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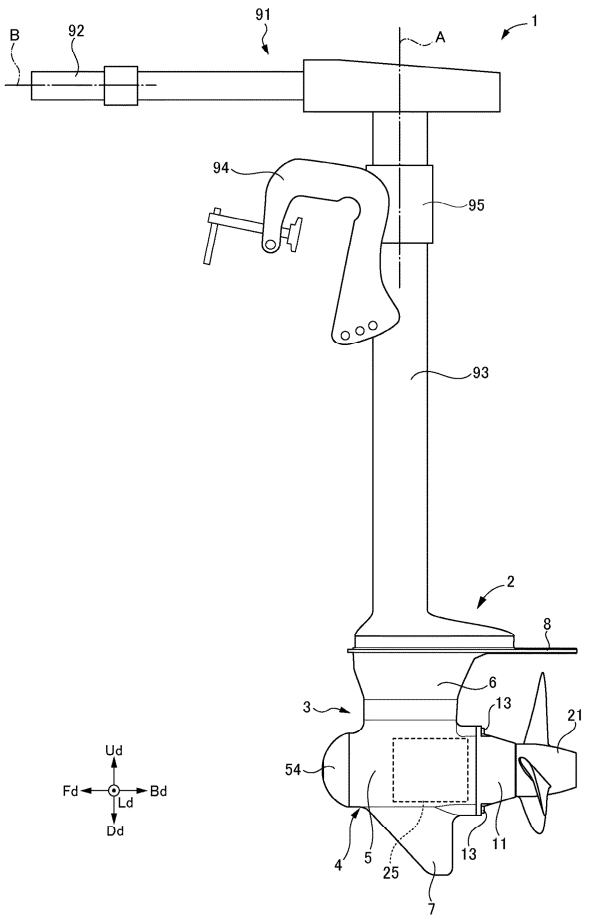
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# (54) ELECTRIC OUTBOARD MACHINE

(57) An electric outboard machine (1) for propelling a boat, includes: an outer case (3) provided in a lower part of the machine; a propeller (21) rotatably supported in the outer case; and a motor (25) provided in the outer case and rotates the propeller. The outer case (3) includes a cylindrical portion (5) including an axis. The cylindrical portion (5) includes a front motor support portion (61) and a rear motor support portion (81, 101). The rear motor support portion is a member that is formed in an annular shape and detachable from the cylindrical portion, and the rear motor support portion is attached to the cylindrical portion by coupling an outer circumferential surface of the rear motor support portion and an inner circumferential surface of the cylindrical portion to each other.

*FIG.1*

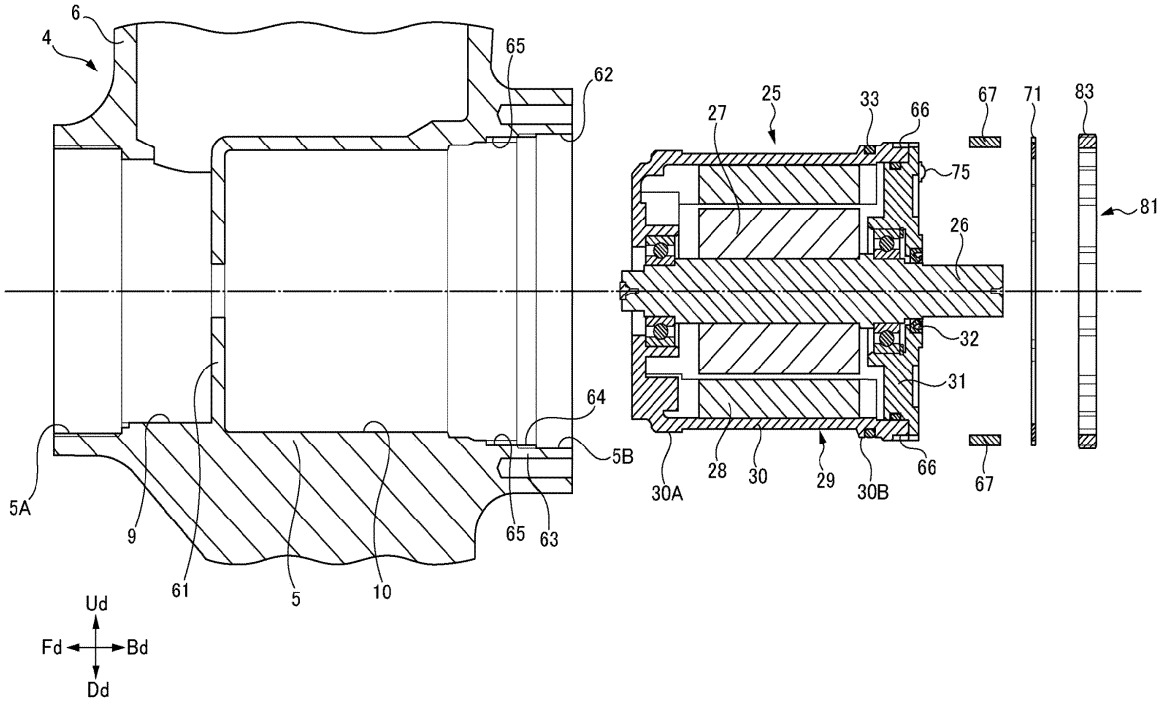



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*FIG.5*


6
4
65
62
25
27
33
66
67
71
83
75
81
26
32
31
64
5B
5A
9
61
5
10
65
63
30A
28
30
29
30B
66
67
Ud
Fd
Bd
Dd

## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to an electric outboard machine.

### BACKGROUND ART

**[0002]** An electric outboard machine is known that includes a motor (electric motor) as a power source for rotating a propeller. In some electric outboard machines, a motor is located on a lower part of the electric outboard machine, that is, a portion of the electric outboard machine that is submerged in the water. JPH10-16886A (Patent Literature 1) describes a boat propulsion device that corresponds to such an electric outboard machine.

**[0003]** The boat propulsion device described in the above publication is provided with an electric drive unit at its lower portion. The electric drive unit has a casing that forms an outer shell thereof, and an electric motor is accommodated within the casing. The electric motor includes a motor case that constitutes a part of a stator, and a rotor accommodated in the motor case. In addition, the electric motor is fixed to the casing by coupling a support piece provided at a front end of the motor case to a partition plate of the casing using a bolt.

### CITATION LIST

### PATENT LITERATURE

**[0004]** Patent Literature 1: JPH10-16886A

**[0005]** Generally, when fixing a motor to an apparatus equipped with the motor, a flange or bracket that protrudes outward from an outer circumferential portion of a motor case having a cylindrical shape is provided on the motor case, and the motor is fixed to the apparatus by coupling the flange or bracket to a housing of the apparatus or the like. In the boat propulsion device described in the above publication, the electric motor is fixed to the casing by connecting a support piece that protrudes outward (downward) from an outer circumferential portion of a front end of the motor case to a partition plate of the casing.

**[0006]** However, when a motor is mounted inside an outer case that forms an outer shell of a lower part of an electric outboard machine and the motor is fixed to the outer case by a method of providing a flange or bracket on the motor case of the motor that protrudes outward from an outer circumferential portion of the motor case and connecting the flange or bracket to an inside part of the outer case, vertical or horizontal dimensions of the outer case will increase depending on an amount by which the flange or bracket protrudes outward from the outer circumferential portion of the motor case. In this way, increasing the size of the outer case by increasing the vertical or horizontal dimensions has disadvantages such as increasing water resistance when the boat is propelled.

### SUMMARY

**[0007]** The present invention is made in consideration of the circumstances described above, for example, and an object of the present invention is to provide an electric outboard machine that can prevent an increase in size of an outer case that accommodates a motor.

**[0008]** In order to solve the above problems, the present invention is an electric outboard machine for propelling a boat, electric outboard machine including an outer case provided in a lower part of the electric outboard machine, a propeller rotatably supported in the outer case, and a motor provided in the outer case and configured to rotate the propeller, where the outer case includes: a cylindrical portion including an axis extending in a front-rear direction and in which the motor is disposed, the cylindrical portion includes: a front motor support portion configured to support the motor from a front side so as to prevent the motor from moving forward relative to the cylindrical portion; and a rear motor support portion configured to support the motor from a rear side so as to prevent the motor from moving rearward relative to the cylindrical portion, and the rear motor support portion is a member that is formed in an annular shape and detachable from the cylindrical portion, and the rear motor support portion is attached to the cylindrical portion by coupling an outer circumferential surface of the rear motor support portion and an inner circumferential surface of the cylindrical portion to each other.

**[0009]** According to the present invention, it is possible to prevent the outer case that accommodates the motor from becoming large in size.

### BRIEF DESCRIPTION OF DRAWINGS

**[0010]**

FIG. 1 is an overall view illustrating an electric outboard machine according to an example of the present invention.

FIG. 2 is a cross-sectional view illustrating a lower unit of the electric outboard machine according to the example of the present invention.

FIG. 3 is an external view illustrating a state in which an outer case body to which a motor is attached is viewed from behind in the electric outboard machine according to the example of the present invention.

FIG. 4 is a cross-sectional view illustrating the motor, the outer case body, and the like taken along a line E-E in FIG. 3.

FIG. 5 is a cross-sectional view illustrating the electric outboard machine according to the example of the present invention with the outer case body, the motor, a washer, a rear motor support member, and the like disassembled.

FIG. 6 is an enlarged view of a rear part of the outer case body in FIG. 4.

FIG. 7A is an external view illustrating the outer case body of the electric outboard machine according to the example of the present invention as viewed from behind, and FIG. 7B is an external view illustrating the motor of the electric outboard machine as viewed from behind.

FIG. 8A is an external view illustrating the washer in the electric outboard machine according to the example of the present invention as viewed from behind, and FIG. 8B is an external view illustrating the rear motor support member in the electric outboard machine as viewed from behind.

FIG. 9A is an external view illustrating the rear motor support member to which the washer is coupled in an electric outboard machine according to the example of the present invention, as viewed from behind, and FIG. 9B is a cross-sectional view illustrating the washer and the rear motor support member taken along a line F-F in FIG. 9A.

FIG. 10 is an external view illustrating a modification example of the rear motor support member in the electric outboard machine according to the example of the present invention.

## DESCRIPTION OF EMBODIMENTS

**[0011]** An electric outboard machine according to an embodiment of the present invention includes an outer case provided in a lower part of the electric outboard machine, a propeller rotatably supported in the outer case, and a motor provided in the outer case and configured to rotate the propeller. The outer case also includes a cylindrical portion, which is formed into a cylindrical shape having an axis extending in a front-rear direction, and the motor is disposed inside the cylindrical portion. Further, the cylindrical portion is provided with a front motor support portion that supports the motor from a front side so as to prevent the motor from moving forward relative to the cylindrical portion. Furthermore, the cylindrical portion is provided with a rear motor support portion that supports the motor from a rear side so as to prevent the motor from moving rearward relative to the cylindrical portion. Additionally, the rear motor support portion is a member that is formed in an annular shape and detachable from the cylindrical portion. In addition, the rear motor support portion is attached to the cylindrical portion by coupling an outer circumferential surface and an inner circumferential surface of the cylindrical portion to each other.

**[0012]** According to the electric outboard machine of this embodiment, the motor arranged inside the cylindrical portion can be fixed inside the cylindrical portion by being pinched in the front-rear direction between the front motor support portion and the rear motor support portion. Therefore, with the electric outboard machine of this embodiment, when fixing the motor to the outer case, it is not necessary to provide the motor case with a flange or bracket that protrudes outward from an outer circumferential portion of the motor case of the motor, as in the related art described above. Therefore, it is possible to prevent vertical or horizontal dimensions of the outer case from increasing depending on an amount of protrusion of the flange or bracket protruding outward from the outer circumferential portion of the motor case, and it is possible to suppress an increase in the size of the outer case.

