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(71) Applicant (for all designated States except US): AISIN
SEIKI KABUSHIKI KAISHA [JP/JP]; 1, Asahi-machi
2-chome, Kariya-shi, Aichi 448-8650 (JP).

(72) Inventor; and

(75) Inventor/Applicant (for US only): DEAI, Junji
[JP/JP]; c/o AISHIN SEIKI KABUSHIKI KAISHA,
1, Asahi-machi 2-chome, Kariya-shi, Aichi 448-8650 (JP).

(74) Agent: KITAMURA, Shuichiro; 3-18, Nakanoshima
2-chome, Kita-ku, Osaka-shi, Osaka 5300005 (JP).

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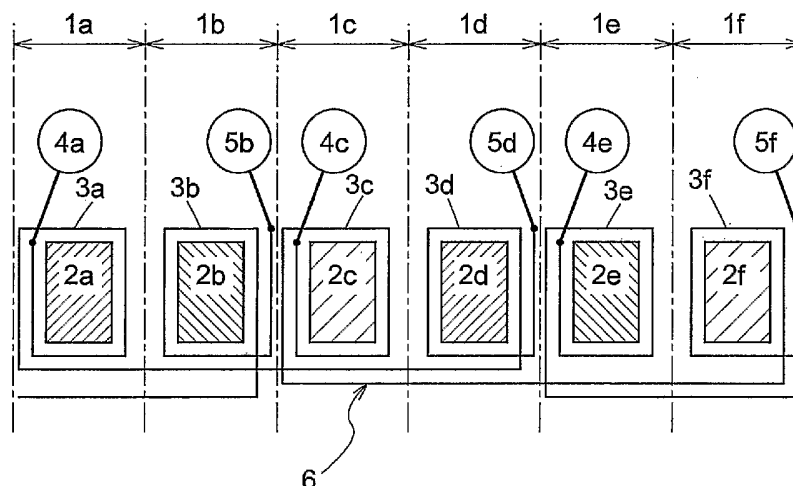
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(54) Title: STATOR FOR ELECTRIC ROTARY MACHINE



(57) Abstract: A stator for an electric rotary machine has a magnetic pole member arranged along a rotational direction of a rotor. The magnetic pole member includes at least two pairs of magnetic pole elements. Each pair of magnetic pole elements has a stator coil wire. Each stator coil wire includes an electric-source-side coil (3a, 3c, 3e) wound around one of said pair of magnetic pole elements and a neutral-point-side coil (3b, 3d, 3f) wound around the other of said pair of magnetic pole elements. The electric-source-side coil (3a, 3c, 3e) and the neutral-point-side coil (3b, 3d, 3f) are electrically connected through a connection wire (6). Each electric-source-side coil (3a, 3c, 3e) extends between a first end (4a, 4c, 4e) connected to an electric source and the connection wire (6). Each neutral-point-side coil (3b, 3d, 3f) extends between a second end (5b, 5d, 5f) connected to the neutral point and the connection wire (6). The first ends (4a, 4c, 4e) and the second ends (5b, 5d, 5f) are provided on one axial side of the stator whereas a connection between the electric-source-side coil (3a, 3c, 3e) wire and the connection wire (6) and the connection between the neutral-point-side coil (3b, 3d, 3f) and the connection wire (6) are provided on the other axial side of the stator.



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DESCRIPTION

STATOR FOR ELECTRIC ROTARY MACHINE

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TECHNICAL FIELD

The present invention relates to a stator for an electric rotary machine. More particularly, the present invention pertains to a stator for an electric rotary machine including magnet poles arranged along a rotational direction of a rotor and each having a stator coil wire.

10

BACKGROUND ART

In a conventional stator of an electric rotary machine such as an electric generator and an electric motor, as described in Japanese Patent Laid-Open Publication No. 2001-275291, a pair of magnetic pole elements form one phase. An electric-source-side stator coil wire is coiled around one magnetic pole element, and a neutral-point-side stator coil wire is coiled around the other magnetic pole element. The electric-source-side stator coil wire and the neutral-point-side stator coil wire are connected through a connection wire provided between the magnetic pole elements in the pair. The electric-source-side stator coil wire includes an end connected to a electric source and an end connected to the connection wire. Further, the neutral-point-side stator coil wire includes an end connected to a neutral point and an end connected to the connection wire. The end connected to the electric source, the end connected to the neutral point, and the connection wire are provided on one side the stator. In addition, there are some devices where a plurality of stator coil wires, configured from the electric-source-side stator coil wires, the connection wires, and the neutral-point-side stator coil wires are provided in parallel. For example, when two parallel stator wires are coiled for forming the a pair of magnet pole elements, two electric-source-side stator coil wires are coiled for forming one of the magnet pole elements in the pair, and two neutral-point-side stator coil wires are coiled for forming the other of the magnet pole elements in the pair, and two connection wires are provided

between the pair of magnet pole elements for connecting the electric-source-side stator coil wires and the neutral-point-side stator coil wires respectively.

In the conventional stator of the electric rotary machine, the end connected to the electric source and the end connected to the neutral point, and the connection wire of the stator wire are provided on the same side of the stator. Therefore, when the number of wires placed in parallel wires increases, space required for providing the ends connected to the electric source, the ends connected to the neutral point, and the connection wires becomes larger on that side of the stator. Then, some times, the spaces for the ends connected to the electric source, the ends connected to the neutral point, and the connection wire overlap one another, which tends to require complex wiring of the stator coil wire. The complex wiring tends to cause much labor for coiling the stator coil wire.

A need thus exists for a stator for an electric rotary machine enabling simple wiring work for a stator wire even when the number of stator coil wires placed in parallel is large. The present invention was made in view of the above circumstances and provides such a stator for an electric rotary machine. The present invention can also provide a simplified structure for stators where the number of wires placed in parallel is not large.

DISCLOSURE OF THE INVENTION

According to an aspect of the present invention, a stator for an electric rotary machine has a magnetic pole member arranged along a rotational direction of a rotor. The magnetic pole member includes at least two pairs of magnetic pole elements. Each pair of magnetic pole elements has a stator coil wire. Each stator coil wire includes an electric-source-side stator coil wire coiled around one of said pair of magnetic pole elements and a neutral-point-side stator coil wire coiled around the other of said pair of magnetic pole elements. The electric-source-side stator coil wire and the neutral-point-side stator coil wires are electrically connected through a connection wire. The electric-source-side stator coil wire extends between a first end connected to an electric source and the connection wire. The neutral-point-side stator coil wire extends between a second end connected to a neutral point and the connection wire. The first end and the second end are provided on

one side of the stator whereas a connection between the electric-source-side stator coil wire and the connection wire and a connection between the neutral-point-side stator coil wire and the connection wire are provided on the other side of the stator.

