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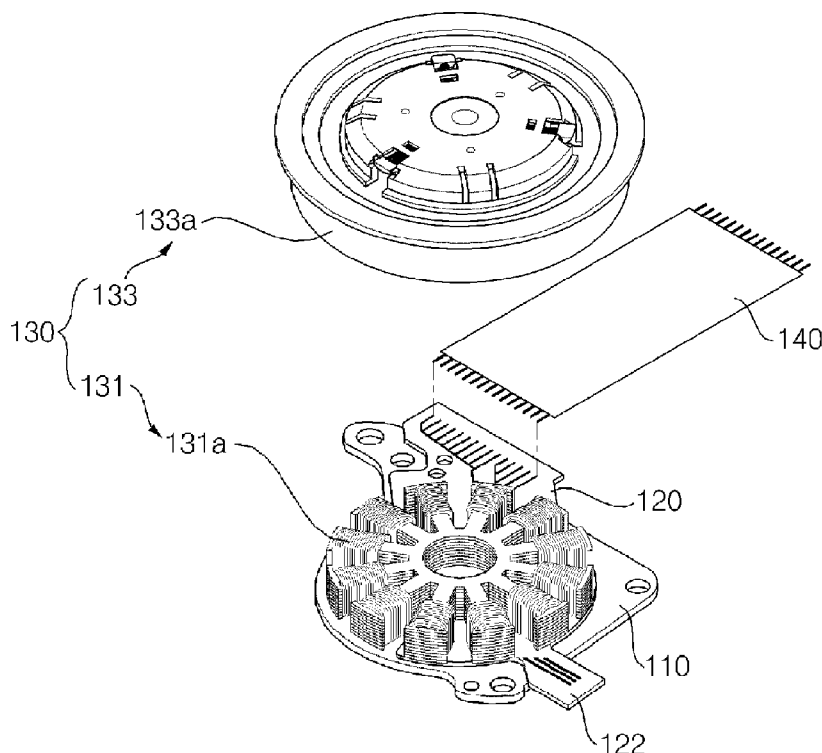
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(54) Title: SPINDLE MOTOR
[Fig. 2]



[Continued on next page]



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(57) Abstract: A spindle motor is disclosed, where the spindle motor is provided with only a substrate for driving a motor unit and a base having a substantially same size as that of the substrate, whereby the sizes of the substrate and the base are reduced to save the manufacturing cost. Furthermore, the substrate and the outside are connected by using an FFC (Flexible Flat Cable) to further reduce the manufacturing cost.

Description

Title of Invention: SPINDLE MOTOR

Technical Field

- [1] The present invention relates to a spindle motor.

Background Art

- [2] A spindle motor performs the function of rotating a disk to enable an optical pickup which linearly reciprocates in an optical disk drive (ODD) to read data recorded on the disk.

[3]

- [4] FIG. 1 is a perspective view illustrating the conventional spindle motor. Referring to FIG.1, a base (11) is mounted with a substrate (21) and a motor (31). The substrate (21) is integrally formed with an auxiliary substrate (25). The auxiliary substrate (25) is connected to the substrate (21) and is also connected to a main substrate of the product and a stepping motor for feeding an optical pickup.

[5]

- [6] The motor unit (31) is supportively disposed at a portion of the base mounted with the substrate (21) to be connected to the substrate (21). If an external power is transmitted to the motor unit (31) via the substrate (21), the spindle motor is rotated to rotate the disk.

[7]

- [8] The thus configured conventional spindle motor is such that the substrate (21) is integrally formed with the auxiliary substrate (25) to increase the size and area of the base (11), making it difficult to install the spindle motor in a compact space and causing the manufacturing cost to increase.

Disclosure of Invention

Technical Problem

- [9] The present invention is disclosed to obviate the above-mentioned problems, and it is an object to provide a spindle motor capable of reducing the manufacturing cost.

Solution to Problem

- [10] In one general aspect of the present invention, there is provided a spindle motor comprising: a base; a substrate coupled to the base; a motor unit supportively formed at the base and connected to the substrate, wherein the substrate is composed of a circuit for driving the motor unit, and the substrate is connected by an FFC (Flexible Flat Cable), and the substrate is connected to an outside via the FFC.

