

SPINDLE MOTOR WITH SOUNDPROOFING

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a spindle motor. More particularly, the invention relates to a spindle motor with a soundproofing formed on a stator outside a peripheral surface of a rotor part for preventing noises and obtaining a slim-type motor.

10 2. Description of the Prior Art

FIG. 1 illustrates a schematic construction of a outer rotor-type DC spindle motor.

Referring to FIG. 1, the spindle motor comprises a rotor 1 and a stator 2. The rotor 2 includes a shaft 3, bearing 4, case 5 and magnet 6, while a stator 2 has a bearing holder 7 supporting the bearing 4 and the shaft 3. A core 9 with a wounded coil 8 is fixed in the bearing holder 7 of the stator 2, and the bearing holder 7 is formed integrally with a mounting plate 10 fixed to a housing.

20 With this construction of the motor, the core 6 and the magnet 6 of the rotor 1 cooperate to rotate the rotor 1 when a current is applied to the coil 8 of the stator 2.

Noise inside the motor, however, leaks out of the motor by way of a gap between the rotor 1 and the stator 2 during the rotation of the rotor 1. This leakage of noise is amplified by their reflection against the mounting plate 10 of the stator 2.

25 Furthermore, in the case of a motor mounted on a motor set, such noise is even more amplified by resonance, which is one

critical problem in manufacturing current low-noise motor sets.

It is nearly impossible to remove the noises because of its irregular reflection on outer members occurring when the rotor incompletely rotates due to friction of the motor bearings and eccentricity.

Many suggestions have been made in order to prevent the noise, for example, a method by precisely manufacturing a motor and a method by providing an outer soundproofing. The precise motor manufacture, however, has a limitation, and the separate soundproofing requires a larger space for motor installation and thus causes a rise in the cost of production and installation as well as puts difficulties in manufacturing a slim-type apparatus or motor.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a spindle motor with soundproofing means for minimizing motor noise and realizing a slim-type motor manufacture.

The characteristic of the present invention for attainment of this object is that in a spindle motor having a rotor and a stator, the spindle motor comprises soundproofing means formed on the stator outside a peripheral surface of the rotor.

According to this characteristic, the noise generated inside the motor during operation is absorbed in or reflected on the soundproofing means so as to prevent resonance and reduce the noise intensity remarkably, and the volume of the motor does not increase because the soundproofing means is formed on the stator, which means that a slim-type motor can be achieved.



BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and advantages of the present invention will become more readily apparent upon consideration of the following description and drawings in which:

5 FIG. 1 is a schematic sectional view of a conventional spindle motor;

FIG. 2 is a schematic sectional view according to a first embodiment of the present invention;

10 FIG. 3 is a fragmentary plan view of a soundproof wall of the spindle motor according to a second embodiment of the present invention;

FIG. 4 is a fragmentary front view of a soundproof wall of the spindle motor according to a third embodiment of the present invention.

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DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 2 is a sectional view of a spindle motor illustrating an embodiment of the invention. Referring to FIG. 2, the spindle motor comprises a rotor 1 including a shaft 3, bearing 4, case 5 and magnet 6, and a stator 2 including a bearing holder 7 for supporting the bearing 4 and the shaft 3 and a core 9 fixed in the bearing holder 7 for winding a coil 8. The bearing holder 7 is formed integrally with or fixed to a mounting plate 10.

25 According to this embodiment, a soundproof wall 12 as a soundproofing is formed on the mounting plate 10 of the stator 2. The soundproof wall 12 is formed concentrically to the case 5 of the rotor 1. The soundproof wall 12 is preferably formed



integrally with the mounting plate 10 of the stator 2.

Furthermore, the soundproof wall 12 is so formed that its height is correspondent to or more than a distance a between the rotor 1 and the stator 2 and a distance c between the soundproof wall 12 and the case 5 of the rotor 1 is correspondent to or less than the distance a between the rotor 1 and the stator 2, i.e. a b and a c .

The soundproof function of the soundproof wall 12 is described below.

When the motor is operated, noise is generated inside the motor and this noise resonates outside through a gap a between the bottom part of the rotor case 5 and the mounting plate 10 of the stator 2. The noise, however, comes into collision on the wall 12 prior to its escape outside to return inside the motor, with the result that only very little noise is conducted outside.

Moreover, although the noise is generated and travels outward, it does not escape outside until it undergoes multiple reflection and refraction on the wall 12, thereby the noise is reduced considerably. In other words, the noise travelling outward is absorbed in or reflected on the mounting plate 10 of the stator 2 and thus the magnitude of noise is reduced remarkably.

Additionally, since the wall 12 is formed integrally with the motor stator, a slim-type motor is realized owing to no effect on the volume change of the motor.

In FIG. 3 there is seen a second embodiment of the invention. Referring to FIG. 3, the soundproof wall 12 is formed with a plurality of concave and convex portions 13a on a inner



circumferential surface. These portions 13a optimize the soundproof effect by more effective reflection and refraction of the noise on the wall.

FIG. 4 illustrates a third embodiment of the invention. According to FIG. 4, the soundproof wall 12 is formed with a concave groove 14a at the lower end of the inner circumferential surface. This groove 14a can conduct the reflection and the refraction of the noise to the mounting plate 10 of the stator 2 and prevent the noise from escaping outside along with the wall.

As described hereinbefore, the spindle motor according to the invention permits significant reduction of the motor noise and realization of the slim-type motor.

Although the present invention has been described with reference to preferred embodiments, it will be understood that various changes and modifications may be made by those of skill in the art without departing from the spirit and the scope of the invention as set forth in the following claims.

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WHAT IS CLAIMED IS:

1. A spindle motor having a rotor and a stator, said spindle motor comprising soundproofing means formed on said stator outside a peripheral surface of said rotor.

5 2. A spindle motor according to claim 1 wherein said soundproofing means is a soundproof wall concentric to said rotor.

3. A spindle motor according to claim 2 or 3 wherein said soundproof wall is formed integrally with said stator.

10 4. A spindle motor according to claim 2 or 3 wherein a inner circumferential surface of said soundproof wall is formed in a concave and convex shape.

15 5. A spindle motor according to claim 2 or 3 wherein said soundproof wall is formed with a concave groove at the lower end of said inner circumferential surface.

20 6. A spindle motor according to claim 2 or 3 wherein said soundproof wall is so formed that its height is correspondent to or more than a distance between said rotor and said stator and a distance between said soundproof wall and a case of said rotor is correspondent to or less than the distance between said rotor and said stator.

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