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(54) **VERTICAL AIR-CONDITIONER AIR SUPPLY APPARATUS WITH AIRFLOW DISTRIBUTION ASSEMBLY**

(57) An air-conditioner air supply apparatus (1) provided with an airflow distribution assembly is provided. The air supply apparatus (1) includes at least two annular air guiding bodies. Each of the annular air guiding bodies is a single component, annular air guiding bodies are sequentially arranged from front to rear, and an annular heat-exchanged air duct (14, 15) is formed between two adjacent annular air guiding bodies. An airflow distribution assembly (16) constituted by airflow distribution plates is disposed in the at least one annular heat-exchanged air duct (14, 15). The airflow distribution assembly (16) at least includes a pair of primary airflow distribution plates (161, 162), and the pair of primary airflow distribution plates (161, 162) are bilaterally symmetrically disposed at a lower part of the annular heat-exchanged air duct (14, 15) along an air supply direction of a heat-exchanged air, and divides the annular heat-exchanged air duct (14, 15) into two parts whose lengths are at a ratio of 1:2 to 1:4.

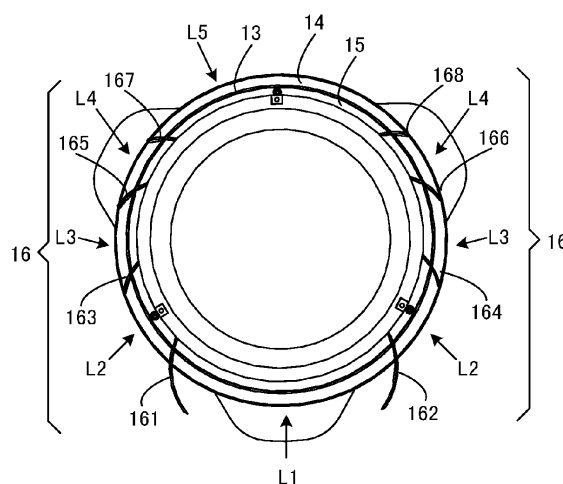


FIG. 4

Description

BACKGROUND

Technical Field

[0001] The present invention relates to the field of air conditioning technologies, and particularly to a vertical air-conditioner air supply apparatus provided with an air-flow distribution assembly.

Related Art

[0002] When a conventional vertical air-conditioner supplies air, air is subjected to heat exchange by a heat exchanger and is directly blown out from an air outlet provided on the air-conditioner under the action of an internal fan, and all of the blown-out air is heat-exchanged air. Generally, no additional air supply apparatus is disposed between the heat exchanger and the air outlet. One disadvantage of such an air supply method of the air-conditioner is that indoor air circulation is slow because the supplied air is all heat-exchanged air, an air volume is small, and the air flow rate is low; another disadvantage is that the supplied air is not mild enough, and especially in the cooling mode, the blown-out cool air directly blows on a user, making the user feel uncomfortable.

[0003] To solve the foregoing problems, the applicant proposed an air-conditioner air supply apparatus that can be applied to an air-conditioner. The air-conditioner air supply apparatus includes an annular cover body, where a through-duct running through the annular cover body is formed in the middle of the annular cover body, and an annular opening is formed on a wall of the annular cover body; several annular deflectors are disposed on the annular opening; and an annular air outlet duct is formed between adjacent annular deflectors. The installation of the air-conditioner air supply apparatus between a heat exchanger of an air-conditioner and an air outlet of a housing of the air-conditioner can not only increase the air intake volume, and accelerate indoor air circulation, but also enable the air-conditioner to supply milder air, thereby making the user feel more comfortable and improving the user experience. However, because the annular deflectors and the annular air outlet duct are both formed on an annular cover body, it is not convenient to flexibly select and control the structure of the annular deflector and the air outlet duct. Therefore, the scope of application is narrow. Moreover, because the fan of the air-conditioner supplies air from bottom to top, the heat-exchanged air is not uniformly distributed in the circumferential direction when entering the annular air outlet duct, and the air volume is large at the lower end of the annular air outlet duct but small at the left and right sides of the annular air outlet duct, so that the air supplied by the air-conditioner air supply apparatus is not uniformly distributed in the entire circumferential direction, thereby

affecting the comfort of the user.

SUMMARY

5 [0004] An objective of the present invention is to provide a vertical air-conditioner air supply apparatus provided with an airflow distribution assembly. The airflow distribution assembly constituted by airflow distribution plates is used to distribute air in a circumferential direction of the air supply apparatus, so as to improve the uniformity of air supply.