Advantageous Effects of Invention

- [11] The spindle motor according to the present invention is provided with only a

substrate for driving a motor unit and a base having a substantially same size as that of the substrate. Therefore, the sizes of the substrate and the base are reduced to save the manufacturing cost. Furthermore, the substrate and the outside are connected by using the FFC (Flexible Flat Cable) to further reduce the manufacturing cost.

Brief Description of Drawings

- [12] FIG.1 is a perspective view illustrating the conventional spindle motor.
- [13] FIG.2 is a perspective view illustrating a spindle motor according to a first exemplary embodiment of the present invention.
- [14] FIG.3 is a bottom view of a base and a substrate illustrated in FIG.2.
- [15] FIG.4 is a perspective view of essential elements of a spindle motor according to a second exemplary embodiment of the present invention.
- [16] FIG.5 is a perspective view of essential elements of a spindle motor according to a third exemplary embodiment of the present invention.

Best Mode for Carrying out the Invention

- [17] A spindle motor according to the exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings.
- [18]
- [19] FIG.2 is a perspective view illustrating a spindle motor according to a first exemplary embodiment of the present invention, and FIG.3 is a bottom view of a base and a substrate illustrated in FIG.2.
- [20]
- [21] As depicted in the drawings, a spindle motor according to the first exemplary embodiment of the present invention includes a base (110), a substrate (120) and a motor unit (130).
- [22]
- [23] In designating a direction and a surface of constituent parts, a direction and a surface facing an upper vertical side of the base (110) are respectively called "an upper side" and "an upper surface", while a direction and a surface facing a bottom vertical side of the base are respectively called "a bottom side" and "a bottom surface".
- [24]
- [25] The base (110) is made of a metal, and a bottom of the base is coupled to the product. The substrate (120) is coupled at its bottom to an upper surface of the base (110), and the motor unit (130) is supported by the base (110) to be erectively installed.
- [26]
- [27] A coil (131a) of a stator (131) in the motor unit (130) is connected to the substrate (120) to receive an external power. If the power is applied to the coil (131a), a rotor (133) is rotated by operation from the stator (131) and the rotor (133), whereby a disk

mounted on a rotor yoke (133a) of the rotor (133) is rotated.

[28] The substrate (120) of the spindle motor according to the first exemplary embodiment of the present invention is formed only with a circuit necessary for driving the motor unit (130), such that the substrate (120) must be connected to an external part that supplies a power to the spindle motor. At this time, the external part may be a power unit, a driving integrated circuit, a stepping motor and the like. The external part may be comprised of a single part or more than two parts.

[29]

[30] To this end, the substrate (120) is connected to one side of an FFC (140. Flexible Flat Cable) via soldering method. The other side of the FFC (140) is connected to the external part via a connector contact or via soldering method.

[31]

[32] One side of the substrate (120) is protruded (122) outside of the base (110), and an upper surface or a bottom surface of the protruder (122) on the substrate (120) is formed with a connection terminal (122a). The connection terminal (122a) is provided on an extra base, and connected to a necessary external part.

[33]

[34] The spindle motor according to the exemplary embodiment of the present invention is provided only with a substrate (120) for driving the motor unit (130), such that the size of the base (110) is substantially the same size of the substrate (120), thereby reducing the size of the substrate (120) and the size of the base (110) to the advantage of reduction in manufacturing cost.

[35]

[36] FIG.4 is a perspective view of essential elements of a spindle motor according to a second exemplary embodiment of the present invention.

[37]

[38] Referring to FIG.4, the FFC (140) is made of a plurality of conductive cables each arranged in parallel, which are wrapped by an insulation body. It is difficult to reduce the length of the FFC (140) shorter than 30mm due to characteristics in manufacturing process. However, there may occur a case where the FFC (240) manufactured to have a length longer than a predetermined length has to be arranged at a portion having a connection shorter than the length of FFC (240). At this time, if one side of the FFC (240) is connected to the substrate (220), and if the length of the FFC (240) that is exposed to the outside is longer than is necessary, there may occur a contact interference with other parts or a problem of decreased space availability.

[39]

[40] In a bid to solve this or other problems, a center portion of FFC (240) is lengthwise or widthwise folded once or several times, stacked and pressed. Then, the FFC (240) is

shortened to allow being connected to an external part having a short connection length or increasing the space availability.

Mode for the Invention

[41] FIG.5 is a perspective view of essential elements of a spindle motor according to a third exemplary embodiment of the present invention.