### Example

**[0013]** An example of the present invention will be described with reference to the drawings. For ease of description, when describing directions of up (Ud), down (Dd), front (Fd), back (Bd), left (Ld), and right (Rd) in relation to the examples, the arrows will be referred to in the lower left corner of each figure.

### Electric Outboard Machine

**[0014]** FIG. 1 illustrates an electric outboard machine 1 according to an example of the present invention. The electric outboard machine 1 is a device for propelling a boat, and is attached to the boat. As illustrated in FIG. 1, the electric outboard machine 1 includes a lower unit 2, an operating handle 91, a connecting portion 93, a clamp bracket 94, and a swivel bracket 95.

**[0015]** The lower unit 2 is a unit provided at a lower part of the electric outboard machine 1. The lower unit 2 is provided with a propeller 21, a motor 25, and the like. The operating handle 91 is a handle for operating the electric outboard machine 1 and is provided on an upper part of the electric outboard machine 1. The connecting portion 93 is a member that connects the lower unit 2 and the operating handle 91, and is formed in a columnar or tubular shape that extends in an up-down direction. The clamp bracket 94 is a mechanism for attaching and fixing the electric outboard machine 1 to a transom of the boat. The swivel bracket 95 is a mechanism that supports the connecting portion 93 so that the connecting portion 93 can pivot about its axis A. The swivel bracket 95 is connected to the clamp bracket 94.

**[0016]** When the electric outboard machine 1 is attached to the transom of the boat and the boat is stopped, the lower unit 2 is positioned below the water surface, and the operating handle 91, the clamp bracket 94, and the swivel bracket 95 are positioned above the water surface. An operator can change the rotation speed and direction of the motor 25 provided in the lower unit 2 by grasping a grip 92 provided at a tip of the operating handle 91 and pivoting the grip 92 around its axis B. By changing the rotation speed of the motor 25, the rotation speed of the propeller 21 can be changed, and the speed of the boat can be changed. In addition, by changing the rotation direction of the motor 25, the rotation direction of the propeller 21 can be changed, and the boat can be

switched between forward and reverse motion. In addition, the operator can grasp the grip 92 and pivot the operating handle 91 around the axis A of the connecting portion 93 to pivot the lower unit 2 horizontally and change the direction of the propeller 21 provided on the lower unit 2. By changing the direction of the propeller 21, the boat can be turned.

Lower Unit

**[0017]** FIG. 2 illustrates a cross section of the lower unit 2 as viewed from the left, taken along a plane that passes through a center of the lower unit 2 in a left-right direction and extends in up-down and front-rear directions.

**[0018]** As illustrated in FIG. 2, the lower unit 2 includes an outer case 3, the propeller 21, a propeller shaft 22, the motor 25, a reduction gear 41, an inverter 42, and the like.

**[0019]** The outer case 3 forms an outer shell of the lower unit 2. With the electric outboard machine 1 mounted on the transom of the boat, when the boat is stationary, the outer case 3 is disposed in water. The outer case 3 includes an outer case body 4, a reduction gear case portion 11, an inner lid 51, an outer lid 54, and the like.

**[0020]** As illustrated in FIG. 1, the outer case body 4 has a cylindrical portion 5 formed in a cylindrical shape having an axis extending in the front-rear direction, and a columnar portion 6 formed in a columnar shape extending upward from the cylindrical portion 5. The outer case body 4 is made of a metal material such as aluminum. In addition, a skeg 7 is integrally formed or attached to a lower end of the cylindrical portion 5. An anti-cavitation plate 8 is integrally formed or attached to an upper portion of the columnar portion 6.

**[0021]** The reduction gear case portion 11 has an axis extending in the front-rear direction and is formed in a cylindrical shape of which a diameter decreases toward the rear. The reduction gear case portion 11 is formed, for example, from the same material as the outer case body 4. The reduction gear case portion 11 is attached to a rear end of the cylindrical portion 5 of the outer case body 4. As illustrated in FIG. 2, a front end of the reduction gear case portion 11 is inserted into an opening portion 5B on a rear side of the cylindrical portion 5. The reduction gear case portion 11 is fixed to a rear portion of the outer case body 4 using a coupling member 13 such as a bolt. In addition, a seal 14 (for example, a sealing member such as an O-ring) is provided between the cylindrical portion 5 and the reduction gear case portion 11 to prevent water from entering the outer case 3 and to prevent lubricating oil from inside the outer case 3 from leaking out of the outer case 3.

**[0022]** The inner lid 51 and the outer lid 54 are attached to a front end of the cylindrical portion 5 of the outer case body 4. The opening portion 5A on the front side of the cylindrical portion 5 is doubly covered by the inner lid 51 and the outer lid 54.

**[0023]** The inner lid 51 is formed in a circular plate shape and has an outer diameter approximately equal to an inner diameter of the cylindrical portion 5 so that it fits inside the cylindrical portion 5. The inner lid 51 is attached to an innermost portion of the opening portion 5A on the front side of the cylindrical portion 5, and closes the opening portion 5A in that position. In addition, a seal 52 (for example, a sealing member such as an O-ring) is provided between the inner lid 51 and the cylindrical portion 5 to prevent water from entering the inverter accommodating portion 9 or the motor accommodating portion 10 of the outer case 3.

**[0024]** Further, in the opening portion 5A, a stopper 53 is provided in front of the inner lid 51 to prevent the inner lid 51 from coming off the cylindrical portion 5. The stopper 53 is fastened within the opening portion 5A by coupling between threads formed on its outer circumferential surface and threads formed on an inner circumferential surface of the front end of the cylindrical portion 5.

**[0025]** The outer lid 54 is formed in a spherical crown shape or a cup shape. The outer lid 54 is attached to an open end of the opening portion 5A, and in that position closes the opening portion 5A. The outer lid 54 is fastened to the open end of the opening portion 5A by coupling threads formed on an outer circumferential surface of its rear portion with threads formed on an inner circumferential surface of the front end of the cylindrical portion 5. A seal 55 (for example, a sealing member such as an O-ring) is provided between the outer lid 54 and the cylindrical portion 5 to prevent water from entering the outer case 3. Further, the outer lid 54 is connected to the stopper 53 by a connecting member 56 such as a bolt.

**[0026]** Further, an inverter accommodating portion 9, a motor accommodating portion 10, and a reduction gear accommodating portion 12 are provided within the outer case 3. Specifically, the inverter accommodating portion 9 and the motor accommodating portion 10 are provided inside the cylindrical portion 5 of the outer case body 4. The inverter accommodating portion 9 is disposed in front of the motor accommodating portion 10. The reduction gear accommodating portion 12 is provided inside the reduction gear case portion 11. The reduction gear accommodating portion 12 is disposed behind the motor accommodating portion 10.

**[0027]** The propeller 21 generates a propulsive force for the boat by rotating. The propeller 21 is disposed at the rear of the outer case 3 and is rotatably supported by the outer case 3 via the propeller shaft 22 and a bearing 23. The propeller shaft 22 extends in the front-rear direction. A front portion of the propeller shaft 22 is disposed within the reduction gear accommodating portion 12 and is rotatably supported by the reduction gear case portion 11 via the bearing 23. Furthermore, the propeller 21 is attached and fixed to a rear end of the propeller shaft 22. In addition, a seal 24 (sealing member, sealing mechanism, or the like) is provided between a rear end of the reduction gear case portion 11 and the propeller shaft 22 to prevent water from entering the outer case 3 and to prevent lubricating oil from inside the outer case 3 from

leaking out of the outer case 3.

**[0028]** The motor 25 is a power source that rotates the propeller 21. The motor 25 is disposed within the motor accommodating portion 10 of the outer case 3. The motor 25 is, for example, an AC motor. The motor 25 has an output shaft 26, a rotor 27, a stator 28, and a motor case 29. The motor case 29 also has a motor case body 30 and a closing member 31.

**[0029]** The motor case body 30 is formed in a cylindrical shape with a bottom. The motor case body 30 is disposed so that its axis faces the front-rear direction. Moreover, the motor case body 30 is arranged so that a bottom portion at one axial end thereof faces forward and an opening portion at the other axial end thereof faces backward. The closing member 31 is formed in a disk shape having an outer diameter substantially equal to an inner diameter of the motor case body 30. Furthermore, a through hole for passing the output shaft 26 is formed in the center of the closing member 31. The closing member 31 is attached to the other axial end (rear end) of the motor case body 30, and more specifically, is fitted into an opening portion of the motor case body 30.

**[0030]** The output shaft 26, the rotor 27, and the stator 28 are disposed within a motor case 29. The output shaft 26 extends in the front-rear direction and is rotatably supported by the motor case 29 via a bearing. In addition, a rear end portion of the output shaft 26 passes through a through hole formed in the center of the closing member 31 and protrudes outside the motor case 29, and a rear end of the output shaft 26 is connected to the reduction gear 41. The rotor 27 is located on an outer periphery of the output shaft 26 and rotates integrally with the output shaft 26. The stator 28 is located on an outer periphery of the rotor 27 and is fixed to the motor case 29. Further, a seal 32 (sealing member, sealing mechanism, or the like) is provided between the output shaft 26 and the closing member 31 to seal the gap between them.

**[0031]** The reduction gear 41 is a device that transmits the rotation of the output shaft 26 to the propeller shaft 22 while reducing the rotation speed, and has, for example, a planetary reduction mechanism. The reduction gear 41 is disposed within the reduction gear accommodating portion 12 of the outer case 3. Furthermore, lubricating oil is sealed inside the reduction gear accommodating portion 12 for lubricating and cooling the reduction gear 41 and the bearing 23.

**[0032]** The inverter 42 is a device that controls the driving of the motor 25. The inverter 42 outputs a drive current to the motor 25 for driving the motor 25. The inverter 42 is disposed in the inverter accommodating portion 9 of the outer case 3. In addition, a signal cable 43 for transmitting a control signal to the inverter 42 and a power cable 44 for supplying power to the inverter 42 are connected to the inverter 42.

Motor Placement

**[0033]** FIG. 3 illustrates the outer case body 4 to which the motor 25 is attached as viewed from the rear. FIG. 4 illustrates cross sections of the motor 25, the outer case body 4, and the like taken along a line E--E in FIG. 3, as viewed from the left. FIG. 5 illustrates the outer case body 4, the motor 25, a washer 71, a rear motor support member 81, and the like in FIG. 4 in an exploded state.

**[0034]** As illustrated in FIGS. 4 and 5, the motor 25 is inserted into the cylindrical portion 5 of the outer case body 4 from the rear, and is removably fitted within the cylindrical portion 5. In addition, the motor 25 is disposed coaxially with the cylindrical portion 5.

**[0035]** A protrusion 30A is formed on a front end portion of a peripheral wall of the motor case 29, protruding slightly radially outward from an outer circumferential surface of the peripheral wall. The protrusion 30A is formed around the entire periphery of the motor case 29. A protrusion 30B is formed on a rear end portion of the peripheral wall of the motor case 29, protruding slightly radially outward from the outer circumferential surface of the peripheral wall. The protrusion 30B is formed around the entire periphery of the motor case 29. An outer diameter of a part of the motor 25 (motor case 29) where the protrusion 30A is formed is approximately equal to the inner diameter of the cylindrical portion 5. Further, the outer diameter of a part of the motor 25 (motor case 29) where the protrusion 30B is formed is approximately equal to the inner diameter of the cylindrical portion 5. When the motor 25 is disposed inside the cylindrical portion 5 (inside the motor accommodating portion 10) as illustrated in FIG. 4, an outer peripheral surface of the protrusion 30A is in contact with an inner peripheral surface of the cylindrical portion 5, and an outer peripheral surface of the protrusion 30B is in contact with the inner peripheral surface of the cylindrical portion 5. As a result, the motor 25 is positioned within the cylindrical portion 5 so as not to move in a radial direction (up-down or left-right direction).

