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(54) **ELECTRIC OUTBOARD MOTOR**

- (57) An electric outboard motor (1, 21, 51, 81) for propelling a boat, includes: a propeller unit (2, 22, 52); a motor (6, 26, 53); a first battery (11, 31, 61) and a second battery (12, 32, 62); an accommodation portion (57); and a support portion (8, 28, 65, 82). The first battery is disposed in the accommodation portion such that a thickness direction thereof is an upper-lower direction of the electric outboard motor, and is located above the support portion. The second battery is disposed in the accommodation portion such that a thickness direction thereof is a front-rear direction of the electric outboard motor, and is located rearward of an upper portion of the support portion.

## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to an electric outboard motor for propelling a boat.

### BACKGROUND ART

**[0002]** An electric outboard motor includes a motor serving as a power source that generates propulsion of a boat, a propeller that converts power of the motor into propulsion, a propeller shaft to which the propeller is fixed, a transom bracket for attaching the electric outboard motor to a transom of the boat, and the like.

**[0003]** There are two types of electric outboard motors, one with the propeller, the propeller shaft, and the motor disposed at a lower portion of the electric outboard motor below a water surface, and one with the propeller and the propeller shaft disposed at the lower portion of the electric outboard motor below the water surface, the motor disposed at an upper portion of the electric outboard motor above the water surface, and a drive shaft provided between the motor and the propeller shaft to transmit power of the motor to the propeller shaft.

**[0004]** Further, a battery is required to drive the motor, and there are two types of electric outboard motors, one with the battery disposed in the boat and one with the battery disposed inside the electric outboard motor. JP2005-162054A (Patent Literature 1) discloses an electric outboard motor including a motor case at an upper portion and a battery in the motor case.

### CITATION LIST

### PATENT LITERATURE

**[0005]** PTL 1: JP2005-162054A

**[0006]** To extend a range of a boat when sailing with an electric outboard motor, it is necessary to increase a battery capacity. An increase in the battery capacity increases a battery size. When an accommodation portion such as a case is provided at an upper portion of the electric outboard motor and a battery is disposed in the accommodation portion, the accommodation portion may largely protrude upward or rearward due to an increase in a size of the battery. When the accommodation portion largely protrudes upward or rearward, the electric outboard motor may have an increased size, which may impair a weight balance of the electric outboard motor.

### SUMMARY

**[0007]** The present invention is made in view of, for example, the problem described above, and an object of the present invention is to provide an electric outboard motor that includes a battery in an accommodation portion at an upper portion of the electric outboard motor and

can prevent upward and rearward protrusions of the accommodation portion.

**[0008]** To solve the problem described above, the present invention provides an electric outboard motor for propelling a boat, the electric outboard motor including: a propeller unit including a propeller shaft, a propeller fixed to the propeller shaft, and a case rotatably supporting the propeller shaft, the propeller unit being disposed at a lower portion of the electric outboard motor; a motor configured to rotate the propeller shaft; a first battery and a second battery configured to supply electric power for driving the motor to the motor; an accommodation portion accommodating the first battery and the second battery, the accommodation portion being disposed at an upper portion of the electric outboard motor; and a support portion formed in a columnar shape extending in an upper-lower direction, the propeller unit being supported at a lower portion and the accommodation portion being supported at an upper portion. Each of the first battery and the second battery is formed in a rectangular parallelepiped shape having a thickness dimension smallest among a length dimension, a width dimension, and the thickness dimension. The first battery is disposed in the accommodation portion such that a thickness direction thereof is the upper-lower direction of the electric outboard motor, and is located above the support portion. The second battery is disposed in the accommodation portion such that a thickness direction thereof is a front-rear direction of the electric outboard motor, and is located rearward of the upper portion of the support portion.

**[0009]** According to the present invention, it is possible to provide a battery in an accommodation portion at an upper portion of an electric outboard motor and prevent upward and rearward protrusions of the accommodation portion.

### BRIEF DESCRIPTION OF DRAWINGS

#### [0010]

FIG. 1A is a schematic view showing an electric outboard motor according to a first embodiment of the present invention, FIG. 1B is a schematic view showing an electric outboard motor according to a first comparative example, and FIG. 1C is a schematic view showing an electric outboard motor according to a second comparative example.

FIG. 2 is a schematic view showing an electric outboard motor according to a second embodiment of the present invention.

FIG. 3 is a perspective view of an electric outboard motor according to an example of the present invention when viewed from front upper left.

FIG. 4 is a schematic view showing the electric outboard motor according to the example of the present invention when viewed from left.

FIG. 5 is a schematic view showing the electric outboard motor according to the example of the present

invention when viewed from front.

FIGS. 6A and 6B are schematic views showing a battery case detached from the electric outboard motor according to the example of the present invention.

FIG. 7 is a sectional view of the electric outboard motor taken along a line VII-VII in FIG. 5 when viewed from left.

FIG. 8 is a schematic view showing a state in which the battery case of the electric outboard motor according to the example of the present invention is detached from the electric outboard motor and placed on a floor surface or the like.

FIGS. 9A to 9D are schematic views showing modifications of arrangements of a first battery and a second battery in the electric outboard motor according to the example of the present invention.

FIG. 10 is a schematic view showing an electric outboard motor according to another example of the present invention.

## DESCRIPTION OF EMBODIMENTS

### First Embodiment

**[0011]** FIG. 1A shows an electric outboard motor 1 according to a first embodiment of the present invention when viewed from left. In FIG. 1A, the electric outboard motor 1 is an electric outboard motor for propelling a boat, and includes a propeller unit 2 disposed at a lower portion of the electric outboard motor 1, a motor 6, a first battery 11 and a second battery 12 that supply electric power for driving the motor 6 to the motor 6, an accommodation portion 7 disposed at an upper portion of the electric outboard motor 1 and accommodating the first battery 11 and the second battery 12, and a support portion 8 formed in a columnar shape extending in an upper-lower direction with the propeller unit 2 supported at a lower portion and the accommodation portion 7 supported at an upper portion. The propeller unit 2 includes a propeller shaft 3, a propeller 4 fixed to the propeller shaft 3, and a case 5 that rotatably supports the propeller shaft 3. In the electric outboard motor 1 according to the first embodiment, the motor 6 is disposed in the case 5 of the propeller unit 2, and the propeller shaft 3 rotates by power of the motor 6.

