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(54) OUTDOOR UNIT OF AIR-CONDITIONER

AUSSENEINHEIT EINER KLIMAANLAGE

UNITÉ EXTÉRIEURE DE CLIMATISEUR

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(73) Proprietor: **LG Electronics Inc.**
Seoul 150-721 (KR)

(72) Inventors:
- **KEUM, Kyo-Ha**
  Gyoungsangnam-do, 641-711 (KR)
- **YOON, Yong-Sang**
  Gyoungsangnam-do, 641-711 (KR)
- **CHOI, Seok-Ho**
  Gyoungsangnam-do, 641-711 (KR)

(74) Representative: **Vossius & Partner**
Patentanwälte Rechtsanwälte mbB
Siebertstrasse 3
81675 München (DE)

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- **None**

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EP 2 483 604 B1

Description

Technical Field

[0001] The embodiment relates to an outdoor unit of an air-conditioner.

Background Art

[0002] Generally, an air-conditioner is an apparatus for cooling and heating the room by performing a refrigerant cycle that includes compression-con-densation-expansion-evaporation.

[0003] The air-conditioner includes an indoor unit that performs the heat exchange of a refrigerant and an indoor air and an outdoor unit that performs the heat exchange of the refrigerant and an outdoor air. The indoor unit includes an indoor heat exchanger that performs the heat exchange of the refrigerant and the indoor air, a fan that blows the indoor air, and a motor that rotates the fan. The outdoor unit includes an outdoor heat exchanger that performs the heat exchange of the refrigerant and the outdoor air, a fan that blows the outdoor air, a motor that rotates the fan, a compressor that compresses the refrigerant, an expander that expands the refrigerant, and a 4-way valve that changes a gas direction of the refrigerant.

[0004] When the indoor cooling is performed, the indoor heat exchanger becomes an evaporating unit and the outdoor heat exchanger becomes a condensing unit. When the indoor heating is performed, the indoor heat exchanger becomes a condensing unit and the outdoor heat exchanger becomes an evaporating unit. The switching of the cooling and heating operation is performed by changing the flow direction of the refrigerant by the 4-way valve.

[0005] EP 1 120 571 A1 relates to a frame being provided around the perimeter of the air outlet of a fan. The frame includes a plurality of board-shaped ribs extending radially outward from the vicinity of the center of the frame in the direction of the radius of the fan. The frame also includes a plurality of cylindrical ribs integrated with the plurality of board-shaped ribs, and arranged concentrically around the rotation axis of the fan at predetermined intervals in the direction of the radius of the fan. The board-shaped ribs are curved outward in the direction of rotation of the fan and inclined in the direction of air flowing from the fan.

[0006] DE 197 53 373 A1 relates to a housing for an axial fan, especially for cooling of EMC-screened apparatus, consisting of a mounting part having an air opening and a metallic screen-grating covering the air-opening.

Disclosure of Invention

Technical Problem

[0007] The present invention is to provide an outdoor unit of an air-conditioner that can minimize flow resistance of air.

[0008] The present invention is to provide an outdoor unit of an air-conditioner that can improve heat exchange performance.

Solution to Problem

[0009] An outdoor unit of an air-conditioner according to the present invention proposed as described in independent claim 1 includes: a main body in which an outlet for discharging an outdoor air sucked into the inside thereof; an outdoor heat exchanger that is provided inside the main body and performs heat exchange between the outdoor air and a refrigerant; a fan that is rotated for forcibly flowing the outdoor air; and a discharge grill that is provided in the outlet in a circular for and includes a central part positioned at the center of a circle and a plurality of grill parts that that are each extended from the central part to an edge, wherein the grill part is connected to the central part in a tilted state based on the rotating orbit of the fan.

Advantageous Effects of Invention

[0010] As described above, with the outdoor unit of the air-conditioner according to the present invention, since the discharge grill is formed to be tilted based on the rotating orbit of the fan, it may be positioned in a parallel direction with the flow direction of air passing through the discharge grill. In addition, the grill part of the discharge grill is extended in the same shape as a trailing edge of the fan. Therefore, the flow resistance of air passing through the discharge grill can be minimized.