**[0036]** On the other hand, an outer diameter of a front-rear middle portion of the motor 25, that is, an outer diameter of a part of the motor case 29 between a portion where the protrusion 30A is formed and a portion where the protrusion 30B is formed, is smaller than the inner diameter of the cylindrical portion 5. Therefore, when the motor 25 is disposed inside the cylindrical portion 5 (inside the motor accommodating portion 10) as illustrated in FIG. 4, an outer peripheral surface of the front-rear direction middle portion of the motor 25 is spaced apart from the inner peripheral surface of the cylindrical portion 5. Since the outer peripheral surface of the front-rear direction middle portion of the motor 25 is separated from the inner peripheral surface of the cylindrical portion 5, friction when the motor 25 moves in the front-rear direction relative to the cylindrical portion 5 is smaller than when the entire outer peripheral surface of the motor 25 is in contact with the inner peripheral surface of the cylindrical portion 5. Therefore, when assembling the electric outboard machine 1, the motor 25 can be easily inserted into the cylindrical portion 5, and when disassembling the

electric outboard machine 1, the motor 25 can be easily removed from inside the cylindrical portion 5.

**[0037]** A groove is formed around the entire outer periphery of the protrusion 30B of the motor case 29, and a seal 33 (for example, a sealing member such as an O-ring) is provided in the groove. The seal 33 seals a gap between the protrusion 30B of the motor case 29 and the cylindrical portion 5.

**[0038]** Furthermore, a front motor support portion 61 is provided at a front portion within the cylindrical portion 5. The front motor support portion 61 has a function of supporting the motor 25 from the front side so as to prevent the motor 25 from moving forward relative to the cylindrical portion 5. The front motor support portion 61 is disposed at a boundary between the inverter accommodating portion 9 and the motor accommodating portion 10. The front motor support portion 61 protrudes inward from the inner peripheral surface of the cylindrical portion 5 around the entire circumference of the cylindrical portion 5. The front motor support portion 61 is a disk-shaped wall that is perpendicular to the axis of the cylindrical portion 5. Further, a through hole is formed in the center of the front motor support portion 61. When the motor 25 is disposed inside the cylindrical portion 5 (inside the motor accommodating portion 10), a front surface of the motor 25 (motor case 29) is in contact with a rear surface of the front motor support portion 61, as illustrated in FIG. 4. As a result, the motor 25 cannot move forward beyond the front motor support portion 61.

Motor Fixing

**[0039]** FIG. 6 illustrates an enlarged view of a rear part of the cylindrical portion 5 of the outer case body 4 in FIG. 4. As illustrated in FIG. 6, a fixing mechanism (fitted grooves 65, 66, and key member 67), the washer 71, and the rear motor support member 81 are provided at the rear part of the cylindrical portion 5.

**[0040]** An open end of the opening portion 5B on a rear side of the cylindrical portion 5 serves as a case attachment portion 62 into which a front end of the reduction gear case portion 11 is inserted and attached. At a rear part of the cylindrical portion 5, a portion forward of the case attachment portion 62 serves as a coupling portion 63 to which the rear motor support member 81 is coupled. A thread 64 is formed on an inner peripheral surface of the coupling portion 63 of the cylindrical portion 5. Further, two fitted grooves 65 are formed on an inner circumferential surface of the rear part of the cylindrical portion 5, in a portion forward of the coupling portion 63. FIG. 7A illustrates the outer case body 4 from which the motor 25 is removed, as viewed from the rear. As illustrated in FIG. 7A, the two fitted grooves 65 are arranged circumferentially at an interval of 180 degrees, with one fitted groove 65 located at the upper part of the cylindrical portion 5 and the other fitted groove 65 located at the lower part of the cylindrical portion 5.

**[0041]** The fixing mechanism is a mechanism that fixes the cylindrical portion 5 and the motor 25 to each other in a circumferential direction so that the motor 25 does not move in the circumferential direction relative to the cylindrical portion 5. In this example, the fixing mechanism is composed of the fitted groove 65, the fitted groove 66, and the key member 67. The fixing mechanisms are provided at the upper rear part of the cylindrical portion 5 and at the lower rear part of the cylindrical portion 5.

**[0042]** FIG. 7B illustrates the motor 25 as viewed from behind. As illustrated in FIG. 7B, two fitted grooves 66 are formed on the outer peripheral surface of the rear end portion of the motor case 29 of the motor 25. The two fitted grooves 66 are arranged at an interval of 180 degrees in the circumferential direction. In FIG. 6, the motor 25 is inserted into the cylindrical portion 5 so that the positions of the two fitted grooves 66 formed in the motor 25 match the positions of the two fitted grooves 65 formed in the cylindrical portion 5, respectively. In addition, when the motor 25 is inserted deep into the cylindrical portion 5 until the front surface of the motor 25 hits the front motor support portion 61, one of the fitted grooves 66 on the motor 25 and the fitted groove 65 on the upper side in the cylindrical portion 5 face each other in the up-down direction, and the other fitted groove 66 on the motor 25 and the fitted groove 65 on the lower side in the cylindrical portion 5 face each other in the up-down direction. The key member 67 is fitted into one of the fitted grooves 66 of the motor 25 and the fitted groove 65 on the upper side in the cylindrical portion 5 from behind. Further, another key member 67 is fitted into the other fitted groove 66 of the motor 25 and the fitted groove 65 on the lower side of the cylindrical portion 5 from behind. By a key-coupling structure of such a fixing mechanism, the motor 25 is fixed to the cylindrical portion 5 so as not to move in the circumferential direction. The fitted groove 65 is a specific example of a "first fitted portion", and the fitted groove 66 is a specific example of a "second fitted portion".

**[0043]** The washer 71 is a member that restricts the rear motor support member 81 from moving in the circumferential direction relative to the cylindrical portion 5. FIG. 8A illustrates the washer 71 as viewed from behind. As illustrated in FIG. 8A, the washer 71 is, for example, a metal plate formed in a circular ring shape. The washer 71 has an outer diameter approximately equal to the inner diameter of the cylindrical portion 5 so that it fits inside the cylindrical portion 5. Two locking notches 72 having a rectangular shape and a plurality of (for example, six) locking notches 73 having a circular shape are formed on an outer edge of the washer 71. The two locking notches 72 having a rectangular shape are arranged at an interval of 180 degrees in the circumferential direction, and the plurality of locking notches 73 having a circular shape are arranged at predetermined intervals (for example, intervals of 60 degrees) in the circumferential direction. Further, the washer 71 is formed with a plurality of (for example, six) latch portions 74. The plurality of latch portions 74 are arranged at predetermined intervals in

the circumferential direction, and each latch portion 74 extends inward from an inner circumferential surface of an outer circumferential portion of the washer 71.

**[0044]** In FIG. 6, the washer 71 is disposed behind the motor 25. The washer 71 is detachably fitted into the cylindrical portion 5 from the rear. Furthermore, the two locking notches 72 having a rectangular shape and formed in the washer 71 respectively engage with rear ends of the two key members 67. As illustrated in FIG. 5 and FIG. 7B, a locking portion 75 is provided on an outer circumferential portion of a rear surface of the closing member 31 of the motor case 29, protruding rearward from the rear surface of the closing member 31. For example, the locking portion 75 is formed by fastening a bolt to the outer circumferential portion of the rear surface of the closing member 31. As illustrated in FIG. 3, one of the plurality of locking notches 73 having a circular shape and formed in the washer 71 is engaged with the locking portion 75. The washer 71 is engaged with the key member 67 by the locking notch 72 at the rear end of the key member 67, and is fixed so as not to move in the circumferential direction relative to the cylindrical portion 5. In addition, the washer 71 is locked to the locking portion 75 by the locking notch 73 engaging with the locking portion 75, and is fixed so as not to move circumferentially relative to the motor 25 which is fixed circumferentially to the cylindrical portion 5 by the above-mentioned fixing mechanism. The washer 71 is a specific example of a "movement restricting member", and the locking notches 72 and 73 are each a specific example of a "locked portion".

**[0045]** The rear motor support member 81 is a member that supports the motor 25 from the rear side so as to prevent the motor 25 from moving rearward relative to the cylindrical portion 5. FIG. 8B illustrates the rear motor support member 81 as viewed from behind. As illustrated in FIG. 8B, the rear motor support member 81 is formed in a circular ring shape and is made of, for example, metal. The rear motor support member 81 has an outer diameter approximately equal to the inner diameter of the cylindrical portion 5 so that it fits inside the cylindrical portion 5. Further, a thread 83 is formed on an outer circumferential surface of the rear motor support member 81. Additionally, the rear motor support member 81 is formed with a plurality of protrusions 82 each protruding inwardly from the inner circumferential surface of the outer circumferential portion thereof. These protrusions 82 are portions with which a tool is engaged when fastening the rear motor support member 81 to the cylindrical portion 5 or when removing the rear motor support member 81 from the cylindrical portion 5. The rear motor support member 81 is a specific example of a "rear motor support portion".

**[0046]** In FIG. 6, the rear motor support member 81 is disposed behind the washer 71. In addition, the rear motor support member 81 is disposed coaxially with the cylindrical portion 5. Further, the rear motor support member 81 is detachably attached from the rear inside the cylindrical portion 5. Specifically, the rear motor support member 81 is attached to the cylindrical portion 5 by having its outer circumferential surface coupled to the inner circumferential surface of the coupling portion 63 of the cylindrical portion 5. More specifically, the rear motor support member 81 is screwed and fastened to the cylindrical portion 5 by screwing the thread 83 formed on its outer circumferential surface into the thread 64 formed on the inner circumferential surface of the coupling portion 63 of the cylindrical portion 5. When the rear motor support member 81 is attached to the cylindrical portion 5, it forms a wall that protrudes inward from the inner circumferential surface of the cylindrical portion 5 around the entire circumference of the cylindrical portion 5. Furthermore, by fastening the rear motor support member 81 to the rear of the cylindrical portion 5, the motor 25 is pushed forward, and the front surface of the motor 25 is brought into secure contact with the front motor support portion 61.

**[0047]** As illustrated in FIG. 4, the motor 25 is pinched in the front-rear direction within the cylindrical portion 5 between the front motor support portion 61 provided at the front of the cylindrical portion 5 and the rear motor support member 81 fastened to the rear of the cylindrical portion 5. As a result, the motor 25 cannot move in an axial direction (front-rear direction) relative to the cylindrical portion 5. As described above, the protrusions 30A and 30B come into contact with the inner peripheral surface of the cylindrical portion 5, and therefore the motor 25 cannot move in the radial direction (up-down or left-right direction). As described above, the motor 25 cannot move in the circumferential direction due to the fixing mechanism. In this manner, the motor 25 is fixed inside the cylindrical portion (inside the motor accommodating portion 10) so as to be immovable in all directions relative to the cylindrical portion 5.

**[0048]** Further, the rear motor support member 81 is restricted from moving in the circumferential direction relative to the washer 71 by the respective latch portions 74 of the washer 71. FIG. 9A illustrates the rear motor support member 81 coupled to the washer 71 via the latch portion 74 as viewed from behind. FIG. 9B illustrates a cross section of the rear motor support member 81 and the washer 71 taken along a line F-F in FIG. 9A. Before the washer 71 is attached to the cylindrical portion 5, each of the latch portions 74 of the washer 71 extends inward from the inner circumferential surface of the outer circumferential portion of the washer 71, as illustrated in FIG. 8A. After fitting the washer 71 into the cylindrical portion 5 and fastening the rear motor support member 81 to the cylindrical portion 5, each of the latch portions 74 of the washer 71 is bent forward so as to hook onto the outer circumferential portion of the rear motor support member 81, as illustrated in FIG. 9A and FIG. 9B. In this way, each latch portion 74 of the washer 71 is hooked onto the rear motor support member 81, whereby the washer 71 and the rear motor support member 81 are coupled to each other, and the rear motor support member 81 is secured to the washer 71. This restricts circum-

ferential movement of the rear motor support member 81 relative to the washer 71.

