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(71) Applicants:
- **GD Midea Environment Appliances MFG Co., Ltd.**
  Zhongshan, Guangdong 528425 (CN)
- **Midea Group Co., Ltd.**
  Foshan, Guangdong 528311 (CN)

(72) Inventors:
- **LUO, Weijin**
  Zhongshan, Guangdong 528425 (CN)
- **YE, Sijin**
  Zhongshan, Guangdong 528425 (CN)
- **LU, Jianbin**
  Zhongshan, Guangdong 528425 (CN)
- **SONG, Pingze**
  Zhongshan, Guangdong 528425 (CN)

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

(54) **FAN HEAD ASSEMBLY FOR BLADELESS AIR-BLOWING APPARATUS, BLADELESS AIR-BLOWING APPARATUS, HEAD FOR BLADELESS FAN, AND BLADELESS FAN**

(57) A fan head assembly for a bladeless air-blowing apparatus, a bladeless air-blowing apparatus, a head (100) for a bladeless fan (1000), and a bladeless fan (1000). The fan head assembly comprises an air outlet portion (10). The air outlet portion (10) comprises an air inlet (13), a nozzle (12), and an air duct (11). Both the air inlet (13) and the nozzle (12) communicate with the air duct (11). The air duct (11) has a variable cross-section part. An airflow passage area of the variable cross-section part continuously switches from bottom to top, and the airflow passage area at the lower end of the variable cross-section part is larger than the airflow passage area at the upper end. The configuration allows a flow rate of an inlet airflow to increase when the inlet airflow passes through the variable cross-section part, such that the flow rate of the airflow output from an upward nozzle and a downward nozzle at the variable cross-section part is uniform, thereby improving the user experience.

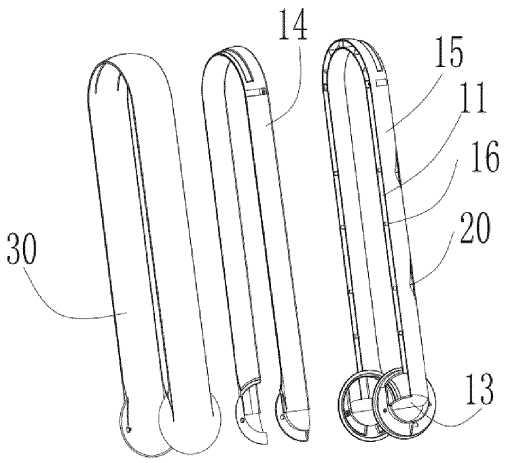

FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to the following four Chinese patent applications filed at the National Intellectual Property Administration, PRC on December 19, 2017: 1. Chinese patent application "bladeless fan and head thereof' with application number 201721803727.9; 2. Chinese patent application "fan head component and bladeless blowing device" with application number 201711376203.0; 3. Chinese patent application "fan head component and bladeless blowing device" with application number 201721803860.4; and 4. Chinese patent application "fan head component and bladeless blowing device" with application number 201711378783.7. All contents of the above four Chinese patent applications are incorporated by reference in this application.

TECHNICAL FIELD

[0002] The disclosure relates to the field of domestic appliances, and particularly to a fan head component for a bladeless blowing device, a bladeless blowing device, a head for a bladeless fan, and a bladeless fan.

BACKGROUND

[0003] A bladeless fan generates high-pressure air through a drive system, and the high-pressure air enters an air channel and is emitted through nozzles. However, in the existing bladeless fan, after the high-pressure air enters the air channel from an air inlet, the closer the air emitted from the nozzle to the lower side of the air channel, the larger the flow rate, and the closer the air emitted from the nozzle to the upper side of the air channel, the lower the flow rate. Thus, the flow rates of the air emitted from the nozzles are not uniform in the vertical direction in which the nozzles extend, and the user experience is poor.

SUMMARY

[0004] Based on the above, the embodiments of the disclosure are expected to provide a fan head component for a bladeless blowing device, a bladeless blowing device, a head for a bladeless fan, and a bladeless fan to improve the uniformity of the flow rates of the air emitted from nozzles and enhance the user experience.

[0005] In order to achieve the above objective, according to a first aspect of the embodiments of the disclosure, a fan head component for a bladeless blowing device is provided. The fan head component includes an air output portion. The air output portion includes an air inlet, a nozzle and an air channel, both the air inlets and the nozzle are communicated with the air channel. The air channel has a variable cross-section portion, an air flow area corresponding to the variable cross-section portion varies continuously in a vertical direction. The air flow area corresponding to a lower end of the variable cross-section portion is greater than the air flow area corresponding to an upper end of the variable cross-section portion.

[0006] In an embodiment of the present application, the variable cross-section portions are positioned at an upper part and/or a middle part of the air channel.

[0007] In an embodiment of the present application, a side wall of the air output portion is tapered inwardly in the vertical direction to form the variable cross-section portion.

[0008] In an embodiment of the present application, the nozzle extends along the vertical direction of the air channel. There are a plurality of variable cross-section portions, and the plurality of variable cross-section portions are disposed along the vertical direction of the air channel and spaced from each other.

[0009] In an embodiment of the present application, the fan head component includes a guide device disposed in the air channel. The guide device includes a first guide member having a first guide surface which obliquely extends downward to block a part of intake air. The air flow area of the air channel corresponding to the lower end of the first guide surface is greater than the air flow area of the air channel corresponding to the upper end of the first guide surface. A corresponding part of the air channel between the lower end and the upper end of the first guide surface is the variable cross-section portion.

[0010] In an embodiment of the present application, the first guide member is of plate shape, and the first guide member obliquely extends downward from the upper end of the air channel.

[0011] In an embodiment of the present application, the first guide surface faces toward the nozzle to guide a part of intake air to the nozzle.

[0012] In an embodiment of the present application, the nozzle is disposed at the first side of the air output portion. The first guide member is disposed at the second side of the air output portion opposite to the first side. The edge of the first guide member is tightly connected with the inner wall of the second side of the air output portion.

[0013] In an embodiment of the present application, the first guide surface faces toward the side wall of the air output portion, and the edge of the first guide member is tightly connected with the side wall of the air output portion.

[0014] In an embodiment of the present application, the guide device further includes a second guide member positioned above the first guide member. The second guide member has a second guide surface which obliquely extends upward. The lower end of the second guide surface is connected with the upper end of the first guide surface. The air flow area of the air channel at the lower end of the second guide surface is less than the air flow area of the air channel at the upper end of the

second guide surface.

[0015] In an embodiment of the present application, the second guide surface is a flat surface, an arc surface or a combination of a flat surface and an arc surface, and/or the first guide surface is a flat surface, an arc surface or a combination of a flat surface and an arc surface.

[0016] In an embodiment of the present application, from the lower end of the second guide surface to the upper end of the second guide surface, the air flow area of the corresponding air channel gradually increases.

[0017] In an embodiment of the present application, the guide device includes a third guide member having a third guide surface, and the second guide surface is in smooth transition connection with the first guide surface through the third guide surface.

[0018] In an embodiment of the present application, the air output portion includes a front air output member and a rear air output member. The front air output member and the rear air output member together define the air channel. The nozzle is disposed at a front side of the front air output member, and the guide device is tightly connected to a rear side of the rear air output member.

[0019] In an embodiment of the present application, the guide device is integrated with the rear air output member.

[0020] In an embodiment of the present application, one of the front air output member and the rear air output member is provided with a positioning slot, the other one is provided with a positioning protrusion matching with the positioning slot. The front air output member and the rear air output member are connected to one another through ultrasonic welding or gluing.

[0021] In an embodiment of the present ap
plication, the fan head component further includes a housing covering the outside of the air output portion.

[0022] In an embodiment of the present application, from the lower end of the first guide surface to the upper end of the first guide surface, the air flow area of the corresponding air channel gradually decreases.

[0023] In an embodiment of the present application, the air output portion further includes reinforcing ribs disposed in the air channel. Two ends of the reinforcing ribs are fixedly connected with the inner walls of the left and right sides of the air channel.

[0024] In an embodiment of the present application, the nozzle extend along the vertical direction of the air channel. There are a plurality of guide devices. The plurality of guide devices are disposed along the vertical direction of the air channel and spaced from one another, and the plurality of guide devices are disposed to correspond to the nozzle.

[0025] According to a second aspect of the embodiments of the disclosure, a fan head component for a bladeless blowing device is provided. The fan head component includes an air output portion which comprises an air inlet, a nozzle and an air channel. Both the air inlet and the nozzle are communicated with the air channel. The air channel comprises a first end and a second end. An air flow direction is a direction from the first end to the second end of the air channel. The air channel comprises a variable cross-section portion. An air flow area of the variable cross-section portion continuously varying along the air flow direction. The air flow area corresponding to an end of the variable cross-section portion adjacent to the first end being greater than the air flow area corresponding to an end of the variable cross-section portion adjacent to the second end.

[0026] In an embodiment of the present application, the side wall of the air output portion is tapered inward to form the variable cross-section portion.

[0027] In an embodiment of the present application, the nozzle extends along the air flow direction of the air channel. There are a plurality of variable cross-section portions, and the plurality of variable cross-section portions are disposed along the air flow direction of the air channel and spaced from one another.

[0028] In an embodiment of the present application, the fan head component includes a guide device disposed in the air channel. The guide device includes a first guide member having a first guide surface. The first guide surface obliquely extends relative to the air flow direction to block a part of intake air. A part of the air channel at a position corresponding to the first guide surface is the variable cross-section portion.

[0029] In an embodiment of the present application, the first guide surface faces toward the nozzle to guide a part of intake air to the nozzle.

[0030] In an embodiment of the present application, the guide device further includes a second guide member positioned adjacent to the second end. The second guide member has a second guide surface which obliquely extends relative to the air flow direction. The second guide surface is connected with the first guide surface. The air flow area of the air channel corresponding to the end of the second guide surface adjacent to the first guide surface is less than the air flow area of the air channel corresponding to the end of the second guide surface away from the first guide surface.

[0031] In an embodiment of the present application, the air flow area of the air channel corresponding to the second guide surface gradually increases along the air flow direction.

[0032] According to a third aspect of the embodiments of the disclosure, a bladeless blowing device is provided. The bladeless blowing device includes a base, a drive system disposed in the base, and any one of the above fan head components. The fan head component is connected with the base to receive the intake air generated by the drive system through the air inlet and emit the intake air through the nozzle.

[0033] In an embodiment of the present application, the bladeless blowing device is any one of a bladeless fan, a bladeless blower, a bladeless heater, a bladeless humidifier and a bladeless cooler.

[0034] According to a fourth aspect of the embodiments of the disclosure, a head for a bladeless fan is

provided. An air channel is formed in the head, the air channel has a first end and a second end. The first end of the air channel is provided with an air inlet. An air flow direction is a direction from the first end to the second end of the air channel. The wall of the air channel is provided with an air outlet which passes through the wall of the air channel in a direction perpendicular to the air flow direction. The air outlet is arranged along the air flow direction. A transition section is formed between the first end and the second end of the air channel. The flow area of the transition section gradually varies in the air flow direction.

[0035] In an embodiment of the present application, the transition section includes a first sub-section, and the flow area of the first sub-section gradually decreases in the air flow direction.

[0036] In an embodiment of the present application, one end of the first sub-section extends to the first end of the air channel or is spaced from the first end of the air channel, and the other end of the first sub-section extends to the second end of the air channel.

[0037] In an embodiment of the present application, the first sub-section is spaced from the second end of the air channel. The transition section further includes a second sub-section. One end of the second sub-section is connected with the first sub-section, the other end of the second sub-section extends toward the second end of the air channel. The flow area of the second sub-section gradually increases in the air flow direction.

[0038] In an embodiment of the present application, the length of the second sub-section in the air flow direction is greater than the length of the first sub-section in the air flow direction.

[0039] In an embodiment of the present application, the transition section directly faces at least a part of the air outlet.

[0040] In an embodiment of the present application, the wall of the air channel protrudes toward an inside of the air channel to form the transition section.

[0041] In an embodiment of the present application, there are a plurality of transition sections spaced from one another in the air flow direction, and the lengths of the plurality of transition sections in the air flow direction are the same.

[0042] In an embodiment of the present application, there are at least three transition sections spaced from one another in the air flow direction, and an interval between every two adjacent transition sections in the at least three transition sections is the same.

[0043] In an embodiment of the present application, the head includes a first air channel member and a second air channel member. The air channel is formed in each of the first air channel member and the second air channel member. One end of the first air channel member is connected and communicated with one end of the second air channel member, or one end of the first air channel member is connected with one end of the second air channel member by a connector. The air channel in the first air channel member is spaced from the air channel in the second air channel member.

[0044] In an embodiment of the present application, the head includes a first air channel member, a second air channel member and a connector. The first air channel member extends along a vertical direction. The second air channel member also extends along the vertical direction. The first air channel member and the second air channel member are spaced from one another in a left-right direction and parallel to each other and are parallel to each other. One end of the connector is connected with an upper end of the first air channel member and another end is connected with the upper end of the second air channel member. The air channel is formed in each of the first air channel member and the second air channel member. The lower end of the air channel is the first end, and the upper end of the air channel is the second end.

[0045] According to a fifth aspect of the embodiments of the disclosure, a bladeless fan is provided. The bladeless fan includes a base, a head and an air generation device. The head is any one of the above heads for a bladeless fan and is installed on the base. The air generation device is disposed in the base and configured to supply air into the air channel.

