1b, and 1c are disposed opposite to individual concave surfaces of the core back segments 1d, 1e, and 1f. Specifically, for the core back segment 1f disposed at the left of the second core back segment group 1B, the concave surface of the core back segment 1f is disposed opposite to the respective concave surfaces of the core back segments 1a and 1b, a first end thereof is disposed opposite to the bottom of the concave surface of the core back segment 1a, and a second end thereof is disposed opposite to the bottom of the concave surface of the core back segment 1b. For the core back segment 1e disposed at the center of the second core back segment group 1B, the concave surface of the core back segment 1e is disposed opposite to the respective concave surfaces of the core back segments 1b and 1c, a first end thereof is disposed opposite to the bottom of the concave surface of the core back segment 1b, and a second end thereof is disposed opposite to the bottom of the concave surface of the core back segment 1c. For the core back segment 1d disposed at the right of the second core back segment group 1B, the concave surface of the core back segment 1d is disposed opposite to the concave surface of the core back segment 1c, and a first end thereof is disposed opposite to the bottom of the concave surface of the core back segment 1c.

[0017] A fitting portion 1af in a protruding shape to be fitted in a recessed portion 1fa formed at the first end of the core back segment 1f is formed at a first end of the core back segment 1a. A second end of the core back segment 1a is connected to a first end of the core back segment 1b via the thin-walled connection 1ab. A second end of the core back segment 1b is connected to a first end of the core back segment 1c via the thin-walled connection 1bc. A recessed portion 1cd in which a fitting portion 1dc

in a protruding shape formed at a second end of the core back segment 1d is formed at a second end of the core back segment 1c. The first end of the core back segment 1d is connected to the second end of the core back segment 1e via the thin-walled connection 1de. The first end of the core back segment 1e is connected to the second end of the core back segment 1f via the thin-walled connection 1ef.

[0018] The fitting structure of the core back segments 1a and 1f and the fitting structure of the core back segments 1c and 1d are not limited to those in the illustrated example. They may be structures in which a recessed portion is provided at the first end of the core back segment 1a, and a fitting portion in a protruding shape is provided at the first end of the core back segment 1f, and a fitting portion in a protruding shape is provided at the second end of the core back segment 1c, and a recessed portion is provided at the second end of the core back segment 1d.

[0019] A notch 12ab in a V shape widening from the convex surfaces toward concave surfaces of the core back segments is provided in a region surrounded by the thin-walled connection 1ab, the second end of the core back segment 1a, and the first end of the core back segment 1b. Likewise, notches 12bc, 12de, and 12ef in a V shape widening from the concave surfaces toward convex surfaces of the core back segments are provided in a region surrounded by the thin-walled connection 1bc, the second end of the core back segment 1b, and the first end of the core back segment 1c, a region surrounded by the thin-walled connection 1de, the second end of the core back segment 1e, and the first end of the core back segment 1d, and a region surrounded by the thin-walled connection 1ef, the second end of the core back segment 1f, and the first

[0028] The insulating bobbins 4b and 4e illustrated in FIG. 8 are provided to the tooth pieces 2b and 2e constituting the second tooth piece pair 2-2 fixed to the jig. The insulating bobbin 4b is an insulator made of resin for insulating the winding 5b illustrated in FIG. 11 from the tooth pieces 2b, and the insulating bobbin 4e is an insulator made of resin for insulating the winding 5e illustrated in FIG. 11 from the tooth pieces 2e. The insulating bobbin 4b and the insulating bobbin 4e are connected by the annular connecting member 6be. A pair of separators 4s insulating adjacent windings from each other are fixed to the connecting member 6be. This provides a second annular insulating tooth pair 31.

[0029] The insulating bobbins 4c and 4f illustrated in FIG. 9 are provided to the tooth pieces 2c and 2f constituting the third tooth piece pair 2-3 fixed to the jig. The insulating bobbin 4c is an insulator made of resin for insulating the winding 5c illustrated in FIG. 12 from the tooth pieces 2c, and the insulating bobbin 4f is an insulator made of resin for insulating the winding 5f illustrated in FIG. 12 from the tooth pieces 2f. The insulating bobbin 4c and the insulating bobbin 4f are connected by the annular connecting member 6cf. A pair of separators 4s insulating adjacent windings from each other are fixed to the connecting member 6cf. This provides a third annular insulating tooth pair 32.

[0030] Although the insulating bobbins 4a to 4f made of resin are used in the first embodiment, the material of the insulating bobbins 4a to 4f is not limited to resin.

