A magnetized fan and a method of fabricating the same are disclosed. The fan has a hub and a plurality of blades radially extending from a periphery of the hub. The fan is fabricated from magnetic material. Thereby, sectors are formed multiple N and S poles. To fabricate the fan, the N and S poles are arranged in accordance with the requirement of the sectors, and the magnetic material is injected to the fan according to the arrangement of the N and S poles. The magnetic material is then magnetized to generate magnetic force.
Arrange N and S poles according to the required sectors of the fan

Injecting a magnetic material into the fan according to the arrangement of the N and S poles

Magnetizing the magnetic sectors of the fan to generate a magnetic force

FIG. 3
MAGNETIZED FAN AND METHOD OF FABRICATING THE SAME

BACKGROUND OF THE INVENTION

[0001] The present invention relates in general to a magnetized fan and a method of fabricating the same, and more particularly, to a fan which is fabricated by injecting magnetic material into the blades of the fan, such that sectors are constructed by multiple N and S poles.

[0002] The conventional fan blades are made of plastic material, such that a magnetic device such as a magnet in the fan blades, such that fan blades can be used as the fan rotator to interact with the fan stator.

[0003] As the conventional fan blades are formed separately with the magnetic device, more processing steps are required. Further, the magnetic device occupies an additional volume of space, such that the internal space of the hub is reduced when the fan blades are attached thereto. As a result, the space for installing the fan stator is restricted, and the number of magnetic poles and windings are limited to affect the rotating speed of the fan. The performance of the fan is thus seriously degraded.

SUMMARY OF THE INVENTION

[0004] The present invention provides a magnetized fan and a method of fabricating the same. The fan is fabricated by injecting magnetic material into the fan at the time while the blades of the fan are formed. Therefore, the blades are intrinsically magnetic without the requirement for installing a magnetic device. As the magnetic device is not required, the volume of the fan can be reduced.

[0005] The method for fabricating the fan includes the following steps. Firstly, N and S poles are arranged according to the required sectors of the fan. The magnetic material is then injected into the fan in accordance with the arrangement of the sectors. The sectors are then further processed to generate magnetic force.

[0006] The fan provided by the present invention includes a hub, a plurality of blades extending radially from a periphery of the hub. The blades include magnetic material to induce a plurality of N and S poles, so as to construct multiple sectors.

[0007] These and other objectives of the present invention will become obvious to those of ordinary skill in the art after reading the following detailed description of preferred embodiments.

[0008] It is to be understood that both the foregoing general description and the following detailed description are exemplary, and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF ACCOMPANIED DRAWINGS

[0009] The above objects and advantages of the present invention will be become more apparent by describing in detail exemplary embodiments thereof with reference to the attached drawings in which:

[0010] FIG. 1 shows a bottom view of a fan provided in a first embodiment of the present invention;

[0011] FIG. 2 shows a top view of the fan as illustrated in FIG. 1; and

[0012] FIG. 3 shows a flow chart of a method for fabricating the fan.

DETAILED DESCRIPTION OF EMBODIMENT

[0013] Referring to FIG. 1, the fan 1 includes a hub 10 and a plurality of blades 10 extending radially from a periphery of the hub 10. The hub 10 and the blades 11 can be formed integrally or at separate processing steps. The blades 11 can be axial-flow type, centrifugal-flow type, inclined-flow type or transverse-flow type blades to generate and guide a desired air flow.

[0014] In this embodiment, magnetic material is injected into bulk material for fabricating the fan 1, such that a plurality of N and S poles are formed to construct a plurality of sectors 12. In the exemplary embodiment, as shown in FIG. 1, the sectors 12 are distributed along the periphery of the hub 10. It will be appreciated that the sectors 12 can also be distributed in other positions such as the edges of the blades 11 as shown in FIG. 2. According to the specific requirement, the magnetic material can be injected into either the hub 10 or the blades 11, or both the hub 10 and the blades 11, such that the sectors 12 can be arranged as required. The fan 1 can be fabricated by various processes such as injection, casting, or powder metallurgy to inject the magnetic material therein. Therefore, when the fan 1 is molded and fabricated is intrinsically magnetic.

[0015] The magnetic material includes ferrite magnetic material, SmCo magnetic material, Ni2Fe2B magnetic material and FeCoNi magnetic material, for example.

[0016] As shown in FIG. 3, the present invention further provides a method of fabricating the magnetized fan.