According to a further aspect of the present invention, a stator for electric rotary
5 machine includes a magnetic pole member arranged along a rotational direction of a rotor.
The magnetic pole member includes at least two pairs of magnetic pole elements. Each
pair of magnetic pole elements has a stator coil wire. Each stator coil wire includes an
electric-source-side stator coil wire coiled around one of said pair of magnetic pole
elements and a neutral-point-side stator coil wire coiled around the other of said pair of
10 magnetic pole elements. The electric-source-side stator coil wire and the neutral-point-side
stator coil wire are electrically connected through a connection wire. The electric-source-
side stator coil wire extends between a first end connected to an electric source and the
connection wire and the neutral-point-side stator coil wire extends between a second end
connected to a neutral point and the connection wire. The first end and the second end are
15 provided on one side of the stator. The number of turns of the electric-source-side stator
coil wire extending between the first end and the connection wire is an integer + 1/2 and
the number of turns of the neutral-point-side stator coil wire extending between second end
and the connection wire is an integer + 1/2.

20 BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and additional features and characteristics of the present invention
will become more apparent from the following detailed description considered with
reference to the accompanying drawing figures in which like reference numerals designate
like elements.

25 Fig. 1 represents a diagram illustrating a stator of an electric rotary machine seen
from one side of the stator.

Fig. 2 represents a cross-sectional view illustrating the stator taken on line II-II of
Fig. 1.

Fig. 3 represents a diagram illustrating the stator seen from the other side of the stator.

Fig. 4 represents a schematic view illustrating a fundamental coiled wire structure of a stator coil wire.

5 Fig. 5 represents a schematic view illustrating a parallel coiled wire structure of the stator coil wire.

Fig. 6 represents a diagram illustrating the electric rotary machine.

BEST MODE FOR CARRYING OUT THE INVENTION

10 Embodiments of the present invention will be explained with reference to the illustrations of the drawing figures as follows. According to an embodiment of the present invention, as illustrated in Fig. 6, an electric rotary machine includes a rotor 11 and a stator S provided so as to surround the rotor 11. The rotor 11 is provided so as to rotate with a shaft 12 rotatably provided at a housing 13. The stator S is provided in the housing 13 so as not to rotate. Fig. 1 represents a diagram illustrating the stator S of the electric rotary machine such as an electric generator and an electric motor seen from one side of the stator S. Fig. 2 represents a cross-sectional view of the stator S illustrated in Fig. 1 taken on line II-II of Fig. 1. Fig. 3 represents a diagram illustrating the stator S of the electric rotary machine illustrated in Fig. 1 seen from the other side of the stator S. As illustrated in Fig. 1 and Fig. 2, the stator S includes a magnetic pole member 1 forming a plurality of magnetic pole elements 1a, 1b, 1c, 1d, 1e, and 1f (6 pole elements in the embodiment) arranged along a rotational direction of the rotor 11 so as to surround a cylindrical space in which the rotor 11 is rotatably provided. Each magnetic pole elements 1a, 1b, 1c, 1d, 1e, and 1f is configured from a stator coil wire 3 coiled around each coil frame member (2a, 2b, 2c, 2d, 2e, and 2f). Each coil frame member 2a, 2b, 2c, 2d, 2e, and 2f is a part of an iron core 10. 15 20 25 The six magnetic pole elements 1a, 1b, 1c, 1d, 1e, and 1f form three pairs of poles, which generate a U phase, a V phase, and a W phase. The U phase is generated by a magnetic pole element 1a and a magnetic pole element 1d. The V phase is generated by a magnetic pole element 1e and a magnetic pole element 1b. The W phase is generated by a magnetic

pole element 1c and a magnetic pole element 1f. Then, the stator coil wire 3 forming each of the magnetic pole elements 1a, 1e, and 1c is connected to an electric source through each electric source terminal 4 (4a, 4e, 4c) serving as an end connected to the electric source. In the present description, while an electrical terminal can serve as an end of a wire, an end of a wire does not always have to be a terminal. In stead, an end of a wire can have other forms known to a person skilled in the art, such as an exposed conducting wire. The stator coil wire 3 forming each of the magnetic pole elements 1d, 1b and 1f is connected to each neutral point terminal 5 (5d, 5b, 5f) serving as an end connected to the neutral point. Accordingly, in following explanations, the stator coil wire 3 coiled for forming each of the magnetic pole element 1a, the magnetic pole element 1b, and the magnetic pole element 1c will be referred to an electric-source-side stator coil wire 3a, 3b, and 3c. The stator coil wire 3 coiled for forming each of the magnetic pole elements 1d, the magnetic pole element 1b, and the magnetic pole element 1f will be referred to a neutral-point-side stator coil wire 3d, 3b, and 3f respectively.

The electric-source-side stator coil wire 3a of the magnetic pole element 1a and the neutral-point-side stator coil wire 3d of the magnetic pole element 1d are electrically connected through a connection wire 6 illustrated in Fig. 2 and Fig. 3. In other words, the electric-source-side stator coil wire 3a is provided and coiled on the frame member between the electric source terminal 4a and the connection wire 6. Further, the neutral-point-side stator coil wire 3d is provided and coiled on the frame member between the neutral point terminal 5d and the connection wire 6. Then, as illustrated in Figs. 1 to 3, the electric source terminal 4a and the neutral point terminal 5d are provided on one side of the stator S. On the other hand, the connection wire 6 is provided on the other side of the stator S opposite to the side where the electric source terminal 4a and the neutral point terminal 5d are provided.

Similarly, the electric-source-side stator coil wire 3e of the magnet pole element 1e and the neutral-point-side stator coil wire 3b of the magnet pole element 1b are electrically connected through the connection wire 6. In other words, the electric-source-side stator coil wire 3e is provided and coiled on the frame member between the electric source

terminal 4e and the connection wire 6. Further, the neutral-point-side stator coil wire 3e is provided and coiled on the frame member between the neutral-point-side stator coil wire 5b and the connection wire 6. Then, the electric source terminal 4e and the neutral point terminal 5b are provided on one side of the stator S. On the other hand, the connection wire 6 is provided on the other side of the stator S opposite to the side where the electric source terminal 4e and the neutral point terminal 5b are provided.

