



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
25.05.2016 Bulletin 2016/21

(51) Int Cl.:
F24F 13/10 ^(2006.01) **F24F 13/04** ^(2006.01)
F24F 13/08 ^(2006.01)

(21) Application number: **14825665.4**

(86) International application number:
PCT/CN2014/073420

(22) Date of filing: **14.03.2014**

(87) International publication number:
WO 2015/007101 (22.01.2015 Gazette 2015/03)

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

(30) Priority: **16.07.2013 CN 201310297872**
16.07.2013 CN 201320422803 U

(71) Applicants:
• **Haier Group Corporation**
Qingdao, Shandong 266101 (CN)
• **Qingdao Haier Air Conditioner Gen Corp., Ltd.**
Qingdao, Shandong 266101 (CN)

(72) Inventors:
• **LI, Dasen**
Qingdao
Shandong 266101 (CN)

• **LIU, Weijie**
Qingdao
Shandong 266101 (CN)
• **JIAO, Litao**
Qingdao
Shandong 266101 (CN)
• **YANG, Benqiang**
Qingdao
Shandong 266101 (CN)
• **CHANG, Lihua**
Qingdao
Shandong 266101 (CN)

(74) Representative: **Ziebig, Marlene**
Straße 4, Nr. 12A
13125 Berlin (DE)

(54) **FLOOR AIR CONDITIONER**

(57) A vertical air-conditioner includes an indoor unit, the indoor unit including a front panel (102), a rear panel (103), a left panel and a right panel. An internal air duct of the indoor unit is defined by the front panel (102), the rear panel (103), the left panel and the right panel. A mixed air outlet (1021) is formed on the front panel (102); a non-heat-exchanged air inlet (1031) is formed on the rear panel (103) at a position corresponding to the mixed air outlet (1021); and a baffle (104) configured to open/close the non-heat-exchanged air inlet (1031) is disposed at the non-heat-exchanged air inlet (1031).

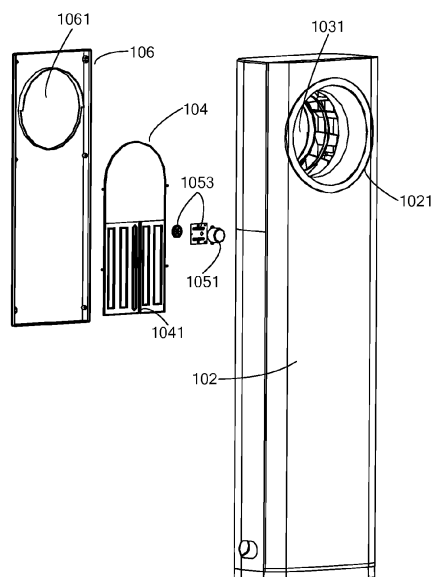


FIG. 2

Description

BACKGROUND

Technical Field

[0001] The present invention relates to the field of air conditioning technologies, and particularly to a vertical air-conditioner.

Related Art

[0002] In existing vertical air-conditioners, an air inlet of an indoor unit is generally formed below a front panel and/or side panel of the air-conditioner, and an air outlet is formed above the front panel of the air-conditioner. Indoor air enters inside of the air-conditioner from the air inlet, and is blown by a centrifugal blower to a heat exchanger. The indoor air is subjected to heat exchange by the heat exchanger to form heat-exchanged air, and blown out from the air outlet to enter indoors. The amount of air supplied from the air outlet of the air-conditioner completely depends on air intake volume of the air inlet of the air-conditioner and the power of the centrifugal blower, and the air intake volume cannot be increased by the air-conditioner itself, thereby leading to a limited amount of air supplied and failure to obviously improve indoor air circulation.

[0003] Currently, a rear panel of a vertical air-conditioner is generally not provided with an air inlet, and even if an air inlet is provided, the air inlet is still located below the rear panel. In addition, air entering from underneath of the rear panel will fully enter a heat exchanger for heat exchange, as a result, the air inlet below the rear panel takes the same effect as the air inlet disposed below the front panel and/or side panel of the air-conditioner, which cannot help increase the air volume of the air-conditioner at all.

[0004] In order to increase the air intake volume of the air-conditioner, an air inlet may be formed on the rear panel of the air-conditioner, and an air-conditioner air supply apparatus having a through-duct is arranged between the air inlet of the rear panel and the air outlet of the front panel. When the heat-exchanged air is blown out from the air outlet by the air-conditioner air supply apparatus, a negative pressure is formed in the through-duct. Under the negative pressure, indoor non-heat-exchanged air enters the through-duct of the air-conditioner air supply apparatus from the air inlet on the rear panel, and is mixed with the heat-exchanged air in the through-duct to form mixed air, and then sent together from the air outlet of the front panel. Therefore, the amount of air supplied from the air outlet is equal to the amount of the heat-exchanged air plus the amount of the non-exchanged air that enters from the air inlet of the rear panel and is not subjected to heat exchange, so that the amount of air supplied is obviously increased, and circulating air volume and heat exchange rate of indoor air are im-

proved. Moreover, the mixed air formed by mixing two parts of air is mild at a proper temperature. Particularly in a cooling mode, the temperature of the mixed air is not excessively low, thereby making users feel very comfortable.

[0005] However, the air inlet formed on the rear panel and configured to introduce extra non-heat-exchanged air is of an open structure, which has the following disadvantages: firstly, the amount of non-exchanged air that enters from the rear panel cannot be controlled, and thus the ratio between heat-exchanged air and non-heat-exchanged air included in the mixed air that is supplied from the air outlet cannot be controlled. Therefore, the air volume and the temperature of air supplied cannot be adjusted according to individual differences of users, leading to a narrow application scope. Secondly, with respect to usage habit and comfort of temperature feeling of users, in a cooling mode, it is expected that cool heat-exchanged air can be mixed with a part of non-heat-exchanged air at a high temperature and then supplied; while in a heating mode, it is not expected that heat-exchanged air is mixed with non-heat-exchanged air at a low temperature, that is, the demands for sucking non-exchanged air or not vary in different work modes of the air-conditioner. The air inlet of an open structure cannot meet usage requirements of users in different work modes, namely cooling and heating modes. Thirdly, the rear air inlet of an open structure easily causes illusion of users. The users may believe the cooling or heating rate of the air-conditioner is lower than conventional air-conditioners without a rear air inlet, thereby affecting the confidence degree of users on such air-conditioner products and reducing the market competitiveness of the products.

SUMMARY

[0006] An objective of the present invention is to provide a vertical air-conditioner, where a rear panel of the vertical air-conditioner is provided with a baffle at a non-heat-exchanged air inlet configured to introduce non-heat-exchanged air, so as to open/close the inlet, thereby meeting demands of different users and different demands of a user.

[0007] To achieve the foregoing objective of the present invention, the present invention is implemented by means of the following technical solutions:

A vertical air-conditioner includes an indoor unit, the indoor unit including a front panel, a rear panel, a left panel and a right panel, an internal air duct of the indoor unit being defined by the front panel, the rear panel, the left panel and the right panel, where a mixed air outlet is formed on the front panel, a non-heat-exchanged air inlet is formed on the rear panel at a position corresponding to the mixed air outlet, and a baffle configured to open/close the non-heat-exchanged air inlet is disposed at the non-heat-ex-

changed air inlet.

[0008] In the vertical air-conditioner described above, the non-heat-exchanged air inlet may be opened/closed by the baffle in a straight-line push-and-pull manner.

[0009] In the vertical air-conditioner described above, the rear panel is provided with a baffle driving motor and a guide rail for sliding of the baffle, a gear drive mechanism is disposed on an output shaft of the baffle driving motor, and the baffle is provided with a rack engaged with the gear drive mechanism, where the baffle and the baffle driving motor are connected with the gear drive mechanism through the rack in a driving manner.

[0010] In the vertical air-conditioner described above, the non-heat-exchanged air inlet is opened/closed by the baffle in a manner of sliding up and down, and the rear panel is provided with a lug boss for limiting a lowest position of the baffle.

