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(54) **FAN**

(57) The present application relates to the technical field of fans, and in particular, to a fan. The fan includes a head assembly, a support assembly, and a bracket assembly. The support assembly is capable of driving the bracket assembly to rotate around a first axis extending along a first direction. The head assembly includes a housing part; an air outlet and a first air inlet are disposed at two ends of the housing part in a second direction, and a second air inlet is disposed on a side wall of the housing part. The bracket assembly includes a connecting wall and two hinge parts; the support assembly is connected to the bracket assembly via the connecting wall, and the two hinge parts are respectively hinged to two ends of the housing part in a third direction, such that the bracket assembly is capable of driving the housing part to rotate around a second axis extending along the third direction. The connecting wall includes a third air inlet, and the third air inlet can be disposed opposite to the second air inlet. According to the fan provided in the present application, the stability of the rotation of the head assembly is improved, the uniformity of air intake of the head assembly is improved, and the probability of abnormal noise generated during rotation is reduced.

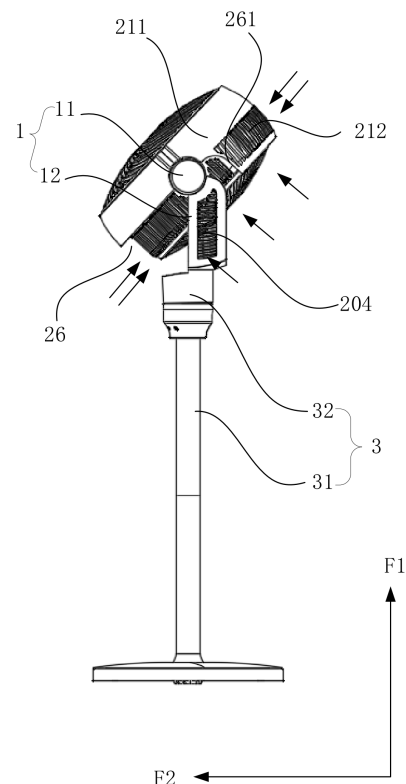


FIG. 3

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present disclosure claims priority to Chinese Patent Application No. 202410521401.5, filed with the China National Intellectual Property Administration on April 28, 2024 and entitled "FAN", the content of which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present disclosure relates to the technical field of fans, and in particular, to a fan.

BACKGROUND

[0003] Currently, the mainstream circulating fans are typically configured such that a support bracket 02 is mounted at the rear of a fan head 01, enabling the fan head to swing up and down by means of the structure at the rear. The advantage of such a structure is that the support bracket 02 does not occupy the space of the head, and in the case that the size of the head remains unchanged, fan blades with a relatively large diameter may be selected for the machine, thereby ensuring the performance of the product. In addition, the head structure is complete and unified, making the appearance relatively aesthetically pleasing.

[0004] However, as shown in FIG. 1, in the structure in which the support bracket 02 is mounted at the rear of the fan head 01, when the fan oscillates up and down, since the connecting point between the support bracket 02 and the fan head 01 is located at the rear of the fan head 01, the distance between the head and the center of gravity of the up-and-down rotation (i.e., the D1 value shown in FIG. 1) and the distance between the rotation center of the side-to-side oscillation and the farthest end of the motor head (i.e., the D2 value shown in FIG. 1) are both relatively large. This increases the load of the motor, and over the long term, not only will abnormal noise be generated, but the service life of the motor will even be adversely affected. In addition, since the back of the fan head 01 is shielded by a portion of the support bracket 02 structure, the air intake at the back is uneven, which increases the operating noise of the machine and disrupts the balance of the head.

SUMMARY OF THE INVENTION

[0005] Embodiments of the present disclosure provide a fan. The fan includes a head assembly, a support assembly, and a bracket assembly. The support assembly extends along a first direction, the bracket assembly is disposed at one end of the support assembly in the first direction, and the support assembly is configured to drive the bracket assembly to rotate around a first axis extending along the first direction.

[0006] The head assembly includes a housing part, and the housing part is provided with an air outlet, a first air inlet, and a second air inlet; the air outlet and the first air inlet are disposed at two ends of the housing part in a second direction, and the second air inlet is disposed on a side wall of the housing part; the second direction intersects with the first direction.

[0007] The bracket assembly includes a connecting wall and two hinge parts; the support assembly is connected to the bracket assembly via the connecting wall, and the two hinge parts are respectively hinged to two ends of the housing part in a third direction, such that the bracket assembly is capable of driving the housing part to rotate around a second axis extending along the third direction.

[0008] The connecting wall includes a third air inlet, and the third air inlet can be disposed opposite to the second air inlet.

[0009] In one or more embodiments, the housing part includes a first cover, a second cover, and the side wall, and a main air duct extending through the side wall along the second direction is provided within the side wall.

[0010] The first cover and the second cover are disposed to cover two ends of the main air duct in the second direction, respectively; the air outlet is disposed on the first cover, and the first air inlet is disposed on the second cover.

[0011] The side wall includes an air gathering region and an air inlet region sequentially disposed along the second direction; one end, at which the air gathering region is located, of the side wall is connected to the first cover, and the second air inlets are all disposed in the air inlet region.

[0012] In one or more embodiments, the hinge part is disposed at a junction between the air gathering region and the air inlet region.

[0013] In one or more embodiments, the hinge part is disposed on one side, proximal to the air gathering region in the second direction, of the connecting wall.

[0014] The connecting wall is disposed on an outer side of the air inlet region.

[0015] In one or more embodiments, the head assembly further includes a fan blade part and a rotating part, both disposed in the main air duct; the rotating part is provided with a rotating shaft extending along the second direction, and the rotating part and the fan blade part are both coaxially disposed via the rotating shaft to drive the fan blade part to rotate around the rotating shaft.

[0016] The fan blade part includes a connecting portion and a plurality of blades, and the plurality of blades are evenly arranged along a circumferential direction of the connecting portion.

[0017] In one or more embodiments, the connecting portion is in transmission connection with one end, proximal to the first cover, of the rotating shaft, and the blade extends from the connecting portion toward an outer side of the connecting portion and toward a side on which the second cover is located.

[0018] In the second direction, an air inlet gap is provided between one end, distal to the connecting portion, of the blade and the second cover.

[0019] In one or more embodiments, in the second direction, a size of the air inlet gap is 4% to 6% of a size of the main air duct.

[0020] In one or more embodiments, the second air inlet extends from one end of the air inlet region to the other end along the second direction.

[0021] At least a portion of the blade extends into the air inlet region.

[0022] In the second direction, a size of the portion of the blade extending to the air inlet region accounts for 40% to 50% of a size of the air inlet region.

[0023] In one or more embodiments, an outer side of the side wall is provided with a placement recess, and the connecting wall is disposed within the placement recess, such that outer side surfaces of both the connecting wall and the side wall are aligned with each other. In one or more embodiments, one side, distal to the air outlet, of the placement recess is open.

[0024] In a circumferential direction of the side wall, a span of the placement recess is greater than a span of the bracket assembly, such that two ends of the placement recess in the circumferential direction of the side wall extend beyond two end portions of the bracket assembly in the circumferential direction of the side wall, respectively.

[0025] In one or more embodiments, the placement recess includes a limiting flange, and the limiting flange is disposed at the two ends of the placement recess in the circumferential direction of the side wall.

[0026] The limiting flange is configured to exactly fit against an outer edge of the connecting wall when the head assembly rotates to a limit angle around the second axis.

[0027] In one or more embodiments, one end, distal to the air outlet, of the placement recess is provided with a clearance chamfer.

[0028] In the second direction, a size of the clearance chamfer accounts for 8% to 10% of the size of the main air duct.

[0029] The clearance chamfer is 12° to 24°.

[0030] In one or more embodiments, in the second direction, specifically in a direction from one side, facing the first air inlet, of the connecting wall toward the other side, an inner surface of the connecting wall gradually tilts toward an outer side of the connecting wall.

[0031] In one or more embodiments, an included angle between the inner surface of the connecting wall and the second direction is 8° to 20°.

[0032] In one or more embodiments, a region, in which the third air inlet is provided, of the connecting wall is defined as an air passing region, and other portions of the connecting wall are defined as a reinforcing region, a thickness of the reinforcing region being greater than a thickness of the air passing region.

[0033] In one or more embodiments, the connecting

wall includes a support frame and a cover plate.

[0034] The support assembly is disposed in a middle portion of the support frame, and the hinge part is fixedly disposed at two ends of the support frame.

[0035] The support frame includes a through groove extending through the support frame, the third air inlet is disposed on the cover plate, and the cover plate is configured to be capable of being snap-fitted to a portion of the support frame between the support assembly and the hinge part, such that the air passing region of the cover plate is disposed opposite to the through groove.

