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(71) Applicants:
- **GD Midea Heating & Ventilating Equipment Co., Ltd.**
  Foshan, Guangdong 528311 (CN)
- **Hefei Midea Heating & Ventilating Equipment Co., Ltd.**
  Hefei, Anhui 230601 (CN)

(72) Inventors:
- **TU, Yunchong**
  Foshan, Guangdong 528311 (CN)
- **WU, Duode**
  Foshan, Guangdong 528311 (CN)
- **WU, Yandong**
  Foshan, Guangdong 528311 (CN)
- **SU, Qiqin**
  Foshan, Guangdong 528311 (CN)
- **HU, Xiaowen**
  Foshan, Guangdong 528311 (CN)
- **ZHAN, Dongwen**
  Foshan, Guangdong 528311 (CN)

(74) Representative: **RGTH**
Patentanwälte PartGmbB
Neuer Wall 10
20354 Hamburg (DE)

(54) **AIR CHANNEL ASSEMBLY AND AIR CONDITIONING DEVICE HAVING SAME**

(57) An air channel assembly and an air conditioning device (100) having same. The air channel assembly comprises an upstream air channel part (1) and a cross-flow air channel part (2); the air channel assembly has an air supplement path (3); an air inlet (31) of the air supplement path (3) is located in an air outlet section (212) and is in communication with a region of a cross-flow air channel (23) located downstream of a fan mounting cavity (231); an air outlet (32) of the air supplement path (3) is provided between a volute tongue section (211) and the upstream air channel part (1), and the air outlet is open towards the outside of the cross-flow air channel (23) and is in communication with the upstream air channel (11). The air channel assembly can effectively improve the air intake efficiency of the cross-flow air channel (23), improve the air flow performance in the cross-flow air channel (23), improve the pressure resistance of the cross-flow air channel (23), and improve the air volume of the cross-flow air channel (23).

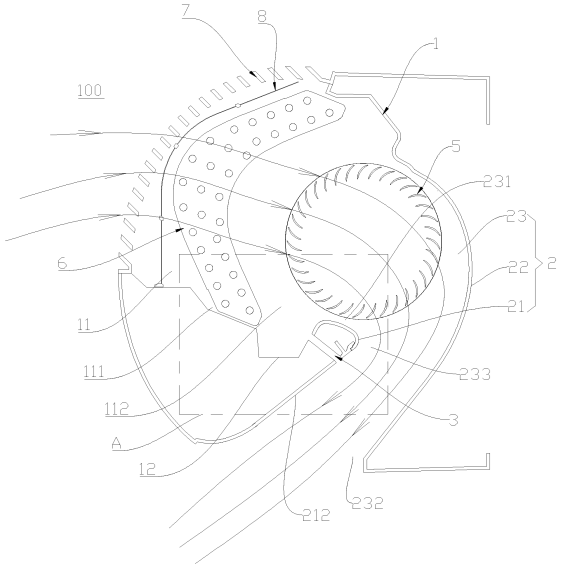

FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application is filed on the basis of Chinese patent application No. 202210114732.8, filed on January 30, 2022, and claims the priority of the above-mentioned Chinese patent application, which is incorporated herein by reference in its entirety.

FIELD

[0002] The present disclosure relates to the field of air channel technology, and more particularly, to an air channel assembly and an air conditioning device having same.

BACKGROUND

[0003] Some air conditioning devices such as an air conditioner in the related art use a cross-flow fan to induce airflow circulation, wherein the cross-flow fan is arranged in a cross-flow air channel, an eccentric vortex exists in the cross-flow air channel near a volute tongue, resulting in a poor air intake efficiency of the cross-flow air channel, a poor air flow performance in the cross-flow air channel, and a poor pressure resistance of the cross-flow air channel, and thus resulting in a low air volume of the cross-flow air channel.

SUMMARY

[0004] The present disclosure aims to solve at least one of the technical problems existing in the prior art. To this end, the present disclosure is directed to an air channel assembly which has a good pressure resistance and can increase an air volume.

[0005] The present disclosure also provides an air conditioning device having the above air channel assembly.

[0006] The air channel assembly according to an embodiment of a first aspect of the present disclosure includes: an upstream air channel part defining an upstream air channel; and a cross-flow air channel part, wherein in a cross-section of the cross-flow air channel part, the cross-flow air channel part includes a first air channel wall and a second air channel wall arranged at intervals; wherein a cross-flow air channel is formed between the first air channel wall and the second air channel wall and communicates downstream of the upstream air channel; wherein the first air channel wall includes a volute tongue section, the cross-flow air channel including a fan mounting cavity formed between a volute tongue windward surface of the volute tongue section and the second air channel wall, and a part of the first air channel wall between a volute tongue tip of the volute tongue section and an air channel outlet being an air outlet section; wherein the air channel assembly has an air supplement path, an air inlet of the air supplement path being located at the air outlet section and being in communication with a region of the cross-flow air channel located downstream of the fan mounting cavity, and an air outlet of the air supplement path being provided between the volute tongue section and the upstream air channel part, and the air outlet being open towards the outside of the cross-flow air channel and being in communication with the upstream air channel.

[0007] According to the air channel assembly of an embodiment of the present disclosure, air supplement of the air supplement path can change with a rotation speed of the cross-flow fan, adaptively adjust flow characteristics of an eccentric vortex and a low-pressure vortex, effectively improve an air intake efficiency of the cross-flow air channel, improve a air flow performance in the cross-flow air channel, improve a pressure resistance of the cross-flow air channel, and improve an air volume of the cross-flow air channel.

[0008] In some embodiments, the air outlet is located on a side of the volute tongue windward surface facing away from the fan mounting cavity.

[0009] In some embodiments, the air outlet includes at least one of a first outlet formed on the first air channel wall, a second outlet formed on the upstream air channel part, and a third outlet formed at a gap between the first air channel wall and the upstream air channel part.

[0010] In some embodiments, the volute tongue section further includes a volute tongue extension surface extending from an end of the volute tongue windward surface facing away from the volute tongue tip in a direction facing away from the fan mounting cavity, and wherein the first outlet is provided on the volute tongue extension surface.

[0011] In some embodiments, the third outlet is defined between an end of the volute tongue windward surface facing away from the volute tongue tip and the upstream air channel part; or the volute tongue section further includes a volute tongue extension surface extending from an end of the volute tongue windward surface facing away from the volute tongue tip in a direction facing away from the fan mounting cavity, the third outlet being defined between an end of the volute tongue extension surface facing away from the volute tongue windward surface and the upstream air channel part.

[0012] In some embodiments, the upstream air channel includes a heat exchanger mounting cavity, and wherein the air outlet is provided between the volute tongue section and the heat exchanger mounting cavity and is in communication with a region of the upstream air channel located downstream of the heat exchanger mounting cavity.

[0013] In some embodiments, a centerline of the cross-flow air channel extends in a transverse direction, wherein the upstream air channel part includes a water receiving section defining a water receiving tank, at least a part of the water receiving section being located below a region between the heat exchanger mounting cavity and the fan mounting cavity, and wherein the air outlet is lo-

cated on a side of the water receiving section close to the volute tongue section.

[0014] In some embodiments, the air outlet is formed at at least one of the volute tongue section, the water receiving section, and a gap between the volute tongue section and the water receiving section.

[0015] In some embodiments, the air channel assembly further includes: a downstream air channel part defining a downstream heat exchange air channel, wherein the downstream heat exchange air channel communicates downstream of the cross-flow air channel, and wherein the downstream heat exchange air channel includes a downstream mounting cavity for mounting of a heat exchange device.

[0016] In some embodiments, at least one air outlet is provided, and when the at least one air outlet includes a plurality of air outlets, the plurality of air outlets is successively arranged at intervals in a direction facing away from the fan mounting cavity, and any one of the plurality of air outlets is an opening or includes a plurality of sub-outlets arranged at intervals in an axial direction of the cross-flow air channel.

[0017] In some embodiments, the air supplement path includes an air supplement channel for communication between the air outlet and the air inlet, the air supplement channel extending in a direction from the air inlet to the air outlet, and wherein the air outlet, the air inlet, and the air supplement channel communicate in one-to-one correspondence.

[0018] In some embodiments, the air supplement channel has a width ranging from 3 mm to 7 mm.

[0019] In some embodiments, the air supplement channel extends from the air inlet to the air outlet along a straight line, or a curved line, or a combination of a straight line and a straight line, or a combination of a straight line and a curved line.

[0020] In some embodiments, in a longitudinal section of the cross-flow air channel part, the air outlet, the air inlet, and the air supplement channel, which are in communication with each other, are positioned in correspondence in an axial direction of the cross-flow air channel.

[0021] In some embodiments, the air supplement path includes a sealed cavity for communication between the air outlet and the air inlet, the sealed cavity is in communication with the plurality of air outlets simultaneously and/or with the plurality of air inlets simultaneously.

[0022] In some embodiments, all of the air outlets and all of the air inlets are in communication with the sealed cavity.

[0023] In some embodiments, the air channel assembly further includes: an air deflector provided at the air outlet and located on a side of the air outlet facing away from the fan mounting cavity.

[0024] In some embodiments, the air deflector is resiliently swingable or is actuatable to swing between a direction close to the air outlet and a direction away from the air outlet, and/or the air deflector is a cambered air deflector or a planar air deflector.

[0025] The air conditioning device according to an embodiment of a second aspect of the present disclosure includes the air channel assembly according to an embodiment of a first aspect of the present disclosure; and a cross-flow fan provided in the fan mounting cavity. According to the air conditioning device of the present disclosure, by providing the air channel assembly of the embodiment in the first aspect, the ventilation performance of the air conditioning device is improved.

[0026] Additional aspects and advantages of the present disclosure will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the present disclosure.

BRIEF DESCRIPTION OF DRAWINGS

[0027]

FIG. 1 is a cross-sectional view of an air conditioning device according to some embodiments of the present disclosure;

FIG. 2 is an enlarged view at A shown in FIG. 1;

FIG. 3 is a flow field simulation diagram of an air conditioning device according to some embodiments of the present disclosure;

FIG. 4 is a flow field simulation diagram of the air conditioning device shown in FIG. 3 after an air supplement path is canceled;

FIG. 5 is a partial cross-sectional view of an air conditioning device according to some embodiments of the present disclosure;

FIG. 6 is a partial cross-sectional view of an air conditioning device according to some embodiments of the present disclosure;

FIG. 7 is a partial cross-sectional view of an air conditioning device according to some embodiments of the present disclosure;

FIG. 8 is a partial cross-sectional view of an air conditioning device according to some embodiments of the present disclosure;

FIG. 9 is a partial cross-sectional view of an air conditioning device according to some embodiments of the present disclosure;

FIG. 10 is a cross-sectional view of an air conditioning device according to some embodiments of the present disclosure;

FIG. 11 is a velocity field simulation diagram of an air conditioning device according to some embodiments of the present disclosure;

FIG. 12 is a velocity field simulation diagram after the air conditioning device shown in FIG. 11 after an air supplement path is canceled;

FIG. 13 is a cross-sectional view of an air conditioning device according to some embodiments of the present disclosure.