[0011] Moreover, since the flow resistance of air passing through the discharge grill is small, the flow of air passing through the outdoor heat exchanger can be more smoothed. Therefore, the heat exchange performance of the outdoor heat exchanger can be more improved.

Brief Description of Drawings

[0012]

FIG. 1 is a front view showing an outdoor unit of an air-conditioner according to an embodiment of the present invention;

FIG. 2 is a perspective view showing an inside of the outdoor unit of the air-conditioner according to the embodiment of the present invention;

FIG. 3 is a front view showing a discharge grill of the outdoor unit of the air-conditioner according to the present invention;

FIG. 4 is a cross-sectional view taken along line A-A in the discharge grill of the outdoor unit of the air-conditioner according to the present invention;

FIG. 5 is a cross-sectional view taken along line B-B in the discharge grill of the outdoor unit of the air-

conditioner according to the present invention; and FIG. 6 is a cross-sectional view taken along line C-C in the discharge grill of the outdoor unit of the air-conditioner according to the present invention.

Best Mode for Carrying out the Invention

[0013] Hereinafter, an outdoor unit of an air-conditioner according to the present invention will be described in more detail with reference to the accompanying drawings.

[0014] FIG. 1 is a front view showing an outdoor unit of an air-conditioner according to an embodiment of the present invention and FIG. 2 is a perspective view showing an inside of the outdoor unit of the air-conditioner according to the embodiment of the present invention.

[0015] Referring to FIGS. 1 and 2, an outdoor unit 1 of an air-conditioner according to the embodiment of the present invention includes various devices that flows a refrigerant, a fan motor assembly for blowing, a partitioning part 104 that partitions an inner space of the outdoor unit 1, a control box 12 that controls the various devices and the fan motor assembly, and an outcase 10 that forms an external appearance.

[0016] In detail, various devices that flows the refrigerant includes a compressor 103 that compresses the refrigerant, a 4-way valve that changes the flow direction of the refrigerant, an expander that expands the refrigerant, an outdoor heat exchanger 101 that performs the heat exchange of a refrigerant and an outdoor air, an accumulator that separates a gas refrigerant and a liquid refrigerant, a refrigerant pipe that connects each device to flow the refrigerant, and a connecting pipe that connects an indoor unit performing the heat exchange of the refrigerant to the refrigerant pipe.

[0017] The fan motor assembly includes a fan that forms a pressure difference in air by rotation and a motor that provides a driving force for rotating the fan 102.

[0018] The partitioning part 104 is provided between various devices for flowing the refrigerant except for the outdoor heat exchanger 101 and the fan motor assembly. In other words, the inside of the outdoor unit 1 is partitioned into a blowing area 107 in which the fan motor assembly is installed and a device area 106 in which various devices for flowing the refrigerant except for the outdoor heat exchanger 101 are installed, by the partitioning unit 104.

[0019] The control box 12 is seated at an upper end of the partitioning unit 104. In other words, the control box 12 is simultaneously exposed to the blowing area 107 and the device area 106.

[0020] The outcase 10 includes a front case that forms a front external appearance, a pipe side case that shields the refrigerant pipe, a heat exchange side case that shields the side surface of the outdoor heat exchanger 101, a top case that shields the top surface thereof, various devices for flowing the refrigerant, and a base fan 100 that supports the fan motor assembly. At least two of the front case, the pipe side case, the heat exchanger side case, the top case, and the base fan 100 can be integrally formed.

[0021] In more detail, the front case is provided with a discharge grill 11 that discharges the heat exchanged air through the outdoor heat exchanger 101. The discharge grill 11 is formed in a circular form that is equal to or larger than the fan 102, when being viewed from the front. In addition, the discharge grill 11 is formed with a plurality of outlets in the same shape as a net.

[0022] The heat exchanger side case is provided with a plurality of inlets that sucks the outdoor air into the outdoor heat exchanger 101. The rear surface of the outdoor heat exchanger 101, that is, the rear surface of the outcase 10 is provided with a rear suction grill for sucking an outdoor air.

[0023] Hereinafter, the discharge grill in the outdoor unit of the air-conditioner according to the present invention will be described with reference to the accompanying drawings.

