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• **Hisense (Guangdong) Air Conditioner Co., Ltd.**
JiangMen, Guangdong 528303 (CN)

(72) Inventor: **WANG, Weige**
Foshan
Guangdong 528303 (CN)

(74) Representative: **Casalonga**
Casalonga & Partners
Bayerstraße 71/73
80335 München (DE)

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(71) Applicants:
• **Hisense Kelon Electrical Holdings Co., Ltd.**
Foshan, Guangdong 528303 (CN)

(54) **AIR CONDITIONER INDOOR UNIT**

(57) The present disclosure relates to the technical field of air conditioners and discloses an air conditioner indoor unit. The air conditioner indoor unit is invented to solve the problem that air conditioners with fresh air systems in the prior art have low anti-resistance capabilities and can obtain only a small amount of fresh air. An air conditioner indoor unit, comprising a shell, the shell being provided with an indoor air inlet, an outdoor air inlet, and an air outlet, a double side air inlet centrifugal fan being arranged inside the shell, the centrifugal fan comprising a first air inlet side, a second air inlet side, and an air outlet side, the first air inlet side being arranged opposite the indoor air inlet, the second air inlet side being arranged opposite the outdoor air inlet, the air outlet side being arranged opposite the air outlet, and a heat exchanger being arranged between the first air inlet side and the indoor air inlet. The air conditioner indoor unit of the present disclosure is used for adjusting indoor air temperature and quality.

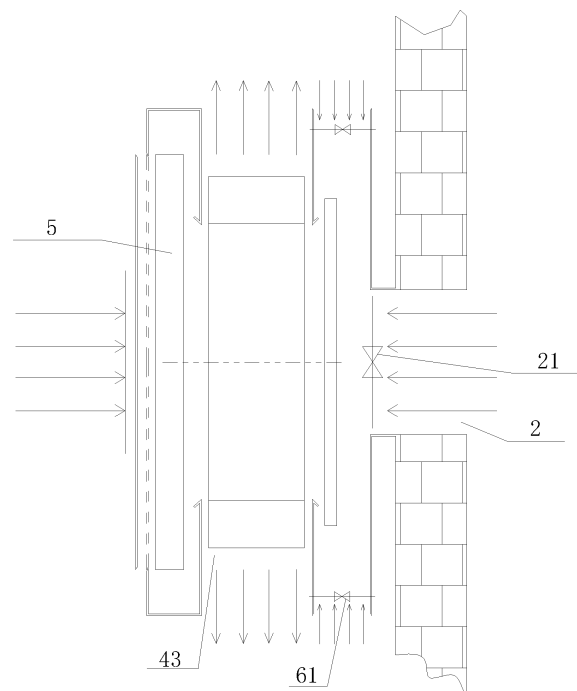


FIG. 2

Description

[0001] This application claims priority to Chinese Patent Application No. 201610061609.9, filed on January 28, 2016, titled "AN AIR CONDITIONER INDOOR UNIT", which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to the field of air conditioner technologies, in particular, to an air conditioner indoor unit.

BACKGROUND

[0003] As people pay more and more attention to air quality, air purification products are becoming more and more popular. Relevant air purifiers on the market improve air quality by sucking indoor air into the machine, treating the pollutants in the air by adsorption, decomposition or conversion, and then discharging them into the room again. However, as air purifiers are used in closed rooms for the long term, due to the lack of fresh air, the oxygen content in the air will gradually drop, causing people to feel stuffed up when breathing indoors. Therefore, it is necessary to open the window for ventilation from time to time; if the quality of the outdoor air is poor, the untreated air will directly enter the room, causing the original air in the room to deteriorate further.

[0004] Relevant air conditioners with fresh air systems generally adopt a cross-flow fan. The cross-flow fan partially opens the shell so that the airflow directly enters the fan in a radial direction. As the airflow is rather concentrated at the air inlet of the fan, some blades are subjected to a large pressure. Therefore, the cross-flow fan has low anti-resistance capabilities. Moreover, as the direction of the airflow needs to be forcibly turned in the impeller, there is large air loss at the head of the fan and the amount of obtained fresh air is too small. As a result, the air exchange speed is slow, and the ventilation effect is unsatisfactory.

SUMMARY

[0005] Embodiments of the present disclosure provide an air conditioner indoor unit, for use in solving the problem that air conditioners with fresh air systems in the prior art can obtain only a small amount of fresh air due to their low anti-resistance capabilities.

