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(19) **United States**(12) **Patent Application Publication****Yu et al.**(10) **Pub. No.: US 2007/0147992 A1**(43) **Pub. Date: Jun. 28, 2007**(54) **FAN AND FAN HOUSING THEREOF****Publication Classification**(75) Inventors: **Po-Hao Yu**, Taoyuan Hsien (TW);
Wen-Shi Huang, Taoyuan Hsien (TW)(51) **Int. Cl.**
F01D 9/00 (2006.01)(52) **U.S. Cl.** **415/191**

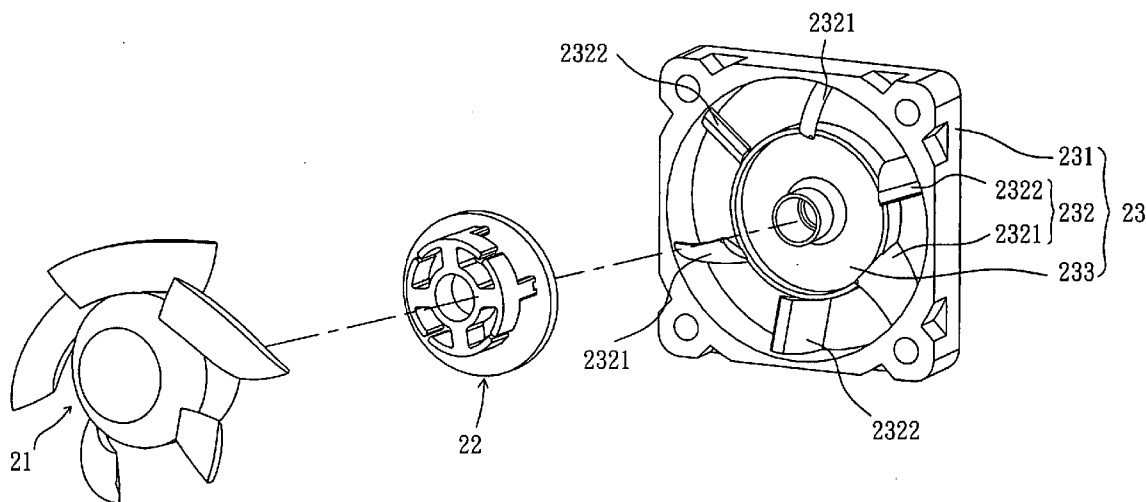
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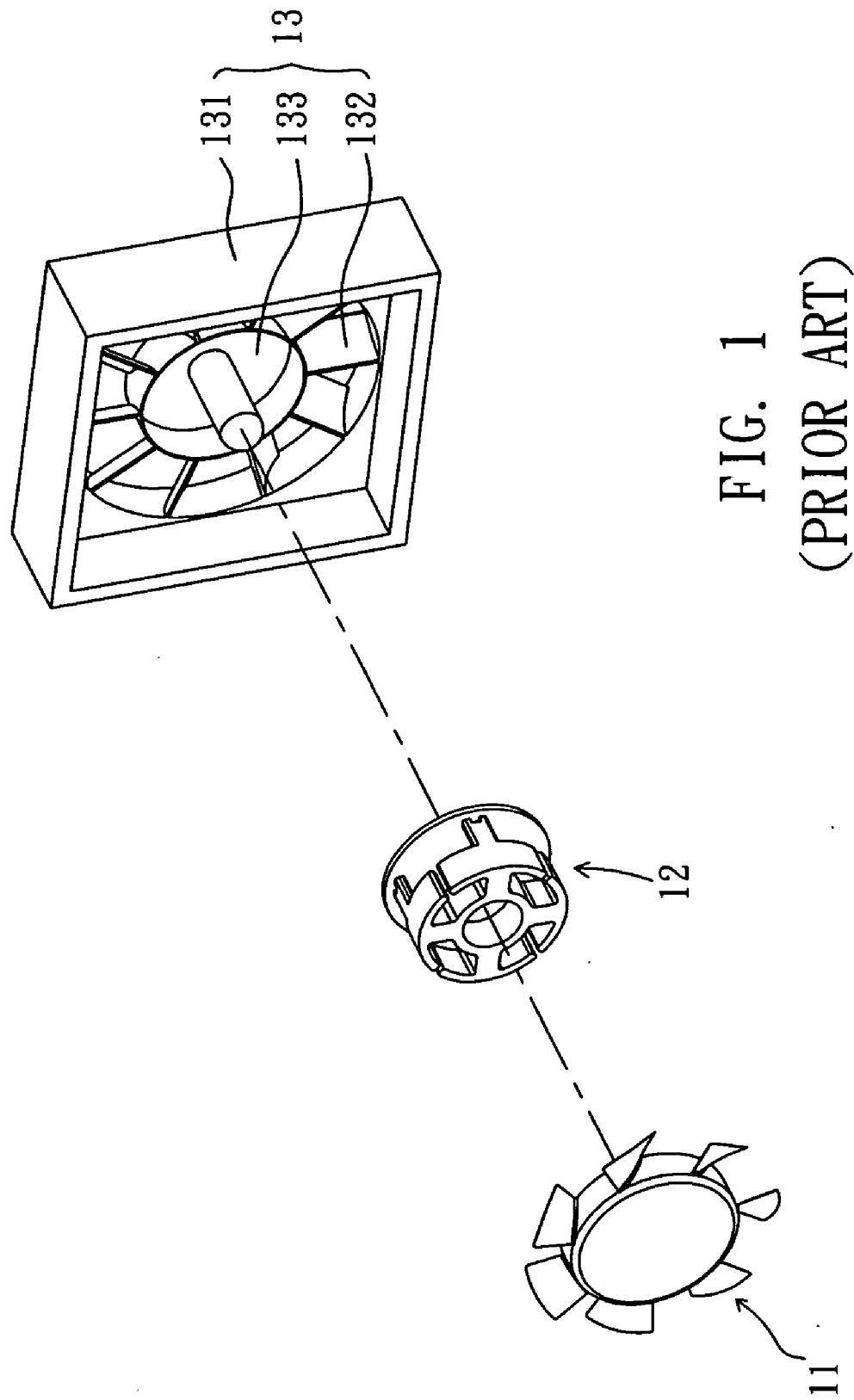
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(57) **ABSTRACT**