[0031] Next, the windings 5a and 5d illustrated in FIG. 10 are wound around the first annular insulating tooth pair 30, the windings 5b and 5e illustrated in FIG. 11 are wound around the second annular insulating tooth pair 31, and the

recessed portion 1fa is different from the sheet thickness of the fitting portion 1af, and a plurality of core backs 1 is stacked, a recessed portion 1fa constituting a part of a core back 1, for example, enters a gap between the core back 1 and an adjacent core back 1, which can cause the problem that dimensional accuracy in the stacking direction suffers, or the fitting strength of the core back 1 is reduced. In the present embodiment, the first core back segment group 1A and the second core back segment group 1B arranged as illustrated in FIG. 1 are stamped out of the electromagnetic steel sheet 50, so that the sheet thickness of the recessed portion 1cd is equal to the sheet thickness of the fitting portion 1dc, and the sheet thickness of the recessed portion 1fa is equal to the sheet thickness of the fitting portion 1af. Therefore, the above problem can be prevented from occurring. Although an example of configuring the annular core back 1 using two core back segment groups has been explained with FIG. 14, the number of core back segment groups is not limited to two. When three or more core back segment groups are used to configure the annular core back 1, the same effects can be provided. In particular, division into an even number of core back segment groups allows the sheet thicknesses of all fitting portions to be made uniform.

[0034] Thereafter, as illustrated in FIG. 15, welding is performed on an abutting portion 6ab between the core back segments 1a and 1b, an abutting portion 6bc between the core back segments 1b and 1c, an abutting portion 6cd between the core back segments 1c and 1d, an abutting portion 6de between the core back segments 1d and 1e, an abutting portion 6ef between the core back segments 1e and 1f, and an abutting portion 6fa between the core back segments 1f and 1a. Portions illustrated by round points

In the first core back segment group 1-1, end portions of first core back segments of adjacent core back segments of the plurality of core back segments constituting the first core back segment group 1-1 are different in shape from end portions of second core back segments, and end portions 1a2, 1b2, 1c2, 1d2, 1e2, and 1f2 of the second core back segments have a shape protruding toward the first core back segments. In the first core back segment group 1-1, notches 12ab1, 12bc1, 12de1, and 12ef1 in a V shape widening from convex surfaces toward concave surfaces of the core back segments are provided in regions surrounded by the thin-walled connections 1ab, 1bc, 1de, and 1ef, the first core back segments, and the second core back segments. The notches 12ab1, 12bc1, 12de1, and 12ef1 correspond to the notches 12ab, 12bc, 12de, and 12ef illustrated in FIG. 2, respectively. However, the notches 12ab1 to 12ef1 illustrated in FIG. 17 have an asymmetrical V shape with respect to a line segment A passing through the thin-walled connections 1ab to 1ef and orthogonal to the longitudinal direction of the first core back segment group 1-1.

[0040] A second core back segment group 1-2 illustrated in FIG. 18 corresponds to the first core back segment group 1A or the second core back segment group 1B illustrated in FIG. 2, like the first core back segment group 1-1. In the second core back segment group 1-2, as in the first core back segment group 1-1, end portions of first core back segments of adjacent core back segments are different in shape from end portions of second core back segments. However, in the second core back segment group 1-2, end portions 1a3, 1b3, 1c3, 1d3, 1e3, and 1f3 of the first core back segments have a shape protruding toward the second core back segments. That is, notches 12ab2, 12bc2, 12de2, and 12ef2 have an asymmetrical V shape with respect to a