[0036] In one or more embodiments, the outer side of the side wall is provided with a hinge shaft extending along the third direction, and the hinge part is hinged to the side wall via the hinge shaft.

[0037] In one or more embodiments, the support frame is provided with an air guide chamfer, and the air guide chamfer is disposed around an edge of the through groove.

[0038] In one or more embodiments, the support assembly includes a support rod base and a rotating base, where the support rod base extends along the first direction, the rotating base is disposed at one end of the support rod base in the first direction, and the support assembly is connected to the bracket assembly via the rotating base to drive the support assembly to rotate around the support rod base.

[0039] In one or more embodiments, an anti-interference gap is formed between the side wall and the connecting wall, and the anti-interference gap is 3 mm to 8 mm.

[0040] To make the above objectives, features, and advantages of the present disclosure more apparent and easy to understand, preferred embodiments are described in detail hereinafter with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0041] To more clearly illustrate the technical solutions in the specific embodiments of the present disclosure or in the prior art, the accompanying drawings required for illustrating the specific embodiments or the prior art will be briefly described below. Apparently, the accompanying drawings in the following description show merely some embodiments of the present disclosure, and those of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

FIG. 1 is a schematic structural diagram of a fan in the prior art;

FIG. 2 is a schematic structural diagram from a side view showing a fan at an initial position according to an embodiment of the present disclosure;

FIG. 3 is a schematic structural diagram from a side view showing a fan in a position where the fan is rotated 45° around a second axis according to an

embodiment of the present disclosure;

FIG. 4 is a schematic structural diagram from a side view showing a fan in a state where the fan is rotated to a limit position around a second axis according to an embodiment of the present disclosure;

FIG. 5 is an exploded schematic structural diagram of a fan according to an embodiment of the present disclosure;

FIG. 6 is a schematic diagram of a sectioned structure obtained by sectioning, along a plane determined by both a first direction and a second direction, a fan assembly according to an embodiment of the present disclosure;

FIG. 7 is an axonometric structural schematic diagram of a bracket assembly according to an embodiment of the present disclosure;

FIG. 8 is an exploded schematic structural diagram of a bracket assembly according to an embodiment of the present disclosure; and

FIG. 9 is a schematic diagram of a sectioned structure obtained by sectioning, along a plane determined by both a first direction and a second direction, a bracket assembly according to an embodiment of the present disclosure.

[0042] Reference numerals:

01-fan head; 02-support bracket;
1-bracket assembly; 11-hinge part; 111-support frame; 112-cover plate; 113-through groove; 12-connecting wall; 13-docking base;
2-head assembly; 201-first air inlet; 202-second air inlet; 203-air outlet; 204-third air inlet; 21-side wall; 211-air gathering region; 212-air inlet region; 22-first cover; 23-second cover; 24-fan blade part; 241-blade; 25-rotating part; 251-rotating shaft; 26-placement recess; 261-limiting flange;
3-support assembly; 31-support rod base; 32-rotating base.
F1-first direction; F2-second direction; F3-third direction.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0043] The technical solutions of the present disclosure will be clearly and fully described below with reference to the accompanying drawings, and it is apparent that the described embodiments are some, but not all, embodiments of the present disclosure.

[0044] The assemblies of the embodiments of the present disclosure that are generally described and shown in the accompanying drawings herein may be arranged and designed in a variety of different configurations. Therefore, the following detailed description of the embodiments of the present disclosure provided in the accompanying drawings is not intended to limit the protection scope of the present disclosure, but merely represents

the selected embodiments of the present disclosure.

[0045] Based on the embodiments in the present disclosure, all other embodiments obtained by those of ordinary skill in the art without creative work shall fall within the protection scope of the present disclosure.

[0046] In the description of the present disclosure, it should be noted that the orientations or positional relationships indicated by terms such as "center", "upper", "lower", "left", "right", "vertical", "horizontal", "inner", and "outer" are those shown based on the accompanying drawings, and are merely intended to facilitate and simplify description of the present disclosure rather than to indicate or imply that the indicated device or element must have a specific orientation and be structured and operated according to the specific orientation, and should not be construed as limiting the present disclosure. In addition, the terms "first", "second", and "third" are merely used for descriptive purposes and shall not be construed as indicating or implying relative importance.

[0047] In the description of the present disclosure, it should be noted that unless otherwise explicitly specified and defined, the terms "mount", "interconnect", and "connect" should be interpreted in their broad senses. For example, "connect" may refer to a fixed connection, a detachable connection, or an integrated connection; a mechanical connection or an electrical connection; or a direct connection, an indirect connection via an intermediate, or internal communication between two elements. For those of ordinary skill in the art, the specific meaning of the above terms in the present disclosure may be interpreted according to specific conditions.

[0048] The fan provided in the embodiments of the present disclosure solves, to a certain extent, the technical problems in the prior art, namely, that the distance between the head and the center of gravity of up-and-down rotation (i.e., the D1 value shown in FIG. 1) and the distance between the rotation center of side-to-side oscillation and the farthest end of the motor head (i.e., the D2 value shown in FIG. 1) are both relatively large, which increases the load of the motor, and over the long term, not only will abnormal noise be generated, but the service life of the motor will even be adversely affected; in addition, since the back of the fan head is shielded by a portion of the bracket structure, the air intake at the back is uneven, which increases the operating noise of the machine and disrupts the balance of the head.

[0049] For the fan provided in the embodiments of the present disclosure, on the one hand, two ends of a connecting wall are each provided with a hinge part, and the two hinge parts are respectively hinged to two ends of a housing part in a third direction. In this way, compared with the structure in which the support bracket 02 is disposed on the fan head 01 in the prior art (as shown in FIG. 1), the fan provided in the present disclosure can not only effectively shorten the distance between a second axis and an edge of a head assembly, but also effectively shorten the distance between the second axis and the edge of the head assembly. That

is, the fan provided in the present disclosure can effectively shorten the rotation radius of the head assembly rotating around a first axis and the rotation radius of the head assembly rotating around the second axis, thereby effectively improving the stability of the rotation of the head assembly, reducing the probability of abnormal noise generated during rotation, and effectively improving the service life of the driving structure (e.g., the motor) for driving the rotation of the head assembly. On the other hand, the connecting position between a bracket assembly and the head assembly is arranged on a side wall of the housing part, which can effectively avoid the shielding of a first air inlet by the bracket assembly. In addition, a third air inlet hole that can be provided opposite to a second air inlet is provided on the connecting wall, which can effectively ensure the uniformity of air intake in a circumferential direction of the head assembly. In this way, the uniformity of air intake of the head assembly is greatly improved, thereby effectively reducing the probability of abnormal noise generated during the operation of the fan due to the uneven air intake, and further improving the stability of the operation of the head assembly.

[0050] The fan according to some embodiments of the present disclosure is described below with reference to FIGs. 2 to 8.

[0051] Referring to FIGs. 2 to 8, the embodiments of the present disclosure provide a fan. The fan includes a head assembly 2, a support assembly 3, and a bracket assembly 1. The support assembly 3 extends along a first direction F1, the bracket assembly 1 is disposed at one end of the support assembly 3 in the first direction F1, and the support assembly 3 is capable of driving the bracket assembly 1 to rotate around a first axis extending along the first direction F1. The head assembly 2 includes a housing part, and the housing part is provided with an air outlet 203, a first air inlet 201, and a second air inlet 202. The air outlet 203 and the first air inlet 201 are disposed at two ends of the housing part in a second direction F2, and the second air inlet 202 is disposed on a side wall 21 of the housing part; the second direction F2 intersects with the first direction F1. The bracket assembly 1 includes a connecting wall 12 and two hinge parts 11; the support assembly 3 is connected to the bracket assembly 1 via the connecting wall 12, and the two hinge parts 11 are respectively hinged to two ends of the housing part in a third direction F3, such that the bracket assembly 1 is capable of driving the housing part to rotate around a second axis extending along the third direction F3. The connecting wall 12 includes a third air inlet 204, and the third air inlet 204 can be provided opposite to the second air inlet 202.