A fan includes an impeller, a fan housing and a motor. The fan housing includes a frame, a base and a plurality of stationary blade sets. The base is disposed inside the frame. Each of the stationary blade sets includes a plurality of stationary blades disposed between the frame and the base. The motor is disposed onto the base to drive the impeller to rotate. At least one stationary blade of one stationary blade set has a different shape, dimension or inclined angle from that of at least one stationary blade of another stationary blade set.





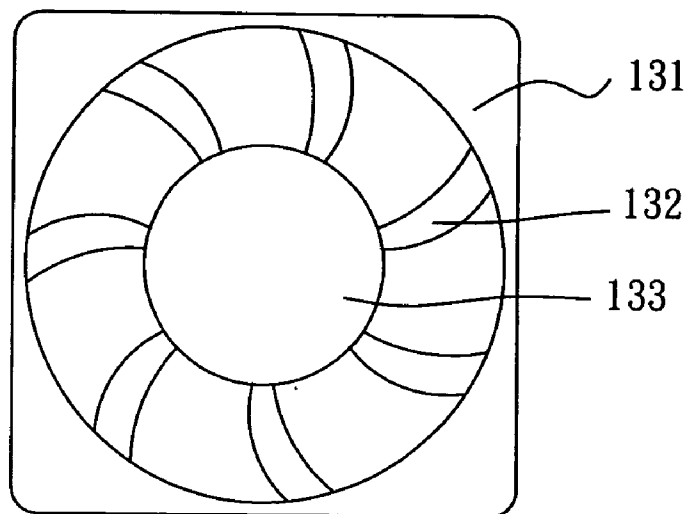


FIG. 2a
(PRIOR ART)

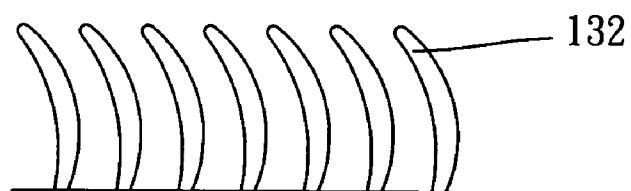


FIG. 2b
(PRIOR ART)

