



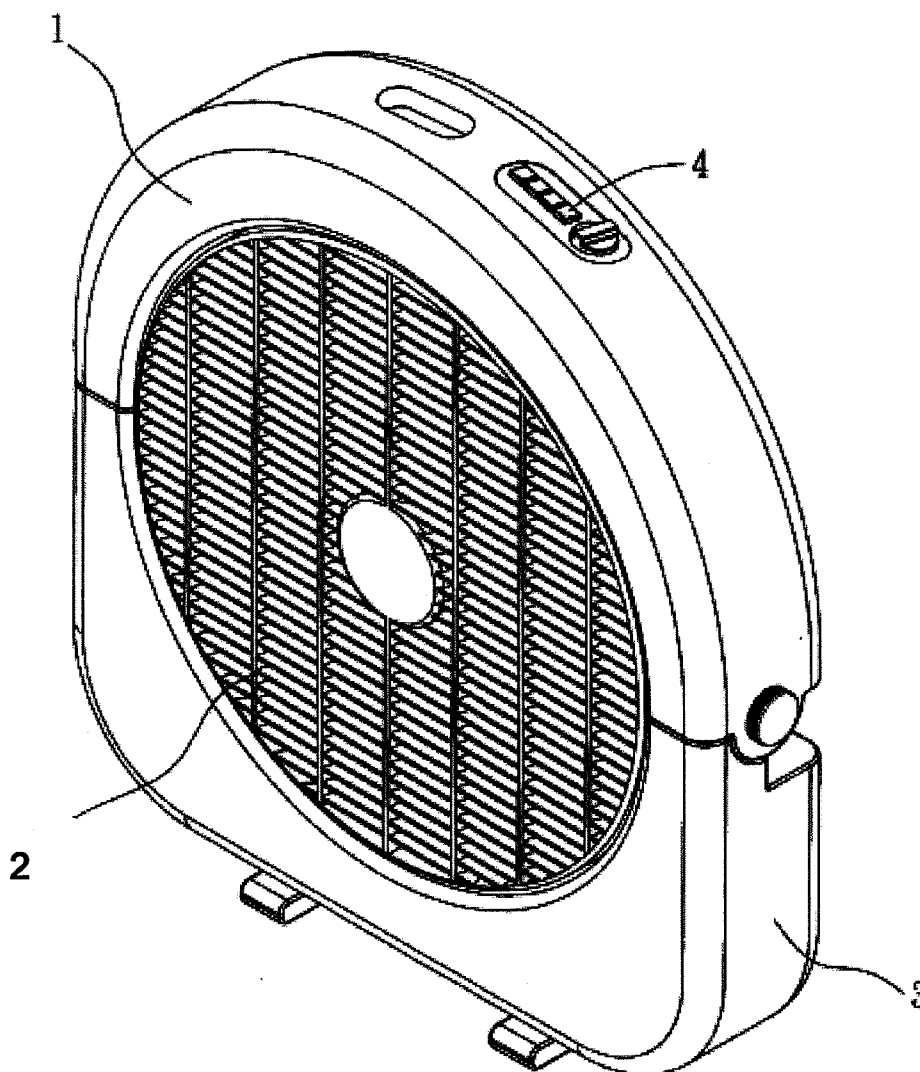
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(19) **United States**(12) **Patent Application Publication**
Su(10) **Pub. No.: US 2013/0052000 A1**(43) **Pub. Date: Feb. 28, 2013**(54) **STRUCTURE OF WIND DIRECTION COVER OF ELECTRIC FAN**(76) Inventor: **Cheng Ming Su**, Taipei City (TW)(21) Appl. No.: **13/597,863**(22) Filed: **Aug. 29, 2012**(30) **Foreign Application Priority Data**

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F04D 29/54 (2006.01)(52) **U.S. Cl.** **415/200; 415/208.1**(57) **ABSTRACT**

The invention provides a wind direction cover of an electric fan, comprising a central cap, an external circular frame, a plurality of wind guiding blades between the central cap and the external circular frame which are concentric with the central cap, and a plurality of anchor plates of the wind guiding blades. The exterior side of the most internal wind guiding blade is parallel to the flank of the central cap, and the exterior sides of external wind guiding blades slant toward the external circular frame, angulating the exterior sides of the wind guiding blades with the parallel plane of the flank of the central cap, and the more external the wind guiding blade is, the larger its angle slanting toward the external circular frame is.