**[0012]** Each of the first battery 11 and the second battery 12 is, for example, a battery module or a battery pack including a plurality of cells. Each of the first battery 11 and the second battery 12 is formed in a rectangular parallelepiped shape having a thickness dimension smallest among a length dimension, a width dimension, and a thickness dimension. The first battery 11 is disposed in the accommodation portion 7 such that a thickness direction thereof is an upper-lower direction of the electric outboard motor 1, and the second battery 12 is disposed in the accommodation portion 7 such that a thickness direction thereof is a front-rear direction of the

electric outboard motor 1. The first battery 11 is disposed above the support portion 8, and the second battery 12 is disposed rearward of the upper portion of the support portion 8.

**[0013]** In the electric outboard motor 1 according to the first embodiment of the present invention, by disposing the first battery 11 formed in a rectangular parallelepiped shape having the thickness dimension smallest among the length dimension, the width dimension, and the thickness dimension in an orientation in which the thickness direction thereof is the upper-lower direction of the electric outboard motor 1, a dimension of the first battery 11 in the upper-lower direction can be minimized. By disposing the first battery 11 above the support portion 8 and disposing the second battery 12 rearward of the upper portion of the support portion 8, the first battery 11 can be provided in a vicinity of an upper end of the support portion 8 while avoiding interfering with the second battery 12. In this way, since the dimension of the first battery 11 in the upper-lower direction is minimized and the first battery 11 is provided in the vicinity of the upper end of the support portion 8, a distance D1 between an upper surface of the accommodation portion 7 and the upper end of the support portion 8 can be shortened, and the accommodation portion 7 can be prevented from protruding upward.

**[0014]** Further, by disposing the second battery 12 formed in a rectangular parallelepiped shape having the thickness dimension smallest among the length dimension, the width dimension, and the thickness dimension in an orientation in which the thickness direction thereof is the front-rear direction of the electric outboard motor 1, a dimension of the second battery 12 in the front-rear direction can be minimized. By disposing the first battery 11 above the support portion 8 and disposing the second battery 12 rearward of the upper portion of the support portion 8, the second battery 12 can be provided in a vicinity of the upper portion of the support portion 8 while avoiding interfering with the first battery 11. In this way, since the dimension of the second battery 12 in the front-rear direction is minimized and the second battery 12 is provided in the vicinity of the upper portion of the support portion 8, a distance D2 between a rear surface of the accommodation portion 7 and the upper portion of the support portion 8 can be shortened, and the accommodation portion 7 can be prevented from protruding rearward.

**[0015]** According to the electric outboard motor 1 in the first embodiment of the present invention as described above, the accommodation portion 7 can be prevented from protruding upward and rearward, and thus it is possible to prevent an increase in a size of the electric outboard motor 1 and deterioration of a weight balance of the electric outboard motor 1.

**[0016]** This effect of the electric outboard motor 1 according to the first embodiment of the present invention will be further studied. FIG. 1B shows an electric outboard motor 151 according to a first comparative example when

viewed from left. In the electric outboard motor 151 according to the first comparative example, a first battery 161 and a second battery 162 are accommodated in an accommodation portion 157. The first battery 161 and the second battery 162 are respectively the same as the first battery 11 and the second battery 12 provided in the electric outboard motor 1 according to the first embodiment of the present invention. In the accommodation portion 157 of the electric outboard motor 151 according to the first comparative example, the first battery 161 is disposed such that a thickness direction thereof is an upper-lower direction of the electric outboard motor 151, and the second battery 162 is also disposed such that a thickness direction thereof is the upper-lower direction of the electric outboard motor 151. The second battery 162 is disposed above the first battery 161 and overlaps the first battery 161. In the electric outboard motor 151 according to the first comparative example, since the first battery 161 and the second battery 162 overlap in the upper-lower direction, a distance D3 between an upper surface of the accommodation portion 157 and an upper end of the support portion 158 in the electric outboard motor 151 according to the first comparative example is longer than the distance D1 between the upper surface of the accommodation portion 7 and the upper end of the support portion 8 in the electric outboard motor 1 according to the first embodiment of the present invention. As a result, the accommodation portion 157 of the electric outboard motor 151 according to the first comparative example protrudes upward compared to the accommodation portion 7 of the electric outboard motor 1 according to the first embodiment of the present invention. In the electric outboard motor 151 according to the first comparative example, the electric outboard motor 151 has a large height dimension since the accommodation portion 157 protrudes upward. In addition, the second battery 162 having a large weight is accommodated in a part of the accommodation portion 157 that protrudes upward, and thus an upper portion of the electric outboard motor 151 is remarkably heavier than a lower portion thereof, which may impair a weight balance of the electric outboard motor 151.

**[0017]** FIG. 1C shows an electric outboard motor 171 according to a second comparative example when viewed from left. In the electric outboard motor 171 according to the second comparative example, a first battery 181 and a second battery 182 are accommodated in an accommodation portion 177. The first battery 181 and the second battery 182 are respectively the same as the first battery 11 and the second battery 12 provided in the electric outboard motor 1 according to the first embodiment of the present invention. In the accommodation portion 177 of the electric outboard motor 171 according to the second comparative example, the first battery 181 is disposed such that a thickness direction thereof is a front-rear direction of the electric outboard motor 171, and the second battery 182 is also disposed such that a thickness direction thereof is the front-rear direction of

the electric outboard motor 171. The second battery 182 is disposed rearward of the first battery 181 and overlaps the first battery 181 in the front-rear direction. In the electric outboard motor 171 according to the second comparative example, since the first battery 181 and the second battery 182 overlap in the front-rear direction, a distance D4 between a rear surface of the accommodation portion 177 and an upper portion of the support portion 178 in the electric outboard motor 171 according to the second comparative example is longer than the distance D2 between the rear surface of the accommodation portion 7 and the upper portion of the support portion 8 in the electric outboard motor 1 according to the first embodiment of the present invention. As a result, the accommodation portion 177 of the electric outboard motor 171 according to the second comparative example protrudes rearward compared to the accommodation portion 7 of the electric outboard motor 1 according to the first embodiment of the present invention. In the electric outboard motor 171 according to the second comparative example, the electric outboard motor 171 has a large length dimension (length in the front-rear direction) since the accommodation portion 177 protrudes rearward. In addition, the second battery 182 having a large weight is accommodated in a part of the accommodation portion 177 that protrudes rearward, and thus a rear portion of the electric outboard motor 171 is remarkably heavier than a front portion thereof, which may impair a weight balance of the electric outboard motor 171.