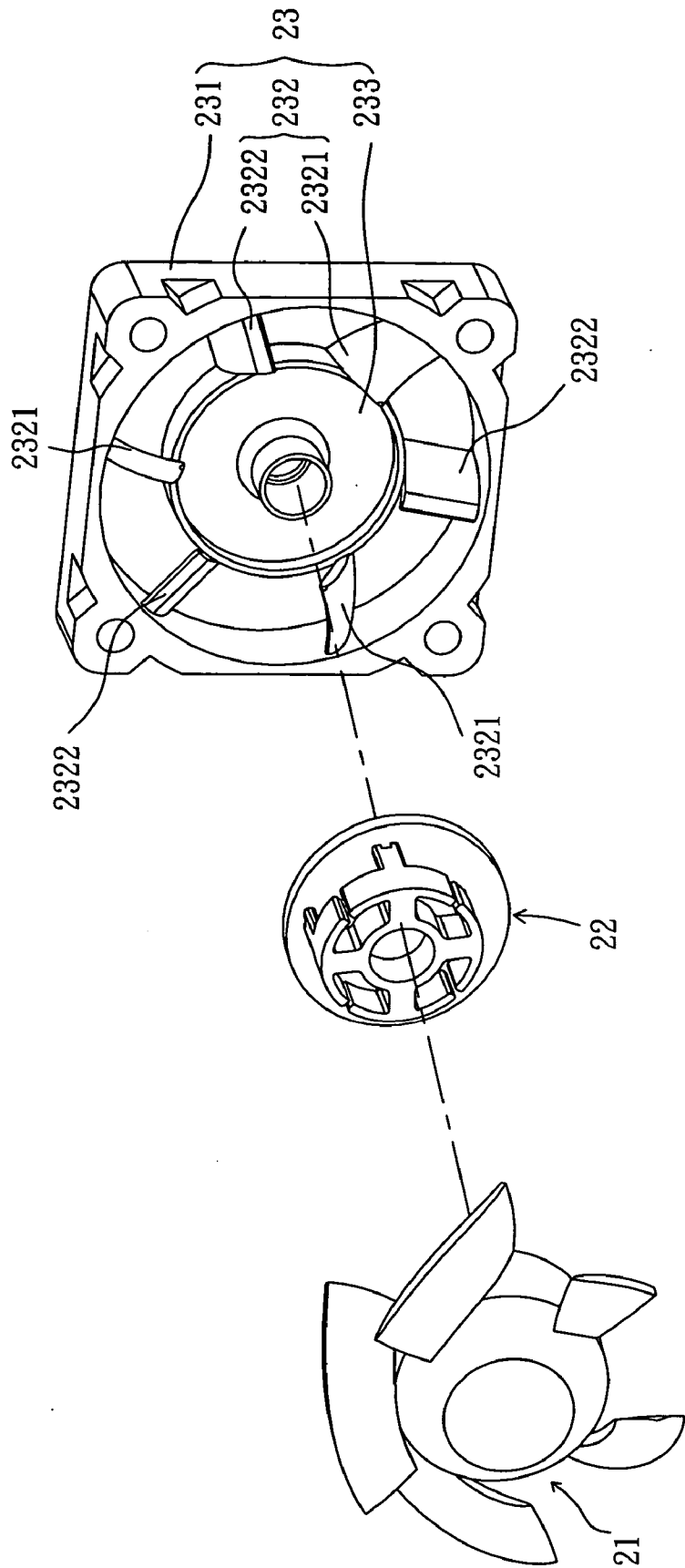


FIG. 3

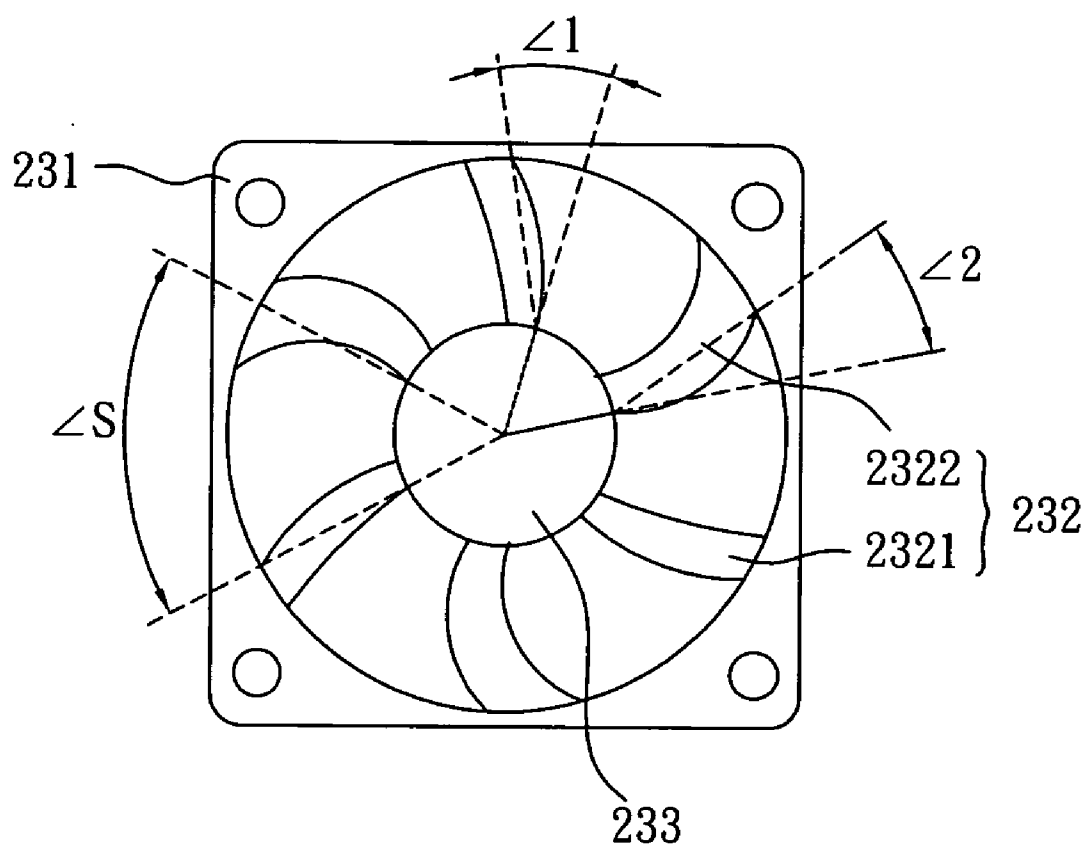


FIG. 4

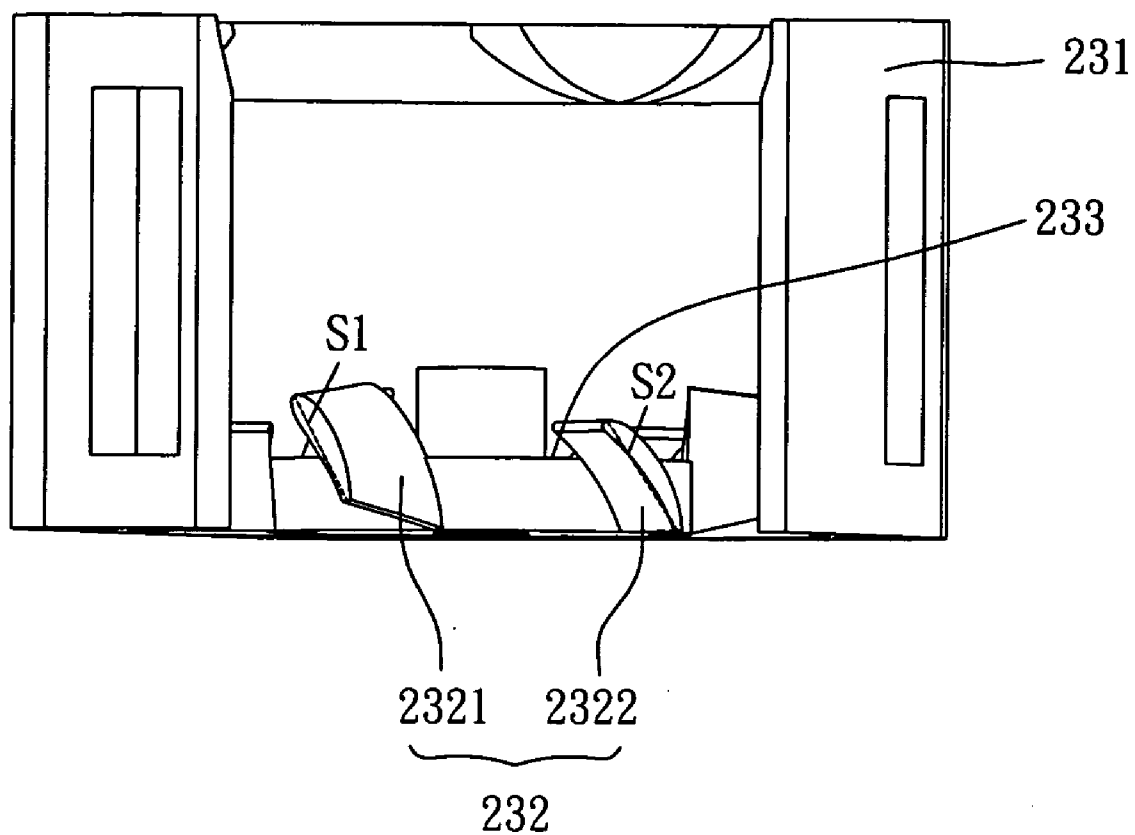


FIG. 5

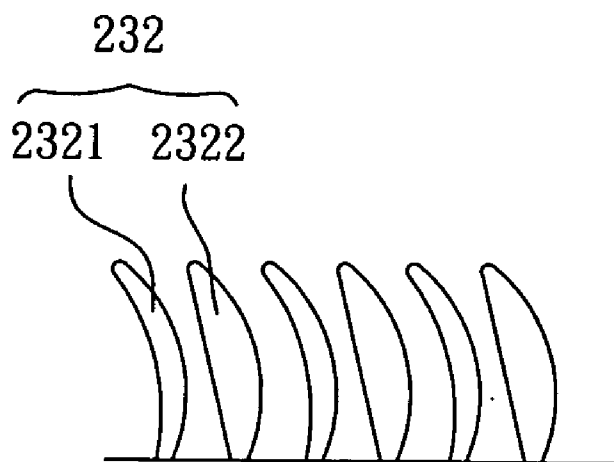


FIG. 6

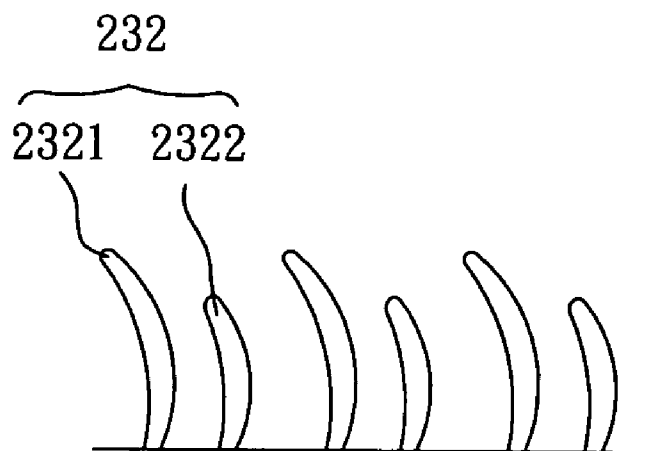


FIG. 7

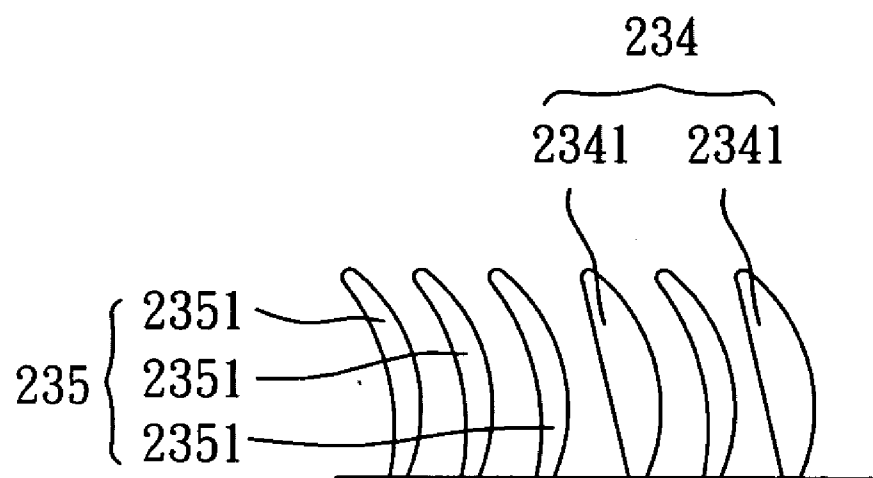


FIG. 8

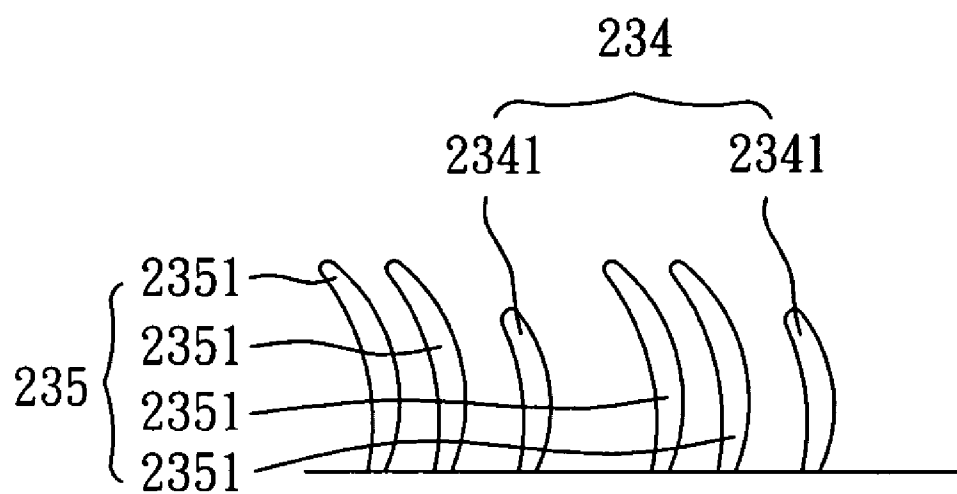


FIG. 9

FAN AND FAN HOUSING THEREOF

BACKGROUND OF THE INVENTION

[0001] 1. Field of Invention

[0002] The present invention relates to a fan and a fan housing thereof, and more particularly to a fan and a fan housing thereof capable of eliminating noise.

[0003] 2. Related Art

[0004] Accompanying with the rapid development of the electronic products which tend to high functionality, high frequency, and fast response, much more heat is generated by the electronic products. The heat can result in instable operation and, therefore, affect the reliability of the electronic products. In general, a fan is often used as a heat-dissipating device for the electronic product.