[0052] For the fan provided according to the above technical features, on the one hand, two ends of the connecting wall 12 are each provided with the hinge part 11, and the two hinge parts 11 are respectively hinged to the two ends of the housing part in the third direction F3. In this way, compared with the structure in which the

support bracket 02 is disposed on the fan head 01 in the prior art (as shown in FIG. 1), the fan provided in the present disclosure can not only effectively shorten the distance between the second axis and the edge of the head assembly 2, but also effectively shorten the distance between the second axis and the edge of the head assembly 2. That is, the fan provided in the present disclosure can effectively shorten the rotation radius of the head assembly 2 rotating around the first axis and the rotation radius of the head assembly 2 rotating around the second axis, thereby effectively improving the stability of the rotation of the head assembly 2, reducing the probability of abnormal noise generated during rotation, and effectively improving the service life of the driving structure (e.g., the motor) for driving the rotation of the head assembly 2. On the other hand, the connecting position between the bracket assembly 1 and the head assembly 2 is arranged on the side wall 21 of the housing part, which can effectively avoid the shielding of the first air inlet 201 by the bracket assembly 1. In addition, the third air inlet that can be provided opposite to the second air inlet 202 is provided on the connecting wall 12, which can effectively ensure the uniformity of air intake in the circumferential direction of the head assembly 2. In this way, the uniformity of air intake of the head assembly 2 is greatly improved, thereby effectively reducing the probability of abnormal noise generated during the operation of the fan due to the uneven air intake, and further improving the stability of the operation of the head assembly 2.

[0053] As shown in FIGs. 2 to 8, F1 in the figure shows an example of the first direction F1, F2 in the figure shows an example of the second direction F2, and F3 in the figure shows an example of the third direction F3. In some embodiments, the third direction F3 and the second direction F2 are perpendicular to each other to ensure the smoothness of the rotation of the head assembly 2 around the second axis.

[0054] In some embodiments, the support assembly 3 may include a support rod base 31 and a rotating base 32. The support rod base 31 may extend along the first direction F1, the rotating base 32 may be disposed at one end of the support rod base 31 in the first direction F1, and the support assembly 3 is connected to the bracket assembly 1 via the rotating base 32 to drive the support assembly 3 to rotate around the support rod base 31. In other words, the first axis may be the axis of the support rod base 31.

[0055] Optionally, the rotating base 32 may be a first rotating motor.

[0056] In some embodiments, as shown in FIG. 5, the housing part may include a first cover 22, a second cover 23, and a side wall 21, and a main air duct extending through the side wall 21 along the second direction F2 is provided within the side wall 21. The first cover 22 and the second cover 23 are disposed to cover two ends of the main air duct in the second direction F2, respectively, to ensure that a stable space is formed within the housing

part for the placement of a fan blade part 24, which will be described below. This ensures the safety of the operation of the fan and prevents the fan blade part 24 from injuring people during the operation of the fan.

[0057] Correspondingly, as shown in FIG. 2, the air outlet 203 may be disposed on the first cover 22, and the first air inlet 201 is disposed on the second cover 23. It should be noted that the distribution forms of the air outlet 203 and the first air inlet 201 on the first cover 22 and the second cover 23, respectively, are similar to those of the existing fans, which will not be described in detail herein.

[0058] In some embodiments, as shown in FIG. 2, the side wall 21 includes an air gathering region 211 and an air inlet region 212 sequentially disposed along the second direction F2; one end, at which the air gathering region 211 is located, of the side wall 21 is connected to the first cover 22, and the second air inlets 202 are all disposed in the air inlet region 212. In this way, the airflow entering the main air duct in some directions via the first air inlet 201 and the second air inlet 202 can, under an gathering effect of the side wall 21 of the air gathering region 211, flow to the air outlet 203 along the second direction F2, thereby effectively ensuring the smoothness of the airflow toward the air outlet 203, and effectively avoiding the occurrence of the phenomenon where the airflow entering the main air duct through the second air inlet 202 forms a vortex and thus interferes with the air outflow from the air outlet 203.

[0059] In some embodiments, as shown in FIGs. 2 to 4, the hinge part 11 may be disposed at the junction between the air gathering region 211 and the air inlet region 212. In this way, the centrality of the first axis and the second axis is improved, and the stability of the rotation of the head assembly 2 is further improved.

[0060] In some embodiments, as shown in FIG. 2, the hinge part 11 may be disposed on one side, proximal to the air gathering region 211 in the second direction F2, of the connecting wall 12, and the connecting wall 12 is disposed on the outer side of the air inlet region 212. In this way, on the one hand, it is convenient for the head assembly 2 to rotate from the end, proximal to the second cover 23, into or out of the space surrounded and defined by the connecting wall 12, thereby effectively reducing the interference with the air outflow from the air outlet 203 during the rotation of the head assembly 2 around the second axis. On the other hand, the connecting wall 12 is disposed on the outer side of the air inlet region 212, and when the fan is at an initial position (that is, in a state where the head assembly 2 does not rotate around the second axis), it can effectively facilitate the alignment of the third air inlet 204 on the connecting wall 12 with the second air inlet 202, thereby facilitating the air intake of the side wall 21 of the head assembly 2.

[0061] In some embodiments, the outer side of the side wall 21 may be provided with a hinge shaft extending along the third direction F3, and the hinge part 11 is hinged to the side wall 21 via the hinge shaft. In other words, the second axis may be the hinge shaft. In some

embodiments, not shown in the figure, the fan may further include a second rotating motor, and the second rotating motor may be disposed on at least one of the two hinge parts 11, so as to drive the hinge shaft to drive the head assembly 2 to rotate around the second axis.

[0062] In some embodiments, as shown in FIGs. 2 to 6, the outer side of the side wall 21 is provided with a placement recess 26, and the connecting wall 12 is disposed within the placement recess 26, such that outer side surfaces of both the connecting wall 12 and the side wall 21 are aligned with each other. In this way, on the one hand, the connecting wall 12 can be effectively hidden in the housing part, which reduces the space occupied by the bracket assembly 1 and improves the neatness and aesthetics of the fan; on the other hand, the structure in which the connecting wall 12 is hidden in the placement recess 26 can effectively improve the compactness between the bracket assembly 1 and the head assembly 2, thereby effectively improving the effective air outlet efficiency of the fan. Specifically, compared with the fan occupying the same outer diameter space, disposing the bracket assembly 1 fittingly within the placement recess 26 can effectively increase the inner diameter of the main air duct of the fan, thereby enabling the fan blade part 24 with a larger diameter to be placed within the main air duct, and thereby effectively improving the effective air outlet efficiency of the fan.

[0063] In some embodiments, as shown in FIGs. 2 to 6, one side, distal to the air outlet 203, of the placement recess 26 is open. In this way, it is further convenient for the head assembly 2 to rotate from the end, proximal to the second cover 23, into or out of the space surrounded and defined by the connecting wall 12, thereby effectively reducing the interference with the air outflow from the air outlet 203 during the rotation of the head assembly 2 around the second axis.

[0064] Further, in some embodiments, as shown in FIG. 6, one end, distal to the air outlet 203, of the above placement recess 26 is provided with a clearance chamfer, which is further convenient for the head assembly 2 to rotate from the end, proximal to the second cover 23, into or out of the space surrounded and defined by the connecting wall 12, thereby avoiding the interference by the connecting wall 12 with the rotational motion of the head assembly 2 around the second axis.

[0065] In some embodiments, in the second direction F2, the size of the clearance chamfer accounts for 8% to 10% of the size of the main air duct. According to the simulation tests of the simulation software, when the size of the clearance chamfer in the second direction F2 falls within 8% to 10% of the size of the main air duct, the head assembly 2 can rotate around the second axis smoothly and has minimal impact on the air inlet direction of the second air inlet 202.

[0066] In some embodiments, the above clearance chamfer (i.e., $\angle\alpha$ shown in FIG. 6) is 12° to 24°, which ensures that the clearance angle has minimal impact on the space of the main air duct while ensuring the smooth-

ness of the rotation of the head assembly 2 around the second axis.

[0067] Correspondingly, as shown in FIG. 9, in the second direction F2, specifically in a direction from one side, facing the first air inlet 201, of the connecting wall 12 toward the other side, the inner surface of the connecting wall 12 gradually tilts toward the outer side of the connecting wall 12 to further avoid the interference by the connecting wall 12 with the rotational motion of the head assembly 2 around the second axis.

[0068] In some embodiments, as shown in FIG. 9, an included angle between the inner surface of the connecting wall 12 and the second direction F2 (i.e., $\angle\beta$ shown in FIG. 9) is 8° to 20° . In other words, the angle difference between the inner surface of the connecting wall 12 and the bottom wall of the placement recess 26 is at least 4° to avoid the interference by the connecting wall 12 with the rotational motion of the head assembly 2 around the second axis. It should be noted that the included angle between the inner surface of the connecting wall 12 and the second direction F2 described above may be understood as an included angle between a tangent at any point on a curve formed by the connecting wall 12 on a predetermined cross section and the second direction F2, where the predetermined cross section is a plane confirmed by both a certain radial direction of the side wall 21 and the second direction F2.