[0006] In order to achieve the above objective, embodiments of the present disclosure adopt a technical solution as follows:

[0007] An air conditioner indoor unit, comprising a shell, the shell being provided with an indoor air inlet, an outdoor air inlet, and an air outlet, a double side air inlet centrifugal fan being arranged inside the shell, the centrifugal fan comprising a first air inlet side, a second air inlet side, and an air outlet side, the first air inlet side

being arranged opposite the indoor air inlet, the second air inlet side being arranged opposite the outdoor air inlet, the air outlet side being arranged opposite the air outlet, and a heat exchanger being arranged between the first air inlet side and the indoor air inlet.

[0008] In the air conditioner indoor unit provided by embodiments of the present disclosure, since the centrifugal fan arranged inside the shell comprises a first air inlet side and a second air inlet side, and the first air inlet side is arranged opposite the indoor air inlet with a heat exchanger arranged therebetween, the air will enter the air conditioner from the indoor air inlet, get heat-exchanged at the heat exchanger, and then be discharged from the indoor air outlet, thereby completing the function of adjusting the indoor air temperature; since the second air inlet side of the centrifugal fan is arranged opposite the outdoor air inlet, the outdoor air will enter the centrifugal fan from the outdoor air inlet through the second air inlet side; since the centrifugal fan is provided with an air inlet on a side plate in an axial direction of a housing thereof, the airflow will enter the centrifugal fan in the axial direction, therefore all the blades are simultaneously subjected to force, and the contact area between the air and the blades is large. As a result, the centrifugal fan has high anti-resistance capabilities and can obtain a large amount of fresh air. Consequently, the amount of air blown out from the indoor air outlet through the air outlet side of the centrifugal fan is relatively large, and the air exchange speed of the air conditioner is fast, thereby overcoming the disadvantages of the prior art and improving the fresh air-exchanging efficiency of air conditioners.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] In order to describe technical solutions in embodiments of the present disclosure or in the prior art more clearly, the accompanying drawings to be used in the description of embodiments or the prior art will be introduced briefly. Obviously, the accompanying drawings to be described below are merely some embodiments of the present disclosure, and a person of ordinary skill in the art can obtain other drawings according to these drawings without paying any creative effort.

FIG. 1 is a schematic structural diagram of an air conditioner indoor unit according to embodiments of the present disclosure;

FIG. 2 is a schematic structural diagram of an air conditioner indoor unit mounted on a wall according to embodiments of the present disclosure;

FIG. 3 is a front view of a centrifugal fan of an air conditioner indoor unit according to embodiments of the present disclosure;

FIG. 4 is a schematic diagram showing a three-dimensional structure of a centrifugal fan of an air conditioner indoor unit according to embodiments of the present disclosure;

FIG. 5 is a left view of a centrifugal fan of an air conditioner indoor unit according to embodiments of the present disclosure.

DETAILED DESCRIPTION OF IMBODIMENTS

[0010] The technical solutions in embodiments of the present disclosure will be described clearly and completely with reference to the accompanying drawings in the embodiments of the present disclosure. Obviously, the described embodiments are merely some but not all of embodiments of the present disclosure. All other embodiments made on the basis of the embodiments of the present disclosure by a person of ordinary skill in the art without paying any creative effort shall be included in the protection scope of the present disclosure.

[0011] It should be understood that in the description of the present disclosure, orientations or positional relationships indicated by terms "center", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", etc. are based on orientations or positional relationships shown in the drawings, merely to facilitate and simplify the description of the present disclosure, but not to indicate or imply that the referred devices or elements must have a particular orientation, or must be constructed or operated in a particular orientation. Therefore they should not be construed as limitations to the present disclosure.

[0012] The terms "first" and "second" are used for descriptive purposes only and are not to be construed as indicating or implying the relative importance or implicitly indicating the number of indicated technical features. Thus, features defined as "first", "second" may explicitly or implicitly include one or more of the features. In the description of the present disclosure, "plurality" means two or more unless otherwise specified.

[0013] In the description of the present disclosure, it should be noted that the terms "mounted", "connected", and "connection" should be understood in a broad sense unless specifically defined or limited. For example, it may be a fixed connection, a detachable connection, or it may be an integrated connection; it may be directly connected, indirectly connected through an intermediate medium, or it may be internal connection between two components. For a person of ordinary skill in the art, the specific meanings of the above terms in the present disclosure can be understood according to specific circumstances.