Reference numerals:

[0028] air conditioning device 100; upstream air channel part 1; upstream air channel 11; heat exchanger mounting cavity 111; second region 112; water receiving section 12; water receiving tank 121; cross-flow air channel part 2; first air channel wall 21; volute tongue section 211; volute tongue windward surface 2a; volute tongue tip 2b; volute tongue air deflecting surface 2c; volute tongue extension surface 2d; air outlet section 212; pressure expanding surface 2e; second air channel wall 22; cross-flow air channel 23; fan mounting cavity 231; air channel outlet 232; first region 233; air supplement path 3; air inlet 31; air outlet 32; air supplement channel 33; sealed cavity 34; air deflector 4; cross-flow fan 5; heat exchanger 6; air return grill 7; filter screen 8; thermal insulation material 9; air guiding mechanism 110.

DESCRIPTION OF EMBODIMENTS

[0029] Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the same or similar elements, or elements having same or similar function throughout the several views. The embodiments described below with reference to the figures are exemplary and are intended to explain the present disclosure and are not to be construed as limiting the present disclosure.

[0030] The following disclosure provides many different embodiments or examples for implementing different structures of the present disclosure. To simplify the present disclosure, specific example components and arrangements are described below. They are, of course, merely examples and are not intended to limit the present disclosure. In addition, the present disclosure may repeat reference numerals and/or letters in different examples. This repetition is for the purpose of simplicity and clarity and does not in itself dictate a relationship between the various embodiments and/or arrangements discussed. In addition, the present disclosure provides examples of various specific processes and materials, but a person skilled in the art may recognize the applicability of other processes and/or the use of other materials.

[0031] Hereinafter, an air channel assembly according to an embodiment of the present disclosure will be described with reference to the accompanying drawings.

[0032] As shown in FIGS. 1 and 2, the air channel assembly includes an upstream air channel part 1 and a cross-flow air channel part 2, wherein the upstream air channel part 1 defines an upstream air channel 11; in a cross section of the cross-flow air channel part 2, the cross-flow air channel part 2 includes a first air channel wall 21 and a second air channel wall 22 arranged at intervals; wherein a cross-flow air channel 23 is formed between the first air channel wall 21 and the second air channel wall 22 and communicates downstream of the upstream air channel 11; the first air channel wall 21 includes a volute tongue section 211, and the cross-flow air channel 23 includes a fan mounting cavity 231 formed between a volute tongue windward surface 2a of the volute tongue section 211 and the second air channel wall 22; a part of the first air channel wall 21 between the volute tongue tip 2b of the volute tongue section 211 and the air channel outlet 232 of the cross-flow air channel 23 is an air outlet section 212. For example, the volute tongue section 211 further includes a volute tongue deflecting surface 2c, and the volute tongue deflecting surface 2c and the volute tongue windward surface 2a are connected smoothly by a curved surface to form the volute tongue tip 2b.

[0033] As shown in FIGS. 1 and 2, the fan mounting cavity 231 is configured to mount a cross-flow fan 5, wherein the cross section of the cross-flow air channel part 2 refers to a cross section taken through the cross-flow air channel part 2 using a plane perpendicular to a central axis of the cross-flow fan 5. When the cross-flow fan 5 rotates, an airflow is induced to flow through the upstream air channel 11, and the airflow flowing out of the upstream air channel 11 enters the cross-flow air channel 23 from an air channel inlet of the cross-flow air channel 23, and then is discharged out of the cross-flow air channel 23 through the air channel outlet 232. The fan mounting cavity 231 is located at the air channel inlet of the cross-flow air channel 23.

[0034] As shown in FIGS. 1 and 2, the air channel assembly has an air supplement path 3, an air inlet 31 of the air supplement path 3 is located at the air outlet section 212, and the air inlet 31 is in communication with a region of the cross-flow air channel 23 located downstream of the fan mounting cavity 231, such as a first region 233 shown in FIG. 1. An air outlet 32 of the air supplement path 3 is provided between the volute tongue section 211 and the upstream air channel part 1, and the air outlet is open towards the outside of the cross-flow air channel 23 and is in communication with the upstream air channel 11, so that the air outlet 32 can discharge the airflow to the upstream air channel 11 outside the cross-flow air channel 23 at a position relatively close to the volute tongue section 211 upstream of the fan mounting cavity 231, and the airflow then flows from the upstream air channel 11 to the cross-flow air channel 23, i.e. the airflow discharged from the air outlet 32 can first enter the upstream air channel 11 and then enter the cross-flow air channel 23.

[0035] It should be noted that the direction of the air outlet 32 is not limited as long as the air outlet 32 is not open towards the inside of the cross-flow air channel 23. It should be noted that upstream of a feature described herein refers to the location before the airflow enters the feature, and downstream of the feature refers to the location after the airflow flows out of the feature.

[0036] Thus, an air pressure of the air outlet 32 can be less than an air pressure of the air inlet 31, and a part of the airflow flowing out from the cross-flow fan 5, when reaching the air inlet 31, can be sucked into the air inlet

31 under the action of the air pressure, and then is discharged outside of the cross-flow air channel 23 via the air outlet 32 so as to be located upstream the outside of the fan mounting cavity 231, and then enters the cross-flow air channel 23 via the air channel inlet of the cross-flow air channel 23, and then enters the fan mounting cavity 231, so as to control an eccentric vortex in the cross-flow air channel 23 at a position in the fan mounting cavity 231 close to the volute tongue section 211, effectively improving the air intake efficiency of the cross-flow air channel 23, thereby improving a pressure resistance of the cross-flow air channel 23, and further improving an air volume of the cross-flow air channel 23.

[0037] The applicant has inventively found in the research that when the air outlet 32 of the air supplement path 3 is arranged relatively close to the volute tongue section 211, and is open towards the outside of the cross-flow air channel 23 and is in communication with the upstream air channel 11, the airflow discharged from the air outlet 32 can firstly enter the upstream air channel 11, and then be sucked into the cross-flow air channel 23; at this time, in conjunction with FIG. 3, the airflow can more effectively impact the edge of the eccentric vortex in the circumferential direction or tangential direction of the eccentric vortex, thereby improving the driving efficiency of the eccentric vortex, improving the air intake efficiency of the cross-flow air channel 23, and improving the air flow performance in the cross-flow air channel 23, increasing the pressure resistance of the cross-flow air channel 23, thereby increasing the air volume of the cross-flow air channel 23.

[0038] Moreover, the flow field formed at the volute tongue section 211 changes with different rotation speeds of the cross-flow fan 5, and the airflow in the air supplement path 3 can change adaptively with the rotation speeds, so that the eccentric vortex can be controlled stably and adaptively, and the air intake efficiency of the cross-flow air channel 23 can be improved more effectively, the air flow performance in the cross-flow air channel 23 can be improved, the pressure resistance performance of the cross-flow air channel 23 can be improved, and the air volume of the cross-flow air channel 23 can be improved.

[0039] In addition, it is worth mentioning that the applicant has inventively found in the research that if the air outlet 32 of the air supplement path 3 is provided on the volute tongue windward surface 2a and is open towards the inside of the cross-flow air channel 23 (an example is not shown in the figure), the air supplement path 3 is directly in communication with the inside of the cross-flow air channel 23, and the airflow discharged from the air supplement path 3 directly flows from the volute tongue windward surface 2a to a small space between the volute tongue windward surface 2a and the cross-flow fan 5 in the cross-flow air channel 23, and directly impacts the eccentric vortex in the radial direction of the eccentric vortex in general, in this way, not only the eccentric vortex cannot be effectively controlled, but also the eccentric vortex more obstructs the airflow in the cross-flow air channel 23, resulting in a more poor pressure resistance of the cross-flow air channel 23 and a reduced air volume of the cross-flow air channel 23.

[0040] In short, according to the air channel assembly of an embodiment of the present disclosure, by providing the air supplement path 3, the air supplement is able to change with the rotation speed of the cross-flow fan 5 and the self-characteristics of the volute tongue section 211, the flow characteristics of the eccentric vortex are adaptively adjusted to improve the air intake efficiency of the cross-flow air channel 23, thereby improving the flow performance of the cross-flow air channel 23 and improving the air volume of the cross-flow air channel 23.

[0041] In some embodiments of the present disclosure, a heat exchanger 6 may be provided in the upstream air channel 11, the upstream air channel 11 includes a heat exchanger mounting cavity 111 for mounting of the heat exchanger 6. As shown in FIGS. 1 and 2, when the cross-flow fan 5 rotates, the airflow is induced to flow through the upstream air channel 11. The airflow enters the upstream air channel 11 to exchange heat with the heat exchanger 6, then flows to the cross-flow air channel 23, and then is discharged outside of the cross-flow air channel 23 through the air channel outlet 232.

[0042] It should be noted that a specific type of the heat exchanger 6 is not limited as long as it has a heat exchange function, and the heat exchanger 6 may include, for example, a tube-fin heat exchanger, a microchannel heat exchanger, a resistance heat exchanger, etc. In addition, in some embodiments, the upstream air channel 11 may not be provided with a heat exchanger 6, such as nothing may be provided in the upstream air channel 11; or the upstream air channel 11 may be provided with other functional elements, such as an air deflector, a filter, a purifier, a humidifier, etc.

[0043] As shown in FIGS. 1 and 2, when the upstream air channel 11 includes the heat exchanger mounting cavity 111 for mounting of the heat exchanger 6, the air outlet 32 may be provided between the volute tongue section 211 and the heat exchanger mounting cavity 111 and in communication with a region of the upstream air channel 11 located downstream of the heat exchanger mounting cavity 111, such as a second region 112 shown in FIG. 1.

[0044] It will be appreciated that the airflow flowing out from the cross-flow fan 5 may first reach the first region 233 before reaching the air channel outlet 232, and the airflow flowing out from the heat exchanger 6 may first reach the second region 112 before entering the cross-flow air channel 23. The pressure at the first region 233 is greater than the pressure at the second region 112, so that the airflow at the air inlet 31 may be sucked into the air supplement path 3 under the action of the air pressure and discharged into the second region 112 through the air outlet 32 and then into the cross-flow air channel 23.