[0024] FIG. 3 is a front view showing a discharge grill of the outdoor unit of the air-conditioner according to the present invention and FIG. 4 is a cross-sectional view taken along line A-A in the discharge grill of the outdoor unit of the air-conditioner according to the present invention. FIG. 5 is a cross-sectional view taken along line B-B in the discharge grill of the outdoor unit of the air-conditioner according to the present invention and FIG. 6 is a cross-sectional view taken along line C-C in the discharge grill of the outdoor unit of the air-conditioner according to the present invention.

[0025] Referring to FIG. 3, the discharge grill 11 is provided at the front surface of the outdoor unit 1 in a circular form. The discharge grill 11 includes a central part 111 that is positioned at the center of a circle, a plurality of grill parts 113 and 114 that are each extended from the central part 111 to an edge, and an edge part 112 to which the plurality of grill parts 113 and 114 are connected.

[0026] In more detail, the discharge grill 11 includes the central part 111, the plurality of first grill parts 114 that are positioned along the rotating orbit of the fan 102, the plurality of second grill parts 113 that connect the plurality of first grill parts 114, and the edge part 112 that forms the edge of the discharge grill 11 and is connected to the second grill part 113.

[0027] The central part 111 is positioned, in a circular form, at the center of the fan 102, that is, the front of a portion to which a driving shaft of the motor is fixed. At this time, the size of the central part 111 may be formed at the center of the fan 102 to be the same as the size of the portion to which the driving shaft of the motor is fixed.

[0028] The discharge grill 11 may be formed at a size overlapped with the fan 102 in the discharge direction of the outdoor air. In other words, when being viewed from the front of the outdoor unit 1, the edge of the fan 102 is shown through the discharge grill 11. On the other hand,

when being viewed from the front of the outdoor unit 1, the edge of the fan 102 is shown through the discharge grill 11.

[0029] Meanwhile, the second grill part 113 is extended in the same shape as a trailing edge 109 (see FIG. 1) of the fan 102. In other words, the trailing edge 109 of the fan 102 is extended from the center of the fan 102 to the outside thereof and then is bent and extended in the rotating direction of the fan 102, likewise the second grill part 113 is extended from the central part 111 of the discharge grill 11 to the outside thereof and is bent and extended in the rotating direction of the fan 102.

[0030] On the other hand, the second grill part 113 is formed to be tilted based on the rotating orbit of the fan 102. In detail, the second grill part 113 is connected to the central part 111 in a tilted state based on the rotating orbit of the fan 102. In other words, the end of second grill part 113, which is connected to the central part 111, is formed to be tilted based on the rotating orbit of the fan 102.

[0031] The tilted angle of the second grill part 113 with respect to the rotating orbit of the fan 102 has been gradually changed according to the distance from the central part 111. In more detail, a cross section of three portions of the grill part 113 is the same as one shown in FIGS. 4 to 6 At this time, a cross section of the first portion nearest to the central part 111 among three portions is the same as one shown in FIG. 4, a cross section of the second portion secondly nearest thereto is the same as one shown in FIG. 5, and a cross section of the third portion farthest therefrom is the same as one shown in FIG. 6.

[0032] When being viewed from the cross section of the second grill part, if the rotating orbit of the fan 102 is H, a tilted angle of the first portion with respect to the rotating orbit of the fan 102 may be defined as a, a tilted angle of the second portion, a tilted angle with respect to the rotating orbit of the fan 102 may be defined as b, and in the third portion, and a tilted angle of the third portion with respect to the rotating orbit of the fan 102 may be defined as c.

[0033] At this time, the tilted angle of the first portion is smaller than the tilted angle of the second portion ($a < b$) and the titled angle of the second portion is smaller than the tilted angle of the third portion ($b < c$). To the contrary, the tilted angle of the third portion is relatively largest than the tilted angle, the tilted angle of the first portion is relatively smallest, the tilted angel of the second portion is smaller than the tilted angle of the third portion and is larger than the first tilted angle ($a < b < c$).

