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(54) **HIGH-SPEED WIND-GATHERING BOOSTER FAN**

(52) **U.S. Cl.**

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**ABSTRACT**

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A high-speed wind-gathering booster fan is provided. The high-speed wind-gathering booster fan includes a housing. An air duct is arranged inside the housing. A motor base is arranged at an axis of the air duct. Part of a circumferential wall surface of the motor base extends radially outward to form guide vanes. The air guide vane includes a parallel part and a torsional wind cutting part. The parallel part is close to the side of an air outlet. The parallel part is in parallel with an axis of an air outlet. The torsional wind cutting part is close to the side of an air inlet. The torsional wind cutting part is deviated from a plane where the parallel part is. An extension surface of the torsional wind cutting part is axially intersected with a wind-deflecting fan blade set.

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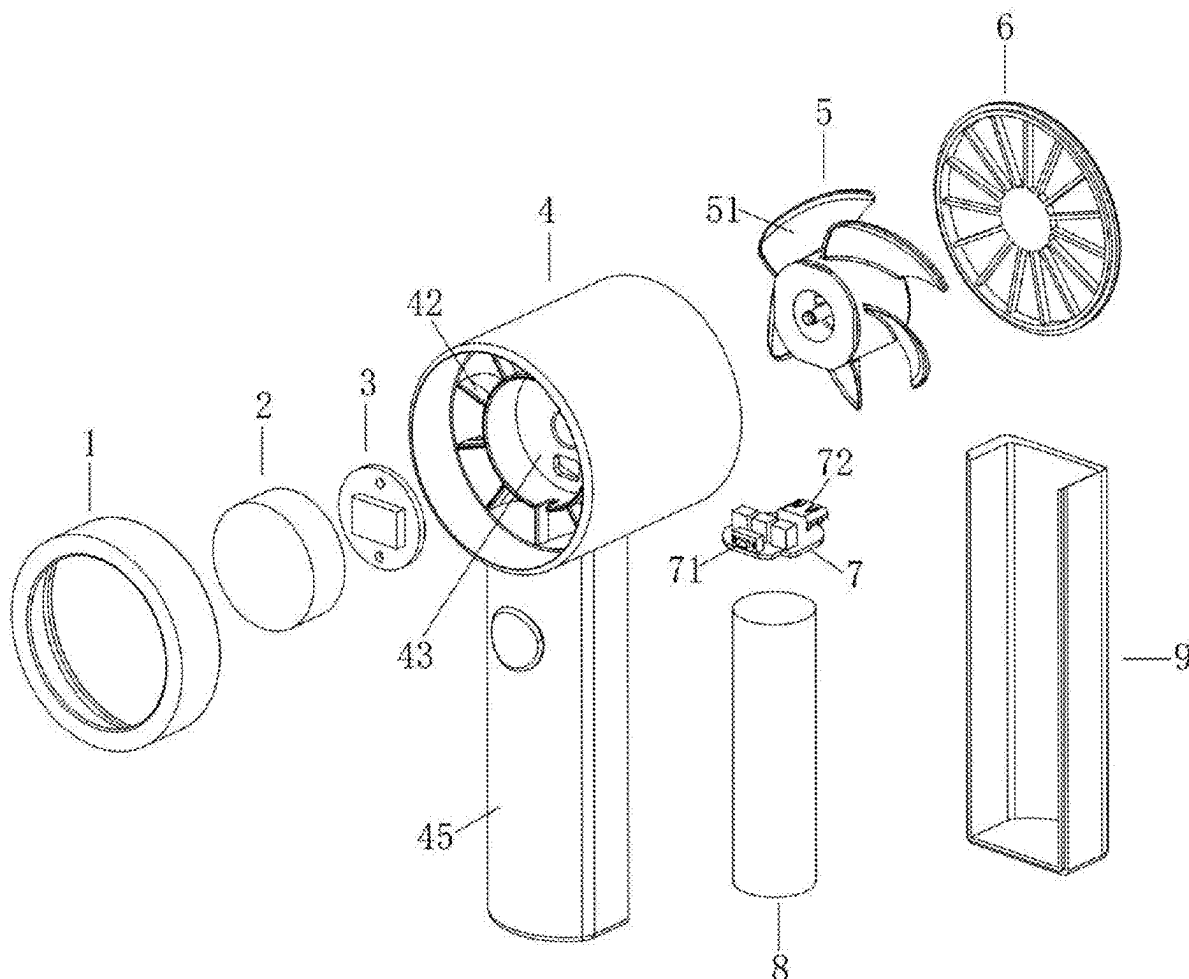
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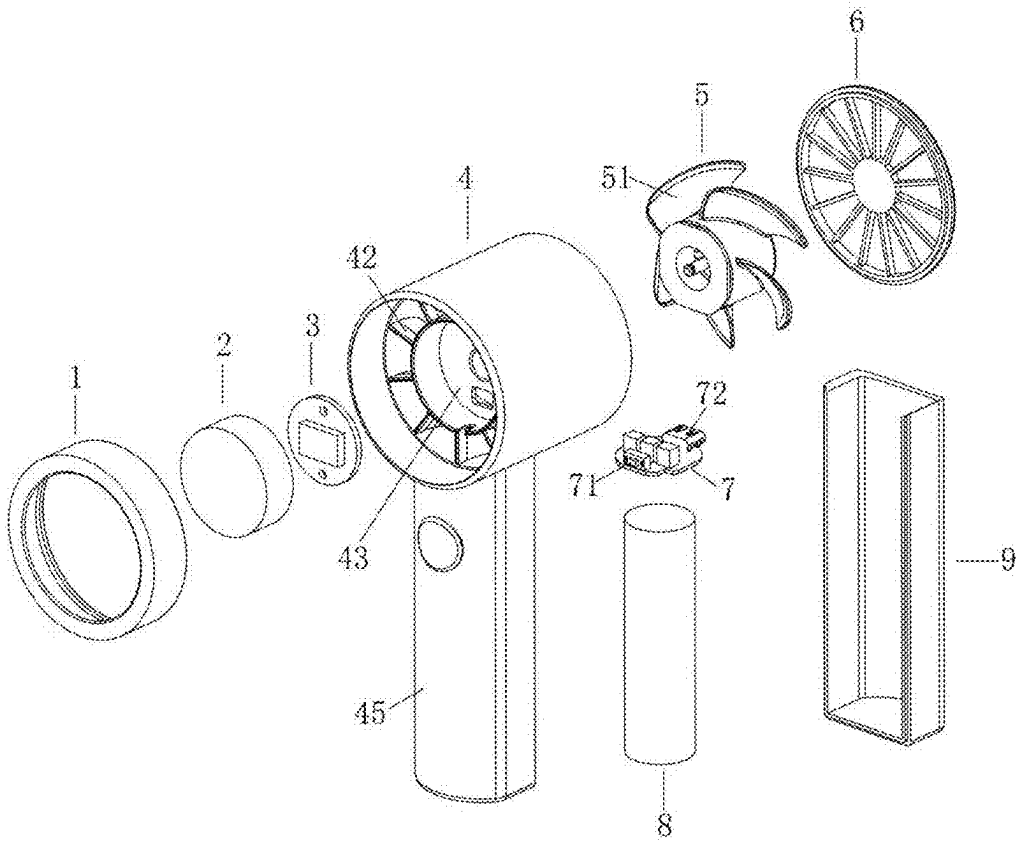


