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(54) **Title of the Invention: METHOD FOR MANUFACTURING ARMATURE FOR INTERNAL-ROTATION TYPE MULTIPOLAR MAGNET GENERATOR**

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(72) Inventor: Masahiro Asai 1-1, Showa-cho, Kariya-shi, within Nippondenso Co., Ltd.

(71) Applicant: Nippondenso Co., Ltd. 1-1, Showa-cho, Kariya-shi

(74) Agents: Takashi Okabe, Patent Attorney

Specification

1. Title of the Invention

METHOD FOR MANUFACTURING ARMATURE FOR INTERNAL-ROTATION TYPE MULTIPOLAR MAGNET GENERATOR

2. Claims

1. A method for manufacturing an armature for an internal-rotation type multipolar magnet generator, said method comprising:

arranging a plurality of magnetic pole cores in an outer circumference of a support member such that the plurality of magnetic pole cores is projected radially;

winding generating coils to outer circumferences of the plurality of magnetic pole cores, and thereafter;

fixing the outer circumferences of the plurality of magnetic pole cores to an inner circumference side of an outer circumference core, which has a ring-shape.

2. The method according to claim 1,

wherein the support member is formed of a resin so that the support member has a ring-shape and is integrated with an insulation material formed in the outer circumferences of the plurality of magnetic pole cores.

3. Detailed Description of Embodiments

[Industrial Applicability]

The present invention relates to a method for manufacturing an armature for an internal-rotation type multipolar magnet generator, the armature including, inside its inner circumference, a plurality of magnetic pole cores projected radially.

[Related Art]

As a generally known internal-rotation type multipolar magnet generator, there has been the one including an outer circumference core, a plurality of magnetic pole cores that is integrated with an inner circumference of the outer circumference core and is projected radially, and generating coils wound to outer circumferences of the magnetic pole cores from the inside of the outer circumference core (for example, Japanese Examined Utility Model (Registration) Application Publication No. S50-5922).

[Problem to be Solved]

However, according to the above-described known technique, since the generating coils are wound to the outer circumferences of the magnetic pole cores from the inside of the outer circumference core, the winding of the generating coils is disturbed by the outer circumference core. Furthermore, a winding machine has a complex configuration. Moreover, for, e.g., an external-rotation type multipolar magnet generator including an inner circumference core and a plurality of magnet pole portions that is disposed on an outer circumference of the inner circumference core and is projected radially, a winding machine is designed to wind, from the outside, generating coils to outer circumferences of the magnetic pole portions. Such a winding machine is not applicable to the above-described internal-rotation type multipolar magnet generator. Thus, for manufacturing of the multipolar magnet generator, which involves a wide-variety small-lot production and a lot of production fluctuations, a lot of equipment with a low operation ratio is necessary. This causes the problem of a cost increase.

In view of this, an object of the present invention is to allow the winding machine for an armature for the external-rotation type multipolar magnetic generator to be applicable even to an armature for the internal-rotation type multipolar magnet generator.

[Means for Solving the Problem]

In order to attain the object, the present invention provides a method for manufacturing an armature for an internal-rotation type multipolar magnet generator, the method including arranging a plurality of magnetic pole cores in an outer circumference of a support member such that the plurality of magnetic pole cores is projected radially, winding generating coils to outer circumferences of the plurality of magnetic pole cores, and thereafter fixing the outer circumferences of the plurality of magnetic pole cores to an inner circumference side

of an outer circumference core, which has a ring-shape.

[Effects]

With this, before the magnetic pole cores are assembled to the outer circumference core, the winding of the generating coils can be performed by a winding machine in a state where the magnetic pole cores are arranged similarly to those of the external-rotation type.

[Embodiments]

The following describes the present invention with reference to embodiments illustrated in the drawings. In Figs. 1 to 3, the reference numeral “1” indicates an outer circumference core including an attachment hole 1a and a plurality of wedge-shaped grooves 1b. The attachment hole 1a is designed to perform attachment to an engine case (not illustrated). The plurality of wedge-shaped grooves 1b, provided in an inner circumference of the outer circumference core 1, is configured to be engaged with wedge-shaped projections 2b formed on outer circumference portions of a plurality of magnetic pole cores 2 that is projected radially. The outer circumference core 1 is constituted by stacking of laminated steel sheets, and is formed in a ring-shape. The reference numeral “2” indicates the magnetic pole cores each having a magnetic pole portion 2a, which is disposed in a winding portion and an inner surface portion separated from the outer circumference core 1 and which is opposed to a rotor (not illustrated). The reference numeral “3” indicates generator coils wound to the outer circumferences of the magnetic pole cores 2. The reference numeral “4” indicates an insulation material fixedly attached to the outer circumferences of the magnetic pole cores 2 so that the generating coils 3 and the magnetic pole cores 2 are insulated from each other. A support member 4a, which has a ring-shape and is designed to make the magnetic pole cores 2 continuous, is formed of a resin so as to be integrated with an inner circumference portion of the insulation material 4, the inner circumference portion being opposed to the rotor. Furthermore, the reference numeral “4b” indicates side plates that are projected and insulate only the coil portions in order to avoid winding collapse in an outer side of the generating coils 2. The side plates 4b are formed of a resin such that the side plates 4b are integrated with the insulation material 4.