[0034] Therefore, the tilted angle of the second grill part 113 has been gradually increased based on the rotating orbit of the fan 102 as a distance is increased from the central part 111 based on the rotating orbit of the fan 102. When viewing the discharge grill from the front, the portion nearer to the central part 111 on the second grill part 113 is positioned in a vertical direction with respect to an eye line and is positioned nearer to a horizontal direction with respect to an eye line as going to the outside. Therefore, when viewing the discharge grill 11 from the front, the portion near to the central part 111 on the second grill part 113 is relatively widely shown and the portion nearer to the edge of the discharge grill 111 is relatively narrowly shown.

[0035] One portion of the second grill part 113 adjacent to the edge of the discharge grill 11 is vertically formed to the rotating orbit of the fan 102. In other words, the end of second grill part 113, which is connected to the edge part 112, is positioned in a vertical state to the rotating orbit of the fan 102.

[0036] With the outer unit 1, the flow resistance of air discharged through the discharge grill 11 can be minimized. In detail, since the second grill part 113 of the discharge grill 11 is formed to be the same as the shape of the trailing edge 109 of the fan 102, the flow resistance occurring while the air, which forcibly flows by the fan 102, passes through the discharge grill 11 can be minimized.

[0037] Since the second grill part 113 is positioned to be tilted based on the rotating orbit of the fan 102, the air, which forcibly flows by the fan 102, can minimize the flow resistance occurring while passing through the discharge grill 11. The reason is that the second grill part 113 of the discharge grill 11 is positioned in a parallel direction with the flow direction of the air passing through the discharge grill 11.

[0038] In more detail, the air passing through the discharge grill flows in a direction that forms a relatively small angle based on the rotating orbit of the fan 102 at a point approaching the central part 111 and flows in a direction that forms a relatively large angle based on the rotating orbit of the fan 102 at a point approaching the edge part 112. The discharge grill 11 of the outdoor unit 1 according to the present invention forms a relatively small tilted angle based on the rotating orbit of the fan 102 at a point approaching the central part 111 and forms a relatively large tilted angle based on the rotating orbit of the fan 102 at a point approaching the edge part 112. Therefore, the discharge grill 11 may be positioned in a parallel direction with the flow direction of air passing through the discharge grill 11. Therefore, the air, which forcibly flows by the fan 102, can minimize the flow resistance occurring while passing through the discharge grill 11.

[0039] In particular, the air, which passes through a point adjacent to the central part 111, flows in a direction that forms a relatively smallest angle to the rotating orbit of the fan 102. In the discharge grill 11 of the outdoor unit 1 according to the present invention, since the ends of the second grill part 113 adjacent to the central part 111 are connected in a state that forms a relatively smallest angle based on the rotating orbit of the fan 102, the flow resistance of air passing through the discharge grill 11 can be more minimized.

[0040] When the flow resistance of air discharged through the discharge grill 11 is minimized, the flow of air passing through the outdoor heat exchanger 101 can

be more smoothed. In other words, since the air volume passing through the outdoor heat exchanger 101 can be increased, the heat exchange performance of the outdoor heat exchanger 101 can be more improved.

[0041] The invention is defined in the appended claims.

Claims

1. An outdoor unit of an air-conditioner, comprising:

   a main body in which is an outlet for discharging an outdoor air sucked into the inside thereof;
   an outdoor heat exchanger (101) that is provided inside the main body and performs heat exchange between the outdoor air and a refrigerant;
   a fan (102) that is rotated for forcibly flowing the outdoor air and, has a trailing edge (109) extending from a center of the fan(102) to an outside thereof and then bent and extending in the rotating direction of the fan (102); and
   a discharge grill (11) that is provided in the outlet in a circular form,
   wherein the discharge grill (11) includes:

      a central part (111) positioned at the center of a circle; a plurality of grill parts (113, 114) that are each extended from the central part (111) to an edge, wherein the plurality of grill parts (113,114) include a plurality of first grill parts (114) positioned along a rotating orbit (H) of the fan (102) and a plurality of second grill parts (113) connected to the plurality of first grill parts (114); and
      an edge part (112) that forms the edge and is connected to the plurality of second grill parts (113),
      wherein the plurality of second grill parts (113) are extended in the same shape as a trailing edge (109) extending from a center of the fan(102) to an outside thereof and then bent and extending in the rotating direction of the fan (102), **characterized in that** the second grill parts (113) are connected to the central part (111) in a tilted state based on the rotating orbit (H) of the fan (102),
      wherein a tilted angle (a) with respect to the rotating orbit of the fan (102) of a first portion of the second grill parts (113) is smaller than a tilted angle (b) with respect to the rotating orbit of the fan (102) of a second portion of the second grill parts (113), and
      wherein the tilted angle (b) of the second portion is smaller than a tilted angle (c) with respect to the rotating orbit of the fan (102) of a third portion of the second grill parts (113),
      wherein the first portion is the nearest to the central part (111) among the three portions, the second portion is secondly nearest thereto, and the third portion farthest therefrom.

2. The outdoor unit of the air-conditioner according to claim 1, wherein one portion of the plurality of second grill parts (113) adjacent to the edge part (112) being formed to be vertical to the rotating orbit (H) of the fan (102).

3. The outdoor unit of the air-conditioner according to claim 1, wherein the discharge grill (11) is overlapped with the fan (102) in the discharge direction of the outdoor air.

Patentansprüche

1. Außeneinheit einer Klimaanlage, die aufweist:

   einen Hauptkörper, in dem sich ein Auslass zum Ausstoßen von Außenluft befindet, die in dessen Inneres gesaugt wird;
   einen Außenwärmetauscher (101), der im Inneren des Hauptkörpers vorgesehen ist und einen Wärmetausch zwischen der Außenluft und einem Kältemittel durchführt;
   einen Ventilator (102), der gedreht wird, um die Außenluft zwangsweise strömen zu lassen, und der eine Hinterkante (109) aufweist, die sich von einer Mitte des Ventilators (102) zu einer Außenseite desselben erstreckt und dann gebogen ist und sich in der Drehrichtung des Ventilators (102) erstreckt; und
   ein Ausstoßgitter (11), das in dem Auslass in einer kreisförmigen Form vorgesehen ist, wobei das Ausstoßgitter (11) aufweist:

      einen Mittelteil (111), der in der Mitte eines Kreises angeordnet ist;
      mehrere Gitterteile (113, 114), die sich jeweils vom Mittelteil (111) zu einer Kante erstrecken, wobei die mehreren Gitterteile (113, 114) mehrere erste Gitterteile (114), die entlang einer Drehumlaufbahn (H) des Ventilators (102) positioniert sind, und mehrere zweite Gitterteile (113) aufweisen, die mit den mehreren ersten Gitterteilen (114) verbunden sind, und
      einen Kantenteil (112), der die Kante bildet und mit den mehreren zweiten Gitterteilen (113) verbunden ist, wobei sich die mehreren zweiten Gitterteile (113) in derselben Form wie eine hintere Kante (109) erstrecken, die sich von einer Mitte des Ventila-

tors (102) zu einer Außenseite davon erstreckt und dann gebogen ist und sich in der Drehrichtung des Ventilators (102) erstreckt,
dadurch gekennzeichnet, dass
die zweiten Gitterteile (113) mit dem Mittelteil (111) bezogen auf die Drehumlaufbahn (H) des Ventilators (102) in einem geneigten Zustand verbunden sind,
wobei ein Neigungswinkel (a) in Bezug auf die Drehumlaufbahn des Ventilators (102) eines ersten Abschnitts der zweiten Grillteile (113) kleiner ist als ein Neigungswinkel (b) in Bezug auf die Drehumlaufbahn des Ventilators (102) eines zweiten Abschnitts der zweiten Grillteile (113), und
wobei der Neigungswinkel (b) des zweiten Abschnitts kleiner ist als ein Neigungswinkel (c) in Bezug auf die Drehumlaufbahn des Ventilators (102) eines dritten Abschnitts der zweiten Grillteile (113),
wobei der erste Abschnitt unter den drei Abschnitten dem Mittelteil (111) am nächsten ist, der zweite Abschnitt diesem am zweitnächsten ist und der dritte Abschnitt am weitesten davon entfernt ist.