[42]

[43] Referring to FIG.5, an external power supply side may be differently located from a direction of an object depending on a space where a spindle motor is installed. To this end, a connector of an FFC (340) may include a first connecting unit (341) and a second connecting unit (343).

[44] Therefore, a portion of FFC (340), for example, a boundary portion (340a) with the first connecting unit (341) of FFC (340) connected to a first external part such as the power supply and with the second connecting unit (343) of FFC (340) connected to a second connection may be cut. That is, a part of the insulation body is cut along the widthwise direction of the conductive cables to allow one side of the FFC (340) to be connected widthwise but allow the other side of the FFC (340) to be separated into two strands.

[45]

[46] At this time, an FFC (340) portion positioned at the boundary portion (340a) between the first connecting unit (341) and the second connecting unit (343) may form an unused conductive cable or a dummy part which is an insulation body, and thereafter the dummy part is cut off. That is, the FFC (340) includes the dummy part arranged between the conductive cables, and part of the insulation body comprising the FFC (340) is cut off from the portion on which the dummy part is arranged.

[47]

[48] Furthermore, the first connecting unit (341) of FFC (340) may be lengthwise folded at the center thereof and stacked, while the second connecting unit (343) of the FFC (340) may be widthwise folded. Conversely, the first connecting unit (341) of FFC (340) may be widthwise folded, while the second connecting unit (343) of FFC (340) may be lengthwise folded at the center portion thereof.