**[0049]** As described above, the washer 71 is fixed so as not to move circumferentially relative to the cylindrical portion 5 by the locking notch 72 engaging with a rear end of the key member 67 and the locking notch 73 engaging with the locking portion 75 of the motor 25. In this case, each latch portion 74 of the washer 71 is hooked onto the rear motor support member 81, thereby restricting circumferential movement of the rear motor support member 81 relative to the washer 71. As a result of the above, circumferential movement of the rear motor support member 81 relative to the cylindrical portion 5 is restricted via the washer 71. This prevents the rear motor support member 81 from becoming loose relative to the cylindrical portion 5.

Motor Installation/Removal

**[0050]** The motor 25 is detachable from the outer case 3. The motor 25 can be removed from the outer case 3, for example, in the following manner. In FIG. 2, first, the propeller 21 is removed from the propeller shaft 22. Next, the drain bolt 58 attached to the rear of the reduction gear case portion 11 is removed, and the lubricating oil in the reduction gear accommodating portion 12 is drained from a drain bolt hole 57 to the outside of the outer case 3. Next, the coupling member 13 is removed, and the reduction gear case portion 11 is removed from the outer case body 4. By removing the reduction gear case portion 11 from the outer case body 4, the reduction gear 41 and the propeller shaft 22 are separated from the output shaft 26. Next, in FIG. 6, after each latch portion 74 of the washer 71 is removed from the rear motor support member 81, the rear motor support member 81 is removed from the outer case body 4. Next, the washer 71 and the key member 67 are successively removed from the outer case body 4. Next, the motor 25 is removed from the opening portion 5B on the rear side of the outer case body 4.

**[0051]** Moreover, the motor 25 can be attached to the outer case 3, for example, by the following method. First, the motor 25 is inserted into the outer case body 4 through the opening portion 5B at the rear side of the outer case body 4. Next, the key member 67 and the washer 71 are attached to the outer case body 4 in this order. Next, the rear motor support member 81 is fastened to the outer case body 4. Next, each latch portion 74 of the washer 71 is hooked onto the rear motor support member 81. Next, the reduction gear case portion 11 is attached to the outer case body 4 while the reduction gear 41 and the propeller shaft 22 are connected to the output shaft 26. Then, the coupling member 13 is fastened to fix the reduction gear case portion 11 to the outer case body 4. Next, lubricating oil is poured in through the drain bolt hole 57, and after the pouring is completed, the drain bolt 58 is tightened in the drain bolt hole 57. Next, the propeller 21 is attached to the propeller shaft 22.

**[0052]** As described above, in the electric outboard machine 1 of the example of the present invention, the cylindrical portion 5 is provided with the front motor support portion 61 that supports the motor 25 from the front side to prevent the motor 25 from moving forward relative to the cylindrical portion 5, and the rear motor support member 81 that supports the motor 25 from the rear side to prevent the motor 25 from moving rearward relative to the cylindrical portion 5, and the rear motor support member 81 is formed in an annular shape and is a member that is detachable from the cylindrical portion 5, and is attached to the cylindrical portion 5 by coupling the outer circumferential surface of the rear motor support member 81 and the inner circumferential surface of the cylindrical portion 5 to each other. Specifically, the rear motor support member 81 is screwed to the cylindrical portion 5 by screwing the thread 83 formed on the outer circumferential surface of the rear motor support member 81 into the thread 64 formed on the inner circumferential surface of the cylindrical portion 5. According to this configuration, the motor 25 arranged inside the cylindrical portion 5 can be fixed inside the cylindrical portion 5 by being pinched in the front-rear direction between the front motor support portion 61 and the rear motor support member 81. Therefore, with the electric outboard machine 1 of this embodiment, when fixing the motor to the outer case, it is not necessary to provide the motor case with a flange or bracket that protrudes outward from the outer circumferential portion of the motor case of the motor, as in the related art described above. Therefore, it is possible to prevent vertical or horizontal dimensions of the outer case from increasing depending on an amount of protrusion of the flange or bracket protruding outward from the outer circumferential portion of the motor case, and it is possible to suppress an increase in the size of the outer case.

**[0053]** In addition, by being attached to the cylindrical portion 5, the rear motor support member 81 becomes a wall that protrudes inward from the inner circumferential surface of the cylindrical portion 5. In addition, the front motor support portion 61 is a wall that protrudes inward from the inner circumferential surface of the cylindrical portion 5. The two walls pinching the motor 25 each protrude inward from the inner circumferential surface of the cylindrical portion 5, so even when these walls are provided on the cylindrical portion 5, an outer diameter of the cylindrical portion 5 does not increase at all or increases very little. By pinching and fixing the motor 25 between these two walls, the outer diameter of the cylindrical portion 5 can be reduced while the motor 25 is securely fixed inside the cylindrical portion 5. For example, the outer diameter of the cylindrical portion 5 can be made closer to an outer diameter of the motor 25. Therefore, the outer case 3 can be made smaller.

**[0054]** In the electric outboard machine 1 of this embodiment, the cylindrical portion 5 and the motor 25 are provided with the fixing mechanism that fixes the cylindrical portion 5 and the motor 25 to each other in the

circumferential direction. This makes it possible to prevent the motor 25 from being displaced in the circumferential direction within the cylindrical portion 5.

**[0055]** The fixing mechanism also has the fitted groove 65 provided in the cylindrical portion 5, the fitted groove 66 provided in the motor 25, and the key member 67 that fits into each of the fitted grooves 65 and 66. This makes it possible to easily form the fixing mechanism.

**[0056]** Furthermore, in the electric outboard machine 1 of this embodiment, the washer 71 is provided within the cylindrical portion 5 to restrict the rear motor support member 81 from moving in the circumferential direction relative to the cylindrical portion 5. This makes it possible to prevent the rear motor support member 81 from loosening relative to the cylindrical portion 5, and to prevent the fixation of the motor 25 from weakening.

**[0057]** In addition, the washer 71 has the locking notch 72 that is locked to the cylindrical portion 5 (the key member 67 fitted to the fitted groove 65 of the cylindrical portion 5), the locking notch 73 that is locked to the motor 25 that is fixed circumferentially to the cylindrical portion 5 by the fixing mechanism, and the latch portion 74 that latches the rear motor support member 81. This makes it possible to easily restrict circumferential movement of the rear motor support member 81 using the washer 71. In other words, when manufacturing the electric outboard machine 1, the washer 71 is fitted into the cylindrical portion 5, the locking notch 72 and the locking notch 73 are respectively engaged with the rear end of the key member 67 and the locking portion 75 of the motor 25, the rear motor support member 81 is then screwed into the cylindrical portion 5, and the latch portion 74 of the washer 71 is then bent and hooked onto the rear motor support member 81, thereby easily restricting circumferential movement of the rear motor support member 81.

**[0058]** Furthermore, in the electric outboard machine 1 of this example, the motor 25 can be easily separated from the outer case body 4 by removing the rear motor support member 81, the washer 71, and the key member 67 from the outer case body 4. As a result, the outer case 3 of the electric outboard machine 1 of this example can be made small enough to be comparable to an outer case of an electric outboard machine that employs a method in which a motor is shrinkfitted into the outer case, and in this case, the motor 25 can be made detachable from the outer case 3, reducing maintenance costs of the electric outboard machine. That is, when the method of shrink-fitting the motor into the outer case is adopted, the outer diameter of the outer case can be made very close to the outer diameter of the motor, making it possible to reduce the size of the outer case. However, when the method of shrink-fitting the motor into the outer case is adopted, it becomes difficult to separate the motor from the outer case, which has a disadvantage of increasing the maintenance costs of the electric outboard machine, for example, when the motor breaks down, the motor and the outer case must be replaced together. In contrast, with the electric outboard machine 1 of this example, the outer diameter of the outer case 3 can be made closer to the outer diameter of the outer case in the electric outboard machine which employs a method of shrink-fitting the motor into the outer case, making it possible to reduce the size of the outer case 3. In this case, since the motor 25 can be made detachable from the outer case 3, when the motor 25 breaks down, for example, the motor 25 can be removed from the outer case 3 and repaired or replaced. As a result, there is no need to replace the outer case 3, and the maintenance costs of the electric outboard machine 1 can be reduced.

**[0059]** In the electric outboard machine 1 of the above example, the thread 83 is formed on the outer circumferential surface of the rear motor support member 81 and the thread 64 is formed on the inner circumferential surface of the cylindrical portion 5, and the rear motor support member 81 is screwed to the cylindrical portion 5, but the present invention is not limited to this. For example, as the rear motor support member 101 illustrated in FIG. 10, a locking claw 102 may be formed on an outer circumferential portion of the rear motor support member 101, while a recess may be formed on an inner circumferential surface of a cylindrical portion, and the rear motor support member 101 may be attached to the cylindrical portion by engaging the locking claw 102 with the recess. In addition to this, a notch type, a bayonet type, or the like can be used as a structure for attaching the rear motor support member to the cylindrical portion.

**[0060]** Furthermore, in the electric outboard machine 1 of the above example, the front motor support portion 61 has a structure in which it extends inward from the inner circumferential surface of the cylindrical portion 5, but the present invention is not limited to this. For example, a front motor support portion may be provided on a lid provided at an opening portion on a front side of the outer case body 4 or on another member.

**[0061]** Further, in the example described above, the locking notch 72 and the locking notch 73 are formed on the outer edge of the washer 71, but only the locking notch 72 may be formed on the outer edge of the washer 71. In addition, the outer diameter of the washer 71 may be reduced so that the washer 71 can be inserted between the upper and lower key members 67, and only the locking notch 73 may be formed on the outer edge of the washer 71.

**[0062]** Furthermore, the fixing mechanism is not limited to a key-coupling structure using the key member 67, and other types of engagement and locking structures may be adopted.

**[0063]** Furthermore, the present invention can be modified as appropriate without departing from the spirit or concept of the invention as can be read from the claims and the entire specification, and electric outboard machines with such modifications are also included in the technical concept of the present invention.

REFERENCE SIGNS LIST

**[0064]**

1: electric outboard machine
2: lower unit
3: outer case
4: outer case body
5: cylindrical portion
21: propeller
25: motor
61: front motor support portion
64: thread
65: fitted groove (fixing mechanism, first fitted portion)
66: fitted groove (fixing mechanism, second fitted portion)
67: key member (fixing mechanism)
71: washer (movement restricting member)
72, 73: locking notch (locked portion)
74: latch portion
81, 101: rear motor support member
83: thread

**Claims**

**1.** An electric outboard machine (1) for propelling a boat, comprising:

an outer case (3) provided in a lower part of the electric outboard machine;
a propeller (21) rotatably supported in the outer case; and
a motor (25) provided in the outer case and configured to rotate the propeller,
wherein the outer case (3) includes:
a cylindrical portion (5) including an axis extending in a front-rear direction and in which the motor is disposed,
wherein the cylindrical portion (5) includes:

a front motor support portion (61) configured to support the motor from a front side so as to prevent the motor from moving forward relative to the cylindrical portion; and
a rear motor support portion (81, 101) configured to support the motor from a rear side so as to prevent the motor from moving rearward relative to the cylindrical portion, and

wherein the rear motor support portion is a member that is formed in an annular shape and detachable from the cylindrical portion, and the rear motor support portion is attached to the cylindrical portion by coupling an outer circumferential surface of the rear motor support portion and an inner circumferential surface of the cylindrical portion to each other.