[0046] In the fan head component according to the embodiments of the disclosure, the flow rate of the intake air is increased during the intake air flows through the variable cross-section portions, so that the flow rates of the air emitted from the nozzle located at corresponding position of the variable cross-section portion are relatively uniform, and the user experience is enhanced.

BRIEF DESCRIPTION OF THE DRAWINGS

[0047]

FIG. 1 is a schematic diagram of a decomposition structure of a fan head component according to a first embodiment in a specific implementation I of the disclosure.

FIG. 2 is a schematic diagram of an assembly structure of the fan head component in FIG. 1.

FIG. 3 is a schematic structural diagram of an air output portion of the fan head component in FIG. 1.

FIG. 4 is a schematic structural diagram of a rear air output member and guide devices in FIG. 1.

FIG. 5 is a left view of FIG. 4.

FIG. 6 is a schematic structural diagram of a rear air output member according to a second embodiment in the specific implementation I of the disclosure.

FIG. 7 is a schematic structural diagram of a rear air

output member and guide devices according to a third embodiment in the specific implementation I of the disclosure.

FIG. 8 is a schematic structural diagram of a rear air output member and guide devices according to a fourth embodiment in the specific implementation I of the disclosure.

FIG. 9 is a schematic structural diagram of a rear air output member and guide devices according to a fifth embodiment in the specific implementation I of the disclosure.

FIG 10 is a schematic structural diagram of a rear air output member and guide devices according to a sixth embodiment in the specific implementation I of the disclosure.

FIG. 11 is a schematic structural diagram of an air output portion having the rear air output member in FIG. 8 taken along a direction A-A in FIG. 8 and rotated 90° clockwise.

FIG. 12 is a schematic diagram of a head according to an embodiment in a specific implementation II of the disclosure.

FIG. 13 is an exploded view of the head shown in FIG. 12.

FIG. 14 is a schematic diagram of a combination of a first splicing part and a second splicing part shown in FIG. 13.

FIG. 15 is a side projection diagram of the first splicing part and the second splicing part shown in FIG. 14.

FIG. 16 is a cross-sectional diagram of the first splicing part and the second splicing part shown in FIG. 15.

FIG. 17 is a three-dimensional diagram of the first splicing part shown in FIG. 13.

FIG. 18 is another three-dimensional diagram of the first splicing part shown in FIG. 13.

FIG. 19 is a three-dimensional diagram of a first splicing part according to an embodiment in the specific implementation II of the disclosure.

FIG 20 is a three-dimensional diagram of a first splicing part according to another embodiment in the specific implementation II of the disclosure.

FIG 21 is a three-dimensional diagram of a first splicing part according to another embodiment in the specific implementation II of the disclosure.

FIG 22 is a schematic diagram of a bladeless fan according to an embodiment in the specific implementation II of the disclosure.

DETAILED DESCRIPTION

Specific implementation I

[0048] The specific implementationI is described below in conjunction with FIG. 1 to FIG. 11. The orientation words "upper", "lower", "front", "rear", "left", "right", and the like used in the specific implementation of the disclosure refer to the orientation words under the normal use of a bladeless blowing device. "Front" refers to the side facing a user, and "rear" refers to the side facing away from the user. Taking FIG. 5 as an example, "front" is an outward direction perpendicular to the plane of the paper shown in FIG. 5, "rear" is an inward direction perpendicular to the plane of the paper shown in FIG. 5, "upper" and "lower" are vertical direction shown in FIG. 5, and "left" and "right" are left and right directions shown in FIG. 5.

[0049] In the specific implementation, an "ejection angle" is an angle between the direction of the air emitted from the nozzle and the horizontal direction shown in FIG. 5. The "air flow area" refers to the area of the air output portion 10 in the cross section along the horizontal direction shown in FIG. 5, through which the intake air flows upward in the air channel 11. The "first side" and the "second side" refer to directions. The "side walls of the air output portion" refer to all side walls of the housing of the air output portion 10 that form the air channel 11, and include a left side wall 101a, a right side wall 101b, a front side wall and a rear side wall of the air channel 11.

[0050] The specific implementation of the disclosure provides a bladeless blowing device, including a base (not shown), a drive system (not shown) disposed in the base, and a fan head component. The fan head component is connected with the base to receive the intake air generated by the drive system and emit the intake air outward. In the present embodiment, the description will be made by taking a bladeless fan as an example of the bladeless blowing device. It can be understood that the type of the bladeless blowing device is not limited to the bladeless fan. For example, the bladeless blowing device may also be any one of a bladeless blower, a bladeless heater, a bladeless humidifier and a bladeless cooler.

[0051] Referring to FIG. 1, FIG. 2 and FIG. 3, according to the first embodiment in the specific implementation of the disclosure, the fan head component includes an air output portion 10 and a housing 30. The air output portion 10 includes air inlets 13, nozzles 12 and air channels 11, and both the air inlets 13 and the nozzles 12 are communicated with the air channels 11. The overall shape of the air output portion 10 is not limited, and may be a

circular ring shape, an ∩ shape, a polygonal shape, and the like. A cavity inside the air output portion 10 forms the air channel 11, and the shape of the air channel 11 matches with the shape of the air output portion 10. In the present embodiment, the air output portion 10 is substantially in a bilaterally symmetrical n-shaped structure, the number of the air inlets 13 is two, and an air inlet 13 is respectively formed at the lower part of each of the air channels 11 at the left and right sides of the ∩-shaped air output portion 10. The nozzle 12 of the air output portion 10 is disposed at the first side of the air output portion 10, and the first side may be a front side of the air output portion 10 facing a user or a rear side facing away from the user. The nozzle 12 may extend along the vertical direction of the first side and is in a long slit structure with a small width. The drive system in the base generates intake air with pressure, the intake air enters the air channel 11 from the base through the air inlet 13. During the movement of the intake air from bottom to top in the air channel 11, the intake air will be continuously emitted from the nozzle 12.

[0052] The structural form of the air output portion 10 is not limited. For example, the left side wall 101a, the right side wall 101b, the front side wall and the rear side wall of the air output portion 10 may be integrally formed. For another embodiment, referring to FIG. 1 and FIG. 3, in the first embodiment, in order to facilitate demolding during production, the air output portion 10 includes a front air output member 14 and a rear air output member 15, the front air output member 14 and the rear air output member 15 are tightly jointed to one another, the inside of each of the front air output member 14 and the rear air output member 15 is a hollow cavity, and the two hollow cavities together define the above air channel 11. The nozzle 12 is disposed at the front side of front air output member 14, that is, the first side of the air output portion 10. In order to facilitate the connection and positioning of the front air output member 14 and the rear air output member 15, the corresponding positions of the front air output member 14 and the rear air output member 15 are provided with a positioning slot 141 and a positioning protrusion 151 which are matched to each other. The positioning protrusion 151 is clamped into the positioning slot 141, that is, the relative positions of the front air output member 14 and the rear air output member 15 are preset, so as to facilitate the subsequent hermetic connection. For example, the front air output member 14 and the rear air output member 15 may be connected to one another by gluing or ultrasonic welding at the joint position.

[0053] Since the air output portion 10 generally has a flat thin-walled structure, when the air output portion 10 is subjected to external pressure, the shape of the internal air channel 11 easily changes, thereby affecting the fluid distribution in the air channel 11. Therefore, referring to FIG. 5, FIG. 6 and FIG. 7, the air output portion 10 further includes reinforcing ribs 16 disposed in the air channel 11, and two ends of the reinforcing ribs 16 are fixed between the left side wall 101a and the right side wall 101b of the air channel 11. Specifically, the reinforcing ribs 16 are disposed on the side walls of the left and right sides in the front air output member 14 and/or the rear air output member 15.

[0054] The housing 30 covers the outside of the air output portion 10. Specifically, the housing 30 covers the outside of the front air output member 14 and the rear air output member 15 to play a role in beautifying the fan component. The housing 30 may be connected with the air output portion 10 by means of bolts, screws or clamping.

[0055] The air channel 11 has variable cross-section portions, the air flow areas corresponding to the variable cross-section portions continuously vary from bottom to top, and the air flow area corresponding to the lower end of the variable cross-section portion is greater than the air flow area corresponding to the upper end of the variable cross-section portion. The "continuous vary" means that there is no larger sudden vary in the value of the air flow area. For example, the variable cross-section portion is substantially in a form with a large lower part and a small upper part. The air flow area of the variable cross-section portion may gradually decrease linearly, or may be in a substantially decreasing trend in a slower curve.

[0056] During the movement of the intake air from the lower end of the variable cross-section portion to the upper end of the variable cross-section portion, the intake air is continuously squeezed, and the air flow rate is continuously increased to reduce the flow rate difference of the air emitted from the nozzle 12 in the vertical direction, so that the rate of the air emitted from the nozzle 12 in the vertical direction corresponding to the variable cross-section portion is relatively uniform, and the user experience is improved.

[0057] It should be noted that the "variable cross-section portion" refers to the air channel 11 with a variation in a cross-section of air flow area along the vertical direction of the air channel 11.

[0058] The variable cross-section portion may be positioned at the upper part or the middle part of the air channel 11, or both the upper part and the middle part of the air channel 11 are provided with variable cross-section portions.

[0059] One variable cross-section portion may be provided, or a plurality of variable cross-section portions may be provided and are spaced from one another along the vertical direction of the air channel 11.

[0060] The side wall 101 of the air output portion 10 may be tapered inward to form the variable cross-section portion. For example, the left side wall 101a and/or the right side wall 101b of the air output portion 10 may incline to the inside of the air channel 11 to form the variable cross-section portion, and/or the front side wall and/or the rear side wall of the air output portion 10 may incline to the inside of the air channel 11 to form the variable cross-section portion. The "front side wall of the air output portion 10" is a side wall corresponding to the first side

of the air output portion 10, and the "rear side wall of the air output portion 10" is a side wall corresponding to the second side opposite to the first side. Referring to FIG. 6, in the second embodiment provided by the specific implementation I, the right side wall 101b of the air output portion 10 inclines to the inside of the air channel 11.

[0061] A guide device may be additionally disposed in the air channel 11 in the air output portion 10 to form the variable cross-section portion. Referring to FIG. 1 and FIG. 7 to FIG. 10, the fan head component further includes a guide device 20 disposed in the air channel 11. The guide device 20 includes a first guide member 21. The first guide member 21 has a first guide surface 21a. The first guide surface 21a obliquely extends downward in the air channel 11 to block a part of intake air. The air flow area of the air channel 11 corresponding to the lower end of the first guide surface 21a is greater than the air flow area of the air channel 11 corresponding to the upper end of the first guide surface 21a, and the corresponding part of the air channel 11 between the lower end and the upper end of the first guide surface 21a is the variable cross-section portion. Further, the first guide surface 21a faces toward the nozzle 12 to guide part of intake air from the air inlet 13 to the nozzle 12.

[0062] The first guide surface 21a may face toward any direction of the air output portion 10. Referring to FIG. 7, in the third embodiment provided by the specific implementation I, the first guide surface 21a faces toward the left side wall 101a and/or the right side wall 101b of the air output portion 10. Specifically, the first guide member 21 is in a plate shape with a longer length, the first guide member 21 in the plate shape is positioned at the second side of the air output portion 10 adjacent to the upper part, the first guide member 21 obliquely extends gradually downward from the upper end of the air channel 11, and the periphery in a plate shape is tightly connected with the inner wall of the air output portion 10.

[0063] In the related technologies, the intake air of a bladeless fan enters an air channel from an air inlet and then is emitted obliquely upward from a nozzle at a higher speed and a larger ejection angle, instead of being blown to a user in a horizontal direction, resulting in poor user experience. Along the height direction of the air channel, the flow rate of the air emitted from the nozzle gradually decreases, the ejection angle of the air emitted obliquely upward by the nozzle becomes smaller and smaller, the air emitted from the upper nozzle is emitted in a horizontal direction where the ejection angle is almost zero, but the air emitted obliquely upward by the lower nozzle and the air emitted in the upper horizontal direction will cause turbulence, thereby further affecting the user experience. Therefore, referring to FIG. 1 and FIG. 8 to FIG. 10, in the first embodiment, the fourth embodiment, the fifth embodiment and the sixth embodiment in the specific implementation of the disclosure, the first guide surface 21a is disposed facing toward the nozzle 12. Under the guide action of the first guide surface 21a, the movement direction of a part of intake air gradually varies from vertical upward movement to movement in a direction facing toward the nozzle 12. During the movement of the intake air from the lower end of the first guide surface 21a to the upper end of the first guide surface 21a, since the air flow area of the air channel 11 corresponding to the lower end of the first guide surface 21a is greater than the air flow area of the air channel 11 corresponding to the upper end of the first guide surface 21a, the intake air is continuously squeezed and guided toward the nozzle 12, and then, a part of intake air may be emitted from the nozzle 12 at a smaller ejection angle under the guide action of the first guide surface 21a, so as to effectively improve the phenomenon that the intake air is emitted obliquely upward from the nozzle 12 to enhance the user experience. Since the ejection angle of the air emitted from the nozzle 12 is reduced, the turbulence phenomenon may be effectively inhibited, and the user experience may be further enhanced.

[0064] On the first guide surface 21a, the disturbance to the air by structures, such as sharp corners, should be avoided as much as possible. The first guide surface 21a may be a flat surface, an arc surface, or a combination of a flat surface and an arc surface.