**[0018]** As can be seen from a comparison among the electric outboard motor 1 according to the first embodiment of the present invention, the electric outboard motor 151 according to the first comparative example, and the electric outboard motor 171 according to the second comparative example, according to the electric outboard motor 1 in the first embodiment of the present invention, an accommodation portion can be appropriately prevented from protruding both upward and rearward, and thus it is possible to appropriately prevent an increase in a height dimension and a length dimension of an electric outboard motor and deterioration of a weight balance of the electric outboard motor. Further, according to the electric outboard motor 1 in the first embodiment of the present invention, since the two batteries 11 and 12 are provided, a battery capacity can be increased, and a range of a boat can be extended.

## Second Embodiment

**[0019]** FIG. 2 shows an electric outboard motor 21 according to a second embodiment of the present invention when viewed from left. In the electric outboard motor 1 according to the first embodiment of the present invention described above, as shown in FIG. 1A, the motor 6 is disposed in the case 5 of the propeller unit 2. In the electric outboard motor 21 according to the second embodiment of the present invention, as shown in FIG. 2, a

motor 26 is disposed in an accommodation portion 27 at an upper portion of the electric outboard motor 21. A first battery 31 and a second battery 32 accommodated in the accommodation portion 27 are respectively the same as the first battery 11 and the second battery 12 provided in the electric outboard motor 1 according to the first embodiment of the present invention. Also in the electric outboard motor 21 according to the second embodiment of the present invention, similar to the electric outboard motor 1 according to the first embodiment of the present invention, the first battery 31 is disposed in the accommodation portion 27 such that a thickness direction thereof is an upper-lower direction of the electric outboard motor 21, and the second battery 32 is disposed in the accommodation portion 27 such that a thickness direction thereof is a front-rear direction of the electric outboard motor 21. The first battery 31 is disposed above a support portion 28, and the motor 26 is disposed between an upper end of the support portion 28 and the first battery 31. The second battery 32 is disposed rearward of an upper portion of the support portion 28 as well as rearward of the motor 26. The support portion 28 is formed in a tubular shape, and is provided therein with a drive shaft 29 extending in the upper-lower direction. Similar to the propeller unit 2 of the electric outboard motor 1 according to the first embodiment of the present invention, a propeller unit 22 includes a propeller shaft 23, a propeller 24, and a case 25, and the case 25 is provided therein with a gear mechanism 30. The propeller shaft 23 rotates by power of the motor 26. The power of the motor 26 is transmitted to the propeller shaft 23 via the drive shaft 29 and the gear mechanism 30. According to the electric outboard motor 21 in the second embodiment of the present invention having such a configuration, similar to the electric outboard motor 1 according to the first embodiment of the present invention, the accommodation portion 27 can be prevented from protruding upward and rearward.

#### Examples

**[0020]** Examples of the electric outboard motor of the present invention will be described with reference to FIGS. 3 to 10. In the examples, description on upward (Ud), downward (Dd), forward (Fd), rearward (Bd), leftward (Ld), and rightward (Rd) directions follow arrows drawn on lower left in FIGS. 3 to 7, and 9A to 10.

#### Electric Outboard Motor

**[0021]** FIG. 3 shows an electric outboard motor 51 according to an example of the present invention when viewed from front upper left. FIG. 4 shows the electric outboard motor 51 when viewed from left. FIG. 5 shows the electric outboard motor 51 when viewed from front.

**[0022]** The electric outboard motor 51 is a device attached to a transom of a boat to propel the boat. As shown in FIG. 4, the electric outboard motor 51 includes a

propeller unit 52, a first battery 61, a second battery 62, a battery case 57, a support portion 65, a transom bracket 71, a swivel bracket 74, a steering shaft 75, a bar handle 76, and a fine dust capture device 77.

**[0023]** The propeller unit 52 is disposed at a lower portion of the electric outboard motor 51, and is located below a water surface in a state in which the electric outboard motor 51 is attached to a boat. The propeller unit 52 includes a motor 53, a propeller shaft 54, a propeller 55, and a propeller unit case 56. The motor 53 is disposed at a front portion in the propeller unit case 56. The propeller shaft 54 extends in a front-rear direction, and a front portion of the propeller shaft 54 is rotatably supported by a rear portion in the propeller unit case 56. The propeller shaft 54 is connected to an output shaft of the motor 53, is integrally formed with the output shaft of the motor 53, and rotates by power of the motor 53. The propeller 55 is fixed to a rear end portion of the propeller shaft 54 and rotates integrally with the propeller shaft 54. The propeller unit case 56 is a sealed columnar case.

**[0024]** The first battery 61 and the second battery 62 are electrically connected to the motor 53 and supply electric power for driving the motor 53 to the motor 53. Each of the first battery 61 and the second battery 62 is, for example, a battery module or a battery pack including a plurality of cells. Each of the first battery 61 and the second battery 62 is formed in a rectangular parallelepiped shape having a thickness dimension smallest among a length dimension, a width dimension, and a thickness dimension.

**[0025]** The battery case 57 is disposed at an upper portion of the electric outboard motor 51, and is located above the water surface in the state in which the electric outboard motor 51 is attached to a boat. The first battery 61 and the second battery 62 are accommodated in the battery case 57. The battery case 57 is a specific example of an "accommodation portion".