**2.** The electric outboard machine according to claim 1, wherein the rear motor support portion is screwed to the cylindrical portion by a thread formed on the outer circumferential surface of the rear motor support portion screwing into a thread formed on the inner circumferential surface of the cylindrical portion.

**3.** The electric outboard machine according to claim 1, wherein the rear motor support portion is attached to the cylindrical portion to form a wall that protrudes inward from the inner circumferential surface of the cylindrical portion.

**4.** The electric outboard machine according to claim 1, wherein the front motor support portion is a wall that protrudes inward from the inner circumferential surface of the cylindrical portion.

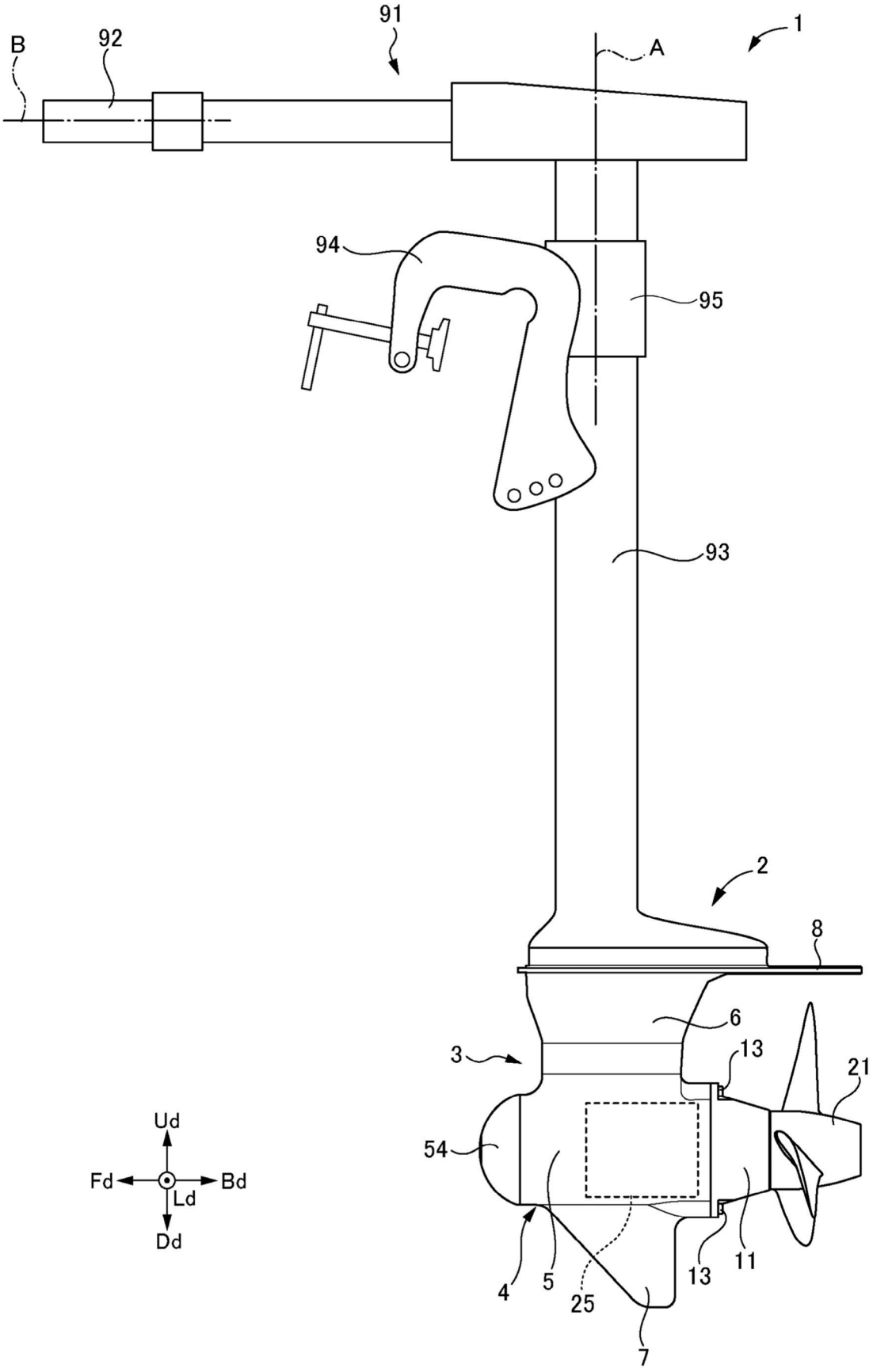
**5.** The electric outboard machine according to claim 1, wherein the cylindrical portion and the motor are provided with a fixing mechanism for fixing the cylindrical portion and the motor to each other in a circumferential direction.

**6.** The electric outboard machine according to claim 5, wherein the fixing mechanism includes a first fitted portion provided on the cylindrical portion, a second fitted portion provided on the motor, and a key member that fits with each of the first fitted portion and the second fitted portion.

**7.** The electric outboard machine according to claim 1, wherein a movement restricting member is provided within the cylindrical portion to restrict circumferential movement of the rear motor support portion relative to the cylindrical portion.

**8.** The electric outboard machine according to claim 7, wherein the movement restricting member is a washer including a locked portion and a latch portion, the locked portion is locked to the motor circumferentially fixed to the cylindrical portion or locked to the cylindrical portion, and the latch portion is hooked onto the rear motor support portion to lock the rear motor support portion.