10 [0005] To achieve the foregoing objective of the present invention, the present invention is implemented by means of the following technical solutions:

15 A vertical air-conditioner air supply apparatus provided with an airflow distribution assembly is provided, where the air supply apparatus includes at least two annular air guiding bodies that are hollow and have front and rear openings; each of the annular air guiding bodies is a single component; multiple annual air guiding bodies are sequentially arranged from front to rear, and a through-duct which runs from front to end is formed in the middle; an annular heat-exchanged air duct is formed between two adjacent annular air guiding bodies; an air inlet of a rear-end annular air guiding body located at the rear end is a non-heat-exchanged air inlet; an air outlet of a front-end annular air guiding body located at the front end is a mixed air outlet; and an airflow distribution assembly for distributing heat-exchanged air that enters the heat-exchanged air duct from a heat exchanger of an air-conditioner that has the air-conditioner air supply apparatus is disposed in at least one annular heat-exchanged air ducts, where the airflow distribution assembly at least includes a pair of primary airflow distribution plates dividing the heat-exchanged air into left, middle and right parts, and the pair of the airflow distribution plates are bilaterally symmetrically disposed at a lower part of the annular heat-exchanged air duct along an air supply direction of the heat-exchanged air, and divides the annular heat-exchanged air duct into two parts having circumferential lengths whose lengths are at a ratio of 1:2 to 1:4.

20 [0006] According to the vertical air-conditioner air supply apparatus described above, the airflow distribution assembly further includes several pairs of auxiliary airflow distribution plates, and the several pairs of auxiliary airflow distribution plates are bilaterally symmetrically disposed sequentially above the primary airflow distribution plate, along the air supply direction of the heat-exchanged air, at a gradually decreasing spacing from bottom to top. According to the vertical air-conditioner air supply apparatus described above, the areas of the several pairs of auxiliary airflow distribution plates gradually decrease from bottom to top, and the area of the auxiliary

airflow distribution plate at the lowest position is smaller than the area of the primary airflow distribution plate.

[0007] According to the vertical air-conditioner air supply apparatus described above, among the several pairs of auxiliary airflow distribution plates, the circumferential length of the annular heat-exchanged air duct between the pair of airflow distribution plates that is located at the top accounts for 1/5 to 1/3 of the total circumferential length of the annular heat-exchanged air duct.

[0008] Preferably, there are three pairs of auxiliary airflow distribution plates.

[0009] According to the vertical air-conditioner air supply apparatus described above, the primary airflow distribution plates and the auxiliary airflow distribution plates are bent distribution plates of the same bending direction, the bending direction of the multiple airflow distribution plates is reverse to the air supply direction of the heat-exchanged air, and surfaces of each of the primary airflow distribution plates and each of the auxiliary airflow distribution plates are all curved surfaces.

[0010] Preferably, surfaces of each of the primary airflow distribution plates and each of the auxiliary airflow distribution plates are all arc-shaped curved surfaces.

[0011] Compared with the prior art, the present invention has the following advantages and positive effects:

1. After an air-conditioner air supply apparatus of the present invention is applied in an air-conditioner, heat-exchanged air in an internal air duct of the air-conditioner can be blown out from the front end through a through-duct, and part of external air that is not subjected to heat exchange can be sucked under negative pressure and become 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. Moreover, the mixed air is mild, which makes the user feel more comfortable, thereby improving the comfort of the user.

2. Through adopting a plurality of annular air guiding bodies in the form of a single component to constitute the air-conditioner air supply apparatus, it can not only facilitate flexibly controlling the structure of each annular air guiding body according to air supply requirements and easily producing each annular air guiding body having a different structure, but also achieve flexible selection of an assembling manner of the whole air-conditioner air supply apparatus in the air-conditioner, thereby improving the applicable scope of the air-conditioner air supply apparatus and production efficiency of an air-conditioner.

3. According to the feature of air supply of the air-conditioner, an airflow distribution assembly at least including one pair of airflow distribution plates is disposed in a heat-exchanged air duct, and an annular

heat-exchanged air duct is divided into two parts whose circumferential lengths are at a ratio of 1:2 to 1:4, so that the airflow distribution plates can be used to relatively uniformly distribute, in a circumferential direction, heat-exchanged air entering the air supply apparatus, so as to improve the uniformity of the air supply apparatus.

[0012] Other features and advantages of the present invention will become apparent after reading the detailed description of the present invention with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is a schematic structural view of an embodiment of a vertical air-conditioner having a vertical air-conditioner air supply apparatus of the present invention;

FIG. 2 is a schematic structural three-dimensional assembly view of the vertical air-conditioner air supply apparatus of FIG. 1;

FIG. 3 is an exploded schematic structural view of the vertical air-conditioner air supply apparatus of FIG. 2; and

FIG. 4 is a schematic structural rear view of the vertical air-conditioner air supply apparatus of FIG. 2;

DETAILED DESCRIPTION

[0014] The technical solutions of the present invention are further described in detail below with reference to the accompanying drawings and the detailed description. First, technical terms involved in the detailed description are briefly described. The front end or rear end 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 an enclosed structure that is formed by encircling, but is not limited to a

circular ring.