**[0026]** FIG. 6A shows a state in which the battery case 57 is detached from the electric outboard motor 51. FIG. 6B shows the battery case 57 detached from the electric outboard motor 51 when viewed from front lower left. As shown in FIG. 6A, the battery case 57 is attachable to and detachable from the electric outboard motor 51. As shown in FIGS. 3 to 5 and FIG. 6B, the battery case 57 is formed in a bottomed and covered triangular tubular shape in which an axis extends in a left-right direction. The battery case 57 includes a left wall portion 57A, a right wall portion 57B, an upper wall portion 57C, a rear wall portion 57D, and an attachment wall portion 57E. The left wall portion 57A and the right wall portion 57B are each formed in a flat plate shape extending in an upper-lower direction and the front-rear direction, and when viewed from left or right, each of the left wall portion 57A and the right wall portion 57B has a substantially isosceles right triangular shape. The upper wall portion 57C is formed in a flat plate shape extending in the front-rear direction and the left-right direction, and when

viewed from above, the upper wall portion 57C has a rectangular shape elongated in the front-rear direction. The rear wall portion 57D is formed in a flat plate shape extending in the upper-lower direction and the left-right direction, and when viewed from rear, the rear wall portion 57D has a rectangular shape elongated in the upper-lower direction. The attachment wall portion 57E is formed in a flat plate shape extending from a front edge of the upper wall portion 57C to a lower edge of the rear wall portion 57D. The attachment wall portion 57E is inclined such that a rear end thereof is located below a front end thereof, and an inclination angle thereof relative to a horizontal direction is substantially 45 degrees. As shown in FIG. 6B, the attachment wall portion 57E is formed with, in a central side part of an outer surface thereof, a concave portion 58 fitted with a convex portion 67 of an attachment plate portion 66 to be described later.

**[0027]** A space is defined in the battery case 57, and the first battery 61 and the second battery 62 are disposed in the space. The first battery 61 and the second battery 62 are surrounded by the left wall portion 57A, the right wall portion 57B, the upper wall portion 57C, the rear wall portion 57D, and the attachment wall portion 57E.

**[0028]** As shown in FIG. 3, the battery case 57 is further provided with a battery case conveyance grip 59. The battery case conveyance grip 59 is disposed at a part at which the upper wall portion 57C and the rear wall portion 57D of the battery case 57 intersect, that is, at a rear end portion of the upper wall portion 57C or an upper end portion of the rear wall portion 57D. When the battery case 57 is viewed from left or right, as shown in FIG. 6A, the battery case conveyance grip 59 is disposed at an apex of each of the left wall portion 57A and the right wall portion 57B formed in a substantially isosceles right triangular shape. The apex of the left wall portion 57A and the apex of the right wall portion 57B protrude upward and rearward, and the battery case conveyance grip 59 extends in the left-right direction in a manner of bridging a top end portion of a part protruding upward and rearward from the apex of the left wall portion 57A and a top end portion of a part protruding upward and rearward from the apex of the right wall portion 57B. A user can grip the battery case conveyance grip 59 and convey the battery case 57 detached from the electric outboard motor 51. In a state in which the battery case 57 is mounted on the electric outboard motor 51, the user can grip the battery case conveyance grip 59 and tilt up the electric outboard motor 51.

**[0029]** As shown in FIG. 4, the support portion 65 is a member that couples and supports the battery case 57 and the propeller unit 52. The propeller unit 52 is supported at a lower portion of the support portion 65, and the battery case 57 is supported at an upper portion of the support portion 65.

**[0030]** Specifically, the support portion 65 is formed in a columnar shape extending in the upper-lower direction, and the propeller unit case 56 is fixed to a lower end portion of the support portion 65. As shown in FIG. 6A, the

attachment plate portion 66 for attaching the attachment wall portion 57E of the battery case 57 is provided at an upper end portion of the support portion 65. The attachment plate portion 66 is formed in a plate shape inclined such that a rear end thereof is located below a front end thereof. An inclination angle of the attachment plate portion 66 relative to the horizontal direction is substantially 45 degrees. A substantially central portion of a lower surface of the attachment plate portion 66 is fixed to the upper end portion of the support portion 65.

**[0031]** An upper surface of the attachment plate portion 66 has a shape corresponding to the outer surface of the attachment wall portion 57E of the battery case 57. The attachment plate portion 66 is formed with the convex portion 67 on a central side part of the upper surface thereof, and the convex portion 67 has a shape corresponding to a shape of the concave portion 58 formed in the attachment wall portion 57E of the battery case 57. When the battery case 57 is mounted on the electric outboard motor 51, the attachment wall portion 57E of the battery case 57 is placed on the attachment plate portion 66 of the support portion 65. At this time, the attachment plate portion 66 and the attachment wall portion 57E overlap, and the convex portion 67 formed on the attachment plate portion 66 is fitted into the concave portion 58 of the attachment wall portion 57E. Although not shown, the attachment plate portion 66 and the attachment wall portion 57E are provided with a fixing mechanism that detachably bonds and fixes the attachment plate portion 66 and the attachment wall portion 57E.

**[0032]** As shown in FIG. 4, the support portion 65 is provided with, at a rear portion thereof, an outboard motor conveyance grip 68 for conveying the electric outboard motor 51 detached from a boat by the user.

**[0033]** The transom bracket 71 is a clamp mechanism for attaching the electric outboard motor 51 to a transom of a boat. As shown in FIG. 4, the transom bracket 71 is disposed at a front portion of an upper end side part of the support portion 65. The transom bracket 71 is provided with, at a front portion thereof, a clamp screw 72 for fastening the electric outboard motor 51 to the transom. The transom bracket 71 is provided with, at a rear portion thereof, a trim angle adjusting portion 73 for adjusting a trim angle of the electric outboard motor 51.

