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(54) OUTDOOR UNIT FOR SPLIT TYPE AIR-CONDITIONER

AUSSENEINHEIT FÜR KLIMAANLAGE DER GETEILTEN BAUART

UNITE EXTERNE DE CONDITIONNEUR D'AIR DE TYPE A DEUX BLOCS

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Description

[0001] The present invention relates to an outdoor unit for a split type air-conditioner which can maximize cooling capability by efficiently increasing a ventilation amount, even though the large-sized outdoor unit is installed inside an opening space of an outer wall of a building.

Background Art

[0002] In general, an air-conditioner is classified into a split type air-conditioner in which an indoor unit and an outdoor unit are split and individually installed in an inside space and an outside space, and a single type air-conditioner in which an indoor unit and an outdoor unit are combined into one device and installed through a window or wall. The indoor unit and the outdoor unit are increased in size die to high cooling or heating capacity, and serious vibrations are generated in the outdoor unit due to the operation of a compressor of the outdoor unit. Accordingly, the split type air-conditioner has been more popularly used than the single type air-conditioner.

[0003] The split type air-conditioner includes an indoor unit installed indoors, for exchanging heat between low temperature low pressure gas refrigerants and air, and supplying warm or cool air into the air-conditioned space, and an outdoor unit installed outdoors, for compressing, condensing and expanding the refrigerants to facilitate the heat exchange in the indoor unit. The indoor unit and the outdoor unit are coupled to each other through refrigerant tubes.

[0004] Here, the indoor unit includes an indoor casing on which a suction hole and a discharge hole for sucking or discharging indoor air are formed, an evaporator installed inside the indoor casing, for exchanging heat between low temperature low pressure gas refrigerants and air, and an indoor fan and a motor installed at one side of the evaporator, for supplying indoor air to the evaporator so that cool air can be discharged to the indoor space.

[0005] In addition, the outdoor unit includes an outdoor casing on which a suction hole and a discharge hole for sucking or discharging outdoor air are formed, a compressor installed inside the outdoor casing, for compressing the refrigerants from the evaporator into high temperature high pressure gas refrigerants, a condenser for condensing the refrigerants from the compressor into mesothermal high pressure liquid refrigerants by exchanging heat between the refrigerants and outdoor air, an expansion means such as a capillary tube or electronic expansion valve for decompressing the refrigerants from the condenser into low temperature low pressure gas refrigerants, and an outdoor fan, a kind of axial fan, and a motor that are installed at one side of the condenser, for supplying the outdoor air to the condenser. The motor is a general single phase or three phase induction motor. In the induction motor, when an alternating current is applied to a stator installed inside a housing to rotate a shaft and a rotor at the middle portion of the stator, a rotary magnetic field is generated to rotate the rotor.

[0006] Normally, the suction holes are formed on the three sides of the outdoor casing and the discharge hole is formed on the top surface thereof in order to improve ventilation efficiency. Therefore, when the outdoor fan is operated, air is sucked through the three sides of the outdoor casing, heat-exchanged, and discharged through the top surface thereof.

[0007] Here, the compressor, the condenser, the expansion means and the evaporator are coupled to each other through the refrigerant tubes, so that the refrigerants can be circulated to be sequentially compressed, condensed, expanded and evaporated.

[0008] However, the conventional outdoor unit for the air-conditioner is restricted in installation spaces due to high density and strict environment regulations of cities, and increases civil applications due to noise and heat. Especially, in a common residential area such as large-scaled apartment buildings, the outdoor units must be installed in indoor verandas to improve the appearance and reduce noises.

[0009] Recently, a front suction/discharge type outdoor unit for a split type air-conditioner which sucks air through the front surface, exchanges heat, and discharges the heat-exchanged air through the front surface has been applied to a common residential area such as large-scaled apartment buildings.

[0010] Such a front suction/discharge type outdoor unit has been disclosed in international patent application WO 2004/0769335. This outdoor unit for a split type air-conditioner comprises a casing installed outdoors, with a suction unit and a discharge unit individually formed on the opened front surface of the casing. It further comprises a compressor installed inside the suction unit for compressing refrigerants and a condenser installed inside the suction unit, for condensing the refrigerants compressed in the compressor by exchanging heat between the refrigerant and outdoor air. The unit according to WO 2004/076935 further comprises a single fan housing with a single cooling fan installed therein.

Disclosure of Invention

Technical Problem

[0011] Nevertheless, the front suction/discharge type outdoor unit for the split type air-conditioner has a smaller air suction area than the three-side suction/discharge type outdoor unit for the air-conditioner. As a result, a ventilation amount is reduced to deteriorate ventilation efficiency and cooling capability.

[0012] In addition, the front suction/discharge type outdoor unit for the split type air-conditioner uses the general single phase or three phase induction motor to drive the ventilation fan. The induction motor has low efficiency below 40 to 50%. Especially, since a stable torque area is narrow, a range of a RPM variable area is restricted.

In case the RPM exceeds the stable torque area, noises are generated and efficiency is reduced.

[0013] The present invention is achieved to solve the above problems. An object of the present invention is to provide an outdoor unit for a split type air-conditioner which can improve a ventilation amount and ventilation efficiency by using a fan having a relatively large ventilation amount, even though outdoor air is sucked or discharged to/from a restricted space.

[0014] Another object of the present invention is to provide an outdoor unit for a split type air-conditioner which can improve operational reliability and efficiency by using a stable high efficiency motor to drive a fan for sending outdoor air.

[0015] Yet another object of the present invention is to provide an outdoor unit for a split type air-conditioner which is reduced in size by decreasing an installation space by improving an installation structure of a fan for sending outdoor air and a motor for driving the fan.

[0016] Yet another object of the present invention is to provide an outdoor unit for a split type air-conditioner which has a realistic front suction/discharge type installation structure to be selectively built in an outer wall of a building.

Technical Solution

[0017] In order to achieve the above-described objects of the invention, there is provided an outdoor unit for a split type air-conditioner, including: a casing installed outdoors, a suction unit and a discharge unit being individually formed on the opened front surface of the casing; a compressor installed inside the suction unit of the casing, for compressing refrigerants; a condenser installed inside the suction unit of the casing, for condensing the refrigerants compressed in the compressor by exchanging heat between the refrigerants and outdoor air; a pair of fan housings having suction holes near the condenser and discharge holes near the discharge unit of the casing, being built in the casing so that the discharge holes can contact the discharge unit, and guiding the discharge direction of the air heat-exchanged in the condenser; a pair of sirocco fans installed inside the fan housings, respectively, for sucking the outdoor air through the suction unit of the casing, sending the outdoor air to the condenser, and discharging the outdoor air through the discharge unit of the casing; a pair of motors connected to the sirocco fans, for driving the sirocco fans, respectively; and a pair of motor support members for fixing the motors to the fan housings, respectively.

[0018] Preferably, the front surface of the casing is divided into upper and lower portions, the suction unit is formed at the lower portion of the casing, and the discharge unit is formed at the upper portion of the casing. The discharge unit of the casing is divided into both sides, first and second discharge units are formed at both sides, and the fan housings are installed to contact the first and second discharge units to be linked to the first and second discharge units, respectively.

[0019] More preferably, the outdoor unit further includes a suction grill and a discharge grill installed at the suction unit and the discharge unit of the casing, for preventing alien substances from coming into the casing.

[0020] Preferably, the suction holes are formed on the top and bottom surfaces of the pair of fan housings so that air can be sucked in the axial directions of each sirocco fan, and the discharge holes linked to the first and second discharge units are formed on the front surfaces of the pair of fan housings so that air can be discharged in the circumferential directions of each sirocco fan.

[0021] Preferably, the pair of sirocco fans are rotated in the opposite directions to prevent interferences of the air sent by each sirocco fan, and the pair of fan housings face each other to guide the discharged air in the opposite directions.

[0022] More preferably, the pair of sirocco fans are rotated in the same direction, and the pair of fan housings are installed in the same direction to guide the discharged air in the same direction.

[0023] Preferably, the pair of sirocco fans are rotated to send air in the opposite direction to air sent by a pair of sirocco fans of an adjacent outdoor unit, for preventing interferences with the air sent by the pair of sirocco fans of the adjacent outdoor unit.

[0024] Preferably, the pair of motors are fixedly installed on the upper suction holes of each fan housing having a relatively small suction flux, and more preferably, the pair of motors are BLDC motors.

[0025] More preferably, the BLDC motor includes: a motor rotation shaft connected to the sirocco fan for transmitting power; a stator having the motor rotation shaft rotatably installed at its center, and being fixedly installed on the motor support member, a coil being coiled around a core of the stator; a rotor installed at the outer circumference of the stator, connected to the motor rotation shaft, and rotated with the motor rotation shaft; a permanent magnet fixed to the rotor, for rotating the rotor and the motor rotation shaft by an electromagnetic force with the stator; and a sensor for sensing the position of the rotor, and sequentially sending a current to the coil of the stator.

[0026] Preferably, the motor support member includes: a cylindrical shaft support unit for supporting the motor rotation shaft to be rotated by a bearing; a stator support unit incorporated with the upper end of the shaft support unit, the stator being fixedly mounted thereon; and a plurality of fixed units protruded from the circumference of the stator support unit in the radial direction at predetermined intervals, and fixed to the top surface of the fan housing by screws.

[0027] More preferably, in the motor support member, the core of the stator is fixed to the upper portion of the stator support unit by screws.

[0028] More preferably, in the motor support member, intensity reinforcing ribs are formed among the shaft support unit, the stator support unit and the fixed units to

reinforce intensity of the fixed units.

[0029] More preferably, in the motor support member, the middle portions of the fixed units are upwardly inclined in the radial direction so that part of the BLDC motor can be installed inside the fan housing.

[0030] More preferably, in the motor support member, three fixed units are formed on the circumferences of the shaft support unit and the stator support unit at predetermined intervals.

[0031] Preferably, the condenser is formed in the 'U' shape to be protruded toward the suction unit of the casing, and more preferably, the pair of condensers are installed to be stacked at the upper and lower inside portions of the suction unit of the casing.