In addition, the electric-source-side stator coil wire 3c of the magnetic pole element 1c and the neutral-point-side stator coil wire 3f of the magnetic pole element 1f are electrically connected through the connection wire 6. In other words, the electric-source-side stator coil wire 3c is provided and coiled on the frame member between the electric source terminal 4c and the connection wire 6. Further, the neutral-point-side stator coil wire 3d is provided and coiled on the frame member between the neutral point terminal 5d and the connection wire 6. Then, the electric source terminal 4c and the neutral point terminal 5f are provided on one side of the stator S. The connection wire 6 is provided on the other side of the stator S opposite to the side where the electric source terminal 4c and the neutral point terminal 5f are provided.

In addition, it appears as if the neutral point terminal 5f, the electric source terminal 4a, the neutral point terminal 5b, the electric source terminal 4c, and the neutral point terminal 5d are formed as a single member in Fig. 1. However, it is not. As illustrated in Fig. 3, the neutral point terminal 5f, the neutral point terminal 5b, and the neutral point terminal 5d are electrically connected through an electrically conductive member 9 of an approximately C-shape. Further, the electric source terminal 4a and the electric source terminal 4c are insulated from each other.

Next, a fundamental coiled wire structure will be explained with reference to a schematic view illustrated in Fig. 4. In the embodiment, the electric-source-side stator coil wire 3a, the connection wire 6, and the neutral-point-side stator coil wire 3d are configured from a single conducting wire. Further, the electric-source-side stator coil wire 3e, the connection wire 6, and the neutral-point-side stator wire 3b are configured from a single conducting wire. Furthermore, the electric-source-side stator coil wire 3c, the connection

wire 6, and the neutral-point-side stator coil wire 3f are configured from a single conducting wire.

As schematically illustrated in Fig. 4, the electric-source-side stator coil wire 3a is connected to the electric terminal 4a of the magnetic pole element 1a. Then, the electric-source-side stator coil wire 3a is coiled around the coil frame member 2a a set number of times, extends to the magnetic pole 1d through the connection wire 6, coiled around the coil frame member 2d of the magnetic pole 1d a set number of times, and is connected to the neutral point terminal 5d. Fundamental coil wire structure is as described above. As described above, the electric source terminal 4a and the neutral point terminal 5d are provided on the other side of the stator S opposite from the side where the connection wire 6 is provided. Accordingly, the number of turns of the electric-source-side stator coil wire 3a and the number of turns of the neutral-point-side stator coil wire 3d are equal to an integer + 1/2. In the example illustrated in Fig. 4, the number of turns is set to $1+1/2$.

The fundamental coiled wire structure described above is applied to a coiled wire structure of the stator coil wire 3 for the pair of the magnetic pole elements 1e and 1b in a similar way. In addition, the same structure is applied to a coiled wire structure of the stator coil wire 3 on the pair of the magnetic pole elements 1c and 1f.

Next, as an application of a fundamental coiled wire structure represented in a schematic diagram illustrated in Fig. 4, a coiled wire structure represented in a schematic diagram illustrated in Fig. 5 will be explained.

In the coiled wire structure illustrated in Fig. 5, in addition to the fundamental coiled wire structure illustrated in Fig. 4, a second electric-source-side stator coil wire 3a, a second connection wire 6, and a second neutral-point-side stator coil wire 3d are provided in parallel with the electric-source-side stator coil wire 3a, the connection wire 6, and the neutral-point-side stator coil wire 3d respectively. In other words, the stator coil wire 3 having been connected to the neutral point terminal 5d from the electric source terminal 4a through the connection wire 6 in a similar way as illustrated in Fig. 4 is further coiled around the coil frame member 2d of the magnet pole element 1d a set number of times, extends to the magnet pole element 1a, coiled around the coil frame member 2a of the

magnet pole element 1a a set number of times, and is connected to the electric source terminal 4a. As described above, the parallel electric-source-side stator coil wires 3a, the parallel connection wires 6, the parallel neutral-point-side stator coil wires 3d are configured from the single conducting wire.

5 In addition, in Fig. 5, for the purpose of simplifying drawings, only a coiled structure of the parallel electric-source-side stator coil wires 3a provided to the magnetic pole element 1a, the parallel neutral-point-side stator coil wires 3d provided to the magnetic pole element 1d, and the parallel connection wires 6 provided therebetween are illustrated. A coiled wire structure of a parallel electric-source-side stator coil wires 3e of
10 the magnetic pole element 1e, a parallel neutral-point-side stator coil wires 3b of the magnetic pole element 1b, and a parallel connection wires 6 can be similarly configured as described above. Furthermore, a parallel electric-source-side stator coil wires 3c of the magnetic pole element 1c, a parallel neutral-point-side stator coil wires 3f of the magnetic pole element 1f, and a parallel connection wires 6 can be similarly configured as described
15 above.

As mentioned above, in an example illustrated in Fig. 5, the parallel stator coil wires 3 are provided between the electric source terminal 4a and the neutral point terminal 5d. However, it is not limited in this manner. Stator coil wires 3 having greater number of wires extending in parallel can be provided between the electric source terminal 4a and the
20 neutral point terminal 5d to configure a multiple parallel coil wire structure. For example, in the coil wire structure illustrated in Fig. 1 to Fig. 3, a nonary parallel coil wire structure is configured.

Specifically, the electric-source-side stator coil wire 3a is connected to a connection portion A of the electric source terminal 4a. The electric-source-side stator coil wire 3a is
25 coiled around the coil frame member 2a of the magnetic pole element 1a a set number of times. Then, the electric-source-side stator coil wire 3a is pulled out as the connection wire 6. At this time, the electric source terminal 4 is provided at the other side of the stator S opposite to the side where the connection wire 6 is introduced. Therefore, the number of turns of the electric-source-side stator coil wire 3a is an integer + 1/2, as described above.