**[0034]** The swivel bracket 74 is a bracket for making the electric outboard motor 51 attached to the transom pivotable in the left-right direction relative to the boat, and is integrally formed at the rear portion of the transom bracket 71. The steering shaft 75 is pivotably attached to the swivel bracket 74, and is fixed to a front portion of the upper portion of the support portion 65. Accordingly, the support portion 65 can pivot relative to the swivel bracket 74 with an axis of the steering shaft 75 as a pivot axis, and as a result, the electric outboard motor 51 can pivot in the left-right direction relative to the boat.

**[0035]** The bar handle 76 is a handle that pivots the electric outboard motor 51 in the left-right direction re-

lative to the boat in order to steer the boat. The bar handle 76 is disposed above and forward of the support portion 65. Specifically, the bar handle 76 is attached to an end portion on an upper front side of the attachment plate portion 66. The user can pivot the electric outboard motor 51 to right or left relative to the boat by grasping a top end portion of the bar handle 76 and moving the bar handle 76 to left or right, and can change an orientation of the propeller 55 to right or left.

[0036] A base end portion of the bar handle 76 is attached to the attachment plate portion 66 such that the bar handle 76 is pivotable in the upper-lower direction about an axial center K relative to the attachment plate portion 66. The user can pivot the bar handle 76 in the upper-lower direction within a range of substantially 90 degrees from a position in which the bar handle 76 extends in the horizontal direction to a position in which the bar handle 76 extends in the substantially upper-lower direction. Accordingly, the user can adjust a height of the top end portion of the bar handle 76. When the user detaches the electric outboard motor 51 from the boat and stores the electric outboard motor 51 in a warehouse or the like, the user can change an orientation of the bar handle 76 such that an extending direction of the bar handle 76 is substantially parallel to an extending direction of the support portion 65. This facilitates storage of the electric outboard motor 51.

[0037] The fine dust capture device 77 is a device that captures fine dust such as microplastic scattered in a water area in which the boat sails. The fine dust capture device 77 is provided with a passage for taking in water from a front portion of the fine dust capture device 77 and discharging the taken water from a rear portion of the fine dust capture device 77, and a filter for capturing fine dust in an intermediate portion of the passage. As shown in FIG. 5, the fine dust capture device 77 is disposed between a lower end of the support portion 65 and the propeller unit case 56.

#### Arrangements of Batteries

[0038] FIG. 7 shows a section of the electric outboard motor 51 cut along a cutting line VII-VII in FIG. 5 when viewed from left (right in FIG. 5).

[0039] As shown in FIG. 7, in the battery case 57, the first battery 61 is disposed such that a thickness direction thereof is the upper-lower direction of the electric outboard motor 51, and the second battery 62 is disposed such that a thickness direction thereof is the front-rear direction of the electric outboard motor 51.

[0040] The first battery 61 is located above the support portion 65. Specifically, the first battery 61 is disposed in a position intersecting a straight line L1 that passes a center of the support portion 65 in the upper-lower direction. The second battery 62 is located rearward of the upper portion of the support portion 65. Specifically, the second battery 62 is disposed in a position intersecting a straight line L2 that passes an intersection Q between an

upper end surface S of the support portion 65 and the straight line L1 and extends in the front-rear direction. In FIG. 7, the upper end surface S of the support portion 65 is indicated by a two-dot chain line.

[0041] The first battery 61 is disposed such that an upper surface 61A thereof is parallel to the upper wall portion 57C of the battery case 57 and is disposed in a position in a vicinity of the upper wall portion 57C. The second battery 62 is disposed such that a rear surface 62A thereof is parallel to the rear wall portion 57D of the battery case 57 and is disposed in a position in a vicinity of the rear wall portion 57D.

[0042] A position P15 of an upper end of the second battery 62 is lower than a position P14 of a lower surface of the first battery 61. In the front-rear direction, a position P5 of a rear end of the first battery 61 aligns with a position of the rear surface 62A of the second battery 62.

[0043] A position P17 of a lower end of the second battery 62 is lower than a position P16 of an upper end of the transom bracket 71. A position P2 of a front end of the first battery 61 is forward of a rear end of the transom bracket 71, specifically, a position P3 of a rear end of the trim angle adjusting portion 73.

[0044] The position P15 of the upper end of the second battery 62 is lower than a position of the base end portion of the bar handle 76, specifically, a position P13 of the axial center K of the pivoting of the bar handle 76 in the upper-lower direction. In the upper-lower direction, the position of the first battery 61 substantially aligns with the position of the base end portion of the bar handle 76.

[0045] The attachment plate portion 66 overlaps the first battery 61 in a plan view. That is, the position P2 of the front end of the first battery 61 is located forward of a position P4 of a rear end of the attachment plate portion 66, and the position P5 of the rear end of the first battery 61 is located rearward of a position P1 of the front end of the attachment plate portion 66. The attachment plate portion 66 overlaps the second battery 62 in a front view. That is, the position P15 of the upper end of the second battery 62 is located above a position P18 of the lower end of the attachment plate portion 66, and the position P17 of the lower end of the second battery 62 is located below a position P11 of an upper end of the attachment plate portion 66.

[0046] In addition, as shown in FIG. 5, the first battery 61 and the second battery 62 are disposed substantially at a center of the battery case 57 in the left-right direction.

[0047] The first battery 61 is fixed to an inner surface of each of the upper wall portion 57C, the left wall portion 57A, and the right wall portion 57B of the battery case 57 using a bracket or the like. The second battery 62 is fixed to an inner surface of each of the rear wall portion 57D, the left wall portion 57A, and the right wall portion 57B of the battery case 57 using a bracket or the like.

#### Utilization as Mobile Batteries

[0048] FIG. 8 shows a state in which the battery case

57 accommodating the batteries 61 and 62 is detached from the electric outboard motor 51 and placed on a floor surface or the like (for example, a deck of the boat, a ground, and a desk).