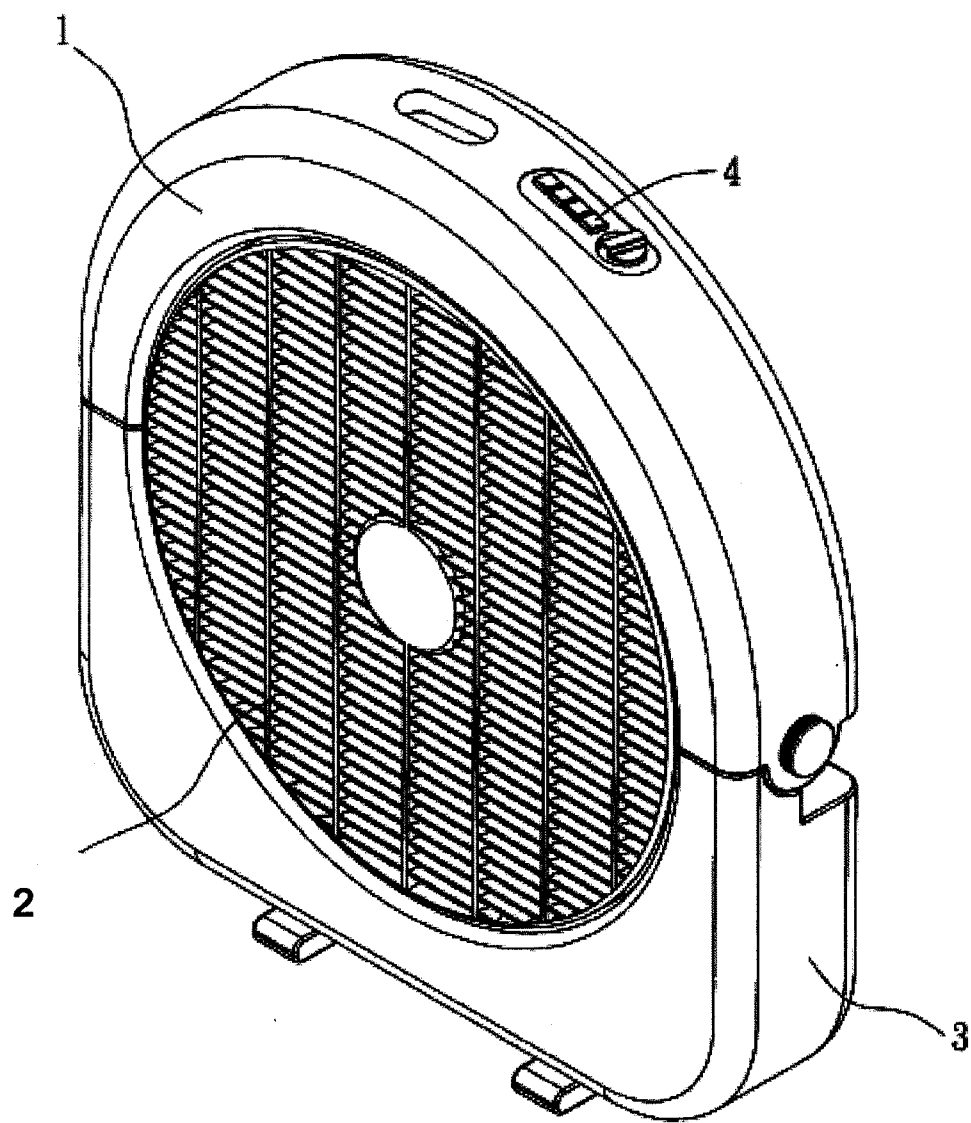


FIG 1