[0069] In some embodiments, in the radial direction of the side wall 21, an anti-interference gap is formed between the side wall 21 and the connecting wall 12, and the anti-interference gap may be 3 mm to 8 mm. In this way, during the operation of the fan, the head assembly 2 can oscillate up and down around the second axis on the bracket. The anti-interference gap is formed between the side wall 21 and the connecting wall 12, which not only prevents the rotational interference but also allows the gap to become part of the air intake during the operation of the fan blades. This ensures the uniformity of the air intake and reduces the operating noise.

[0070] In some embodiments, as shown in FIGs. 2 to 4, in the circumferential direction of the side wall 21, the span of the placement recess 26 is greater than the span of the bracket assembly 1, such that two ends of the placement recess 26 in the circumferential direction of the side wall 21 extend beyond two end portions of the bracket assembly 1 in the circumferential direction of the side wall 21, respectively, thereby providing a rotating space for the end portions of the bracket assembly 1, and preventing the recess wall of the placement recess 26 from interfering with the bracket assembly 1 and affecting the rotation of the bracket assembly 1 relative to the head assembly 2.

[0071] In some embodiments, as shown in FIGs. 2 to 4, the placement recess 26 includes a limiting flange 261, and the limiting flange 261 is disposed at the two ends of the placement recess 26 in the circumferential direction of the side wall 21. As shown in FIG. 4, when the head assembly 2 rotates to a limit angle around the second

axis, the limiting flange 261 exactly fits against the outer edge of the connecting wall 12. In this way, the limiting flange 261 can define the rotational limit position of the head assembly 2, thereby effectively ensuring the rotation precision of the limit position of the head assembly 2, and avoiding the over-rotation of the head assembly 2 due to its own weight and causing damage to the hinge part 11.

[0072] As shown in FIG. 4, an example in which the limit angle is 90 degrees is shown in the figure. However, the limit angle is not limited thereto and may be adaptively adjusted based on actual requirements for the fan.

[0073] In the embodiments, as shown in FIGs. 5 and 6, the head assembly 2 may further include a fan blade part 24 and a rotating part 25, both disposed in the main air duct. The rotating part 25 is provided with a rotating shaft 251 extending along the second direction F2, and the rotating part 25 and the fan blade part 24 are both coaxially disposed via the rotating shaft 251 to drive the fan blade part 24 to rotate around the rotating shaft 251, thereby achieving the air driving function of the fan. Specifically, the fan blade part 24 includes a connecting portion and a plurality of blades 241, and the plurality of blades 241 are evenly arranged along the circumferential direction of the connecting portion.

[0074] In some embodiments, the rotating part 25 may be a third rotating motor.

[0075] In some embodiments, as shown in FIG. 6, the connecting portion is in transmission connection with one end, proximal to the first cover 22, of the rotating shaft 251, and the blade 241 extends from the connecting portion toward the outer side of the connecting portion and toward the side on which the second cover 23 is located. In this way, the space that can be covered by the blade 241 in the main air duct can be expanded and ensured, thereby improving the air driving capability of the blade 241. In some embodiments, as shown in FIG. 6, in the second direction F2, an air inlet gap is provided between one end, distal to the connecting portion, of the blade 241 and the second cover 23. In this way, the smoothness of the airflow entering the main air duct from the second air inlet is ensured.

[0076] In some embodiments, in the second direction F2, the size of the air inlet gap (L1 as shown in FIG. 6) is 4% to 6% of the size of the main air duct. According to the calculations of the simulation experiments, when the size of the air inlet gap (L1 as shown in FIG. 6) is 4% to 6% of the size of the main air duct, the airflow can smoothly enter the main air duct from the second air inlet, and the operating noise of the fan is minimized.

[0077] In some embodiments, as shown in FIG. 6, the second air inlet 202 extends from one end of the air inlet region 212 to the other end along the second direction F2. In other words, the second air inlet 202 may be a long strip-shaped through hole extending along the second direction F2.

[0078] In some embodiments, as shown in FIG. 6, at least a portion of the blade 241 can extend into the air inlet

region 212, such that the fan blade drives the airflow entering the main air duct from the second air inlet.

[0079] In some embodiments, as shown in FIG. 6, in the second direction F2, the size of the portion of the blade 241 extending to the air inlet region 212 (L2 as shown in FIG. 6) accounts for 40% to 50% of the size of the air inlet region 212. According to the calculations of the simulation experiments, on the one hand, when the size of the portion of the blade 241 extending to the air inlet region 212 (L2 as shown in FIG. 6) accounts for less than 40% of the size of the air inlet region 212, the air outlet volume at the air outlet 203 is significantly reduced. In other words, the range of the blade 241 covering the air inlet region 212 is excessively small, resulting in insufficient air inlet area; on the other hand, when the size of the portion of the blade 241 extending to the air inlet region 212 (L2 as shown in FIG. 6) accounts for greater than 50% of the size of the air inlet region 212, the air pressure loss of the blade 241 is obviously increased. In some embodiments, as shown in FIG. 6, in the second direction F2, the size of the portion of the blade 241 in the air gathering region 211 (L3 as shown in FIG. 6) accounts for 95% to 98% of the size of the air gathering region 211.

[0080] In the embodiments, as shown in FIGs. 7 and 8, a region, in which the third air inlet 204 is provided, of the connecting wall 12 is defined as an air passing region, and other regions of the connecting wall 12 are defined as a reinforcing region; the thickness of the reinforcing region is greater than the thickness of the air passing region. In this way, on the one hand, the thinning of the air passing region can effectively prevent the thickness of the air passing region from affecting the air intake volume of the third air inlet 204; on the other hand, the thickened structure of the reinforcing region can effectively improve the support strength of the connecting wall 12 and ensure the support stability of the connecting wall 12.

[0081] In some embodiments, a ratio of the thickness of the reinforcing region to the thickness of the air passing region is 4:1 to 5:1 to ensure the support strength of the reinforcing portion.

[0082] In some embodiments, as shown in FIG. 8, the connecting wall 12 may include a support frame 111 and a cover plate 112. The support assembly 3 is disposed in the middle portion of the support frame 111, and the hinge part 11 is fixedly disposed at two ends of the support frame 111, to ensure the support balance of the connecting wall 12.

[0083] In some embodiments, as shown in FIG. 8, the connecting wall 12 may further include a docking base 13. The docking base 13 may be fixedly disposed on one side, facing away from the head assembly 2, of the support frame 111, and the bracket assembly 1 is in transmission connection with the first rotating motor via the docking base 13.

[0084] In some embodiments, as shown in FIG. 8, the support frame 111 may include a through groove 113 extending through the support frame 111; the third air inlet 204 is disposed on the cover plate 112, and the cover

plate 112 can be snap-fitted to the portion of the support frame 111 between the support assembly 3 and the hinge part 11, such that the air passing region of the cover plate 112 is disposed opposite to the through groove 113. In this way, by means of the structure of the through groove 113, the portion of the connecting wall 12 corresponding to the reinforcing region is a double-layer structure, and the portion of the connecting wall 12 corresponding to the air passing region is a single-layer structure, thereby effectively improving the structural strength of the reinforcing region of the connecting wall 12 and the air intake volume of the air passing region.

[0085] In some embodiments, as shown in FIG. 8, the number of the cover plates 112 is two, which are respectively disposed on two sides of the docking base 13 in the third direction F3. Correspondingly, the support frame 111 is provided with the through groove 113 structure on each of the two sides of the docking base 13 in the third direction F3.

[0086] In some embodiments, the cover plate 112 may be snap-fitted to the support frame 111 to facilitate the separate processing of the cover plate 112 and the support frame 111.

[0087] In some embodiments, the support frame 111 is provided with an air guide chamfer; the air guide chamfer is disposed around the edge of the through groove 113, and the air guide chamfer is 2° to 6°, to improve the air intake volume of the third air inlet 204. Finally, it should be noted that the above embodiments are merely intended to describe the technical solutions of the present disclosure, rather than to limit the present disclosure. Although the present disclosure has been described in detail with reference to the foregoing embodiments, those of ordinary skill in the art should understand that they may still make modifications to the technical solutions described in the foregoing embodiments, or make equivalent replacements to part or all of the technical features therein; and these modifications or replacements do not make the essence of the corresponding technical solutions depart from the scope of the technical solutions of the embodiments of the present disclosure.