**[0049]** As shown in FIG. 8, the batteries 61 and 62 can be used as mobile batteries when the battery case 57 accommodating the batteries 61 and 62 is detached from the electric outboard motor 51. As shown in FIG. 6B, the concave portion 58 is formed in the central side part of the outer surface of the attachment wall portion 57E of the battery case 57, and an outer peripheral side part of the outer surface of the attachment wall portion 57E is a flat surface. Accordingly, the battery case 57 accommodating the batteries 61 and 62 can be stably placed on the floor surface or the like when the battery case 57 accommodating the batteries 61 and 62 is placed on the floor surface or the like with the attachment wall portion 57E facing downward.

**[0050]** The user can grip the battery case conveyance grip 59 and carry the battery case 57 accommodating the batteries 61 and 62. Since the two batteries 61 and 62 are disposed in the battery case 57 as shown in FIG. 7, a center of gravity G of the battery case 57 accommodating the batteries 61 and 62 is located on a straight line L3, which passes a center point of the attachment wall portion 57E of the battery case 57 and is orthogonal to the attachment wall portion 57E, between the attachment wall portion 57E and the battery case conveyance grip 59, as shown in FIG. 8. Accordingly, when the user grips the battery case conveyance grip 59 and lifts the battery case 57 accommodating the batteries 61 and 62, the outer peripheral side part of the outer surface of the attachment wall portion 57E is horizontal. Accordingly, when placing the battery case 57 on the floor surface or the like after gripping the battery case conveyance grip 59 and lifting and conveying the battery case 57 accommodating the batteries 61 and 62, the user can easily place the battery case 57 on the floor surface or the like in a stable state by lowering the battery case 57 in the upper-lower direction.

**[0051]** As described above, in the electric outboard motor 51 according to the example of the present invention, the first battery 61 formed in a rectangular parallelepiped shape having the thickness dimension smallest among the length dimension, the width dimension, and the thickness dimension is disposed in the battery case 57 such that the thickness direction thereof is the upper-lower direction of the electric outboard motor 51 and is located above the support portion 65, and the second battery 62 formed in a rectangular parallelepiped shape having the thickness dimension smallest among the length dimension, the width dimension, and the thickness dimension is disposed in the battery case 57 such that the thickness direction thereof is the front-rear direction of the electric outboard motor 51 and is located rearward of the upper portion of the support portion 65. With this configuration, the battery case 57 can be prevented from protruding upward and rearward.

**[0052]** That is, a dimension of the first battery 61 in the upper-lower direction can be minimized by disposing the first battery 61 formed in a rectangular parallelepiped shape having the thickness dimension smallest among the length dimension, the width dimension, and the thickness dimension in an orientation in which the thickness direction thereof is the upper-lower direction of the electric outboard motor 51. By disposing the first battery 61 above the support portion 65 and disposing the second battery 62 rearward of the upper portion of the support portion 65, the first battery 61 can be provided in a vicinity of an upper end of the support portion 65 while avoiding interfering with the second battery 62. In this way, since the dimension of the first battery 61 in the upper-lower direction is minimized and the first battery 61 is provided in the vicinity of the upper end of the support portion 65, a distance between an upper surface of the battery case 57 and the upper end of the support portion 65 can be shortened, and the battery case 57 can be prevented from protruding upward. Further, by disposing the second battery 62 formed in a rectangular parallelepiped shape having the thickness dimension smallest among the length dimension, the width dimension, and the thickness dimension in an orientation in which the thickness direction thereof is the front-rear direction of the electric outboard motor 51, a dimension of the second battery 62 in the front-rear direction can be minimized. By disposing the first battery 61 above the support portion 65 and disposing the second battery 62 rearward of the upper portion of the support portion 65, the second battery 62 can be provided in a vicinity of the upper portion of the support portion 65 while avoiding interfering with the first battery 61. In this way, since the dimension of the second battery 62 in the front-rear direction is minimized and the second battery 62 is provided in the vicinity of the upper portion of the support portion 8, a distance between a rear surface of the battery case 57 and the upper portion of the support portion 65 can be shortened, and the battery case 57 can be prevented from protruding rearward.

**[0053]** According to the electric outboard motor 51 in the present example as described above, since the battery case 57 can be prevented from protruding upward and rearward, it is possible to accommodate the two batteries 61 and 62 in the battery case 57 and prevent an increase in a size of the electric outboard motor 51 and deterioration of a weight balance of the electric outboard motor 51.

**[0054]** In the electric outboard motor 51 according to the present example, as shown in FIG. 7, the first battery 61 is disposed in a position intersecting the straight line L1 that passes the center of the support portion 65 in the upper-lower direction, and the second battery 62 is disposed in a position intersecting the straight line L2 that passes the intersection Q between the upper end surface S of the support portion 65 and the straight line L1 and extends in the front-rear direction. Accordingly, the first battery 61 and the second battery 62 can be provided in the vicinity of the upper end portion of the support portion



65, and the battery case 57 can be prevented from protruding upward and rearward.

**[0055]** In the electric outboard motor 51 according to the present example, the position P15 of the upper end of the second battery 62 is lower than the position P12 of the upper surface 61A of the first battery 61. Accordingly, it is possible to prevent the upper end of the second battery 62 from protruding above the upper surface 61A of the first battery 61, and thus the battery case 57 can be prevented from protruding upward.

**[0056]** In the electric outboard motor 51 according to the present example, the rear end of the first battery 61 aligns with the rear surface 62A of the second battery 62 in the front-rear direction. Accordingly, the rear end of the first battery 61 can be prevented from protruding rearward beyond the rear surface 62A of the second battery 62, and thus the battery case 57 can be prevented from protruding rearward.

**[0057]** In the electric outboard motor 51 according to the present example, the upper end of the second battery 62 is located below the lower surface of the first battery 61. Accordingly, the second battery 62 can be provided in the vicinity of the upper portion of the support portion 65 while avoiding interfering with the first battery 61. Accordingly, the battery case 57 can be prevented from protruding rearward.

**[0058]** In the electric outboard motor 51 according to the present example, the lower end of the second battery 62 is located below the upper end of the transom bracket 71. By lowering a position of the second battery 62 in this way, a position of the first battery 61 can be lowered while avoiding interfering with the second battery 62. Accordingly, the battery case 57 can be prevented from protruding upward.

