A housing includes a top portion and a wall portion. The wall portion is connected with the circumference of the top portion. The top portion has a plurality of protruding structures disposed around a central axis of the top portion for increasing the force-bearing area of top portion. The thicknesses of the protruding structures are substantially the same as that of the top portion. The housing can be applied to a fan or a motor, and the housing can serve as a base of the motor, or serve as a hub of an impeller of the fan.
FIG. 1 (PRIOR ART)
FIG. 5
FAN, MOTOR AND HOUSING THEREOF

BACKGROUND OF THE INVENTION

[0002] 1. Field of Invention

[0003] The invention relates to a fan, a motor and a housing thereof, and in particular to a fan, a motor and a housing thereof with reinforced structures.

[0004] 2. Related Art

[0005] As modern electronic products are rapidly developing along a trend towards higher performance, higher frequency, higher speed and more compactness, heat generated by the electronic products increases. However, electronic products may be unstable at high temperatures, adversely affecting their reliability. Thus, the dissipation of heat has become an important issue for current electronic products.

[0006] Fans are common heat dissipating devices for electronic products. As shown in FIG. 1, a conventional fan 10 mainly has an impeller, which is composed of a plurality of blades 101 and a hub 102. The blades 101 are disposed around the hub 102, and the hub 102 is used for accommodating a motor (not shown), which drives the impeller to rotate. The rotating blades 101 can thus generate an airflow.

[0007] In order to dissipate the increasing heat generated by electronic products with ever more powerful functions, the prior art is to increase the airflow quantity and pressure of the fan 10 so as to enhance the heat dissipation efficiency. To increase the airflow quantity and pressure, the rotation speed of the motor or the area of the blades 101 in the prior art is increased. However, the impeller is easily caused by impact on shaking and vibration, and then the structures of the fan 10, especially the housing 102, are damaged.

[0008] Therefore, under the trend towards high efficient fan 10, it is an important subject to provide a fan, a motor and a housing thereof with strengthened structures.

SUMMARY OF THE INVENTION

[0009] In view of the foregoing, the invention is to provide a fan, a motor and a housing thereof with reinforced structures.

[0010] To achieve the above, the invention discloses a housing including a top portion and a wall portion. The wall portion is connected with the circumference of the top portion. The top portion has a plurality of protruding structures symmetrically disposed around a central axis of the top portion so as to increase the force-bearing area of the top portion over which force is dispersed thereon.

[0011] To achieve the above, the invention also discloses a motor, which includes a stator structure, a rotor structure and a housing. The rotor structure is disposed corresponding to the stator structure. The stator structure and rotor structure are accommodated in the housing. The housing includes a top portion and a wall portion connected with the circumference of the top portion. The top portion has a plurality of protruding structures symmetrically disposed around a central axis of the top portion so as to increase the force-bearing area of the top portion over which force is dispersed thereon.

[0012] To achieve the above, the invention further discloses a fan, which includes a motor, an impeller and a plurality of protruding structures. The motor includes a stator structure, a rotor structure, and a first housing. The stator structure and the rotor structure are disposed corresponding to each other and both are accommodated in the first housing. The impeller, which is connected with the rotor structure, includes a second housing and a plurality of blades disposed around the second housing. The protruding structures are disposed either on a top portion of the first housing or the second housing or the protruding structures can be disposed both on the top portions of the first housing and the second housing. The protruding structures are symmetrically located around a central axis of the top portion so as to increase the force-bearing area of the top portion over which force is dispersed thereon.

[0013] As mentioned above, the fan, motor and housing of the invention have a plurality of protruding structures disposed on the top portion of the housing. The thickness of the protruding structures is roughly the same as that of the top portion. In the invention, the protruding structures are formed by deforming the top portion of the housing. The protruding structures can increase the force-bearing area of the top portion so as to provide buffering in planes, and thus efficiently distribute the force applied to the housing evenly. The present invention utilizes the protruding structures instead of using additional elements such as ribs to providing reinforcing functions. Therefore, the present invention can achieve the object of strengthening the structure, and requires fewer raw materials in manufacturing, thus reducing the manufacturing cost.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The invention will become more fully understood from the detailed description given herein below illustration only, and thus is not restrictive of the present invention, and wherein:

[0015] FIG. 1 is a schematic view showing the conventional fan;

[0016] FIG. 2 and FIG. 3 are schematic views showing a housing according to an embodiment of the present invention;

[0017] FIG. 4 is a schematic view showing a motor according to an embodiment of the present invention; and

[0018] FIG. 5 is a schematic view showing a fan according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0019] The present invention will be apparent from the following detailed description, which proceeds with reference to the accompanying drawings, wherein the same references relate to the same elements.