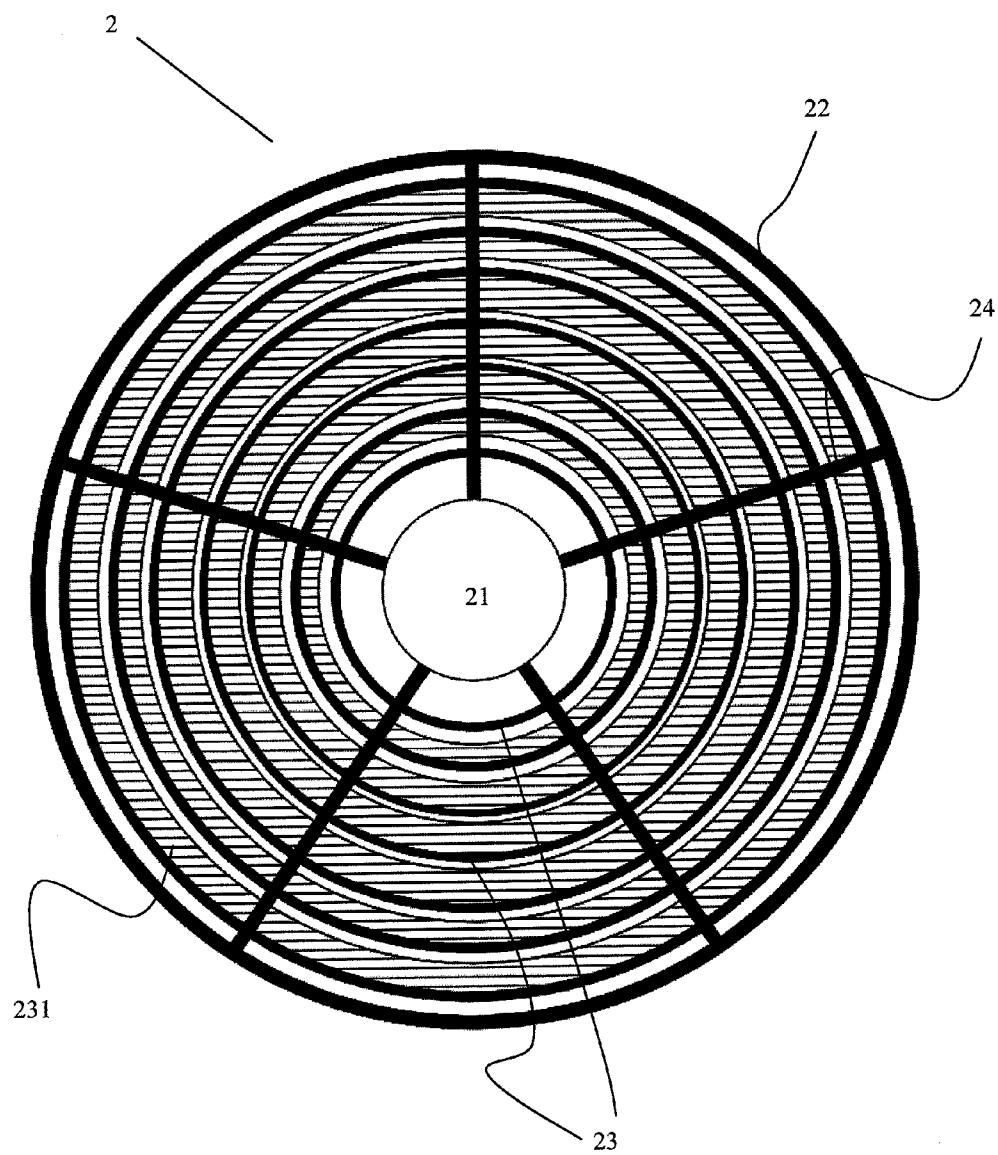
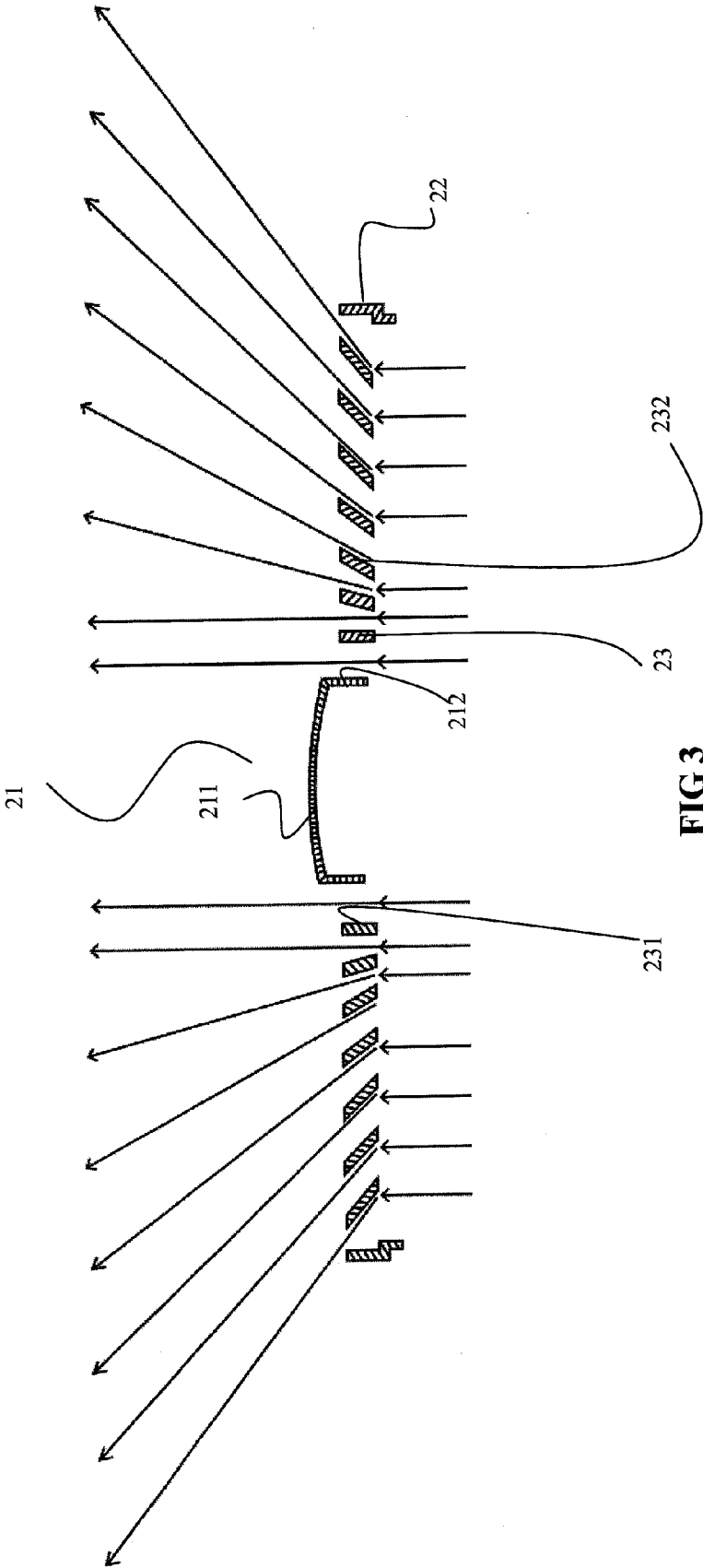


