AXIAL FLOW FAN STRUCTURE

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ABSTRACT

An axial flow fan structure includes a bottom plate having a mounting portion to which a stator is mounted. The stator includes a pivotal portion for rotatably receiving a shaft of a fan wheel. A plurality of blades extends outward from a hub of the fan wheel and each has a distal end that terminates at a cylindrical guide wall that is integral with the blades. The guide wall includes an air inlet in an end thereof and an air outlet in the other end thereof.
FIG. 1
PRIOR ART
FIG. 2
AXIAL FLOW FAN STRUCTURE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to an axial flow fan structure. In particular, the present invention relates to an axial flow fan structure allowing simplified manufacture and having reduced noise resulting from tangential wind during rotation of the fan wheel.

[0003] 2. Description of the Related Art

[0004] FIG. 1 of the drawings illustrates a conventional fan structure comprising a casing 90 having a bottom plate 91 on which a stator bobbin 92 is mounted. The stator bobbin 92 comprises an axle tube 93 for rotatably receiving a shaft 95 of a fan wheel 94. When the winding mounted around the stator bobbin 92 is energized, the fan wheel 94 is driven to turn. Thus, the blades 96 on the fan wheel 94 drive air current to exit the casing 90 via an air outlet 97 of the casing 90.

[0005] In manufacture of the fan structure, the stator bobbin 92 is assembled inside the narrow space in the casing 90. Since the casing 90 has a considerable wall thickness, assembly inside the casing 90 is difficult and the cost is increased. Further, when the fan wheel 94 turns, noise resulting from tangential wind is generated between the fan wheel 96 and the wall of the casing 90 surrounding the fan wheel 96. Further, noise resulting from turbulence is generated on the air outlet side due to interference from the ribs supporting the bottom plate 91. And the amount of outputted air is decreased.

SUMMARY OF THE INVENTION

[0006] It is an object of the present invention to provide an axial flow fan structure that allows easy manufacture at a low cost.

[0007] It is another object of the present invention to provide an axial flow fan structure having a low noise resulting from tangential wind during rotation of the fan.

[0008] It is a further object of the present invention to provide an axial flow fan structure that allows smoother introduction of incoming air and smoother expelling of outgoing air, providing an improved heat-dissipating effect.

[0009] The axial flow fan structure in accordance with the present invention includes a bottom plate having a mounting portion to which a stator is mounted. The stator includes a pivotal portion for rotatably receiving a shaft of a fan wheel. A plurality of blades extends outward from a hub of the fan wheel and each has a distal end that terminates at a cylindrical guide wall that is integral with the blades. The guide wall includes an air inlet in an end thereof and an air outlet in the other end thereof.

[0010] Other objects, specific advantages, and novel features of the invention will become more apparent from the following detailed description and preferable embodiments when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is an exploded perspective view of a conventional axial flow fan.

[0012] FIG. 2 is an exploded perspective view of a first embodiment of an axial flow fan structure in accordance with the present invention.

[0013] FIG. 3 is a top view of the axial flow fan structure in FIG. 2.

[0014] FIG. 4 is a sectional view taken along plane 4-4 in FIG. 3.

[0015] FIG. 5 is a sectional view similar to FIG. 4, illustrating a second embodiment of the invention.

[0016] FIG. 6 is a sectional view similar to FIG. 4, illustrating a third embodiment of the invention.

[0017] FIG. 7 is a sectional view similar to FIG. 6, illustrating a fourth embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] Preferred embodiments in accordance with the present invention will now be described with reference to the accompanying drawings.

[0019] Referring to FIG. 2, a first embodiment of an axial flow fan structure in accordance with the present invention generally includes a bottom plate 1, a stator 2, and a fan wheel 3.

[0020] The bottom plate 1 includes a mounting portion 11 to which the stator 2 is mounted. Fasteners 12 are provided to secure the bottom plate 1 to an appropriate position. If necessary, the bottom plate 1 can be a circuit board having electrical elements that are required for forming a driving circuit.

[0021] The stator 2 includes polar plates (not labeled) and a winding (not labeled). The winding may be a conventional radial or axial winding. The stator 2 is mounted to the mounting portion 11 of the bottom plate 1 and includes a pivotal portion 21 for rotatably receiving a shaft 32 of a fan wheel 3.

[0022] The fan wheel 3 includes a hub 31 with the shaft 32. The shaft 32 of the hub 31 is rotatably received in the pivotal portion 21 of the stator 2. The fan wheel 3 includes a plurality of blades 33 extending outward from the hub 31. Each blade 33 has a distal end that terminates at a cylindrical guide wall 34 that is integral with the blades 33. The guide wall 34 includes an air inlet 35 in an end thereof for introducing air and an air outlet 36 in the other end thereof. Preferably, an axial height of the guide wall 34 is greater than that of the blades 33.