[0032] Preferably, the outdoor unit further includes a louver frame for dividing an opening space of an outer wall of a building into a suction area corresponding to the suction unit of the casing and a discharge area corresponding to the discharge unit of the casing, so that the outdoor unit can be installed at the opening space.

[0033] More preferably, a plurality of louver blades are stacked in the suction area and the discharge area of the louver frame at predetermined intervals, for controlling a suction air direction and a discharge air direction:

Brief Description of the Drawings

[0034] The present invention will become better understood with reference to the accompanying drawings which are given only by way of illustration and thus are not limitative of the present invention, wherein:

Fig. 1 is a perspective view illustrating an outdoor unit for a split type air-conditioner in accordance with the present invention;

Fig. 2 is a front view illustrating the outdoor unit for the split type air-conditioner in accordance with the present invention;

Fig. 3 is a partially-cut perspective view illustrating a mounting structure of the outdoor unit for the split type air-conditioner built in a wall in accordance with the present invention;

Fig. 4 is a perspective view illustrating disassembly of an installation coupling structure of Fig. 3;

Fig. 5 is a perspective view illustrating disassembly of a coupling state of a heat exchange unit and a ventilation unit of the outdoor unit for the split type air-conditioner in accordance with the present invention;

Fig. 6 is a perspective view illustrating disassembly of the heat exchange unit of the outdoor unit for the split type air-conditioner in accordance with the present invention;

Fig. 7 is a perspective view illustrating disassembly of the ventilation unit of the outdoor unit for the split type air-conditioner in accordance with the present invention;

Fig. 8 is a front-sectional view illustrating a ventilation device applied to the outdoor unit for the split type air-conditioner in accordance with the present invention; and

Fig. 9 is a detailed perspective view illustrating a motor support member of the ventilation device applied to the outdoor unit for the split type air-conditioner in accordance with the present invention.

Best Mode for Carrying Out the Invention

[0035] An outdoor unit for a split type air-conditioner in accordance with the preferred embodiment of the present invention will now be described in detail with reference to the accompanying drawings.

[0036] Figs. 1 and 2 are a perspective view and a front view illustrating the outdoor unit for the split type air-conditioner in accordance with the present invention.

[0037] Referring to Figs. 1 and 2, the outdoor unit for the split type air-conditioner includes a heat exchange unit 10 for sucking and heat-exchanging outdoor air, and a ventilation unit 20 for sending the outdoor air to be sucked or discharged for the heat exchange in the heat exchange unit 10.

[0038] In more detail, a suction unit and a discharge unit for sucking and discharging air are individually formed in the heat exchange unit 10 and the ventilation unit 20, by forming an outer appearance with upper and lower casings 12 and 22 having their front surfaces opened. A refrigeration cycle excluding an evaporator (not shown), namely, compressors (not shown), condensers 14 and an electronic expansion valve (not shown) are installed inside the lower casing 12. Sirocco fans 26 and motors 28 for driving the sirocco fans 26 are installed inside a pair of fan housings 24 in the upper casing 22 to send air. A control box (not shown) is installed at one side of the cond ensers 14 to control the above components.

[0039] The outdoor unit is connected to an indoor unit (not shown) installed indoors through refrigerant tubes. The indoor unit includes an evaporator and an indoor fan (not shown) for sending indoor air. The refrigerants are compressed, condensed, expanded and evaporated through the compressors, the condensers 14, the electronic expansion valve and the evaporator, and heat-exchanged with the indoor air sent to the evaporator, for cooling the indoor air.

[0040] The outdoor unit can be installed in a space having its four sides opened. In the front suction/discharge type, the outdoor unit can be installed to a partially opened outer wall of a residential and/or commercial building.

[0041] Fig. 3 is a partially-out perspective view illustrating a mounting structure of the outdoor unit for the split type air-conditioner built in a wall in accordance with the present invention, and Fig. 4 is a perspective view illustrating disassembly of an installation coupling structure of Fig. 3.

[0042] The structure for mounting the outdoor unit on

an outer wall W of a building will now be explained in more detail with reference to Figs. 3 and 4. An external frame 100 is fixedly installed on an inner wall of a rectangular space formed on the outer wall. An internal frame 110 is fixedly installed inside the external frame 100. If necessary, the internal and external frames 110 and 100 can be incorporated.

[0043] A middle isolator 130 is installed to cross the middle to divide the inside area of the internal frame 110 into a suction area IN and a discharge area OUT in the up/down direction. A plurality of louver blades 120 are installed in each area. Air is sucked or discharged through gaps between the louver blades 120.

[0044] The louver blades 120 are formed in the horizontal direction with their both ends rotatably installed on the inner surfaces of the internal frame 110. Here, the louver blades 120 are stacked in the vertical direction with a predetermined gap, for controlling the air direction in the up/down direction.

[0045] In addition, a sealing member S for preventing air leakage and buffering vibration is installed between the internal frame 110 and the outdoor unit. In a state where the heat exchange unit 10 is closely adhered to the suction area IN of the internal frame 110 and the ventilation unit 20 is closely adhered to the discharge area OUT of the internal frame 110, both sides of the lower casing 12 and the upper casing 22 are fixedly installed on the internal frame 110 by L-shaped brackets (not shown).

[0046] The external frame 100, the internal frame 110, the middle isolator 130 and the louver blades 120 are designated as a louver frame. The outdoor unit is closely adhered to the inner wall of the opened space of the outer wall W by the louver frame.

[0047] Fig. 5 is a perspective view illustrating disassembly of a coupling state of the heat exchange unit and the ventilation unit of the outdoor unit for the split type air-conditioner in accordance with the present invention.

[0048] The structure of the outdoor unit will now be explained in detail with reference to Fig. 5. The ventilation unit 20 is installed on the heat exchange unit 10. When the top surface of the heat exchange unit 10 is opened, the bottom surface of the ventilation unit 20 is opened, so that the heat exchange unit 10 and the ventilation unit 20 can be linked to each other. A lower connection frame C1 for isolating both sides is fixedly installed on the top surface of the heat exchange unit 10, so that the ventilation unit 20 can be mounted thereon. An upper connection frame C2 for supporting inside components such as the fan housings 24 and 24' is fixedly installed on the bottom surface of the ventilation unit 20.

[0049] Figs. 6 and 7 are perspective views illustrating disassembly of the heat exchange unit and the ventilation unit of the outdoor unit for the split type air-conditioner in accordance with the present invention, Fig. 8 is a front-sectional view illustrating a ventilation device applied to the outdoor unit for the split type air-conditioner in accordance with the present invention, and Fig. 9 is a detailed perspective view illustrating a motor support member of the ventilation device applied to the outdoor unit for the split type air-conditioner in accordance with the present invention.

[0050] The structure of the heat exchange unit 10 will now be described in more detail with reference to Fig. 6.

[0051] The front and upper surfaces of the lower casing 12 are omitted, and the condensers 14 and the compressors 16a, 16b and 16c are mounted on the bottom surface of the lower casing 12. A bar-shaped lower separating member A1 for separating the lower casing 12 from the upper casing 22 is installed at the upper portion of the front surface of the lower casing 12.

[0052] The lower connection member C1 is fixed on the top surface of the lower casing 12, for supporting the mounted ventilation unit 20. Connection protrusions 12a and 12b are upwardly protruded from both sides of the top surface of the lower casing 12, so that the ventilation unit 20 can be screw-coupled thereto.

[0053] A pair of support members B are installed on the bottom surface of the lower casing 12. Preferably, support holes h are formed at both sides of the support members B, so that the outdoor unit can be lifted by a fork-lift truck.

[0054] A mesh-shaped front grill (not shown) can be additionally installed on the front surface of the lower casing 12 to prevent incoming of alien substances or invasion of animals (for example, rats).

[0055] In order to improve cooling capability for a large capacity of air-conditioner, one condenser 14 can be formed in a large size. For easy production, two heat exchangers can be connected. In this case, a pair of condensers 14a and 14b are stacked in the up/down direction.

[0056] In the condensers 14a and 14b, a plurality of refrigerant tubes are arranged in a curved shape, and a plurality of cooling fins are installed in the vertical direction. The central straight line.parts of the U-shaped condensers 14a and 14b are positioned inside the front surface of the lower casing 12. The compressors 16a, 16b and 16c are positioned inside the straight line parts, and the control box is positioned near the bottom surfaces of the straight line parts.

[0057] Preferably, the plurality of compressors 16a, 16b and 16c are installed to improve cooling capability of the air-conditioner. More preferably, two constant speed compressors 16a and 16b and one inverter compressor 16c are used to maximize cooling capability. The operation of the compressors 16a, 16b and 16c is controlled by load.

[0058] Here, the constant speed compressors 16a and 16b are operated regardless of load, but the operational speed of the inverter compressor 16c is decided in proportion to load.

[0059] The structure of the ventilation unit 20 will now be described in more detail with reference to Figs. 7 and 8.

[0060] The front and bottom surfaces of the upper cas-

ing 22 are omitted, and the fan housings 24 and 24', the sirocco fans 26 and 26' and the motors 28 and 28' are installed inside the upper casing 22. A bar-shaped separating member A2 for separating the upper casing 22 from the lower casing 12 is installed at the lower portion of the front surface of the upper casing 22. A front separating member A3 for separating the pair of fan housings 24 and 24' at both sides is installed inside the front surface of the upper casing 22.

[0061] The lower connection member C2 is fixed to the bottom surface of the upper casing 22 so that the fan housings 24 and 24' can be mounted thereon. After the ventilation unit 20 is mounted on the heat exchange unit 10, the ventilation unit 20 is screw-connected to the connection protrusions 12a and 12b of the heat exchange unit 10.

[0062] Identically to the lower casing 12, a mesh-shaped front grill (not shown) can be additionally installed on the front surface of the upper casing 22 to prevent incoming of alien substances or invasion of animals (for example, rats).