In the above configuration, the magnetic pole cores 2, which are separated from the outer circumference core 1, are formed of an insulation material (e.g., a nylon resin). In this case, as shown in Fig. 3, the magnetic pole cores 2 are arranged such that the magnetic pole cores 2 are projected outwardly and radially. Furthermore, inner circumference sides of the magnetic pole cores 2 are made continuous by the ring-shaped support member 4a of the insulation material 4, so that the magnetic pole cores 2 are integrated together in advance. In this state, winding wires of the generating coils 3 are wound by a winding machine to the magnetic pole cores 2 from an outer circumference having an opening. After the winding, the wedge-shaped projections 2b of the magnetic pole cores 2, which have been made continuous, are simultaneously driven into the

wedge-shaped grooves 1b of the ring-shaped outer circumference core 1 for engagement therebetween. Thus, an armature as those shown in Fig. 1 is given.

Fig. 4 shows another embodiment of the present invention. In this embodiment, a support member 4a of an insulation material 4 is formed of a resin linearly in advance, so that magnetic pole cores 2 are made continuous. The magnetic pole cores 2 are then segmented by thin-walled portions 4b of the continuous support member 4a into pieces whose number corresponds to a desired number of poles. The resin pieces, which are continuous for the necessary number of poles, are bent into a ring shape. Thereafter, generating coils 3 are consecutively wound around the magnetic pole cores 2 by a winding machine. Furthermore, after the winding, wedge-shaped projections 2b of the magnetic pole cores 2 are driven into wedge-shaped grooves 1b of an outer circumference core 1 for engagement therebetween. Thus, an armature is given. Here, parts of the thin-walled portions 4b in the resin pieces, which are formed of a resin so as to be continuous, has a reduced thickness to facilitate the bending at the continued portions. Moreover, as necessary, the support member 4a may be cut off at all the thin-walled portions 4b at a final stage, so that the support member 4a is separated into pieces each including one respective magnetic pole core 2.

Fig. 5 shows further another embodiment. In this embodiment, each magnetic pole core 2 has a magnetic pole portion 2a, which is a part of both end plates 5 and is opposed to a rotor. The magnetic pole portion 2a has a flange 5a formed to be projected in an axial direction and to be bent.

In the above-described embodiment, the support member 4a is formed to be integrated with the insulation member 4. Alternatively, in addition to the insulation member 4, a support member (which may be made of a metal material) may be provided. Such a support member is configured to detachably support inner circumference ends of magnetic pole cores 2 in such a manner that the magnetic pole cores 2 are projected outwardly and radially. After generating coils 3 are wound around the magnetic pole cores, the magnetic pole cores 2 are simultaneously assembled to an outer circumference core 1. Thereafter, the support member is separated from the magnetic pole cores 2. In this manner, the support member may be consecutively used as a manufacturing device for an armature 4, in manufacturing of the armature.

[Effects of the Invention]

As described above, with the present invention, before magnetic pole cores are assembled to an outer circumference core, the winding of the generating coils can be performed by a winding machine in a state where the magnetic pole cores are arranged similarly to those of the external-rotation type. Thus, the winding of the generating coils is not disturbed by the outer circumference core. Therefore, with the present invention, a configuration of the winding machine can be simplified. In addition to this, with the present invention, a single winding machine is applicable to both the internal-rotation type multipolar magnet generator and the

external-rotation type multipolar magnet generator. This effectively increases an operation ratio of the winding machine, thereby bringing about a great effect of a cost reduction.

4. Brief Description of the Drawings

Fig. 1 is a front view of an armature to which an embodiment of the method according to the present invention is applied.

Fig. 2 is a front view of a single magnetic pole core in the armature.

Fig. 3 is a front view illustrating a continuous state of the magnetic pole cores, the continuous state being observed just before winding of winding coils in the armature.

Fig. 4 is a front view of magnetic pole cores according to another embodiment of the method of the present invention.

Fig. 5 is a perspective view of further another embodiment of a single magnetic pole core in an armature.

1 Outer circumference core
2 Magnetic pole core
3 Generating coil
4 Insulation member
4a Support member

Agent Takashi Okabe, Patent Attorney

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