[0005] As shown in FIG. 1, a conventional fan 1 includes an impeller 11, a motor 12 and a fan housing 13. The fan housing 13 includes a frame 131, a plurality of stationary blades 132 and a base 133. Two ends of the stationary blade 132 are respectively connected with the frame 131 and the base 133. The motor 12 is disposed onto the base 133 to drive the impeller 11 to rotate. FIG. 2a is a schematic diagram of the fan housing 13, and FIG. 2b is a schematic diagram of the aerofoil of the stationary blades 132. The aerofoils, as well as the intervals, of the stationary blades 132 are the same.

[0006] The thermal dissipating efficiency of the fan can be raised by guiding the airflow through the stationary blades. However, a high-frequency noise is unpleasantly generated due to the high rotation of the fan. One of the causes is that the aerofoils and the intervals of the stationary blades are the same, which causes the same pressure variation on the surfaces of the stationary blades during the air flowing through the stationary blades. The pressure variation on the surface of the stationary blade is one of the sources of noise, and the same pressure variation on each stationary blade will result in the noise accumulation. Lessening stationary blades or replacing stationary blades with ribs just can slightly eliminate the noise accumulation, but is disadvantageous to the thermal dissipating efficiency.

[0007] It is thus imperative to provide a fan and a fan housing thereof capable of solving high-frequency noise caused from the noise accumulation without affecting thermal dissipating efficiency thereof.

SUMMARY OF THE INVENTION

[0008] In view of the foregoing, the present invention provides a fan and a fan housing thereof capable of eliminating high-frequency noise without affecting thermal dissipating efficiency thereof.

[0009] To achieve the above, a fan housing according to the present invention includes a frame, a base and a plurality of stationary blade sets. The base is disposed inside the frame. Each of the stationary blade sets includes a plurality of stationary blades disposed between the frame and the base. At least one stationary blade of one stationary blade set has a different shape, dimension or inclined angle from that of at least one stationary blade of another stationary blade set.

[0010] To achieve the above, a fan according to the present invention includes an impeller, a fan housing and a motor. The fan housing includes a frame, a base and a plurality of stationary blade sets. The base is disposed inside the frame. Each of the stationary blade sets includes a plurality of stationary blades disposed between the frame and the base. The motor is disposed onto the base to drive the impeller to rotate. At least one stationary blade of one stationary blade set has a different shape, dimension or inclined angle from that of at least one stationary blade of another stationary blade set.