2. Außeneinheit der Klimaanlage nach Anspruch 1, wobei ein Abschnitt der mehreren zweiten Gitterteile (113) neben dem Kantenteil (112) senkrecht zur Drehumlaufbahn (H) des Ventilators (102) ausgebildet ist.

3. Außeneinheit der Klimaanlage nach Anspruch 1, wobei das Ausstoßgitter (11) mit dem Ventilator (102) in der Ausstoßrichtung der Außenluft überlappt.

Revendications

1. Unité extérieure d'un climatiseur, comprenant :

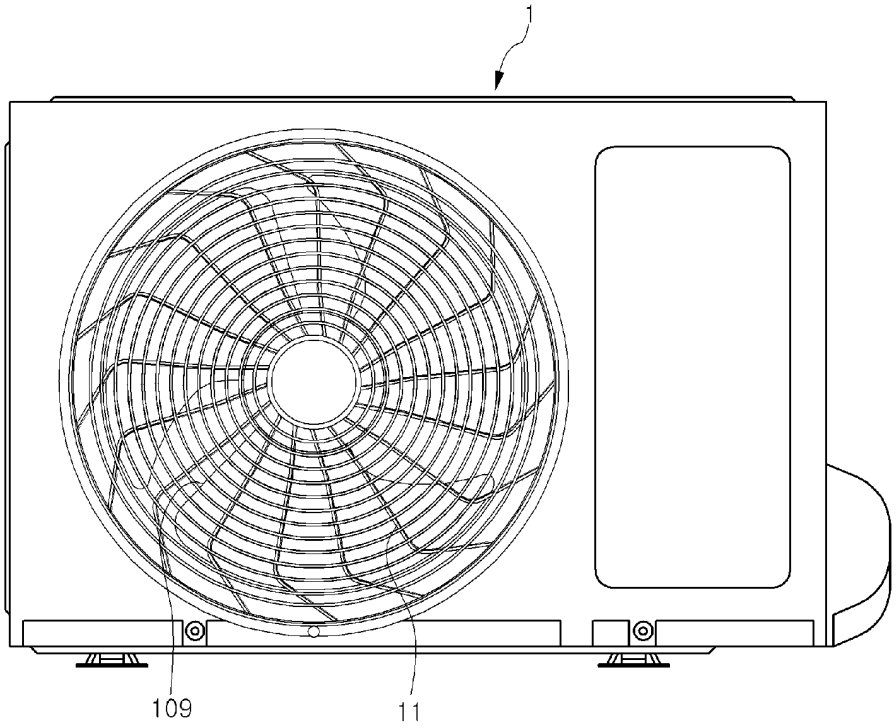
un corps principal où est présentée une sortie pour le refoulement de l'air extérieur aspiré à l'intérieur de celui-ci ;
un échangeur de chaleur extérieur (101) prévu à l'intérieur du corps principal et réalisant un échange thermique entre l'air extérieur et un réfrigérant ;
un ventilateur (102) entraîné en rotation pour forcer l'écoulement de l'air extérieur et présentant un bord d'attaque (109) s'étendant depuis le centre dudit ventilateur (102) vers l'extérieur de celui-ci, coudé et s'étendant dans le sens de rotation du ventilateur (102) ;
et
une grille de refoulement (11) prévue dans la sortie avec une forme circulaire, ladite grille de refoulement (11) comprenant :