[0014] Referring to FIG. 1, an air conditioner indoor unit includes a shell (not shown), and the shell is provided with an indoor air inlet 1 and an indoor air outlet 3; a centrifugal fan 4 is arranged inside the shell, and a heat exchanger 5 is arranged between the centrifugal fan 4 and the indoor air inlet 1; the air will get heat-exchanged at the heat exchanger 5, and then be blown out from the indoor air outlet 3 through the centrifugal fan 4.

[0015] The air conditioner indoor unit according to embodiments of the present disclosure includes a shell, and

the shell is provided with an indoor air inlet 1, an outdoor air inlet 2 and an indoor air outlet 3; a centrifugal fan 4 installed inside the shell is provided with a first air inlet side 41 and a second air inlet side 42, and the first air inlet side 41 is arranged opposite the indoor air inlet 1, with a heat exchanger arranged therebetween; the second air inlet side 42 is arranged opposite the outdoor air inlet 2, and the centrifugal fan 4 is further provided with an air outlet side 43, as shown in FIGS. 1 to 2.

[0016] In the air conditioner indoor unit provided by embodiments of the present disclosure, since the centrifugal fan 4 provided in the shell includes a first air inlet side 41 and a second air inlet side 42, and the first air inlet side 41 is arranged opposite the indoor air inlet 1, with a heat exchanger 5 arranged therebetween, the air will enter the air conditioner from the indoor air inlet 1, get heat-exchanged at the heat exchanger 5, and then be blown out from the indoor air outlet 3, thereby completing the function of adjusting the indoor air temperature; since the second air inlet side 42 of the centrifugal fan 4 is arranged opposite the outdoor air inlet 2, the outdoor air will enter the centrifugal fan 4 from the outdoor air inlet 2 through the second air inlet side 42; since the centrifugal fan 4 is provided with an air inlet on a side plate in an axial direction of a housing thereof, the airflow will enter the centrifugal fan 4 in the axial direction, therefore all the blades are simultaneously subjected to force, and the contact area between the air and the blades is large. As a result, the centrifugal fan 4 has high anti-resistance capabilities and can obtain a large amount of fresh air. Consequently, the amount of air blown out from the indoor air outlet 3 through the air outlet side 43 of the centrifugal fan 4 is relatively large, and the air exchange speed of the air conditioner is fast, thereby overcoming the disadvantages of the prior art and improving the fresh air-exchanging efficiency of air conditioners.

[0017] The centrifugal fan 4 includes a fan hub 44. A front plate 45 and a rear plate 46 are respectively arranged on the upper and lower edge of an outer circumference of the fan hub 44, and a partition plate is arranged between the front plate 45 and the rear plate 46 to divide the air outlet side 43 of the centrifugal fan 4 into a front air outlet side and a rear air outlet side. If the air conditioner only performs cooling or heating operations, the indoor air can only enter from the first air inlet side 41 of the centrifugal fan 4, and eventually be blown out from the front air outlet side close to the front panel 45; if the air conditioner performs a fresh air cycle, the air only enters from the second inlet side 42, and eventually be blown out from the rear air outlet side close to the rear panel 46. In this way, the air-blowing efficiency is low. Therefore, preferably, in embodiments of the present disclosure, an air hole 47 for connecting the first air inlet side and the second air inlet side 42 can be opened on the fan hub 44 of the centrifugal fan 4, as shown in FIGS. 3 to 5, so that when air enters the centrifugal fan 4 from only one side, the air can be blown out not only from the front air outlet side/rear air outlet side of the correspond-

ing side, but part of the air can also flow out through the air hole 47, and then be blown out from the front air outlet side/rear air outlet side on the other side of the centrifugal fan 4. Since the air is blown out from both the front air outlet side and the rear air outlet side, the air-blowing efficiency of the air conditioner is improved, and it is guaranteed that the centrifugal fan 4 can run efficiently with low noise when the air enters from only one side.

[0018] Further, if a plurality of air holes 47 are randomly opened on the fan hub 44, the air will enter the other air outlet side through the air holes 47, and the amount of air around the axial direction of the centrifugal fan 4 may not even. As a result, the air blown out from different areas of the indoor air outlet 3 may not even. Therefore, preferably, in embodiments of the present disclosure, a plurality of air holes 47 are evenly opened on the centrifugal fan 4 around the axial direction, so that the air in the centrifugal fan 4 can evenly flow out to the other air outlet side through the air holes 47 around the axial direction of the centrifugal fan 4, and the air blown out from different areas of the indoor air outlet 3 is more even.