Then, the electric source side-coil wire 3a pulled out as the connection wire 6 is extended to the magnetic pole element 1d through one of a groove of a double guide groove 8 formed by a guide groove member 7 illustrated in Fig. 2. Here, the double guide groove 8 is provided at the stator S. One groove of the double guide groove 8 is provided adjacent to another. Then, the neutral point side-coil wire 3d is coiled around the coil frame member 2d of the magnetic pole element 1d a set number of times (integer $+1/2$). Then, the neutral point side-coil wire 3d is pulled out and hooked to a connection portion A' of the neutral point terminal 5d. Then, the neutral point side-coil wire 3d is coiled around the coil frame member 2d a set number of times again, and pulled out as the connection wire 6. Then, the connection wire 6 is extended to the magnet pole element 1a, and the electric-source-side stator coil wire 3a is coiled around the coil frame member 2a a set number of times. Then, the electric source side-coil wire 3d is pulled out and hooked to a connection portion B of the electric source terminal 4a, and coiled around the coil frame member 2a a set number of times. Then, the conducting wire is pulled out as the connection wire 6. Further, the electric source side-coil wire 3a and the neutral point side-coil wire 3d are repeatedly coiled around the coil frame member 2d and the coil frame member 2a alternately and similarly hooked to connection portions B', C, C', D, D', E, and E' as described above. Each connection portion of the electric source terminal 4 and the neutral point terminal 5 can be electrically connected to the conducting wire by resistance welding or the like.

Thus, a nonary parallel coil wire structure (including nine parallel connection wires 6 provided between the coil frame member 2a and the coil frame member 2d) illustrated in Fig. 1 to 3 is constructed. In this case, all of the nonary parallel electric-source-side stator coil wire 3a, the nonary parallel connection wire 6, and the nonary parallel neutral-point-side stator wire 3d are configured from a single conducting wire. Therefore, a start point of coiling is the connection portion A of the electric source terminal 4a, and an end point of coiling is the connection portion E' of the neutral point terminal 5d.

In addition, a coiled wire structure of a multiple parallel electric-source-side stator coil wire 3e coiled around the coil frame member 2e of the magnetic pole 1e, a multiple parallel neutral-point-side stator coil wire 3b coiled around the coil frame member 2b of

the magnetic pole 1b, and a multiple parallel connection wire 6 can be configured in a similar way as described above. Further, a coiled wire structure of a multiple parallel electric-source-side stator coil wire 3c coiled around the coil frame member 2c of the magnetic pole 1c, a multiple parallel neutral-point-side stator coil wire 3f coiled around the coil frame member 2f of the magnetic pole 1f, and a multiple parallel connection wire 6 can be configured in a similar way as described above.

As described above, the electric source terminal 4 and the neutral point terminal 5 are provided at one side of the stator S, and the connection wire 6 is provided at the other side of the stator S opposite to the side where the electric source terminal 4 and the neutral point terminal 5 are provided. Accordingly, even when a coiled wire structure has large number of a multiple parallel coil, such as a nonary parallel coiled wire structure as illustrated in Fig. 1 to 3, sufficient spaces for the electric source terminal 4, the neutral point terminal 5, and the connection wire 6 can be surely obtained.

In following, another embodiment of the present invention will be explained. In the embodiment described above, the stator wire 3 was configured to be nonary parallel. However, it is not limited. The stator wire 3 can be configured to be multiple parallel other than nonary.

In the embodiment described above, the stator S had six magnetic poles. However, it is not limited. The stator S can have a number of magnetic poles other than six.

In the embodiment described above, the connection wire 6 was guided by the double guide groove 8. However, it is not limited in this manner. The connection wire 6 can be guided by guide groove of other shapes and structure, such as guide having only one groove or more than two guide grooves.

According to an aspect of the present invention, an electric rotary machine includes a rotor and a stator including a magnetic pole member arranged along a rotational direction of the rotor. The magnetic pole member includes at least two pairs of magnetic pole elements;

each pair of magnetic pole elements has a stator coil wire. Each stator coil wire includes an electric-source-side stator coil wire coiled around one of said pair of magnetic

pole elements and a neutral-point-side stator coil wire coiled around the other of said pair of magnetic pole elements. The electric-source-side stator coil wire and the neutral-point-side stator coil wires are electrically connected through a connection wire. The electric-source-side stator coil wire extends between a first end connected to an electric source and the connection wire and the neutral-point-side stator coil wire extends between a second end connected to a neutral point and the connection wire. The first end and the second end are provided on one side of the stator whereas a connection between the electric-source-side stator coil wire and the connection wire and a connection between the neutral-point-side stator coil wire and the connection wire are provided on the other side of the stator.

10 According to the aspect of the present invention, the first end and second end are provided on one side of the stator whereas connections between the electric-source-side stator coil wire and the neutral-point-side stator coil wires and the connection wire are provided on the other side of the stator. Accordingly, a position for providing the end connected to the electric source and the end connected to the neutral point as well as a position for providing the connection wire can be provided at different locations. As a result, sufficient space is provided for the end connected to the electric source, the end connected to the neutral point and for the connection wire. Therefore, wiring work for the stator coil wire becomes less troublesome. Accordingly, an electric rotary machine can be provided by which the wiring work for the stator coil can be simplified even when the number of wires placed in parallel becomes large. However, the present invention provides a simplified structure even when the number of wires placed in parallel is one.

According to a further aspect of the present invention, in the electric rotary machine, the electric-source-side stator coil wire, the connection wire, and the neutral-point-side stator coil wire are configured from one conducting wire.

25 According to the aspect of the present invention, because the electric-source-side stator coil wire, the connection wire, and the neutral-point-side stator coil wire are configured from one conducting wire, no work is required to connect the electric-source-side stator wire, the connection wire, the neutral-point-side stator wire. As a result, wiring work for the stator coil wire is simplified.

According to a further aspect of the present invention, the connection wire connecting the electric-source-side stator coil wire and the neutral-point-side stator coil wire is provided along a guide groove.

According to the aspect of the present invention, because the connection wire is
5 provided along the guide groove, the wire can be placed in a orderly fashion without bending out of shape.

According to a further aspect of the present invention, an electric rotary machine includes a rotor and a stator including a magnetic pole member arranged along a rotational direction of a rotor. The magnetic pole member includes at least two pairs of magnetic pole
10 elements. Each pair of magnetic pole elements has a stator coil wire. Each stator coil wire includes a electric-source-side stator coil wire coiled around one of said pair of magnetic pole elements and a neutral-point-side stator coil wire coiled around the other of said pair of magnetic pole elements. The electric-source-side stator coil wire and the neutral-point-side stator coil wire are electrically connected through a connection wire. The electric-
15 source-side stator coil wire extends between a first end connected to an electric source and the connection wire and the neutral-point-side stator coil wire extends between a second end connected to a neutral point and the connection wire. The first end and the second end are provided on one side of the stator. And the number of turns of the electric-source-side stator coil wire extending between the first end and the connection wire is an integer + $1/2$
20 and the number of turns of the neutral-point-side stator coil wire extending between second end and the connection wire is an integer + $1/2$.