[0011] In the vertical air-conditioner described above, the rear panel is further provided with a rear cover plate that is configured to cover the baffle driving motor, the guide rail and the baffle, where an opening matching the non-heat-exchanged air inlet is formed on the rear cover plate.

[0012] Preferably, the rear panel is connected to the rear cover plate by clamping.

[0013] In the vertical air-conditioner described above, the non-heat-exchanged air inlet may also be opened/closed by the baffle in a curved-line rotating manner.

[0014] In the vertical air-conditioner described above, the rear panel is provided with several fixing parts in the circumferential direction outside an edge of the non-heat-exchanged air inlet, and provided with a rotating part at a position below the non-heat-exchanged air inlet. The baffle is correspondingly provided with several fixing coordination parts and a rotating coordination part. The baffle and the rear cover plate are assembled through the rotating coordination part and the rotating part in a rotating manner; and when the non-heat-exchanged air inlet is closed by the baffle, the baffle and the rear cover plate are fixed and connected through the fixing coordination parts and the fixing parts.

[0015] Preferably, the fixing parts comprise several screw holes and a first locating column, where the first locating column is located above the non-heat-exchanged air inlet; the fixing coordination parts comprise a screw hole and a groove matching the first locating column; the rotating part is a second locating column; and the rotating coordination part is a locating hole matching the second locating column.

[0016] More preferably, in order to prevent the baffle from dropping, the second locating column is provided with a sealing cap.

[0017] In the vertical air-conditioner described above, the non-heat-exchanged air inlet may also be opened/closed by the baffle in a dismountable manner, so as to simplify the structure.

[0018] In the vertical air-conditioner described above, to achieve mixed air supply, the indoor unit is provided with an air-conditioner air supply apparatus inside, the air-conditioner air supply apparatus including at least two annular air guiding bodies that are hollow and have front and rear openings, where the rear openings of the annular air guiding bodies are air inlets and the front openings thereof are air outlets; the at least two annular air guiding bodies are arranged sequentially from front to rear, and a through-duct which runs from the front to rear is formed in the middle; an annular heat-exchanged air duct is formed between two adjacent annular air guiding bodies; and in the air-conditioner air supply apparatus, an air outlet of a front-end annular air guiding body located at the front end and an air inlet of a rear-end annular air guiding body located at the rear end are respectively enclosed and connected with the mixed air outlet on the front panel and the non-heat-exchanged air inlet on the rear panel.

[0019] In the vertical air-conditioner described above, in order to improve the uniformity of air supply in the circumferential direction, at least one annular heat-exchanged air duct is provided with an airflow distribution assembly configured to distribute heat-exchanged air that is from a heat exchanger of the indoor unit and enters the annular heat-exchanged air duct.

[0020] In the vertical air-conditioner described above, the airflow distribution assembly includes a plurality of airflow distribution plates, where the plurality of airflow distribution plates is arranged bilaterally symmetrically in the circumferential direction of the annular heat-exchanged air duct, and along an air supply direction of the heat-exchanged air.

[0021] Preferably, the plurality of airflow distribution plates is bent distribution plates of the same bending direction, and the bending direction of the plurality of bent distribution plates is reverse to the air supply direction of the heat-exchanged air.

[0022] Compared with the prior art, the present invention has the following advantages and positive effects: through disposing a baffle at a non-heat-exchanged air inlet of a rear panel of an air-conditioner, the non-heat-exchanged air inlet can be opened or closed by control of the baffle as demanded, thereby meeting demands of different users or a user for selectively using the non-heat-exchanged air inlet in a different usage state. In addition, through controlling the baffle position, the opening degree of the non-heat-exchanged air inlet can also be controlled, and then the air intake volume of the non-heat-exchanged air inlet can be flexibly regulated, thereby regulating a ratio between heat-exchanged air and non-heat-exchanged air in mixed air that is blown from the mixed air outlet. As a result, the application scope is wide.

[0023] Other features and advantages of the present invention will become more apparent after reading the detailed description of the present invention with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

FIG. 1 is a partial schematic structural side view of an embodiment of a vertical air-conditioner according to the present invention;

FIG. 2 is a partial breakdown structure view of the vertical air-conditioner of the embodiment in FIG. 1;

FIG. 3 is a three-dimensional view of the vertical air-conditioner of the embodiment in FIG. 1 when a non-heat-exchanged air inlet is completely closed by a baffle;

FIG. 4 is a three-dimensional view of the vertical air-conditioner of the embodiment in FIG. 1 when a non-heat-exchanged air inlet is completely opened by a baffle;

FIG. 5 is a partial schematic structural side view of another embodiment of a vertical air-conditioner according to the present invention;

FIG. 6 is a three-dimensional view of the vertical air-conditioner of the embodiment in FIG. 5 when a non-heat-exchanged air inlet is completely opened by a baffle;

FIG. 7 is a three-dimensional view of the vertical air-conditioner of the embodiment in FIG. 5 when a non-heat-exchanged air inlet is completely closed by a baffle;

FIG. 8 is a three-dimensional structural view of an air-conditioner air supply apparatus in the vertical air-conditioner of the embodiment in FIG. 1; and

FIG. 9 is a rear view of the air-conditioner air supply apparatus in FIG. 8.

DETAILED DESCRIPTION

[0025] The technical solutions of the present invention are further described in detail below with reference to the accompanying drawings and the detailed description.

[0026] First, technical terms involved in the detailed description are briefly described. The front or rear of each structural component as mentioned below is defined in terms of the position of the structural component in the normal use state relative to the user; front or rear, when used to describe the positions at which multiple structural components are arranged, is also defined in terms of the position of an apparatus formed by the multiple structural components in the normal use state relative to the user. In the following description, heat-exchanged air refers to air that is from the inside of an air-conditioner and has

been subjected to heat exchange by a heat exchanger; non-heat-exchanged air refers to air from the environmental space in which the air-conditioner is located, is relative to the heat-exchanged air, and is part of air that is not directly from the heat exchanger; and mixed air refers to air formed by mixing the heat-exchanged air with the non-heat-exchanged air. In the following description, the shape being annular refers to an enclosed structure that is formed by encircling, but is not limited to a circular ring.

[0027] FIG. 1 to FIG. 4 show an embodiment of a vertical air-conditioner according to the present invention, where FIG. 1 is a partial schematic structural side view of this embodiment; FIG. 2 is a partial breakdown structure view thereof; and FIG. 3 and FIG. 4 are respectively a three-dimensional view thereof when a non-heat-exchanged air inlet is completely closed and completely opened by a baffle. As shown in FIG. 1 to FIG. 4, the vertical air-conditioner of this embodiment includes an indoor unit, where the indoor unit includes a front panel 102, a rear panel 103, a left panel and a right panel (not marked in the figures), an internal air duct of the indoor unit being defined by the front panel 102, the rear panel 103, the left panel and the right panel. A circular mixed air outlet 1021 is formed on an upper part of the front panel 102, and a non-heat-exchanged air inlet 1031 is formed on an upper part of the rear panel 103 of the air-conditioner and at a position corresponding to the mixed air outlet 1021 on the front panel 102. A blower, a heat exchanger (an existing structure, not shown in the figures) and an air-conditioner air supply apparatus 101 are disposed from bottom to top in the internal air duct, and the blower is arranged in such a manner that air from the internal air duct of the air-conditioner is blown out from the mixed air outlet 1021 on the front panel 102 through the air-conditioner air supply apparatus 1. A baffle 104 is disposed at a non-heat-exchanged air inlet 1031, and the non-heat-exchanged air inlet 1031 may be opened or closed by the baffle 104 in a straight-line push-and-pull manner.