[0019] Specifically, the indoor air inlet 1 is provided with an indoor damper, and the indoor air inlet 1 can be opened or closed by the indoor damper; the outdoor air inlet 2 is provided with an outdoor damper, and the outdoor air inlet 2 can be opened or closed by the outdoor damper. When the indoor air quality is superior to the outdoor air quality, the indoor damper can be opened and the outdoor damper can be closed, so that the air conditioner can only performs cooling or heating operations; when the outdoor air quality is superior to the indoor air quality, the outdoor damper can be opened and the indoor damper can be closed, so that the air conditioner runs the fresh air system to introduce the outdoor air into the room, so as to change the air and effectively improve the indoor air quality. Especially when cooling in the summer, if the outdoor temperature is lower than the indoor temperature, the indoor damper can be closed and only the outdoor damper is opened, so that the air conditioner can only performs the fresh air operation, and the energy consumption of the air conditioner can be effectively reduced.

[0020] Further, if the temperature difference between the outdoor air and the indoor air is large, when the outdoor damper is suddenly opened, a large amount of outdoor air will be poured into the room and cause a sudden drop in the indoor temperature, which may easily cause a disease such as a cold. Therefore, in embodiments of the present disclosure, the opening degree of the outdoor damper is set to be adjustable. For example, a fresh air valve 21 is used to adjust the opening degree of the outdoor damper. According to actual needs, the opening degree of the outdoor damper is adjusted by the fresh air valve 21, so that the outdoor air gradually flows into the room, causing the indoor temperature to change slowly. In this way, it is not easy to cause diseases, and the user experience is better.

[0021] If the oxygen content in the indoor air is decreas-

ing, but the quality of the outdoor air is poor, the air directly blown from the outside will pollute the indoor air, resulting in a decrease in the indoor air quality. Therefore, preferably, in embodiments of the present disclosure, an air purification module 6 is further arranged between the second air inlet side 42 of the centrifugal fan 4 and the outdoor air inlet 2. After the outdoor air is processed by the air purification module 6, the quality of the outdoor air will be improved. Therefore, after the outdoor air flows into the room, the oxygen content and quality of the indoor air will both be improved.

[0022] In addition, if the quality of both the outdoor air and indoor air is poor, the outdoor damper can be opened to run the fresh air system. The outdoor air will enter the room after being processed by the air purification module 6, so as to improve the indoor air quality. Since generally there is a temperature difference between the outdoor air and the indoor air, the outdoor air will cause a temperature change in the indoor air after entering the room. Therefore, the temperature of the indoor air needs to be further adjusted, resulting in higher energy consumption. Preferably, in embodiments of the present disclosure, an indoor purification air inlet is opened in the shell at a position corresponding to the air purification module 6. The indoor air can directly enter the air conditioner through the indoor purification air inlet, and then be blown out from the indoor air outlet 3 after being processed by the air purification module 6. In this way, the indoor air quality is improved. Moreover, when the indoor air re-enters the room after being processed by the air purification module 6, it will not cause a temperature change in the indoor air. Therefore, the temperature does not need to be further adjusted, and the energy consumption is relatively low.

[0023] The indoor purification air inlet is also provided with a purification air inlet damper, and the purification air inlet damper can open or close the indoor purification air inlet. When there is no need to purify the indoor air, the purification air inlet damper is closed to reduce energy consumption.

[0024] Similarly, the opening degree of the above-mentioned purification air inlet damper is also adjustable, and in embodiments of the present disclosure, an air purification valve 61 is used to adjust the opening degree of the purification air inlet damper. When the indoor air quality is superior to the outdoor air quality, the fresh air valve 21 and the purification air valve 61 can both be closed, so that the air conditioner can performs cooling or heating operations; when the indoor air quality drops, the purification air inlet damper and the outdoor damper can both opened; the opening degree of purification air inlet damper can be adjusted by the purification air valve 61 according to specific conditions, and the opening degree of the outdoor damper can be adjusted by the fresh air valve 21, so that the air conditioner can simultaneously performs indoor air purification, fresh air circulation and temperature adjustment operations; if the air conditioner simultaneously performs cooling and air purification op-

erations, cold air and purified normal-temperature air can be pre-mixed, so that the air blown out from the air outlet is cool but not cold, which improves the comfort of temperature; when there is no need to adjust the indoor temperature, the indoor damper can be closed by a kinematic mechanism, and the purification air inlet damper and the purification air valve 61 can be opened, so that the air conditioner can only performs the air purification operation. The opening degree of the fresh air valve 21 can be adjusted according to the oxygen content of the indoor air, so as to control the speed at which the outdoor air flows into the room and improve the quality and oxygen content of the indoor air.