[0045] In short, since the air pressure of the air outlet

32 is less than the air pressure of the air inlet 31, a part of the airflow flowing out from the cross-flow fan 5, when reaching the air inlet 31, can be sucked into the air inlet 31 under the action of the air pressure, and then is discharged to a position downstream of the heat exchanger 6 in the upstream air channel 11 via the air outlet 32, so as to control the eccentric vortex in the cross-flow air channel 23 at a position in the fan mounting cavity 231 close to the volute tongue section 211 when the airflow is subsequently sucked into the cross-flow air channel 23, thereby effectively improving the air intake efficiency of the cross-flow air channel 23, and improving the pressure resistance performance of the cross-flow air channel 23, and further improving the air volume of the cross-flow air channel 23.

[0046] In some of the split wall-mounted air conditioners in the related art, in order to improve the heat exchange capacity, a heat exchange device using integrated C-type fin (such as the heat exchanger 6 shown in FIG. 1) can improve the heat exchange capacity by more than 10% with respect to a heat exchange device using V-type fin. However, the pressure loss of the C-type fin increases with respect to the fluid performance of the air channel. For example, it has been tested that the outlet cross-section of the C-type fin has a maximum air velocity of 3.5 m/s, and the outlet cross-section of the V-type fin has a maximum air velocity of 4 m/s. The total pressure drop of the C-type fin is 17.7 Pa, and the total pressure drop of the V-type fin is 12.7 Pa. It can be seen therefrom that the pressure drop of the C-type fin is larger and the pressure loss of the C-type fin is larger, resulting in an increase in the air intake resistance and an unsmooth air intake. Further, in a cooling state, water will be accumulated on the fins, resulting in a further increase in air intake resistance and a more unsmooth air intake, and at the same rotation speed, the air volume will be sharply reduced and the local air velocity will be too small.

[0047] When the split wall-mounted air conditioner uses the cross-flow fan, when the cross-flow fan is operated, an eccentric vortex (e.g. at X shown in FIG. 4) is formed near the volute tongue of the cross-flow fan to reduce the pressure resistance of the cross-flow air channel. Furthermore, a low-pressure vortex (e.g. at Y shown in FIG. 4) is easily formed near one end of the volute tongue outside the air channel inlet of the cross-flow air channel due to the flow characteristics of the cross-flow air channel to reduce the air intake efficiency of the cross-flow air channel. Furthermore, due to some other requirements of the split wall-mounted air conditioner, a structural end wall, such as a water receiving plate, is usually provided at the low-pressure vortex, thereby further deteriorating the air intake efficiency of the cross-flow air channel, making the flow of the cross-flow airflow unstable, and affecting the air intake efficiency of the cross-flow air channel.

[0048] However, according to the air channel assembly of an embodiment of the present disclosure, by providing the air supplement path 3, the air supplement can adaptively adjust the flow characteristics of the eccentric vortex and the low-pressure vortex with the rotation speed of the cross-flow fan 5 and the self-characteristics of the volute tongue section 211, thereby effectively improving the air intake efficiency of the cross-flow air channel 23, improving the air flow performance in the cross-flow air channel 23, improving the pressure resistance of the cross-flow air channel 23 and improving the air volume of the cross-flow air channel 23.

[0049] In some embodiments of the present disclosure, the air channel assembly may include: a downstream air channel part defining a downstream heat exchange air channel. The downstream heat exchange air channel communicates downstream of the cross-flow air channel. The downstream heat exchange air channel includes a downstream mounting cavity for mounting of a heat exchange device, including but not limited to the heat exchanger 6 described above. Thus, when the cross-flow fan 5 rotates, the airflow is induced to flow through the upstream air channel 11, then flow through the cross-flow air channel 23, then enter the downstream heat exchange air channel. The airflow enters the downstream heat exchange air channel to exchange heat with the heat exchange device, and then is discharged out of the downstream heat exchange air channel. At this time, the upstream air channel 11 may not be provided with nothing therein; or the upstream air channel 11 may be provided with functional members, such as an air deflector, a filter, a purifier, a humidifier, a heat exchanger 6, etc. Additionally, in other embodiments, the air channel assembly may not include the downstream air channel part.

[0050] It is worth noting that the air inlet 31 and the air outlet 32 of the air supplement path 3 may overlap each other (for example, a plate may be punched directly as the air supplement path 3, and the perforation hole is both the air inlet 31 and the air outlet 32). Of course, the present disclosure is not limited thereto, and the air inlet 31 and the air outlet 32 of the air supplement path 3 may also not overlap each other, for example, the air inlet 31 and the air outlet 32 may be in communication with each other via an air supplement channel 33, or a sealed cavity 34, or an air guide hard pipe, or an air guide hose, etc.

[0051] In some embodiments of the present disclosure, the air outlet 32 of the air supplement path 3 may be located on a side of the volute tongue windward surface 2a facing away from the fan mounting cavity 231. It should be noted that reference herein to "the side facing away from the fan mounting cavity 231" refers to a side facing away from the cross-flow fan 5. The reference herein to feature I being located on a side of feature II facing away from the fan mounting cavity 231 means that a radial distance between feature I and the cross-flow fan 5 is greater than a radial distance between feature II and the cross-flow fan 5.

[0052] Therefore, "the air outlet 32 of the air supplement path 3 is located on the side of the volute tongue windward surface 2a facing away from the fan mounting

cavity 231" means that the air outlet 32 of the air supplement path 3 is located near the volute tongue windward surface 2a, and the radial distance between the air outlet 32 and the cross-flow fan 5 is greater than the radial distance between the volute tongue windward surface 2a and the cross-flow fan 5. Thus, it is possible to prevent the air outlet 32 of the air supplement path 3 from being located on a surface of a side of the volute tongue windward surface 2a facing the fan mounting cavity 231. Thus, it is possible to ensure that the air outlet 32 is located on the side of the volute tongue windward surface 2a facing away from the fan mounting cavity 231, so that it is possible to prevent the airflow flowing out of the air outlet 32 from directly flowing out of the volute tongue windward surface 2a and directly entering the cross-flow air channel 23. In fact, the airflow flowing out of the air outlet 32 can first enter the upstream air channel 11 outside the cross-flow air channel 23 and then enter the cross-flow air channel 23. Thus, it is more advantageous to have a positive influence on the air intake efficiency of the cross-flow air channel 23. Of course, the present disclosure is not limited thereto. In other embodiments of the present disclosure, the relative positional relationship between the air outlet 32 and the volute tongue windward surface 2a may be provided to be less clear, which will not be described in detail herein.

[0053] In an embodiment of the present disclosure, the number and the forming position of the air outlet 32 are not limited. For example, the air outlet 32 includes at least one of a first outlet formed on the first air channel wall 21, a second outlet formed on the upstream air channel part 1, and a third outlet formed at a gap between the first air channel wall 21 and the upstream air channel part 1. That is, the air outlet 32 may be formed at at least one of the first air channel wall 21, the upstream air channel part 1, and a gap between the first air channel wall 21 and the upstream air channel part 1. Thus, the air outlet 32 can be designed accordingly for different types of machines to increase the application range and simplify the processing.

[0054] Alternatively, at least one air outlet 32 is provided, and when the at least one air outlet 32 includes a plurality of air outlets 32, the plurality of air outlets 32 are successively arranged at intervals in a direction facing away from the fan mounting cavity 231, and any one of the plurality of air outlets 32 may be an opening or may include a plurality of sub-outlets arranged at intervals in the axial direction across the cross-flow air channel 23. By the same reasoning, at least one air inlet 31 is provided, and when the at least one air inlet 31 includes a plurality of air inlets 31, the plurality of air inlets 31 are successively arranged at intervals in the air discharge direction, and any one of the plurality of air inlets 31 may be an opening or may include a plurality of sub-inlets arranged at intervals in the axial direction of the cross-flow air channel 23.

[0055] When the at least one air outlet 32 includes a plurality of air outlets 32, for example, the air outlet 32 may include at least two of the first outlet, the second outlet and the third outlet, and the number of each air outlet 32 is at least one, and for another example, the air outlet 32 may include one of the first outlet, the second outlet and the third outlet, and the number of such air outlets 32 is at least two.

[0056] For example, one or more first outlets is provided, and when the one or more first outlets includes a plurality of first outlets, the plurality of first outlets are successively arranged at intervals in a direction facing away from the cross-flow fan 5, and any one of the plurality of first outlets may be an opening or may include a plurality of first sub-outlets arranged at intervals in the axial direction of the cross-flow air channel 23.

[0057] For example, one or more second outlets is provided, and when the one or more second outlets includes a plurality of second outlets, the plurality of second outlets are successively arranged at intervals in a direction facing away from the cross-flow fan 5, and any one of the plurality of second outlets may be an opening or may include a plurality of second sub-outlets arranged at intervals in the axial direction of the cross-flow air channel 23.

[0058] For example, the third outlet may be an opening or may include a plurality of third sub-outlets arranged at intervals in the axial direction of the cross-flow air channel 23.

[0059] For example, in some embodiments, the volute tongue section 211 further includes a volute tongue extension surface 2d, wherein the volute tongue extension surface 2d extends from an end of the volute tongue windward surface 2a facing away from the volute tongue tip 2b in a direction facing away from the fan mounting cavity 231 (in conjunction with FIGS. 1 and 2). The first outlet is provided on the volute tongue extension surface 2d. Thus, the first outlet can be directly machined on the volute tongue section 211, which is convenient to machine and reduce costs. Furthermore, the first outlet can be far away from the cross-flow fan 5 compared with the volute tongue windward surface 2a, thereby improving the driving efficiency of the eccentric vortex and improving the air intake efficiency more effectively.

[0060] For example, in some embodiments, the volute tongue section 211 further includes a volute tongue extension surface 2d, wherein the volute tongue extension surface 2d extends from an end of the volute tongue windward surface 2a facing away from the volute tongue tip 2b in a direction facing away from the fan mounting cavity 231 (in conjunction with FIGS. 1 and 2). The third outlet is defined between an end of the volute tongue extension surface 2d facing away from the volute tongue windward surface 2a and the upstream air channel part 1. Thus, the formation of the third outlet is simple, the processing is convenient, the cost is reduced. Furthermore, the third outlet can be far away from the cross-flow fan 5 compared with the volute tongue windward surface 2a, thereby improving the driving efficiency of the eccentric vortex and improving the air intake efficiency more effectively.

[0061] For example, in some embodiments, as shown in FIGS. 7 and 8, the third outlet is defined between an end of the volute windward surface 2a facing away from the volute tongue tip 2b and the upstream air channel part 1. Thus, the formation of the third outlet is simple, the processing is convenient, and the cost is reduced.

