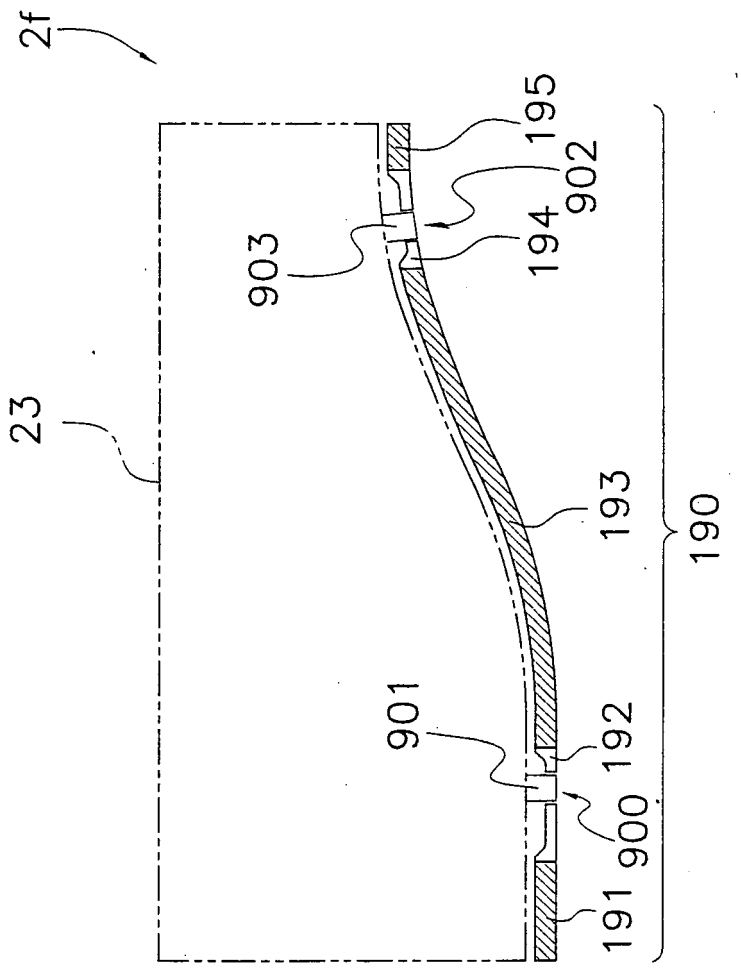

Fig. 33

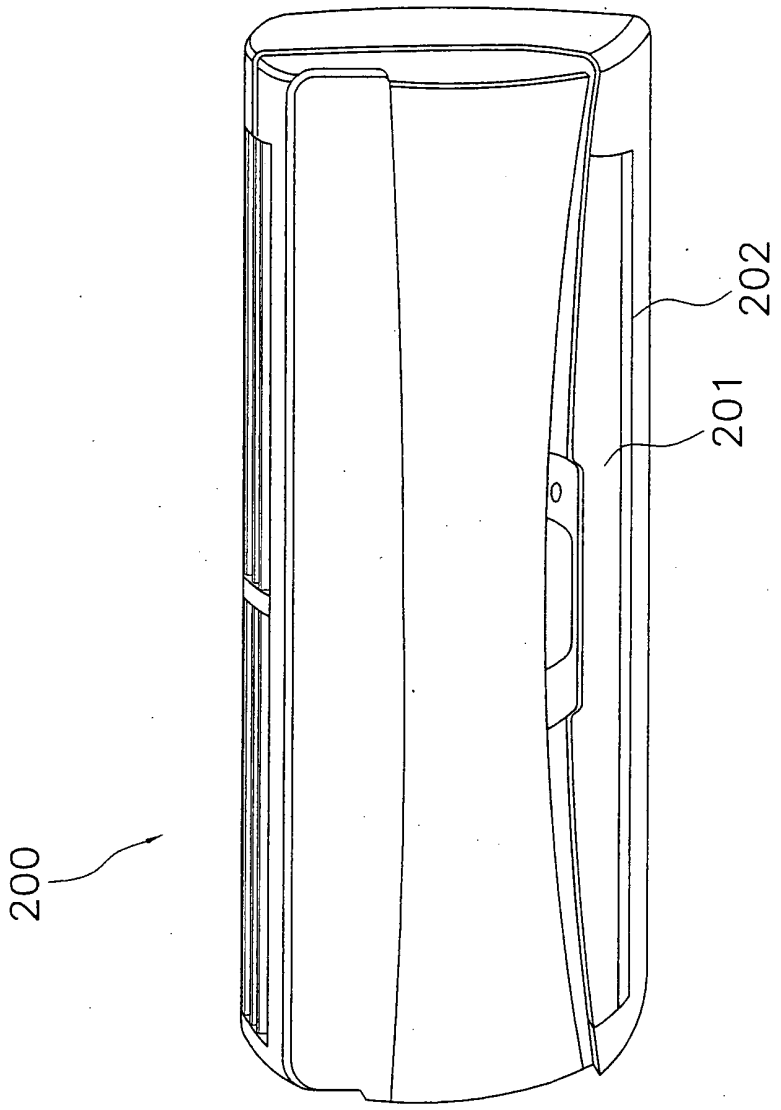

Fig. 34

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2005/019558

A. CLASSIFICATION OF SUBJECT MATTER
F24F13/10(2006.01), ***F24F1/00***(2006.01)

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)
F24F13/10(2006.01), ***F24F1/00***(2006.01)

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 1996-2006
Kokai Jitsuyo Shinan Koho 1971-2006 Toroku Jitsuyo Shinan Koho 1994-2006

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 10-227475 A (Mitsubishi Heavy Industries, Ltd.), 25 August, 1998 (25.08.98), Fig. 4 (Family: none)	1-12
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 174006/1985(Laid-open No. 83136/1987) (Wako Kasei Kogyo Kabushiki Kaisha), 27 May, 1987 (27.05.87), Fig. 6 (Family: none)	1-12

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

* Special categories of cited documents:
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 January, 2006 (18.01.06)	31 January, 2006 (31.01.06)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2005)

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Patent documents cited in the description

- JP 3334688 B **[0004]**