[0028] As the baffle 104 is provided and can open or close the non-heat-exchanged air inlet 1031, the non-heat-exchanged air inlet 1031 may be completely opened by control of the baffle 104, so that non-heat-exchanged air can enter the air-conditioner air supply apparatus 101 in the indoor unit through the non-heat-exchanged air inlet 1031, and then mix with heat-exchanged air that enters the air-conditioner air supply apparatus 101 to form mixed air that is then blown out from the mixed air outlet 1021 on the front panel 102; otherwise, the non-heat-exchanged air inlet 1031 may be completely closed by control of the baffle 104, thereby achieving air supply having the same structure and mode as the existing air-conditioners. In addition, a part of the non-heat-exchanged air inlet 1031 may be shielded by control of the baffle 104, thereby controlling the amount of non-heat-exchanged air entering the indoor unit from the non-heat-exchanged air inlet 1031, and achieving control over the

ratio between heat-exchanged air volume and non-heat exchanged air volume in the mixed air.

[0029] In this embodiment, the non-heat-exchanged air inlet 1031 may be opened or closed by the baffle 104 in a manner of straight-line sliding movement. For the specific structure of implementation by sliding, please refer to FIG. 2 to FIG. 4. As shown in FIG. 2 to FIG. 4, a baffle driving motor 1051 is disposed on the rear panel 103 at a middle position below the non-heat-exchanged air inlet 1031, and a gear drive mechanism 1053 is disposed on an output shaft (not shown in the figures) of the baffle driving motor 1051. The rear panel 103 is provided with a guide rail 1052 respectively on both sides of the baffle driving motor 1051, and the guide rail 1052 is located outside the non-heat-exchanged air inlet 1031. Edges on both sides of the baffle 104 are respectively embedded into the guide rail 1052 on left and right side, and can slide up and down along the guide rail 1052. The baffle 104 is provided with a rack 1041 on front surface thereof facing the baffle driving motor 1051 and the gear drive mechanism 1053. When the baffle 104 is assembled into the guide rail 1052, the rack 1041 is engaged with a drive gear in the gear drive mechanism 1053, thereby achieving connection of the baffle 104 and the baffle driving motor 1051 in a driving manner.

[0030] In this embodiment, the non-heat-exchanged air inlet 1031 is opened/closed by the baffle 104 in a manner of sliding up and down, and in order to limit a lowest position of the baffle 104, and ensure that the baffle 104 will not break away from the guide rail 1052 under action of gravity, the rear panel 102 is provided with a lug boss 1032 below the guide rail 1052. When the baffle 104 slides down to completely open the non-exchanged air inlet 1031, the lower edge thereof will be against the lug boss 1032. Moreover, to assure overall aesthetics and appearance consistency of the air-conditioner indoor unit, and prevent dust from dropping on mechanical transmission mechanisms such as the baffle driving motor 1051 and the gear drive mechanism 1053, the rear panel 103 is further provided with a rear cover plate 106 connected with the rear panel 103 in a dismountable manner. A circular opening 1061 with a size and position matching the non-heat-exchanged air inlet 1031 is formed on an upper part of the rear cover plate 106. The rear cover plate 106 is configured to cover the baffle driving motor 1051, the gear drive mechanism 1063 and the guide rail 1052, and the opening thereof 1061 and the non-heat-exchanged air inlet 1031 on the rear panel 103 are overlapped from front to rear, not affecting the air intake volume of the non-heat-exchanged air inlet 1031. As a preferred implementation manner, the rear cover plate 106 may be connected with the rear panel 103 by clamping, thereby achieving convenient dismountable connection.

[0031] The action process of opening or closing the non-heat-exchanged air inlet by the baffle 104 in a manner of automatically controlled sliding is briefly described as follows: if it is not expected by a user that non-heat-

exchanged air becomes a part of air supplied by the air-conditioner, for example, the temperature of air supplied from the air-conditioner is expected to be high when the air-conditioner operates in a heating work mode, a control signal can be transmitted according to a key configured on a remote controller of the air-conditioner or a control panel of the indoor unit. After receiving the control signal, the controller will control the baffle driving motor 1051 to rotate, and through coordination with the gear drive mechanism 1053 and the rack 1041, convert the rotation of the motor to a straight-line movement of the baffle 104, and drive the baffle 104 to move up along the guide rail 1052, until the non-heat-exchanged air inlet 1031 is completely closed by the baffle 104. The current position of the baffle 104 is as shown in FIG. 3.

[0032] If a user expects that the amount of air supplied by the air-conditioner increases or mild mixed air at a proper temperature is supplied by the air-conditioner that operates in a cooling work mode, a corresponding control signal can be transmitted according to a key configured on a remote controller of the air-conditioner or a control panel of the indoor unit. After receiving the control signal, the controller will control the baffle driving motor 1051 to rotate in reverse, and through coordination with the gear drive mechanism 1053 and the rack 1041, convert the rotation of the motor to a straight-line movement of the baffle 104, and drive the baffle 104 to move down along the guide rail 1052, until the non-heat-exchanged air inlet 1031 is completely opened by the baffle 104. The current position of the baffle 104 is as shown in FIG. 4. Certainly, through setting a corresponding control key, a part of the non-heat-exchanged air inlet 1031 may also be closed by control of the baffle 104, that is, a part of the non-heat-exchanged air inlet 1031 is opened. The non-heat-exchanged air intake volume is changed with a different actual inlet air area of the non-heat-exchanged air inlet 1031, thereby adjusting a mixing ratio of the non-heat-exchanged air volume and the heat-exchanged air volume in the mixed air.

[0033] FIG. 5 to FIG. 7 show another embodiment of a vertical air-conditioner according to the present invention, where FIG. 5 is a partial schematic structural side view of this embodiment; FIG. 6 and FIG. 7 are respectively a three-dimensional view thereof when a non-heat-exchanged air inlet is completely opened and completely closed by a baffle.

[0034] As shown in FIG. 5 to FIG. 7, the vertical air-conditioner of this embodiment includes an indoor unit, where the indoor unit includes a front panel 202, a rear panel 203, a left panel and a right panel (not marked in the figures), an internal air duct of the indoor unit being defined by the front panel 203, the rear panel 103, the left panel and the right panel. A circular mixed air outlet 2021 is formed on an upper part of the front panel 202, and a circular non-heat-exchanged air inlet 2031 is formed on an upper part of the rear panel 203 of the air-conditioner and at a position corresponding to the mixed air outlet 2021 on the front panel 202. A blower, a heat

exchanger (an existing structure, not shown in figures) and an air-conditioner air supply apparatus 201 are disposed from bottom to top in the internal air duct, and the blower is arranged in such a manner that air from the internal air duct of the air-conditioner is blown out from the mixed air outlet 2021 on the front panel 202 through the air-conditioner air supply apparatus 201. A circular baffle 204 is disposed at the non-heat-exchanged air inlet 2031, and the non-heat-exchanged air inlet 2031 may be opened or closed by the baffle 204 in a curved-line rotating manner.

[0035] As the baffle 204 is provided and can open or close the non-heat-exchanged air inlet 2031, the non-heat-exchanged air inlet 2031 may be completely opened through controlling the position of the baffle 204, so that non-heat-exchanged air can enter the air-conditioner air supply apparatus 201 in the indoor unit through the non-heat-exchanged air inlet 2031, and then mix with heat-exchanged air that enters the air-conditioner air supply apparatus 201 to form mixed air that is then blown out from a mixed air outlet 2021 on the front panel 201; otherwise, the non-heat-exchanged air inlet 31 may be completely closed by control of the baffle 204, thereby achieving air supply having the same structure and mode as the existing air-conditioners. In addition, a part of the non-heat-exchanged air inlet 2031 may be shielded by control of the baffle 204, thereby controlling the amount of non-heat-exchanged air that enters the indoor unit from the non-heat-exchanged air inlet 2031, and achieving control over the ratio between heat-exchanged air volume and non-heat exchanged air volume in the mixed air.

[0036] In this embodiment, for the convenience of use by a user, the non-heat-exchanged air inlet 2031 may be opened or closed by the baffle 204 in a curved-line rotating manner that is manually controlled. For the specific implementation structure, please refer to FIG. 6, FIG. 7 and the following description of the two figures.