FIG.1



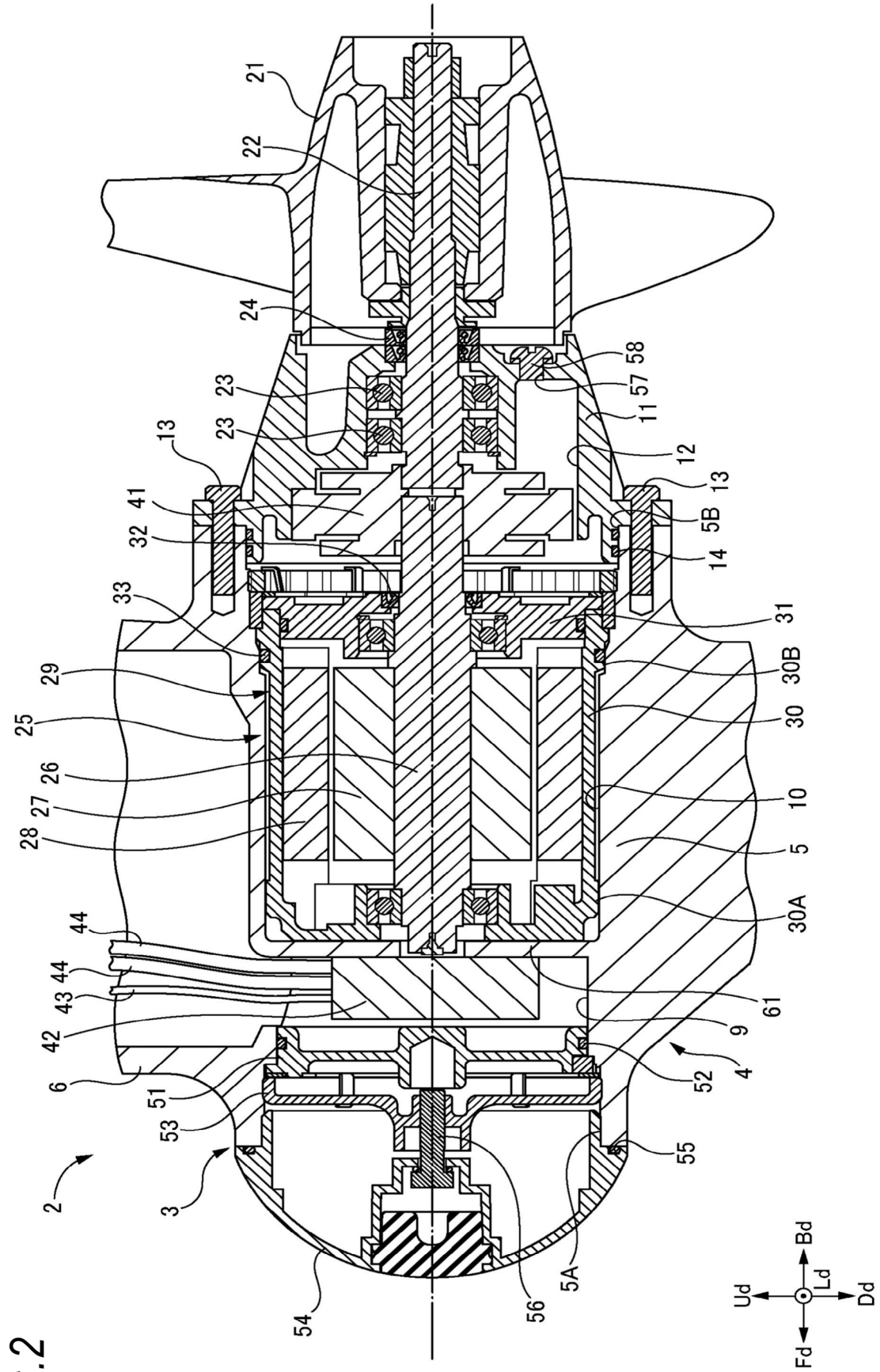

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FIG.2

FIG.3

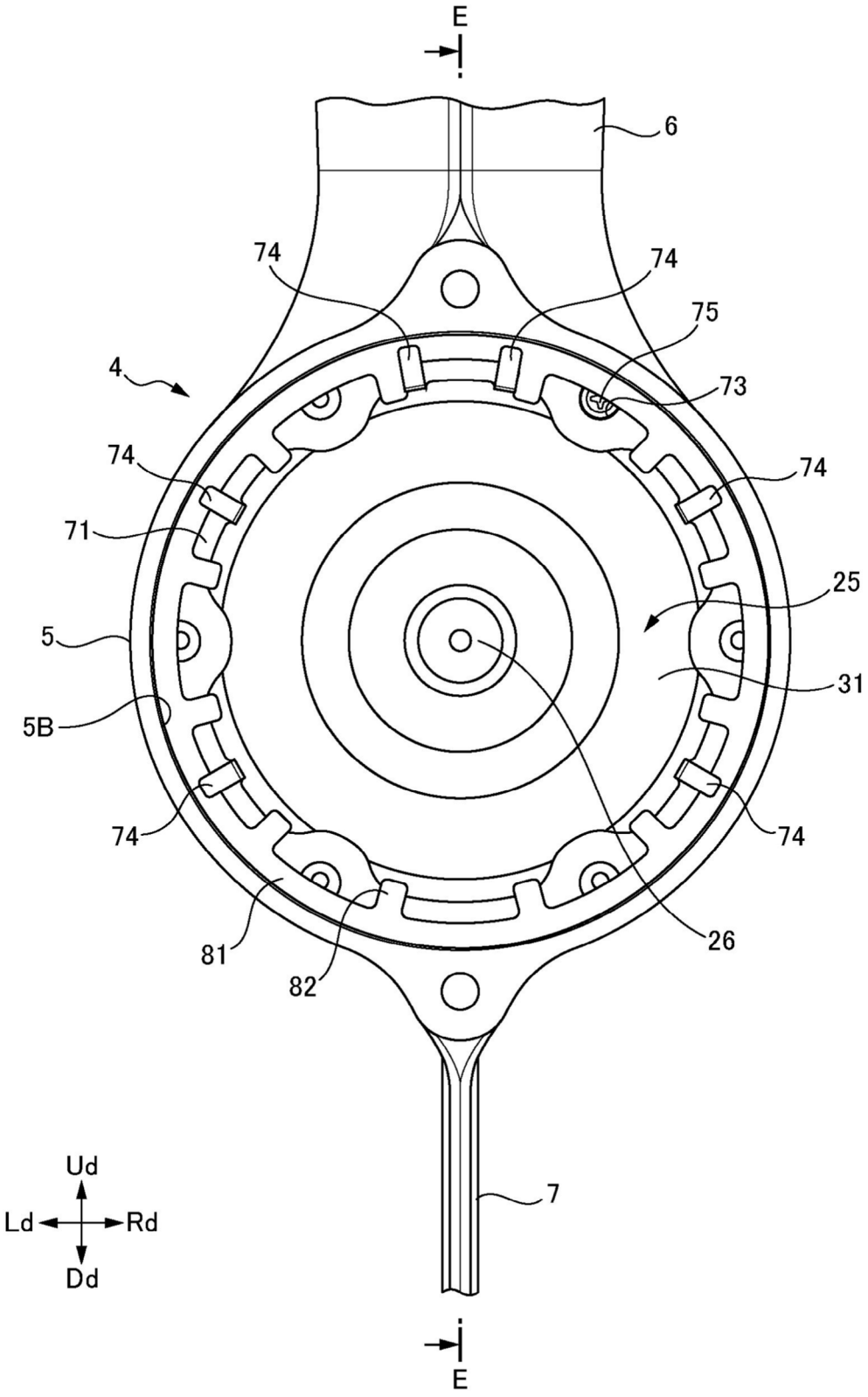
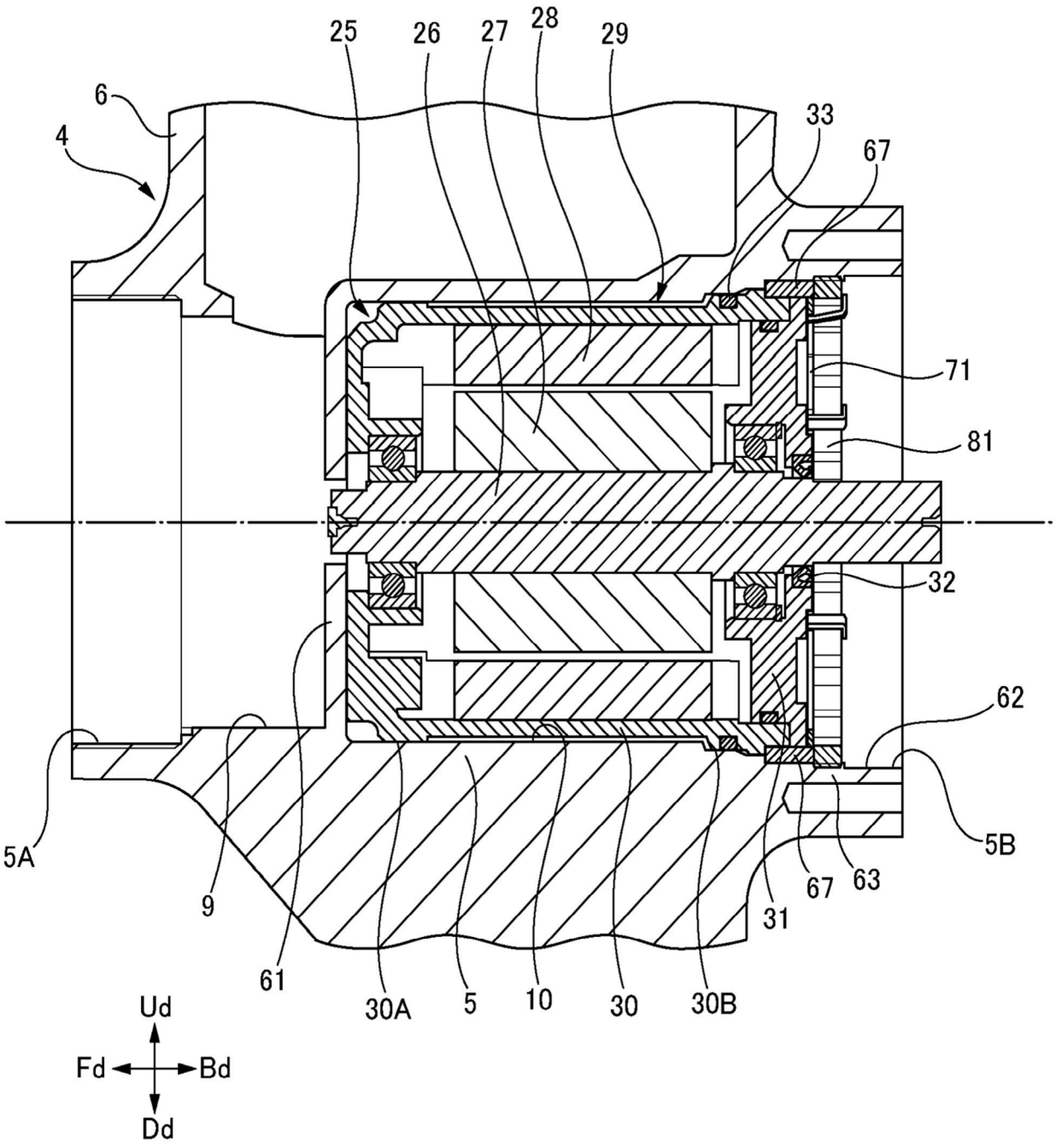


FIG.4


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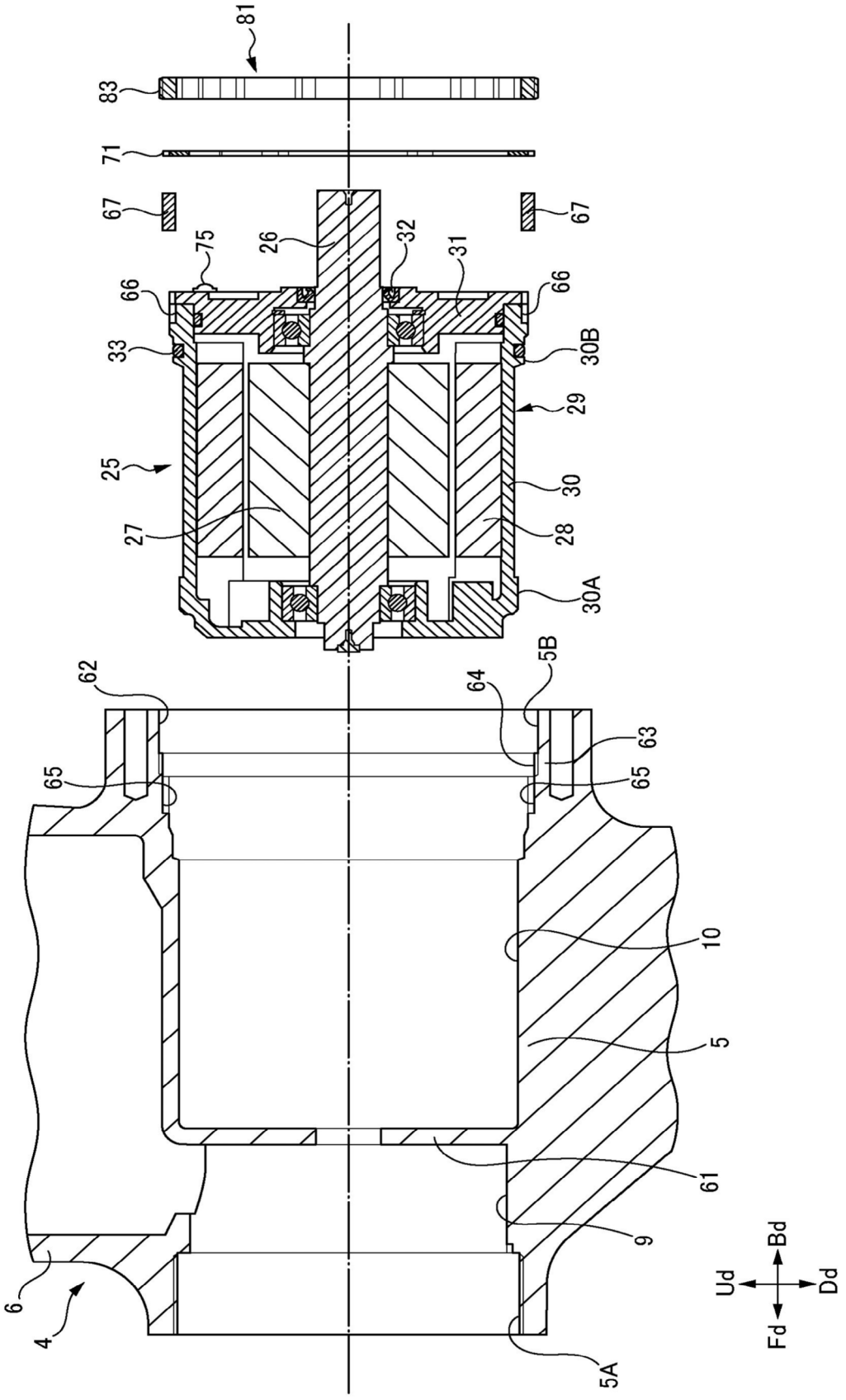