According to the aspect of the present invention, since the first end, connected to the electric source, of the electric-source-side stator coil wire and the second end, connected to the neutral point, of the neutral-point-side stator coil wire are provided on the
25 same side of the stator, and since the number of turns of the electric-source-side stator coil wire extending between the first end connected to the electric source and the connection wire and the number of turns of the neutral-point-side stator coil wire extending between the second end connected to the neutral side and the connection wire are an integer + $1/2$, the connection between the electric-source-side stator coil wire and the connection wire

and the connection between the neutral-point-side stator coil wire and the connection wire are provided on the other side of the stator. In other words, because the connection wire is provided on the other side of the stator where the end connected to the electric source and the end connected to the neutral point are provided, a position for providing the end
5 connected to the electric source, a position for the end connected to the neutral point and a position for the connection wire can be provided at different positions. As a result, a sufficient space is provided for the end connected to the electric source and the end connected to the neutral point and for the connection wire. Therefore, wiring work for the stator coil wire can be simplified.

10 Accordingly, an electric rotary machine can be provided by which the wiring work for the stator coil wire can be simplified even when the number of wires positioned in parallel becomes large although the present invention also simplified structures for machines with fewer parallel wires.

According to a further aspect of the present invention, the electric rotary machine
15 further includes a conductive member which is approximately C-shaped and is provided along the rotational direction of the rotor; wherein the ends, connected to the neutral point, of neutral-point-side stator coil wires of a plurality of the magnetic pole elements are electrically connected by the conductive member.

According to the aspect of the present invention, for electrically connecting a
20 plurality of wire ends connected to the neutral point, a conductive member of a simple and of an approximate C-shape having its curved portion extending along the rotational direction of the rotor is utilized. Accordingly, the conductive member can be easily connected to each of the ends to be connected to the neutral point.

25

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CLAIMS

1. A stator for an electric rotary machine including a magnetic pole member arranged along a rotational direction of a rotor,

5 characterized in that

the magnetic pole member includes at least two pairs of magnetic pole elements;

each pair of magnetic pole elements has a stator coil wire;

each stator coil wire includes an electric-source-side stator coil wire coiled around one of said pair of magnetic pole elements and a neutral-point-side stator coil wire coiled
10 around the other of said pair of magnetic pole elements, the electric-source-side stator coil wire and the neutral-point-side stator coil wires are electrically connected through a connection wire, the electric-source-side stator coil wire extends between a first end connected to an electric source and the connection wire, the neutral-point-side stator coil wire extends between a second end connected to a neutral point and the connection wire;
15 and

the first end and the second end are provided on one side of the stator whereas a connection between the electric-source-side stator coil wire and the connection wire and a connection between the neutral-point-side stator coil wire and the connection wire are provided on the other side of the stator.

20

2. The stator for electric rotary machine according to claim 1, wherein the electric-source-side stator coil wire, the connection wire, and the neutral-point-side stator coil wire are configured from one conducting wire.

25 3. The stator for electric rotary machine according to claim 2, wherein the connection wire connecting the electric-source-side stator coil wire and the neutral-point-side stator coil wire is provided along a guide groove.

4. A stator for electric rotary machine including a magnetic pole member arranged along a rotational direction of a rotor,

characterized in that

the magnetic pole member includes at least two pairs of magnetic pole elements;

5 each pair of magnetic pole elements has a stator coil wire;

each stator coil wire includes a electric-source-side stator coil wire coiled around one of said pair of magnetic pole elements and a neutral-point-side stator coil wire coiled around the other of said pair of magnetic pole elements, the electric-source-side stator coil wire and the neutral-point-side stator coil wire are electrically connected through a connection wire, the electric-source-side stator coil wire extends between a first end connected to an electric source and the connection wire, the neutral-point-side stator coil wire extends between a second end connected to a neutral point and the connection wire;

the first end and the second end are provided on one side of the stator; and

15 the number of turns of the electric-source-side stator coil wire extending between the first end and the connection wire is an integer + 1/2 and the number of turns of the neutral-point-side stator coil wire extending between second end and the connection wire is an integer + 1/2.

5. The stator for electric rotary machine according to claim 1, further comprising:

20 a conductive member which is approximately C-shaped and is provided along the rotational direction of the rotor; wherein

ends, connected to the neutral point, of neutral-point-side stator coil wires of a plurality of the magnetic pole elements are electrically connected by the conductive member.

25

6. The stator for electric rotary machine according to claim 2, further comprising:

a conductive member which is approximately C-shaped and is provided along the rotational direction of the rotor; wherein

ends, connected to the neutral point, of neutral-point-side stator coil wires of a plurality of the magnetic pole elements are electrically connected by the conductive member.

- 5 7. The stator for electric rotary machine according to claim 3, further comprising:
a conductive member which is approximately C-shaped and is provided along the rotational direction of the rotor; wherein

ends, connected to the neutral point, of neutral-point-side stator coil wires of a plurality of the magnetic pole elements are electrically connected by the conductive
10 member.

8. The stator for electric rotary machine according to claim 4, further comprising:
a conductive member which is approximately C-shaped and is provided along the rotational direction of the rotor; wherein
15 ends, connected to the neutral point, of neutral-point-side stator coil wires of a plurality of the magnetic pole elements are electrically connected by the conductive member.

9. An electric rotary machine comprising a rotor and a stator including a magnetic
20 pole member arranged along a rotational direction of the rotor,

characterized in that

the magnetic pole member includes at least two pairs of magnetic pole elements;
each pair of magnetic pole elements has a stator coil wire;
each stator coil wire includes an electric-source-side stator coil wire coiled around
25 one of said pair of magnetic pole elements and a neutral-point-side stator coil wire coiled around the other of said pair of magnetic pole elements, the electric-source-side stator coil wire and the neutral-point-side stator coil wires are electrically connected through a connection wire, the electric-source-side stator coil wire extends between a first end connected to an electric source and the connection wire, the neutral-point-side stator coil

wire extends between a second end connected to a neutral point and the connection wire;
and

the first end and the second end are provided on one side of the stator whereas a
connection between the electric-source-side stator coil wire and the connection wire and a
5 connection between the neutral-point-side stator coil wire and the connection wire are
provided on the other side of the stator.