[0063] The sirocco fans 26 and 26' can be built in the fan housings 24 and 24'. A pair of suction holes 24_{in} and $24'_{in}$ are formed to face each other in the up/down axial direction, and discharge holes 24_{out} and $24'_{out}$ are formed on the front surfaces of the fan housings 24 and 24', so that the sirocco fans 26 and 26' can suck air in the axial directions and discharge the air in the circumferential directions. Guides R are inwardly protruded from each suction hole 24_{in} and $24'_{in}$ to guide the sucked air.

[0064] The fan housings 24 and 24' are fixed in the upper casing 22 by brackets (not shown) to be positioned at both sides of the front separating member A3 in the upper casing 22. The lower suction hole 24_{in} is linked to the bottom surface of the upper casing 22 and the top surface of the lower casing 12, and the discharge holes 24_{out} and $24'_{out}$ are linked to the front surface of the upper casing 22.

[0065] Here, the fan housings 24 and 24' can be installed to guide the air sent by each sirocco fan 26 and 26' in the opposite directions or the same direction to prevent interferences. Although the fan housings 24 and 24' of one outdoor unit are installed to guide the air sent by each sirocco fan 26 and 26' in one direction, the fan housings 24 and 24' of the adjacent outdoor unit are installed to guide the air sent by each sirocco fan 26 and 26' in the opposite direction.

[0066] Preferably, the rotary direction and the operation of the sirocco fans 26 and 26' built in the fan housings 24 and 24' are determined by the shape of the fan housings 24 and 24'.

[0067] The sirocco fans 26 and 26' are axial fans for sucking the air in the axial directions and discharging the air in the circumferential directions. The sirocco fans 26 and 26' having a large air volume are suitable for the outdoor unit having high cooling capability.

[0068] The sirocco fans 26 and 26' are built in the fan housings 24 and 24' in the up/down axial direction to face the suction holes 24_{in} and $24'_{in}$ of each fan housing 24 and 24'. The sirocco fans 26 and 26' are rotated to send the air to the discharge holes 24_{out} and $24'_{out}$ of each fan housing 24 and 24' according to the shape and installation direction of each fan housing 24 and 24'.

[0069] As shown in Fig. 8, the motors 28 and 28' are preferably installed near the upper suction hole $24'_{in}$ having a relatively small suction flux among the suction holes 24_{in} and $24'_{in}$ of the fan housings 24 and 24'. To reduce the installation space, the motors 28 and 28' are partially positioned inside the suction holes 24_{in} and $24'_{in}$ of the fan housings 24 and 24'.

[0070] Especially, BLDC motors using not a brush but a manual circuit in converting an alternating current into a direct current are employed as the motors 28 and 28'. Since the BLDC motors do not have a carbon brush, the BLDC motors do not generate sparks in the operation, reduce possibility of gas explosion, are stably driven in most of revolution numbers, and maintain high efficiency of 70 to 80%.

[0071] In detail, the BLDC motor 28 includes a motor rotation shaft 282 for transmitting power to the sirocco fan 26, a stator 284, a rotor 286 and permanent magnets 288 for driving the motor rotation shaft 282 by generating a rotary force by a mutual electromagnetic force, and a sensor (not shown) for controlling a supplied current by sensing the position of the rotor 286.

[0072] In order to reduce a suction flowing resistance, the BLDC motor 28 is fixedly installed on the motor support member 30 near the upper suction hole 24_{in} of the fan housing 24 having a relatively small suction flux.

[0073] The motor rotation shaft 282 is supported on the motor support member 30 by a ball bearing 289 to rotatably pass through the motor support member 30. The end of the motor rotation shaft 282 is connected to the axial center of the sirocco fan 26 by corking. The stator 284 is fixedly installed on the motor support member 30 with a predetermined gap from the outer circumference of the motor rotation shaft 282.

[0074] The outer diameter part of the rotor 286 is positioned on the outer circumference of the stator 284, and the inner diameter part thereof is fixedly installed on the motor rotation shaft 282. A plurality of ribs are formed long on the top or bottom surface of the rotor 286 in the radial direction to reinforce intensity in generation of a centrifugal force. The plurality of permanent magnets 288 are fixedly installed in the outer diameter part of the rotor 286 in the circumferential direction at predetermined intervals to generate the mutual electromagnetic force with the stator 284. The sensor is fixedly installed near the core of the stator 284.

[0075] Accordingly, when the current is sequentially applied to the coil of the stator 284, the rotor 286 is rotated by the mutual electromagnetic force between the current of the coil and the permanent magnets 288. The rotary force of the rotor 286 rotatably drives the sirocco fan 26 by the motor rotation shaft 282.

[0076] The motor support members 30 and 30' install

the sirocco fans 26 and 26' and the BLDC motors 28 and 28' to hang in the fan housings 24 and 24', respectively. In detail, as illustrated in Fig. 9, the motor support member 30 includes a cylindrical shaft support unit 302 for rotatably supporting the motor rotation shaft 282 by the ball bearing 289, a stator support unit 304 incorporated with the upper end of the shaft support unit 302, the stator 284 being fixedly mounted thereon, and a plurality of fixed units 306 protruded from the circumference of the stator support unit 304 in the radial direction at predetermined intervals, and screw-fixed near the upper suction hole 24_{in} of the fan housing 24.

[0077] Here, the cylindrical shaft support unit 302 is shorter than the motor rotation shaft 282. The ball bearing 289 is installed in the upper and lower ends of the shaft support unit 302, for rotatably supporting the motor rotation shaft 282. A plurality of grooves or holes 304a and a plurality of screw holes 304h are formed on the stator support unit 304, so that the stator 284 can be inserted and fixed by screws.

[0078] Preferably, three fixed units 306 are formed on the circumferences of the shaft support unit 302 and the stator support unit 304 of the motor support member 30 at an interval of 120 (to distribute the supported load. More preferably, in order to reinforce intensity of the fixed units 306, a plurality of intensity reinforcing ribs 308 are formed among the shaft support unit 302, the stator support unit 304 and the fixed units 306 to support the lower portions of the stator support unit 304 and the fixed units 306, and a plurality of auxiliary intensity reinforcing ribs 309 are formed on the top surfaces of the fixed units 306.

[0079] Especially, the fixed units 306 are protruded from the stator support unit 304 in the radial direction. The middle portions 306a of the fixed units 306 are upwardly inclined in the radial direction. The screw holes 306h are formed in the horizontal parts of the ends 306b of the fixed units 306. In the motor support member 30, the ends 306b of the fixed units 306 are screw-coupled near the upper suction hole 24_{in} of the fan housing 24.

[0080] The assembly and installation process of the outdoor unit for the split type air-conditioner will now be described. The condensers 14, the compressors 16a, 16b and 16c and the expansion means are installed in the lower casing 12, and the control box for controlling the above components is installed at one side of the condensers 14, thereby forming the heat exchange unit 10.

[0081] The pair of sirocco fans 26 and 26' and the BLDC motors 28 and 28' are fixed to the fan housings 24 and 24' by the motor support members 30 and 30', respectively, for composing a pair of ventilation devices. The ventilation devices are fixed in the upper casing 22, thereby forming the ventilation unit 20.

[0082] The assembly process of the ventilation unit 20 will now be explained in more detail. The motor rotation shaft 282 of the BLDC motor 28 is rotatably installed in the shaft support unit 302 of the motor support member 30 by the ball bearing 289, and the stator 284 is screw-fixed to the top surface of the stator support unit 304 of the motor support member 30, thereby forming a motor assembly. In the motor assembly, when the sirocco fan 26 is positioned in the fan housing 24, the motor rotation shaft 282 is connected to the axial center of the sirocco fan 26 by corking, and when the fixed units 306 of the motor support member 30 are mounted near the upper suction hole 24_{in} of the fan housing 24, the fixed units 306 are fixedly connected thereto by screws.

[0083] Accordingly, the pair of ventilation devices including the BLDC motors 28 and 28' are positioned at both sides of the upper casing 22, and fixedly installed by brackets. The BLDC motors 28 and 28' are connected to the control box by wires and controlled by the control box.

[0084] The lower casing 12 and the upper casing 22 have their front surfaces opened. The lower separating member A1 and the upper separating member A2 are installed to separate the lower casing 12 and the upper casing 22. Especially, the front separating member A3 is installed on the front surface of the upper casing 22 to separate the fan housings 24 and 24'.

[0085] Here, the discharge holes 24_{out} and $24'_{out}$ formed on the front surfaces of the fan housings 24 and 24' are closely adhered to the front surface of the upper casing 22, for directly externally discharging the air from each fan housing 24 and 24'.

[0086] The lower connection member C1 is installed to cover the top surface of the lower casing 12, the upper connection member C2 is installed to be supported on the bottom surface of the upper casing 22, the upper casing 22 is mounted on the lower casing 12, and the assembly protrusions 12a and 12b of the lower casing 12 are screw-coupled to the upper casing 22. The top surface of the lower casing 12 and the bottom surface of the upper casing 22 are linked to each other.

[0087] Therefore, the compressors 16a, 16b and 16c, the condensers 14 and the expansion means of the outdoor unit are connected to the evaporator of the indoor unit by the refrigerant tubes. The operation of the compressors 16a, 16b and 16c is controlled by load.

[0088] The operation of the outdoor unit will now be explained in detail. The compressors 16a, 16b and 16c are operated according to the signal of the control box generated by the load. The refrigerants are sucked to the indoor unit through the compressors 16a, 16b and 16c, the condensers 14 and the expansion means, and circulated along the evaporator of the indoor unit. The refrigerants passing through the evaporator cool the air near the evaporator, thereby performing the cooling operation indoors.

[0089] When the refrigerants are circulated in the condensers 14, the sirocco fans 26 and 26' are driven by the BLDC motors 28 and 28', respectively. Therefore, the air sucked through the front surface of the lower casing 12 exchanges heat with the refrigerants through the condensers 14, and condenses the refrigerants. The heat-exchanged air is discharged from the front surface of the upper casing 22 through the sirocco fans 26 and 26'.