[0065] The position of the first guide member 21 is not limited. For example, the first guide member 21 may be disposed on the left side wall 101a or the right side wall 101b of the air output portion 10, or may be disposed on the inner wall of the second side of the air output portion 10, that is, the rear side wall of the air output portion 10, and the edge of the first guide member 21 is tightly connected with the inner wall of the second side of the air output portion 10. Specifically, the first guide member 21 is disposed at the rear side of the rear air output member 15, and is tightly connected with the inner wall of the rear side of the rear air output member 15. For example, the first guide member 21 is integrally formed on the inner wall of the rear side of the rear air output member 15. Therefore, on the one hand, the fan component is simple and compact in structure and convenient to produce and process. On the other hand, all the intake air flows through the space between the first guide member 21 and the first side of the air output portion 10, and the first guide surface 21a may achieve a better guide effect on the intake air.

[0066] The number of the first guide members 21 may be set according to actual use needs, and may be one or more. Each of the first guide members 21 corresponds to a variable cross-section portion. For example, referring to FIG. 1 to FIG. 5, in the first embodiment, the number of the first guide members 21 is two, and the two first guide members 21 are spaced from one another in a vertical direction in the air channel 11. Referring to FIG. 8, in the fourth embodiment, the number of the first guide member 21 is one, the first guide member 21 is in plate shape with a longer length, the first guide surface 21a faces toward the nozzle 12, the first guide member 21 in the plate shape is positioned at the second side of the air output portion 10 adjacent to the upper part, the first

guide member 21 obliquely extends gradually downward from the upper end of the air channel 11, and the periphery in a plate shape is tightly connected with the inner wall of the air output portion 10. It should be noted that the "plate shape" should be understood to include a straight plate shape and a slightly curved plate shape with a certain radian. The extension length of the first guide member 21 may be correspondingly changed according to actual needs.

[0067] The guide device 20 further includes a second guide member 22, the second guide member 22 is positioned above the first guide member 21, the second guide member 22 has a second guide surface 22a which obliquely extends upward, the lower end of the second guide surface 22a is connected with the upper end of the first guide surface 21a, and the connection may be direct connection or smooth transition connection through an intermediate structure. For example, referring to 9, in the fifth embodiment, the guide device 20 further includes a third guide member 23, the third guide member 23 has a third guide surface 23a, and the first guide surface 21a is in smooth transition connection with the second guide surface 22a through the third guide surface 23a of the third guide member 23. The first guide surface 21a, the second guide surface 22a and the third guide surface 23a are in smooth transition connection to achieve a better guide effect.

[0068] The second guide surface 22a may guide the intake air which continues to move upward after bypassing the first guide surface 21a, so as to prevent the occurrence of the vortex phenomenon at the upper position of the first guide member 21.

[0069] Further, the air flow area of the air channel 11 corresponding to the lower end of the second guide surface 22a is less than the air flow area of the air channel 11 corresponding to the upper end of the second guide surface 22a, so as to achieve a damping effect on the upward moving intake air. Further, the air flow area of the corresponding part of the air channel 11 between the lower end of the second guide surface 22a and the upper end of the second guide surface 22a gradually increases. That is, in the present embodiment, the air flow area of the air channel 11 at the corresponding position of the guide device gradually is tapered from bottom to top and then gradually expands.

[0070] The shape of the second guide surface is not limited. For example, the second guide surface may be a flat surface, an arc surface, or a combination of a flat surface and an arc surface.

[0071] The position of the second guide member 22 needs to be matched with the position of the first guide member 21. For example, when the first guide member 21 is disposed at the rear side of the rear air output member 15, the second guide member 22 is also correspondingly disposed at the rear side of the rear air output member 15.

[0072] The number of the second guide member 22 is determined according to actual needs. When there are a plurality of second guide members 22, a plurality of second guide members 22 are spaced from one another in the vertical direction of the air channel 11. It should be noted that the first guide member 21 of the disclosure does not need to be disposed in one-to-one correspondence with the second guide member 22. That is, the first guide member 21 may have a matched second guide member 22, or may have no matched second guide member 22.

[0073] It should be noted that the guide device 20 may be in a split type structure or an integrated structure. Specifically, the first guide member 21 may be in a split type structure or an integrated structure, and the second guide member 22 may be in a split type structure or an integrated structure. Specifically, the first guide member 21, the second guide member 22 and the rear side of the rear air output member 15 are in an integrated structure.

[0074] When there are a plurality of variable cross-section portions, the plurality of variable cross-section portions spaced from one another in the vertical direction of the air channel 11. Referring to FIG. 1, FIG. 3, FIG. 4 and FIG. 5, taking the first embodiment as an example, the working processes of the fan head component according to the embodiment of the disclosure are as follows:

the intake air from the air inlet 13 enters the air channel 11, when the intake air enters the first variable cross-section portion, that is, encounters the first guide surface 21a of the guide device 20, the intake air is continuously squeezed, the air flow rate continuously increases, the flow rate of the air emitted from the nozzle 12 in the vertical direction corresponding to the first variable cross-section portion is relatively uniform, and the flow direction of the intake air is changed under the action of the first guide surface 21a, so that a part of intake air is emitted from the nozzle 12 at a smaller ejection angle. The intake air which is not emitted from the nozzle 12 bypasses the first guide surface 21a and continues to move upward to encounter the second guide surface 22a, the air flow area increases to achieve a damping effect on the intake air, the intake air continues to move upward to encounter the first guide surface 21a of the second guide device 20, and similarly, the function analysis of the second guide device 20 is the same as above and will not be described here.

[0075] Generally, the air emitted from the nozzle 12 near the middle position of the bladeless fan along the vertical direction of the air channel 11 has a great influence on the user experience, therefore, the guide device 20 should be disposed in this region.

[0076] In a specific implementation not shown, different from the description of the above specific implementation, the air channel 11 includes a first end and a second end, and the air flow direction is from the first end to the second end of the air channel 11. The direction from bottom to top in the above specific implementation is the air flow direction in this specific implementation. Taking FIG. 5 as an example, the direction from bottom to top in FIG. 5 is the air flow direction, the first end of the air channel

is positioned below FIG. 5, and the second end of the air channel is positioned above FIG. 5. The air flow area of the variable cross-section portion along the air flow direction continuously varies, and the air flow area corresponding to the end adjacent to the first end of the variable cross-section portion is greater than the air flow area corresponding to the end adjacent to the second end. In other words, in this specific implementation, the air flow direction substitutes for the direction from bottom to top in the above specific implementation I. Other structures are the same as those in the above embodiment, and will not be described here.

[0077] The embodiments described above are merely preferred embodiments of the disclosure, and are not intended to limit the protection scope of the disclosure.

Specific implementation II

[0078] The specific implementation II of the disclosure is described in detail below. Embodiments of the specific implementation II are shown in FIG. 12 to FIG. 22, and the same or similar reference numerals indicate the same or similar components or components having the same or similar functions throughout. The embodiments described below with reference to the drawings are exemplary, and are intended to explain the disclosure, and should not be construed as limiting the disclosure.

[0079] The following disclosure provides many different embodiments or embodiments for implementing different structures of the disclosure. In order to simplify the disclosure, the components and settings of specific embodiments are described below. Of course, they are merely embodiments, and are not intended to limit the disclosure. In addition, the disclosure may repeat reference numerals and/or letters in different embodiments. This repetition is for simplicity and clarity, and does not indicate the relationship between the discussed various embodiments and/or settings. In addition, the implementation manners of the disclosure provide embodiments of various specific processes and materials, but those of ordinary skill in the art may be aware of the applicability of other processes and/or the use of other materials.

[0080] The head 100 for the bladeless fan 1000 according to the embodiment of the first aspect in the specific implementation II will be described below with reference to FIG. 12 to FIG. 22.

[0081] As shown in FIG. 12 and FIG. 13, air channels 11 are formed in the head 100 for the bladeless fan 1000 according to the embodiment of the first aspect.

[0082] Specifically, as shown in FIG. 12 and FIG. 13, two ends in an extension direction of the air channel 11 are a first end 10A and a second end 10B. The first end 10A of the air channel 11 is provided with air inlets 13, and the air flow direction is from the first end 10A to the second end 10B of the air channel 11. The wall of the air channel 11 is provided with air outlets 101 communicated with the air channel 11 and arranged along a direction from the first end 10A to the second end 10B. In other words, the air outlets 101 penetrate through the wall of the air channel 11 along a direction perpendicular to the air flow direction, and the air outlets 101 are arranged along the air flow direction.

[0083] In addition, a transition section 103 is formed between the first end 10A and the second end 10B of the air channel 11, and the flow area of the transition section 103 (the internal areas of cross sections perpendicular to the air flow direction) gradually varies in the air flow direction.

[0084] The head 100 for the bladeless fan 1000 according to the embodiments of the disclosure is provided with the transition sections 103, so that internal air distribution of the air channel 11 may be improved, the noise is reduced, the exhausted air of the head 100 may be more uniform on the overall air output plane, the air output effect of the head 100 is effectively improved, and the user experience is greatly enhanced.

[0085] The air outlet 101 may be a long hole extending from the first end 10A to the second end 10B, or may be a plurality of small holes spaced along the direction from the first end 10A to the second end 10B. Thus, the air may enter the air channel 11 from the first end 10A and move along the air channel 11 toward the second end 10B, and a part of air may be ejected through the air outlet 101 at the same time while moving from the first end 10A to the second end 10B.

[0086] Here, it should be noted that the gradual variation refers to non-sudden variation. The sudden variation in the flow area means that the flow area suddenly changes. For example, the arrangement of a step surface in the air channel 11 will cause a sudden variation in the flow area at the corresponding position of the air channel 11. More specifically, assuming that a step surface is disposed at an M section of the air channel 11, the flow area of the section M firstly keeps an initial value F1 unchanged along the direction from the first end 10A to the second end 10B, then suddenly changes to a value F2 and continues to keep the value F2 unchanged, and then suddenly changes to another value F3 and continues to keep the value F3 unchanged, thereby indicating that the flow area of the M section may not take any one of the values F1 and F2, also may not take any one of the values F2 and F3, and may only take the three values F1, F2 and F3. Conversely, if the flow area of the M section gradually changes along the direction from the first end 10A to the second end 10B, for example, from the value F1 to the value F3, it indicates that the flow area of the M section may take any one of the values F1, F2 and F3. In addition, it can be understood that the concept of the "flow area" is well known to those skilled in the art, and will not be described in detail here.

[0087] In addition, it should be noted that the air channel 11 may be a transition section 103 as a whole, or a part of the air channel 11 may form the transition section 103. If only a part of the air channel 11 forms the transition section 103, at this time, the flow area of one section or more sections of the air channel 11 except the transition

section 103 is unchanged, and the flow area from the transition section 103 to the non-transition section 103 also gradually varies (non-sudden variation).

[0088] The air channel 11 may be vertically disposed. In other words, the air channel 11 may be absolutely vertically disposed at an included angle of 90° crossing the horizontal plane, the air channel 11 may also be non-absolutely vertically disposed at an included angle greater than 45° crossing the horizontal plane, and the air channel 11 may also be set to have a variable included angle with the horizontal plane. Therefore, all-round air supply may be formed. Of course, the disclosure is not limited thereto. In other embodiments of the disclosure, the air channel 11 may also be horizontally disposed (the embodiment is not shown in figures). In other words, the air channel 11 may be absolutely horizontally disposed at an included angle of 0° crossing the horizontal plane, and the air channel 11 may also be non-absolutely horizontally disposed at an included angle less than 45° crossing the horizontal plane. In the following, only the vertical disposition of the air channel 11 is taken as an example for description. After reading the following technical solutions, those skilled in the art may think of the technical solutions for the horizontal disposition of the air channel 11.

[0089] The ratio of the interval between each of the transition sections 103 and the first end 10A (that is, the distance between the end point of the transition section 103 closest to the first end 10A and the first end 10A) to the length of the air channel 11 (X1/L and X2/L shown in FIG. 15, X3/L shown in FIG. 19, X4/L and X5/L shown in FIG. 20, and X6/L shown in FIG. 21) is greater than or equal to 1/8, thereby indicating that the transition section 103 is not tightly adjacent to the first end 10A and is not connected with the first end 10A.

[0090] The interval between the inlet end of the transition section 103 and the air inlet of the air channel 11 is not less than a preset ratio of the length of the air channel 11. The preset ratio may be 1/8, or the preset ratio may be set to any value between 1/10 and 4/5. For example, the preset ratio may be set to 1/8, 1/7, 1/6, 1/5, 1/4, and the like. By limiting the size of the inlet of the transition section 103, the uniformity of the exhausted air of the air outlet may be effectively improved, and the guide effect of the transition section 103 on the intake air of the air inlet may also be limited, so as to avoid that the air output rate of the air outlet adjacent to the air inlet is too high.

[0091] In some embodiments of the disclosure, the air channel 11 includes at least one transition section 103, the flow area of each of the transition sections 103 gradually changes in the direction from the first end 10A to the second end 10B, and the flow area of at least one section of each of the transition sections 103 gradually decreases in the direction from the first end 10A to the second end 10B. In other words, the transition section 103 includes a first sub-section, and the flow area of the first sub-section (not shown) in the air flow direction gradually decreases.