[0037] As shown in FIG. 6 and FIG. 7, a screw hole 2033, a first locating column 2032 and a second locating column 2034 are disposed on the rear panel 203 in the circumferential direction outside an edge of the non-heat-exchanged air inlet 2031. The baffle 204 is provided with a screw hole 2042 corresponding to the screw hole 2033, a groove 2043 corresponding to the first locating column 2032 and a locating hole 2041 corresponding to the second locating column 2034. The first locating column 2032 is located above the non-heat-exchanged air inlet 2031. The screw hole 2033 and the first locating column 2032 constitute fixing parts on the rear panel 203, and correspondingly coordinate with the screw hole 2042 and the groove 2043 as fixing coordination parts on the baffle 204. The second locating column 2034, as a rotating part on the rear panel 203, is disposed below the non-heat-exchanged air inlet 2031, and coordinates with the locating hole 2041 as a rotating coordination part on the baffle 204. The baffle 204 and the rear panel 203 can be assembled in a rotating manner through the rotating coordination part and rotating part, and when the non-heat-

exchanged air inlet 2031 is closed by the baffle 204, the baffle 204 may be fastened and connected with the rear panel 204 through fixing coordination parts and fixing parts.

[0038] Specifically, the second locating column 2034 on the rear panel 203 is sheathed with the locating hole 2041 on the baffle 204. When the baffle 204 is rotated manually, the baffle 204 will rotate with a rotation axis of the second locating column 2034. If it is not expected by a user that non-heat-exchanged air becomes a part of air supplied by the air-conditioner, for example, the temperature of air supplied from the air-conditioner is expected to be high when the air-conditioner operates in a heating work mode, the baffle 204 may be rotated manually, so that the groove 2043 on the baffle 204 rotates to the top, and is stuck below the first locating column on the rear panel 203. In such a case, the screw hole 2042 on the baffle 204 is aligned with the screw hole 2033 on the rear panel 203. Then, a screw is driven in each of the screw holes 2042 and 2033, and the baffle 204 is fixed on the rear panel 203, thereby forming a structure as shown in FIG. 7. In such a case, the non-heat-exchanged air inlet 2031 is completely closed by the baffle 204.

[0039] If a user expects the amount of air supplied by the air-conditioner increases, or mild mixed air at a proper temperature is supplied by the air-conditioner that operates in a cooling work mode, the following operations may be performed: firstly, the screws fixing the baffle 204 and the rear panel 203 are driven out of the screw holes 2033 and 2042; then, the groove 2043 on the baffle is separated from the first locating column 2032 on the rear panel 203 by imposing a slight force, so that the baffle 204 sags naturally under action of gravity with the locating hole 2041 and the second locating column 2034 as a supporting point, and appears as shown in FIG. 6. In such a case, the non-heat-exchanged air inlet 2031 is completely opened by the baffle 204.

[0040] Certainly, more corresponding screw holes may be disposed on the rear panel 203 and the baffle 204 as a fixing hole. After the groove 2043 on the baffle 204 is separated from the first locating column 2032 on the rear panel 203, the baffle 204 is rotated manually, and fixed to the rear panel 203 through a screw hole when the rotation angle thereof is less than 180° and the non-heat-exchanged air inlet 2031 has not been completely opened, so that a part of the non-heat-exchanged air inlet 2031 can be closed by the baffle 204, that is, a part of the non-heat-exchanged air inlet 2031 is opened. In such a case, the actual inlet air area of the non-heat-exchanged air inlet 2031 can be changed according to different rotation angles of the baffle 204, and then the air intake volume of non-heat-exchanged air may be changed according to different actual air inlet areas, thereby adjusting the mixing ratio of non-heat-exchanged air volume and heat-exchanged air volume in the mixed air.

[0041] In this embodiment, to avoid the baffle 204 dropping from the second locating column 2034, a sealing

cap may be disposed on top of the second locating column 2034.

[0042] For the vertical air-conditioner of the above embodiment, if the rear panel 203 and the baffle 204 are only provided with a screw hole, the non-heat-exchanged air inlet 2031 can be completely closed when the baffle 204 is fixed on the rear panel 203 through a screw; and the non-heat-exchanged air inlet 2031 can be completely opened when the screw is driven out and the baffle 204 is dismantled from the rear panel 203, thereby achieving the non-heat-exchanged air inlet 2031 being opened or closed by the baffle 204 in a dismantlable manner. Otherwise, the baffle 204 may also be connected by clamping or thread-connected with the rear panel 203 to achieve dismantling, and thus the non-heat-exchanged air inlet 2031 may be opened or closed by the baffle in a dismantlable manner.

[0043] Using the vertical air-conditioner of the first embodiment as an example, disposing the non-heat-exchanged air inlet 1031 on the rear panel 103 of the indoor unit and setting the non-heat-exchanged air inlet 1031 to be opened/closed in a straight-line push-and-pull manner, aim to adjust the amount of non-heat-exchanged air that enters the air-conditioner air supply apparatus 101 from the non-heat-exchanged air inlet 1031, thereby adjusting the amount and temperature of air supplied by the air-conditioner. The key of increasing the amount and changing the temperature of air supplied by the air-conditioner lies in the air-conditioner air supply apparatus 101 disposed in the internal air duct of the air-conditioner indoor unit.

[0044] Referring to a three-dimensional structural view of the air-conditioner air supply apparatus 101 as shown in FIG. 8 and a rear view in FIG. 9, together with FIG. 1 and FIG. 2, the air-conditioner air supply apparatus 101 provided in the air-conditioner indoor unit of the embodiment, includes three annular air guiding bodies, respectively being a front-end annular air guiding body 1011, a first middle annular air guiding body 1013 and a rear-end annular air guiding body 1012. Each of the three annular air guiding bodies that are arranged sequentially from front to rear is a single component and formed independently. The front-end annular air guiding body 1011 is hollow and has two openings, a front opening and a rear opening, where the front opening thereof is a mixed air outlet 10111; the first middle annular air guiding body 1013 is hollow and has two openings, a front opening and a rear opening; and the rear-end annular air guiding body 1012 is hollow and has two openings, a front opening and a rear opening, where the rear opening thereof is a non-heat-exchanged air inlet 10122. After the front-end annular air guiding body 1011, the first middle annular air guiding body 1013 and the rear-end annular air guiding body 1012 are arranged sequentially from front to rear, a through-duct that runs through all the three annular air guiding bodies from front to rear is formed in the middle (not marked in the figure). Moreover, a first annular heat-exchanged air duct 1014 is formed between

the front-end annular air guiding body 1011 and the first middle annular air guiding body 1013, and a second annular heat-exchanged air duct 1015 is formed between the first middle annular air guiding body 1013 and the rear-end annular air guiding body 1012. An internal air duct of the indoor unit is connected to a through-duct in the air-conditioner air supply apparatus 101 through the first annular heat-exchanged air duct 1014 and the second annular heat-exchanged air duct 1015. The first middle annular air guiding body 1013 is provided with an airflow distribution assembly 1016 that extends toward the first annular heat-exchanged air duct 1014 and the second annular heat-exchanged air duct 1015. In addition, for the convenience of processing, the airflow distribution assembly 1016 is preferably formed with the first middle annular air guiding body 1013 as a whole. Certainly, it may also be formed as a split unit, and then the airflow distribution assembly 1016 is installed and fixed onto the first middle annular air guiding body 1013.

[0045] When the air-conditioner air supply apparatus 101 is assembled in the air-conditioner, the rear-end annular air guiding body 1012 is fastened with the rear panel 103 of the air-conditioner. The first middle annular air guiding body 1013 is first fastened with the front-end annular air guiding body 1011, and then the front-end annular air guiding body 1011 fastened with the first middle annular air guiding body 1013 is fixed on the front panel 102 of the air conditioner. After being fixed in place, the mixed air outlet 10111 of the front-end annular air guiding body 1011, as an air outlet of the entire air-conditioner air supply apparatus 101, is enclosed and assembled with the mixed air outlet 1021 on the front panel 102; and the non-heat-exchanged air inlet 10122 in the rear-end annular air guiding body 1012, as a non-heat-exchanged air inlet of the entire air-conditioner air supply apparatus 101, is enclosed and assembled with the non-heat-exchanged air inlet 1031 on the rear panel 103.