[0015] Then, the design concept of the present invention is briefly described. With an air-conditioner air supply apparatus that can produce and supply mixed air by mixing heat-exchanged air of a heat exchanger of an air-conditioner with external non-heat-exchanged air, the amount of air supplied can be increased and the temperature of air supplied can be ensured. However, because the fan inside the air-conditioner is located at the lower end, the heat-exchanged air is supplied from bottom to top after being subjected to heat exchange by the heat exchanger; in this case, once such an air-conditioner air supply apparatus is arranged in the air-conditioner, most of the heat-exchanged air enters the air-conditioner air supply apparatus from the bottom of the air-conditioner air supply apparatus under the action of the fan, and only a small air volume enters the air-conditioner air supply apparatus from left and right sides and the top of the air-conditioner air supply apparatus, resulting in a non-uniform air supply in the circumferential direction of the air-conditioner air supply apparatus. To solve this problem, in an annular heat-exchanged air duct of an air-conditioner air supply apparatus, an airflow distribution assembly for distributing, particularly uniformly distributing heat-exchanged air that enters the heat-exchanged air duct from the heat exchanger of the air-conditioner may be disposed. The shape, area, and disposing position in the heat-exchanged air duct, of each airflow distribution plate are properly designed, so that the heat-exchanged air uniformly enters the heat-exchanged air duct in the circumferential direction, thereby improving the uniformity of the air supply of the air-conditioner air supply apparatus.

[0016] Referring to FIG. 1, FIG. 1 is a schematic structural view of an embodiment of a vertical air-conditioner having an air-conditioner air supply apparatus 1 of the present invention.

[0017] As shown in FIG. 1, the air-conditioner of this embodiment includes a front panel 2, a rear panel 3, a left panel, a right panel, a top plate and a bottom plate (not marked in the figure) that constitute a housing of the air-conditioner. The housing defines an internal air duct 4 of the air-conditioner. A mixed air outlet 21 is formed on an upper part of the front panel 2 of the air-conditioner, and a non-heat-exchanged air inlet 31 is formed on an upper part of the rear panel 3 of the air-conditioner and at a position corresponding to the mixed air outlet 21 on the front panel 2. A blower 6, a heat exchanger 5 and an air-conditioner air supply apparatus 1 are disposed from bottom to top in the internal air duct 4, and the blower 6 is disposed in such a manner that air from the internal air duct 4 of the air-conditioner is blown out from the mixed air outlet 21 on the front panel 2.

[0018] For a structure of the air-conditioner air supply apparatus 1, reference is made to a schematic structural three-dimensional assembly view of FIG. 2, an exploded schematic structural view of FIG. 3, and a schematic structural rear view of FIG. 4.

[0019] As shown in FIG. 2, FIG. 3, and FIG. 4 together with FIG. 1, the air-conditioner air supply apparatus 1 includes three annular air guiding bodies, which separately are a front-end annular air guiding body 11, a first middle annular air guiding body 13, and a rear-end annular air guiding body 12. Each of the three annular air guiding bodies that are sequentially arranged from front to rear is a single component and formed independently. The front-end annular air guiding body 11 is hollow and has two openings: a front opening and a rear opening, which respectively are a mixed air outlet 111, and an air inlet 112; the first middle annular air guiding body 13 is hollow and has two openings: a front opening and a rear opening, which respectively are an air outlet 131 and an air inlet 132; and the rear-end annular air guiding body 12 is hollow and has two openings: a front opening and a rear opening, which respectively are an air outlet 121 and a non-heat-exchanged air inlet 122. After the front-end annular air guiding body 11, the first middle annular air guiding body 13 and the rear-end annular air guiding body 12 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 14 is formed between the front-end annular air guiding body 11 and the first middle annular air guiding body 13, and a second annular heat-exchanged air duct 15 is formed between the first middle annular air guiding body 13 and the rear-end annular air guiding body 12. The internal air duct 4 of the air-conditioner is connected to the through-duct in the air-conditioner air supply apparatus 1 through the first annular heat-exchanged air duct 14 and the second annular heat-exchanged air duct 15. An airflow distribution assembly 16 extending into the first annular heat-exchanged air duct 14 and the second annular heat-exchanged air duct 15 is disposed on the first middle annular air guiding body 13. Moreover, for ease of processing, the airflow distribution assembly 16 and the first middle annular air guiding body 13 are preferably integrally formed. Certainly, the airflow distribution assembly 16 and the first middle annular air guiding body 13 may also be formed separately, and then the airflow distribution assembly 16 is installed and fixed on the first middle annular air guiding body 13.