[0062] In some embodiments of the present disclosure, as shown in FIGS. 1 and 2, a centerline of the cross-flow air channel 23 extends in a transverse direction, i.e. a central axis of the cross-flow fan 5 is provided horizontally or substantially horizontally. The upstream air channel part 1 includes a water receiving section 12 defining a water receiving tank 121, at least a part of the water receiving section 12 is located below a region between the heat exchanger mounting cavity 111 and the fan mounting cavity 231 (e.g. the second region 112 shown in FIG. 1). The air outlet 32 is located on a side of the water receiving section 12 close to the volute tongue section 211 (e.g. the right side of the water receiving section 12 shown in FIGS. 1 and 2).

[0063] As a result, it is not easy for the air supplement to blow out the water in the water receiving tank 121, thereby alleviating the problem of air blowing water out. In addition, by providing the air outlet 32 on the side of the water receiving section 12 close to the volute tongue section 211, it is ensured that the airflow discharged from the air outlet 32 can more effectively control the eccentric vortex in the cross-flow air channel 23 close to the volute tongue section 211, thereby improving the pressure resistance of the cross-flow air channel 23, and further improving the air volume of the cross-flow air channel 23.

[0064] As shown in FIGS. 1 and 2, the air outlet 32 may be formed at at least one of the volute tongue section 211, the water receiving section 12, and a gap between the volute tongue section 211 and the water receiving section 12. When the air outlet 32 is formed at the volute tongue section 211 (for example, the air outlet 32 being provided at the above-mentioned volute tongue extension surface 2d), the air outlet 32 can be an alternative embodiment of the above-mentioned first outlet; when the air outlet 32 is formed at the water receiving section 12, the air outlet 32 can be an alternative embodiment of the above-mentioned second outlet; when the air outlet 32 is formed at the gap between the volute tongue section 211 and the water receiving section 12 (for example, the air outlet 32 being provided between an end of the above-mentioned volute tongue extension surface 2d facing away from the volute tongue windward surface 2a and the water receiving section 12, as shown in FIG. 9; or the air outlet 32 being provided between an end of the above-mentioned volute tongue windward surface 2a facing away from the volute tongue tip 2b and the water receiving section 12, as shown in FIGS. 7 and 8), the air outlet 32 can be an alternative embodiment of the above-mentioned third outlet. In this way, it is convenient to process and manufacture, and it is possible to simply and effectively ensure that the air outlet 32 is located on the side of the water receiving section 12 close to the volute tongue section 211, so as to ensure that the air supplement is not easy to blow out the water in the water receiving tank 121, thereby alleviating the problem of air blowing water out.

[0065] In some embodiments of the present disclosure, as shown in FIGS. 2, 5, and 6, the air supplement path 3 includes an air supplement channel 33 for communication between the air outlet 32 and the air inlet 31. The air supplement channel 33 extends in a direction from the air inlet 31 to the air outlet 32. The air outlet 32, the air inlet 31, and the air supplement channel 33 communicate in one-to-one correspondence. That is, one air supplement channel 33 is only in communication with one air inlet 31 and one air outlet 32, so that one air outlet 32, one air inlet 31, and one air supplement channel 33 constitute one air supplement group. In one air supplement group, the air outlet 32 is in communication with the air inlet 31 through the air supplement channel 33. The air supplement path 3 includes at least one air supplement group. As a result, it is possible to improve air supplement circulation efficiency and reduce the air supplement loss.

[0066] Alternatively, a width of the air supplement channel 33 is smaller than a radius of the cross-flow fan 5, so that a more effective air supplement effect can be achieved. Alternatively, the width of the air supplement channel 33 is less than 2 times the width of any one of the air inlet 31 and the air outlet 32 and is more than 0.5 times the width of at least one of the air inlet 31 and the air outlet 32. As a result, it is only necessary to provide a small-sized air supplement channel 33, the rapid air supplement and airflow guide can be achieved, and thus improving the air supplement efficiency, reducing the air volume loss and ensuring the air volume.

[0067] Referring to FIG. 2, the width dl of the air inlet 31 refers to an opening size of the air inlet 31 in a cross section perpendicular to the center line of the cross-flow air channel 23. The width d2 of the air outlet 32 refers to an opening size of the air outlet 32 in the cross section perpendicular to the center line of the cross-flow air channel 23. The width dimension d of the air supplement channel 33 refers to the width of the air supplement channel 33 in the cross section perpendicular to the center line of the cross-flow air channel 23.

[0068] For example, in some embodiments, the air supplement channel 33 may have a width ranging from 3 mm to 7 mm, e.g. 3 mm, 4 mm, 5 mm, 6 mm, 7 mm, etc. In this way, the air supplement effect and the overall air volume may be better balanced.

[0069] It is worth noting that the width of the air supplement channel 33 may be a constant width or a gradual width, for example, the air supplement channel 33 may be formed to be tapered in the direction from the air inlet 31 to the air outlet 32 so that the air volume may be increased. Further, for example, the air supplement channel 33 may be formed to expand gradually in the direction from the air inlet 31 to the air outlet 32, so that noise can be reduced. When the width of the air supple-

ment channel 33 is the constant width, both the air volume and the noise can be considered, and the processing can be facilitated.

[0070] In some embodiments, when the cross-flow fan is used in the split wall-mounted air conditioner, in order to balance the cooling and heating effects, in the cooling mode, the air is allowed to blow up as much as possible, and in the heating mode, the air is allowed to blow down as much as possible, and at the same time, the air at the air outlet of the air conditioner is prevented from flowing back to the air inlet of the air conditioner; when the air channel outlet of the air channel is designed, the upper mold line of the pressure expanding section is consciously pressed down, resulting in a low-speed region locally formed in the pressure expanding section, and the low-speed region is insufficient to overcome the static pressure inside the air channel; and the air outside the air channel outlet may flow back into the air channel outlet, causing a pulsating surge sound to occur, affecting using experience of a user.

[0071] It is worth noting that the shape of the air supplement channel 33 is not limited, for example, the air supplement channel 33 may extend from the air inlet 31 to the air outlet 32 along a straight line, or a curved line, or a combination of a straight line and a straight line, or a combination of a straight line and a curved line. That is, in the cross-section of the cross-flow air channel part 2, the shape of the extension center line of the air supplement channel 33 is not limited, and may be a straight line (in a case where the air supplement channel 33 is a straight line type channel, such as shown in FIG. 2), or a curved line (in a case where the air supplement channel 33 is an arc type channel, such as shown in FIG. 5, or a wave type channel, such as shown in FIG. 6, etc.), or a combination of a straight line and a straight line (in a case where the air supplement channel 33 is a broken line type channel, or a sawtooth type channel, etc.), or a combination of a straight line and a curved line, etc.

[0072] Wherein the air supplement channel 33 extending along a straight line can improve the control ability to the eccentric vortex, the air supplement impact speed is enhanced, and the air volume is increased at the same rotation speed of the cross-flow fan 5; the air supplement channel 33 extending along a non-straight line, such as a curved line (e.g. an arc line, a wavy line), a sawtooth line, etc. can slow down the impact speed of the air supplement, with little change in air volume and noise, but can stabilize the flow of the airflow.

[0073] In some embodiments of the present disclosure, the air supplement path 3 only includes the air supplement channel 33, but does not include the sealed cavity 34 described later; in this case, the number of the air outlet 32, the air inlet 31 and the air supplement channel 33 may be the same, and the air outlet 32, the air inlet 31 and the air supplement channel 33 communicate in one-to-one correspondence. That is to say, the number of the air outlet 32, the air inlet 31 and the air supplement channel 33 is the same and may all be N, wherein N is an integer greater than or equal to 1, and each air outlet 32 is in communication with a corresponding air inlet 31 via a corresponding air supplement channel 33 respectively.

[0074] As described above, any one of the air outlets 32 may be an opening or include a plurality of sub-outlets arranged at intervals in the axial direction of the cross-flow air channel 23, and thus the air supplement channel 33 in one air supplement group may be in communication with the plurality of sub-outlets at the same time. In addition, any one of the air inlets 31 may an opening only, or may include a plurality of sub-inlets arranged at intervals in the axial direction of the cross cross-flow air channel 23, and thus the air supplement channel 33 in one air supplement group may be in communication with the plurality of sub-inlets at the same time.

[0075] Any one of the air supplement channels 33 may be one channel, or may include a plurality of sub-channels arranged at intervals in the axial direction of the cross-flow air channel 23. The direction in which the cross-flow air channel 23 extends in the axial direction of the cross-flow air channel 23 is not limited, depending on the relative positions of the air inlet 31 and the air outlet 32 in communication with the air supplement channel 33. For example, in a longitudinal section of the cross-flow air channel part 2 (wherein the longitudinal section of the cross-flow air channel part 2 refers to a longitudinal section taken through the cross-flow air channel part 2 using a plane passing through the central axis of the cross-flow fan 5), the air outlet 32, the air inlet 31, and the air supplement channel 33, which are in communication with each other, are positioned in correspondence in the axial direction of the cross-flow air channel 23. That is to say, the air supplement channel 33 is projected forward to the longitudinal section, the air outlet 32 is projected forward to the longitudinal section, and the air inlet 31 is projected forward to the longitudinal section, and the three forward projections have same range as in the axial direction of the cross-flow fan 5. In this way, the airflow entering the air inlet 31 can be discharged out from the air outlet 32 without being offset in the axial direction of the cross-flow air channel 23, thereby further simplifying the structure of the air supplement channel 33, reducing the difficulty of processing, and improving the air supplement efficiency.

[0076] Of course, the present disclosure is not limited thereto, and in other embodiments of the present disclosure, the positions of the air outlet 32, the air inlet 31, and the air supplement channel 33 in the axial direction of the cross-flow air channel 23 may not correspond to each other, for example, the air outlet 32 corresponds to one end of the cross-flow air channel 23 in the axial direction, the air inlet 31 corresponds to the other end of the cross-flow air channel 23 in the axial direction, etc. In this way, the airflow entering the air inlet 31 needs to be offset in the axial direction of the cross-flow air channel 23 to be discharged from the air outlet 32, which will not be described in detail herein.

[0077] In some embodiments of the present disclosure, as shown in FIG. 10, the air supplement path 3 may include a sealed cavity 34 for communication between the air outlet 32 and the air inlet 31, the sealed cavity 34 is in communication with the plurality of air outlets 32 simultaneously and/or with the plurality of air inlets 31 simultaneously. Thus, different design requirements can be satisfied and a flexible design can be achieved.