[0046] If the air-conditioner air supply apparatus 101 of the above structure is adopted in an air-conditioner, when the non-heat-exchanged air inlet 1031 is opened by the baffle 104 and the air-conditioner operates, indoor air enters the indoor unit, is accelerated by the blower, and enters the heat exchanger for heat exchange. Heat-exchanged air is blown out from an internal air duct to the air-conditioner air supply apparatus 101. The heat-exchanged air, distributed by the airflow distribution assembly 1016, evenly enters the first annular heat-exchanged air duct 1014 and the second annular heat-exchanged air duct 1015 in the circumferential direction, then enters the through-duct through the heat-exchanged air ducts, and then is blown out from the mixed air outlet 10111 on the front-end annular air guiding body 1011 and the mixed air outlet 1021 on the front panel 102 through the through-duct. The flow rate of the heat-exchanged air blown out from the annular heat-exchanged air duct is increased, so that the surface pressure of the corresponding annular air guiding body decreases to form a negative pressure in the through-duct. Under the

negative pressure, indoor air outside the air-conditioner enters the through-duct from the opening 1061 on the rear panel 106, the non-heat-exchanged air inlet 1031 on the rear panel 103, and the non-heat-exchanged air inlet 10122 of the rear annular air guiding body 1012, and is mixed with the heat-exchanged air blown out from the annular heat-exchanged air duct to form mixed air, and then sent to the indoors.

[0047] The vertical air-conditioner is tested for the air volume and temperature at a certain rotation speed of a blower. After using the above air-conditioner air supply apparatus 101, the volume of non-heat-exchanged air introduced is about 1.1 times of the volume of heat-exchanged air, and the volume of mixed air obtained is about 2.1 times of the volume of heat-exchanged air. Compared with air supplied by an air-conditioner without the air-conditioner air supply apparatus 101 under the same condition, air supplied from the air-conditioner increases by about 1.1 times. Moreover, if the room temperature is about 28°C, air supplied from an air-conditioner without the air-conditioner air supply apparatus 101 is heat-exchanged air at a temperature of about 14°C; and after using the air-conditioner air supply apparatus 101, mixed air is supplied from the air-conditioner at about 19°C. The temperature of the mixed air can more conform to requirements for comfort of human body in respect of the temperature feeling. The mixed air is mild, which makes the user feel more comfortable, thereby improving the comfort of the user. In addition, part of external air that is not subjected to heat exchange is sucked under the negative pressure generated by the air supply apparatus 101 and becomes part of the air finally supplied from the air-conditioner, which increases the overall air intake volume of the air-conditioner, accelerates indoor air circulation, and further improves the overall uniformity of indoor air.

[0048] Certainly, if the non-heat-exchanged air inlet 1031 is completely closed by the baffle 104, the air-conditioner air supply apparatus 101 can only supply the heat-exchanged air, achieving air supply capability and functions similar to the existing air-conditioners.

[0049] For the specific structure of the airflow distribution assembly 1016, please refer to a rear view as shown in FIG. 9. The airflow distribution assembly 1016 of the embodiment is implemented by using a plurality of airflow distribution plates. The airflow distribution assembly 1016 of the embodiment totally includes eight airflow distribution plates in pairs, namely, primary airflow distribution plates 10161 and 10162, first auxiliary airflow distribution plates 10163 and 10164, second auxiliary airflow distribution plates 10165 and 10166, and third auxiliary airflow distribution plates 10167 and 10168. All the airflow distribution plates are bent distribution plates of the same bending direction, and the surface of each of the airflow distribution plates is an arc-shaped curved surface, which can effectively guide the air, reduce pressure loss and noise during splitting of the air flow, and achieve a high-speed air supply at low noise. The four pairs of airflow

distribution plates are arranged bilaterally symmetrically in the circumferential direction of the first annular heat-exchanged air duct 1014 and the second annular heat-exchanged air duct 1015 in such a manner that the primary airflow distribution plates 10161 and 10162, the first auxiliary airflow distribution plates 10163 and 10164, the second auxiliary airflow distribution plates 10165 and 10166, and the third auxiliary airflow distribution plates 10167 and 10168 are sequentially arranged from bottom to top. That is, in the air supply direction of the heat-exchanged air that is from bottom to top, the primary airflow distribution plate 10161, the first auxiliary airflow distribution plate 10163, the second auxiliary airflow distribution plate 10165 and the third auxiliary airflow distribution plate 10167 are disposed from bottom to top on the left side of the air-conditioner air supply apparatus 101 (in terms of the left and right sides in the rear view), and the primary airflow distribution plate 10162, the first auxiliary airflow distribution plate 10164, the second auxiliary airflow distribution plate 10166 and the third auxiliary airflow distribution plate 10168 are arranged bilaterally symmetrically on the right side of the air-conditioner air supply apparatus 101. In addition, the bending direction of each of the airflow distribution plates is reverse to the air supply direction of the heat-exchanged air. The air supply direction of the heat-exchanged air is from bottom to top, and accordingly, the bending direction of each of the airflow distribution plates will be reverse to the air supply direction, that is, each of the airflow distribution plates is bent in the anticlockwise direction shown in FIG. 9.

[0050] The airflow distribution assembly 1016 formed by a plurality of bent airflow distribution plates radially symmetrically arranged is disposed in the heat-exchanged air duct, so that the primary airflow distribution plates 10161 and 10162 can be used to divide the heat-exchanged air from the heat exchanger into left, middle and right parts, and the heat-exchanged air on the left and right sides is further divided by the auxiliary airflow distribution plates, so as to finally achieve uniform air intake and outtake in the circumferential direction of the heat-exchanged air duct of the air-conditioner air supply apparatus 101, thereby improving the uniformity of air supply from the air-conditioner air supply apparatus 101.

[0051] Certainly, in addition to using a plurality of bent airflow distribution plates for implementation of the airflow distribution assembly 1016, other structures may also be adopted if the heat-exchanged air from the heat exchanger can be evenly divided in the circumferential direction.

[0052] The foregoing embodiments are merely used to describe rather than limit the technical solutions of the present invention. Although the present invention is described in detail with reference to the foregoing embodiments, a person of ordinary skill in the art can still make modifications to the technical solutions described in the foregoing embodiments, or make equivalent replacements to some technical features thereof. Such modifications or replacements should not make the essence

of corresponding technical solutions depart from the spirit and scope of the technical solutions of the present invention.