10

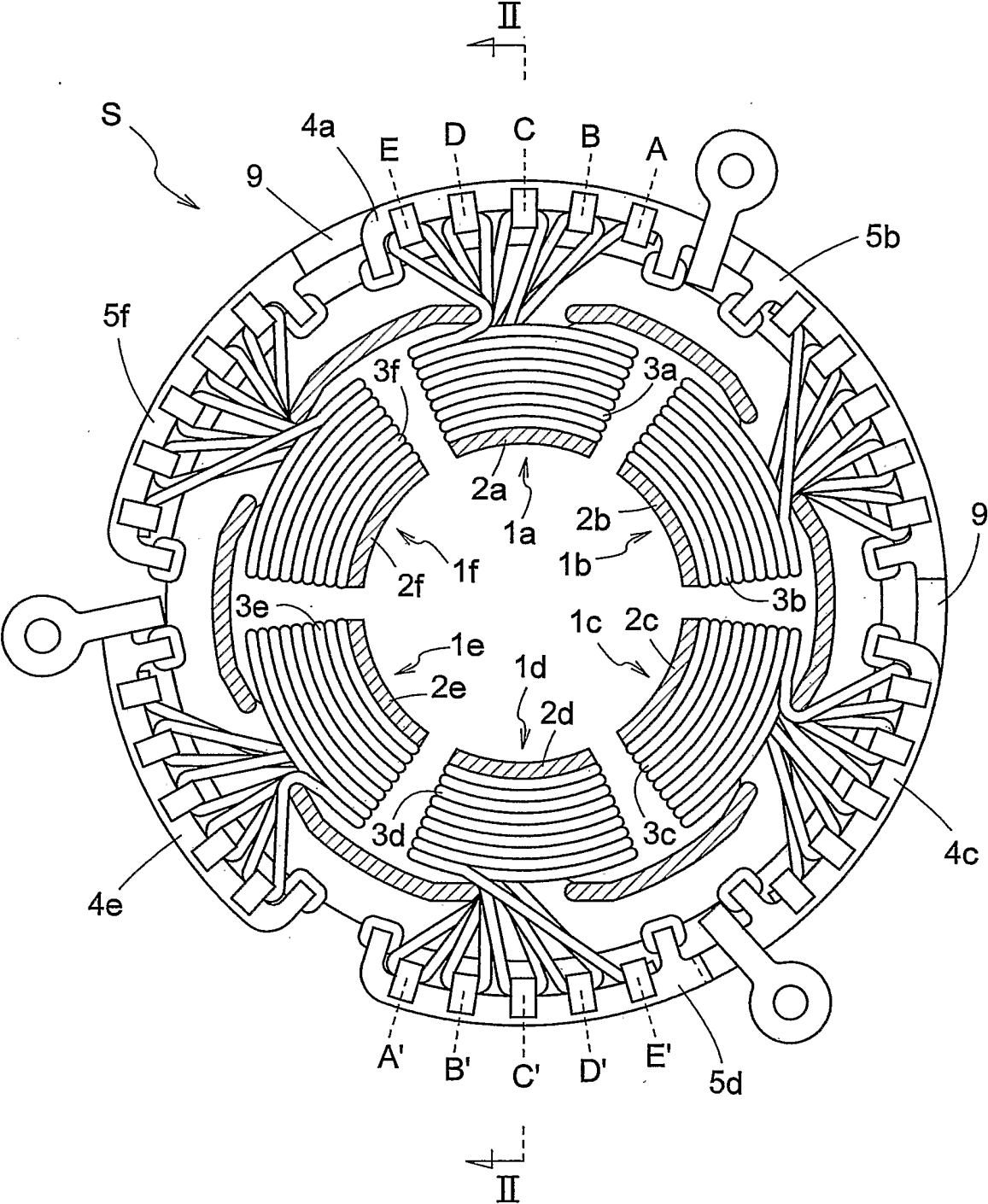
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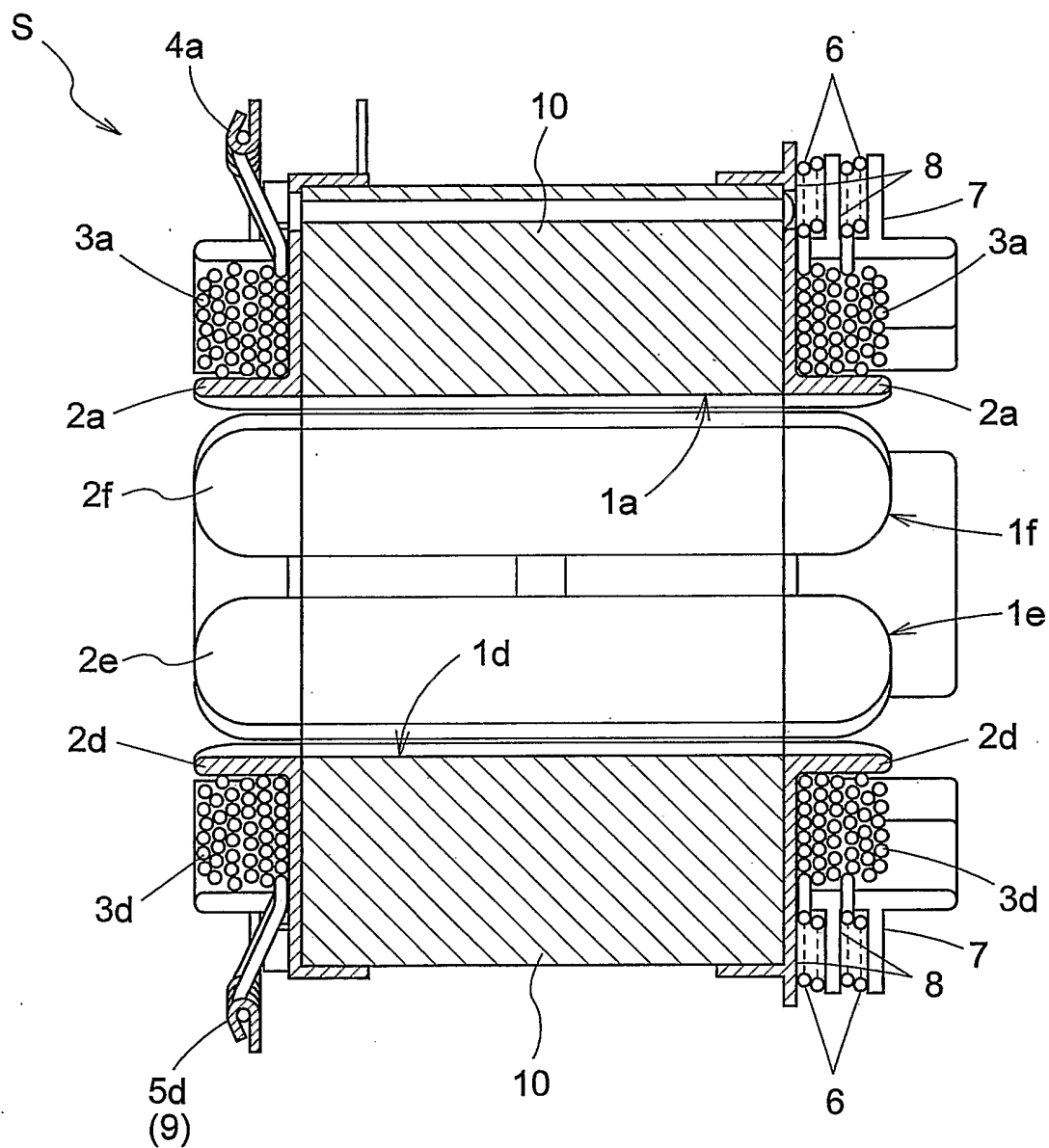