[0078] For example, alternatively, one sealed cavity 34 is in communication with one air inlet 31 while being in communication with a plurality of air outlets 32. In this case, the airflow may enter the sealed cavity 34 from one air inlet 31 and then be discharged in a plurality of streams from the plurality of air outlets 32. As another example, alternatively, one sealed cavity 34 is in communication with a plurality of air inlets 31 while being in communication with one air outlet 32. In this case, the airflow may enter the sealed cavity 34 from the plurality of air inlets 31 and then be discharged from one air outlet 32. As another example, alternatively, one sealed cavity 34 is in communication with a plurality of air inlets 31 while being in communication with a plurality of air outlets 32. In this case, the airflow may enter the sealed cavity 34 from the plurality of air inlets 31 and then be discharged in a plurality of streams from the plurality of air outlets 32.

[0079] It is worth noting that the air supplement path 3 may include only one of the air supplement channel 33 and the sealed cavity 34, or may include both of the air supplement channel 33 and the sealed cavity 34. Thereby, a flexible design can be achieved. For example, in some alternative embodiments, the air supplement path 3 includes only the sealed cavity 34 and does not include the air supplement channel 33, and in this case, all of the air outlets 32 and all of the air inlets 31 may be in communication with the same sealed cavity 34, thereby simplifying the design and reducing the processing difficulty.

[0080] In some alternative embodiments of the present disclosure, the sealed cavity 34 may not have a directionality of extension as compared to the air supplement channel 33, the width of the sealed cavity 34 relative to the air supplement channel 33 may be slightly larger, for example, the width of at least a part of the sealed cavity 34 may be greater than twice the width of at least one of the air inlet 31 and the air outlet 32, etc. whereby a flexible design may be achieved.

[0081] In addition, in some embodiments, if the volume of the sealed cavity 34 is large, thermal insulation material 9 may be added to the sealed container 34 to enhance thermal insulation, anti-condensation, etc.

[0082] In some embodiments of the present disclosure, as shown in FIGS. 8 and 9, the air channel assembly may further include an air deflector 4 provided at the air outlet 32 on a side of the air outlet 32 facing away from the fan mounting cavity 231. As a result, the direction of the airflow flowing out from the air outlet 32 can be more effectively controlled by the air deflector 4, the performance of the eccentric vortex can be more effectively controlled, the air supplement waste can be reduced, and the air volume can be ensured.

[0083] It is worth noting that the structural shape of the air deflector 4 is not limited, for example, it can be a cambered air deflector or a planar air deflector, and when the air deflector 4 is a cambered air deflector, the airflow guiding effect can be improved, and when the air deflector 4 is a planar air deflector, the processing difficulty can be reduced.

[0084] Further, it should be noted that the air deflector 4 may be in a fixed form or in a movable form.

[0085] For example, when the air deflector 4 is in a fixed form, the mounting angle can be designed in advance (for example, a certain angle can be deviated), so that it can more effectively control the direction of the airflow flowing out from the air outlet 32, more effectively control the performance of the eccentric vortex, reduce the air supplement waste and ensure the air volume.

[0086] For example, when the air deflector 4 is in a movable form, alternatively, the air deflector 4 may be elastically swingable so as to be swing between a direction close to the air outlet 32 and a direction facing away from the air outlet 32, i.e. the air deflector 4 may be elastically swingable via an elastic part, so that the eccentric vortex can be adaptively controlled at different rotation speeds by using the elasticity of the elastic part, i.e. automatic elastic swing may be used to adaptively control the eccentric vortex, thereby reducing costs and providing a good adjustable effect.

[0087] For example, when the air deflector 4 is in a movable form, or alternatively, the air deflector 4 can be is actuatable to swing between a direction close to the air outlet 32 and a direction facing away from the air outlet 32, i.e., the swinging of the air deflector 4 can be controlled in a driven manner by providing a driving mechanism, so that the performance of the eccentric vortex can be controlled more effectively at different rotation speeds by means of the control of the driving mechanism, so as to reduce air supplement waste and ensure air volume. For example, when the air deflector 4 swings in the direction facing away from the air outlet 32, the noise can be reduced, and when the air deflector 4 swings in the direction closer to the air outlet 32, the pressure resistance can be increased and the air volume can be increased.

[0088] In some embodiments of the present disclosure, as shown in FIGS. 1 and 2, the air inlet 31 is provided at the end of the air outlet section 212 near the volute tongue tip 2b, for example, the distance between the air inlet 31 and the volute tongue tip 2b is less than one quarter of the length of the air outlet section 212, and as shown in FIGS. 11 and 12, the airflow at the volute tongue tip 2b has a lower air velocity and a higher pressure, and thus the air inlet 31 is provided close to the volute tongue tip 2b, so that the airflow can be better sucked into the air inlet 31 under the action of the pressure, reducing the air volume loss. For example, alternatively, the air outlet section 212 includes a volute tongue air deflecting surface 2c extending along a curved line and a pressure expanding surface 2e extending along a straight line, and

the air inlet 31 is provided near a position where the volute tongue air deflecting surface 2c meets the pressure expanding surface 2e, or near the volute tongue tip 2b. Thereby, it is ensured that the airflow can be sucked into the air inlet 31 more efficiently.

[0089] Hereinafter, an air conditioning device 100 according to an embodiment of the present disclosure will be described.

[0090] As shown in FIG. 1, the air conditioning device 100 may include: the air channel assembly according to any one of the embodiments of the present disclosure, and a cross-flow fan 5 provided in the fan mounting cavity 231. Thus, it is possible to increase the ventilation amount of the air conditioning device 100.

[0091] It is worth noting that the specific type of the air conditioning device 100 according to an embodiment of the present disclosure is not limited, and may be an air conditioner, an air purifier, a humidifier, or the like. Further, the type of the air conditioner is not limited, and may be, for example, a duct type air conditioner, a split-type air conditioner indoor unit (e.g. an air conditioner cabinet machine, a wall-mounted air conditioner), an integrated air conditioner (e.g. a window air conditioner, a portable air conditioner, a mobile air conditioner), etc.

[0092] For example, in some embodiments, when the air conditioning device 100 is a duct type air conditioner, the heat exchange device may be provided downstream of cross-flow air channel 23. When the air conditioning device 100 is a split-type air conditioner indoor unit, the heat exchanger 6 may be provided upstream of the cross-flow air channel 23, which will not be described in detail herein.

[0093] Having determined the type of the air conditioning device 100 according to embodiments of the present disclosure, other configurations and operations of the air conditioning device 100 are known to a person skilled in the art and will not be described in detail herein. For example, when the air conditioning device 100 is a wall-mounted air conditioner, as shown in FIG. 1, an air return grill 7, a filter screen 8, or the like may also be included. As shown in FIG. 13, an air guiding mechanism 110 or the like provided at the air channel outlet 232 may be included to adjust the blowing direction, blowing effect or the like.

[0094] In the description of the present disclosure, it is to be understood that the terms "center", "longitudinal", "lateral", "length", "width", "thickness", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise", "counterclockwise", "axial", "radial", "circumferential", and the like, indicate orientations or positional relationships based on those shown in the drawings, merely for convenience of description and simplification of the description, and do not indicate or imply that the device or element referred to must have a particular orientation, be constructed in a particular orientation, and be operated, and thus, are not to be construed as limiting the present disclosure.

[0095] Further, the terms "first" and "second" are used for descriptive purposes only and are not to be construed as indicating or implying relative importance or implicitly indicating the number of technical features indicated. Thus, a feature defined as "first" or "second" may explicitly or implicitly include one or more of the stated features. In the description of the present disclosure, "a plurality of' refers to two or more unless specifically defined otherwise.

[0096] In this disclosure, unless expressly specified and limited otherwise, the terms "mounted", "coupled", "connected", "secured", and the like are to be construed broadly, e.g. either fixedly or detachably, or integrally connected; it can be directly coupled or indirectly coupled through an intermediate medium, and can be the communication between two elements or the interaction relationship between two elements. The specific meaning of the above terms in the present disclosure can be understood by a person skilled in the art as the case may be.

[0097] In the present disclosure, unless expressly specified and limited otherwise, the first feature "above" or "below" the second feature may be that the first and second features are in direct contact, or that the first and second features are in indirect contact through an intermediary. Further, the first feature being "on", "above" and "over" the second feature may be directly above or obliquely above the second feature or merely indicate that the first feature is at a higher level than the second feature. The first feature being "under", "below" and "beneath" the second feature may be that the first feature is directly below or obliquely below the second feature, or simply that the first feature has a smaller level than the second feature.

[0098] In describing the description, reference to the description of the terms "an embodiment", "some embodiments", "an example", "particular examples", or "some examples", etc., means that a particular feature, structure, material, or characteristic described in connection with the embodiment or example is included in at least an embodiment or example of the present disclosure. In this description, schematic representations of the above terms are not necessarily directed to the same embodiment or example. In addition, the particular features, structures, materials, or characteristics described may be combined in any one or more embodiments or examples in a suitable manner. Moreover, various embodiments or examples described in this specification, as well as features of various embodiments or examples, may be integrated and combined by a person skilled in the art without contradicting each other.

[0099] While embodiments of the present disclosure have been shown and described, it will be appreciated by a person skilled in the art that numerous changes, modifications, substitutions and variations can be made to these embodiments without departing from the principles and spirit of the present disclosure, the scope of which is defined by the claims and their equivalents.

Claims

1. An air channel assembly, comprising:

an upstream air channel part defining an upstream air channel; and
a cross-flow air channel part, wherein in a cross-section of the cross-flow air channel part, the cross-flow air channel part comprises a first air channel wall and a second air channel wall which are arranged at intervals from each other; wherein a cross-flow air channel is formed between the first air channel wall and the second air channel wall and communicates downstream of the upstream air channel; wherein the first air channel wall comprises a volute tongue section, the cross-flow air channel comprising a fan mounting cavity formed between a volute tongue windward surface of the volute tongue section and the second air channel wall, and a part of the first air channel wall between a volute tongue tip of the volute tongue section and an air channel outlet being an air outlet section;
wherein the air channel assembly has an air supplement path, an air inlet of the air supplement path being located at the air outlet section and being in communication with a region of the cross-flow air channel located downstream of the fan mounting cavity, and an air outlet of the air supplement path being provided between the volute tongue section and the upstream air channel part, and the air outlet being open towards an outside of the cross-flow air channel and being in communication with the upstream air channel.

2. The air channel assembly according to claim 1, wherein the air outlet is located on a side of the volute tongue windward surface facing away from the fan mounting cavity.