**[0059]** In the electric outboard motor 51 according to the present example, the front end of the first battery 61 is located forward of the rear end of the transom bracket 71. By disposing the first battery 61 on a front side of the electric outboard motor 51 in this way, a rear end portion of the first battery 61 can be prevented from protruding rearward. Accordingly, the battery case 57 can be prevented from protruding rearward.

**[0060]** In the electric outboard motor 51 according to the present example, the upper end of the second battery 62 is located below the base end portion of the bar handle 76. By lowering a position of the second battery 62 in this way, a position of the first battery 61 can be lowered while avoiding interfering with the second battery 62. Accordingly, the battery case 57 can be prevented from protruding upward.

**[0061]** In the electric outboard motor 51 according to the present example, the position of the first battery 61 substantially aligns with a position of the base end portion of the bar handle 76 in the upper-lower direction. By lowering the position of the first battery 61 in this way, the battery case 57 can be prevented from protruding upward.

**[0062]** In the electric outboard motor 51 according to

the present example, the attachment plate portion 66 is provided at the upper end portion of the support portion 65, and the attachment plate portion 66 is formed in a plate shape inclined such that the rear end is located below the front end. Further, the battery case 57 includes the attachment wall portion 57E, and the attachment wall portion 57E is formed in an inclined plate shape such that the rear end is located below the front end. When the battery case 57 is mounted on the electric outboard motor 51, the attachment wall portion 57E is placed on the attachment plate portion 66, and the attachment plate portion 66 and the attachment wall portion 57E overlap. When the battery case 57 is mounted on the electric outboard motor 51, the attachment plate portion 66 overlaps the first battery 61 in a plan view and overlaps the second battery 62 in a front view. With such a configuration, the first battery 61 can be disposed above the support portion 65, and the second battery 62 can be disposed rearward of the upper portion of the support portion 65.

**[0063]** In the electric outboard motor according to the present example, the battery case 57 is formed in a bottomed and covered triangular tubular shape. This can increase rigidity of the battery case 57.

**[0064]** In the above example, the rear surface of the second battery 62 aligns with the rear end of the first battery 61 in the front-rear direction. Alternatively, the present invention is not limited thereto. As shown in FIG. 9A, the second battery 62 may be disposed such that the rear surface thereof is located forward of the rear end of the first battery 61. In this case, the first battery 61 is disposed such that the front end of the first battery 61 is located forward of the rear end of the transom bracket 71, and the rear end portion of the first battery 61 is prevented from protruding rearward.

**[0065]** In the above example, the rear end of the first battery 61 aligns with the rear surface of the second battery 62 in the front-rear direction, and the upper end of the second battery 62 is located below the lower surface of the first battery 61. As shown in FIG. 9B, the first battery 61 and the second battery 62 may be disposed such that the rear end of the first battery 61 is located forward of a front surface of the second battery 62 and the upper end of the second battery 62 aligns with the upper surface of the first battery 61 in the upper-lower direction.

**[0066]** In a modification shown in FIG. 9B, the upper surface of the first battery 61 aligns with the upper end of the second battery 62 in the upper-lower direction. Alternatively, as shown in FIG. 9C, the first battery 61 may be disposed such that the upper surface thereof is located below the upper end of the second battery 62. In this case, the second battery 62 is disposed such that the lower end thereof is located lower than the upper end of the transom bracket 71, and an upper end portion of the second battery 62 is prevented from protruding upward.

**[0067]** The first battery 61 and the second battery 62 may be in contact with each other, or may be disposed with a gap in between. In the above example, the upper

end of the second battery 62 is in a close vicinity of the lower surface of the first battery 61, and a gap in between is small. Alternatively, as shown in FIG. 9D, for example, when the length dimension of the first battery 61 or the second battery 62 is small, the gap between the first battery 61 and the second battery 62 may be increased.

**[0068]** In the above-described example, the steering shaft 75 is fixed to the front portion of the upper portion of the support portion 65, and the steering shaft 75 is pivotably attached to the swivel bracket 74. Alternatively, the present invention is not limited thereto. As in an electric outboard motor 81 shown in FIG. 10, an entire support portion 82 may be formed by a steering shaft. That is, the battery case 57 may be supported at an upper end portion of the steering shaft, the propeller unit 52 may be supported at a lower end portion of the steering shaft, and the steering shaft may be attached to the swivel bracket 74.

**[0069]** In the above example, the battery case 57 is formed in a bottomed and covered triangular tubular shape. Alternatively, in the present invention, the shape of the battery case (accommodation portion) is not limited to a bottomed and covered triangular tubular shape.

**[0070]** The present invention can be appropriately changed without departing from the gist or concept of the invention that can be read from the claims and the entire specification, and an electric outboard motor with such a change is also included in the technical concept of the present invention.

#### REFERENCE SIGNS LIST

#### **[0071]**

1, 21, 51, 81 electric outboard motor  
 2, 22, 52 propeller unit  
 3, 23, 54 propeller shaft  
 4, 24, 55 propeller  
 5, 25 case  
 6, 26, 53 motor  
 7, 27 accommodation portion  
 8, 28, 65, 82 support portion  
 11, 31, 61 first battery  
 12, 32, 62 second battery  
 56 propeller unit case (case)  
 57 battery case (accommodation portion)  
 57A left wall portion (wall portion)  
 57B right wall portion (wall portion)  
 57C upper wall portion (wall portion)  
 57D rear wall portion (wall portion)  
 57E attachment wall portion (wall portion)  
 66 attachment plate portion  
 71 transom bracket  
 76 bar handle