[0092] In some embodiments, one end of the first sub-section extends to the first end 10A of the air channel 11. Of course, the first sub-section may also be spaced from the first end 10A of the air channel 11. For example, one end of the first sub-section is disposed at the middle part between the first end 10A and the second end 10B of the air channel 11; or, one end of the first sub-section extends to be spaced from the first end 10A or the second end 10B of the air channel 11 by 1/8L, wherein L is the length of the air channel 11.

[0093] Of course, the above embodiments are only some specific embodiments of the disclosure and are not intended to limit the protection scope of the disclosure.

[0094] In addition, the other end of the first sub-section may extend to the second end 10B of the air channel 11.

[0095] Of course, the other end of the first sub-section may not extend to the second end 10B of the air channel 11. In other words, the other end of the first sub-section is spaced from the second end 10B of the air channel 11. At this time, a second sub-section needs to be disposed to achieve smooth transition of the air. Specifically, the first sub-section is spaced from the second end 10B of the air channel 11, the transition section 103 further includes a second sub-section (not shown), one end of the second sub-section is connected with the first sub-section, the other end of the second sub-section extends toward the second end 10B of the air channel 11, and the flow area of the second sub-section in the air flow direction gradually increases.

[0096] Preferably, the length of the second sub-section in the air flow direction is greater than the length of the first sub-section in the air flow direction. In other words, the second sub-section is gentler than the first sub-section.

[0097] In addition, in some embodiments of the disclosure, the transition section 103 directly faces at least a part of the air outlet 101. In other words, the transition section 103 is disposed in a region on the air channel 11 with the air outlet 101.

[0098] Furthermore, a plurality of transition sections 103 may also be arranged to be spaced from one another along the air flow direction. For example, the transition section 103 is disposed in at least one of the midstream side of the air flow direction of the air channel 11, the upstream side of the air flow direction of the air channel 11, the downstream side of the air flow direction of the air channel 11, and the like.

[0099] According to different positions of the transition section 103, different lengths of the transition section 103 may be selected, so as to achieve more uniform air output. Of course, the lengths of a plurality of transition sections 103 may be set to be exactly the same. When there are more than three transition sections 103, the lengths of a plurality of transition sections 103 may be different or partially different. The length of the transition section 103 refers to the size of the transition section 103 along the air flow direction.

[0100] In other words, in the air flow direction, the lengths of a plurality of transition sections 103 are the same or different.

[0101] In addition, when there are more than three transition sections 103 (arranged along the air flow direction), the interval between every two adjacent transition sections 103 may be the same or different. For example, when there are three transition sections, the three transition sections are respectively expressed as A, B and C. The interval between A and B is A-B, the interval between B and C is B-C, and the interval A-B and the interval B-C may be the same or different. Of course, there may be more than four transition sections.

[0102] It should be noted that the interval between two transition sections 103 refers to the gap between two transition sections 103, or the interval between adjacent ends of two adjacent transition sections 103 in the air flow direction. For example, when the air flow direction is the vertical direction, the interval between two transition sections 103 refers to the interval between the upper end of the lower one of the two transition sections 103 and the lower end of the upper one.

[0103] In addition, the transition section 103 in the disclosure may be formed by the wall of the air channel 11 protruding toward the inside of the air channel 11, or may be of a protruded structure formed on the inner surface of the air channel 11.

[0104] For example, a convex surface protruding toward the inside of the air channel 11 may be formed on the air channel 11 to form the transition section 103. For example, the convex structure 5 is disposed at a position opposite to the air outlet 101.

[0105] Specifically, the convex structure 5 is formed on the inner surface between the first end 10A and the second end 10B of the air channel 11, the convex structure 5 directly faces at least a part of the air outlet 101, the convex structure 5 protrudes toward the air outlet 101, and the transition section 103 is formed by the convex structure 5. The surface opposite to the air outlet 101 in the air channel 11 extends smoothly along the air flow direction.

[0106] The convex structure 5 directly faces the air outlet 101. For example, the air outlet 101 is formed on the front side wall of the air channel 11, the convex structure 5 is positioned inside the rear side wall of the air channel 11, and the convex structure 5 directly faces the air outlet 101.

[0107] Referring to FIG. 16, in some embodiments of the disclosure, the air channel 11 includes at least one convex structure 5, each of the convex structures 5 at least includes a first sub-convex surface 51, and the first sub-convex surface 51 inclines toward the air outlet 101 in the air flow direction.

[0108] The first sub-convex surface 51 may be in a flat shape, or may be in a shape that gradually changes from a concave surface to a convex surface in the air flow direction.

[0109] For example, taking the air inlet as an origin, taking the distance between a point on the convex structure 5 along the air flow direction and the origin as x, and taking the flow area of a cross section (perpendicular to the air flow direction) of the point on the convex structure 5 as a function F(x), in the first sub-convex surface, $F(x)'>0$, and $F(x)''=0$ or $F(x)''$ changes from a positive value to a negative value (concave then convex). Of course, the first sub-convex surface 51 may also be a combination of a straight surface and an arc surface (partial region $F(x)''=0$, partial region $F(x)''\neq 0$). $F(x)'$ represents the first derivative of the function F(x), and $F(x)''$ represents the second derivative of F(x).

[0110] In some embodiments, one end of the first sub-convex surface 51 extends to the first end 10A of the air channel 11. Of course, the first sub-convex surface 51 may also be spaced from the first end 10A of the air channel 11. For example, one end of the first sub-convex surface 51 is disposed at the middle part between the first end 10A and the second end 10B of the air channel 11; or, one end of the first sub-convex surface extends to be spaced from the first end 10A or the second end 10B of the air channel 11 by 1/8L, wherein L is the length of the air channel 11.

[0111] Of course, the above embodiments are only some specific embodiments of the disclosure and are not intended to limit the protection scope of the disclosure.

[0112] In addition, the other end of the first sub-convex surface 51 may extend to the second end 10B of the air channel 11.

[0113] Of course, the other end of the first sub-convex surface 51 may not extend to the second end 10B of the air channel 11. In other words, the other end of the first sub-convex surface 51 is spaced from the second end 10B of the air channel 11. At this time, a second sub-convex surface 52 needs to be disposed to achieve smooth transition of the air. Specifically, the first sub-convex surface 51 is spaced from the second end 10B of the air channel 11, the transition section 103 further includes a second sub-convex surface 52, one end of the second sub-convex surface 52 is connected with the first sub-convex surface 51, the first sub-convex surface 51 and the second sub-convex surface 52 are in smooth transition, the other end of the second sub-convex surface 52 extends toward the second end 10B of the air channel 11, and the second sub-convex surface 52 inclines toward a direction away from the air outlet 101 in the air flow direction.

[0114] In some embodiments, the length of the second sub-convex surface 52 in the air flow direction is greater than the length of the first sub-convex surface 51 in the air flow direction. In other words, the second sub-convex surface 52 is gentler than the first sub-convex surface 51.

[0115] The convex structure 5 is disposed on the surface of one side away from the air outlet 101 in the air channel 11, so that the air channel 11 includes at least one transition section 103. The flow area of each of the transition sections 103 gradually changes in the direction from the first end 10A to the second end 10B, and the

flow area of at least one section of each of the transition sections 103 gradually decreases in the direction from the first end 10A to the second end 10B. The ratio of the interval between each of the transition sections 103 and the first end 10A (that is, the distance between the end point of the transition section 103 closest to the first end 10A and the first end 10A) to the length of the air channel 11 (X1/L and X2/L shown in FIG. 15, X3/L shown in FIG. 19, X4/L and X5/L shown in FIG. 20, and X6/L shown in FIG. 21) is greater than or equal to 1/8, thereby indicating that the transition section 103 is not tightly adjacent to the first end 10A and is not connected with the first end 10A.

[0116] Therefore, since the convex structure 5 is disposed in the air channel 11 to occupy the space inside the air channel 11, the convex structure 5 may cause the variation of the flow area at the corresponding position in the air channel 11. Specifically, along the direction from the first end 10A to the second end 10B, if the space occupied by the convex structure 5 in the air channel 11 gradually increases, the flow area of this section of the air channel 11 will gradually decrease, so that the rate of the air flowing through this section will gradually increase. Along the direction from the first end 10A to the second end 10B, if the space occupied by the convex structure 5 in the air channel 11 gradually decreases, the flow area of this section of the air channel 11 will gradually increase, so that the rate of the air flowing through this section will gradually decrease. This shows that the flow parameters (such as rate, pressure and direction) of the air in the air channel 11 will change correspondingly according to the shape change of the convex structure 5. For example, the convex structure 5 is in the shape of an inclined surface (that is, a flat surface which is not parallel to the extended center line of the air channel 11) or a curved surface.

[0117] Therefore, a corresponding convex structure 5 may be designed in the air channel 11 according to air distribution needs, and then, the air ejected from the air outlet 101 in the overall extension direction is uniform. More specifically, since the flow parameters (such as rate, pressure and direction) of the air flowing through the convex structure 5 may continuously change, rather than suddenly change, the problem of vortex generation around the convex structure 5 may be improved, and the disturbance resistance caused by the convex structure 5 to the air is reduced, so as to ensure that the air may smoothly travel and change in the air channel 11 and reduce the aerodynamic noise.

[0118] As shown in FIG. 16, since the convex structure 5 is disposed away from the air outlet 101 and the first end 10A, when the air flows through the convex structure 5, the air will flow out of the air outlet 101 after changing the flow parameters at a position away from the air outlet 101 and the first end 10A, thereby improving the effectiveness of the convex structure 5 in functioning. Moreover, the convex structure 5 is disposed away from the air outlet 101, and then, the problem that the convex structure 5 induces vortex at the air outlet 101 and disturbs the normal ejection of the air from the air outlet 101 is avoided, thereby improving the reliability of air output.

[0119] Therefore, the distribution (including rate distribution, pressure distribution, direction distribution, and the like) of the air in the air channel 11 may be changed by adjusting the shape of the convex structure 5 in the air channel 11, so as to adjust the rate and angle of the air ejected from the air outlet 101, so that the air ejected by the head 100 on the overall blowing plane is uniform. For example, the rate and angle of the air ejected in the vertical direction by the head 100 shown in FIG. 12 are uniform, and the problem of turbulence of the air in the vertical direction and convergence of the air in front of the head 100 will not occur, so that the air supply distance and air supply volume of the head 100 may be effectively improved, and the user experience may be improved.

[0120] In the head 100 for the bladeless fan 1000 according to the embodiments of the disclosure, by disposing the convex structure 5 in the air channel 11, internal air distribution of the air channel 11 may be improved, the disturbance effect of the convex structure 5 on the air is reduced, the noise is reduced, the exhausted air of the head 100 may be more uniform on the overall air output plane, the air output effect of the head 100 is effectively improved, and the user experience is greatly enhanced.

[0121] In the embodiments of the disclosure, a plurality of convex structures 5 may be arranged to be spaced from one another in the air flow direction.

[0122] According to different positions of the convex structures 5, different lengths of the convex structures 5 may be selected, so as to achieve more uniform air output. Of course, the lengths of a plurality of convex structures 5 may be set to be exactly the same. When there are more than three convex structures 5, the lengths of a plurality of convex structures 5 may be different or partially different. The length of the convex structure 5 refers to the size of the convex structure 5 along the air flow direction.

[0123] In other words, in the air flow direction, the lengths of a plurality of convex structures 5 are the same or different.

[0124] In addition, when there are more than three convex structures 5 (arranged along the air flow direction), the interval between every two adjacent convex structures 5 may be the same or different. For example, when there are three convex structures, the three convex structures are respectively expressed as A, B and C. The interval between A and B is A-B, the interval between B and C is B-C, and the interval A-B and the interval B-C may be the same or different. Of course, there may be more than four convex structures.

[0125] It should be noted that the interval between two convex structures 5 refers to the gap between two convex structures 5, or the interval between adjacent ends of two adjacent convex structures 5 in the air flow direction. For example, when the air flow direction is the vertical direc-

tion, the interval between two convex structures 5 refers to the interval between the upper end of the lower one of the two convex structures 5 and the lower end of the upper one.

[0126] In some embodiments of the disclosure, the convex structure 5 may be a circular arc surface or may be formed by smooth transition connection (such as chamfered transition connection) of a plurality of circular arc surfaces, and the convex structure 5 is in smooth transition connection (such as chamfered transition connection) with the surface of the air channel 11. Therefore, it may ensure that the flow area of the air channel 11 at the convex structure 5 continuously varies, and the convex structure 5 may have a smaller disturbance effect on the air, so as to further reduce the possibility of vortex generation and ensure that the air may circulate more smoothly in the air channel 11.

[0127] In some embodiments of the disclosure, as shown in FIG. 15 and FIG. 16, the convex structure 5 may include a first sub-convex surface extending in a direction from the first end 10A to the second end 10B toward a direction adjacent to the air outlet 101, and a second sub-convex surface 52 extending in a direction away from the air outlet 101. The first sub-convex surface 51 is in a shape of a curved surface, and the first sub-convex surface 51 is in smooth transition connection with the second sub-convex surface 52 through the curved surface. Of course, the disclosure is not limited thereto. In other embodiments of the disclosure, the first sub-convex surface 51 may also be in a shape of an inclined surface and includes a first inclined surface extending along the inclined surface in a direction from the first end 10A to the second end 10B toward a direction adjacent to the air outlet 101, and a second inclined surface extending along the inclined surface in a direction away from the air outlet 101.