[0090] In the BLDC motor 28, when the current is applied to the coil of the stator 284, the mutual electromagnetic force is generated between the stator 284 and the permanent magnets 288. The sensor senses the position of the stator 284, and sequentially applies the current to the coil of the stator 284, thereby continuously generating the mutual electromagnetic force between the stator 284 and the permanent magnets 288. The rotor 286 to which the permanent magnets 288 are fixed and the motor rotation shaft 282 are rotated by the electromagnetic force at the same time, for transmitting the rotary force to the sirocco fan 26.

[0091] Since the stable torque area of the BLDC motor 28 is wide, the BLDC motor 28 can be stably operated in various RPM, thereby restricting noises and reducing power consumption.

[0092] The sirocco fans 26 and 26' rotated by the BLDC motors 28 and 28' suck air in the axial directions. The air passing through the condensers 14 is mostly sucked through the lower suction holes 24_{in} and $24'_{in}$ of the fan housings 24 and 24', partially sucked to the upper suction holes 24_{in} and $24'_{in}$ of the fan housings 24 and 24', guided by the guides R formed near the suction holes 24_{in} and $24'_{in}$, sucked in the axial directions of the sirocco fans 26 and 26', discharged in the circumferential directions, guided by the fan housings 24 and 24', and discharged through the discharge holes 24_{out} and $24'_{out}$ of the fan housings 24 and 24'.

[0093] Here, the BLDC motors 28 and 28' are installed near the upper suction holes 24_{in} and $24'_{in}$ having a relatively small suction flux among the suction holes 24_{in} and $24'_{in}$ of the fan housings 24 and 24', thereby minimizing the suction flowing resistance. Moreover, the BLDC motors 28 and 28' are stably efficiently driven to improve ventilation and heat exchange efficiency.

[0094] Because the two sirocco fans 26 and 26' having a relatively large ventilation amount are installed by the BLDC motors 28 and 28', the ventilation amount can be efficiently controlled by load, and the maximum air volume can be increased. In addition, because the two condensers 14 are stacked in the up/down direction and connected to each other, the condensation heat exchange can be facilitated to improve cooling capability of the whole refrigeration cycle.

[0095] Although the front suction/discharge type outdoor unit for the built-in type air-conditioner has been described on the basis of the preferred embodiment of the present invention and the accompanying drawings, it is understood that the present invention should not be limited to these preferred embodiments but various changes and modifications can be made by one skilled in the art within the scope of the present invention as hereinafter claimed.

Claims

1. An outdoor unit for a split type air-conditioner, comprising:

a casing with a suction unit (IN) and a discharge unit (OUT) being individually formed on the opened front surface of the casing;
a compressor (16a; 16b; 16c) installed inside the suction unit of the casing, for compressing refrigerants;
a condenser (14; 14a; 14b) installed inside the suction unit of the casing, for condensing the refrigerants compressed in the compressor by exchanging heat between the refrigerants and outdoor air;
characterized by
a pair of fan housings (24; 24') having suction holes (24_{in}; $24'_{in}$) facing toward and near to the condenser and discharge holes (24_{out}; $24'_{out}$) formed in the front surfaces of the fan housings (24; 24') directly adjacent to the front surface of the casing (22) to guide the discharge direction of the air heat-exchanged in the condenser;
a pair of sirocco fans (26; 26') installed inside the fan housings, respectively, for sucking the outdoor air through the suction unit of the casing, for passing the outdoor air to the condenser, and for discharging the heat-exchanged air through the discharge unit of the casing;
a pair of motors (28; 28') connected to the sirocco fans, for driving the sirocco fans, respectively; and
a pair of motor support members (30; 30') for fixing the motors to the fan housings, respectively.

2. The outdoor unit of claim 1, wherein the casing is divided into upper and lower portions, the suction unit is formed at the lower portion (12) of the casing, and the discharge unit is formed at the upper portion (22) of the casing.

3. The outdoor unit of claim 1 or 2, wherein the discharge unit (OUT) of the casing is divided into two sides, first and second discharge units are formed at both sides, and the fan housings are installed to be directly adjacent to the first and second discharge units to communicate with the first and second discharge units respectively.

4. The outdoor unit of any one of claims 1 to 3, further comprising a suction grill and a discharge grill installed at the suction unit (IN) and the discharge unit (OUT) of the casing, for preventing alien substances from coming into the casing.

5. The outdoor unit of claim 3, wherein the suction holes (24_{in}; $24'_{in}$) are formed on the top and bottom surfaces of the pair of fan housings (24; 24') so that air can be sucked in the axial directions of each sirocco

fan, and the discharge holes (24_{out}; $24'_{out}$) discharge air in the circumferential directions of each sirocco fan (26; 26').

6. The outdoor unit of claim 5, wherein the pair of sirocco fans (26; 26') are arranged to be rotated in the opposite directions to prevent interferences of the air discharged by each sirocco fan, and the pair of fan housings (24; 24') face each other to guide the discharged air in the opposite directions.

7. The outdoor unit of claim 5, wherein the pair of sirocco fans (26; 26') are arranged to be rotated in the same direction, and the pair of fan housings (24; 24') are installed in the same direction to guide the discharged air in the same direction.

8. The outdoor unit of any one of claims 5 to 7, wherein the pair of motors (28; 28') are fixedly installed on the upper suction holes (24_{in}; $24'_{in}$) of each fan housing having a relatively small suction flux.

9. The outdoor unit of any one of claims 1 to 8, wherein the pair of motors (28; 28') are BLDC motors.

10. The outdoor unit of claim 9, wherein the BLDC motor (28; 28') comprises:

a motor rotation shaft (282) connected to the sirocco fan (26; 26') for transmitting power;
a stator (284) having the motor rotation shaft rotatably installed at its center, and being fixedly installed on the motor support member (30; 30'), a coil being coiled around a core of the stator;
a rotor (286) installed at the outer circumference of the stator, connected to the motor rotation shaft, and arranged to be rotated with the motor rotation shaft;
a permanent magnet (288) fixed to the rotor, for rotating the rotor and the motor rotation shaft by an electromagnetic force with the stator; and
a sensor for sensing the position of the rotor, and sequentially sending a current to the coil of the stator.

11. The outdoor unit of claim 10, wherein the motor support member (30; 30') comprises:

a cylindrical shaft support unit (302) for rotatably supporting the motor rotation shaft by a bearing (289);
a stator support unit (304) incorporated with the upper end of the shaft support unit, the stator being fixedly mounted thereon; and
a plurality of fixed units (306) protruded from the circumference of the stator support unit in the radial direction at predetermined intervals, and fixed to the top surface of the fan housing (24; 24') by screws.

12. The outdoor unit of claim 11, wherein, in the motor support member (30; 30'), the core of the stator (284) is fixed to the upper portion of the stator support unit (304) by screws.

13. The outdoor unit of claim 11, wherein, in the motor support member (30; 30'), intensity reinforcing ribs (308; 309) are formed among the shaft support unit (302), the stator support unit (304) and the fixed units (306) to reinforce intensity of the fixed units.

14. The outdoor unit of claim 13, wherein, in the motor support member (30; 30'), the middle portions of the fixed units (306) are upwardly inclined in the radial direction so that part of the BLDC motor can be installed inside the fan housing.

15. The outdoor unit of claim 14, wherein, in the motor support member (30; 30'), three fixed units (306) are formed on the circumferences of the shaft support unit (302) and the stator support unit (304) at predetermined intervals.

16. The outdoor unit of any one of claims 1 to 15, wherein the condenser (14; 14a; 14b) is formed in the 'U' shape with the central straight part of the U-shaped condenser being positioned toward the suction unit of the casing.

17. The outdoor unit of claim 16, wherein a pair of condensers (14a, 14b) are installed to be stacked at the upper and lower inside portions of the suction unit of the casing.

18. The outdoor unit of any one of claims 1 to 17, further comprising a louver frame (100, 110, 120, 130) for dividing an opening space of an outer wall of a building into a suction area corresponding to the suction unit (IN) of the casing and a discharge area corresponding to the discharge unit (OUT) of the casing, so that the outdoor unit can be installed inside the opening space.

19. The outdoor unit of claim 18, wherein a plurality of louver blades (120) are installed in the suction area (IN) and the discharge area (OUT) of the louver frame at predetermined intervals, for controlling a suction air direction and a discharge air direction.

Patentansprüche

1. Außeneinheit für eine Split-Typ-Klimaanlage, umfassend:

ein Gehäuse mit einer Ansaugeinheit (IN) und

einer Auslasseinheit (OUT), die einzeln an der geöffneten Vorderfläche des Gehäuses ausgebildet sind; einen Kompressor (16a; 16b; 16c), der in der Ansaugeinheit des Gehäuses eingebaut ist, um Kältemittel zu verdichten;
einen Kondensator (14; 14a; 14b), der in der Ansaugeinheit des Gehäuses eingebaut ist, um die im Kompressor verdichteten Kältemittel durch Austauschen von Wärme zwischen den Kältemitteln und Außenluft zu kondensieren;
gekennzeichnet durch
ein Paar von Ventilatorgehäusen (24; 24'), die Ansauglöcher (24_{in}; $24'_{in}$), die dem Kondensator zugewandt und nahe sind, und Auslasslöcher (24_{out}; $24'_{out}$), die in den Vorderflächen der Ventilatorgehäuse (24; 24') direkt angrenzend an die Vorderfläche des Gehäuses (22) ausgebildet sind, aufweisen, um die Auslassrichtung der im Kondensator wärmegetauschten Luft zu leiten;
ein Paar von Sirocco-Ventilatoren (26; 26'), die jeweils in den Ventilatorgehäusen eingebaut sind, um die Außenluft **durch** die Ansaugeinheit des Gehäuses anzusaugen, um die Außenluft zum Kondensator zu leiten und um die wärmegetauschte Luft **durch** die Auslasseinheit des Gehäuses auszulassen;
ein Paar von Motoren (28; 28'), die mit den Sirocco-Ventilatoren verbunden sind, um die Sirocco-Ventilatoren jeweils anzutreiben; und
ein Paar von Motortragelementen (30; 30'), um die Motoren jeweils an den Ventilatorgehäusen zu befestigen.