[0020] With reference to FIG. 2, a housing 20 according to an embodiment of the present invention includes a top portion 201 and a wall portion 202. The wall portion 202 is connected with the circumference of the top portion 201. In the embodiment, the housing 20 serves as a base of a motor or a hub of a fan.

[0021] The top portion 201 includes a surface for bearing an external force. In this case, a plurality of protruding
structures 203 are formed on the top portion 201 and are disposed around a central axis of the top portion 201 so as to increase the force-bearing area over which force is dispersed thereon. The thickness of the protruding structures 203 is roughly the same as that of the top portion 201. Of course, the invention is not limited by this restriction, and the thickness of the protruding structures 203 may be different from that of the top portion 201, as requirements of practical uses, as long as the configuration of the protruding structures 203 can achieve the functions of increasing the force-bearing area of the top portion 201.

As shown in FIG. 3, which shows the cross section of the housing 20, the protruding structures 203 are formed by deforming the top portion 201 of the housing 20. In the embodiment, the protruding structures 203 are integrally formed on the top portion 201 of the housing 20 as a single piece. To be noted, the above aspect is for example only and the present invention is not limited to the above. That is, the protruding structures 203 and the top portion 201 may be different components, respectively, and they are connected to form the desired structure. Further, the protruding structures 203 are disposed around the central axis of the top portion 201 with equidistant intervals and are symmetrically arranged with respect to the central axis of the top portion 201.

In the embodiment, the cross section of the protruding structure 203 has a shape which is U-shaped, half-circular, half-elliptical, arched, polygonal, wave-shaped, toothlike, or has any other shapes. In addition, as shown in FIG. 2, each protruding structure 203 has a slanting surface used for buffering the force.

With reference to FIG. 4, a motor 2 according to an embodiment of the present invention includes a stator structure 21, a rotor structure 22, and a housing 20. The motor 2 can be an inner-rotor type motor or an outer-rotor type motor.

The rotor structure 22, which has a shaft 221, is disposed corresponding to the stator structure 21. The stator structure 21 mounts on the shaft 221. Thus, the rotor structure 22 can rotate relative to the stator structure 21 via the magnetic field effects.

In the embodiment, the stator structure 21 and the rotor structure 22 are accommodated in the housing 20, and the shaft 221 of the rotor structure 22 is connected with the housing 20. Herein, the housing 20 serves as a base of the motor 2. The top portion 201 is the surface adjacent to a bearing 23 of the motor 2. As shown in FIG. 4, the top portion 201 has a plurality of protruding structures 203, which is symmetrically disposed around a central axis of the top portion 201 for increasing force-bearing area of the top portion 201. The protruding structures 203 are capable of buffering the force generated as the rotating shaft 221 contacts the housing 20. In other words, the protruding structures 203 can buffer the force that the rotating rotor structure 22 applies to the top portion 201.

To be noted, the structural characteristics and functions of the housing 20 of this embodiment are the same as those of the previous embodiment, so the detailed descriptions are omitted.

Referring to FIG. 5, a fan 3 according to an embodiment of the present invention includes a motor 2, an impeller 30 and a plurality of protruding structures 203. The fan 3 can be an axial-flow fan or a centrifugal fan. In this embodiment, the fan 3 is, for example, a centrifugal fan.

The motor 2 includes a stator structure 21, a rotor structure 22 and a first housing 24. The first housing 24 is equivalent to the housing 20 of the previous embodiment, and the structural characteristics and functions of the motor 2 are the same as those of the previous embodiment, so the detailed descriptions thereof are omitted. In the embodiment, the first housing 24 is a base of the motor 2.

The impeller 30 is connected with the rotor structure 22 of the motor 2, includes a second housing 302 and a plurality of blades 301. The blades 301 are disposed around the second housing 302, and the second housing 302 is connected with the shaft 221. Therefore, when the shaft 221 of the motor 2 rotates, the impeller 30 rotates according thereto and thus generates an airflow. In the embodiment, the second housing 302 is a hub of the impeller 30.

In addition, the fan 3 further includes a connecting member 31, which connects the second housing 302 to the blades 301. In the embodiment, the second housing 302 is extended along the outer periphery of the second housing 302, and the blades 301 are fixed on the connecting member 31. Importantly, the above illustrations are for example only. The connecting member 31 may be integrally formed with the second housing 302 and the blades 301 as a single piece.