[0020] When the air-conditioner air supply apparatus 1 is assembled in the air-conditioner, the rear-end annular air guiding body 12 is fastened with the rear panel 3 of the air-conditioner. The first middle annular air guiding body 13 is first fastened with the front-end annular air guiding body 11 by using a screw, and then the front-end annular air guiding body 11 is fastened with the first middle annular air guiding body 13 is fixed on the front panel 2 of the air-conditioner. After being fixed in place, the mixed air outlet 111 of the front-end annular air guiding body 11 acts as an air outlet of the whole air-conditioner air supply apparatus 1, and is enclosed and assembled with the mixed air outlet 21 on the front panel 2; and the non-

heat-exchanged air inlet 122 in the rear-end annular air guiding body 12 acts as a non-heat-exchanged air inlet of the whole air-conditioner air supply apparatus 1, and is enclosed and assembled with the non-heat-exchanged air inlet 31 on the rear panel 3.

[0021] After the air-conditioner air supply apparatus 1 of the above structure is used in an air-conditioner, when the air-conditioner is running, indoor air enters the air-conditioner, is accelerated, under the action of the blower 6, to be blown to a heat exchanger 5 for a heat exchange. The heat-exchanged air after the heat exchange is blown from the internal air duct 4 to the air-conditioner air supply apparatus 1. The heat-exchanged air is distributed by the airflow distribution assembly, to uniformly enter the through-duct along the circumferential direction, and through the first annular heat-exchanged air duct 14 and the second annular heat-exchanged air duct 15, and then the heat-exchanged air is blown out from the mixed air outlet 111 on the front-end annular air guiding body 11 and the mixed air outlet 21 on the front panel through the through-duct. Meanwhile, a negative pressure is formed in the through-duct. Indoor air, which is used as the non-heat-exchanged air, outside the air-conditioner, enters, under the action of the negative pressure, the through-duct from the non-heat-exchanged air inlet 31 on the rear panel 3 and the non-heat-exchanged air inlet 122 of the rear-end annular air guiding body 12, and is mixed with the heat-exchanged air blown out from the annular heat-exchanged air duct to form mixed air, guided by a mixed air guiding portion 113 that is extended outward, and smoothly sent indoors together with the heat-exchanged air.

[0022] Under a certain rotation speed of the blower, air volume measurement and temperature detection are performed on the vertical air-conditioner. After the foregoing air-conditioner air supply apparatus 1 is used, an air volume of the introduced non-heat-exchanged air is about 0.89 times the volume of the heat-exchanged air, and a volume of the obtained mixed air is about 1.89 times the volume of the heat-exchanged air. Under a same condition, the air supply of the conditioner is about 0.89 times greater than air supply without using the air-conditioner air supply apparatus 1. Moreover, if a room temperature is about 27.5°C, air blown out from an air-conditioner without using the air-conditioner air supply apparatus 1 is heat-exchanged air, and the temperature of the heat-exchanged air is about 13°C; however, after the air-conditioner air supply apparatus 1 is used, mixed air supplied by an air-conditioner is at about 18.5°C, and a temperature of the mixed air more satisfies a requirement of comfort of people. The mixed air is mild, which makes a user feel more comfortable, thereby improving the comfort of the user. Moreover, a part of external air that is not subjected to heat exchange is sucked under the negative pressure generated by the air supply apparatus 1 and becomes a part of the air finally supplied from the air-conditioner, which increases the overall air intake volume of the air-conditioner, accelerates indoor air cir-

ulation, and further improves the overall uniformity of indoor air.

[0023] In this embodiment, the air-conditioner air supply apparatus 1 is constituted by a combination of multiple annular air guiding bodies in the form of a single component, so that it is easier to flexibly control a structure of each annular air guiding body according to an air supply requirement, and produce each annular air guiding body having a different structure, thereby ensuring the uniformity and a speed of air supply. In addition, because each annular air guiding body is a single component, a manner in which the whole air-conditioner air supply apparatus 1 is assembled in the air-conditioner can be flexibly selected, thereby improving applicable scope of the air-conditioner air supply apparatus 1 and production efficiency of the air-conditioner.