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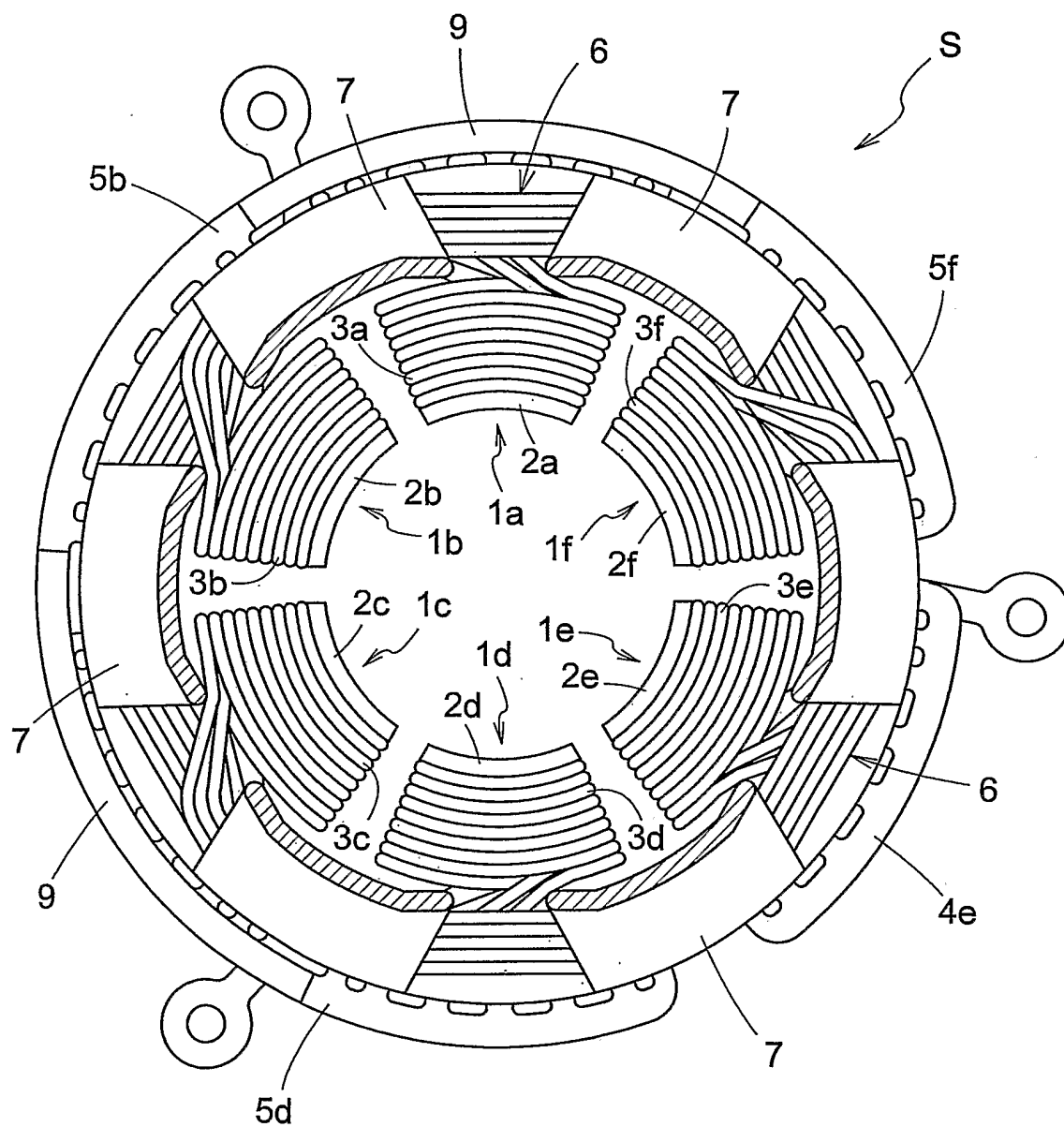
FIG.1