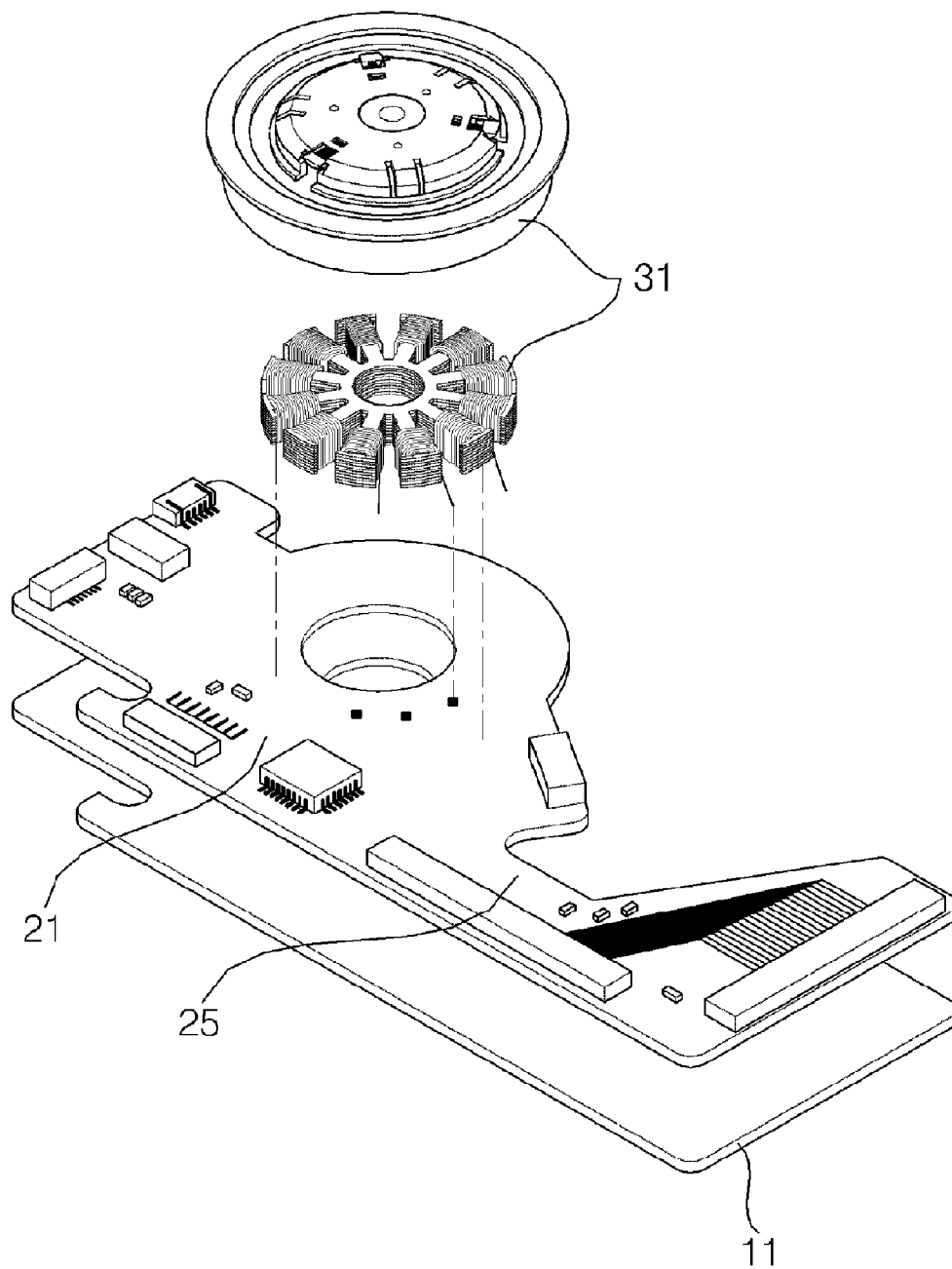
Industrial Applicability

[49] The spindle motor according to the present invention has an industrial applicability in that it is provided with only a substrate for driving a motor unit and a base having a substantially same size as that of the substrate, whereby the sizes of the substrate and the base are reduced to save the manufacturing cost. Furthermore, the substrate and the outside are connected by using the FFC (Flexible Flat Cable) to further reduce the manufacturing cost.