[0128] Therefore, the flow area of the transition section 103 of the air channel 11 provided with the first sub-convex surface may decrease first and then increase in a direction from the first end 10A to the second end 10B. In this way, when the air passes between the air outlet 101 and the first sub-convex surface, the flow rate may gradually increase, and the air flows toward the direction of the air outlet 101; and after passing through a transition curved surface between the first sub-convex surface and the second sub-convex surface 52, the air may move along the second sub-convex surface 52 toward the direction away from the air outlet 101, and the air rate will gradually decrease to enable the air to be in gentle contact with the wall surface of the air channel 11, thereby reducing the air disturbance and buffering the air so as to reduce the aerodynamic noise.

[0129] In some embodiments of the disclosure, as shown in FIG. 15 and FIG. 17, two first sub-convex surfaces 51 are provided and are spaced from one another along a direction from the first end 10A to the second end 10B, the intervals between the two first sub-convex surfaces 51 and the first end 10AA are respectively 1/6 to 2/6 and 4/6 to 5/6 of the length of the air channel 11 (X1/L and X2/L shown in FIG. 15), and the length of each of the first sub-convex surfaces 51 is 1/6 to 2/6 of the length of the air channel 11 (D1/L and D2/L shown in FIG. 15). Therefore, the exhausted air of the head 100 is more uniform, and the air output effect is better.

[0130] In some embodiments of the disclosure, as shown in FIG. 20 and FIG. 21, one first sub-convex surface 51 is provided, the interval between the first sub-convex surface and the first end 10A is 1/6 to 2/6 of the length of the air channel 11 (X4/L and X6/L shown in FIG. 20 and FIG. 21), and the length of the first sub-convex surface is 2/6 to 4/6 of the length of the air channel 11 (D4/L and D6/L shown in FIG. 20 and FIG. 21). Therefore, the exhausted air of the head 100 is more uniform, and the air output effect is better.

[0131] Specifically, since the air rate will decrease when the air moves to the middle downstream side of the air channel 11, the first sub-convex surface is disposed at the middle downstream side of the air channel 11, and then, the rate of the air at the middle downstream side of the air channel 11 may be increased so as to enable the overall air output effect of the air channel 11 to be more uniform. In addition, since the air moves toward the downstream side after entering the air channel 11, the air ejected from the air outlet 101 at the middle upstream side of the air channel 11 will be ejected toward the downstream direction of the air channel 11 at a larger inclination angle, and the air ejected from the air outlet 101 at the middle downstream side of the air channel 11 will be ejected toward the downstream direction of the air channel 11 at a smaller inclination angle. In this way, by disposing the first sub-convex surface at the middle upstream side of the air channel 11, the inclination angle of the air ejected from the air outlet 101 at the middle upstream side of the air channel 11 may be reduced, so that the overall air output effect of the air channel 11 is more uniform. Therefore, by disposing the first sub-convex surfaces at the middle upstream side and the middle downstream side of the air channel 11 respectively, the air ejection angle of the middle upstream side may be reduced, and the air ejection rate of the middle downstream side may be increased, so that the overall air output effect of the air channel 11 is more uniform. Here, it can be understood that the upstream side refers to a position adjacent to the first end 10A, and the downstream side refers to a position adjacent to the second end 10B.

[0132] In some embodiments of the disclosure, as shown in FIG. 19 and FIG. 20, the convex structure 5 may include a second sub-convex surface 52 in a shape of a curved surface, and the second sub-convex surface 52 gradually extends along a direction from the first end 10A to the second end 10B toward the direction adjacent to the air outlet 101, and extends to the second end 10B. Therefore, the convex structure 5 is simpler in structure and more convenient to process. Of course, the disclosure is not limited thereto. In other embodiments of the

disclosure, the second sub-convex surface 52 may also be in a shape of an inclined surface, and extends along the inclined surface in a direction from the first end 10A to the second end 10B toward the direction adjacent to the air outlet 101.

[0133] Preferably, the interval between the second sub-convex surface 52 and the first end 10A is 2/6 to 5/6 of the length of the air channel 11 (X3/L and X5/L shown in FIG. 19 and FIG. 20). In other words, the second sub-convex surface 52 may be disposed at the downstream side of the air channel 11 (third embodiment shown in FIG. 20), or extends from the middle upstream side of the air channel 11 to the downstream side of the air channel 11 (second embodiment shown in FIG. 19). By disposing the second sub-convex surface 52, the flow area adjacent to the downstream side of the air channel 11 gradually decreases, thus the air output rate of the downstream side of the air channel 11 may be effectively increased, and the air output rate of the upstream and downstream sides of the air channel 11 is uniform so as to improve the air output effect and the air output uniformity. Here, it can be understood that before the convex structure 5 is disposed, the rate of the air at the downstream side of the air channel 11 is less than the rate of the air at the upstream side of the air channel 11, and the ejection angle of the air at the downstream side of the air channel 11 is less than the ejection angle of the air at the upstream side of the air channel 11.

[0134] Here, it should be noted that, without contradictions, those skilled in the art may integrate and combine different embodiments or embodiments and features of different embodiments or embodiments described in this specification.

[0135] A head 100 according to multiple embodiments of the disclosure will be described below with reference to FIG. 12 to FIG. 21.

First embodiment

[0136] A head 100 includes a first air channel member 105 and a second air channel member 106, an air channel 11 is formed in each of the first air channel member 105 and the second air channel member 106, and one end of the first air channel member 105 is connected and communicated with one end of the second air channel member 106.

[0137] The first air channel member 105 and the second air channel member 106 may be in an annular shape with an opening, and air inlets are disposed at two ends of the opening of the annular shape.

Second embodiment

[0138] A head 100 includes a first air channel member 105 and a second air channel member 106, an air channel 11 is formed in each of the first air channel member 105 and the second air channel member 106, one end of the first air channel member 105 is connected with one end of the second air channel member 106 by a connector, and the air channel 11 in the first air channel member 105 is spaced from the air channel 11 in the second air channel member 106.

Third embodiment

[0139] A head 100 includes a first air channel member 105, a second air channel member 106 and a connector 107, an air channel 11 is formed in each of the first air channel member 105 and the second air channel member 106, both the first air channel member 105 and the second air channel member 106 extend along an vertical direction, the first air channel member 105 and the second air channel member 106 are spaced along a left-right direction, and the first air channel member 105 and the second air channel member 106 are parallel to each other. In addition, the lower end of the air channel 11 is formed as the above first end 10A, and the upper end of the air channel 11 is formed as the above second end 10B. One end of the connector is connected with the upper end of the first air channel member 105 and another end is connected with the upper end of the second air channel member 106.

Fourth embodiment

[0140] Referring to FIG. 12 to FIG. 18, the head 100 in the third embodiment may include a first splicing part 41 and a second splicing part 42. The first splicing part 41 includes a first inner ring plate 411 which is vertically disposed and has an inverted U shape and a first outer ring plate 412 which is vertically disposed and has an inverted U shape. The first outer ring plate 412 covers the outside of the first inner ring plate 411, and convex structures 5 are disposed in the first splicing part 41. The second splicing part 42 includes a second inner ring plate 421 which is vertically disposed and has an inverted U shape and a second outer ring plate 422 which is vertically disposed and has an inverted U shape. The second outer ring plate 422 covers the outside of the second inner ring plate 421. The second splicing part 42 is spliced at the front side of the first splicing part 41, so that the second sub-air channel 11 and the first splicing part 41 are spliced to form a first air channel member 105, a second air channel member 106 and a connector 107. An air outlet 101 is formed at the front side of the second splicing part 42. Thus, the structure of the head 100 is simple, the processing of the convex structures 5 is facilitated, and the convex structures 5 may be ensured to be disposed away from the air outlet 101.

[0141] Further, referring to FIG. 12 to FIG. 19, the head 100 further includes a third splicing part 43. The third splicing part 43 is vertically disposed and has an inverted U shape and covers the outside of the first splicing part 41 and the second splicing part 42. The convex structures 5 are disposed on the first outer ring plate 412 and are formed by inward indentation of the outer surface of the

first outer ring plate 412. Thus, the third splicing part 43 may play a decorative role, and the overall appearance of the head 100 is beautiful. Furthermore, by processing the convex structures 5 on the first outer ring plate 412 clamped between the first inner ring plate 411 and the third splicing part 43, back recesses 50 of the convex structures 5 may be shielded so as to improve the overall aesthetics of the head 100.

[0142] As shown in FIG. 18, a plurality of reinforcing ribs 16 are disposed between the first inner ring plate 411 and the first outer ring plate 412, therefore, the volume of the first splicing part 41 may be ensured, and the working performance and working reliability of the head 100 may be improved. In addition, a plurality of reinforcing ribs 16 are also disposed between the second inner ring plate 421 and the second outer ring plate 422, therefore, the volume of the second sub-air channel 11 may be ensured, and the working performance and working reliability of the head 100 may be improved. Of course, the disclosure is not limited thereto. In other embodiments of the disclosure, the number of the reinforcing rib 16 may be only one, and the reinforcing rib 16 may also be disposed only in the first splicing part 41 or only in the second splicing part 42.

[0143] As shown in FIG. 16, the matching surfaces of the first splicing part 41 and the second splicing part 42 are spliced through a slot structure 44 and sealed by ultrasonic welding at the spliced position. Therefore, the assembly efficiency may be improved, the sealing reliability is high, and the defect rate may be reduced. Here, it can be understood that the splicing manner of the "slot structure 44" is well known to those skilled in the art, and will not be described in detail here. In addition, after the first splicing part 41 and the second splicing part 42 are spliced through the slot structure 44, the first splicing part 41 and the second splicing part 42 may also be connected at a screw installation structure 45 through screws or bolts, thereby facilitating subsequent ultrasonic welding. Of course, the disclosure is not limited thereto. In other embodiments of the disclosure, the first splicing part 41 and the second splicing part 42 may also be fixed and sealed by gluing.

Fifth embodiment

[0144] As described in the third embodiment, and as shown in FIG. 12 to FIG. 18, in the present embodiment, a left air channel 11 and a right air channel 11 which are not communicated to each other are defined in the head 100. A convex structure 5 having a first sub-convex surface 51 and a second sub-convex surface 52 is respectively arranged at the middle upstream side and the middle downstream side in each of the air channels 11. In this way, after the air enters each of the air channels 11, the air may first pass through a convex structure 5 to change the flow rate, then pass through a gentle section 102 at the midstream of the air channel 11, and then flow to the next first sub-convex surface 51 to change the flow rate.

[0145] Specifically, in the present embodiment, if there are no two convex structures 5 in the air channel 11, after the air enters the air channel 11 from bottom to top, the flow rate of the air at the lower part of the air channel 11 is higher, the rate direction is upward, a part of the air is ejected from the air outlet 101, the air ejection direction is obliquely upward, and the inclination angle is larger. As the air gradually flows upward and is ejected, the flow rate of the air at the upper part of the air channel 11 decreases, and the inclination angle of the air ejected from the air outlet 101 also becomes smaller. In this way, the air ejected from the upper air outlet 101 generates a greater disturbance to the air ejected from the lower air outlet 101, resulting in poor user experience and aerodynamic noise.

[0146] In the present embodiment, since the rear side of the air channel 11 is provided with two smooth convex structures 5, the flow area at the corresponding position of the air channel 11 firstly gradually decreases and then gradually increases, resulting in that the rate of the air at the corresponding position firstly gradually increases and then gradually decreases. In this way, when the air passes through the first sub-convex surface 51 of the lower convex structure 5, the flow rate of the air gradually increases, and the air moves toward the direction of the air outlet 101, so that the air is ejected at a higher rate and a lower inclination angle; and when the air passes through the second sub-convex surface 52 of the convex structure 5, the rate of the air gradually decreases, and the air moves along the second sub-convex surface 52 adjacent to the wall surface of the air channel 11, thereby reducing turbulence, buffering the air rate, and reducing noise. After passing through the gentle section 102 of the air channel 11, the air passes through the first sub-convex surface 51 of the upper convex structure 5, then, the flow rate gradually increases again, and the air moves toward the air outlet 101, so that the air rate at the corresponding air outlet 101 may be increased, and the air supply direction at this position may be improved. Therefore, the air rate on the overall air output plane is relatively uniform, the situation that the overall exhausted air is obliquely upward is well improved, the turbulence of the air on the air output plane is reduced, the noise is reduced, and the user experience is enhanced.

[0147] In conclusion, for the head 100 according to the embodiments of the disclosure, by disposing different convex structures 5 in the air channel 11, compared with the situation that the convex structures 5 are not disposed, the air output effect is greatly enhanced and improved. However, the difference in the convex structure 5 will change the air rate and air direction at different positions on the air output plane. Therefore, in the design height of the air channel 11 of the present embodiment, by disposing two convex structures 5, the air output is more uniform, the air output rate and angle are more comfortable, and the aerodynamic noise is lower.

Sixth embodiment

[0148] As shown in FIG. 19, the structure of the present embodiment is substantially the same as that of the third embodiment.

[0149] Referring to FIG. 19, the convex structure 5 disposed in each of the air channels 11 only includes a first sub-convex surface, and the first sub-convex surface extends from the middle upstream side of the air channel 11 to the downstream side of the air channel 11. Therefore, the convex structure 5 is simple in structure and convenient to process, the flow rate in the overall air channel 11 is more uniform, and the air output effect of the head 100 is improved.

Seventh embodiment

[0150] As shown in FIG. 20, the structure of the present embodiment is substantially the same as that of the third embodiment.