[0024] Referring to the schematic structural rear view of FIG. 4 again, the airflow distribution assembly 16 of this embodiment is implemented by using multiple airflow distribution plates. The airflow distribution assembly 16 of this embodiment totally includes four pairs (eight) of airflow distribution plates, which separately are primary airflow distribution plates 161 and 162, first auxiliary airflow distribution plates 163 and 164, second auxiliary airflow distribution plates 165 and 166, and third auxiliary airflow distribution plates 167 and 168. All the airflow distribution plates are bent distribution plates of a same bending direction, and a surface of each airflow distribution plate is an arc-shaped curved surface, which can effectively guide a direction of air, and reduce pressure loss and noise of airflow during a process of airflow distribution, thereby implementing high-speed air supply in low noise. The four pairs of the airflow distribution plates are bilaterally symmetrically arranged in a circumferential direction of the first annular heat-exchanged air duct 14 and the second annular heat-exchanged air duct 15 in a sequence that the primary airflow distribution plates 161 and 162 are at bottom, and the first auxiliary airflow distribution plates 163 and 164, the second auxiliary airflow distribution plates 165 and 166, and the auxiliary airflow distribution plate 167 and 168 are sequentially disposed upwards. That is, in a bottom-up air supply direction of heat-exchanged air, the primary airflow distribution plate 161, the first auxiliary airflow distribution plate 163, the second auxiliary airflow distribution plate 165, and the third auxiliary airflow distribution plate 167 are disposed from bottom up on the left side (in terms of the left and right sides in a rear view direction) of the air-conditioner air supply apparatus 1; and the primary airflow distribution plate 162, the first auxiliary airflow distribution plate 164, the second auxiliary airflow distribution plate 166 and the third auxiliary airflow distribution plate 168 are disposed in a bilaterally symmetrical form on the right side of the air-conditioner air supply apparatus 1. Moreover, the bending direction of the airflow distribution plates is reverse to the air supply direction of the heat-exchanged air. That is, the air supply direction of the heat-exchanged air is from bottom up, and the bending direc-

tion of the airflow distribution plates is reverse to the air supply direction, that is, the airflow distribution plates are bent at a counterclockwise direction shown in FIG. 4.

[0025] The airflow distribution assembly 16 constituted by multiple bent airflow distribution plates radially symmetrically arranged is disposed in the heat-exchanged air duct, so that the primary airflow distribution plates 161 and 162 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 may further be divided by the auxiliary airflow distribution plates, uniform air intake and outtake in the circumferential direction of the heat-exchanged air duct of the air-conditioner air supply apparatus 1 are finally implemented.

[0026] Certainly, in addition to being implemented by using multiple bent airflow distribution plates, another structure may also be used by the airflow distribution assembly 16, as long as it can be ensured that the heat-exchanged air from the heat exchanger 5 is uniformly distributed in the circumferential direction.

[0027] The shape, area and disposing position of each of the airflow distribution plates in the heat-exchanged air duct are key factors affecting the uniformity of air supply. In this embodiment, the paired airflow distribution plates are of the same shape and area. However, for the multiple airflow distribution plates on one side, from bottom to top, the area of the primary airflow distribution plate 161 or 162 is greater than that of the first auxiliary airflow distribution plate 163 or 164, the area of the first auxiliary airflow distribution plate 163 or 164 is greater than that of the second auxiliary airflow distribution plate 165 or 166, and the area of the fourth auxiliary airflow distribution plate 165 or 166 is greater than that of the third auxiliary airflow distribution plate 167 or 168.

[0028] Moreover, because the density of air flow is not identical in the circumferential direction, the airflow distribution plates on the same side are distributed at unequal spacings. Specifically, a length of an arc L2 between the primary airflow distribution plate 161 or 162 and the first auxiliary airflow distribution plate 163 or 164 (indicating the spacing between the two) is greater than a length of an arc L3 between the first auxiliary airflow distribution plate 163 or 164 and the second auxiliary airflow distribution plate 165 or 166, and a length of the arc L3 between the first auxiliary airflow distribution plate 163 or 164 and the second auxiliary airflow distribution plate 165 or 166 is greater than a length of an arc L4 between the second auxiliary airflow distribution plate 165 or 166 and the third auxiliary airflow distribution plate 187 or 188. Preferably, the ratio of the lengths of the arc L2, the arc L3 and the arc L4 is 6:5:3.

[0029] In addition, the primary airflow distribution plates 161 and 162 disposed at the bottom of the first annular heat-exchanged air duct 14 and the second annular heat-exchanged air duct 15 divide the two annular heat-exchanged air ducts into an upper part and a lower part, where the lower part corresponds to the arc L1, and

all other arcs are the upper part. To ensure the uniformity of air supply in the circumferential direction, the ratio of the length of the arc L1 corresponding to the lower part to the length of the arcs of the upper part (not marked in the figure, which are arcs in the entire circumferential direction other than L1) is 1:2 to 1:4. The third auxiliary airflow distribution plates 167 and 168 located at the top of the two annular heat-exchanged air ducts define an arc L5 at the top, and a length of the arc L5 accounts for 1/5 to 1/3 of the total circumferential length of the first annular heat-exchanged air duct 14 or the second annular heat-exchanged air duct 15.