FIG. 1

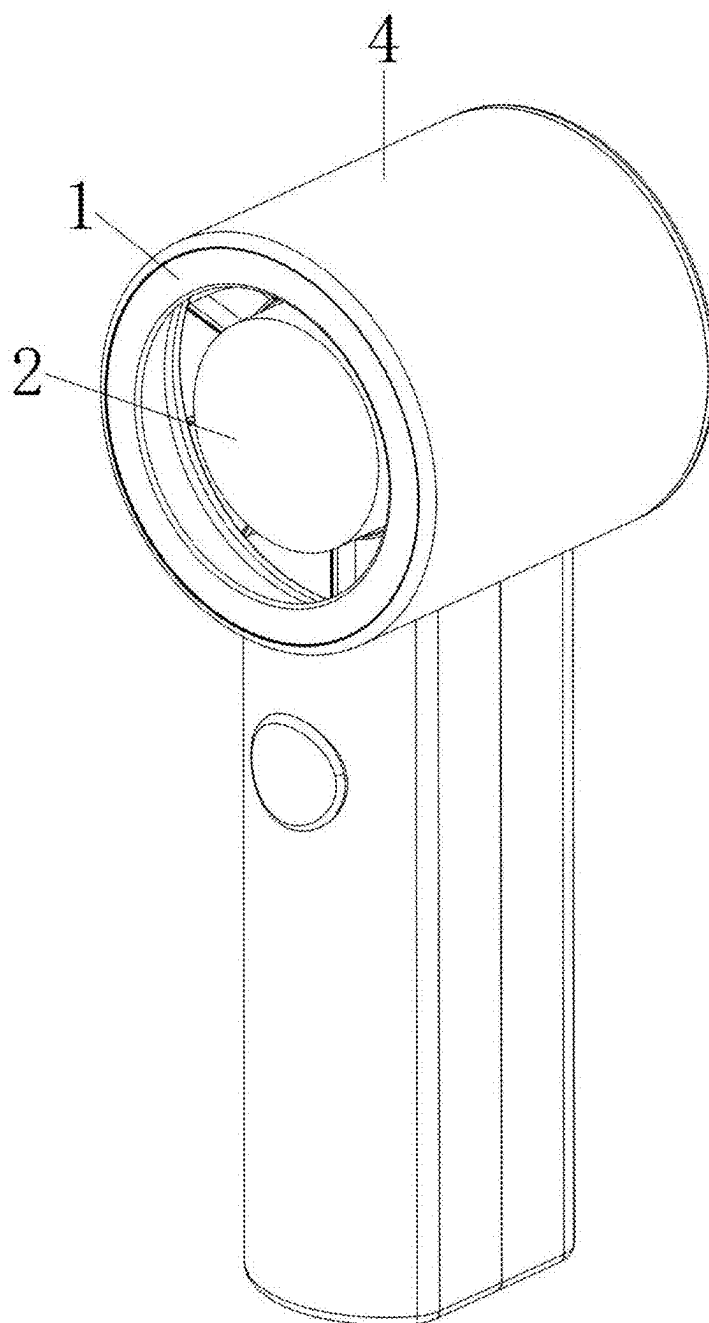


FIG. 2

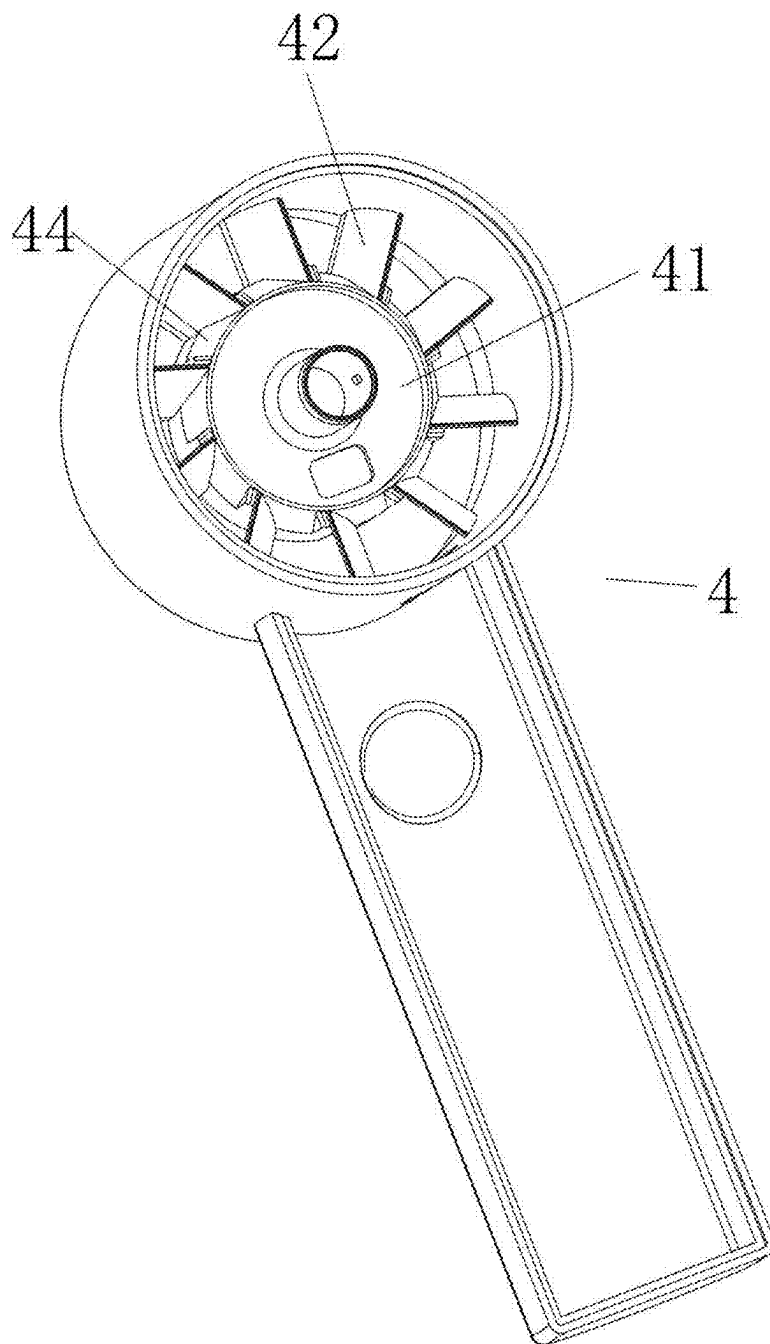


FIG. 3

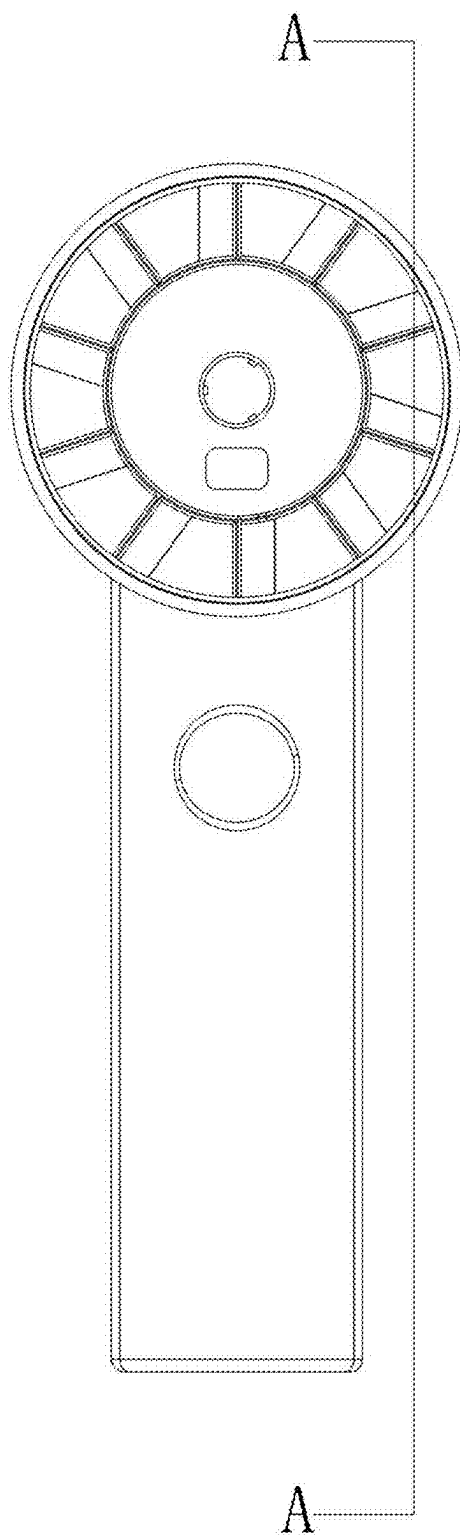


FIG. 4

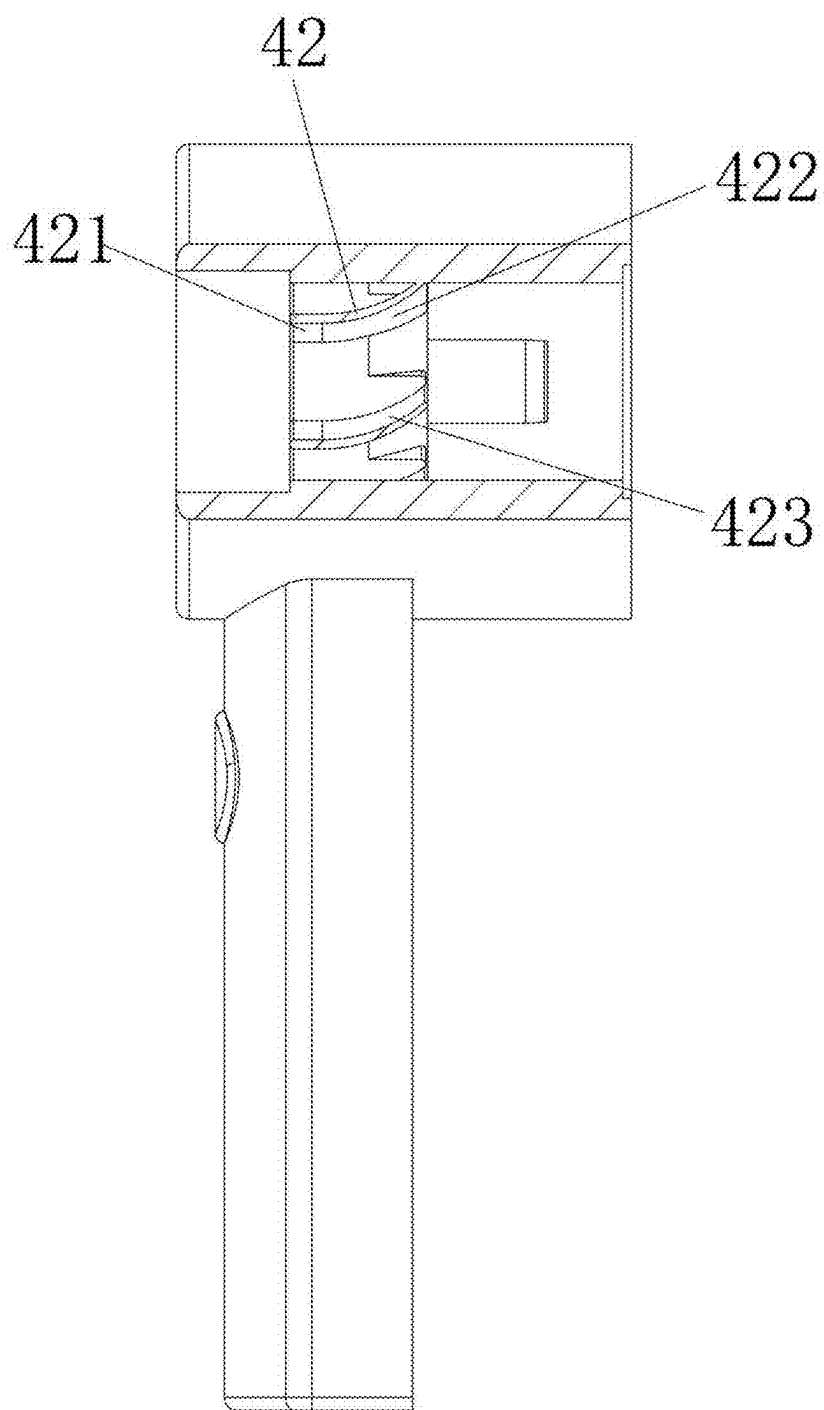


FIG. 5

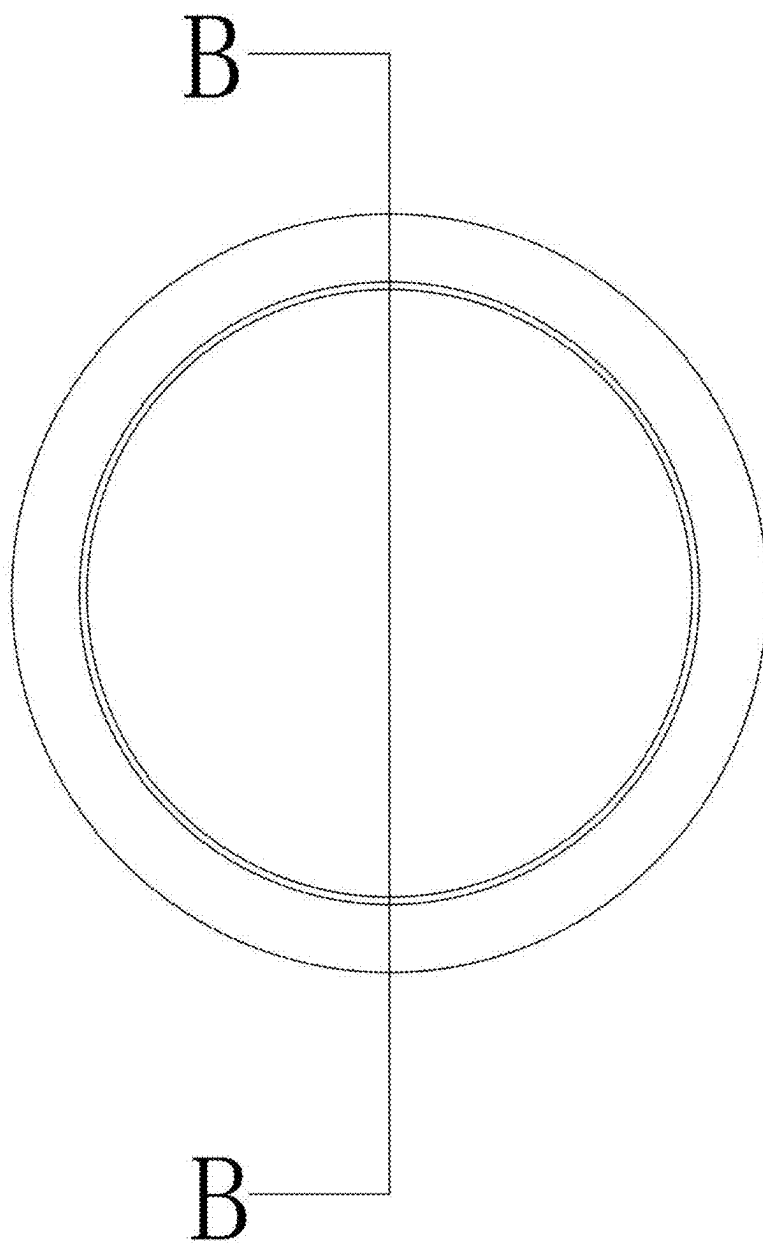


FIG. 6

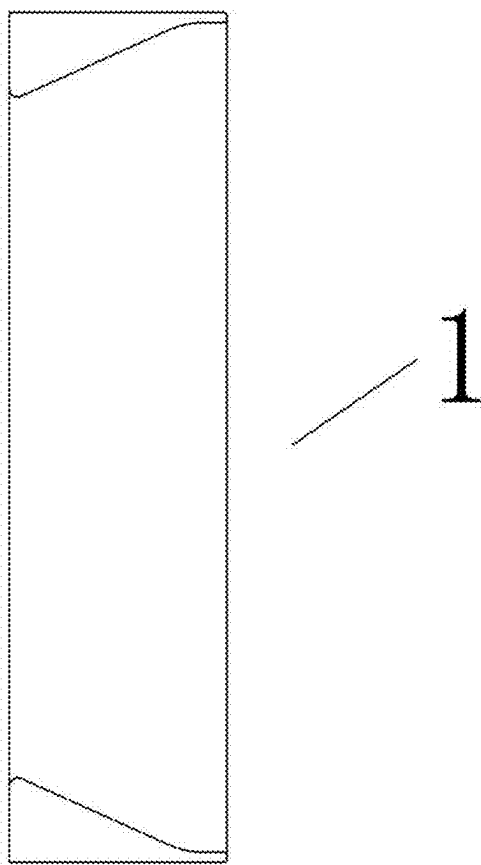


FIG. 7



## HIGH-SPEED WIND-GATHERING BOOSTER FAN

### TECHNICAL FIELD

[0001] The present disclosure relates to the technical field of fans, in particular to a high-speed wind-gathering booster fan.

### BACKGROUND

[0002] When going out or doing outdoor activities in summer, the weather is hot, and there is no air conditioner. In order to enjoy the cool at any time, portable fans have been emerged. The portable fans are popular because of convenience in carrying, and can be used at any time.

[0003] However, the size is small, and the electrical device equipped with the portable fan is only small in power. Therefore, in the previous portable fan, the wind force cannot be designed very large, which results in poor blowing and cooling effect. Although some manufacturers have applied the structures of traditional booster fans to such small portable fans to increase the wind speed and cooling effect, such as a Chinese patent (with the authorization announcement number of CN217029352U), the problem of wind turbulence cannot be taken into account, which results in very large noise during working, has a strong impact on the use experience feeling of consumers and is not conducive to product popularization and application.