2. Außeneinheit nach Anspruch 1, bei der das Gehäuse in einen oberen und unteren Abschnitt unterteilt ist, wobei die Ansaugeinheit am unteren Abschnitt (12) des Gehäuses ausgebildet ist und die Auslasseinheit am oberen Abschnitt (22) des Gehäuses ausgebildet ist

3. Außeneinheit nach Anspruch 1 oder 2, bei der die Auslasseinheit (OUT) des Gehäuses in zwei Seiten unterteilt ist, eine erste und eine zweite Auslasseinheit an beiden Seiten ausgebildet sind und die Ventilatorgehäuse so eingebaut sind, dass sie direkt an die erste und zweite Auslasseinheit angrenzen, um mit der ersten bzw zweiten Auslasseinheit in Verbindung zu stehen

4. Außeneinheit nach irgendeinem der Ansprüche 1 bis 3, ferner umfassend ein Ansauggitter und ein Auslassgitter, die an der Ansaugeinheit (IN) und der Auslasseinheit (OUT) des Gehäuses angebaut sind, um zu verhindern, dass Fremdsubstanzen in das Gehäuse gelangen

5. Außeneinheit nach Anspruch 3, bei der die Ansauglöcher (24_{in}; $24'_{in}$) an der oberen und unteren Oberfläche des Paars von Ventilatorgehäusen (24; 24') ausgebildet sind, so dass Luft in den Axialrichtungen jedes Sirocco-Ventilators angesaugt werden kann; und die Auslasslöcher (24_{out}; $24'_{out}$) Luft in den Umfangsrichtungen jedes Sirocco-Ventilators (26; 26') auslassen.

6. Außeneinheit nach Anspruch 5, bei der die zwei Sirocco-Ventilatoren (26; 26') so angeordnet sind, dass sie in den entgegengesetzten Richtungen zu drehen sind, um Störungen der von jedem Sirocco-Ventilator ausgelassennen Luft zu verhindern; und die zwei Ventilatorgehäuse (24; 24') einander gegenüberliegen, um die ausgelassene Luft in den entgegengesetzten Richtungen zu leiten

7. Außeneinheit nach Anspruch 5, bei der die zwei Sirocco-Ventilatoren (26; 26') so angeordnet sind, dass sie in der gleichen Richtung zu drehen sind; und die zwei Ventilatorgehäuse (24; 24') in der gleichen Richtung eingebaut sind, um die ausgelassene Luft in der gleichen Richtung zu leiten

8. Außeneinheit nach irgendeinem der Ansprüche 5 bis 7, bei der das Paar von Motoren (28; 28') fest an den oberen Ansauglöchern (24_{in}; $24'_{in}$) jedes Ventilatorgehäuses angebaut ist, die einen relativ geringen Ansaugfluss aufweisen.

9. Außeneinheit nach irgendeinem der Ansprüche 1 bis 8, bei der die zwei Motoren (28; 28') bürstenlose Gleichstrommotoren sind.

10. Außeneinheit nach Anspruch 9, bei der der bürstenlose Gleichstrommotor (28; 28') Folgendes umfasst:

eine Motordrehwelle (282), die mit dem Sirocco-Ventilator (26; 26') verbunden ist, um Leistung zu übertragen;
einen Ständer (284), der die Motordrehwelle drehbar an seiner Mitte eingebaut aufweist und fest am Motortragelement (30; 30') angebaut ist, wobei eine Spule rings um einen Kern des Ständers gewickelt ist;
einen Läufer (286), der am Außenumfang des Ständers angebaut ist, mit der Motordrehwelle verbunden ist und so angeordnet ist, dass er mit der Motordrehwelle zu drehen ist;
einen Dauermagneten (288), der am Läufer fixiert ist, um den Läufer und die Motordrehwelle durch eine elektromagnetische Kraft mit dem Ständer zu drehen; und
einen Sensor, um die Position des Läufers zu erfassen und sequentiell einen Strom zur Spule des Ständers zu senden.

11. Außeneinheit nach Anspruch 10, bei der das Motor-

tragelement (30; 30') Folgendes umfasst:

eine zylindrische Wellentrageinheit (302), um die Motordrehwelle drehbar durch ein Lager (289) zu tragen;
eine Ständertrageinheit (304), die mit dem oberen Ende der Wellentrageinheit integriert ist, wobei der Ständer fest daran angebracht ist; und
mehrere feste Einheiten (306), die in der Radialrichtung in vorbestimmten Abständen aus dem Umfang der Ständertrageinheit herausragen und durch Schrauben an der oberen Fläche des Ventilatorgehäuses (24; 24') befestigt sind.

12. Außeneinheit nach Anspruch 11, bei der im Motortragelement (30; 30') der Kern des Ständers (284) durch Schrauben am oberen Abschnitt der Ständertrageinheit (304) fixiert ist.

13. Außeneinheit nach Anspruch 11, bei der im Motortragelement (30; 30') festigkeitsverstärkende Rippen (308; 309) zwischen der Wellentrageinheit (302), der Ständertrageinheit (304) und den festen Einheiten (306) ausgebildet sind, um die Festigkeit der festen Einheiten zu verstärken.

14. Außeneinheit nach Anspruch 13, bei der im Motortragelement (30; 30') die mittigen Abschnitte der festen Einheiten (306) in der Radialrichtung aufwärts geneigt sind, so dass ein Teil des bürstenlosen Gleichstrommotors im Ventilatorgehäuse eingebaut werden kann.

15. Außeneinheit nach Anspruch 14, bei der im Motortragelement (30; 30') drei feste Einheiten (306) in vorbestimmten Abständen an den Umfängen der Wellentrageinheit (302) und der Ständertrageinheit (304) ausgebildet sind

16. Außeneinheit nach irgendeinem der Ansprüche 1 bis 15, bei der der Kondensator (14; 14a; 14b) U-förmig ausgebildet ist, wobei der mittige gerade Teil des U-förmigen Kondensators der Ansaugeinheit des Gehäuses zugewandt angeordnet ist

17. Außeneinheit nach Anspruch 16, bei der ein Paar von Kondensatoren (14a, 14b) stapelbar an den oberen und unteren Abschnitten der Ansaugeinheit des Gehäuses angebaut ist

18. Außeneinheit nach irgendeinem der Ansprüche 1 bis 17, ferner umfassend einen Lamellenrahmen (100, 110, 120, 130) zum Aufteilen eines Öffnungsraums einer Außenwand eines Gebäudes in einen Ansaugbereich, der der Ansaugeinheit (IN) des Gehäuses entspricht, und einen Auslassbereich, der der Auslasseinheit (OUT) des Gehäuses entspricht, so dass die Außeneinheit im Öffnungsraum eingebaut werden kann.

19. Außeneinheit nach Anspruch 18, bei der mehrere Lamellenflügel (120) in vorbestimmten Abständen im Ansaugbereich (IN) und Auslassbereich (OUT) des Lamellenrahmens eingebaut sind, um eine Richtung der Ansaugluft und eine Richtung der Auslassluft zu steuern.

Revendications

1. Unité extérieure pour un conditionneur d'air du type split, comprenant:

un boîtier avec une unité d'aspiration (IN) et une unité d'évacuation (OUT) étant individuellement formées sur la surface avant ouverte du boîtier ;
un compresseur (16a ; 16b ; 16c) installé à l'intérieur de l'unité d'aspiration du boîtier, pour compresser des réfrigérants ;
un condenseur (14 ; 14a ; 14b) installé à l'intérieur de l'unité d'aspiration du boîtier, pour condenser les réfrigérants compressés dans le compresseur par échange de chaleur entre les réfrigérants et l'air extérieur ;
caractérisée par
une paire de carters de ventilateurs (24 ; 24') ayant des trous d'aspiration (24_{in} ; $24'_{in}$) faisant face vers le et à proximité du condenseur et des trous d'évacuation (24_{out} ; $24'_{out}$) formés dans les surfaces avant des carters de ventilateurs (24 ; 24') directement adjacentes à la surface avant du boîtier (22) pour guider la direction d'évacuation de l'air ayant subi un échange de chaleur dans le condenseur ;
une paire de ventilateurs sirocco (26 ; 26') installés à l'intérieur des carters de ventilateurs, respectivement, pour aspirer l'air extérieur à travers l'unité d'aspiration du boîtier, pour faire passer l'air extérieur jusqu'au condenseur, et pour évacuer l'air ayant subi un échange de chaleur à travers l'unité d'évacuation du boîtier ;
une paire de moteurs (28 ; 28') connectés aux ventilateurs sirocco, pour entraîner les ventilateurs sirocco, respectivement ; et
une paire d'éléments de support de moteurs (30 ; 30') pour fixer les moteurs sur les carters de ventilateurs, respectivement.

2. Unité extérieure selon la revendication 1, dans laquelle le boîtier est divisé en des parties supérieure et inférieure, l'unité d'aspiration est formée au niveau de la partie inférieure (12) du boîtier, et l'unité d'évacuation est formée au niveau de la partie supérieure (22) du boîtier

3. Unité extérieure selon la revendication 1 ou 2, dans

laquelle l'unité d'évacuation (OUT) du boîtier est divisée en deux côtés, une première et une deuxième unités d'évacuation sont formées au niveau des deux côtés, et les carters de ventilateurs sont installés de façon à être directement adjacents aux première et deuxième unités d'évacuation pour communiquer avec la première et la deuxième unités d'évacuation respectivement.