[0017] In the first step, the N and S poles are arranged according to the required sectors 12. The sectors 12 can be categorized into axial-, radial-, radiation- or two-directional, or multi-polar. The arrangement of the N and S poles includes isotropic, anisotropic and multi-polar.

[0018] The magnetic material is injected into the fan 1 in accordance with the distribution of the sectors 12. In this step, the magnetic material includes ferrite magnetic material, SmCo magnetic material, Ni2Fe2B magnetic material and FeCoNi magnetic material, for example. The magnetic material is powdered into magnetic powder, which is further processed. That is, the magnetic material, resin and plastic material are then mixed to form magnetic glue particles, followed by injection, baking, sintering or power metallurgy process.

[0019] The sectors 12 of the blade 21 are then magnetized to generate magnetic force. The magnetization process includes magnetizing the fan by electrically conducting the magnetic material. In the magnetization process, a magnetization seat can be used. That is, by disposing the fan 1 in a magnetization seat first, followed by applying a voltage thereto, such that the magnetization discharges transiently to generate a magnetic field and consequently magnetizes the fan 1. The magnetization structure of the magnetization seat includes single-side multi-pole magnetization, complex magnetization, outer circumference multi-pole magnetization or inner circumference multi-pole magnetization.
In addition, before performing the above step, the sectors 12 are arranged according to various requirements. The magnetic field is then analyzed to design the mold. After the mold is developed, the magnetic material is liquefied and injected into the mold to form the fan 1.

Thereby, the magnetized fan can be obtained.

By the method provided by the present invention, the process for fabricating the magnetized fan is shortened. Further, as the fan is magnetized while it is fabricated, the required external magnetic device is required. Therefore, the fan can be made with a reduced volume, while the pole number and winding of the fan stator can be maintained or even increased to improve the performance of the fan.

While the present invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. A method of fabricating a magnetized fan, comprising:
   a) performing arrangement of N and S poles according to the required magnetic sectors of the fan;
   b) injecting a magnetic material into the fan according to the arrangement of the N and S poles; and
   c) magnetizing the magnetic sectors of the fan to generate a magnetic force.

2. The method as claimed in claim 1, wherein the magnetic sectors include axial-, radial-, rotation- or two-directional, or multi-polar sectors.

3. The method as claimed in claim 1 wherein the arrangement of the N and S poles includes isotropic, anisotropic or multi-polar arrangement.

4. The method as claimed in claim 1, wherein the magnetic material includes ferrite magnetic material, SmCo magnetic material, NdFeB magnetic material or FeCoNi magnetic material.

5. The method as claimed in claim 1, wherein the magnetic material is powdered and processed to form magnetic glue particles.

6. The method as claimed in claim 5, further includes mixing the magnetic material, resin and plastic material to form particles.

7. The method as claimed in claim 1, wherein step (b) includes injecting the magnetic material by injection, baking, sintering or powder metallurgy.

8. The method as claimed in claim 1, further comprising performing magnetic field analysis to design a mold, fusing the magnetic material, and injecting the fused magnetic material into the mold before step (b).

9. The method as claimed in claim 1, wherein the magnetization step in step (c) includes conducting electricity of the magnetic material.

10. The method as claimed in claim 1, further comprising a step of using a magnetization seat.

11. The method as claimed in claim 10, wherein step (b) comprises placing the fan in the magnetization seat, and applying a voltage to the magnetization seat to generate a magnetic field, so as to magnetize the fan.

12. The method as claimed in claim 10, wherein the magnetization seat includes a single-side magnetization structure, a complex magnetization structure, outer circumference multi-pole magnetization structure, or an inner circumference multi-pole magnetization.

13. A magnetized fan, including a hub and a plurality of blades radially extending from a periphery of the hub, wherein the magnetic fan includes a built-in magnetic material to form a plurality of magnetic sectors constructed by a plurality of N and S poles.

14. The fan as claimed in claim 12, wherein the blades include axial-flow blades, centrifugal-flow blades, inclined-flow blades or transverse-flow blades.

15. The fan as claimed in claim 12, wherein the magnetic sectors are distributed in the hub, the periphery of the hub, the blades or terminuses of the blades.

16. The fan as claimed in claim 13, wherein the magnetic material is built in all of the fan, or a portion of the fan.

17. The fan as claimed in claim 13, wherein the magnetic material includes ferrite magnetic material, SmCo magnetic material, NdFeB magnetic material or FeCoNi magnetic material.

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