[0011] As mentioned above, a fan and a fan housing thereof according to the present invention utilizes at least two sets of stationary blades with different shape, dimension or inclined angle from each other. The intervals between the stationary blades can also be different such that different pressure variations are formed on the surfaces of the stationary blades during the air flowing through the stationary blades. Compared with the prior art, the accumulation noise according to the present invention can be reduced, i.e. high-frequency noise can be eliminated, and thermal dissipating efficiency of the fan will not be affected.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The present invention will become more fully understood from the detailed description given herein below illustration only, and thus are not limitative of the present invention, and wherein:

[0013] FIG. 1 is a three-dimensional exploded diagram showing a conventional fan;

[0014] FIG. 2a is a schematic diagram showing the conventional fan housing;

[0015] FIG. 2b is a schematic diagram showing the aerofoil and arrangement of the conventional stationary blades;

[0016] FIG. 3 is a three-dimensional exploded diagram showing a fan according to a preferred embodiment of the present invention;

[0017] FIG. 4 is a back view showing the fan housing in FIG. 3;

[0018] FIG. 5 is a cross-sectional diagram showing the fan housing in FIG. 3;

[0019] FIG. 6 is a schematic diagram showing the stationary blades according to the present invention with different aerofoils;

[0020] FIG. 7 is a schematic diagram showing the stationary blades according to the present invention with different chord lengths;

[0021] FIG. 8 is a schematic diagram showing the stationary blades according to the present invention with different aerofoils in arbitrary arrangement; and

[0022] FIG. 9 is a schematic diagram showing the stationary blades according to the present invention with different chord lengths in regular arrangement.

DETAILED DESCRIPTION OF THE INVENTION

[0023] The present invention will be apparent from the following detailed description, which proceeds with refer-

ence to the accompanying drawings, wherein the same references relate to the same elements.

[0024] As shown in FIG. 3, a fan 2 according to a preferred embodiment of the present invention includes an impeller 21, a motor 22 and a fan housing 23. In this embodiment, the fan 2 is an axial fan. The fan housing 23 includes a frame 231, three stationary blade sets 232, and a base 233 disposed inside the frame 231. In this embodiment, each of the stationary blade sets 232 has two different stationary blades 2321 and 2322, and the total number of the stationary blades 2321 and 2322 is six. The stationary blades 2321 and 2322 of each stationary blade set 232 are disposed between the frame 231 and the base 233. That is, two ends of the stationary blade are respectively connected with the frame 231 and the base 233. The frame 231, the base 233 and the stationary blade sets 232 can be integrally formed. The motor 22 is disposed onto the base 233, which drives the impeller 21 to rotate by magnetic interaction.

[0025] FIG. 4 is a back view of the fan housing 23, and FIG. 5 is a cross-sectional diagram of the fan housing 23. As shown in FIG. 4, the stationary blade sets 232 are arranged in order such that the stationary blades 2321 and 2322 are alternately arranged. In addition, the stationary blades 2321 and 2322 are connected with the base 233 in different inclined angles. In this embodiment, the inclined angle $\angle 1$ of the stationary blades 2321 is different from the inclined angle $\angle 2$ of the stationary blades 2322. Preferably, the inclined angles range from -30 degrees to 30 degrees. The interval angles $\angle S$ of two adjacent stationary blades can also be different; however, the minimum interval angle is preferably not less than 45 degrees. As shown in FIG. 5, the aerofoils of the stationary blades 2321 and 2322 are different, and the chord lengths thereof are also different. The shortest chord length $S2$ of the stationary blades 2322 is not greater than 80% of the longest chord length $S1$ of the stationary blades 2321.

[0026] Of course, as shown in FIG. 6, the stationary blades 2321 and 2322 of each stationary blade set 232 can be merely different in aerofoils. Alternately, the stationary blades 2321 and 2322 of each stationary blade set 232 can be merely different in chord lengths as shown in FIG. 7.