[0030] In the air-conditioner in this embodiment, as a preferred implementation manner, the mixed air outlet 21 on the front panel 2 and the non-heat-exchanged air inlet 31 on the rear panel 3 have a circular shape, and correspondingly, each annular air guiding body in the air-conditioner air supply apparatus 1 has an annular shape. However, shapes are not limited thereto, and the technical objectives of the present invention can also be achieved by using other combinations of shapes, for example, an ellipse and an elliptical ring, a regular polygon and a regular polygonal ring, and the like.

[0031] It should be noted that one pair of primary airflow distribution plates and three pairs of auxiliary airflow distribution plates are disposed in this embodiment, but the present invention is not limited thereto. It is also feasible to implement relatively uniform distribution of circumferential air supply by only disposing one pair of primary airflow distribution plates; or one pair, two pairs or pairs higher than three pairs of auxiliary airflow distribution plates may also be disposed as needed. None of these technical solutions depart from the design concept of the present invention, and they all fall in the protection scope of the present invention.

[0032] Moreover, although the air-conditioner air supply apparatus 1 in this embodiment has three annular air guiding bodies, the present invention is not limited to such three annular air guiding bodies, and the air-conditioner air supply apparatus 1 may also only have two annular air guiding bodies: the front annular air guiding body 11 and a rear annular air guiding body 12, where the two annular air guiding bodies form a heat-exchanged air duct. Under this structure, an airflow distribution assembly that is constituted by airflow distribution plates and is fastened with one of the annular air guiding bodies may be disposed in the heat-exchanged air duct to implement the distribution of the heat-exchanged air.

[0033] Certainly, there may also be more annular air guiding bodies. For example, in addition to the front annular air guiding body 11 and the rear annular air guiding body 12, two or more first middle annular air guiding bodies 13 may also be included, to constitute an air-conditioner air supply apparatus having four or more annular air guiding bodies. Under this structure, three or more heat-exchanged air ducts are generated. In such an air-conditioner air supply apparatus, preferably, the airflow distribution assembly constituted by the airflow distribu-

tion plates is disposed in each of the heat-exchanged air ducts. Moreover, to simplify the structure, one airflow distribution assembly may be shared by two heat-exchanged air ducts, that is, the airflow distribution assembly is disposed on the middle annular air guiding body, and extends into other two annular heat-exchanged air ducts formed by the annular air guiding body.

[0034] The foregoing embodiment is 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 embodiment, a person of ordinary skill in the art can still make modifications to the technical solutions described in the foregoing embodiment, 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 air supply apparatus provided with an airflow distribution assembly, wherein the air supply apparatus comprises at least two annular air guiding bodies that are hollow and have front and rear openings; each of the annular air guiding bodies is a single component; multiple annular air guiding bodies are sequentially arranged from front to rear, and a through-duct which runs from front to end is formed in the middle; an annular heat-exchanged air duct is formed between two adjacent annular air guiding bodies; an air inlet of a rear-end annular air guiding body located at the rear end is a non-heat-exchanged air inlet; an air outlet of a front-end annular air guiding body located at the front end is a mixed air outlet; and an airflow distribution assembly for distributing heat-exchanged air that enters the heat-exchanged air duct from a heat exchanger of an air-conditioner that has the air-conditioner air supply apparatus is disposed in at least one annular heat-exchanged air ducts, wherein the airflow distribution assembly at least comprises a pair of primary airflow distribution plates dividing the heat-exchanged air into left, middle and right parts, and the pair of the airflow distribution plates are bilaterally symmetrically disposed at a lower part of the annular heat-exchanged air duct along an air supply direction of the heat-exchanged air, and divides the annular heat-exchanged air duct into two parts whose lengths are at a ratio of 1:2 to 1:4.
2. The vertical air-conditioner air supply apparatus according to claim 1, wherein the airflow distribution assembly further comprises several pairs of auxiliary airflow distribution plates, and the several pairs of auxiliary airflow distribution plates are bilaterally

symmetrically disposed sequentially above the primary airflow distribution plate, along the air supply direction of the heat-exchanged air, at a gradually decreasing spacing from bottom to top.

3. The vertical air-conditioner air supply apparatus according to claim 2, wherein the areas of the several pairs of auxiliary airflow distribution plates gradually decrease from bottom to top, and the area of the auxiliary airflow distribution plate at the lowest position is smaller than the area of the primary airflow distribution plate.
4. The vertical air-conditioner air supply apparatus according to claim 2, wherein among the several pairs of auxiliary airflow distribution plates, the circumferential length of the annular heat-exchanged air duct between the pair of airflow distribution plates that is located at the top accounts for 1/5 to 1/3 of the total circumferential length of the annular heat-exchanged air duct.
5. The vertical air-conditioner air supply apparatus according to claim 2, wherein there are three pairs of auxiliary airflow distribution plates.
6. The vertical air-conditioner air supply apparatus according to any one of claims 2 to 5, wherein the primary airflow distribution plates and the auxiliary airflow distribution plates are bent distribution plates of the same bending direction, the bending direction of the multiple airflow distribution plates is reverse to the air supply direction of the heat-exchanged air, and surfaces of each of the primary airflow distribution plates and each of the auxiliary airflow distribution plates are all curved surfaces.
7. The vertical air-conditioner air supply apparatus according to claim 6, wherein the surfaces of each of the primary airflow distribution plates and each of the auxiliary airflow distribution plates are all arc-shaped curved surfaces.