[0151] Referring to FIG. 20, two convex structures 5 are disposed in each of the air channels 11. One convex structure 5 extends from the middle upstream side of the air channel 11 to the middle downstream side of the air channel 11 and has a first sub-convex surface 51 and a second sub-convex surface 52, and the other convex structure 5 is disposed at the downstream side of the air channel 11 and may only have a first sub-convex surface 51. Therefore, the convex structure 5 is simple in structure and convenient to process, the flow rate in the overall air channel 11 is more uniform, and the air output effect of the head 100 is improved.

Eighth embodiment

[0152] As shown in FIG. 21, the structure of the present embodiment is substantially the same as that of the third embodiment.

[0153] Referring to FIG. 21, a convex structure 5 is disposed in each of the air channels 11. The convex structure 5 extends from the middle upstream side of the air channel 11 to the middle downstream side of the air channel 11. The convex structure 5 has a first sub-convex surface 51 and a second sub-convex surface 52. Therefore, the convex structure 5 is simple in structure and convenient to process, the flow rate in the overall air channel 11 is more uniform, and the air output effect of the head 100 is improved.

[0154] A bladeless fan 1000 according to the embodiments of the second aspect in the specific implementation of the disclosure will be described below with reference to FIG. 22.

[0155] As shown in FIG. 22, the bladeless fan 1000 according to the embodiments of the second aspect in the specific implementation of the disclosure includes: a base 200, an air generation device and the head 100 according to the embodiments of the first aspect in the specific implementation of the disclosure. The head 100 is installed on the base 200. The air generation device is disposed in the base 200 and configured to supply air into the air channel 11.

[0156] Of course, the disclosure is not limited thereto. The bladeless fan 1000 may also include other components. For example, in some specific embodiments in the specific implementation of the disclosure, an air guiding device, such as a tee joint, may also be installed in the base 200. Thus, the high-rate air generated by the air generation device may enter the air channel 11 through the shunt of the tee joint. In addition, other compositions of the bladeless fan 1000 according to the embodiments of the disclosure, such as control systems, and operations are known to those of ordinary skill in the art, and will not be described in detail here.

[0157] For the bladeless fan 1000 according to the embodiments of the disclosure, by disposing the head 100 according to the embodiments of the first aspect, the overall performance of the bladeless fan 1000 is improved.

[0158] For ease of understanding, the general corresponding relationships of some technical features in the specific implementation I and the specific implementation II are as follows: the head is equivalent to the fan head component, the first sub-section in the transition section is equivalent to the variable cross-section portion, the convex structure is equivalent to the guide device, the first sub-convex surface is equivalent to the first guide member, the second sub-convex surface is equivalent to the second guide member, the first splicing part is equivalent to the rear air output member, the second splicing part is equivalent to the front air output member, the third splicing part is equivalent to the housing, the air outlet is equivalent to the nozzle, the air generation device is equivalent to the drive system, and the flow area is equivalent to the air flow area.

[0159] In the description of the disclosure, it should be understood that the orientations or position relationships indicated by terms "upper", "lower", "front", "rear", "top", "bottom", "inside", "outside" and the like are based on orientations or position relationships shown in drawings, These terms are only for the convenience of describing the disclosure and simplifying the description, and do not indicate or imply that the specified device or component must have a specific orientation and must be constructed and operated in the specific orientation, so that it cannot be understood as a limitation to the disclosure.

[0160] In addition, the terms "first" and "second" are only for description of objectives, and cannot be understood as indicating or implying relative importance or implicitly indicating the number of the indicated technical features. Thus, the features defined as "first" and "second" may explicitly or implicitly include one or more of the features. In the description of the disclosure, the meaning of "a plurality of' is two or more, unless otherwise specifically limited.

[0161] In the disclosure, unless otherwise clearly specified and defined, the terms "installation", "connected

with", "connection", "fixation" and the like should be broadly understood, and may be fixed connection, detachable connection, integration, direct connection, indirect connection through an intermediate, internal communication of two components, or interaction between two components. Those skilled in the art may understand the specific meanings of the above terms in the disclosure according to specific situations.

[0162] In the disclosure, unless otherwise clearly specified and defined, the first feature "above" or "below" the second feature may be direct contact between the first feature and the second feature, or indirect contact between the first feature and the second feature through an intermediate. Moreover, the first feature is "over", "above" and "on" the second feature may be that the first feature is directly above or obliquely above the second feature, or simply means that the first feature is higher than the second feature in level. The first feature is "under", "below" and "down" the second feature may be that the first feature is directly below or obliquely below the second feature, or simply means that the first feature is lower than the second feature in level.

[0163] In the description of this specification, the description referring to the terms "an embodiment", "some embodiments", "an example", "a specific example", "some examples" and the like means that the specific features, structures, materials, or characteristics described in combination with the present embodiment or example are included in at least one of the embodiments or examples of the disclosure. In this specification, the schematic representation of the above terms does not necessarily refer to the same embodiment or example. Moreover, the described specific features, structures, materials, or characteristics may be combined in any suitable manner in any one or more embodiments or examples.

[0164] Although the embodiments of the disclosure have been shown and described, those of ordinary skill in the art may understand: various changes, modifications, replacements and variations can be made to these embodiments without departing from the principles and objectives of the disclosure, and the scope of the disclosure is defined by the claims and equivalents thereof.

Claims

1. A fan head component for a bladeless blowing device, comprising an air output portion which comprises an air inlet, a nozzle and an air channel, wherein both the air inlet and the nozzle are communicated with the air channel, **characterized in that** the air channel has a variable cross-section portion, an air flow area corresponding to the variable cross-section portion varying continuously in a vertical direction, and the air flow area corresponding to a lower end of the variable cross-section portion being greater than the air flow area corresponding to an upper end of the variable cross-section portion.

2. The fan head component of claim 1, wherein the variable cross-section portions are positioned at an upper part and/or a middle part of the air channel.

3. The fan head component of claim 1, wherein a side wall of the air output portion is tapered inwardly in the vertical direction to form the variable cross-section portion.

4. The fan head component of claim 1, wherein the nozzle extends along a vertical direction of the air channel, there being a plurality of variable cross-section portions, and the plurality of variable cross-section portions being disposed along the vertical direction of the air channel and spaced from each other.

5. The fan head component of claim 1, wherein the fan head component comprises a guide device disposed in the air channel, the guide device comprising a first guide member, the first guide member having a first guide surface, the first guide surface obliquely extending downwardly to block a part of intake air, the air flow area of the air channel corresponding to a lower end of the first guide surface being greater than the air flow area of the air channel corresponding to an upper end of the first guide surface, and a corresponding part of the air channel between the lower end and the upper end of the first guide surface being the variable cross-section portion.

6. The fan head component of claim 5, wherein the first guide member is of a plate shape, and the first guide member obliquely extends downwardly from the upper end of the air channel.

7. The fan head component of claim 6, wherein the first guide surface faces face the nozzle so as to guide a part of intake air to the nozzle.

8. The fan head component of claim 7, wherein the nozzle is disposed at a first side of the air output portion, the first guide member being disposed at a second side of the air output portion opposite to the first side, and an edge of the first guide member being tightly connected with an inner wall of the second side of the air output portion.

9. The fan head component of claim 6, wherein the first guide surface faces toward the side wall of the air output portion, and the edge of the first guide member being hermetically connected with the side wall of the air output portion.

10. The fan head component of any one of claims 5 to 9, wherein the guide device further comprises a second guide member positioned above the first guide

member, the second guide member having a second guide surface which obliquely extends upwardly, a lower end of the second guide surface being connected with the upper end of the first guide surface, and the air flow area of the air channel at the lower end of the second guide surface being smaller than the air flow area of the air channel at an upper end of the second guide surface.

11. The fan head component of claim 10, wherein the second guide surface is a flat surface, an arc surface or a combination of a flat surface and an arc surface, and/or the first guide surface is a flat surface, an arc surface or a combination of a flat surface and an arc surface.

12. The fan head component of claim 10, wherein from the lower end of the second guide surface to the upper end of the second guide surface, the air flow area of the corresponding air channel gradually increases.

13. The fan head component of claim 12, wherein the guide device comprises a third guide member having a third guide surface, the second guide surface being in smooth transitional connection with the first guide surface through the third guide surface.

14. The fan head component of claim 5 or 7, wherein the air output portion comprises a front air output member and a rear air output member, the front air output member and the rear air output member together defining the air channel, the nozzle being disposed at a front side of the front air output member, and the guide device being tightly connected to a rear side of the rear air output member.

15. The fan head component of claim 14, wherein the guide device is integrated with the rear air output member.

16. The fan head component of claim 14, wherein one of the front air output member and the rear air output member is provided with a positioning slot, the other one being provided with a positioning protrusion matching with the positioning slot, and the front air output member and the rear air output member being connected to one another through ultrasonic welding or gluing.

17. The fan head component of claim 14, wherein the fan head component further comprises a housing covering an outside of the air output portion.

18. The fan head component of claim 7, wherein from the lower end of the first guide surface to the upper end of the first guide surface, the air flow area of the corresponding air channel gradually decreases.

19. The fan head component of claim 7, wherein the air output portion further comprises a reinforcing rib disposed in the air channel, two ends of the reinforcing rib being fixedly connected with inner walls of left and right sides of the air channel.

20. The fan head component of claim 7, wherein the nozzle extends along the vertical direction of the air channel, there being a plurality of guide devices, the plurality of guide devices being disposed along the vertical direction of the air channel and spaced from one another, and the plurality of guide devices being disposed to correspond to the nozzle.

21. A fan head component for a bladeless blowing device, comprising an air output portion which comprises an air inlet, a nozzle and an air channel, wherein both of the air inlet and the nozzle are communicated with the air channel, the air channel comprising a first end and a second end, an air flow direction being a direction from the first end to the second end of the air channel, **characterized in that** the air channel comprises a variable cross-section portion, an air flow area of the variable cross-section portion continuously varying along the air flow direction, and the air flow area corresponding to an end of the variable cross-section portion adjacent to the first end being greater than the air flow area corresponding to an end of the variable cross-section portion adjacent to the second end.

22. The fan head component of claim 21, wherein a side wall of the air output portion is tapered inwardly to form the variable cross-section portion.

23. The fan head component of claim 21, wherein the nozzle extends along the air flow direction of the air channel, there being a plurality of variable cross-section portions, and the plurality of variable cross-section portions being disposed along the air flow direction of the air channel and spaced from one another.

24. The fan head component of claim 21, wherein the fan head component comprises a guide device disposed in the air channel, the guide devices comprising a first guide member having a first guide surface, the first guide surface extending obliquely relative to the air flow direction to block a part of intake air, and a part of the air channel at a position corresponding to the first guide surface being the variable cross-section portion.

25. The fan head component of claim 24, wherein the first guide surface faces the nozzle to guide a part of intake air to the nozzle.

26. The fan head component of claim 24, wherein the guide device further comprises a second guide mem-

ber positioned adjacent to the second end, the second guide member having a second guide surface which extends obliquely relative to the air flow direction, the second guide surface being connected with the first guide surface, and the air flow area of the air channel corresponding to the end of the second guide surface adjacent to the first guide surface being less than the air flow area of the air channel corresponding to the end of the second guide surface away from the first guide surface.

27. The fan head component of claim 26, wherein the air flow area of the air channel corresponding to the second guide surface gradually increases along the air flow direction.

28. A bladeless blowing device, **characterized in that** the bladeless blowing device comprises a base, a drive system disposed in the base, and the fan head component of any one of claims 1 to 27, wherein the fan head component is connected with the base to receive intake air generated by the drive system through the air inlet and emit intake air through the nozzle.

29. The bladeless blowing device of claim 28, wherein the bladeless blowing device is any one of a bladeless fan, a bladeless blower, a bladeless heater, a bladeless humidifier and a bladeless cooler.

30. A head for a bladeless fan, **characterized in that** an air channel is formed in the head, the air channel has a first end and a second end, the first end of the air channel being provided with an air inlet, an air flow direction being a direction from the first end to the second end of the air channel, a wall of the air channel being provided with an air outlet which passes through the wall of the air channel in a direction perpendicular to the air flow direction, and the air outlet being arranged along the air flow direction,
wherein a transition section is formed between the first end and the second end of the air channel, a flow area of the transition section gradually varying in the air flow direction.

31. The head for the bladeless fan of claim 30, wherein the transition section comprises a first sub-section, and the flow area of the first sub-section gradually decreasing in the air flow direction.

32. The head for the bladeless fan of claim 31, wherein one end of the first sub-section extends to the first end of the air channel or is spaced from the first end of the air channel, and the other end of the first sub-section extends to the second end of the air channel.

33. The head for the bladeless fan of claim 31, wherein the first sub-section is spaced from the second end of the air channel, and the transition section further comprises:
a second sub-section, wherein one end of the second sub-section is connected with the first sub-section, the other end of the second sub-section extending towards the second end of the air channel, and the flow area of the second sub-section gradually increasing in the air flow direction.

34. The head for the bladeless fan of claim 33, wherein a length of the second sub-section in the air flow direction is greater than a length of the first sub-section in the air flow direction.

35. The head for the bladeless fan of any one of claims 30 to 34, wherein the transition section directly faces at least a part of the air outlet.

36. The head for the bladeless fan of any one of claims 30 to 34, wherein the wall of the air channel protrudes towards an inside of the air channel to form the transition section.