FIG 2



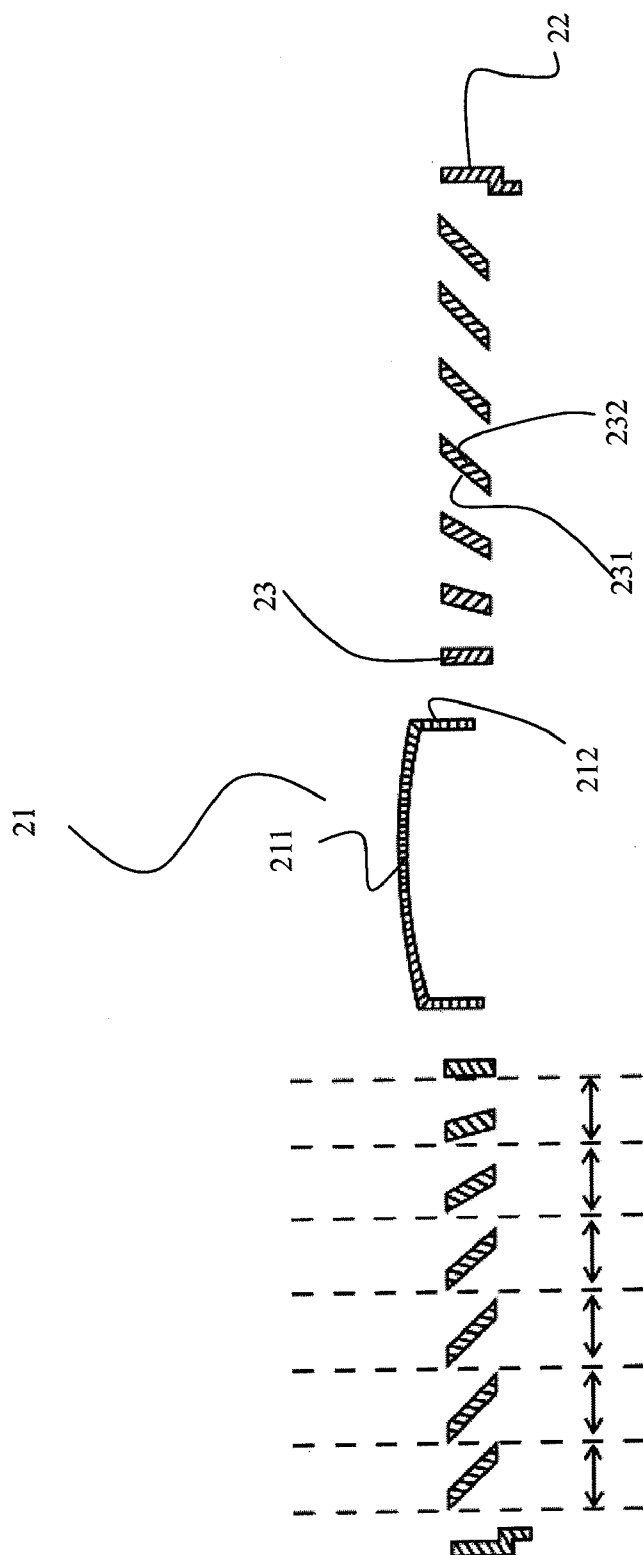


FIG 4

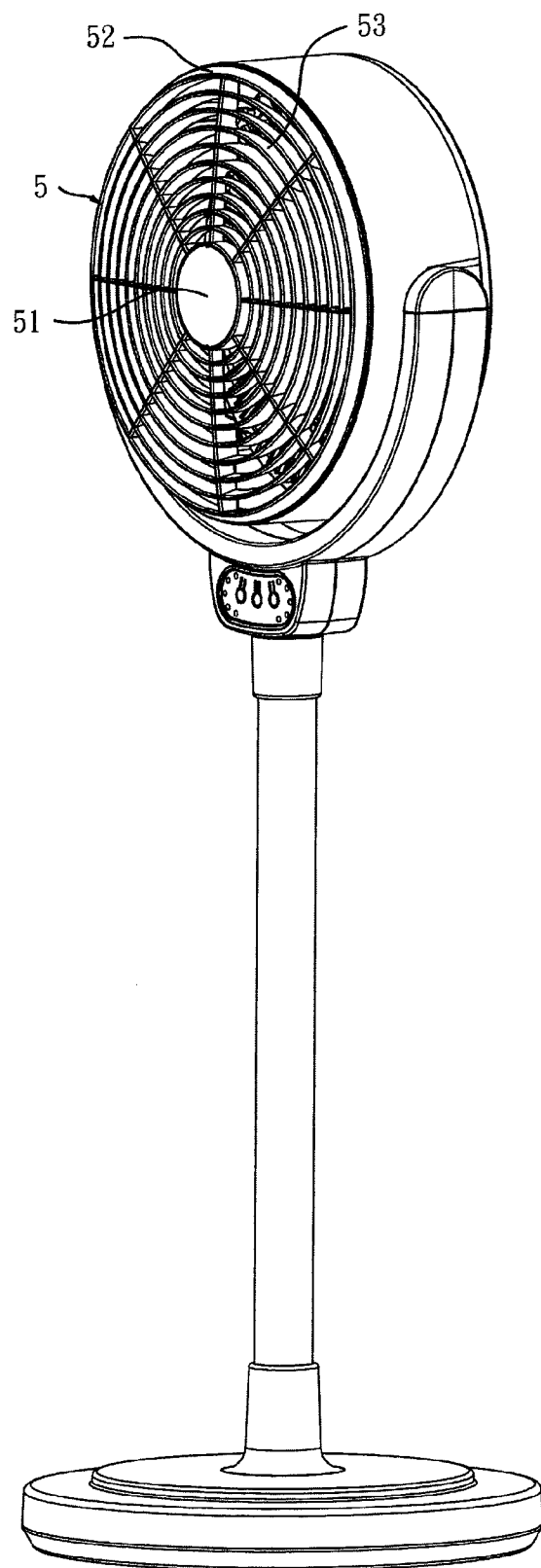


FIG 5

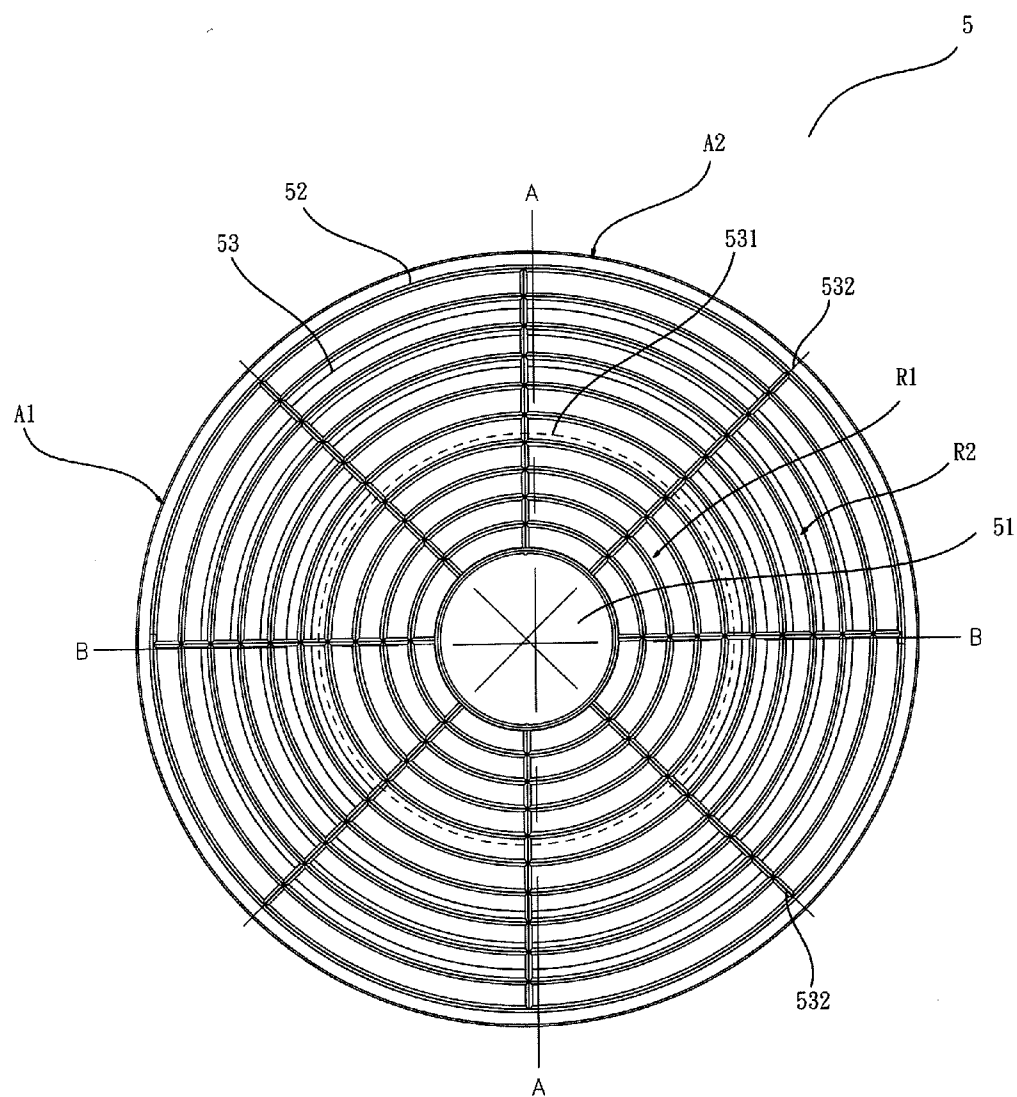


FIG 6

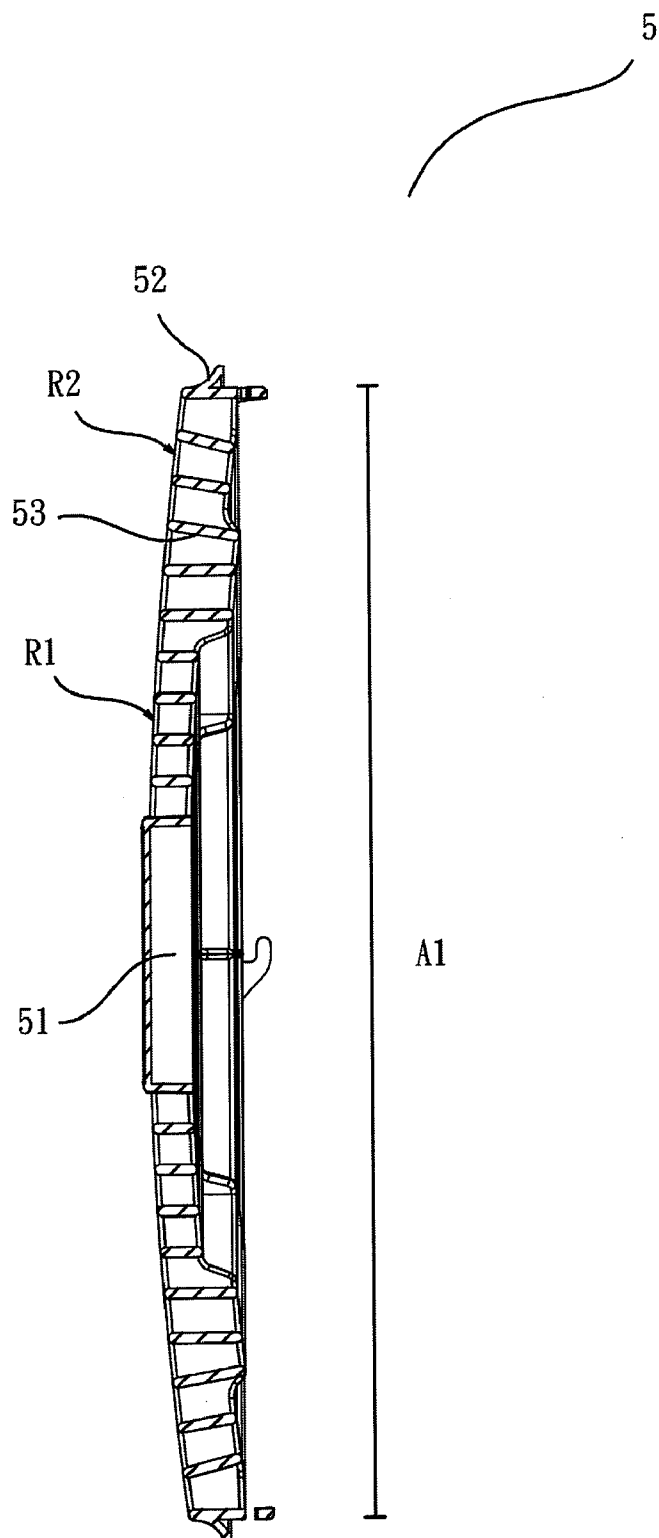


FIG 7

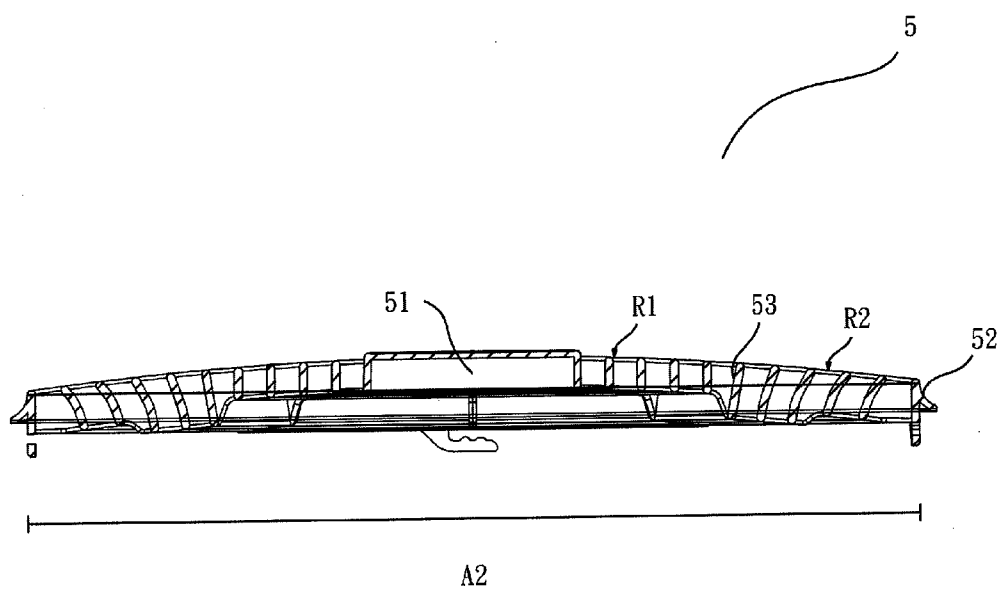


FIG 8

STRUCTURE OF WIND DIRECTION COVER OF ELECTRIC FAN

FIELD OF THE INVENTION

[0001] The present invention relates to an improved structure of wind direction cover of electric fan, and more particularly to an improvement on the wind guiding blades of the wind direction cover.

BRIEF DESCRIPTION OF THE PRIOR ART

[0002] Because of the industrialization, the average temperature of summer has been rising continuously under the enlarging influence of Global Warming. To abate the hot heat, people usually resort to electric fans and air conditioners to reduce the temperature of interiors. However, because of the high electricity consumption of air conditioners, for both saving energy and reducing carbon emission, people often set the temperature of air conditioners to about 28°C and use electric fans as auxiliaries to cool off and save energy. And if the temperature is not too high, electric fans are usually the main option for cooling off.