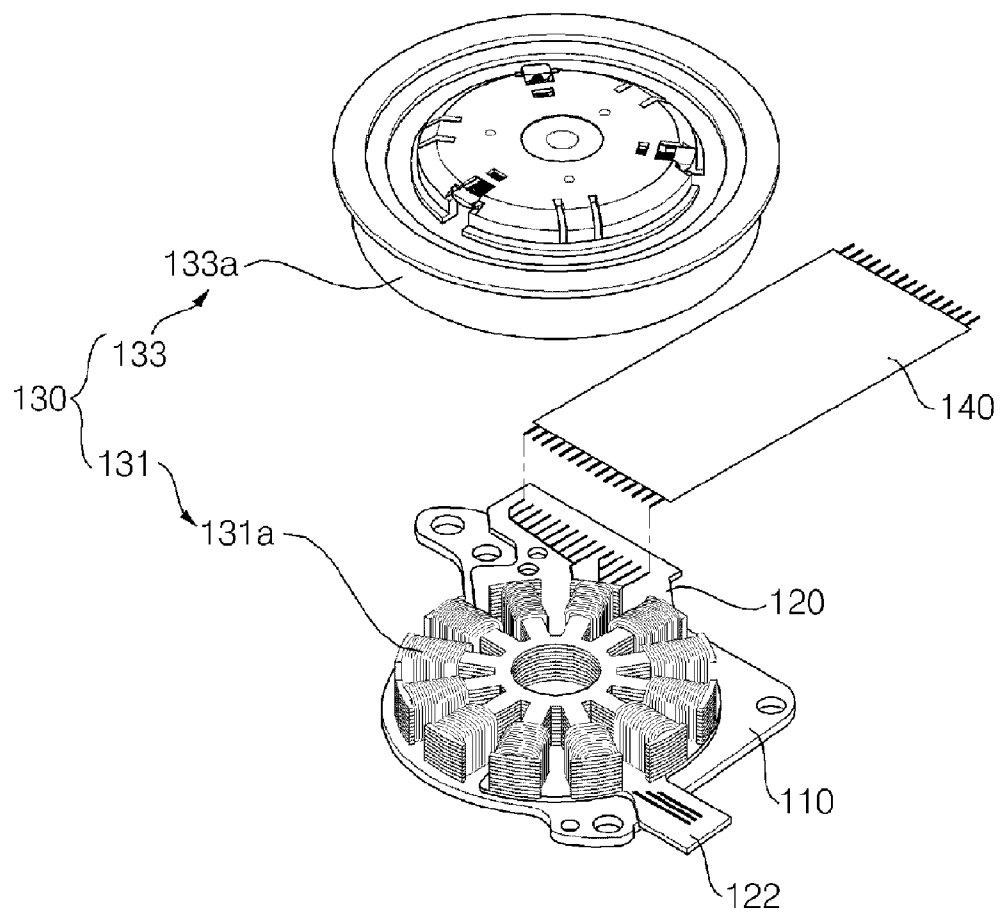
Claims

- [Claim 1] A spindle motor comprising: a base; a substrate coupled to the base; a motor unit supportively formed at the base and connected to the substrate, wherein the substrate is composed of a circuit for driving the motor unit, and the substrate is connected by an FFC (Flexible Flat Cable), and the substrate is connected to an outside via a connecting unit of the FFC.
- [Claim 2] The spindle motor claim 1, wherein parts of the FFC are folded and overlapped each other.
- [Claim 3] The spindle motor claim 1, wherein the FFC made of a plurality of conductive cables each arranged in parallel, and wrapped by an insulation body includes a cut-off part where a part of the insulation body is cut off.
- [Claim 4] The spindle motor claim 3, wherein the FFC includes a dummy part arranged between the conductive cables, and a part of the insulation body is cut off from a portion on which the dummy part is arranged.
- [Claim 5] The spindle motor claim 2, wherein the connecting unit of FFC includes a first connecting unit and a second connecting unit, each arranged at a different position, where the first connecting unit is folded and stacked lengthwise while the second connecting unit is folded widthwise.
- [Claim 6] The spindle motor claim 1, wherein one side of the substrate is protruded to an outside of the base, and the protruder is formed with a connection terminal.

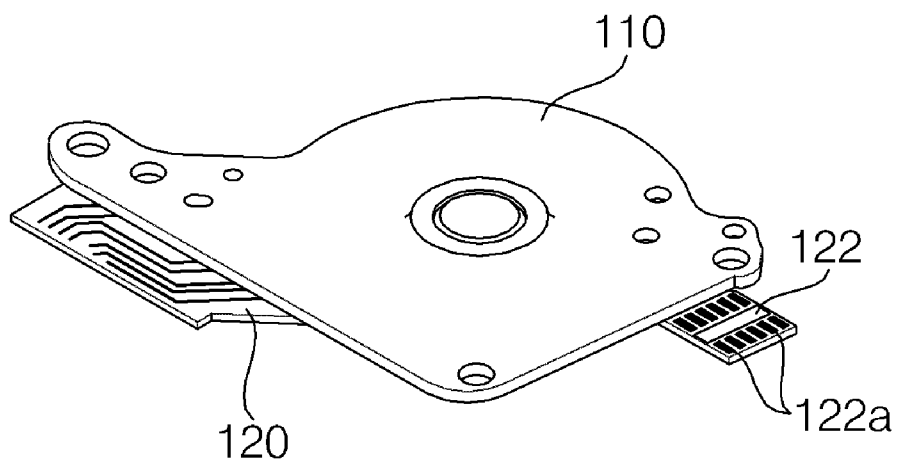
[Fig. 1]



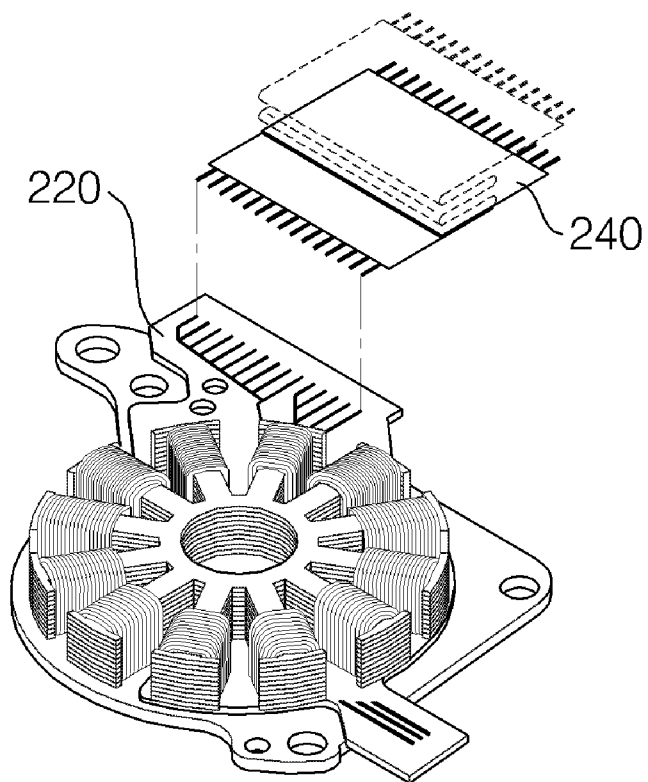
[Fig. 2]



[Fig. 3]



[Fig. 4]



[Fig. 5]