3. The air channel assembly according to claim 1 or 2, wherein the air outlet comprises at least one of a first outlet formed on the first air channel wall, a second outlet formed on the upstream air channel part, and a third outlet formed at a gap between the first air channel wall and the upstream air channel part.

4. The air channel assembly according to claim 3, wherein the volute tongue section further comprises a volute tongue extension surface extending from an end of the volute tongue windward surface facing away from the volute tongue tip in a direction facing away from the fan mounting cavity, and wherein the first outlet is provided on the volute tongue extension surface.

5. The air channel assembly according to claim 3, wherein the third outlet is defined between an end of the volute tongue windward surface facing away from the volute tongue tip and the upstream air channel part; or the volute tongue section further comprises a volute tongue extension surface extending from an end of the volute tongue windward surface facing away from the volute tongue tip in a direction facing away from the fan mounting cavity, the third outlet being defined between an end of the volute tongue extension surface facing away from the volute tongue windward surface and the upstream air channel part.

6. The air channel assembly according to claim 1, wherein the upstream air channel comprises a heat exchanger mounting cavity, and wherein the air outlet is provided between the volute tongue section and the heat exchanger mounting cavity and is in communication with a region of the upstream air channel located downstream of the heat exchanger mounting cavity.

7. The air channel assembly according to claim 6, wherein a centerline of the cross-flow air channel extends in a transverse direction, wherein the upstream air channel part comprises a water receiving section defining a water receiving tank, at least a part of the water receiving section being located below a region between the heat exchanger mounting cavity and the fan mounting cavity, and wherein the air outlet is located on a side of the water receiving section close to the volute tongue section.

8. The air channel assembly according to claim 7, wherein the air outlet is formed at at least one of the volute tongue section, the water receiving section, and a gap between the volute tongue section and the water receiving section.

9. The air channel assembly according to any one of claims 1 to 8, further comprising:
a downstream air channel part defining a downstream heat exchange air channel, wherein the downstream heat exchange air channel communicates downstream of the cross-flow air channel, and wherein the downstream heat exchange air channel comprises a downstream mounting cavity for mounting of a heat exchange device.

10. The air channel assembly according to any one of claims 1 to 9, wherein at least one air outlet is provided, and when the at least one air outlet comprises a plurality of air outlets, the plurality of air outlets are successively arranged at intervals in a direction facing away from the fan mounting cavity, and any one of the plurality of air outlets is an opening or comprises a plurality of sub-outlets arranged at intervals in an axial direction of the cross-flow air channel.

11. The air channel assembly according to any one of claims 1 to 10, wherein the air supplement path comprises an air supplement channel for communication between the air outlet and the air inlet, the air supplement channel extending in a direction from the air inlet to the air outlet, and wherein the air outlet, the air inlet, and the air supplement channel communicate in one-to-one correspondence.

12. The air channel assembly according to claim 11, wherein the air supplement channel has a width ranging from 3 mm to 7 mm.

13. The air channel assembly according to claim 11 or 12, wherein the air supplement channel extends from the air inlet to the air outlet along a straight line, or a curved line, or a combination of straight lines, or a combination of a straight line and a curved line.

14. The air channel assembly according to any one of claims 11 to 13, wherein in a longitudinal section of the cross-flow air channel part, the air outlet, the air inlet, and the air supplement channel, which are in communication with each other, are positioned in correspondence in an axial direction of the cross-flow air channel.

15. The air channel assembly according to any one of claims 1 to 14, wherein the air supplement path comprises a sealed cavity for communication between the air outlet and the air inlet, the sealed cavity is in communication with the plurality of air outlets simultaneously and/or with the plurality of air inlets simultaneously.

16. The air channel assembly according to claim 15, wherein all of the air outlets and all of the air inlets are in communication with the sealed cavity.

17. The air channel assembly according to any one of claims 1 to 16, further comprising:
An air deflector provided at the air outlet and located on a side of the air outlet facing away from the fan mounting cavity.

18. The air channel assembly according to claim 17, wherein the air deflector is resiliently swingable or is actuatable to swing between a direction close to the air outlet and a direction away from the air outlet, and/or the air deflector is a cambered air deflector or a planar air deflector.

19. An air conditioning device, comprising:

an air channel assembly according to any one of claims 1 to 18; and
a cross-flow fan provided in the fan mounting cavity.