[0003] Common electric fans can be categorized into standing fans, ceiling fans, and box fans for different requirements and different places. Standing fans and ceiling fans usually have the swing head function, by means of which these fans can blow their wind to different directions. Nevertheless, the drawback of this swing head function is that the cover range of its wind is too narrow; the wind only blows to the direction immediately opposite to the fan, and there is no wind in all the other directions. Box fans are fans without this swing head design. The structure of box fans is a hollow box open on both the front side and the back side, in the interior of which there is a fan with a rotatable wind direction cover in front of it. There are wind guiding blades arrayed radially or crosswise on the wind direction cover. With this wind direction cover consisting of wind guiding blades, box fans can guide the wind it blows with the rotation of the wind direction cover and the wind guiding blades on the cover.

[0004] However, box fans still have their drawbacks: 1. Box fans control the direction of their winds through the rotation of the wind direction cover, but the cover range of wind of box fans is too narrow, which makes people feel hot as long as the wind direction cover turns away from them. 2. If the wind direction cover is not rotating, the wind of the box fan only blows to a certain direction, wherein there is no wind in all the other directions.

[0005] In known techniques there are also ones that improve the structure of box fan to avoid its drawbacks, for instance Taiwan Utility Model Patent No. M278784, which sets a group of successive shutter-like blades on the main body of the box fan. The blades are connected to a synchronous motor inside the main body of the box fan, which enables them to perform synchronous pitching movements (up and down). Furthermore, there is a cradle on top of the pedestal of the fan, into which the supporting shaft of the fan stretches. Inside the cradle there is also a synchronous motor connected to the supporting shaft which enables the shaft to perform synchronous swinging movements (left and right). With this design, the main body and the blades of the box fan can respectively perform swinging movements and pitching movements simultaneously. However, this improvement is still too complicated and the cover range of its wind is still too

narrow. In addition, its synchronous motors tend to be overheated after long operating time.

[0006] Therefore, it is still necessary to improve the structure of electric fan to amend the shortcomings of the common structure.

SUMMARY OF THE INVENTION

[0007] For this reason, in view of the narrow cover range of wind of box fans by means of rotating wind direction covers, the inventor devoted himself to the improvement and the development of electric fans, and as a result invented a novel wind direction cover that can send the wind of electric fans to an angle up to 360 degrees without rotating.

[0008] One aspect of the invention is to provide a wind direction cover of an electric fan, comprising a central cap, an external circular frame, a plurality of wind guiding blades between the central cap and the external circular frame which are concentric with the central cap, and a plurality of anchor plates of the wind guiding blades; the wind direction cover is characterized in that the exterior side of the most internal wind guiding blade is parallel to the flank of the central cap, and the exterior sides of external wind guiding blades slant toward the external circular frame, angulating the exterior sides of the wind guiding blades with the parallel plane of the flank of the central cap, and the more external the wind guiding blade is, the larger its angle slanting toward the external circular frame is, until the exterior side of the most external wind guiding blade formulates an angle with the plane parallel to the flank of the central cap to about 10 to 50 degrees.

[0009] Another aspect of the invention is to provide a wind direction cover of electric fan, comprising a central cap, an external circular frame, a plurality of wind guiding blades between the central cap and the circular frame which are concentric with the central cap, and a plurality of anchor plates of the wind guiding blades; the wind direction cover is characterized in that a first division line is set between the external circular frame and the central cap that surrounds the central cap, to divide the wind direction cover into a straight air-outlet region located between the first division line and the central cap and a large-angle air-outlet region located between the external circular frame and the first division line; wherein the exterior sides of the wind guiding blades of the straight air-outlet region are parallel to the flank of the central cap, and the exterior sides of the wind guiding blades of the large-angle air-outlet region slant toward the external circular frame, angulating the exterior sides of the wind guiding blades with the planes parallel to the flank of the cylinder, the more external the wind guiding blade is, the larger its angle slanting toward the external circular frame is, until the exterior side of the most external wind guiding blade formulates an angle with the plane parallel to the flank of the central cap to approximately 10 to 50 degrees.

[0010] With the invention, when the wind direction cover of the invention is secured on a box fan, the wind of the fan from the most internal part can straightly blow forth without difficulty because the wind guiding blades of this part are concentric with the central cap and parallel to the flank of the central cap. On the other hand, the wind of the fan from the external parts can blow obliquely to specific directions with the guidance of the wind guiding blades because the blades of these parts slant toward the external circular frame and angulate with the plane parallel to the flank of the central cap. And because the more external the wind guiding blade is, the

larger its angle slanting toward the external circular frame is, the wind coming out of regions closer to the external circular frame therefore blows outward in a larger angle. In addition, the multiple wind guiding blades are arranged in a concentric order, so the wind coming out of the main body of the box fan blows outward in directions forward, backward, upward, and downward in large-angle radiations with an angle up to 360 degrees without any blind spots.

BRIEF DESCRIPTIONS OF THE FIGURES

[0011] FIG. 1 is a perspective view of the structure of common box fans.

[0012] FIG. 2 is a front view of the first embodiment of the wind direction cover of the invention.

[0013] FIG. 3 is a cross-sectional view and the schematic diagram of wind directions of the first embodiment of the wind direction cover of the invention.

[0014] FIG. 4 is a cross-sectional view of the first embodiment of the wind direction cover of the invention.

[0015] FIG. 5 is a perspective view of the structure of a standing fan of the second embodiment of the wind direction cover of the invention.

[0016] FIG. 6 is a front view of the second embodiment of the wind direction cover of the invention.

[0017] FIG. 7 is the cross-sectional view from A-A Line of FIG. 6.

[0018] FIG. 8 is the cross-sectional view from B-B Line of FIG. 6.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0019] While the present invention is to be described in connection with the following exemplary embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims, and equivalents thereof.

[0020] To begin with, a current structure of a box fan of prior art is described. As FIG. 1 shows, the main body of the common box fan consists of an upper shell case (1), a lower shell case (3), and a wind direction cover (2) inlaid in between. A fan providing wind is set inside the box consisting of the upper shell case (1) and the lower shell case (3). Furthermore, a switch (4) is set on the box fan to control the intensity of the wind and the rotation of the wind direction cover (2) so that the wind generated from the fan can blow to a large-angle direction with the guidance of the wind guiding blades on the wind direction cover (2). However, if the wind direction cover (2) is not rotating, then the wind of the fan can only blow straightly to the single direction in front of it.