INDUSTRIAL APPLICABILITY

[0088] According to the fan provided in the embodiments of the present disclosure, two ends of a connecting wall are each provided with a hinge part, and the two hinge parts are respectively hinged to two ends of a housing part in a third direction, which can not only effectively shorten the distance between a second axis and an edge of a head assembly, but also effectively shorten the distance between the second axis and the edge of the head assembly. That is, this can effectively shorten the rotation radius of the head assembly rotating around a first axis and the rotation radius of the head assembly rotating around the second axis, thereby effectively improving the stability of the rotation of the head assembly, reducing the probability of abnormal noise

generated during rotation, and effectively improving the service life of a driving structure (e.g., a motor) for driving the rotation of the head assembly. A connecting position between a bracket assembly and the head assembly is arranged on a side wall of the housing part, which effectively avoids the shielding of a first air inlet by the bracket assembly. In addition, a third air inlet hole that can be provided opposite to a second air inlet is provided on the connecting wall, which effectively ensures the uniformity of air intake in a circumferential direction of the head assembly. This greatly improves the uniformity of air intake of the head assembly, thereby effectively reducing the probability of abnormal noise generated during the operation of the fan due to the uneven air intake, and further improving the stability of the operation of the head assembly.

Claims

1. A fan, comprising a head assembly, a support assembly, and a bracket assembly, wherein the support assembly extends along a first direction, the bracket assembly is disposed at one end of the support assembly in the first direction, and the support assembly is configured to be capable of driving the bracket assembly to rotate around a first axis extending along the first direction;

the head assembly comprises a housing part, and the housing part is provided with an air outlet, a first air inlet, and a second air inlet; the air outlet and the first air inlet are disposed at two ends of the housing part in a second direction, and the second air inlet is disposed on a side wall of the housing part; the second direction intersects with the first direction; the bracket assembly comprises a connecting wall and two hinge parts; the support assembly is connected to the bracket assembly via the connecting wall, and the two hinge parts are respectively hinged to two ends of the housing part in a third direction, such that the bracket assembly is capable of driving the housing part to rotate around a second axis extending along the third direction; and the connecting wall comprises a third air inlet, and the third air inlet can be disposed opposite to the second air inlet.

2. The fan according to claim 1, wherein the housing part comprises a first cover, a second cover, and the side wall, and a main air duct extending through the side wall along the second direction is provided within the side wall;

the first cover and the second cover are disposed to cover two ends of the main air duct

in the second direction, respectively; the air outlet is disposed on the first cover, and the first air inlet is disposed on the second cover; and the side wall comprises an air gathering region and an air inlet region sequentially disposed along the second direction; one end, at which the air gathering region is located, of the side wall is connected to the first cover, and the second air inlets are all disposed in the air inlet region.

3. The fan according to claim 2, wherein the hinge part is disposed at a junction between the air gathering region and the air inlet region.

4. The fan according to claim 3, wherein the hinge part is disposed on one side, proximal to the air gathering region in the second direction, of the connecting wall; and the connecting wall is disposed on an outer side of the air inlet region.

5. The fan according to any one of claims 2 to 4, wherein the head assembly further comprises a fan blade part and a rotating part, both disposed in the main air duct; the rotating part is provided with a rotating shaft extending along the second direction, and the rotating part and the fan blade part are coaxially disposed via the rotating shaft to drive the fan blade part to rotate around the rotating shaft; and the fan blade part comprises a connecting portion and a plurality of blades, and the plurality of blades are evenly arranged along a circumferential direction of the connecting portion.

6. The fan according to claim 5, wherein

the connecting portion is in transmission connection with one end, proximal to the first cover, of the rotating shaft, and the blade extends from the connecting portion toward an outer side of the connecting portion and toward a side on which the second cover is located; and in the second direction, an air inlet gap is provided between one end, distal to the connecting portion, of the blade and the second cover.

7. The fan according to claim 6, wherein in the second direction, a size of the air inlet gap is 4% to 6% of a size of the main air duct.

8. The fan according to claim 6 or 7, wherein the second air inlet extends from one end of the air inlet region to the other end along the second direction;

at least a portion of the blade extends into the air inlet region; and in the second direction, a size of the portion of

the blade extending to the air inlet region accounts for 40% to 50% of a size of the air inlet region.

9. The fan according to any one of claims 2 to 8, wherein an outer side of the side wall is provided with a placement recess, and the connecting wall is disposed within the placement recess, such that outer side surfaces of both the connecting wall and the side wall are aligned with each other.

10. The fan according to claim 9, wherein

one side, distal to the air outlet, of the placement recess is open; and
in a circumferential direction of the side wall, a span of the placement recess is greater than a span of the bracket assembly, such that two ends of the placement recess in the circumferential direction of the side wall extend beyond two end portions of the bracket assembly in the circumferential direction of the side wall, respectively.

11. The fan according to claim 9 or 10, wherein the placement recess comprises a limiting flange, and the limiting flange is disposed at the two ends of the placement recess in the circumferential direction of the side wall; and
the limiting flange is configured to exactly fit against an outer edge of the connecting wall when the head assembly rotates to a limit angle around the second axis.

12. The fan according to any one of claims 9 to 11, wherein one end, distal to the air outlet, of the placement recess is provided with a clearance chamfer;

in the second direction, a size of the clearance chamfer accounts for 8% to 10% of the size of the main air duct; and
the clearance chamfer is 12° to 24°.

13. The fan according to any one of claims 1 to 12, wherein in the second direction, specifically in a direction from one side, facing the first air inlet, of the connecting wall toward the other side, an inner surface of the connecting wall gradually tilts toward an outer side of the connecting wall.

14. The fan according to claim 13, wherein an included angle between the inner surface of the connecting wall and the second direction is 8° to 20°.

15. The fan according to any one of claims 1 to 14, wherein a region, in which the third air inlet is provided, of the connecting wall is defined as an air passing region, and other portions of the connecting

wall are defined as a reinforcing region, a thickness of the reinforcing region being greater than a thickness of the air passing region.

16. The fan according to claim 15, wherein the connecting wall comprises a support frame and a cover plate;

the support assembly is disposed in a middle portion of the support frame, and the hinge part is fixedly disposed at two ends of the support frame; and

the support frame comprises a through groove extending through the support frame, the third air inlet is disposed on the cover plate, and the cover plate is configured to be capable of being snap-fitted to a portion of the support frame between the support assembly and the hinge part, such that the air passing region of the cover plate is disposed opposite to the through groove.

17. The fan according to claim 16, wherein the outer side of the side wall is provided with a hinge shaft extending along the third direction, and the hinge part is hinged to the side wall via the hinge shaft.

18. The fan according to claim 16 or 17, wherein the support frame is provided with an air guide chamfer, and the air guide chamfer is disposed around an edge of the through groove.

19. The fan according to any one of claims 1 to 18, wherein the support assembly comprises a support rod base and a rotating base, wherein the support rod base extends along the first direction, the rotating base is disposed at one end of the support rod base in the first direction, and the support assembly is connected to the bracket assembly via the rotating base to drive the support assembly to rotate around the support rod base.

20. The fan according to any one of claims 1 to 19, wherein an anti-interference gap is formed between the side wall and the connecting wall, and the anti-interference gap is 3 mm to 8 mm.