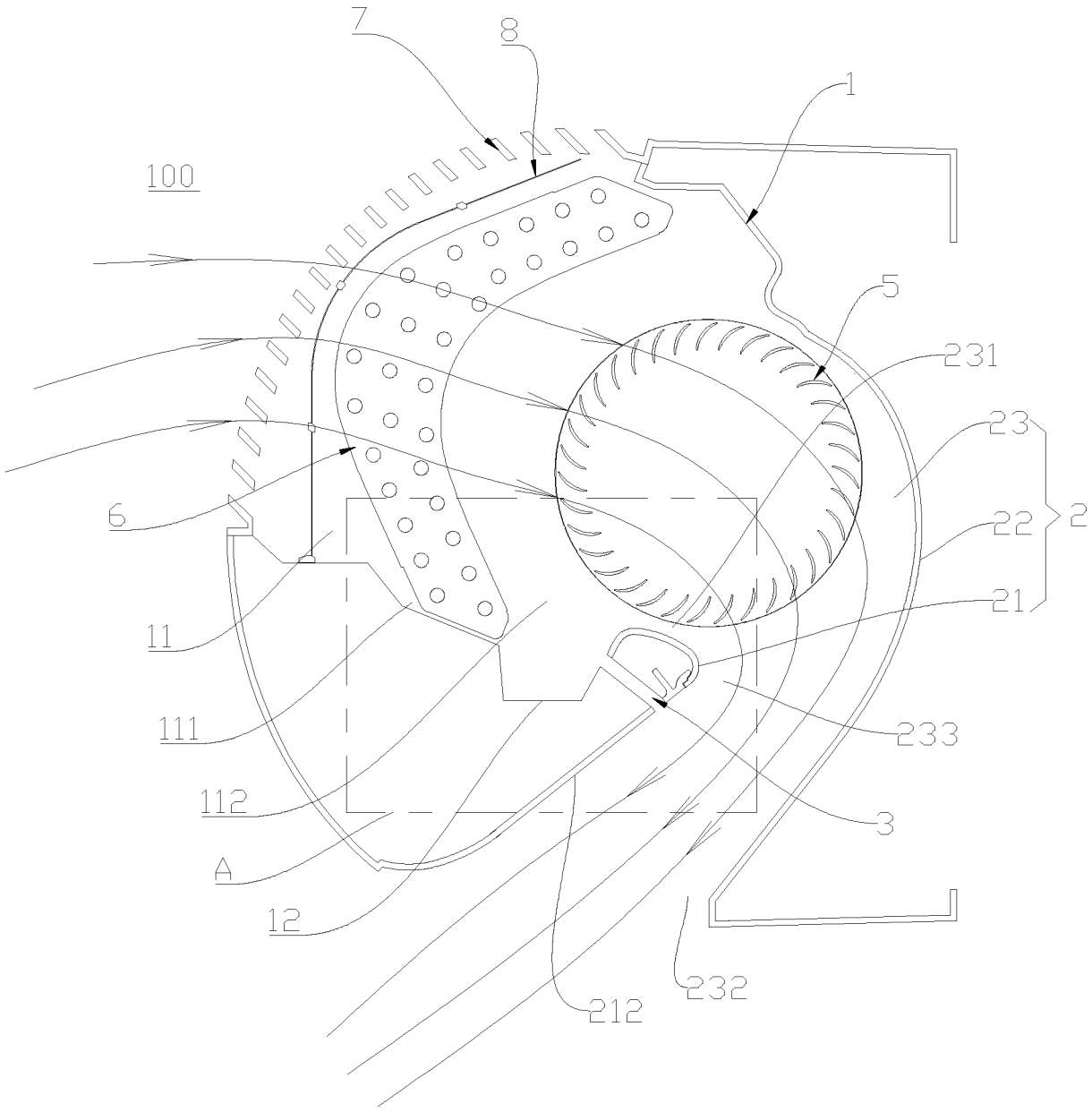

FIG. 1

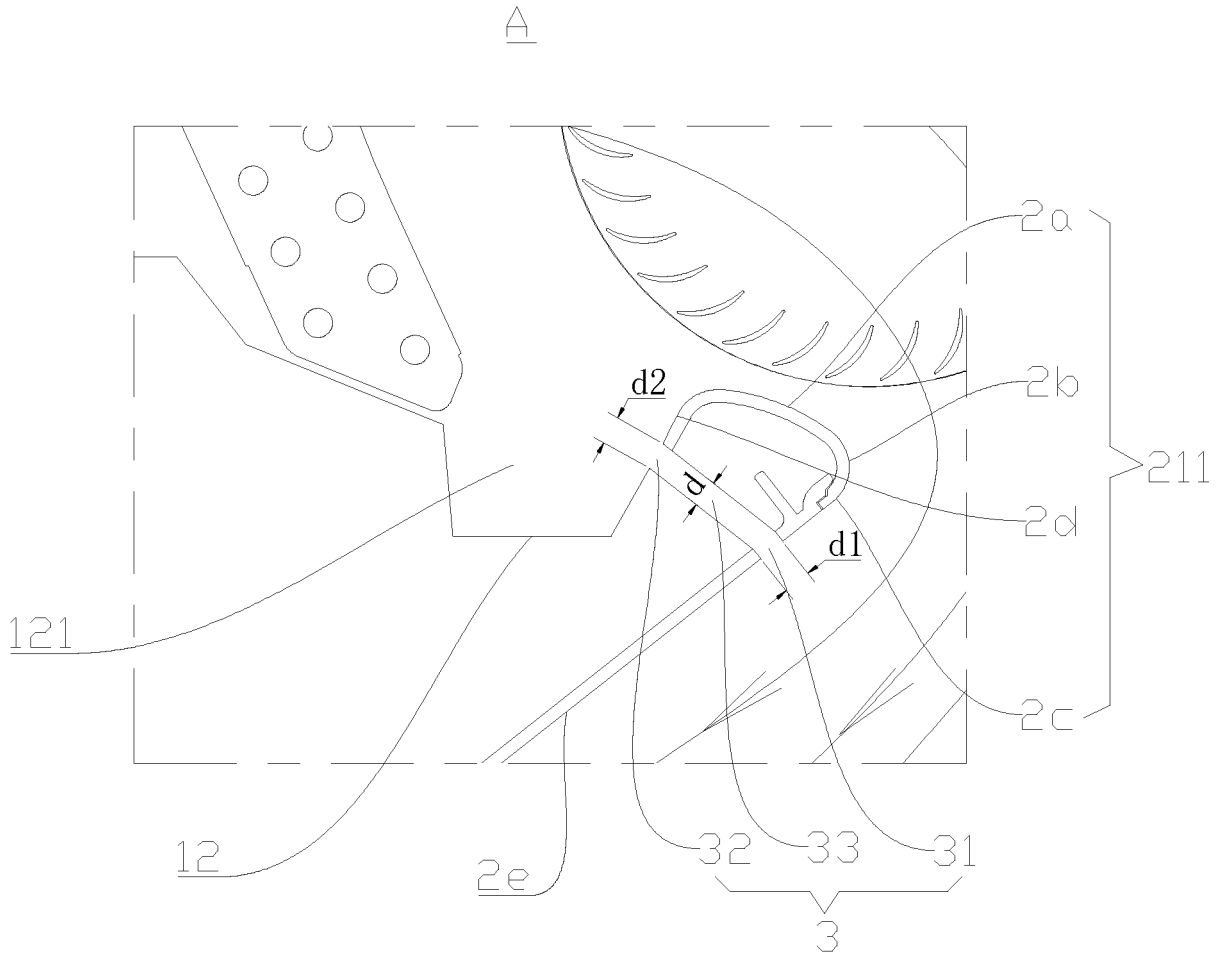

FIG. 2

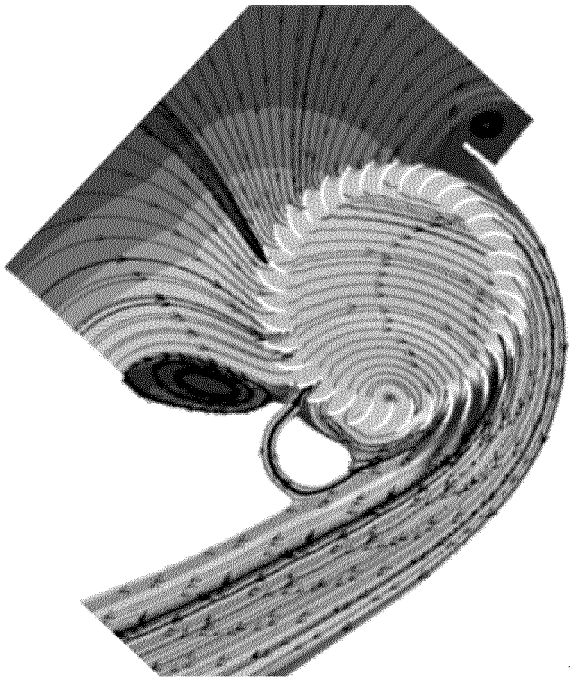

FIG. 3

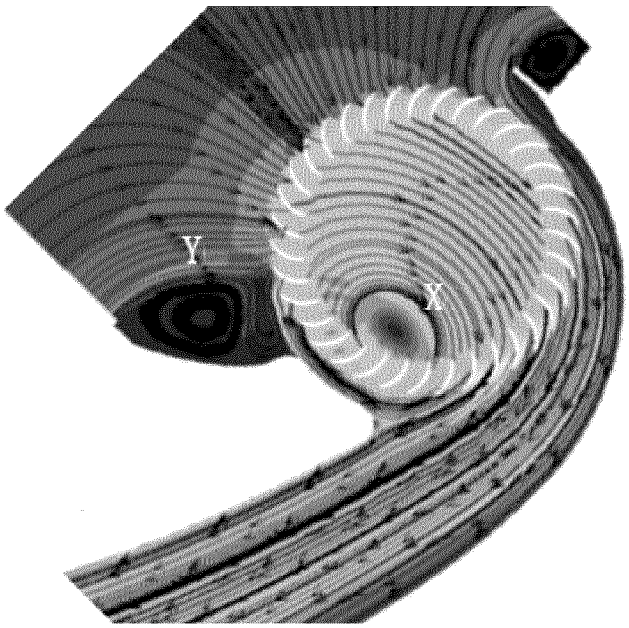

FIG. 4

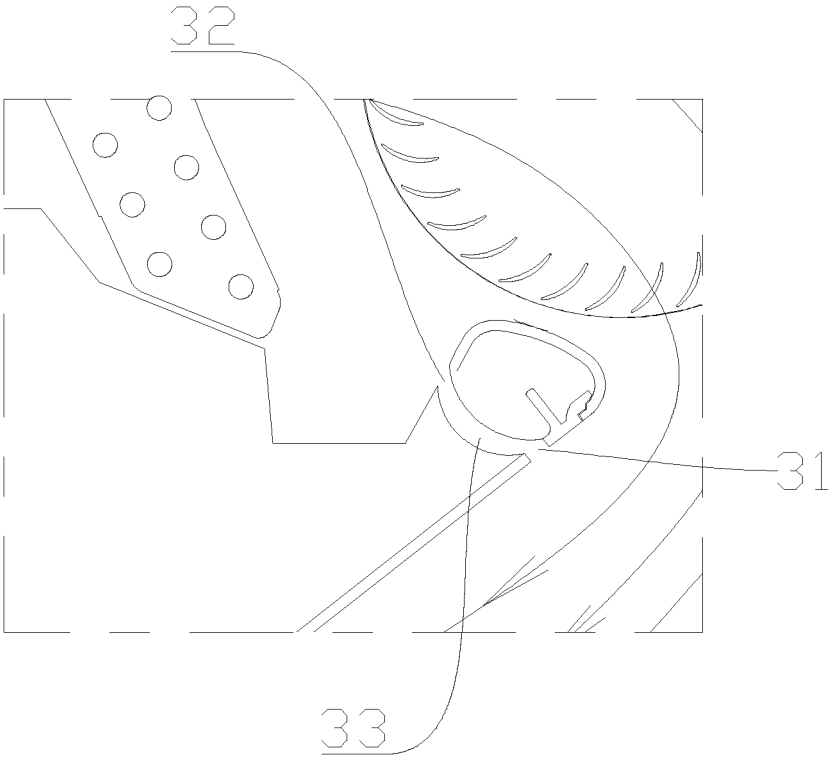

FIG. 5

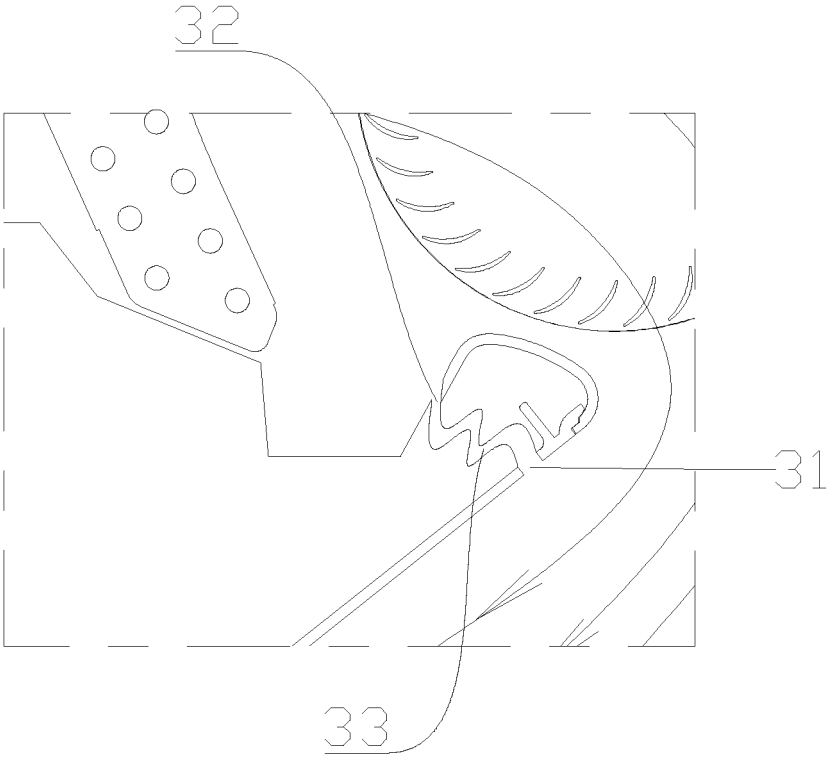

FIG. 6

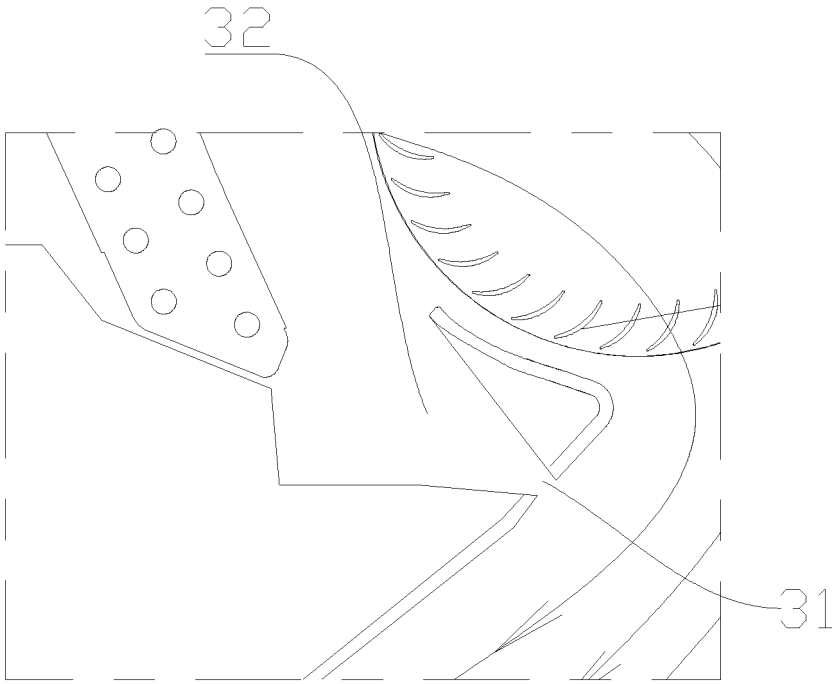

FIG. 7

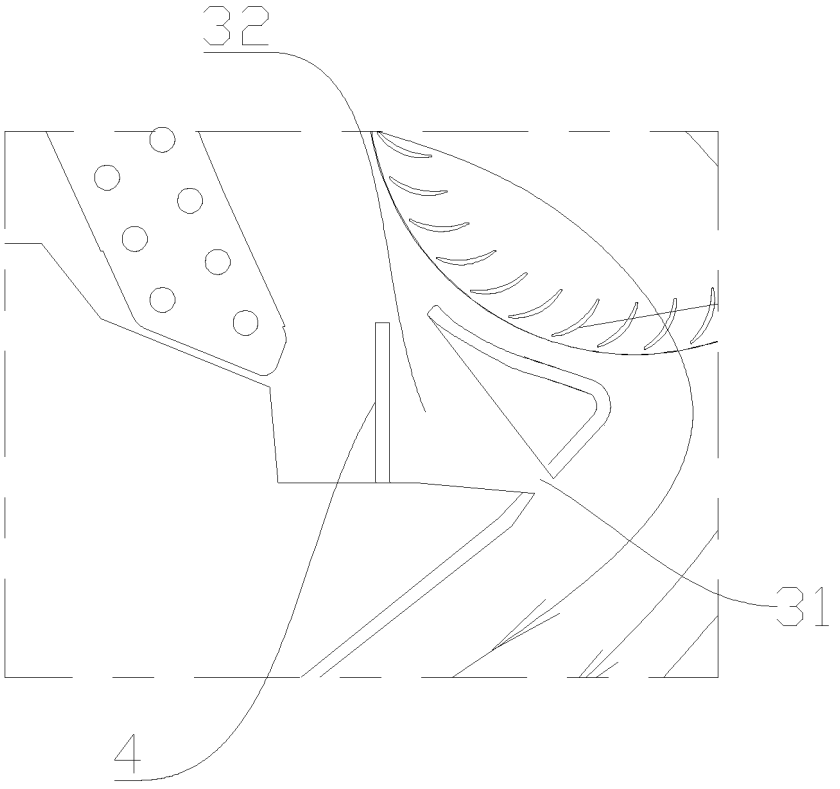

FIG. 8

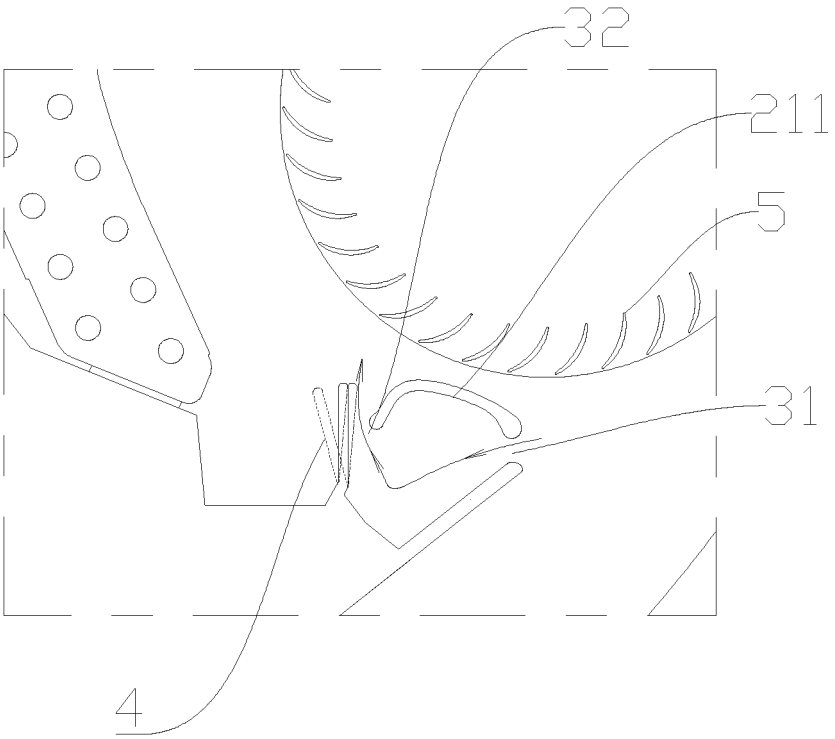

FIG. 9

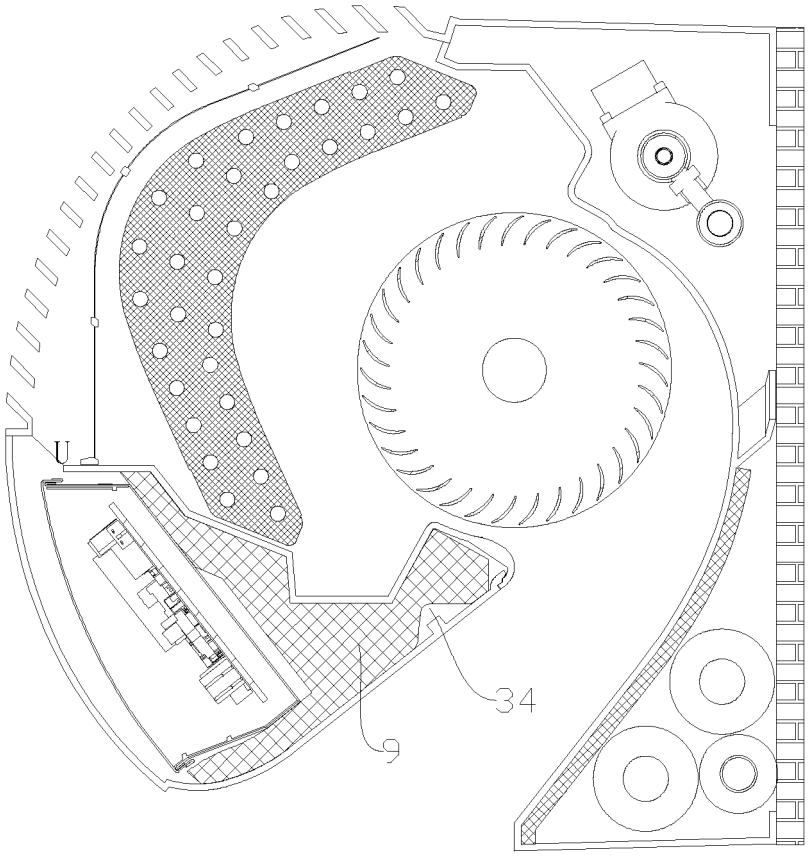

FIG. 10

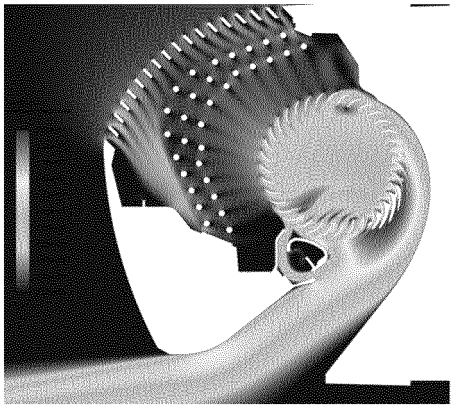

FIG. 11

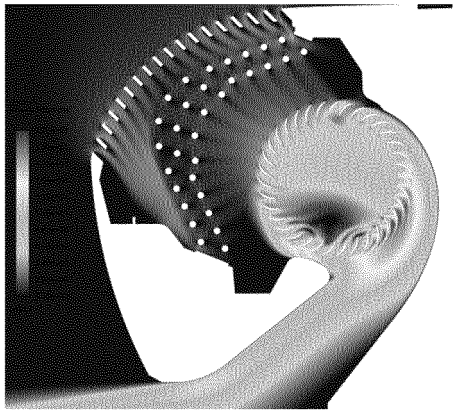

FIG. 12

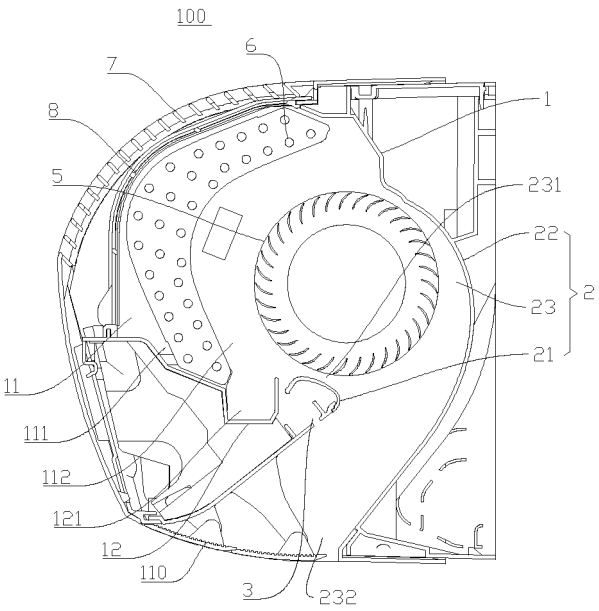

FIG. 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/070527

A. CLASSIFICATION OF SUBJECT MATTER

F24F1/0025(2019.01)i;F24F1/0063(2019.01)i;F24F1/0014(2019.01)i;F24F13/14(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)

CNTXT, CNABS, DWPI, VEN, WPABS, WPABSC, PATENTICS: 美的, 涂运冲, 吴多德, 吴彦东, 苏起钦, 胡小文, 詹东文, 风道, 风机, 风轮, 贯流, 蜗舌, 蜗壳, 偏心涡, 漩涡, 转速, 速度, 补气, 路径, 通道, 通路, 管, air, duct, fan?, wheel, volute, tongue, shell, speed, velocity, path, passage, pipe?

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 114440316 A (GUANGDONG AMERICAN HEATING AND VENTILATION EQUIPMENT LTD. CO. et al.) 06 May 2022 (2022-05-06) claims 1-19	1-19
Y	CN 202868855 U (LI LIYOU) 10 April 2013 (2013-04-10) description, paragraphs [0023]-[0027], and figures 1-2	1-19
Y	CN 108457906 A (GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI) 28 August 2018 (2018-08-28) description, paragraphs [0027]-[0033], and figure 1	1-19
Y	CN 108916116 A (GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI) 30 November 2018 (2018-11-30) description, paragraphs [0039]-[0057], and figures 1-2	1-19
Y	CN 208153402 U (GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI) 27 November 2018 (2018-11-27) description, paragraphs [0024]-[0029], and figures 1-3	1-19

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

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"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	Date of mailing of the international search report
13 March 2023	**27 March 2023**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/070527

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 206175317 U (HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY) 17 May 2017 (2017-05-17) entire document	1-19
A	JP 2017186938 A (MAKITA CORP.) 12 October 2017 (2017-10-12) entire document	1-19

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2023/070527

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 114440316 A	06 May 2022	None	
CN 202868855 U	10 April 2013	None	
CN 108457906 A	28 August 2018	CN 208252438 U	18 December 2018
CN 108916116 A	30 November 2018	None	
CN 208153402 U	27 November 2018	None	
CN 206175317 U	17 May 2017	None	
JP 2017186938 A	12 October 2017	JP 6727006 B2	22 July 2020
		DE 202016007447 U1	27 March 2017
		CN 206647279 U	17 November 2017

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 202210114732 **[0001]**