Claims

1. A vertical air-conditioner, comprising an indoor unit, the indoor unit comprising a front panel, a rear panel, a left panel and a right panel, an internal air duct of the indoor unit being defined by the front panel, the rear panel, the left panel and the right panel, wherein a mixed air outlet is formed on the front panel, a non-heat-exchanged air inlet is formed on the rear panel at a position corresponding to the mixed air outlet, and a baffle configured to open/close the non-heat-exchanged air inlet is disposed at the non-heat-exchanged air inlet. 5
2. The vertical air-conditioner according to claim 1, wherein the non-heat-exchanged air inlet is opened/closed by the baffle in a straight-line push-and-pull manner. 10
3. The vertical air-conditioner according to claim 2, wherein the rear panel is provided with a baffle driving motor and a guide rail for sliding of the baffle, a gear drive mechanism is disposed on an output shaft of the baffle driving motor, and the baffle is provided with a rack engaged with the gear drive mechanism, wherein the baffle and the baffle driving motor are connected with the gear drive mechanism through the rack in a driving manner. 15
4. The vertical air-conditioner according to claim 3, wherein the non-heat-exchanged air inlet is opened/closed by the baffle in a manner of sliding up and down, and the rear panel is provided with a lug boss for limiting a lowest position of the baffle. 20
5. The vertical air-conditioner according to claim 3, wherein the rear panel is further provided with a rear cover plate that is configured to cover the baffle driving motor, the guide rail and the baffle, and an opening matching the non-heat-exchanged air inlet is formed on the rear cover plate. 25
6. The vertical air-conditioner according to claim 5, wherein the rear panel is connected with the rear cover plate by clamping. 30
7. The vertical air-conditioner according to claim 1, wherein the non-heat-exchanged air inlet is opened/closed by the baffle in a curved-line rotating manner. 35
8. The vertical air-conditioner according to claim 7, wherein the rear panel is provided with several fixing parts in the circumferential direction outside an edge of the non-heat-exchanged air inlet, and provided with a rotating part below the non-heat-exchanged air inlet; the baffle is correspondingly provided with several fixing coordination parts and a rotating coordination part; the baffle and the rear cover plate are assembled through the rotating coordination part and the rotating part in a rotating manner; and when the non-heat-exchanged air inlet is closed by the baffle, the baffle and the rear cover plate are fixed and connected through the fixing coordination parts and the fixing parts. 40
9. The vertical air-conditioner according to claim 8, wherein the fixing parts comprise several screw holes and a first locating column, the first locating column being located above the non-heat-exchanged air inlet; the fixing coordination parts comprise a screw hole and a groove matching the first locating column; the rotating part is a second locating column; and the rotating coordination part is a locating hole matching the second locating column. 45
10. The vertical air-conditioner according to claim 9, wherein the second locating column is provided with a sealing cap on top thereof. 50
11. The vertical air-conditioner according to claim 1, wherein the non-heat-exchanged air inlet is opened/closed by the baffle in a dismountable manner. 55
12. The vertical air-conditioner according to any one of claims 1 to 11, wherein the indoor unit is provided with an air-conditioner air supply apparatus inside, the air-conditioner air supply apparatus comprising at least two annular air guiding bodies that are hollow and have front and rear openings, wherein the rear openings of the annular air guiding bodies are air inlets and the front openings thereof are air outlets; the at least two annular air guiding bodies are arranged sequentially from front to rear, and a through-duct which runs from the front to rear is formed in the middle; an annular heat-exchanged air duct is formed between two adjacent annular air guiding bodies; and in the air-conditioner air supply apparatus, an air outlet of a front-end annular air guiding body located at the front end and an air inlet of a rear-end annular air guiding body located at the rear end are correspondingly enclosed and connected with the mixed air outlet on the front panel and the non-heat-exchanged air inlet on the rear panel.
13. The vertical air-conditioner according to claim 12, wherein at least one annular heat-exchanged air duct is provided with an airflow distribution assembly configured to distribute heat-exchanged air that is from a heat exchanger of the indoor unit and enters

the annular heat-exchanged air duct.

14. The vertical air-conditioner according to claim 13, wherein the airflow distribution assembly comprises a plurality of airflow distribution plates, the plurality of airflow distribution plates being arranged bilaterally symmetrically in the circumferential direction of the annular heat-exchanged air duct, and along an air supply direction of the heat-exchanged air.
15. The vertical air-conditioner according to claim 14, wherein the plurality of airflow distribution plates is bent distribution plates of the same bending direction, and the bending direction of the plurality of bent distribution plates is reverse to the air supply direction of the heat-exchanged air.