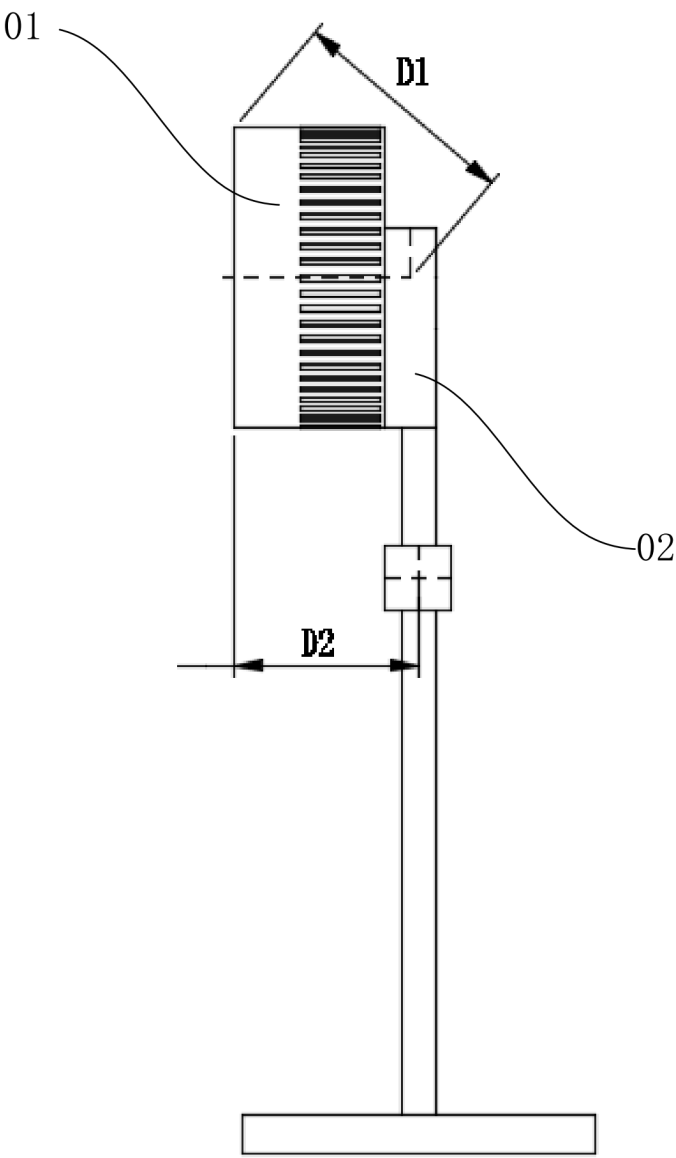


FIG. 1

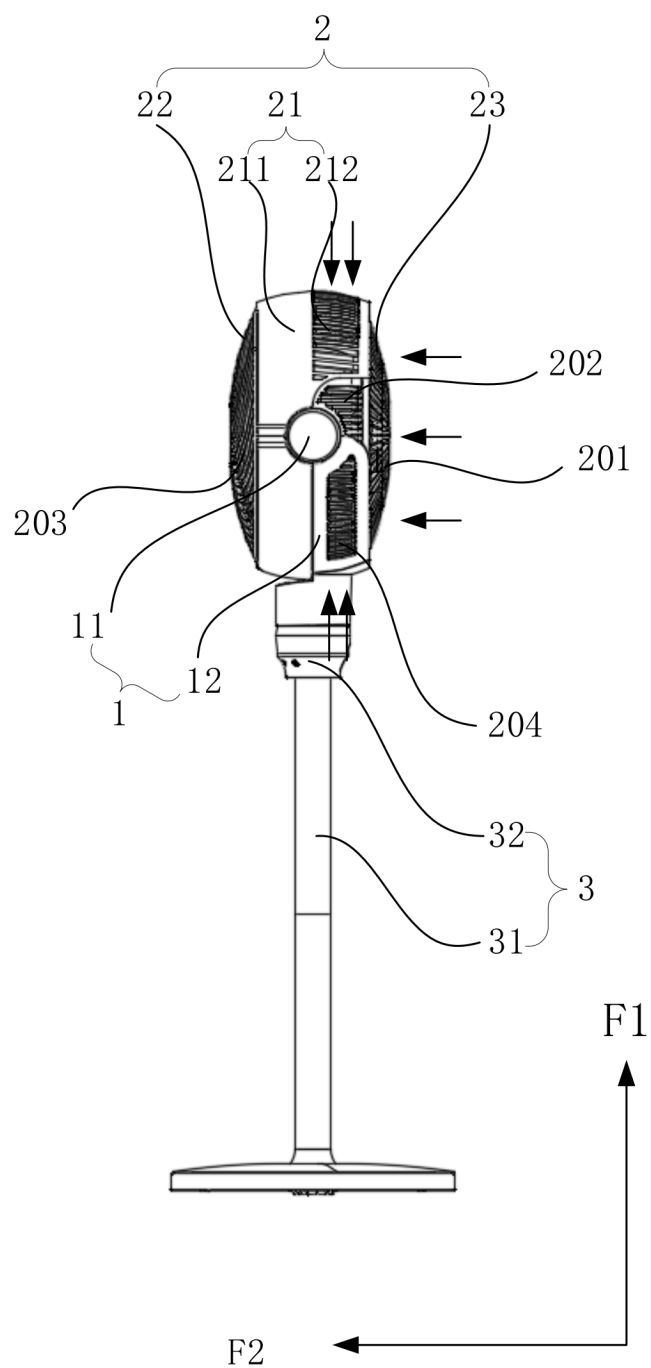


FIG. 2

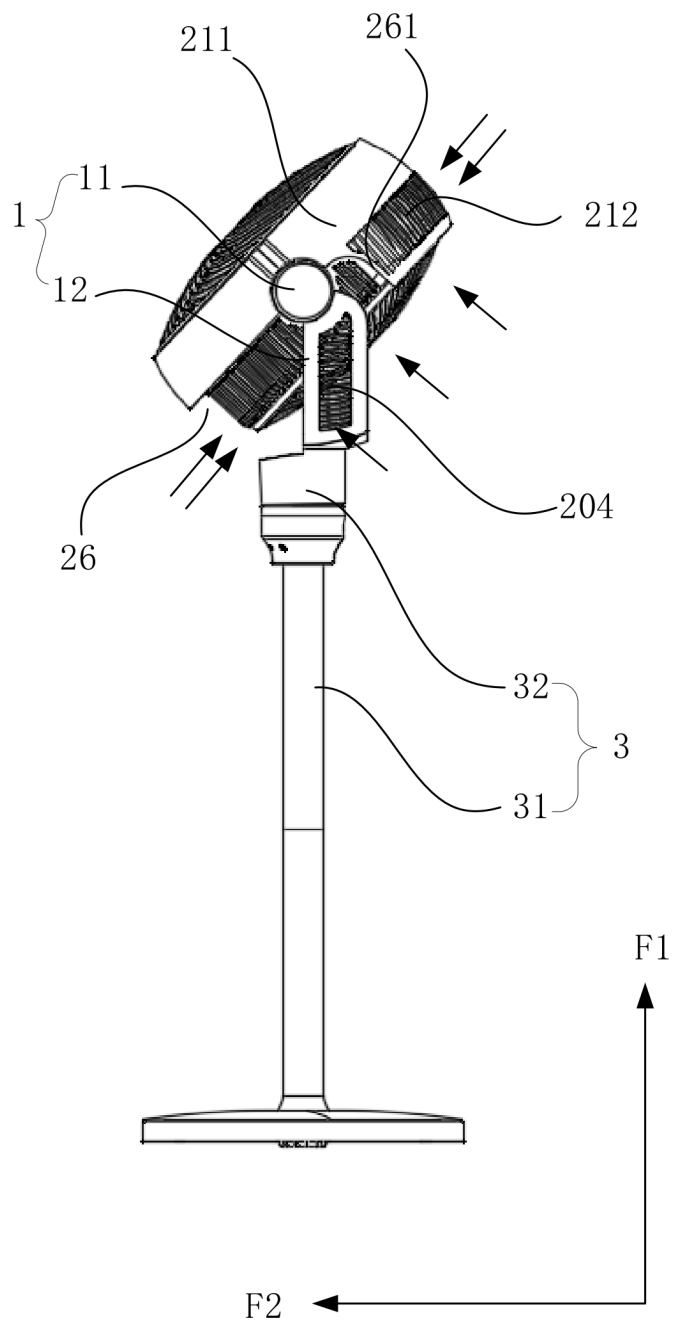


FIG. 3

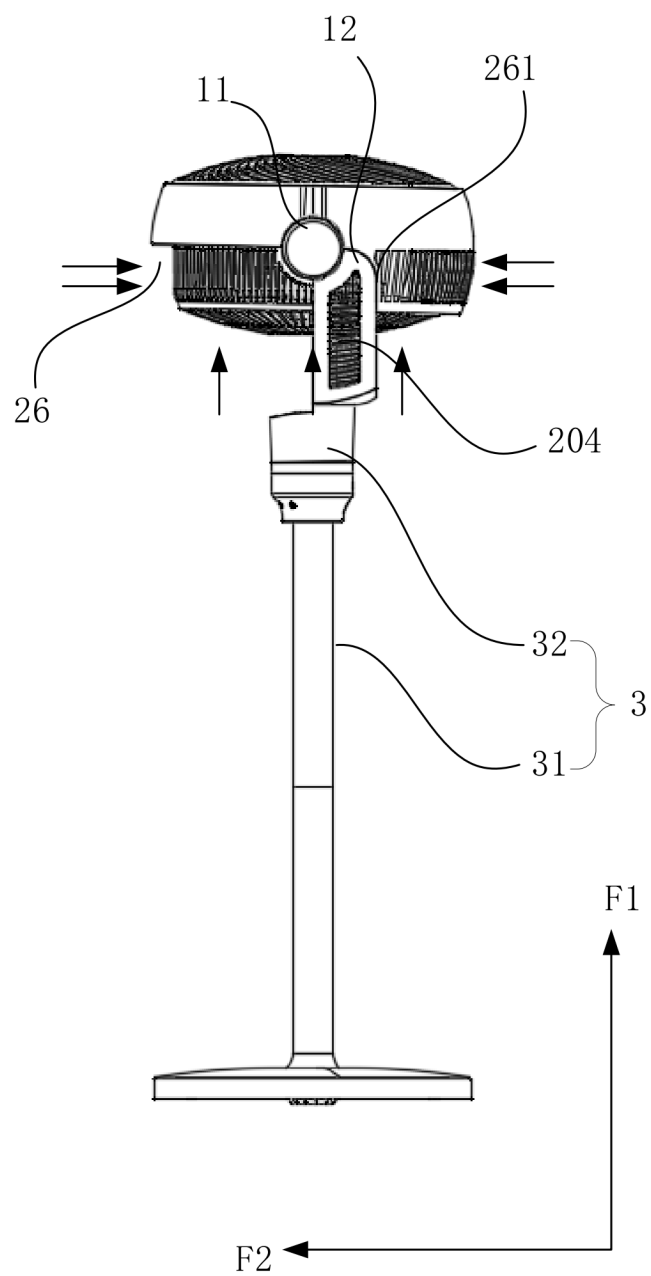


FIG. 4

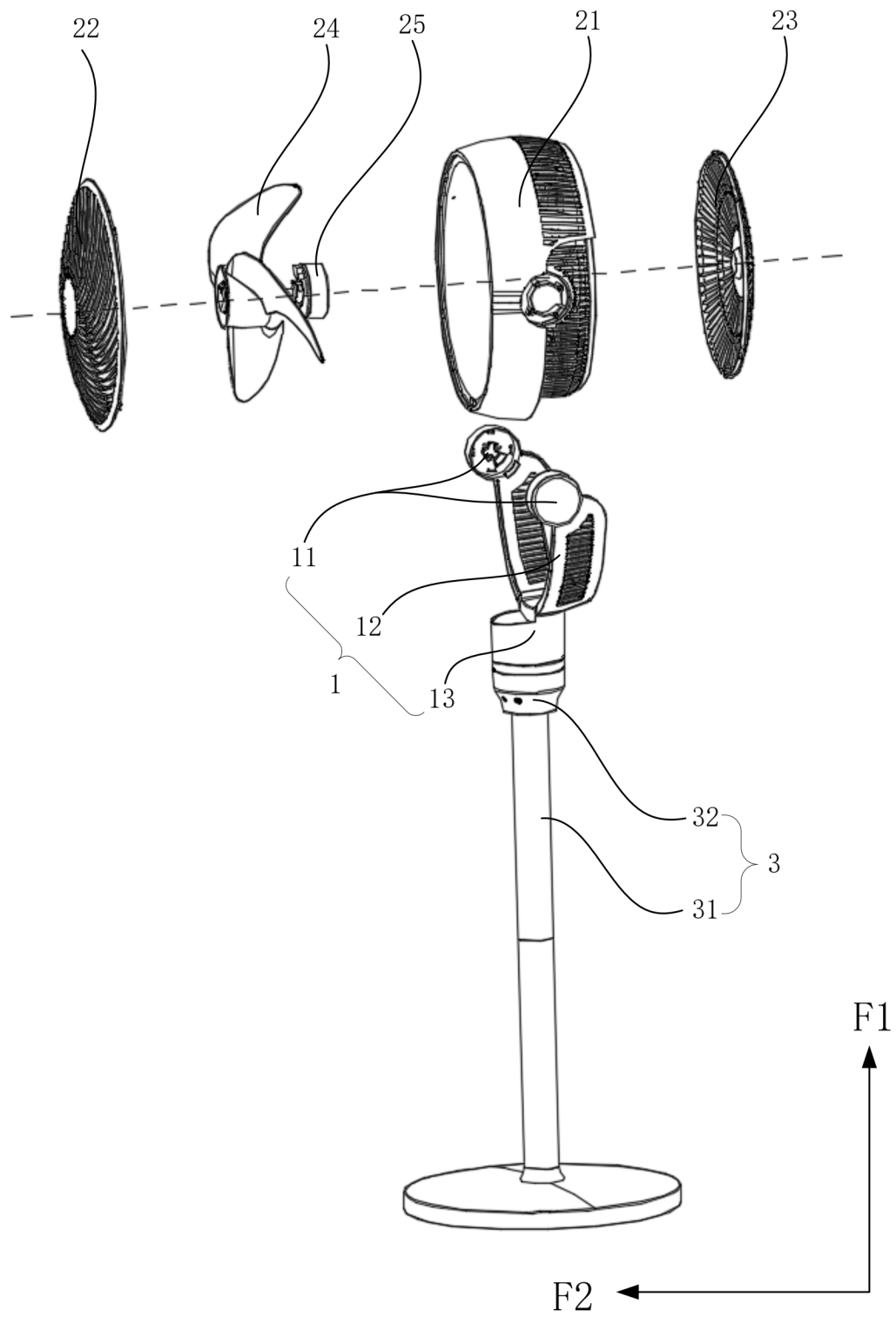


FIG. 5

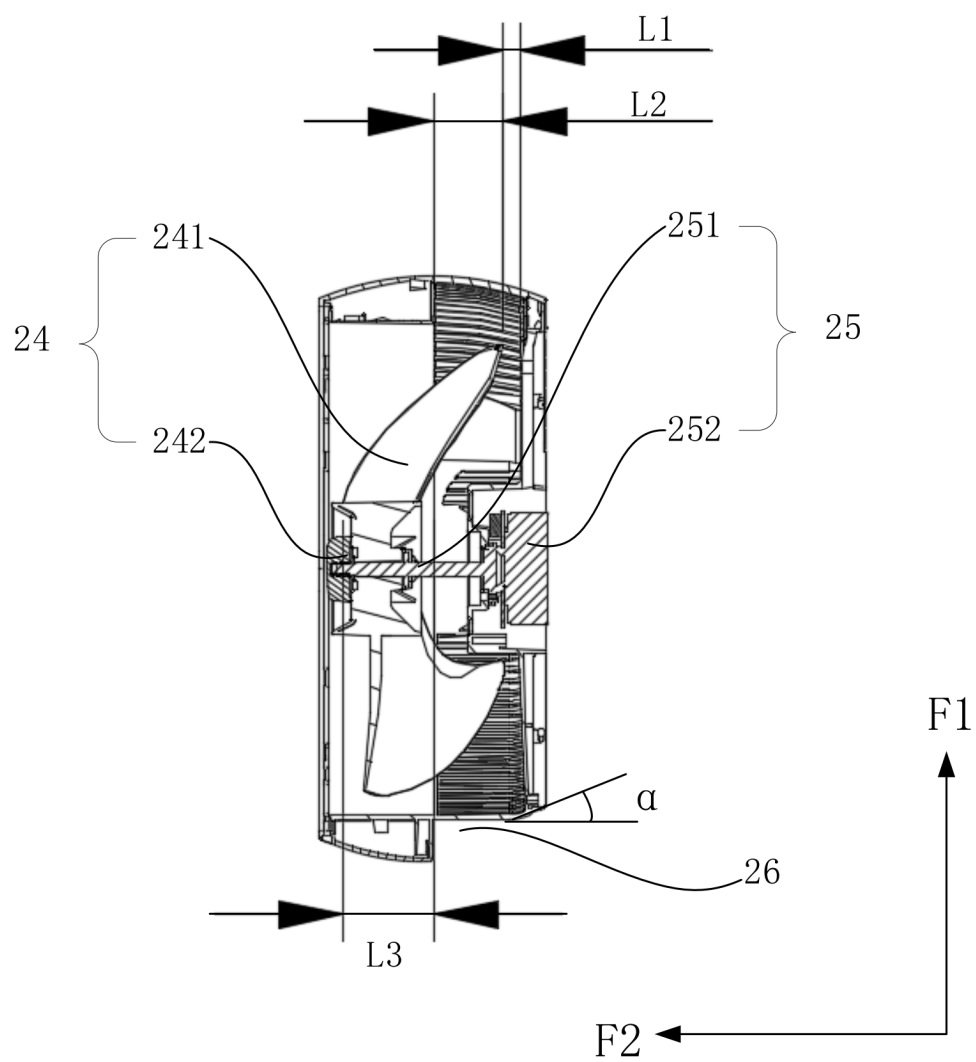


FIG. 6

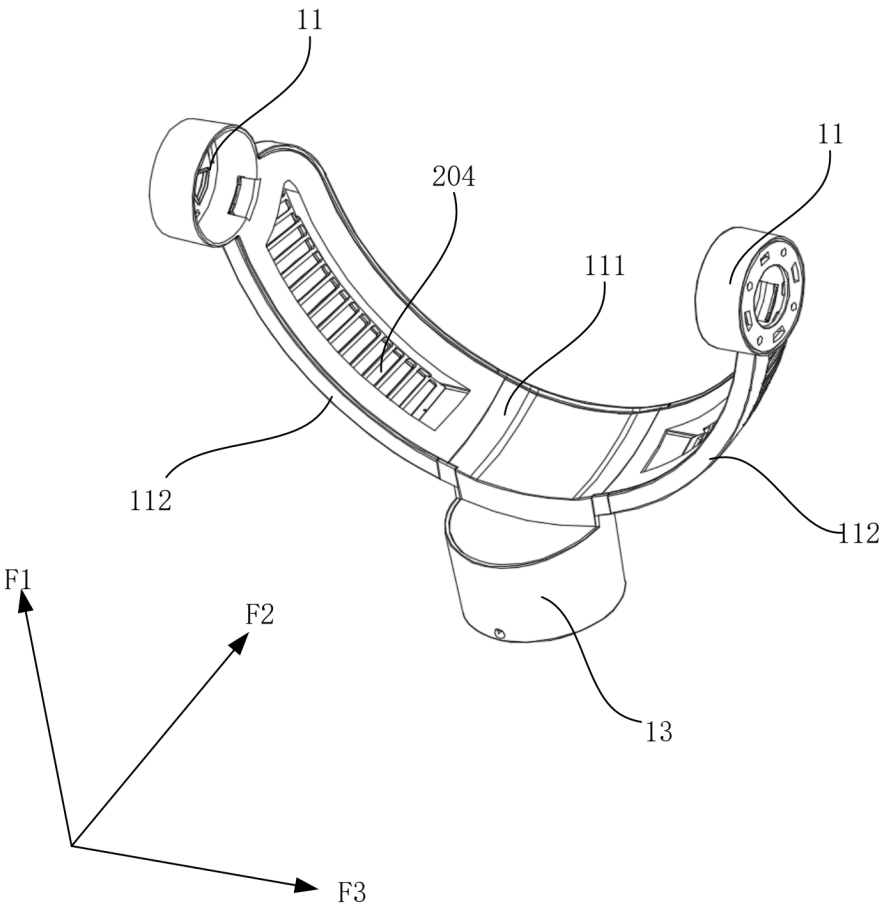


FIG. 7

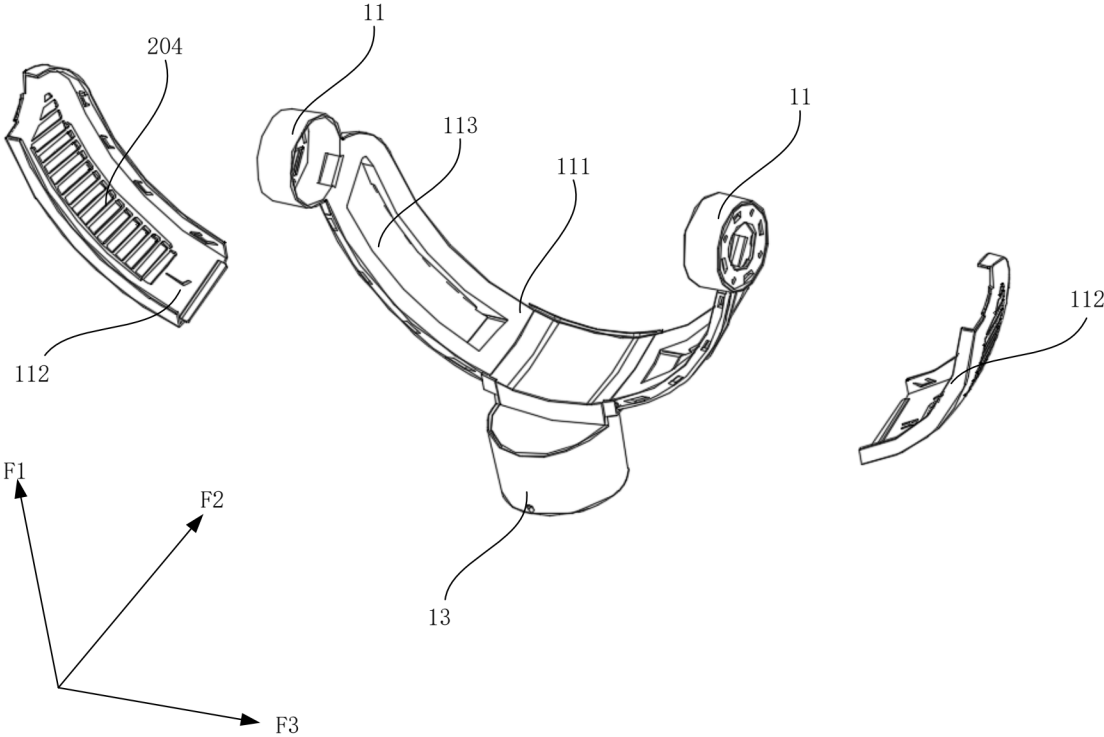


FIG. 8

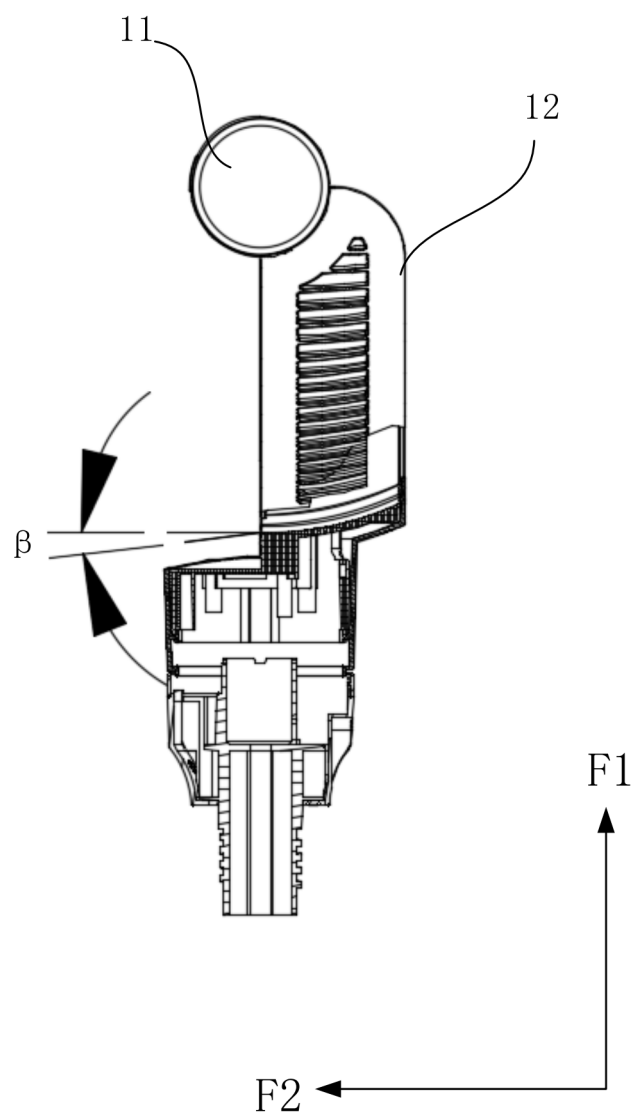


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2024/094390

A. CLASSIFICATION OF SUBJECT MATTER

F04D29/38(2006.01)i; F04D29/54(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: F04D; F24F

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

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

CNTXT; ENTXTC; DWPI; CJFD: 风扇, 旋转, 摆动, fan, rotat+, swing