### SUMMARY

[0004] The present disclosure aims to provide a high-speed wind-gathering booster fan. The air flow is blown outward after boosting acceleration, turbulent flow removal and noise reduction are realized under the cooperation effect of the wind-deflecting fan blade set, the guide vanes, the boosting surface and the wind-gathering cover, so that the wind speed and blowing distance are greatly increased, and at the same time, the effects of noise reduction is realized. The problem proposed in the background art is solved.

[0005] In order to realize the purpose, the present disclosure provides the following technical scheme. A high-speed wind-gathering booster fan includes a housing. An air duct is arranged inside the housing. A motor base is arranged at an axis of the air duct. A wind-deflecting fan blade set is installed on the motor base. An air inlet and an air outlet are respectively formed in both ends of the air duct. The air duct communicates with the air inlet and the air outlet. The wind-deflecting fan blade set guides air located at the air inlet to flow into the air duct, and then the air is flown outward from the air outlet. Part of a circumferential wall surface of the motor base radially extends outward to form guide vanes. The guide vanes are located on the side, facing towards the air outlet, of the wind-deflecting fan blade set. The air guide vane includes a parallel part and a torsional wind cutting part. The parallel part is close to the side of an air outlet. The parallel part is in parallel with an axis of the air outlet. The torsional wind cutting part is close to the side of the air inlet. The torsional wind cutting part is deviated from a plane where the parallel part is. An extension surface of the torsional wind cutting part is axially intersected with the wind-deflecting fan blade set. The air outlet is covered with a wind-gathering cover. An inner diameter of the wind-gathering cover is gradually decreased from the air inlet to the air outlet.

[0006] Preferably, the torsional wind cutting part is a curved surface. The extension surface of the curved surface of the torsional wind cutting part is intersected with an axis of the wind-deflecting fan blade set. An inner side surface of the curved surface is a wind-receiving surface. The wind-deflecting fan blade set includes a rotating seat and wind-deflecting blades uniformly arranged on a peripheral wall surface of the rotating seat. The surface, facing towards the air outlet, of the wind-deflecting blade is a wind-deflecting surface. The wind-receiving surface is intersected with a curved surface where the wind-deflecting surface is. An included angle of smaller than  $90^\circ$  is formed between the wind-receiving surface and the wind-deflecting surface.

[0007] Preferably, an included angle between the wind-receiving surface and a central axis of the wind-deflecting fan blade set is between  $30^\circ$  and  $60^\circ$ .

[0008] Preferably, an electrical compartment is formed in the side, facing towards the air outlet, of the motor base. The electrical compartment is internally provided with a display screen. The outer side of the display screen is covered with a light diffuser.

[0009] Preferably, the light diffuser and the wind-gathering cover are coaxially arranged. The side surface, away from the display screen, of the light diffuser is protruded outward to form a curved surface.

[0010] Preferably, a peripheral wall surface of the motor base includes a boosting surface. Part of the boosting surface is radially increased from the air inlet to the air outlet.

[0011] Preferably, part of a body at a lower end of the housing stretches downward to form a handle front housing. The rear side of the handle front housing is covered with a handle rear housing. An accommodation cavity is formed between the handle front housing and the handle rear housing. A circuit board assembly and a storage battery are installed in the accommodation cavity. The storage battery is electrically connected with the circuit board assembly.

[0012] Preferably, the circuit board assembly is electrically connected and provided with a control key and a USB (Universal Serial Bus) interface. The control key is arranged in a preset through hole of the handle front housing and connected with a key panel. The USB interface is arranged in a preset through hole of the handle rear housing and stretches outward from the through hole.

[0013] Preferably, the air inlet is covered with an air inlet cover. The air inlet cover is a hollowed-out cover.

[0014] Compared with the prior art, the present disclosure has the following beneficial effects.

[0015] According to the high-speed wind-gathering booster fan, the air flow is blown outward after boosting acceleration, turbulent flow removal and noise reduction are realized under the cooperation effect of the wind-deflecting fan blade set, the guide vanes, the boosting surface and the wind-gathering cover, so that the wind speed and blowing distance are greatly increased, and at the same time, the effects of noise reduction is realized.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0016] FIG. 1 is a structural explosive view of the present disclosure.

[0017] FIG. 2 is an appearance space diagram of the present disclosure.

[0018] FIG. 3 is a structure diagram of a housing in the present disclosure.

[0019] FIG. 4 is an A-A sectional azimuth schematic diagram of a housing in the present disclosure.

[0020] FIG. 5 is an A-A sectional view of a housing in the present disclosure.

[0021] FIG. 6 is a B-B sectional azimuth schematic diagram of a wind-gathering cover in the present disclosure.

[0022] FIG. 7 is a B-B sectional view of a wind-gathering cover in the present disclosure.

[0023] Reference signs: 1, wind-gathering cover; 2, light diffuser; 3, display screen; 4, housing; 41, motor base; 42, guide vane; 421, parallel part; 422, torsional wind cutting part; 423, wind-receiving surface; 43, electrical compartment; 44, boosting surface; 45, handle front housing; 5, wind-deflecting fan blade set; 51, wind-deflecting surface; 6, air inlet cover; 7, circuit board assembly; 71, control key; 72, USB interface; 8, storage battery; and 9, handle rear housing.