une pièce centrale (111) placée au centre d'un cercle ;
une pluralité de pièces de grille (113, 114) s'étendant chacune de la pièce centrale (111) à un bord, ladite pluralité de pièces de grille (113,114) comprenant une pluralité de premières pièces de grille (114) disposées le long d'une orbite de rotation (H) du ventilateur (102) et une pluralité de deuxièmes pièces de grille (113) raccordées à la pluralité de premières pièces de grille (114) ; et une pièce de bord (112) formant le bord et raccordée à la pluralité de deuxièmes pièces de grille (113), ladite pluralité de deuxièmes pièces de grille (113) s'étendant avec la même forme comme bord d'attaque (109) s'étendant depuis le centre du ventilateur (102) vers l'extérieur de celui-ci, coudées et s'étendant dans le sens de rotation du ventilateur (102),
caractérisée en ce que
les deuxièmes pièces de grille (113) sont raccordées à la pièce centrale (111) en état d'inclinaison correspondant à l'orbite de rotation (H) du ventilateur (102),
où un angle d'inclinaison (a) par rapport à l'orbite de rotation du ventilateur (102) d'une première partie des deuxièmes pièces de grille (113) est inférieur à un angle d'inclinaison (b) par rapport à l'orbite de rotation du ventilateur (102) d'une deuxième partie des deuxièmes pièces de grille (113), et
où l'angle d'inclinaison (b) des deuxièmes parties est inférieur à un angle d'inclinaison (c) par rapport à l'orbite de rotation du ventilateur (102) d'une troisième partie des deuxièmes pièces de grille (113),
où la première partie est la plus proche de la pièce centrale (111) parmi les trois parties, la deuxième partie est la deuxième à en être proche, et la troisième partie en est la plus distante.

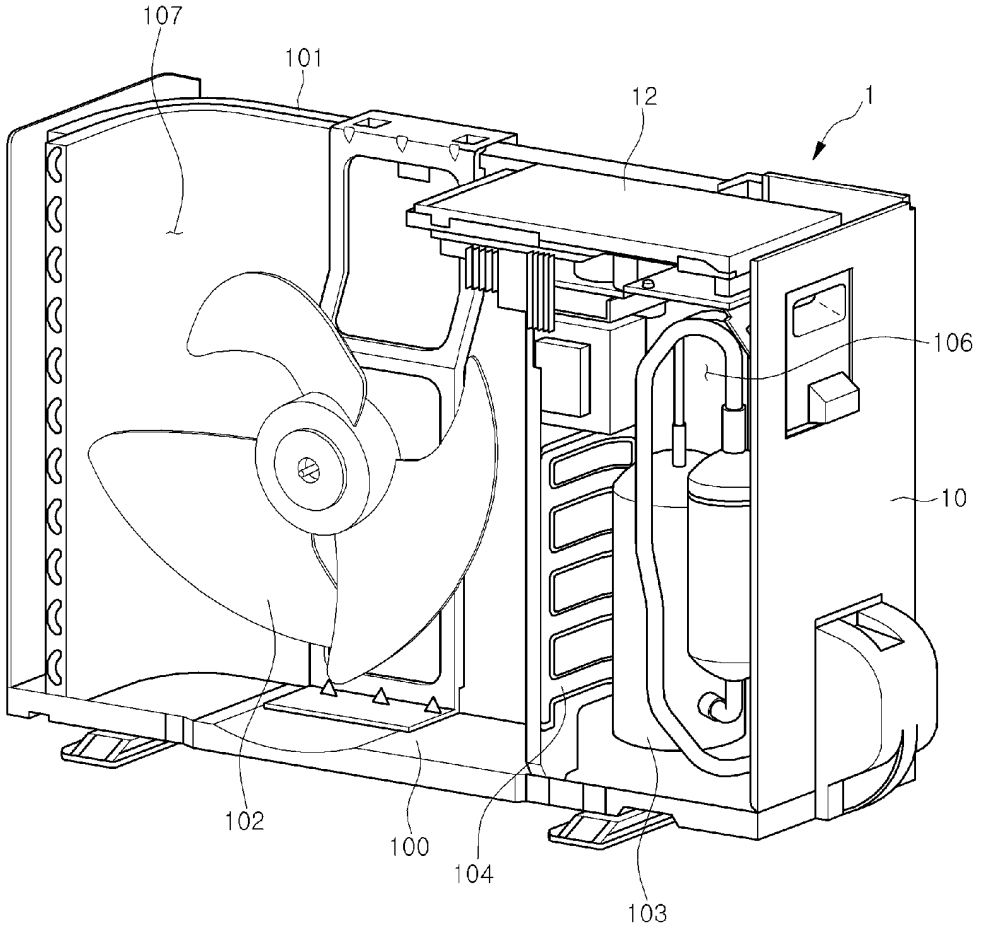
2. Unité extérieure d'un climatiseur selon la revendication 1, où une partie de la pluralité de deuxièmes pièces de grille (113) adjacentes à la pièce de bord (112) sont formées de manière à être verticales par rapport à l'orbite de rotation (H) du ventilateur (102).