[0023] Referring to FIGS. 3 and 4, in assembly, the stator 2 is mounted to the mounting portion 11 of the bottom plate 1, and the shaft 32 of the fan wheel 3 is rotatably received in the pivotal portion 21 of the stator 2. The bottom plate 1 can be directly mounted by fasteners 12 to any desired position. Thus, when the fan wheel 3 turns, the blades 33 drive the air current to enter via the air inlet 35 of the guide wall 34 and then exit via the air outlet 36 of the guide wall 34. Since tangential wind only occurs in the upper end of the blades 33 during rotation of the fan wheel 3 and since the blades 33 terminate at the cylindrical guide wall 34 that rotates together with the blades 33, a relatively small noise
resulting from tangential wind is generated during rotation of the fan wheel 3.

[0024] FIG. 5 illustrates a second embodiment of the invention. In this embodiment, in order to provide an improved driving effect of air when the fan wheel 3 turns, the guide wall 34 includes a trumpet mouth-like outwardly expanding conic wall portion 37 in each of an outlet side and an inlet side thereof. Since the outwardly expanding conic wall portions 37 are not directly connected to the blades 33, the air introducing effect in the air inlet 35 of the guide wall 34 and the air output effect in the air outlet 36 of the guide wall 34 are both improved. Thus, the axial flow fan has a smoother air current-driving effect for dissipating a larger heat-generating area.

[0025] FIG. 6 illustrates a third embodiment of the invention. In this embodiment, the guide wall 34 includes a trumpet mouth-like outwardly expanding conic wall portion 37 in the inlet side thereof. Since the outwardly expanding conic wall portion 37 is directly connected to the blades 33 and since the top edge of the conic wall portion 37 is located at a level not higher than the blades 33, a better air introducing effect is obtained in the air inlet 35 of the guide wall 34 when the fan wheel 3 turns.

[0026] FIG. 7 illustrates a fourth embodiment of the invention. In this embodiment, the guide wall 34 includes a trumpet mouth-like outwardly expanding conic wall portion 37 in the inlet side thereof that has a larger diameter. Further, the outlet 36 side of the guide wall 34 is in the form of an inverted cone having a smaller diameter. In this embodiment, several support rods 13 extend outward from the bottom plate 1, and the outlet 36 allowing the driven air current to flow therethrough is defined between the support rods 13. Further, a post 14 is provided on an end of each support rod 13, and a fastener 12 is attached to an end of the respective post 14 for mounting the bottom plate 1 to any desired position. Thus, when the fan wheel 3 turns, a better air introducing effect is obtained in the air inlet 35 of the guide wall 34. Also, a larger output air pressure is obtained in the air outlet 36.

[0027] The axial flow fan structure in accordance with the present invention provides a simplified structure in which the guide wall 34 on the distal ends of the blades 33 replaces the conventional casing wall. Thus, the axial flow fan is simple in manufacture and assembly. The cost is thus reduced, and the noise resulting from tangential wind during rotation is lowered.

[0028] Although the invention has been explained in relation to its preferred embodiments as mentioned above, it is to be understood that many other possible modifications and variations can be made without departing from the scope of the invention. It is, therefore, contemplated that the appended claims will cover such modifications and variations that fall within the true scope of the invention.

What is claimed is:
1. An axle flow fan structure comprising:
   a bottom plate including a mounting portion;
   a stator mounted to the mounting portion of the bottom plate, the stator including a pivotal portion; and
   a fan wheel including a hub with a shaft that is rotatably received in the pivotal portion of the stator, a plurality of blades extending from the hub and each having a distal end terminating at a guide wall that is integral with the blades, the guide wall including a first end and a second end, an air inlet being defined in the first end of the guide wall, and an air outlet being defined in the second end of the guide wall.
2. The axle flow fan structure as claimed in claim 1, wherein the guide wall includes an axil height higher than that of the blades.
3. The axle flow fan structure as claimed in claim 1, wherein the bottom plate is a circuit board including electric elements for forming a drive circuit.
4. The axial flow fan structure as claimed in claim 1, wherein the air inlet of the guide wall includes a conic wall portion.
5. The axial flow fan structure as claimed in claim 4, wherein the conic wall portion of the air inlet of the guide wall is not directly connected to the distal end of each of the blades.
6. The axial flow fan structure as claimed in claim 4, wherein the conic wall portion of the air inlet of the guide wall is directly connected to the distal end of each of the blades, and wherein the conic wall portion has a top edge that is not higher than the blades.
7. The axial flow fan structure as claimed in claim 1, wherein the air outlet of the guide wall includes a conic wall portion.
8. The axial flow fan structure as claimed in claim 7, wherein the conic wall portion of the air outlet of the guide wall is not directly connected to the distal end of each of the blades.
9. The axial flow fan structure as claimed in claim 7, wherein the conic wall portion of the air outlet of the guide wall is directly connected to the distal end of each of the blades, and wherein the air inlet of the guide wall has a diameter greater than that of the air outlet of the guide wall.
10. The axial flow fan structure as claimed in claim 1, further comprising fasteners for securing the bottom plate in place.
11. The axial flow fan structure as claimed in claim 1, further comprising a plurality of support rods extending outward from the bottom plate.
12. The axial flow fan structure as claimed in claim 12, wherein each of the support rods includes a post mounted thereon, further comprising a fastener attached to each of the posts for securing the fan in place.

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