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FIG.5

FIG.6

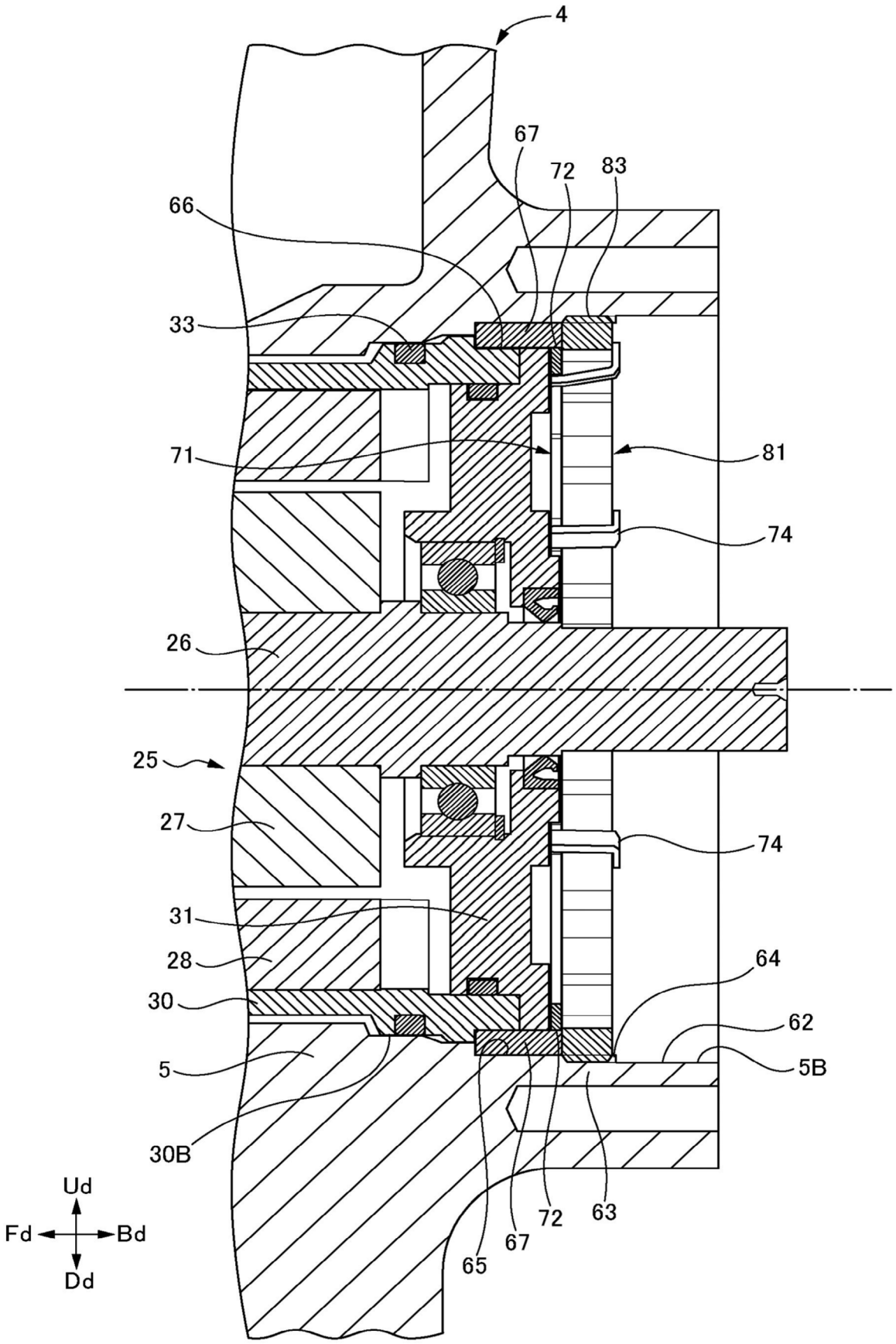

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FIG.7B

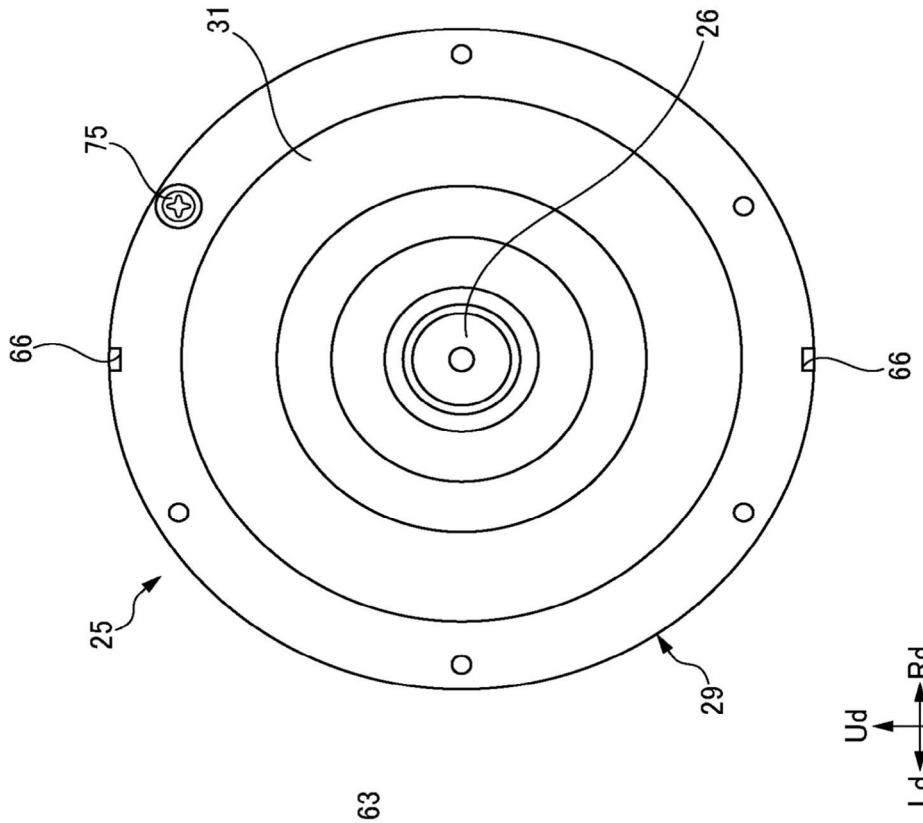



FIG.7A

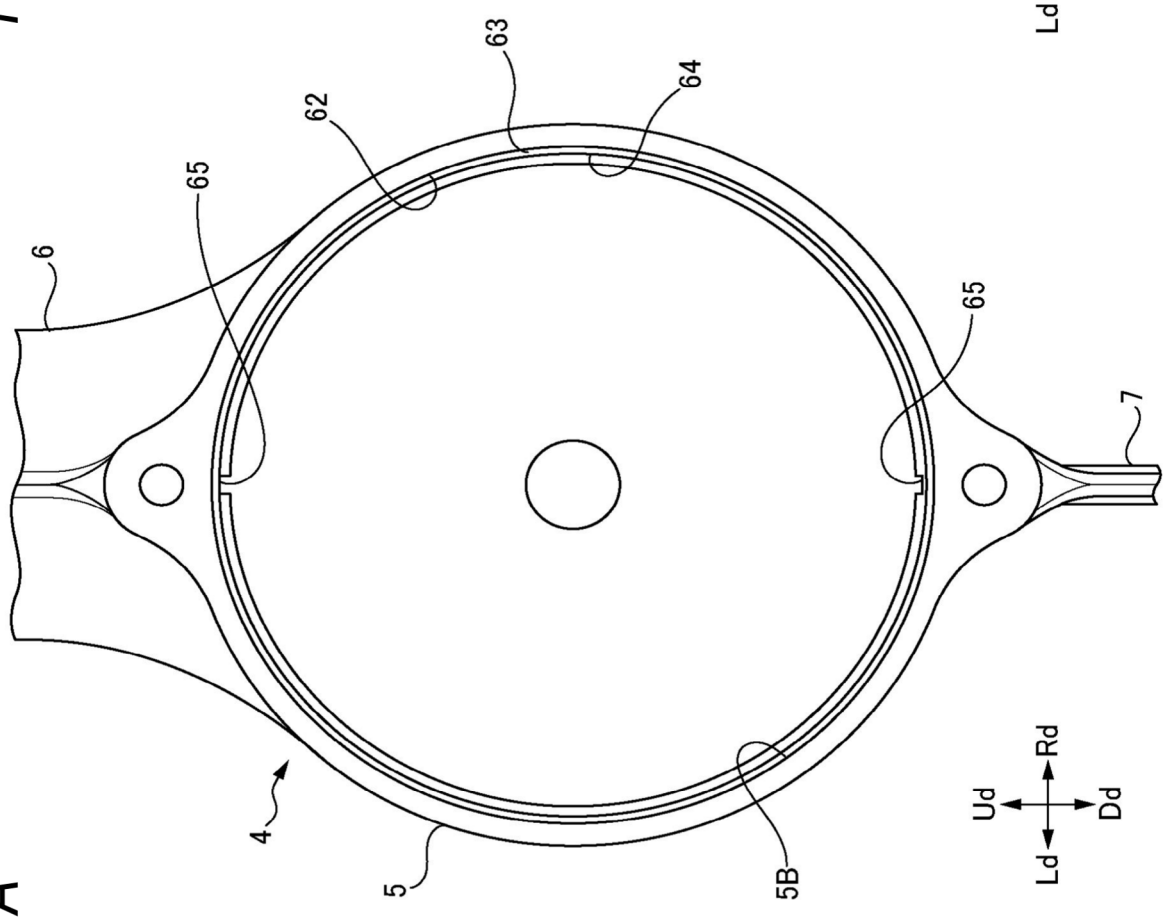


FIG.8B

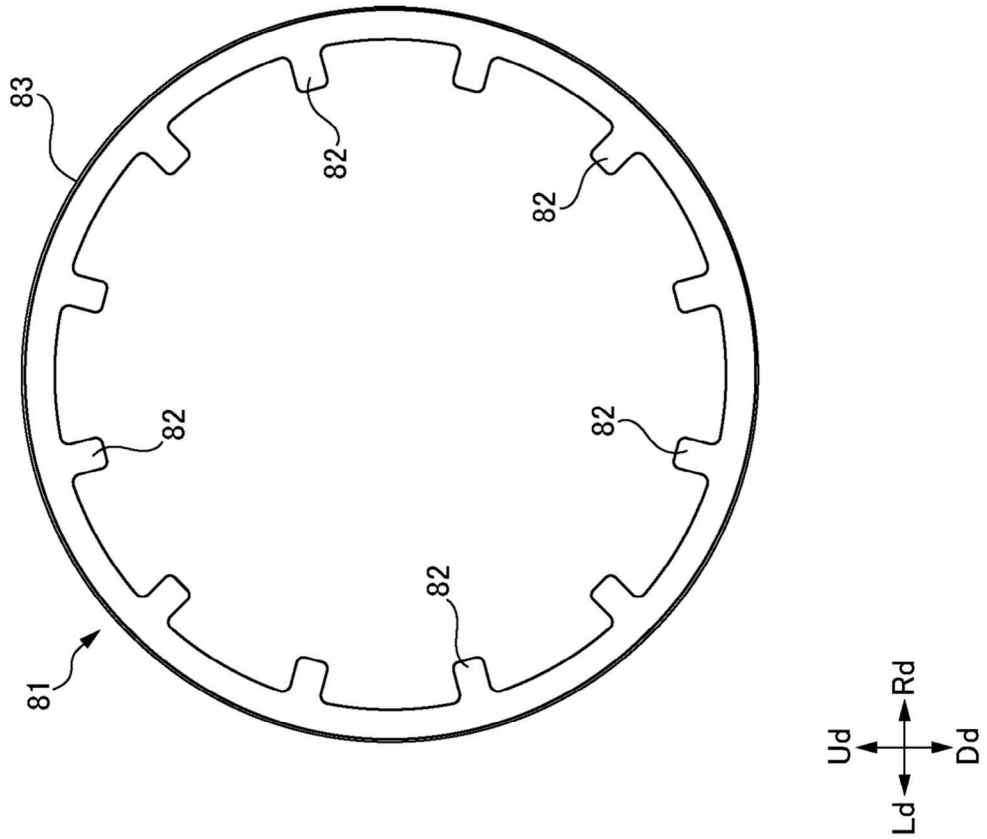

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FIG.8A

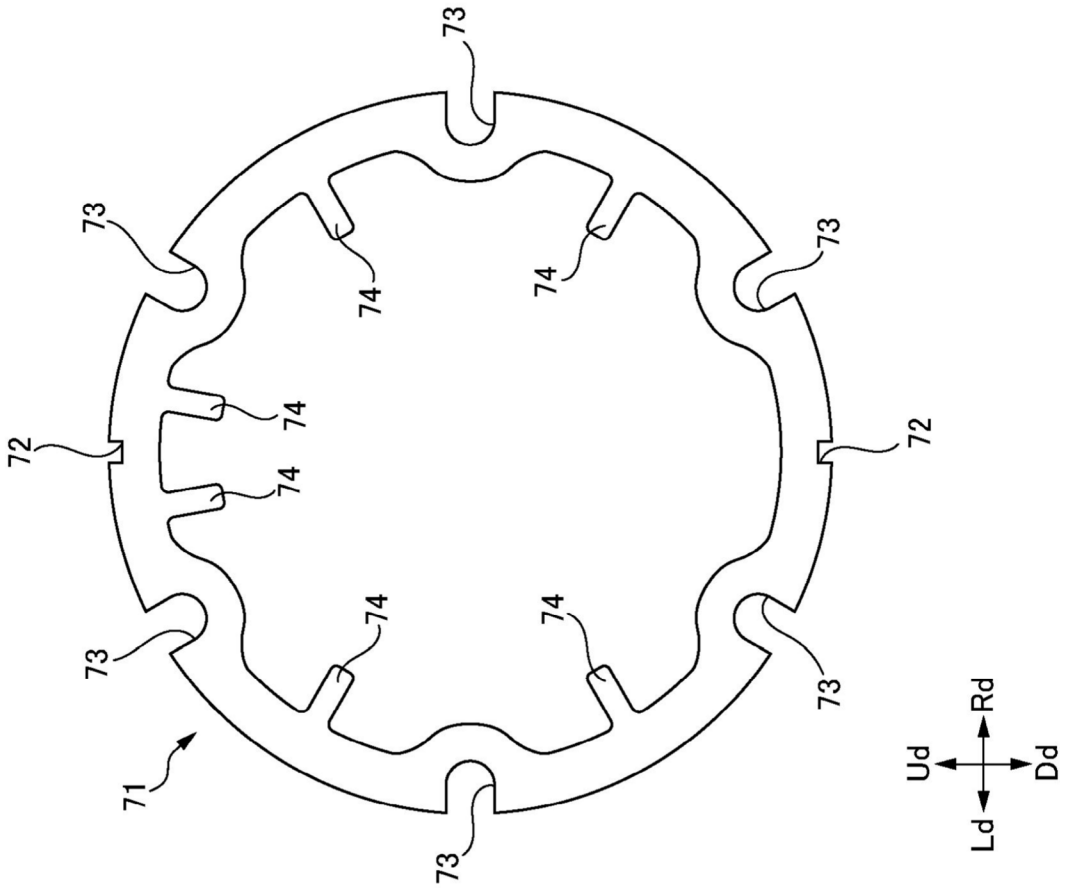

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FIG.9B

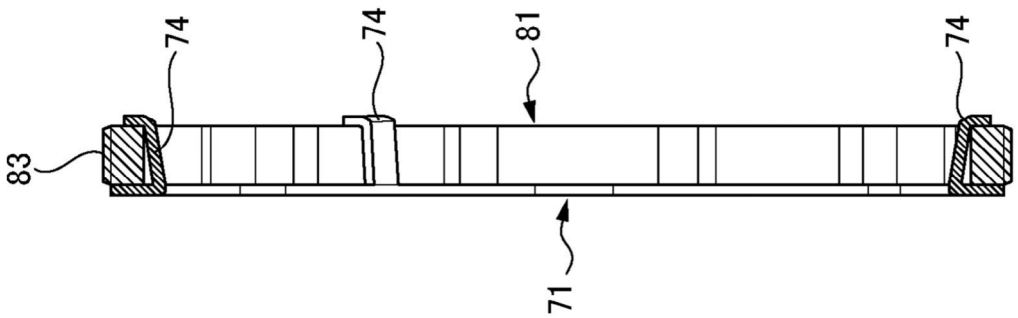

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FIG.9A

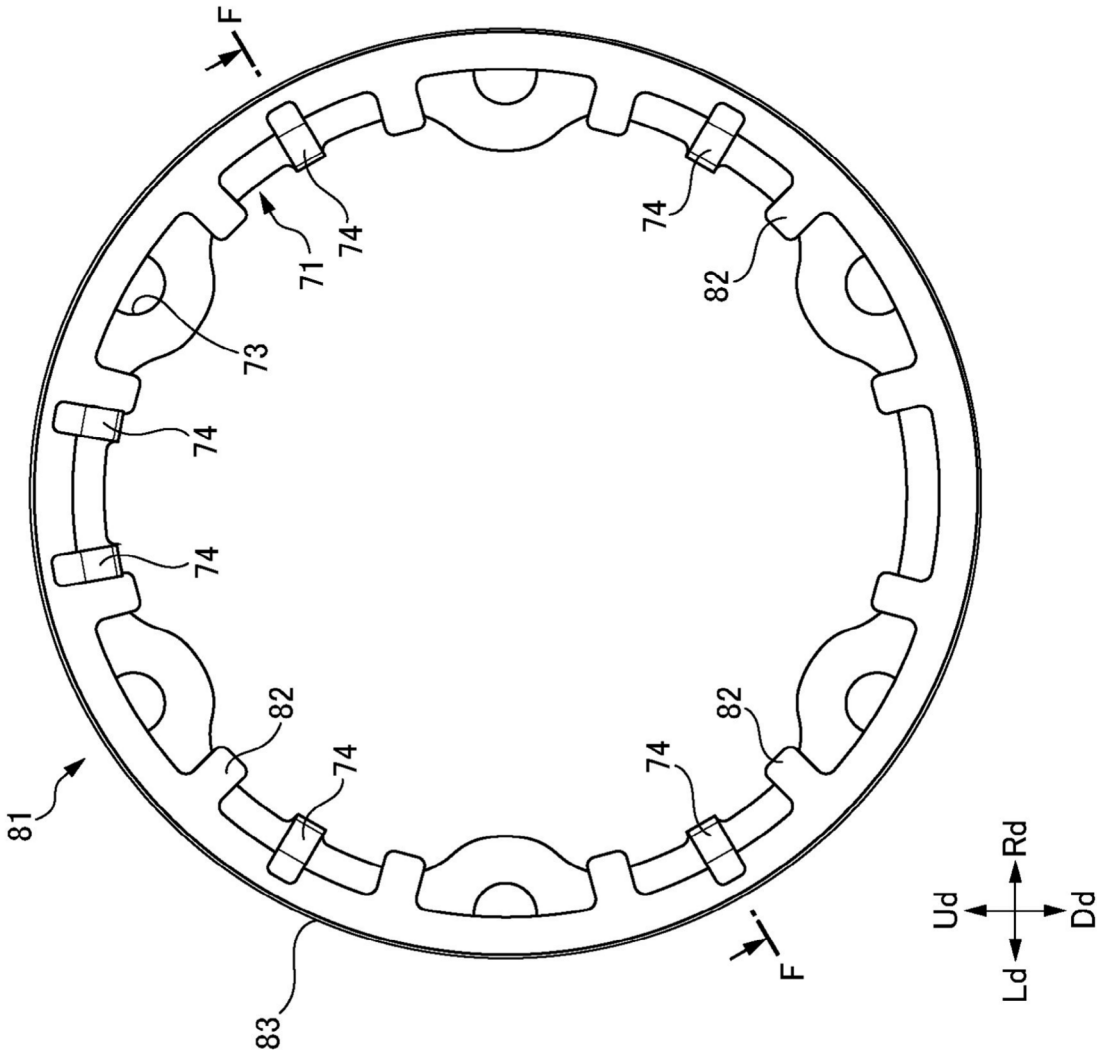
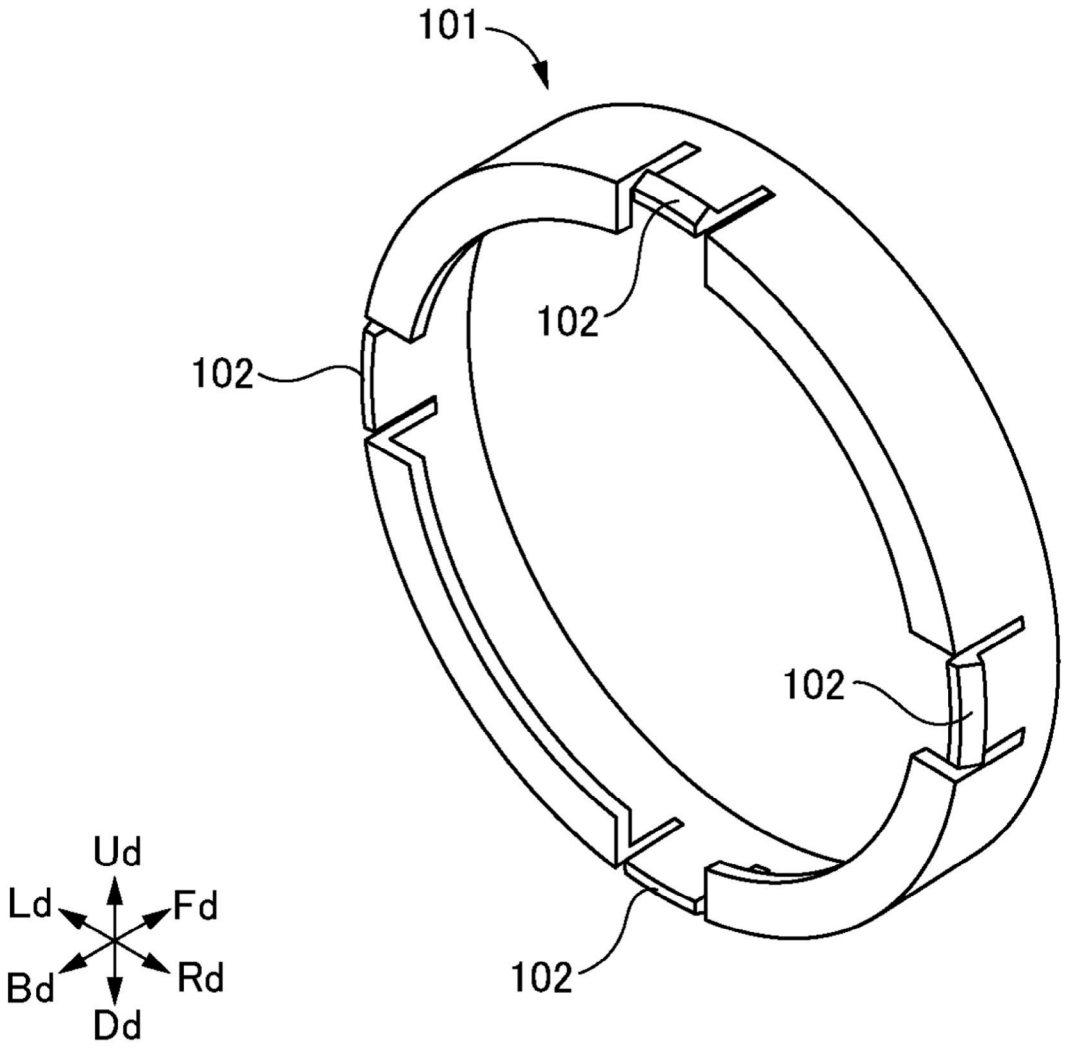

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FIG.10



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# EUROPEAN SEARCH REPORT

Application Number
EP 26 16 4892

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X | US 2010/003871 A1 (WISHART RANDELL J [US]) 7 January 2010 (2010-01-07) * paragraph [0038] - paragraph [0047]; figures 1-8 * | 1-8 | INV. B63H20/00 B63H20/32 B63H21/17 |