#### DETAILED DESCRIPTION OF THE EMBODIMENTS

[0024] The technical schemes according to embodiments of the present disclosure are clearly and completely described in the following with reference to the attached figures in the present disclosure. Apparently, the embodiments in the following description are merely a part rather than all of the embodiments of the present disclosure. Based on the embodiment in the present disclosure, all other embodiments obtained by the ordinary technical staff in the art under the premise of without contributing creative labor belong to the scope protected by the present disclosure.

[0025] Referring to FIG. 1 to FIG. 7, a high-speed wind-gathering booster fan includes a housing 4. An air duct is arranged inside the housing 4. A motor base 41 is arranged at an axis of the air duct. A wind-deflecting fan blade set 5 is installed on the motor base 41. An air inlet and an air outlet are respectively formed in both ends of the air duct. The air duct communicates with the air inlet and the air outlet. The wind-deflecting fan blade set 5 guides air located at the air inlet to flow into the air duct, and then the air is flown outward from the air outlet. Part of a circumferential wall surface of the motor base 41 radially extends outward to form guide vanes 42. The guide vanes 42 are located on the side, facing towards the air outlet, of the wind-deflecting fan blade set 5. The air guide vane 42 includes a parallel part 421 and a torsional wind cutting part 422. The parallel part 421 is close to the side of an air outlet. The parallel part 421 is in parallel with an axis of the air outlet. An air flow input from the torsional wind cutting part 422 is adjusted to be flown outward in a direction opposite to and parallel to the axis of the air outlet as much as possible, which is beneficial to increasing the blowing distance of the air flow, so that the effective availability of the air flow is improved. The torsional wind cutting part 422 is close to the side of the air inlet. The torsional wind cutting part 422 is deviated from a plane where the parallel part 421 is. An extension surface of the torsional wind cutting part 422 is axially intersected with the wind-deflecting fan blade set 5. The air outlet is covered with a wind-gathering cover 1. An inner diameter of the wind-gathering cover 1 is gradually decreased from the air inlet to the air outlet. The wind-gathering cover 1 has the effects of wind gathering and boosting, and also can realize the effects of turbulent flow removal and noise reduction after wind beam compression.

[0026] The torsional wind cutting part 422 is a curved surface. The extension surface of the curved surface of the torsional wind cutting part 422 is intersected with an axis of the wind-deflecting fan blade set 5. An inner side surface of the curved surface is a wind-receiving surface 423. The wind-deflecting fan blade set 5 includes a rotating seat and wind-deflecting blades uniformly arranged on a peripheral wall surface of the rotating seat. The surface, facing towards the air outlet, of the wind-deflecting blade is a wind-deflecting surface 51. The wind-receiving surface 423 is intersected with a curved surface where the wind-deflecting surface 51 is. An included angle of smaller than  $90^\circ$  is formed between the wind-receiving surface 423 and the wind-deflecting surface 51. The wind-receiving surface 423 and the wind-deflecting surface 51 are in an acute-angle impingement state, which can boost the air flow. When the included angle between the wind-receiving surface 423 and the central axis of the wind-deflecting fan blade set 5 is between  $30^\circ$  and  $60^\circ$ , the comprehensive parameter testing is optimal.

[0027] An electrical compartment 43 is formed in the side, facing towards the air outlet, of the motor base 41. The electrical compartment 43 is internally provided with a display screen 3. The outer side of the display screen 3 is covered with a light diffuser 2. The display screen 3 is used for displaying a working mode of a fan and the remaining battery capacity of the storage battery 8.

[0028] The light diffuser 2 and the wind-gathering cover 1 are coaxially arranged. The side surface, away from the display screen 3, of the light diffuser 2 is protruded outward to form a curved surface. The structural arrangement of the curved surface is beneficial to reducing an air pressure effect of the air flow formed at an occupation area of the light diffuser of the air outlet, so that the phenomenon of air flow backflow is reduced as much as possible, and the air flow noise is reduced.

[0029] A peripheral wall surface of the motor base 41 includes a boosting surface 44. Part of the boosting surface 44 is radially increased from the air inlet to the air outlet.

[0030] Part of a body at a lower end of the housing 4 stretches downward to form a handle front housing 45. The rear side of the handle front housing 45 is covered with a handle rear housing 9. An accommodation cavity is formed between the handle front housing 45 and the handle rear housing 9. A circuit board assembly 7 and a storage battery 8 are installed in the accommodation cavity. The storage battery 8 is electrically connected with the circuit board assembly 7. The circuit board assembly 7 is electrically connected and provided with a control key 71 and a USB interface 72. The control key 71 is arranged in a preset through hole of the handle front housing 45 and connected with a key panel. The USB interface 72 is arranged in a preset through hole of the handle rear housing 9 and stretches outward from the through hole. The control key 71 is used for adjusting the working mode and working state of the wind-deflecting fan blade set 5. When the USB interface is externally connected to an external power supply with a charging line, the storage battery 8 can be charged to supplement battery power.

[0031] The air inlet is covered with an air inlet cover 6. The air inlet cover 6 is a hollowed-out cover.