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 115962523 A (GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI) 14 April 2023 (2023-04-14) description, specific embodiments, and figures 1-15	1-8, 15-20
X	CN 219711880 U (GUANGDONG MIDEA ENVIRONMENT APPLIANCES MANUFACTURING CO., LTD.) 19 September 2023 (2023-09-19) description, specific embodiments, and figures 1-8	1-8, 15-20
A	CN 217462628 U (AIRMATE ELECTRICAL (SHENZHEN) CO., LTD.) 20 September 2022 (2022-09-20) entire document	1-20
A	CN 219452442 U (GUANGDONG SHUNDE NOON ELECTRICAL APPLIANCE MANUFACTURING CO., LTD. et al.) 01 August 2023 (2023-08-01) entire document	1-20
A	WO 2024051357 A1 (XUXIN TECHNOLOGY (SHENZHEN) GROUP CO., LTD.) 14 March 2024 (2024-03-14) entire document	1-20

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

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

“&” document member of the same patent family

Date of the actual completion of the international search

15 October 2024

Date of mailing of the international search report

23 January 2025

Name and mailing address of the ISA/CN

China National Intellectual Property Administration (ISA/
CN)
China No. 6, Xitucheng Road, Jimenqiao, Haidian District,
Beijing 100088

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/CN2024/094390

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN	115962523	A	14 April 2023	None	
CN	219711880	U	19 September 2023	None	
CN	217462628	U	20 September 2022	None	
CN	219452442	U	01 August 2023	None	
WO	2024051357	A1	14 March 2024	None	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 202410521401 [0001]