In summary, the fan, motor and housing of the present invention have a plurality of protruding structures disposed on the top portion of the housing. In addition, the thickness of the protruding structures is roughly the same as that of the top portion. In the invention, the protruding structures are formed by deforming the top portion of the housing. The protruding structures can increase the force-bearing area over which force is dispersed so as to provide buffering by planes. This structure can thus efficiently distribute the force applied to the housing evenly. The present invention utilizes the protruding structures instead of using additional elements such as ribs to providing reinforcing functions. Therefore, the present invention can achieve the object of strengthening the structure and can be manufactured with fewer raw materials so as to reduce the manufacturing cost.

Although the 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 invention.

What is claimed is:

1. A housing, comprising:
   a top portion having a plurality of protruding structures disposed around a central axis of the top portion to increase force-bearing area of the top portion; and
a wall portion connected with a circumference of the top portion.

2. The housing according to claim 1, wherein the protruding structures have thicknesses which are substantially the same as a thickness of the top portion.

3. The housing according to claim 1, wherein the protruding structures are disposed around the central axis of the top portion and are symmetrically arranged with respect to the central axis of the top portion.

4. The housing according to claim 1, wherein each of the protruding structures has a slanting surface, or each of the protruding structures has a cross section which is U-shaped, half-circular, half-elliptical, arched, polygonal, wave-shaped, or toothlike.

5. The housing according to claim 1, wherein the protruding structures are arranged with equidistant intervals, and the protruding structures are integrally formed on the top portion of the housing as a single piece.

6. The housing according to claim 1, wherein the housing serves as a base of a motor, or a hub of a fan.

7. A motor, comprising:
   a stator structure;
   a rotor structure disposed corresponding to the stator structure; and
   a housing, comprising a top portion and a wall portion, wherein the stator structure and the rotor structure are accommodated in the housing, the wall portion is connected with a circumference of the top portion, and the top portion has a plurality of protruding structures disposed around a central axis of the top portion for increasing force-bearing area of the top portion.

8. The motor according to claim 7, wherein the protruding structures have thicknesses which are substantially the same as a thickness of the top portion.

9. The motor according to claim 7, wherein the protruding structures are disposed around the central axis of the top portion and are symmetrically arranged with respect to the central axis of the top portion.

10. The motor according to claim 7, wherein each of the protruding structures has a slanting surface, or each of the protruding structures has a cross section which is U-shaped, half-circular, half-elliptical, arched, polygonal, wave-shaped, or toothlike.

11. The motor according to claim 7, wherein the protruding structures are arranged with equidistant intervals, and the protruding structures are integrally formed on the top portion of the housing as a single piece.

12. The motor according to claim 7, wherein the motor is an inner-rotor type motor or an outer-rotor type motor, and the housing serves as a base of the motor.

13. A fan, comprising:
   a motor, comprising a stator structure, a rotor structure, and a first housing, wherein the stator structure and the rotor structure are disposed corresponding to each other and are accommodated in the first housing;
   an impeller connected with the rotor structure and comprising a second housing and a plurality of blades, wherein the blades are disposed around the second housing, and the motor drives the impeller to rotate; and
   a plurality of protruding structures disposed on a top portion of the first housing or the second housing, wherein the protruding structures are disposed around a central axis of the top portion for increasing force-bearing area of the top portion.

14. The fan according to claim 13, wherein the protruding structures have thicknesses which are substantially the same as a thickness of the top portion.

15. The fan according to claim 13, wherein the protruding structures are disposed around the central axis of the top portion and are symmetrically arranged with respect to the central axis of the top portion.

16. The fan according to claim 13, wherein each of the protruding structures has a slanting surface, or each of the protruding structures has a cross section which is U-shaped, half-circular, half-elliptical, arched, polygonal, wave-shaped, or toothlike.

17. The fan according to claim 13, wherein the protruding structures are arranged with equidistant intervals, and the protruding structures are integrally formed on the top portion as a single piece.

18. The fan according to claim 13, wherein the first housing serves as a base of the motor, and the second housing serves as a hub of the impeller.

19. The fan according to claim 13, further comprising a connecting member connecting the second housing and the blades, and the connecting member is extended along an outer periphery of the second housing, and the blades are fixed on the connecting member.

20. The fan according to claim 19, wherein the connecting member, the second housing, and the blades are integrally formed as a single piece.