[0021] Next, the wind direction cover of the invention is described. Please see FIG. 4, in the invention, the term “interior side of the wind guiding blade (231)” refers to the sides of the wind guiding blades that face the central cap, and the term “exterior sides of wind guiding blades (232)” refers to the sides of the wind guiding blades that face the external circular frame.

[0022] Then, please refer to FIG. 2 to FIG. 4. FIG. 2 is the front view of the wind direction cover (2) of the invention. FIG. 3 is the cross-sectional view of the wind direction cover (2) of the invention and the schematic diagram of the directions of its wind. FIG. 4 is the cross-sectional view of the wind

direction cover (2) of the invention. As FIG. 2 shows, the wind direction cover (2) of the invention comprising a central cap (21), an external circular frame (22), a plurality of wind guiding blades (23) located between the central cap (21) and the external circular frame (22) which are concentric with the central cap (21), and a plurality of anchor plates (24). Please also refer to FIG. 4, the wind direction cover (2) is characterized in that the exterior side (232) of the most internal wind guiding blade (23) is parallel to the flank (212) of the central cap (21), and the exterior sides (232) of external wind guiding blades (23) slant toward the external circular frame (22), angulating the exterior sides (232) of the wind guiding blades with planes parallel to the flank (212) of the central cap (as the dotted lines show). The more external the wind guiding blade is, the larger the angle of its exterior side (232) slanting toward the external circular frame (22) is, which is to say the larger the angle between the exterior side (232) of the wind guiding blade and the plane parallel to the flank (212) of the central cap (as the dotted lines show) is, until the exterior side (232) of the most external wind guiding blade and the plane parallel to the flank of the central cap formulate an angle up to approximately 10 to 50 degrees, preferably 40 or 45 degrees. With this design, an electric fan can send out its wind to all directions in a large-angle way through the guidance of the wind guiding blades that have specific guiding angles, as the arrows of FIG. 3 show. In a preferable embodiment, the wind direction cover (2) further comprises an arc-shaped guiding channel on the exterior side of each wind guiding blade to decrease the wind shear.

[0023] Next, the characteristic arrangement of the wind guiding blades of the invention is illustrated. Refer to FIG. 4, in the invention, the wind guiding blades (23) are concentric with the central cap (22), and the distances between intersection points of the exterior sides (232) of wind guiding blades (23) and the planes parallel to the flank (212) of the central cap (22) are the same, which is to say the distances between dotted lines in FIG. 4 (indicated by double arrows) are the same. In a preferable embodiment, the distances between the dotted lines are approximately 10 to 12 millimeters, but they can be adjusted according to the size of the electric fan. Besides, the closest distance between the exterior side (232) of the most external wind guiding blade (23) and the circular frame must be more than 3 millimeters; otherwise the wind from the fan might be obstructed and cannot smoothly flow out because of this narrow distance.

[0024] Please refer to FIG. 5 to FIG. 7, which are respectively the perspective view of the structure of standing fans of the second embodiment of the invention, the front view of the wind direction cover (5) of the second embodiment of the invention, and the cross-sectional view from A-A Line of FIG. 6 of the invention. As the figures show, the difference between this embodiment and the first embodiment is that the wind direction cover (5) of this embodiment is divided into different regions with different air-outlet angles by the division of the first and the second division line (531, 532). To increase the intensity of wind of straight air-outlet, the wind direction cover (5) can be divided into a straight air-outlet region (R1), which is located in between the central cap (51) and a first division line (531) that surrounds the central cap (51), and a large-angle air-outlet region (R2), which is located in between the first division line (531) and the external circular frame (52). As FIG. 7 shows, the exterior sides of wind guiding blades (53) of the straight air-outlet region (R1) are parallel to the flank of the central cap (51), and the exterior

sides of wind guiding blades (53) of large-angle air-outlet region (R2) slant toward the external circular frame (52), angulating the exterior sides of the wind guiding blades (53) with the planes parallel to the flank of the central cap (51). Moreover, in the large-angle air-outlet region (R2), the more external the wind guiding blade (53) is, the larger its angle slanting toward the external circular frame 52 is, until the exterior side of the most external wind guiding blade (53) and the plane parallel to the flank of the central cap (51) formulate an angle up to 10 to 50 degrees, preferably 40 to 50 degrees.

[0025] Please refer to FIG. 6 and FIG. 8. FIG. 8 is the cross-sectional view from B-B Line of FIG. 6 of the invention. As the figures show, in the second embodiment of the invention, there are two second division lines (532) between the external circular frame (52) and the central cap (51) that stretch from the central cap (51) to the external circular frame (52). In a preferable embodiment, the two second division lines (532) intersect at the central cap (51) and are perpendicular to one another. With these second division lines (532), the wind guiding blades (53) can be divided into a first large-angle regions (A1) and a second large-angle regions (A2). The first large-angle regions (A1) are located in between the two second division lines (532) and set oppositely at the left side and the right side of the central cap (51), and the second large-angle regions (A2) are located in between the second division lines (532) and the external circular frame (52) and set oppositely at the upper side and the lower side of the central cap (51). Furthermore, the angles between the exterior sides of the wind guiding blades (53) of the second large-angle regions (A2) and the planes parallel to the flank of the central cap (51) are smaller than the angles between the exterior sides of wind guiding blades (53) of the first large-angle regions (A1) and the planes parallel to the flank of the central cap (51). With this design, the directions of the wind from the fan can be changed (not shown), decreasing the intensity of the radiating wind from the upper and the lower parts of the wind direction cover (5) and increasing the density of the wind in level directions of the wind direction cover (5) (which means not the upper nor the lower parts). This is because the users of the electric fan are usually located at the first large-angle regions (A1) (that is the right and left sides of the electric fan), so the angle for air-outlet of the first large-angle regions (A1) should be increased. Thus, the exterior side of the most external wind guiding blade (53) and the plane parallel to the flank of the central cap (51) formulate an angle up to 40 to 50 degrees, and then the wind can be sent to more users. Since the position for the users to lower their body temperature using the wind is unlikely to be much higher or lower than the electric fan, then the angle for the wind of the second large-angle regions (A2) (that is the upper and lower sides of the electric fan) to blow out should not be too high or low. Thus, the exterior side of the most external wind guiding blade (53) and the plane parallel to the flank of the central cap (51) formulate an angle up to 5 to 20 degrees to prevent sending the wind to upper position and lower position that are wind-unneeded.