[0032] To sum up, according to the high-speed wind-gathering booster fan, the air flow is blown outward after boosting acceleration, turbulent flow removal and noise

reduction are realized under the cooperation effect of the wind-deflecting fan blade set 5, the guide vanes 42, the boosting surface 44 and the wind-gathering cover 1, so that the wind speed and blowing distance are greatly increased, and at the same time, the effects of noise reduction is realized.

[0033] It needs to be noted that in this specification, relational terms such as “first” and “second” are only used to distinguish one entity or operation from another, and do not necessarily require or imply that any actual relationship or sequence exists between these entities or operations. Moreover, the terms “include”, “contain”, or any other variants are intended to cover a non-exclusive inclusion, so that a process, a method, an article, or a device that includes a list of elements not only includes those elements but also includes other elements that are not expressly listed, or further includes elements inherent to such a process, method, article, or device.

[0034] Although the embodiments of the present disclosure have already been illustrated and described, various changes, modifications, replacements and transformations can be made by those skilled in the art under the condition of without departing from the principle and the spirit of the present disclosure, and thus the scope of the present disclosure should be restricted by claims and equivalents thereof.

What is claimed is:

1. A high-speed wind-gathering booster fan, comprising a housing (4), an air duct being arranged inside the housing (4), a motor base (41) being arranged at an axis of the air duct, a wind-deflecting fan blade set (5) being installed on the motor base (41), an air inlet and an air outlet being respectively formed in both ends of the air duct, the air duct communicating with the air inlet and the air outlet, the wind-deflecting fan blade set (5) guiding air located at the air inlet to flow into the air duct and then the air being flown outward from the air outlet, and part of a circumferential wall surface of the motor base (41) radially extending outward to form guide vanes (42), wherein the guide vanes (42) are located on the side, facing towards the air outlet, of the wind-deflecting fan blade set (5), the air guide vane (42) comprising a parallel part (421) and a torsional wind cutting part (422), the parallel part (421) being close to the side of an air outlet, the parallel part (421) being in parallel with an axis of the air outlet, the torsional wind cutting part (422) being close to the side of the air inlet, the torsional wind cutting part (422) being deviated from a plane where the parallel part (421) is, an extension surface of the torsional wind cutting part (422) being axially intersected with the wind-deflecting fan blade set (5), the air outlet being covered with a wind-gathering cover (1), and an inner diameter of the wind-gathering cover (1) being gradually decreased from the air inlet to the air outlet.

2. The high-speed wind-gathering booster fan according to claim 1, wherein the torsional wind cutting part (422) is a curved surface, the extension surface of the curved surface

of the torsional wind cutting part (422) being intersected with an axis of the wind-deflecting fan blade set (5), an inner side surface of the curved surface being a wind-receiving surface (423), the wind-deflecting fan blade set (5) comprising a rotating seat and wind-deflecting blades uniformly arranged on a peripheral wall surface of the rotating seat, the surface, facing towards the air outlet, of the wind-deflecting blade being a wind-deflecting surface (51), the wind-receiving surface (423) being intersected with a curved surface where the wind-deflecting surface (51) is, and an included angle of smaller than 90° being formed between the wind-receiving surface (423) and the wind-deflecting surface (51).

3. The high-speed wind-gathering booster fan according to claim 2, wherein an included angle between the wind-receiving surface (423) and a central axis of the wind-deflecting fan blade set (5) is between 30° and 60°.

4. The high-speed wind-gathering booster fan according to claim 1, wherein an electrical compartment (43) is formed in the side, facing towards the air outlet, of the motor base (41), the electrical compartment (43) being internally provided with a display screen (3), and the outer side of the display screen (3) being covered with a light diffuser (2).

5. The high-speed wind-gathering booster fan according to claim 4, wherein the light diffuser (2) and the wind-gathering cover (1) are coaxially arranged, the side surface, away from the display screen (3), of the light diffuser (2) being protruded outward to form a curved surface.

6. The high-speed wind-gathering booster fan according to claim 1, wherein a peripheral wall surface of the motor base (41) comprises a boosting surface (44), part of the boosting surface (44) being radially increased from the air inlet to the air outlet.

7. The high-speed wind-gathering booster fan according to claim 1, wherein part of a body at a lower end of the housing (4) stretches downward to form a handle front housing (45), the rear side of the handle front housing (45) being covered with a handle rear housing (9), an accommodation cavity being formed between the handle front housing (45) and the handle rear housing (9), a circuit board assembly (7) and a storage battery (8) being installed in the accommodation cavity, and the storage battery (8) being electrically connected with the circuit board assembly (7).

8. The high-speed wind-gathering booster fan according to claim 7, wherein the circuit board assembly (7) is electrically connected and provided with a control key (71) and a USB (Universal Serial Bus) interface (72), the control key (71) being arranged in a preset through hole of the handle front housing (45) and connected with a key panel, the USB interface (72) being arranged in a preset through hole of the handle rear housing (9) and stretching outward from the through hole.

9. The high-speed wind-gathering booster fan according to claim 1, wherein the air inlet is covered with an air inlet cover (6), the air inlet cover (6) being a hollowed-out cover.

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