| X | WO 2014/187711 A1 (FRAUNHOFER GES FORSCHUNG [DE]) 27 November 2014 (2014-11-27) * page 6, line 20 - page 8, line 15; figures 2A-D * | 1 | |
| A | CN 219 821 735 U (GUANGDONG EPROPULSION TECH CO LTD) 13 October 2023 (2023-10-13) * the whole document * | 1-8 | |
| A | US 2024/429784 A1 (DAI XINSHENG [CN] ET AL) 26 December 2024 (2024-12-26) * the whole document * | 1-8 | |

TECHNICAL FIELDS SEARCHED (IPC)

B63H
B63B

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 2 August 2026 | Chirvase, Lucian |

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02-08-2026

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 2010003871 A1 | 07-01-2010 | NONE | |
| WO 2014187711 A1 | 27-11-2014 | DE 102013209682 A1 | 27-11-2014 |
| | | WO 2014187711 A1 | 27-11-2014 |
| CN 219821735 U | 13-10-2023 | NONE | |
| US 2024429784 A1 | 26-12-2024 | CN 117751511 A | 22-03-2024 |
| | | EP 4481998 A1 | 25-12-2024 |
| | | US 2024429784 A1 | 26-12-2024 |
| | | WO 2023178699 A1 | 28-09-2023 |

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### Patent documents cited in the description


- JP H1016886 A **[0002] [0004]**