[0026] The term “more external” or “more internal” position of wind guiding blades (53) is based on the concentric arrangement of these wind guiding blades (53). More specifically, in the concentric arrangement, wind guiding blades (53) that are comparatively closer to the central cap (51) can be regarded as the more internal ones, and wind guiding

blades (53) that are comparatively closer to the external circular frame (52) can be regarded as the more external ones, et cetera.

[0027] The wind direction cover of the invention can not only apply to box fans but also to all kinds of electric fans like standing fans and ceiling fans. An electric fan with the wind direction cover (2) of the invention can be put at any position of a place and radially send out its large-angle wind to all directions without the need of a swinging head. The material of the wind direction cover of the invention is not limited. Preferably, it can be made of plastic or metal.

[0028] To conclude, the structure of the invention can be applied to produce a wind direction cover of electric fans that is simply structured and easy to use. With the slanting design of wind guiding blades, an electric fan can send out its wind equally to all directions without the rotation of the wind direction cover. This is unprecedented in similar products and also unheard-of before the claim, which suffices the statutory requirements of the Patent Law.

[0029] While the invention has been described by means of specific embodiments, numerous modifications and variations could be made thereto by those skilled in the art without departing from the scope and spirit of the invention set forth in the claims.

What is claimed is:

1. A wind direction cover of an electric fan, comprising a central cap, an external circular frame, a plurality of wind guiding blades between the central cap and the external circular frame which are concentric with the central cap, and a plurality of anchor plates of the wind guiding blades; the wind direction cover is characterized in that the exterior side of the most internal wind guiding blade is parallel to the flank of the central cap, and the exterior sides of external wind guiding blades slant toward the external circular frame, angulating the exterior sides of the wind guiding blades with the parallel plane of the flank of the central cap, and the more external the wind guiding blade is, the larger its angle slanting toward the external circular frame is, until the exterior side of the most external wind guiding blade formulates an angle with the plane parallel to the flank of the central cap to about 10 to 50 degrees.

2. The wind direction cover of electric fan of claim 1, further comprising two second division lines between the central cap and the external circular frame that stretch from the central cap toward the external circular frame to divide the wind direction cover into first large-angle regions and second large-angle regions, wherein the first large-angle regions are located oppositely at the right and the left side of the central cap, and the second large-angle regions are located oppositely at the upper side and the lower side of the central cap, and wherein the angles between the exterior sides of the wind guiding blades of the second large-angle regions and the planes parallel to the flank of the central cap is smaller than the angles between the exterior sides of the wind guiding blades of the first large-angle regions and the planes parallel to the flank of the central cap.

3. The wind direction cover of electric fan of claim 1, further comprising an arc-shaped guiding channel on the exterior side of each wind guiding blade.

4. The wind direction cover of electric fan of claim 1, wherein the closest distance between the exterior side of the most external wind guiding blade and the external circular frame is more than 3 millimeters.

5. The wind direction cover of electric fan of claim 1, wherein the distances between intersection points of the exterior sides of the wind guiding blades and the planes parallel to the flank of the central cap are the same.

6. The wind direction cover of electric fan of claim 1, which is secured on a box fan.

7. The wind direction cover of electric fan of claim 1, which is secured on a standing fan.

8. The wind direction cover of electric fan of claim 1, which is secured on a ceiling fan.

9. The wind direction cover of electric fan of claim 1, which is made of plastic.

10. The wind direction cover of electric fan of claim 1, which is made of metal.

11. A wind direction cover of electric fan, comprising a central cap, an external circular frame, a plurality of wind guiding blades between the central cap and the circular frame which are concentric with the central cap, and a plurality of anchor plates of the wind guiding blades; the wind direction cover is characterized in that a first division line is set between the external circular frame and the central cap that surrounds the central cap, to divide the wind direction cover into a straight air-outlet region located between the first division line and the central cap and a large-angle air-outlet region located between the external circular frame and the first division line; wherein the exterior sides of the wind guiding blades of the straight air-outlet region are parallel to the flank of the central cap, and the exterior sides of the wind guiding blades of the large-angle air-outlet region slant toward the external circular frame, angulating the exterior sides of the wind guiding blades with the planes parallel to the flank of the cylinder, the more external the wind guiding blade is, the larger its angle slanting toward the external circular frame is, until the exterior side of the most external wind guiding blade formulates an angle with the plane parallel to the flank of the central cap to approximately 10 to 50 degrees.

12. The wind direction cover of electric fan of claim 11, further comprising two second division lines between the central cap and the external circular frame that stretch from the central cap toward the external circular frame to divide the wind direction cover into first large-angle regions and second large-angle regions, wherein the first large-angle regions are located oppositely at the right and the left side of the central cap, and the second large-angle regions are located oppositely at the upper side and the lower side of the central cap, and wherein the angles between the exterior sides of the wind guiding blades of the second large-angle regions and the planes parallel to the flank of the central cap is smaller than the angles between the exterior sides of the wind guiding blades of the first large-angle regions and the planes parallel to the flank of the central cap.

13. The wind direction cover of electric fan of claim 11, further comprising an arc-shaped guiding channel on the exterior side of each wind guiding blade of the large-angle air-outlet region.

14. The wind direction cover of electric fan of claim 11, wherein the closest distance between the exterior side of the most external wind guiding blade and the external circular frame is more than 3 millimeters.

15. The wind direction cover of electric fan of claim 11, wherein the distances between intersection points of the exterior sides of the wind guiding blades and the planes parallel to the flank of the central cap are the same.

16. The wind direction cover of electric fan of claim 11, which is secured on a box fan.

17. The wind direction cover of electric fan of claim 11, which is secured on a standing fan.

18. The wind direction cover of electric fan of claim 11, which is secured on a ceiling fan.

19. The wind direction cover of electric fan of claim 11, which is made of plastic.

20. The wind direction cover of electric fan of claim 11, which is made of metal.

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