4. Unité extérieure selon l'une quelconque des revendications 1 à 3, comprenant en outre une grille d'aspiration et une grille d'évacuation installées au niveau de l'unité d'aspiration (IN) et de l'unité d'évacuation (OUT) du boîtier, pour éviter que des substances étrangères ne pénètrent à l'intérieur du boîtier

5. Unité extérieure selon la revendication 3, dans laquelle les trous d'aspiration (24_{in} ; $24'_{in}$) sont formés sur les surfaces supérieure et inférieure de la paire de carters de ventilateurs (24 ; 24') de sorte que l'air peut être aspiré dans les directions axiales de chaque ventilateur sirocco, et les trous d'évacuation (24_{out} ; $24'_{out}$) évacuent l'air dans les directions circonférentielles de chaque ventilateur sirocco (26 ; 26')

6. Unité extérieure selon la revendication 5, dans laquelle la paire de ventilateurs sirocco (26 ; 26') sont agencés de façon à être mis en rotation dans les directions opposées pour éviter des interférences de l'air évacué par chaque ventilateur sirocco, et la paire de carters de ventilateurs (24 ; 24') se font face l'un l'autre pour guider l'air évacué dans les directions opposées

7. Unité extérieure selon la revendication 5, dans laquelle la paire de ventilateurs sirocco (26 ; 26') sont agencés de façon à être mis en rotation dans la même direction, et la paire de carters de ventilateurs (24 ; 24') sont installés dans la même direction pour guider l'air évacué dans la même direction

8. Unité extérieure selon l'une quelconque des revendications 5 à 7, dans laquelle la paire de moteurs (28 ; 28') sont installés de façon fixe sur les trous d'aspiration (24_{in} ; $24'_{in}$) supérieurs de chaque logement de ventilateur ayant un débit d'aspiration relativement petit.

9. Unité extérieure selon l'une quelconque des revendications 1 à 8, dans laquelle la paire de moteurs (28 ; 28') sont des moteurs BLDC

10. Unité extérieure selon la revendication 9, dans laquelle le moteur BLDC (28 ; 28') comprend :

un arbre de rotation de moteur (282) connecté au ventilateur sirocco (26 ; 26') pour transmettre la puissance ;
un stator (284) ayant l'arbre de rotation de moteur installé de façon rotative en son centre, et étant installé de façon fixe sur l'élément de support de moteur (30 ; 30'), une bobine étant enroulée autour d'un noyau du stator ;
un rotor (286) installé au niveau de la circonférence extérieure du stator, connecté à l'arbre de rotation de moteur, et agencé de façon à être mis en rotation avec l'arbre de rotation de moteur ;
un aimant permanent (288) fixé au rotor, pour mettre en rotation le rotor et l'arbre de rotation de moteur par une force électromagnétique avec le stator ; et
un détecteur pour détecter la position du rotor, et envoyer séquentiellement un courant à la bobine du stator

11. Unité extérieure selon la revendication 10, dans laquelle l'élément de support de moteur (30 ; 30') comprend :

une unité de support d'arbre cylindrique (302) pour supporter en rotation l'arbre de rotation de moteur par un roulement (289) ;
une unité de support de stator (304) incorporée avec l'extrémité supérieure de l'unité de support d'arbre, le stator étant monté de façon fixe sur celle-ci ; et
une pluralité d'unités fixes (306) faisant saillie de la circonférence de l'unité de support de stator dans la direction radiale à intervalles prédéterminés, et fixées sur la surface supérieure du logement de ventilateur (24 ; 24') par des vis.

12. Unité extérieure selon la revendication 11, dans laquelle, dans l'élément de support de moteur (30 ; 30'), le noyau du stator (284) est fixé sur la partie supérieure de l'unité de support de stator (304) par des vis

13. Unité extérieure selon la revendication 11, dans laquelle, dans l'élément de support de moteur (30 ; 30'), des nervures de renforcement d'intensité (308 ; 309) sont formées parmi l'unité de support d'arbre (302), l'unité de support de stator (304) et les unités fixes (306) pour renforcer l'intensité des unités fixes

14. Unité extérieure selon la revendication 13, dans laquelle, dans l'élément de support de moteur (30 ; 30'), les parties médianes des unités fixes (306) sont inclinées vers le haut dans la direction radiale de façon à ce qu'une partie du moteur BLDC puisse être installée à l'intérieur du logement de ventilateur

15. Unité extérieure selon la revendication 14, dans laquelle, dans l'élément de support de moteur (30 ;

30'), trois unités fixes (306) sont formées sur les circonférences de l'unité de support d'arbre (302) et de l'unité de support de stator (304) à intervalles prédéterminés.

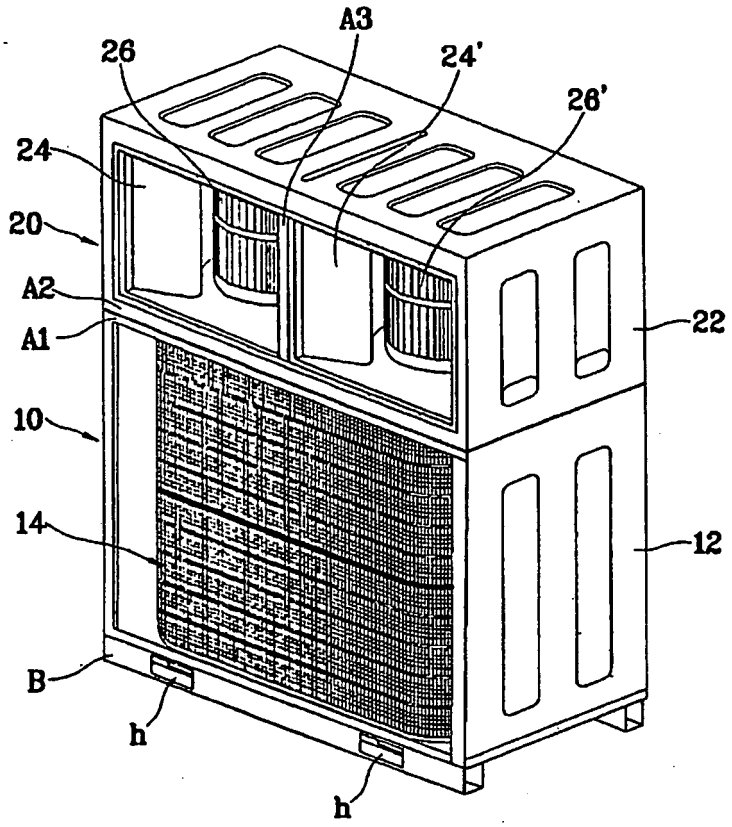
16. Unité extérieure selon l'une quelconque des revendications 1 à 15, dans laquelle le condenseur (14 ; 14a ; 14b) est formé à la forme d'un « U » avec la partie droite centrale du condenseur en forme de U étant positionnée vers l'unité d'aspiration du boîtier

17. Unité extérieure selon la revendication 16, dans laquelle une paire de condenseurs (14a, 14b) sont installés de façon à être empilés au niveau des parties intérieures supérieure et inférieure de l'unité d'aspiration du boîtier

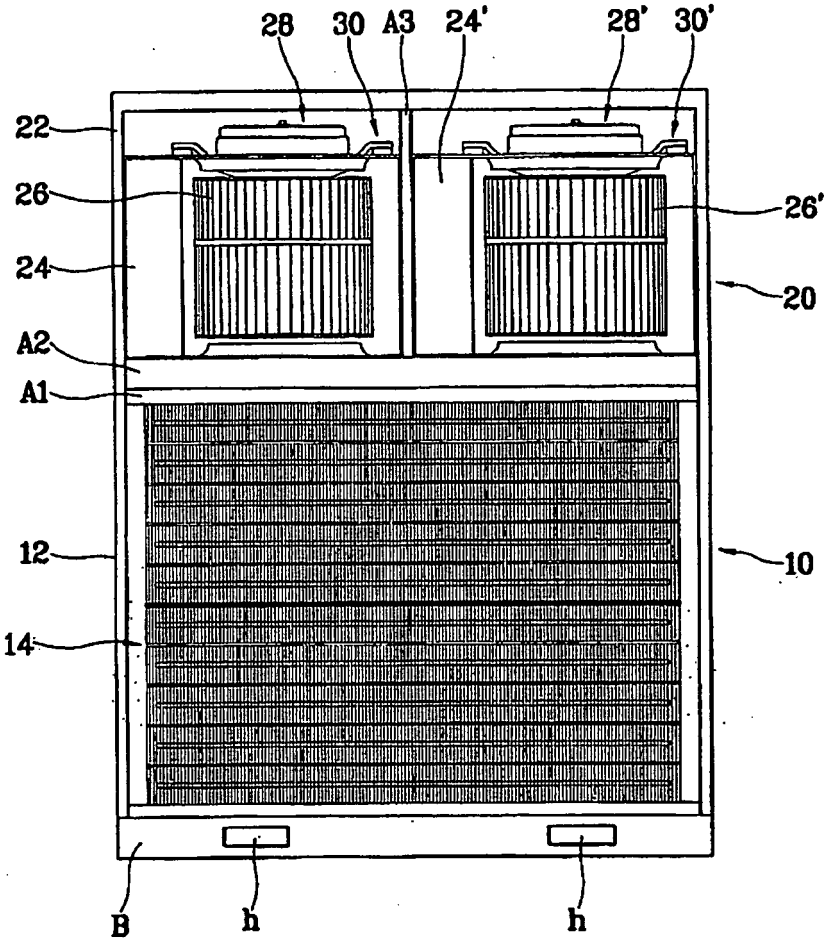
18. Unité extérieure selon l'une quelconque des revendications 1 à 17, comprenant en outre un cadre à déflecteurs (100, 110, 120, 130) pour diviser un espace d'ouverture d'une paroi extérieure d'un bâtiment en une zone d'aspiration correspondant à l'unité d'aspiration (IN) du boîtier et une zone d'évacuation correspondant à l'unité d'évacuation (OUT) du boîtier, de sorte que l'unité extérieure peut être installée à l'intérieur de l'espace d'ouverture

19. Unité extérieure selon la revendication 18, dans laquelle une pluralité de lames de déflecteur (120) sont installées dans la zone d'aspiration (IN) et la zone d'évacuation (OUT) du cadre à déflecteurs à intervalles prédéterminés, pour commander une direction d'air d'aspiration et une direction d'air d'évacuation