1b3 end portion, 1c1 groove, 1c11 opening, 1c12 bottom, 1c2, 1c3 end portion, 1d1 groove, 1d11 opening, 1d12 bottom, 1d2, 1d3 end portion, 1e1 groove, 1e11 opening, 1e12 bottom, 1e2, 1e3 end portion, 1f1 groove, 1f11 opening, 1f12 bottom, 1f2, 1f3 end portion, 1ab, 1bc, 1de, 1ef, 1fa thin-walled connection, 1af, 1dc fitting portion, 1cd, 1fa recessed portion, 1A first core back segment group, 1B second core back segment group, 1-1, 1-3 first core back segment group, 1-2, 1-4 second core back segment group, 1-5, 1-6 core back segment group, 2 tooth, 2a tooth piece, 2a1 fitting portion, 2a2 winding portion, 2a3 rotor-opposed surface, 2a4 distal end portion, 2b tooth piece, 2b1 fitting portion, 2b2 winding portion, 2b3 rotor-opposed surface, 2b4 distal end portion, 2c tooth piece, 2c1 fitting portion, 2c2 winding portion, 2c3 rotor-opposed surface, 2c4 distal end portion, 2d tooth piece, 2d1 fitting portion, 2d2 winding portion, 2d3 rotor-opposed surface, 2d4 distal end portion, 2e tooth piece, 2e1 fitting portion, 2e2 winding portion, 2e3 rotor-opposed surface, 2e4 distal end portion, 2f tooth piece, 2f1 fitting portion, 2f2 winding portion, 2f3 rotor-opposed surface, 2f4 distal end portion, 2g bridge, 2A, 2A-1 tooth piece group, 2-1 first tooth piece pair, 2-2 second tooth piece pair, 2-3 third tooth piece pair, 3 annular insulating tooth unit, 4a, 4b, 4c, 4d, 4e, 4f insulating bobbin, 4s separator, 5a, 5b, 5c, 5d, 5e, 5f winding, 6ad, 6be, 6cf connecting member, 6ab, 6bc, 6cd, 6de, 6ef, 6fa abutting portion, 7a1, 7b1, 7c1, 7a2, 7b2, 7c2 core back segment, 8 hole, 9 pin, 10b curved concave end portion, 10d curved convex end portion, 12ab, 12bc, 12de, 12ef notch, 12ab1, 12bc1, 12de1, 12ef1, 12ab2, 12bc2, 12de2, 12ef2 notch, 14, 15 overlapping portion, 30 first annular insulating tooth

CLAIMS

1. A method of manufacturing a motor stator comprising:

a step of stamping out of an electromagnetic steel sheet and then stacking first strip-shaped core back segment groups made by connecting a plurality of arc-shaped core back segments having a groove in a concave surface, second core back segment groups made by connecting a plurality of arc-shaped core back segments having a groove in a concave surface, the concave surface being disposed opposite to the concave surface of each of the plurality of core back segments constituting the first core back segment groups, and first tooth piece groups made up of a plurality of tooth pieces having a shape corresponding to the grooves of the plurality of core back segments constituting the first core back segment groups, and second tooth piece groups made up of a plurality of tooth pieces having a shape corresponding to the grooves of the plurality of core back segments constituting the second core back segment groups disposed between the first core back segment groups and the second core back segment groups;

a step of manufacturing an annular insulating tooth unit made by combining and disposing an even number of the first tooth piece groups and the second tooth piece groups in an annular shape and provided with windings;

a step of manufacturing a core back made by combining and forming an even number of the first core back segment groups and the second core back segment groups in an annular shape with first ends of the first core back segment groups connected to end portions of the second core back segment groups located opposite to the first ends of the first core back segment groups, and with second ends of the first core back segment groups stamped out of the

electromagnetic steel sheet connected to end portions of the second core back segment groups located opposite to the second ends of the first core back segment groups; and

a step of manufacturing a stator into which the annular insulating tooth unit and the core back are combined by fitting together fitting portions stamped out by the same die during die stamping.

2. The method of manufacturing the motor stator according to claim 1, wherein the first core back segment groups and the second core back segment groups stamped out of the electromagnetic steel sheets have notches of a shape widening from the convex surfaces toward concave surfaces of the core back segments, formed in regions surrounded by thin-walled connections connecting adjacent core back segments, first core back segments, and second core back segments.

3. The method of manufacturing the motor stator according to claim 2, wherein the notches have an asymmetrical V shape with respect to a line segment passing through the thin-walled connections and orthogonal to a longitudinal direction of the first core back segment groups and the second core back segment groups.

4. The method of manufacturing the motor stator according to claim 1, wherein

the first core back segment groups and the second core back segment groups stamped out of the electromagnetic steel sheets have holes formed in first end portions of adjacent core back segments, and

pins are inserted in the holes after the core back segments in which the holes are formed are stacked.

5. The method of manufacturing the motor stator according to claim 1, wherein the plurality of tooth pieces constituting the tooth piece groups are stamped out of the electromagnetic steel sheets in a state where the tooth pieces are connected by tooth piece connecting members.

6. The method of manufacturing the motor stator according to claim 1, wherein welding is performed, from a radially inside surface of the first core back segment groups and the second core back segment groups, on a portion of contact between adjacent core back segments of the plurality of core back segments constituting the core back.

7. The method of manufacturing the motor stator according to claim 1, wherein welding is performed, from a radially inside surface of the core back segment groups, between adjacent core back segment groups of the plurality of stacked first core back segment groups and the second core back segment groups.