5

10

15

20

25

30

35

40

45

50

55

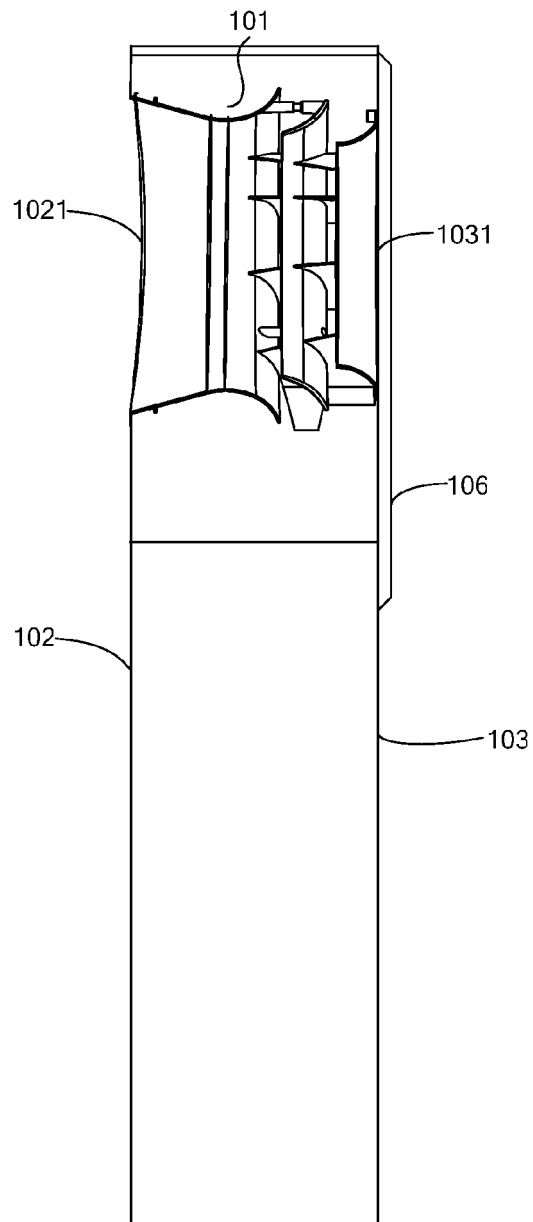


FIG. 1

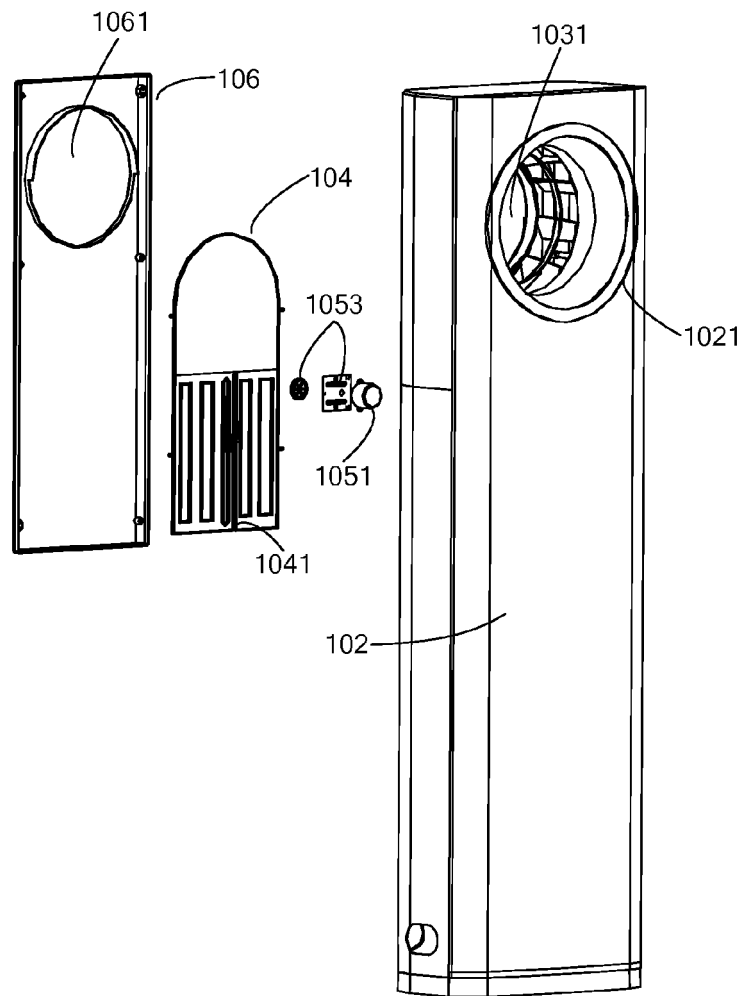


FIG. 2

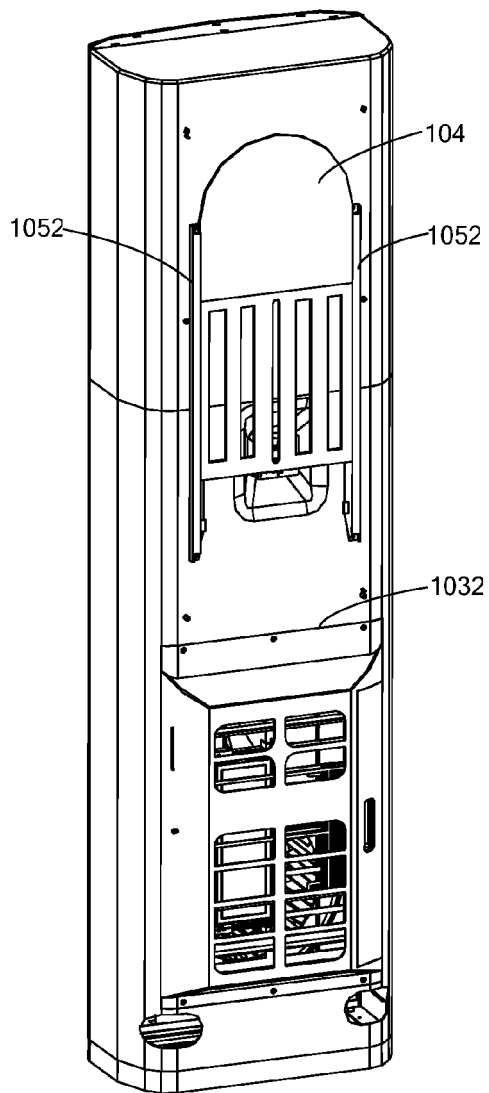


FIG. 3

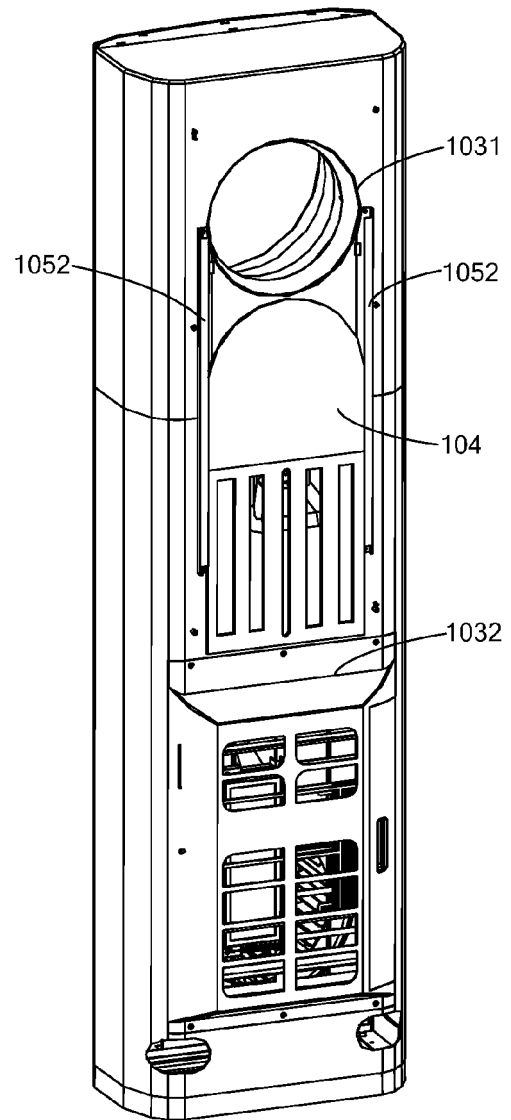


FIG. 4

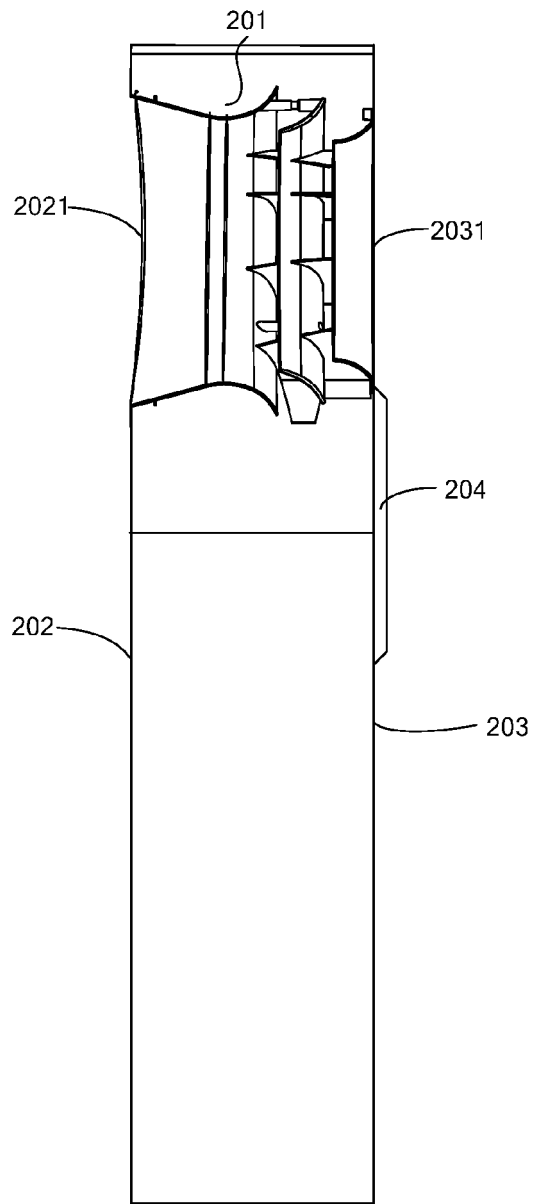


FIG. 5

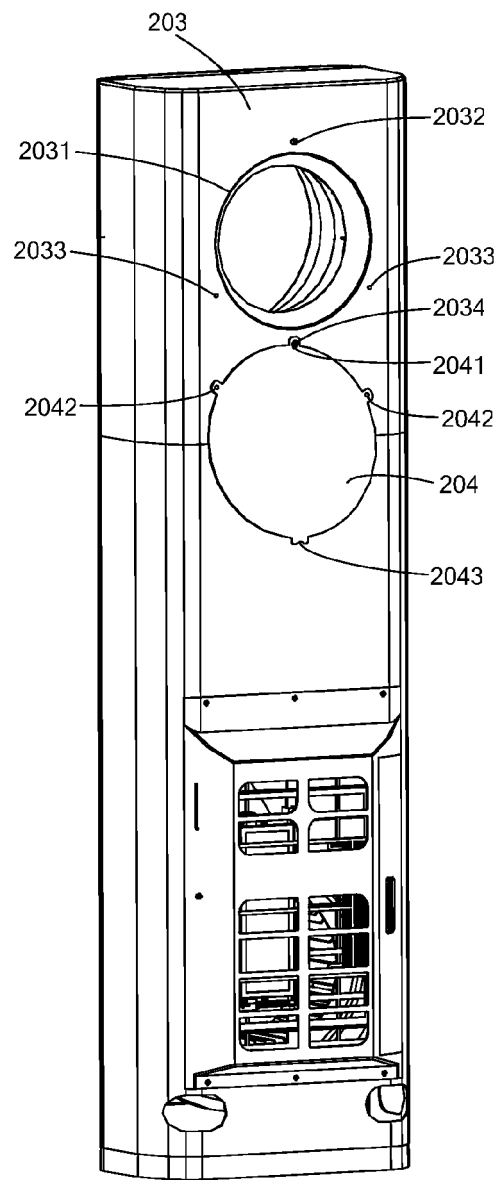


FIG. 6

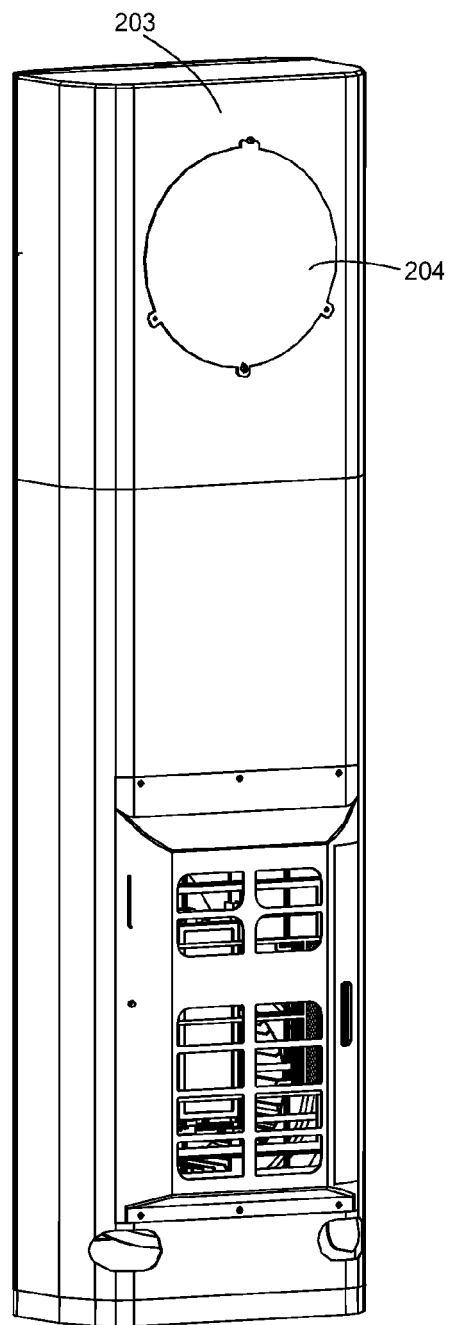


FIG. 7

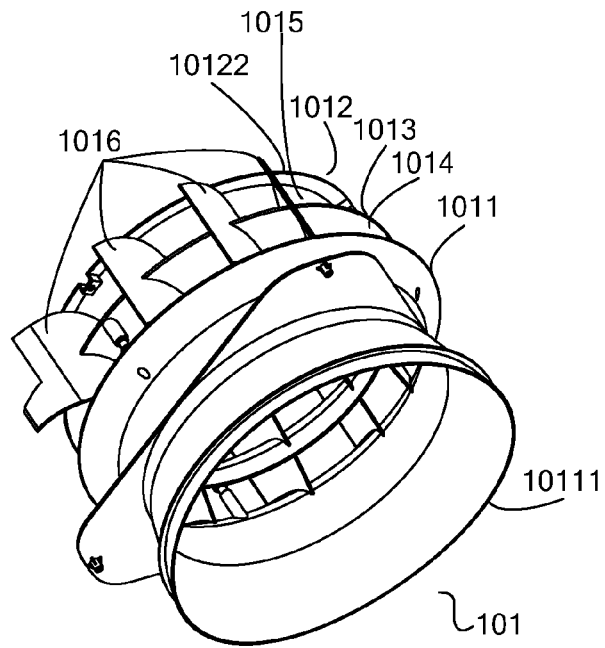


FIG. 8

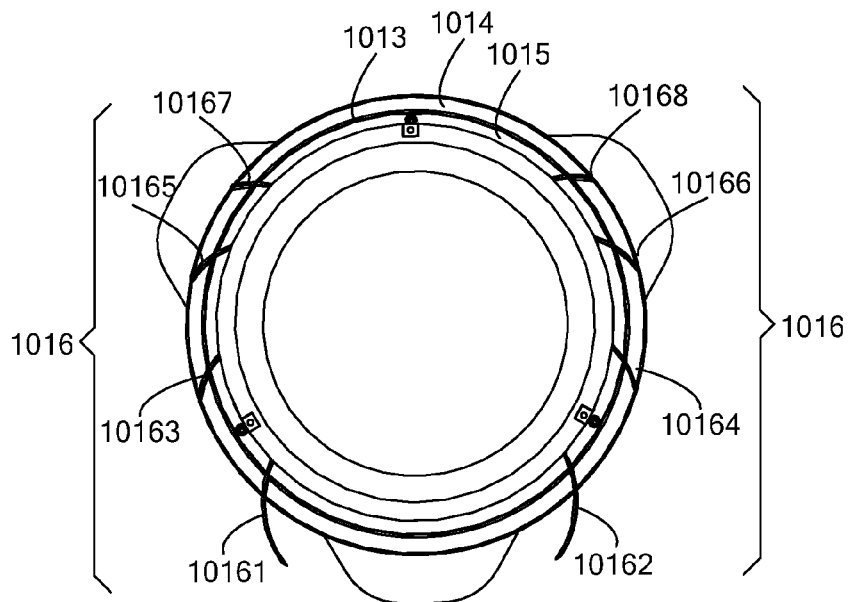


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2014/073420

A. CLASSIFICATION OF SUBJECT MATTER

F24F 13/10 (2006.01) i; F24F 13/04 (2006.01) i; F24F 13/08 (2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: F24F

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

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

CNPAT, CNKI, CNTXT, WPI, EPODOC: air w conditioner, indoor, panel, plate, back, new, wind, mix, damper, inlet, motor, gear, rack, guid+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 201032227 Y (GUAN, Yingui) 05 March 2008 (05.03.2008) description, page 1, line 13 to page 2, line 11, and figure 1	1-7, 10-15
Y	CN 102589053 A (LIU, Huarong) 18 July 2012 (18.07.2012) description, paragraphs [0020] to [0022], and figure 8	1-7, 10-15
Y	CN 201531983 U (FUJITSU GEN SHANGHAI CO., LTD.) 21 July 2010 (21.07.2010) description, paragraphs [0044] and [0045], and figure 5	3-6
Y	CN 202692254 U (LIU, Huarong) 23 January 2013 (23.01.2013) description, paragraph [0012] and figure 4	7
Y	CN 103175260 A (LG ELECTRONICS INC.) 26 June 2013 (26.06.2013) description, paragraphs [0061] to [0087], and figures 6 to 9	12-15

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

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

13 May 2014

Date of mailing of the international search report

25 June 2014

Name and mailing address of the ISA
State Intellectual Property Office of the P. R. China