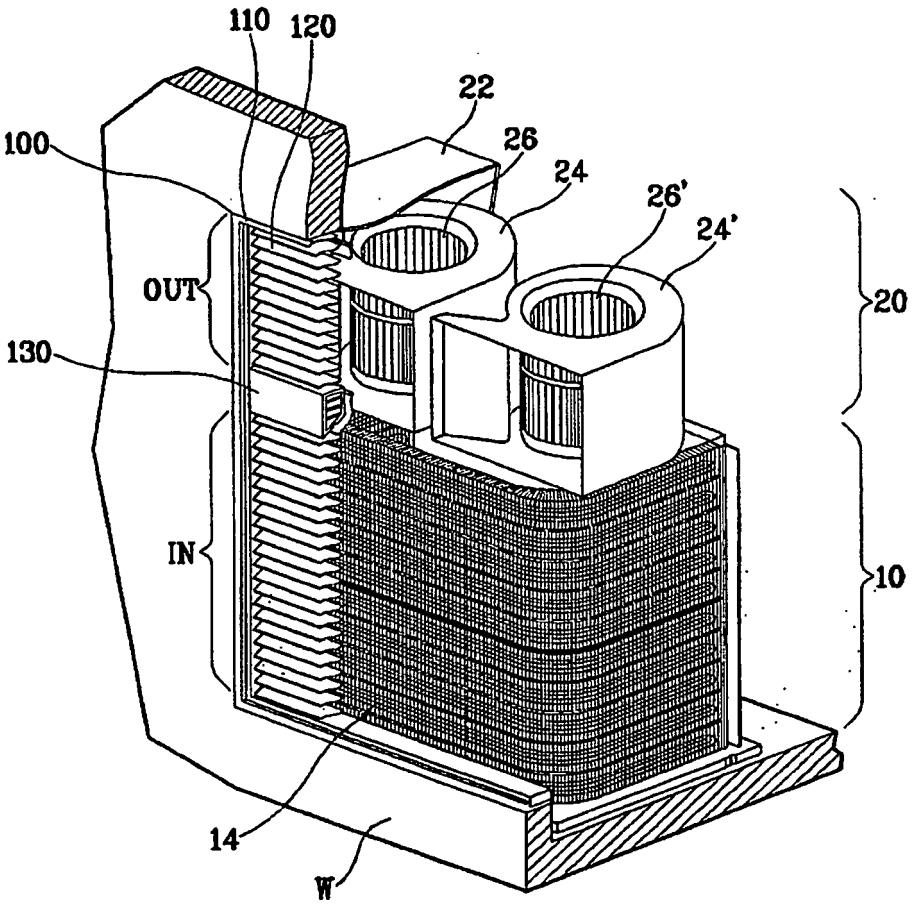
[Fig. 1]



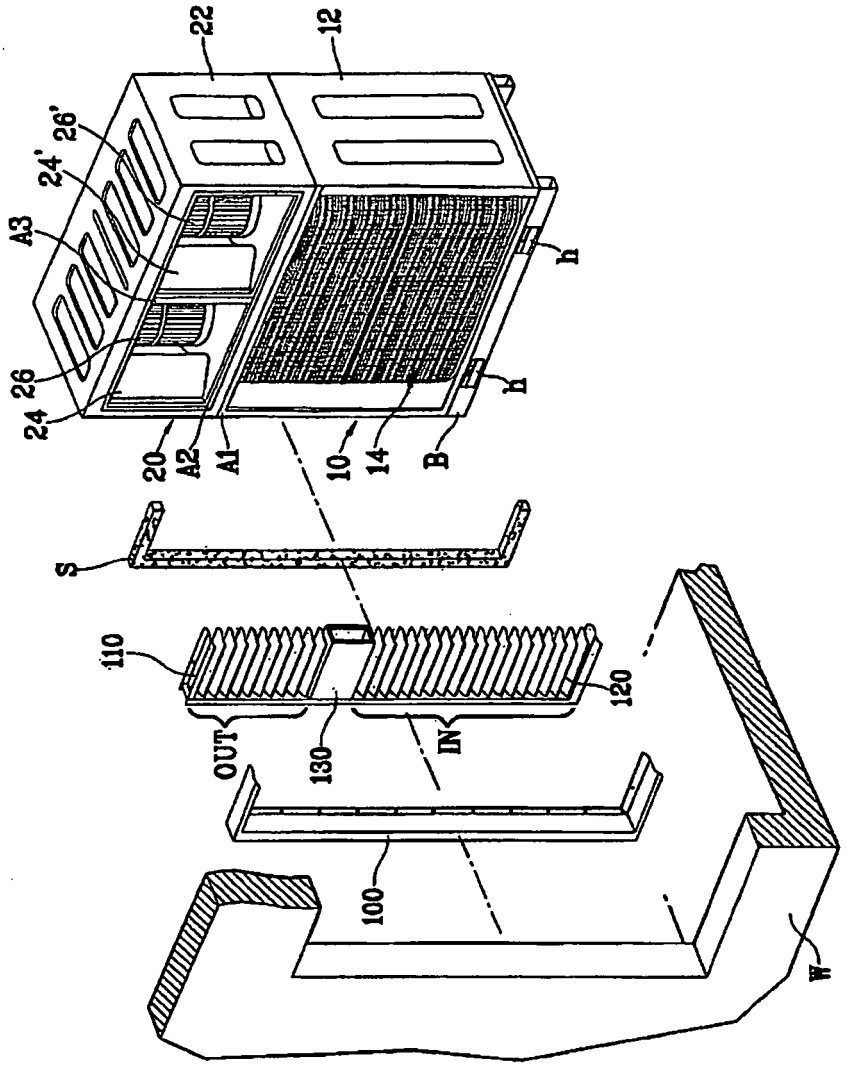
[Fig. 2]



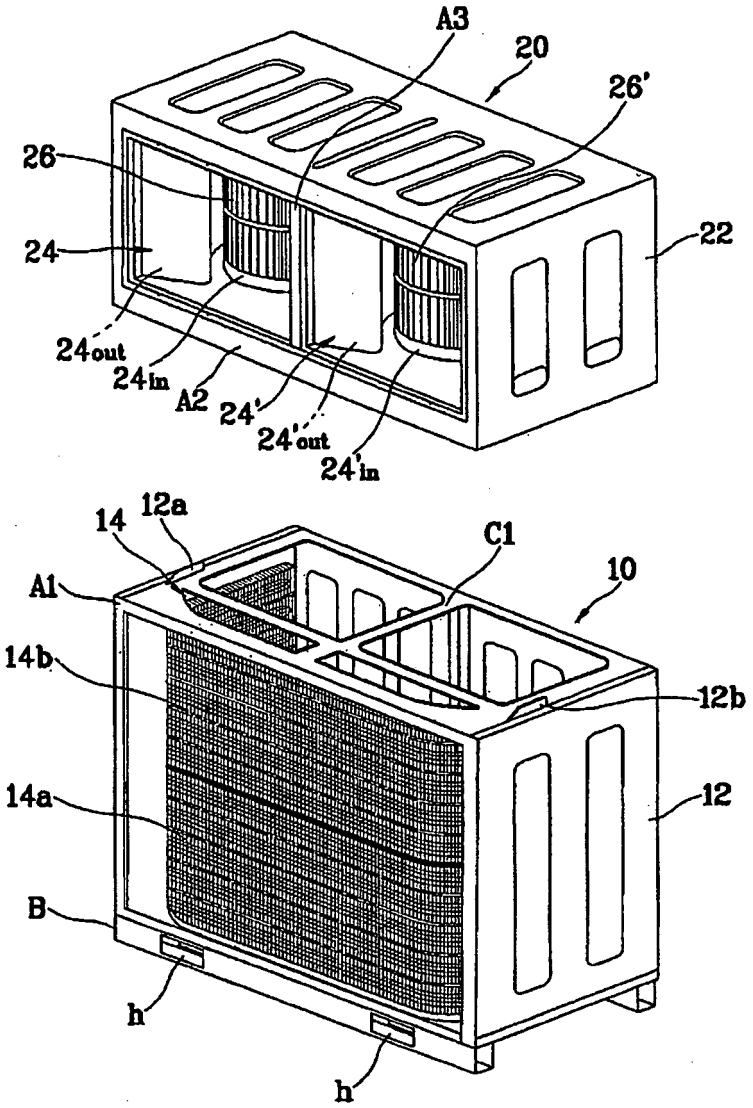
[Fig. 3]



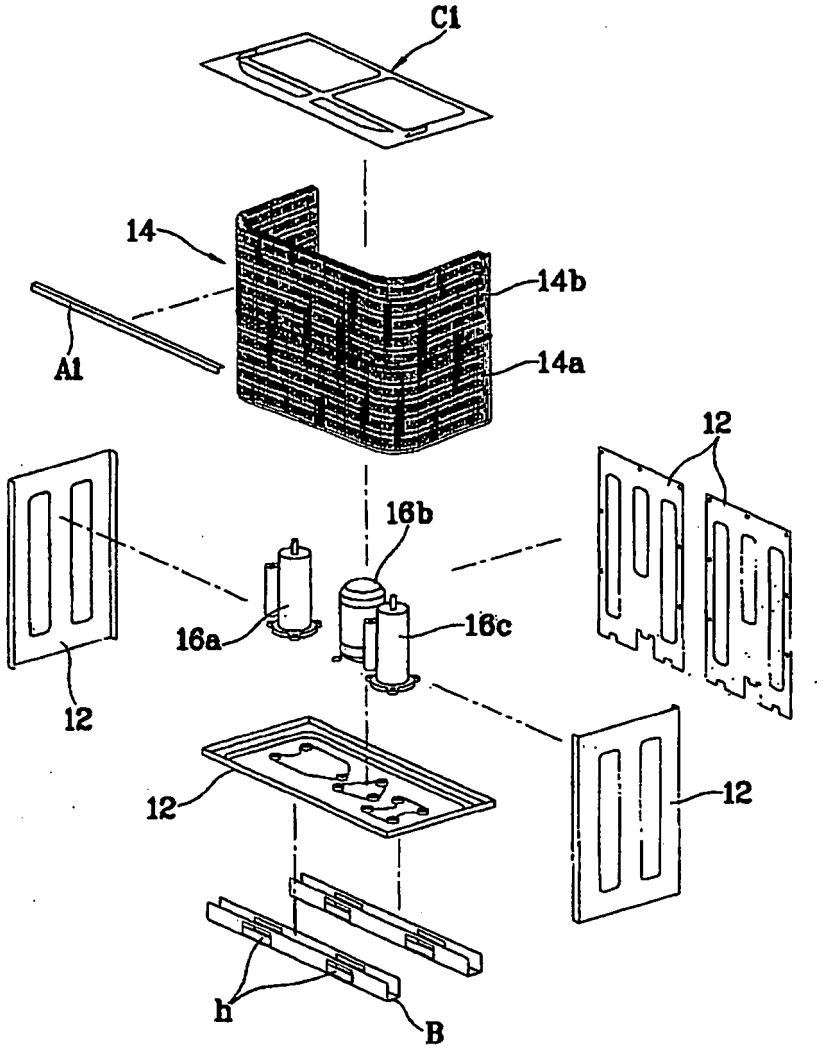
[Fig. 4]