37. The head for the bladeless fan of any one of claims 30 to 34, wherein there are a plurality of transition sections spaced from one another along the air flow direction, and lengths of the plurality of transition sections in the air flow direction being the same.

38. The head for the bladeless fan of claim 37, wherein there are at least three transition sections spaced from one another along the air flow direction, and an interval between every two adjacent transition sections of the at least three transition sections being the same.

39. The head for the bladeless fan of any one of claims 30 to 34, wherein the head comprises:

a first air channel member; and
a second air channel member, wherein the air channel is formed in each of the first air channel member and the second air channel member;
one end of the first air channel member is connected and communicated with one end of the second air channel member; or one end of the first air channel member is connected with one end of the second air channel member by a connector, and the air channel in the first air channel member being spaced from the air channel in the second air channel member.

40. The head for the bladeless fan of any one of claims 30 to 34, wherein the head comprises:

a first air channel member, wherein the first air channel member extends along a vertical direction;

a second air channel member, wherein the second air channel member extends along the vertical direction, and the first air channel member and the second air channel member being spaced from one another in an left-right direction and parallel to each other; and
a connector, wherein one end of the connector is connected with an upper end of the first air channel member and another end is connected with an upper end of the second air channel member; and
the air channel is formed in each of the first air channel member and the second air channel member, a lower end of the air channel being the first end, and an upper end of the air channel being the second end.

41. A bladeless fan, comprising:

a base;
a head, wherein the head is the head for the bladeless fan of any one of claims 30 to 40 and is installed on the base; and
an air generation device, wherein the air generation device is disposed in the base and configured to supply air into the air channel.