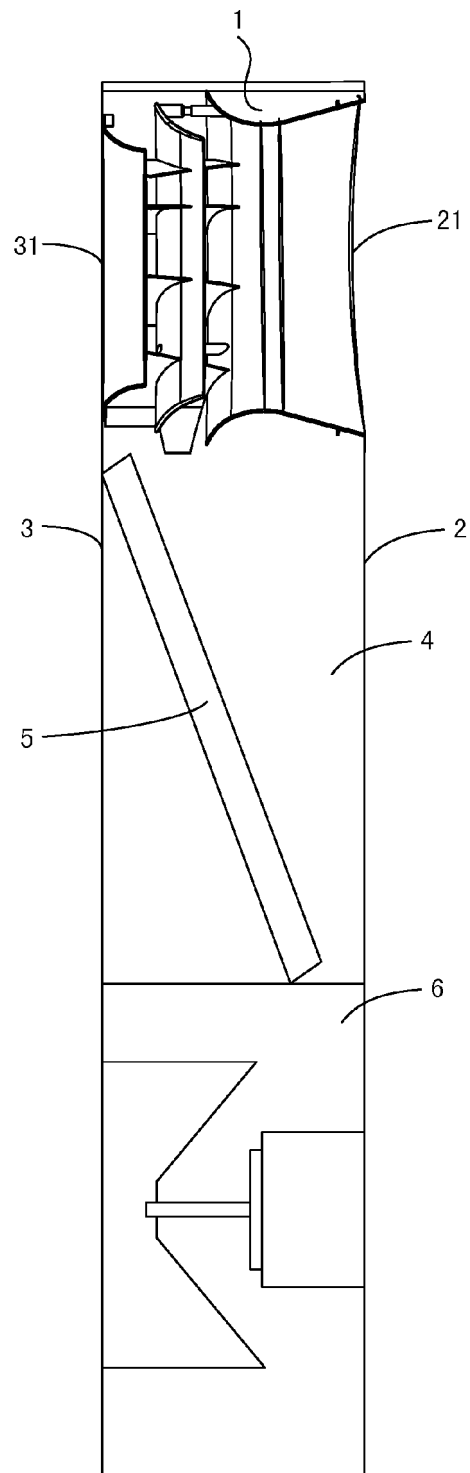


FIG. 1

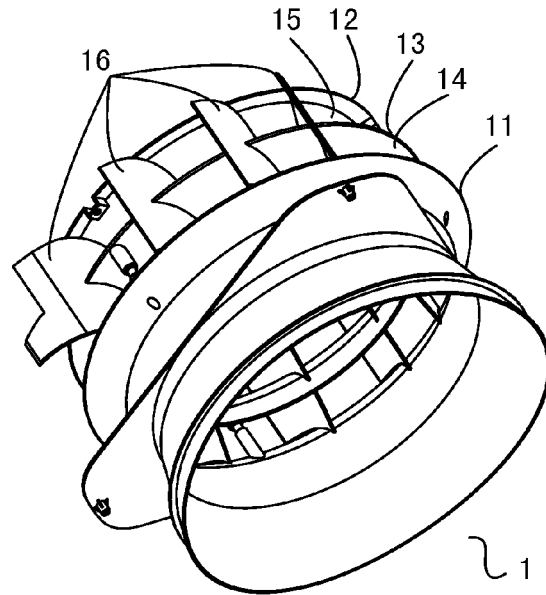


FIG. 2

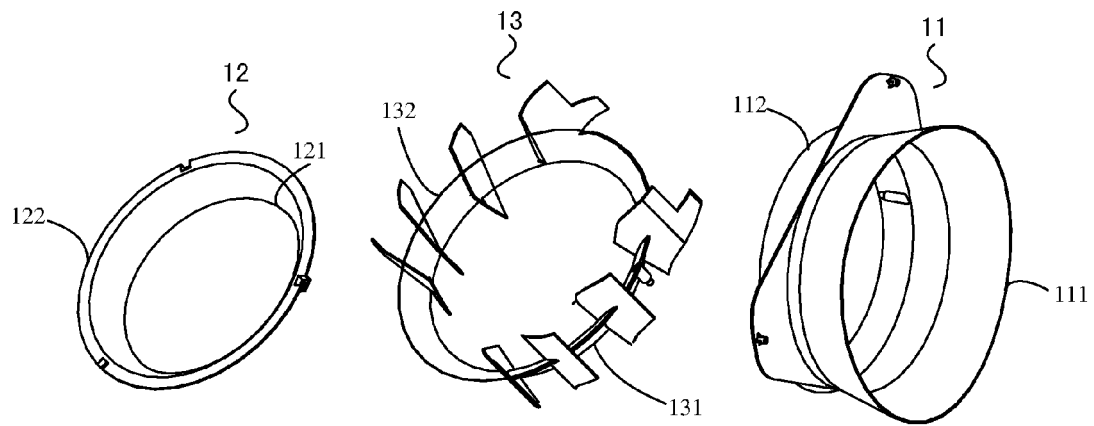


FIG. 3

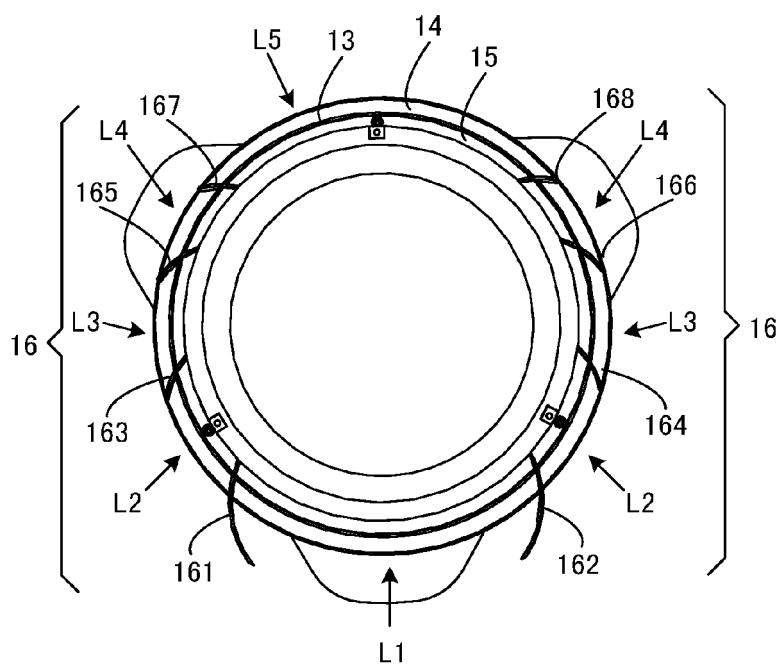


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2014/078204

A. CLASSIFICATION OF SUBJECT MATTER

F24F 13/06 (2006.01) i; F24F 13/02 (2006.01) i; F24F 13/26 (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)

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, WPI, EPODOC: air w conditioner, ventilator, blast, ring, heat w exchang+, mix, distribut+, plate?

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 101234065 B1 (LG ELECTRONICS INC.) 15 February 2013 (15.02.2013) description, paragraphs [0030] to [0076], and figures 1 and 6 to 8	1
Y	JP 2001304670 A (MIYAKO KK et al.) 31 October 2001 (31.10.2001) description, paragraphs [0018] to [0029], and figures 1 and 3	1
A	JPH 10267376 A (OHBAYASHI GUMI KK) 09 October 1998 (09.10.1998) the whole document	1-7
A	CN 202074660 U (KIMURA KOHKI CO LTD) 14 December 2011 (14.12.2011) the whole document	1-7
A	CN 1782601 A (LEJIN ELECTRONIC TIANJIN ELEC APPLIANCE et al.) 07 June 2006 (07.06.2006) the whole document	1-7

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

* Special categories of cited documents:	"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
"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	"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
"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)	"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
"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	"&" document member of the same patent family

Date of the actual completion of the international search 17 July 2014	Date of mailing of the international search report 29 August 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

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2014/078204

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 103453643 A (HAIER GROUP CORP et al.) 18 December 2013 (18.12.2013) the whole document	1-7
PX	CN 203274149 U (HAIER GROUP CORP et al.) 06 November 2013 (06.11.2013) the whole document	1-7

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

INTERNATIONAL SEARCH REPORT
 Information on patent family members

 International application No.
 PCT/CN2014/078204

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
KR 101234065 B1	15 February 2013	EP 2607807 A1	26 June 2013
		CN 103175260 A	26 June 2013
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JPH 10267376 A	09 October 1998	JP 3783320 B2	07 June 2006
CN 202074660 U	14 December 2011	CN 102374625 A	14 March 2012
		JP 2012063079 A	29 March 2012
		HK 1164983 A0	28 September 2012
CN 1782601 A	07 June 2006	CN 100504223 C	24 June 2009
CN 103453643 A	18 December 2013	None	
CN 203274149 U	06 November 2013	None	