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FIG.2

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FIG.3



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FIG.4

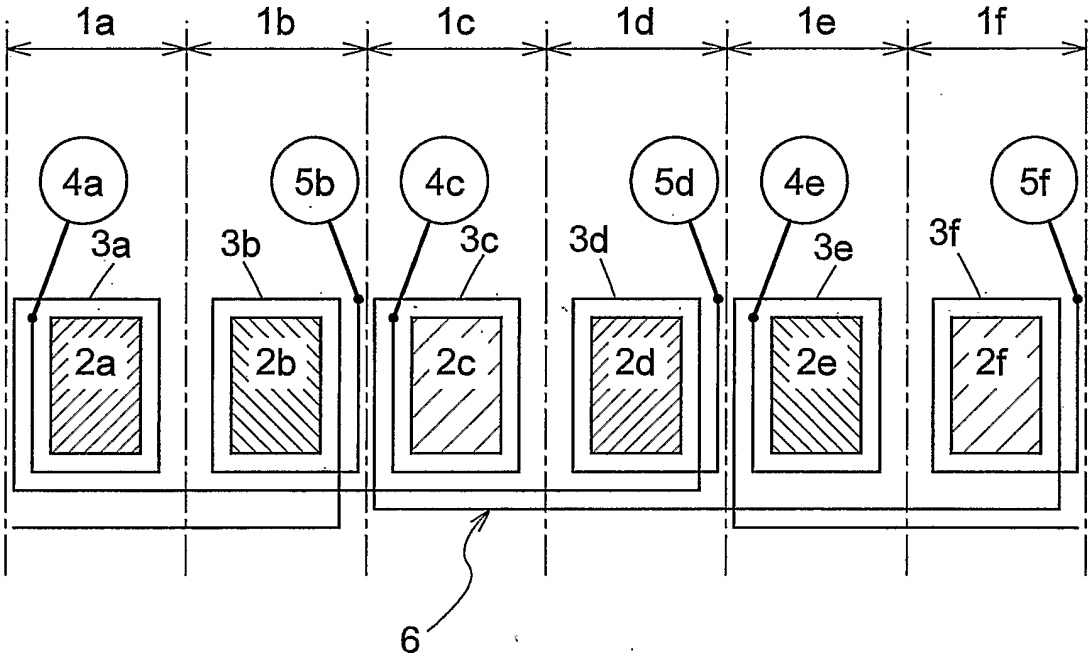
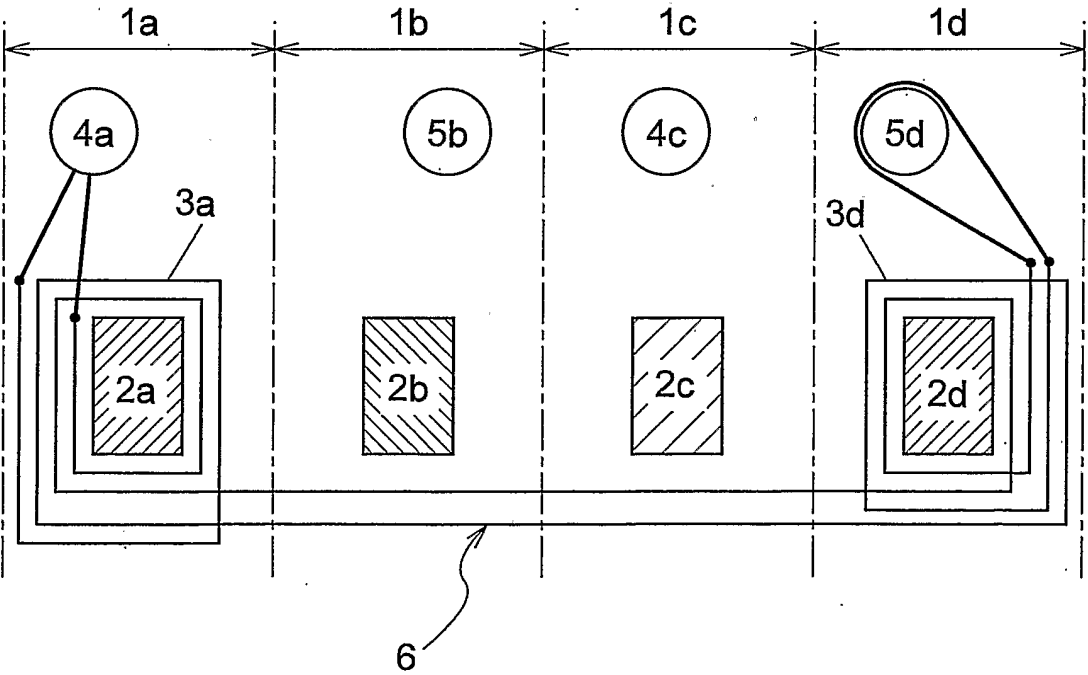
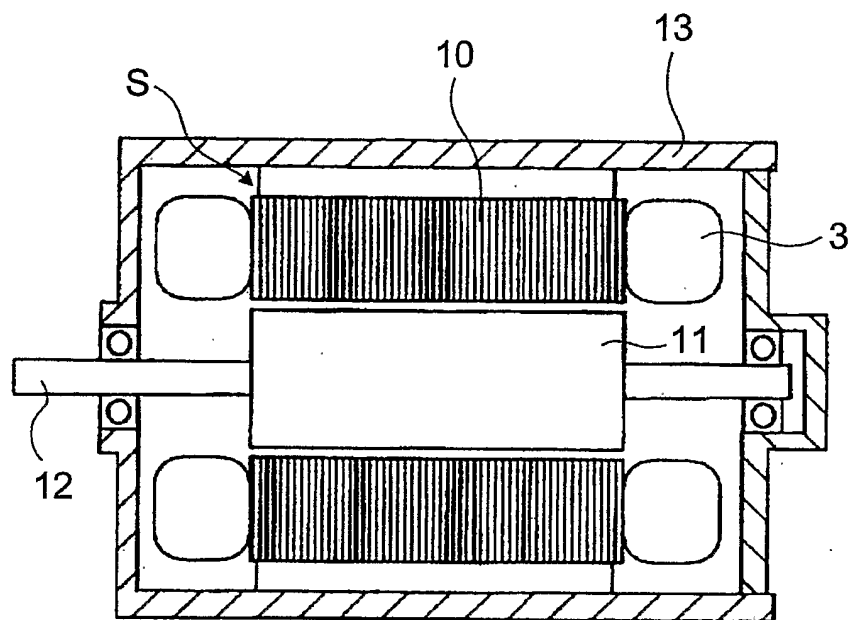


FIG.5



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FIG.6



INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP2005/015970

A. CLASSIFICATION OF SUBJECT MATTER

H02K3/52 H02K3/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H02K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 1 024 581 A (WILO GMBH) 2 August 2000 (2000-08-02) column 4, line 58 - column 5, line 38; figures 1,3	1-4, 9
Y	----- PATENT ABSTRACTS OF JAPAN vol. 2003, no. 11, 5 November 2003 (2003-11-05) -& JP 2003 201986 A (ASMO CO LTD), 18 July 2003 (2003-07-18) abstract; figures 1,2,12-14	1-4, 9
Y	----- PATENT ABSTRACTS OF JAPAN vol. 2003, no. 12, 5 December 2003 (2003-12-05) -& JP 2003 299290 A (HONDA MOTOR CO LTD), 17 October 2003 (2003-10-17) abstract; figures 3,4,6,7,9	1-4, 9
	----- -/--	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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Date of the actual completion of the international search

25 November 2005

Date of mailing of the international search report

07/12/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

von Rauch, E

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	PATENT ABSTRACTS OF JAPAN vol. 2002, no. 02, 2 April 2002 (2002-04-02) -& JP 2001 275291 A (TOSHIBA KYARIA KK), 5 October 2001 (2001-10-05) abstract; figures 1, 2, 5, 6, 9 -----	1, 2, 5-8
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