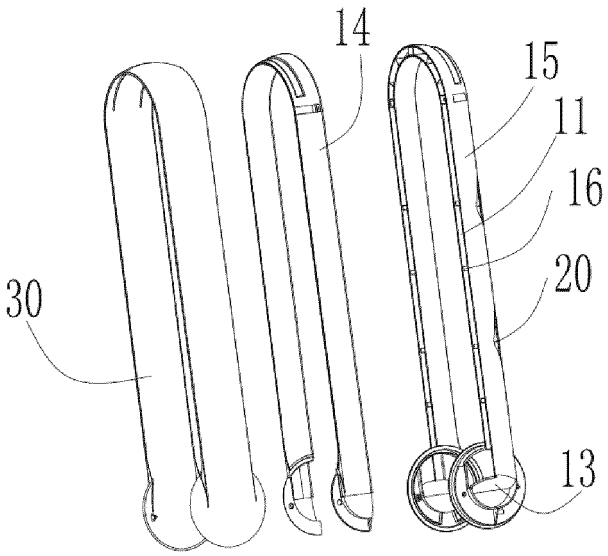

FIG. 1

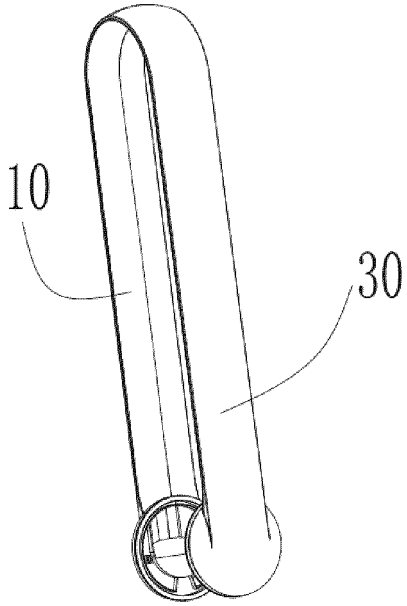

FIG. 2

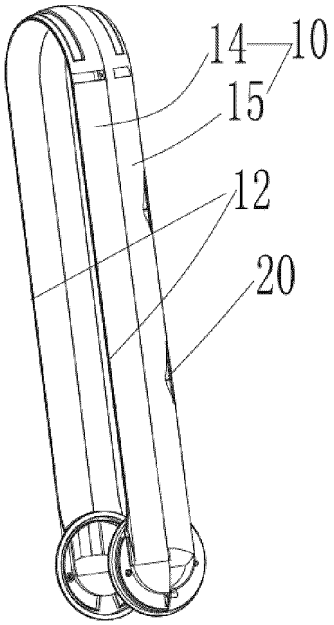

FIG. 3

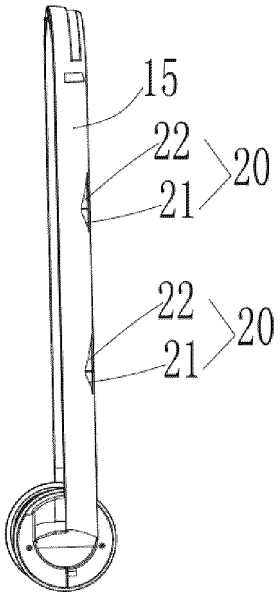

FIG. 4

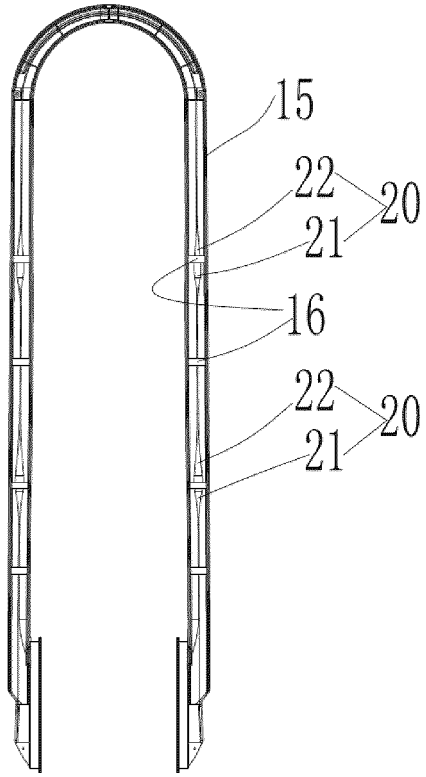

FIG. 5

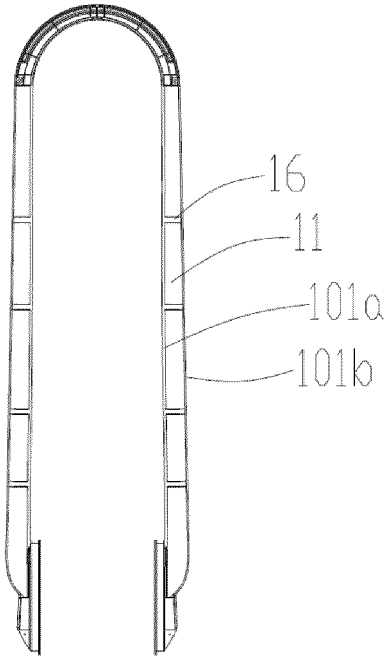

FIG. 6

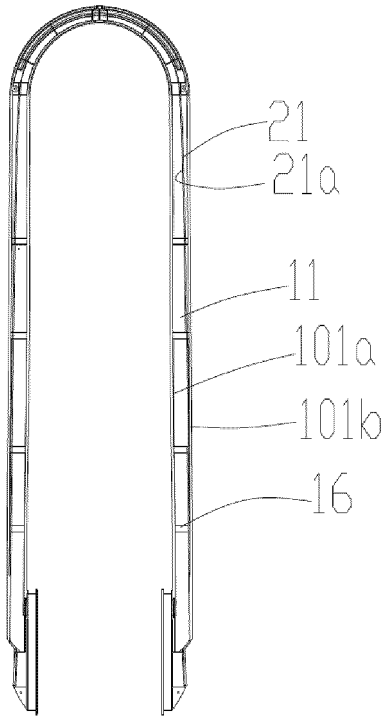

FIG. 7

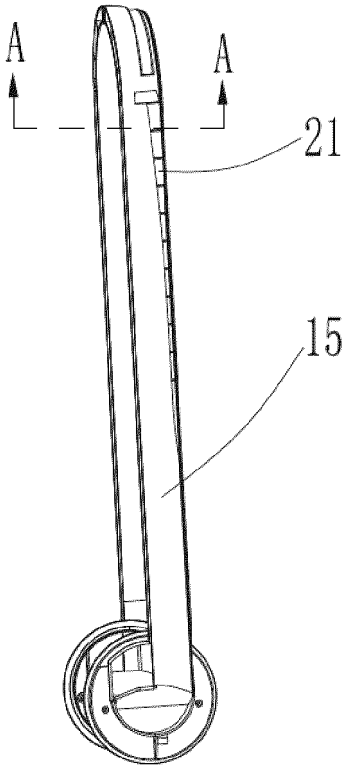

FIG. 8

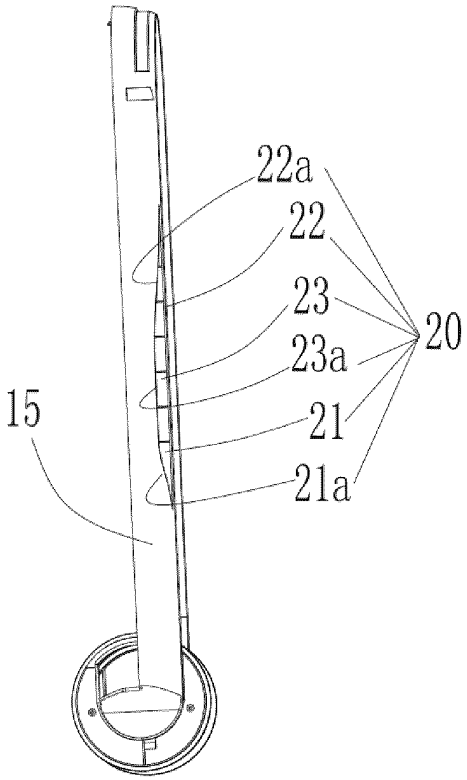

FIG. 9

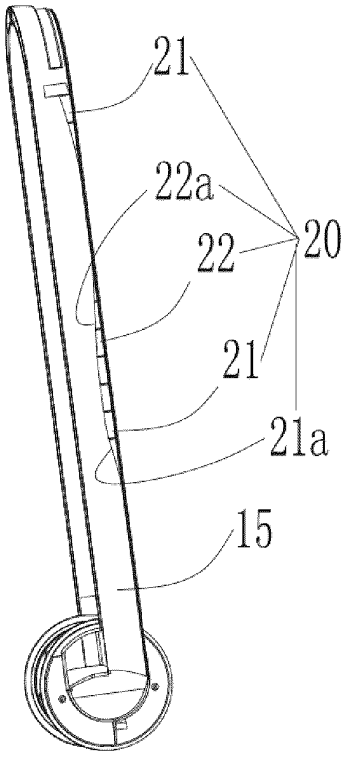

FIG. 10

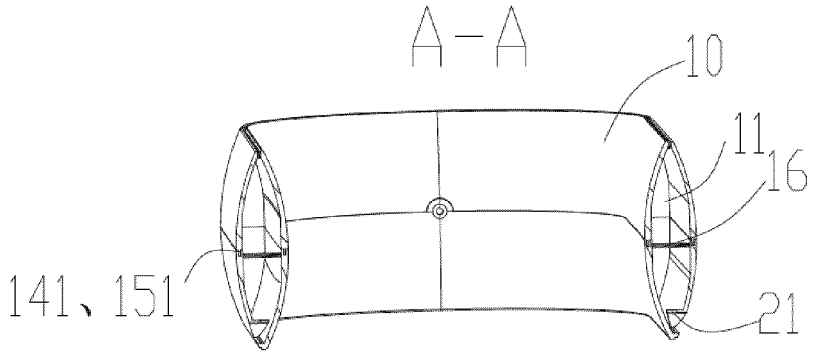

FIG. 11

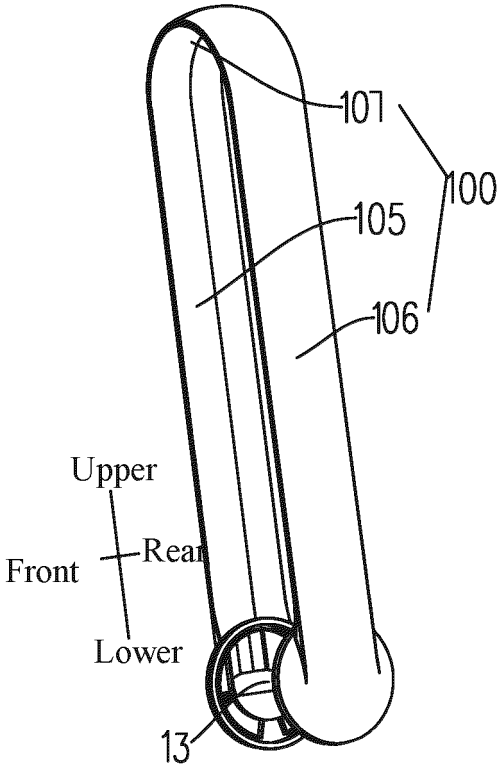

FIG. 12

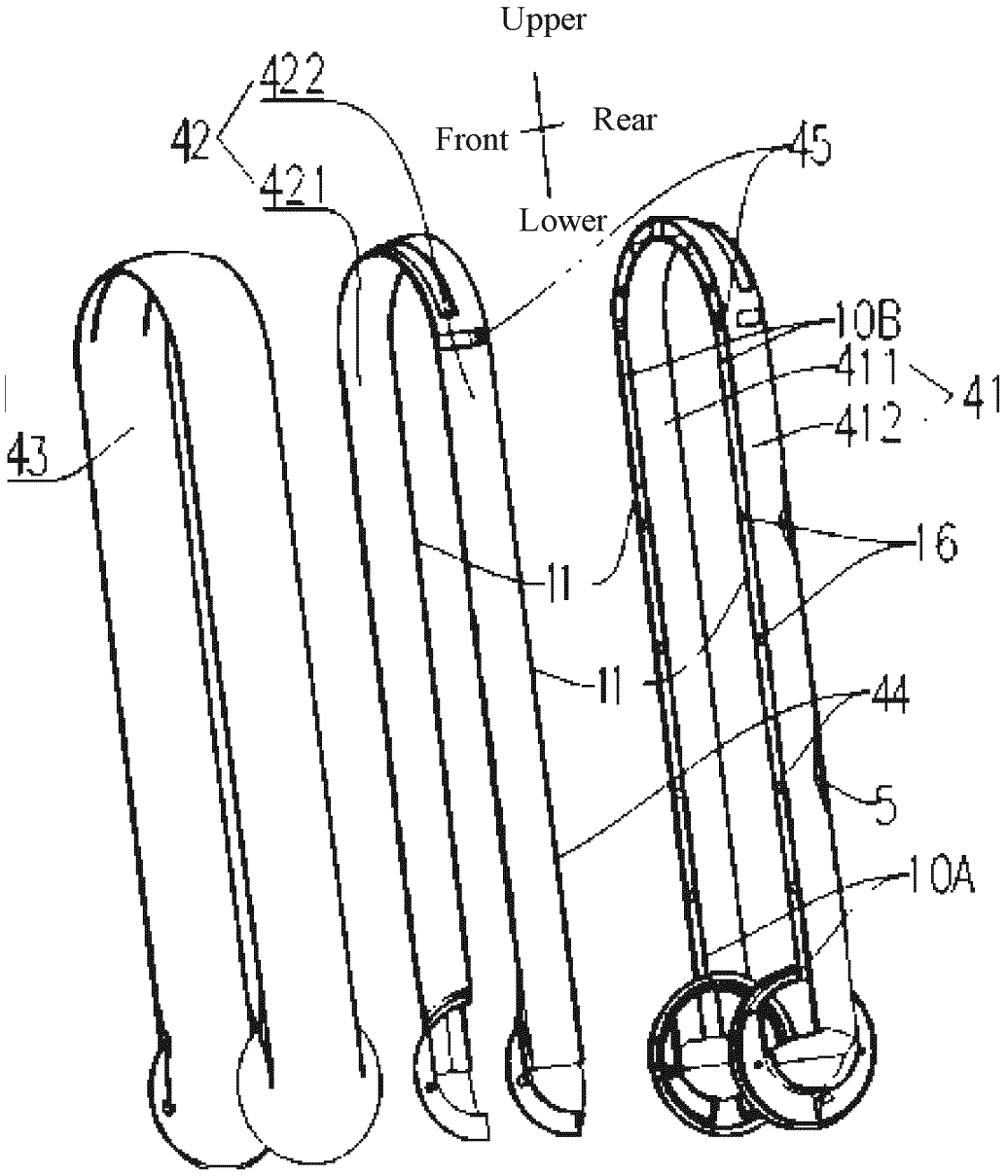
Upper
422
42
421
Front
Rear
Lower
45
10B
411
41
412
43
16
11
11
44
5
10A

FIG. 13

FIG. 14

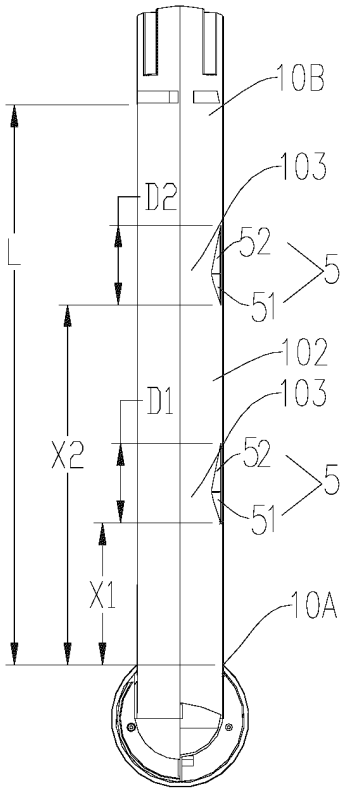

FIG. 15

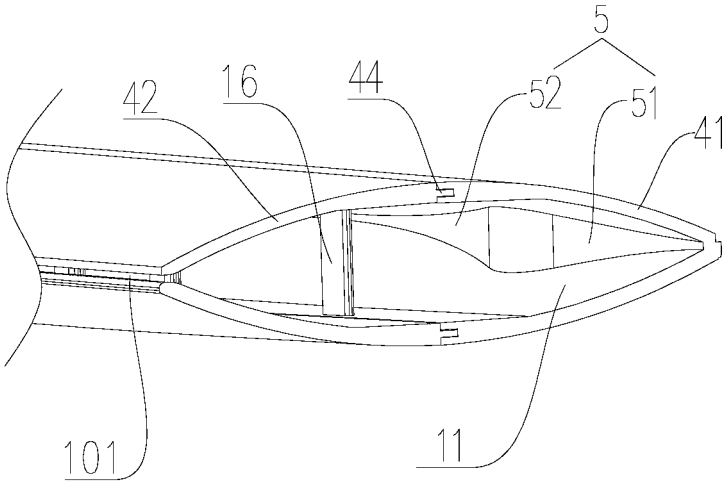

FIG. 16

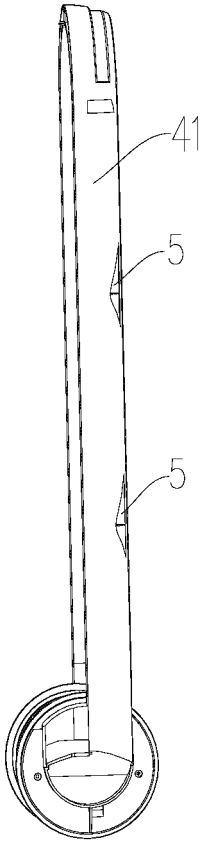

FIG. 17

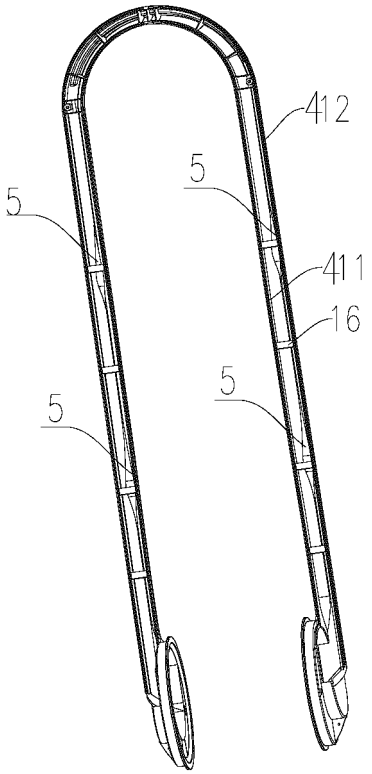

FIG. 18

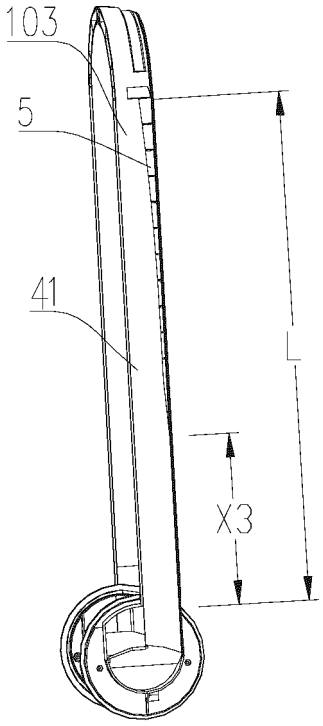

FIG. 19

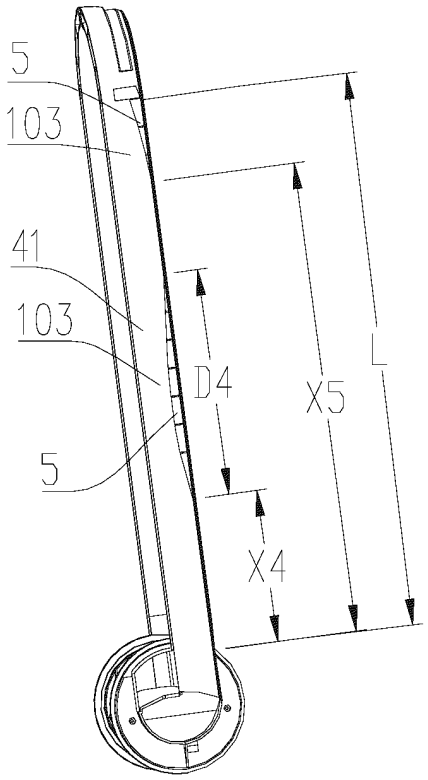

FIG. 20

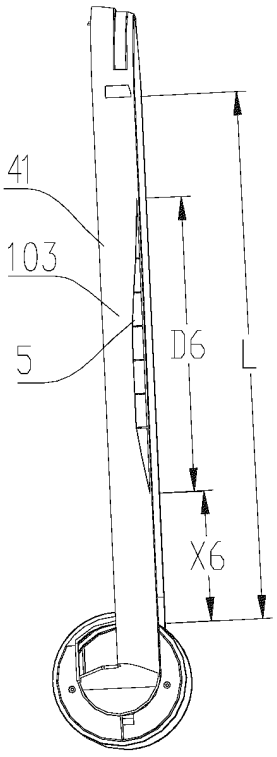

FIG. 21

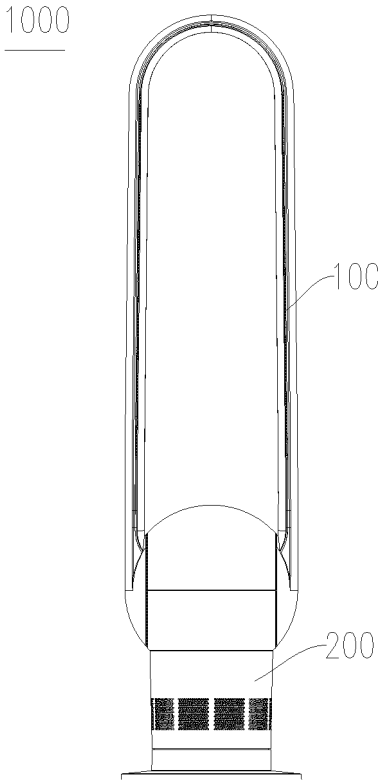

FIG. 22

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2018/121607

A. CLASSIFICATION OF SUBJECT MATTER

F04F 5/44(2006.01)i; F04D 25/08(2006.01)i; F04D 29/40(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)

F04F; F04D

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)

EPODOC, WPI, CNPAT, CNKI: 美的, 无叶, 流速, 速度, 气压, 风压, 风量, 均一, 均匀, 不均, 变小, 导风, 导流, 加压, 变截面, 变窄, 倾斜, 斜面, non-blade?, bladeless, wind?, speed, pressure+, uniform+, equality, guid+, narrow+, incline, lean???, slop???, slant

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 106762852 A (MIDEA GROUP CO., LTD.) 31 May 2017 (2017-05-31) description, paragraphs [0050]-[0092], and figures 1-14	1-3, 5-9, 18, 21, 22, 24, 25, 28-32, 35, 36, 39-41
Y	CN 106762852 A (MIDEA GROUP CO., LTD.) 31 May 2017 (2017-05-31) description, paragraphs [0050]-[0092], and figures 1-14	4, 14-17, 19, 20, 23, 37, 38
Y	KR 101203378 B1 (DAIUNG GOODMORNING CO., LTD.) 21 November 2012 (2012-11-21) description, paragraphs [0026]-[0037], and figures 1-4	4, 20, 23, 37, 38
Y	CN 107477026 A (GUANGDONG MIDEA ENVIRONMENT APPLIANCE MANUFACTURING CO., LTD. ET AL.) 15 December 2017 (2017-12-15) description, paragraphs [0044]-[0056] and [0068], and figures 1-5	14-17, 19
A	CN 103375444 A (JIANGXI WEITE TECHNOLOGY CO., LTD.) 30 October 2013 (2013-10-30) entire document	1-41
A	CN 102661294 A (WEI, JIANFENG) 12 September 2012 (2012-09-12) entire document	1-41

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

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

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

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

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 February 2019	**15 March 2019**
Name and mailing address of the ISA/CN **National Intellectual Property Administration, PRC (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2018/121607

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2502106 A (DYSON TECHNOLOGY LIMITED) 20 November 2013 (2013-11-20) entire document	1-41

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2018/121607

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 106762852 A	31 May 2017	None	
KR 101203378 B1	21 November 2012	None	
CN 107477026 A	15 December 2017	CN 207526761 U	22 June 2018
CN 103375444 A	30 October 2013	None	
CN 102661294 A	12 September 2012	None	
GB 2502106 A	20 November 2013	None	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 201721803727 **[0001]**
- CN 201711376203 **[0001]**
- CN 201721803860 **[0001]**
- CN 201711378783 **[0001]**