[0025] The foregoing descriptions are merely some specific implementation manners of the present disclosure, but the protection scope of the present disclosure is not limited thereto, and the changes or replacements that any person skilled in the art can easily think of in the technical scope disclosed by the present disclosure should be within the protection scope of the present disclosure. Therefore, the protection scope of the present disclosure shall be subject to the appended claims.

Claims

1. An air conditioner indoor unit, comprising a shell, the shell being provided with an indoor air inlet, an outdoor air inlet, and an air outlet, a centrifugal fan being arranged inside the shell and allowing air in from two sides of it, the centrifugal fan comprising a first air inlet side, a second air inlet side, and an air outlet side, the first air inlet side being arranged opposite the indoor air inlet, the second air inlet side being arranged opposite the outdoor air inlet, the air outlet side being arranged opposite the air outlet, and a heat exchanger being arranged between the first air inlet side and the indoor air inlet.
2. The air conditioner indoor unit according to claim 1, wherein the centrifugal fan comprises a fan hub, and the fan hub is provided with an air hole for connecting the first air inlet side and the second air inlet side.
3. The air conditioner indoor unit according to claim 2, wherein there are a plurality of the air holes evenly arranged around an axis of the centrifugal fan.
4. The air conditioner indoor unit according to claim 1, wherein the indoor air inlet is provided with an indoor damper, and the indoor air inlet can be opened or closed by the indoor damper; the outdoor air inlet is provided with an outdoor damper, and the outdoor air inlet can be opened or closed by the outdoor damper.
5. The air conditioner indoor unit according to claim 4, wherein an opening degree of the outdoor damper

is adjustable.

6. The air conditioner indoor unit according to claim 1, wherein an air purification module is arranged between the second air inlet side of the centrifugal fan and the outdoor air inlet.
7. The air conditioner indoor unit according to claim 6, wherein the shell is provided with an indoor purification air inlet at a position corresponding to the air purification module.
8. The air conditioner indoor unit according to claim 7, wherein the indoor purification air inlet is provided with a purification air inlet damper.