No. 6, Xitucheng Road, Jimenqiao
Haidian District, Beijing 100088, China
Facsimile No. (86-10) 62019451

Authorized officer

SUN, Ye

Telephone No. (86-10) 62084688

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/073420

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP S56100243 A (HITACHI LTD) 12 August 1981 (12.08.1981) the whole document	1-15
A	CN 201382498 Y (SHENZHEN CITY YINGWEIKE SCI&TECHNOLOGY LTD) 13 January 2010 (13.01.2010) the whole document	1-15
A	JP S517737 Y1 (MASUSHITA ELECTRIC IND CO., LTD.) 01 March 1976 (01.03.1976) the whole document	1-15
A	KR 100432689 B1 (MANDO CLIMATE CONTROL CORP et al.) 22 May 2004 (22.05.2004) the whole document	1-15
A	JP 2000111083 A (FUJITSU GENERAL LTD) 18 April 2000 (18.04.2000) the whole document	1-15
PX	CN 103604163 A (HAIER GROUP CORP et al.) 26 February 2014 (26.02.2014) the whole document	1-15
PX	CN 203395988 U (HAIER GROUP CORP et al.) 15 January 2014 (15.01.2014) the whole document	1-15

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
 Information on patent family members

 International application No.
 PCT/CN2014/073420

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 201032227 Y	05 March 2008	None	
CN 102589053 A	18 July 2012	None	
CN 201531983 U	21 July 2010	None	
CN 202692254 U	23 January 2013	None	
CN 103175260 A	26 June 2013	KR 101234065 B1	15 February 2013
		KR 2013103288 A	23 September 2013
		EP 2607807 A1	26 June 2013
JPS 56100243 A	12 August 1981	None	
CN 201382498 Y	13 January 2010	None	
JPS 517737 Y1	1 March 1976	None	
KR 100432689 B1	22 May 2004	CN 1200233 C	04 May 2005
		JP 3653634 B2	02 June 2005
		CN 1405511 A	26 March 2003
		KR 20030023162 A	19 March 2003
		JP 2003114048 A	18 April 2003
JP 2000111083 A	18 April 2000	None	
CN 103604163 A	26 February 2014	None	
CN 203395988 U	15 January 2014	None	

Form PCT/ISA /210 (patent family annex) (July 2009)