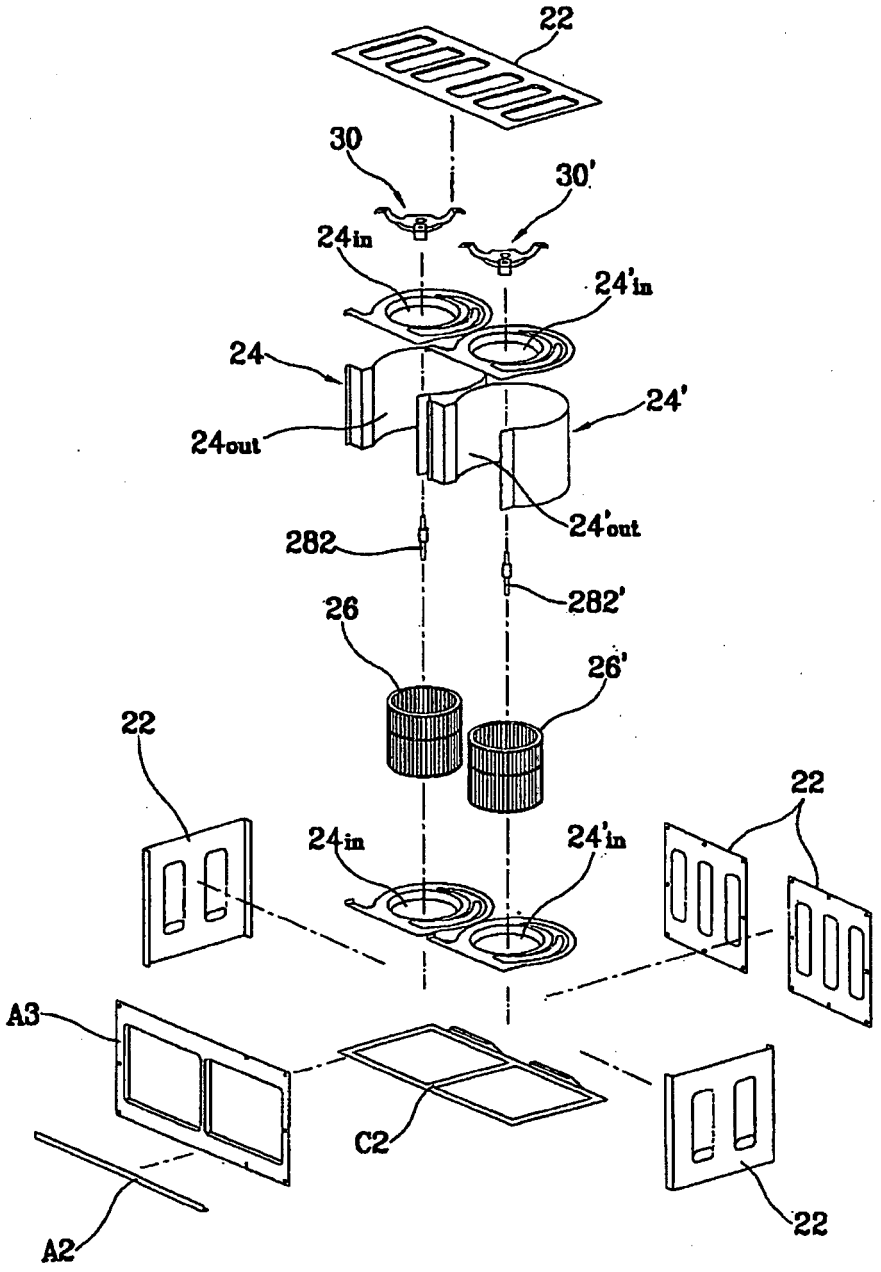
[Fig. 5]


A3
20
26'
26
22
24
24out
24in
A2
24'
24'out
24'in
14
12a
C1
10
A1
14b
12b
14a
12
B
h
h

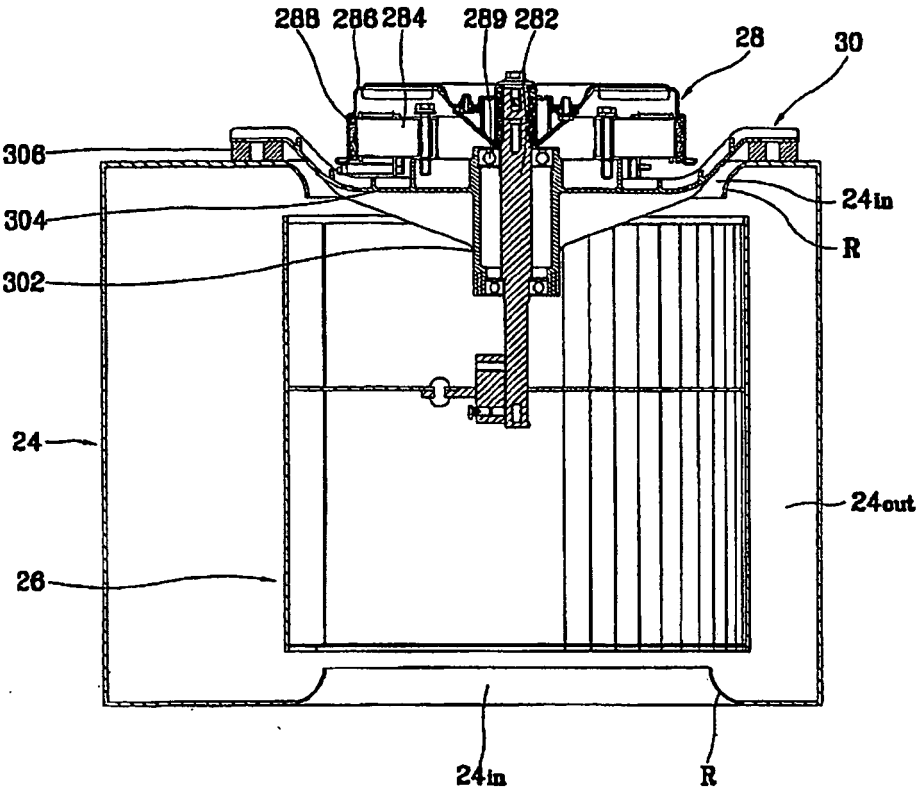
[Fig. 6]



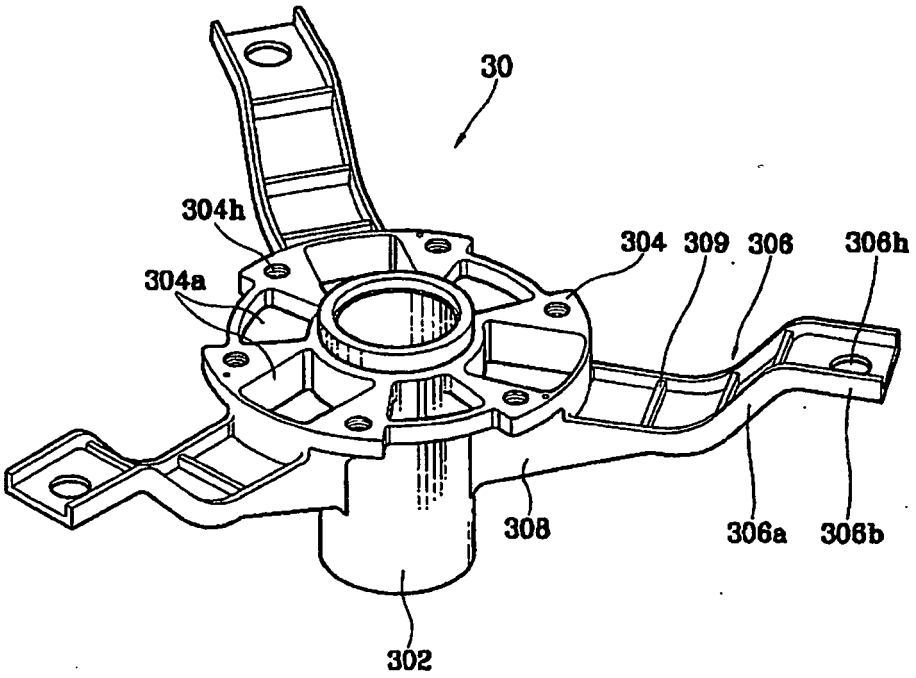
[Fig. 7]


22
30
30'
24in
24'in
24
24'
24out
24'out
282
282'
26
26'
22
24in
24'in
22
A3
C2
22
A2

[Fig. 8]


288
286
284
289
282
28
30
306
304
302
24
26
24in
R
24out
24in
R

[Fig. 9]


30
304h
304a
304
309
306
306h
308
306a
306b
302

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 20040769335 A **[0010]**
- WO 2004076935 A **[0010]**