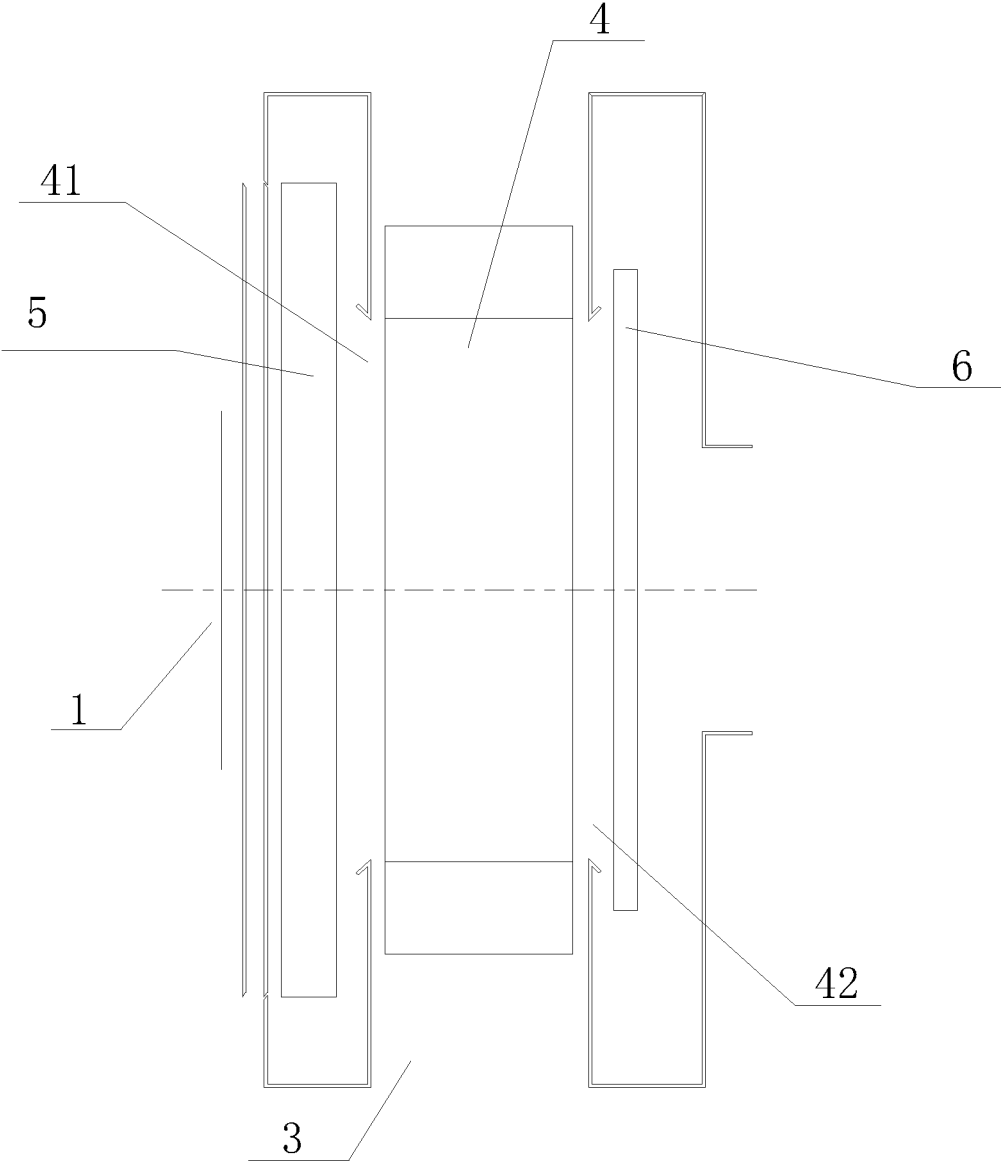


FIG. 1

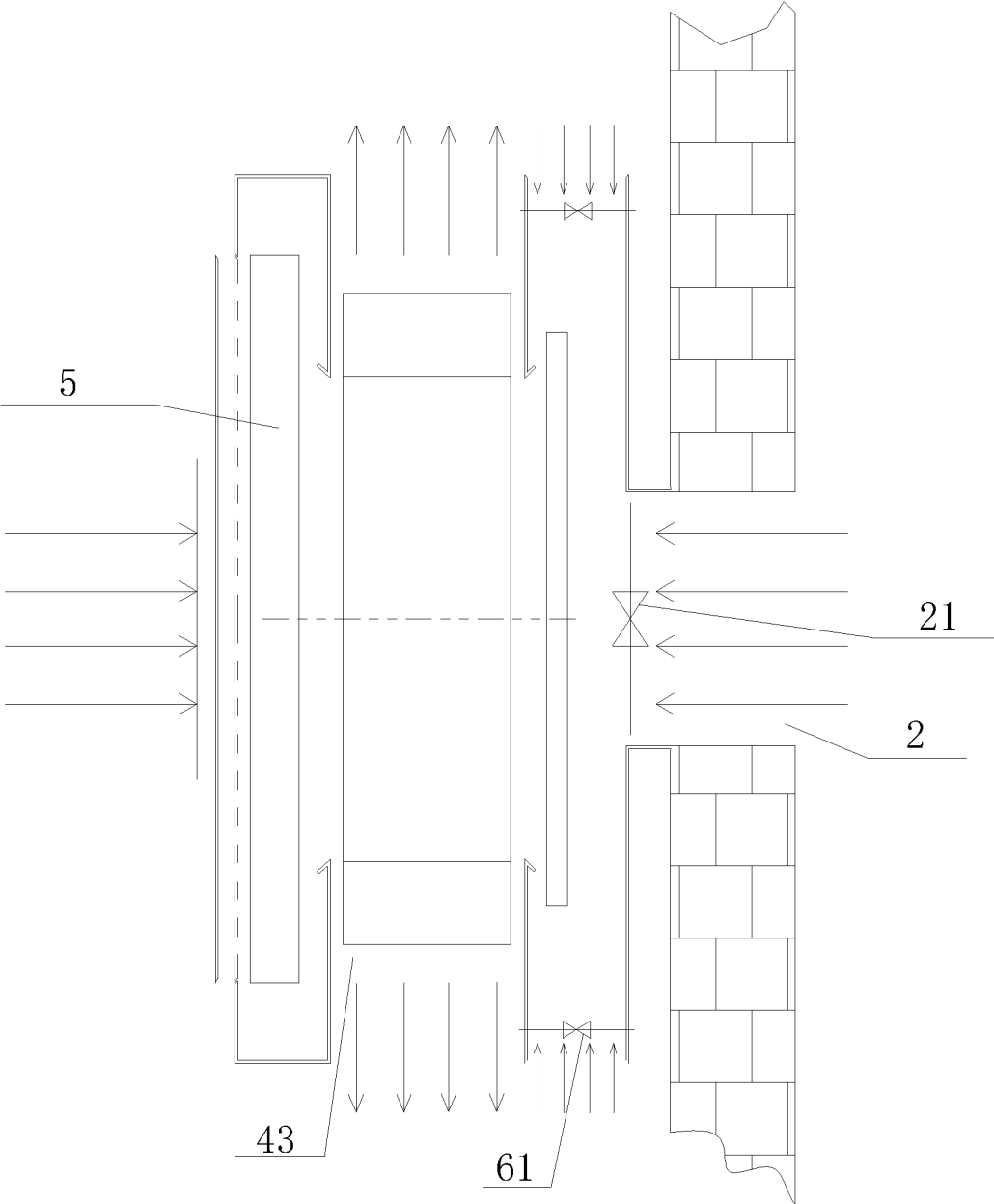


FIG. 2

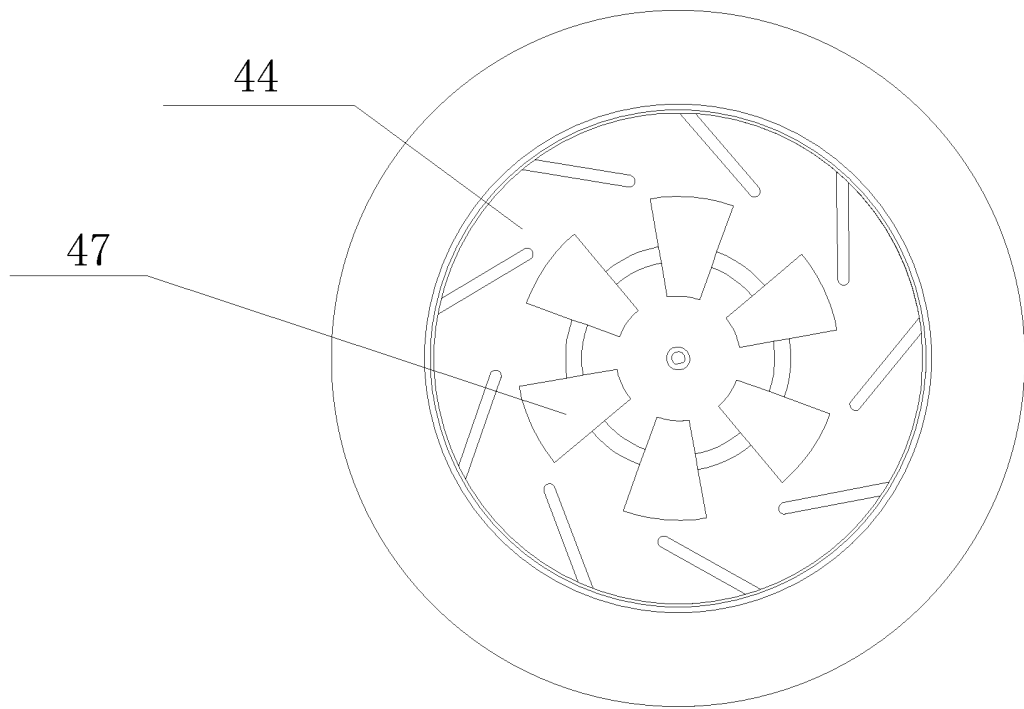


FIG. 3

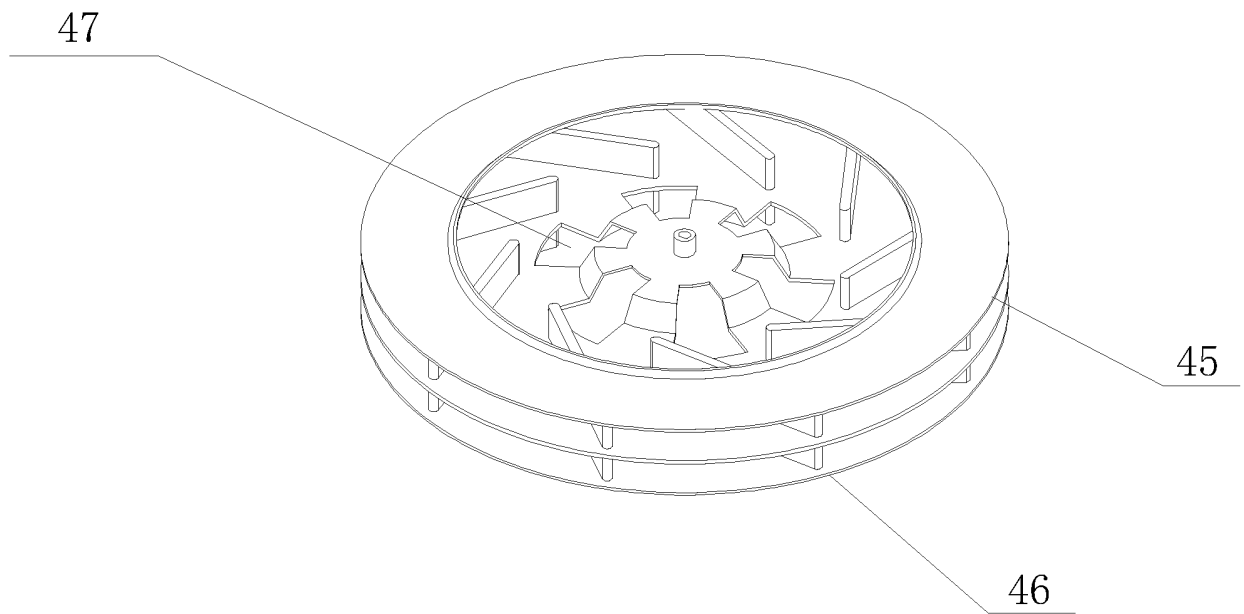


FIG. 4

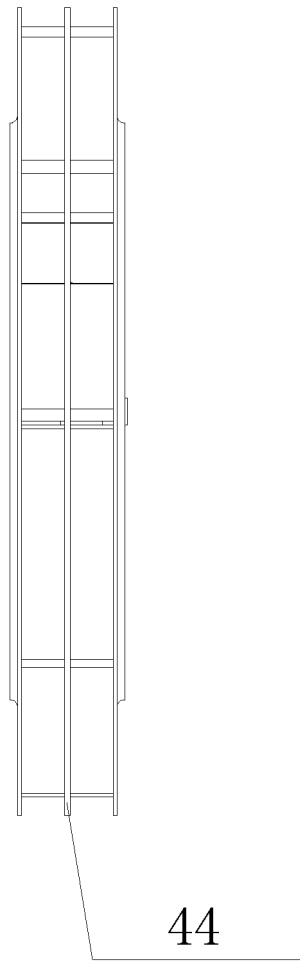


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2016/103444

A. CLASSIFICATION OF SUBJECT MATTER

F24F 1/00 (2011.01) 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)

CNKI, CNPAT, CNTXT, EPODOC, WPI: air conditioning, conditioner, inside, indoor, fresh air, outside, outdoor, centrifuga+, fan, two side, bilateral, throttle, purificat+, clean+, filter+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 200958803 Y (GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI), 10 October 2007 (10.10.2007), description, page 2, line 20 to page 3, bottom line, and figures 1-3	1-8
Y	CN 201032227 Y (GUAN, Yingui), 05 March 2008 (05.03.2008), description, page 2, lines 8-11, and figure 1	1-8
Y	CN 104879842 A (CHENGDU GUIGU ENVIRONMENT TECHNOLOGY CO., LTD.), 02 September 2015 (02.09.2015), description, paragraphs [0012]-[0016], and figure 1	1-8
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☐ 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
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"P" document published prior to the international filing date but later than the priority date claimed	

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Name and mailing address of the ISA/CN: 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 ZHANG, Lianfang Telephone No.: (86-10) 62085047

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2016/103444

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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