3. Unité extérieure d'un climatiseur selon la revendication 1, où la grille de refoulement (11) chevauche le ventilateur (102) dans la direction de refoulement de l'air extérieur.

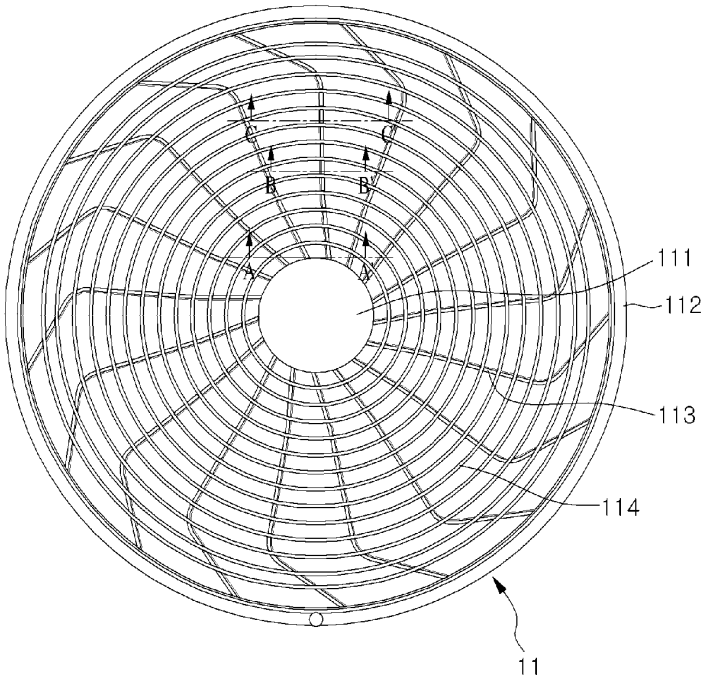
[Fig. 1]



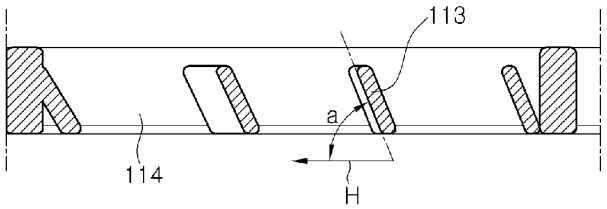
[Fig. 2]



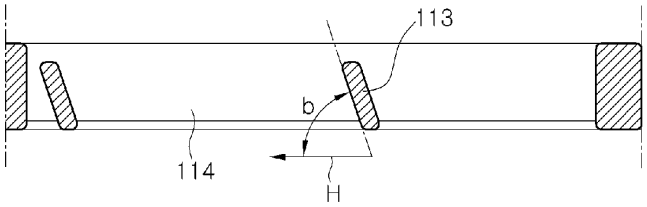
[Fig. 3]



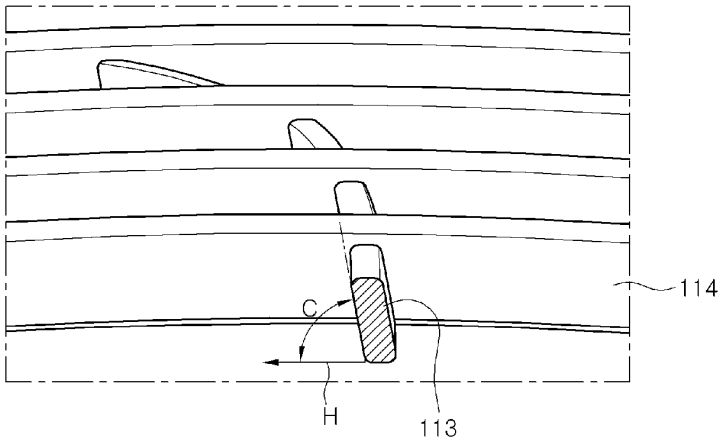
[Fig. 4]



[Fig. 5]



[Fig. 6]



REFERENCES CITED IN THE DESCRIPTION

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