[0027] In addition, the same stationary blades can be grouped as one stationary blade set. As shown in FIG. 8, the stationary blade set 234 has a plurality of same stationary blades 2341 and the stationary blade set 235 has a plurality of another same stationary blades 2351. The aerofoils of the stationary blades 2341 and 2351 are different, and the stationary blades 2341 and 2351 are arbitrarily arranged with one another. The stationary blades 2341 and 2351 can also have different inclined angles or chord lengths thereof. In addition, the intervals between the stationary blades 2341 and 2351 can further be different. As shown in FIG. 9, the chord lengths of the stationary blades 2341 and the stationary blades 2351 are different. The major difference from FIG. 8 is that the stationary blades 2341 and 2351 are regularly arranged with one another. Similarly, the stationary blades 2341 and 2351 can have different inclined angles or chord lengths except the aerofoil, and the intervals between the stationary blades 2341 and 2351 can also be different.

[0028] In summary, a fan and a fan housing thereof according to the present invention utilizes at least two sets of stationary blades with different shape, dimension or

inclined angle from each other. The intervals between the stationary blades can also be different such that different pressure variations are formed on the surfaces of the stationary blades during the air flowing through the stationary blades. Compared with the prior art, the accumulation noise according to the present invention can be reduced, i.e. high-frequency noise can be eliminated, and thermal dissipating efficiency of the fan will not be affected.

[0029] Although the present invention has been described with reference to specific embodiments, this description is not meant to be construed in a limiting sense. Various modifications of the disclosed embodiments, as well as alternative embodiments, will be apparent to persons skilled in the art. It is, therefore, contemplated that the appended claims will cover all modifications that fall within the true scope of the present invention.

What is claimed is:

1. A fan housing comprising:

a frame;

a base disposed inside the frame; and

a plurality of stationary blade sets, each of which comprises a plurality of stationary blades disposed between the frame and the base;

wherein at least one stationary blade of one stationary blade set has a different shape, dimension or inclined angle from that of at least one stationary blade of another stationary blade set.

2. The fan housing according to claim 1, wherein the stationary blades of each stationary blade set are different from each other.

3. The fan housing according to claim 1, wherein the intervals between the stationary blades of the stationary blade sets are not all the same.

4. The fan housing according to claim 1, wherein each stationary blade set has the same number of the stationary blades.

5. The fan housing according to claim 1, wherein the shapes, dimensions or inclined angles of other stationary blades of one stationary blade set are the same as those of other stationary blades of another stationary blade set.

6. The fan housing according to claim 1, wherein the stationary blades of each stationary blade set have different chord lengths thereof.

7. The fan housing according to claim 6, wherein the shortest chord length is less than or equal to 80% of the longest chord length.

8. The fan housing according to claim 1, wherein the stationary blades of each stationary blade set has different inclined angles thereof.

9. The fan housing according to claim 8, wherein the inclined angles range from -30 degrees to 30 degrees.

10. The fan housing according to claim 1, wherein the stationary blades of each stationary blade set have different aerofoils thereof.

11. The fan housing according to claim 1, wherein the stationary blades of each stationary blade set are all the same.

12. The fan housing according to claim 1, wherein the stationary blades of one stationary blade set are arbitrarily or regularly arranged with the stationary blades of another stationary blade set.

13. A fan comprising:

an impeller,

a fan housing comprising a frame, a base and a plurality of stationary blade sets, wherein the base is disposed inside the frame, and each of the stationary blade sets comprises a plurality of stationary blades disposed between the frame and the base; and

a motor disposed onto the base to drive the impeller to rotate;

wherein at least one stationary blade of one stationary blade set has a different shape, dimension or inclined angle from that of at least one stationary blade of another stationary blade set.

14. The fan according to claim 13, wherein the stationary blades of one stationary blade set are arbitrarily or regularly arranged with the stationary blades of another stationary blade set.

15. The fan according to claim 13, wherein the intervals between the stationary blades of the stationary blade sets are not all the same.

16. The fan according to claim 13, wherein the chord lengths of the stationary blades of one stationary blade set are different from those of the stationary blades of another stationary blade set.

17. The fan according to claim 16, wherein the shortest chord lengths are less than or equal to 80% of the longest chord lengths.

18. The fan according to claim 13, wherein the inclined angles of the stationary blades of one stationary blade set are different from those of the stationary blades of another stationary blade set.

19. The fan according to claim 18, wherein the inclined angles range from -30 degrees to 30 degrees.

20. The fan according to claim 13, wherein the aerofoils of the stationary blade of one stationary blade set is different from those of the stationary blade of another stationary blade set.

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