#### Claims

1. An electric outboard motor (1, 21, 51, 81) for propelling a boat, the electric outboard motor comprising:

a propeller unit (2, 22, 52) including a propeller shaft (3, 23, 54), a propeller (4, 24, 55) fixed to the propeller shaft, and a case (5, 25) rotatably supporting the propeller shaft, the propeller unit being disposed at a lower portion of the electric outboard motor;

a motor (6, 26, 53) configured to rotate the propeller shaft;

a first battery (11, 31, 61) and a second battery (12, 32, 62) configured to supply electric power for driving the motor to the motor;

an accommodation portion (57) accommodating the first battery and the second battery, the accommodation portion being disposed at an upper portion of the electric outboard motor; and

a support portion (8, 28, 65, 82) formed in a columnar shape extending in an upper-lower direction, the propeller unit being supported at a lower portion and the accommodation portion being supported at an upper portion, wherein each of the first battery and the second battery is formed in a rectangular parallelepiped shape having a thickness dimension smallest among a length dimension, a width dimension, and the thickness dimension,

the first battery is disposed in the accommodation portion such that a thickness direction thereof is the upper-lower direction of the electric outboard motor, and is located above the support portion, and

the second battery is disposed in the accommodation portion such that a thickness direction thereof is a front-rear direction of the electric outboard motor, and is located rearward of the upper portion of the support portion.

2. The electric outboard motor according to claim 1, wherein the first battery is disposed in a position intersecting a first straight line that passes a center of the support portion in the upper-lower direction, and the second battery is disposed in a position intersecting a second straight line that passes an intersection of an upper end surface of the support portion and the first straight line and extends in the front-rear direction.

3. The electric outboard motor according to claim 1, wherein an upper end of the second battery aligns with an upper surface of the first battery in the upper-lower direction, or is located below the upper surface of the first battery.

4. The electric outboard motor according to claim 1,

wherein a rear end of the first battery aligns with a rear surface of the second battery in the front-rear direction, or is located forward of the rear surface of the second battery.

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5. The electric outboard motor according to any one of claims 1 to 4, wherein the support portion is provided with a transom bracket configured to attach the electric outboard motor to a transom of the boat, and a lower end of the second battery is located below an upper end of the transom bracket. 10
6. The electric outboard motor according to any one of claims 1 to 4, wherein the support portion is provided with a transom bracket configured to attach the electric outboard motor to a transom of the boat, and a front end of the first battery is located forward of a rear end of the transom bracket. 15
7. The electric outboard motor according to any one of claims 1 to 4, wherein a steering bar handle is disposed above and forward of the support portion, and an upper end of the second battery is located below a position of a base end portion of the bar handle. 20  
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8. The electric outboard motor according to any one of claims 1 to 4, wherein a steering bar handle is disposed above and forward of the support portion, and a position of the first battery substantially aligns with a position of a base end portion of the bar handle in the upper-lower direction. 30
9. The electric outboard motor according to any one of claims 1 to 4, wherein the support portion is provided with, at an upper end portion, an attachment plate portion configured to attach the accommodation portion, and the attachment plate portion is formed in a plate shape inclined such that a rear end is located below a front end. 35  
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10. The electric outboard motor according to claim 9, wherein the accommodation portion includes a wall portion surrounding the first battery and the second battery, the wall portion includes an attachment wall portion configured to attach the accommodation portion to the attachment plate portion, and the attachment wall portion is inclined such that a rear end is located below a front end. 45  
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FIG.1A

FIRST EMBODIMENT  
OF PRESENT INVENTION

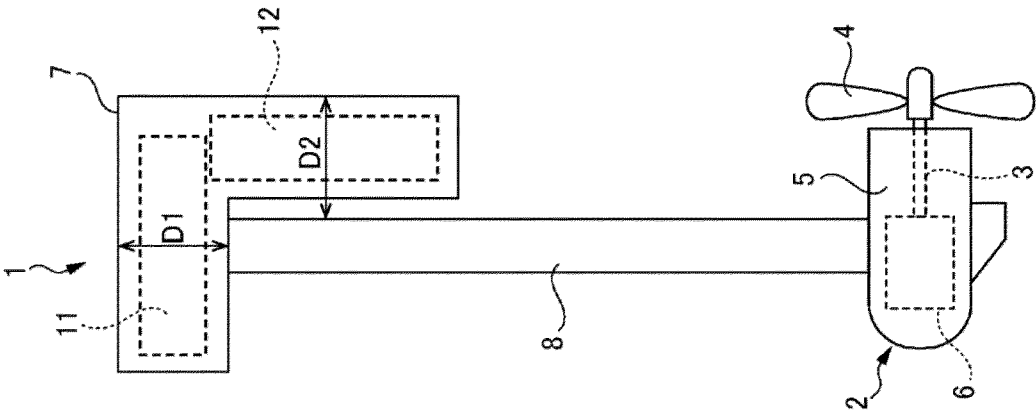


FIG.1B

FIRST  
COMPARATIVE EXAMPLE

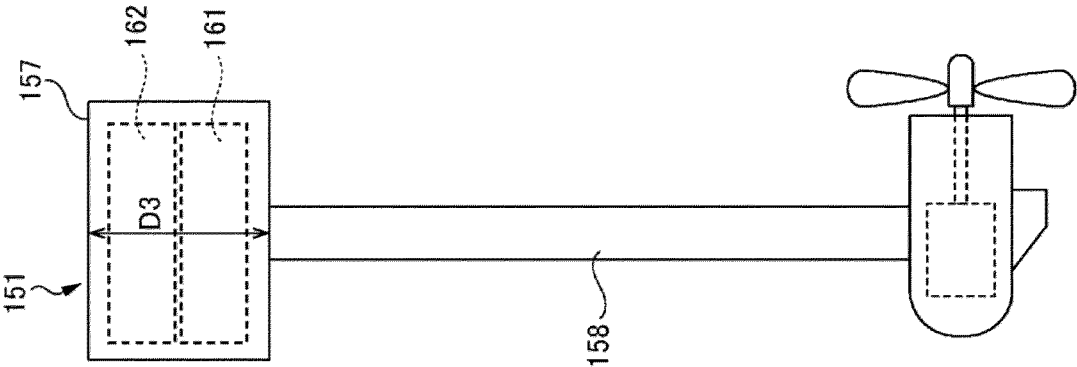


FIG.1C

SECOND  
COMPARATIVE EXAMPLE

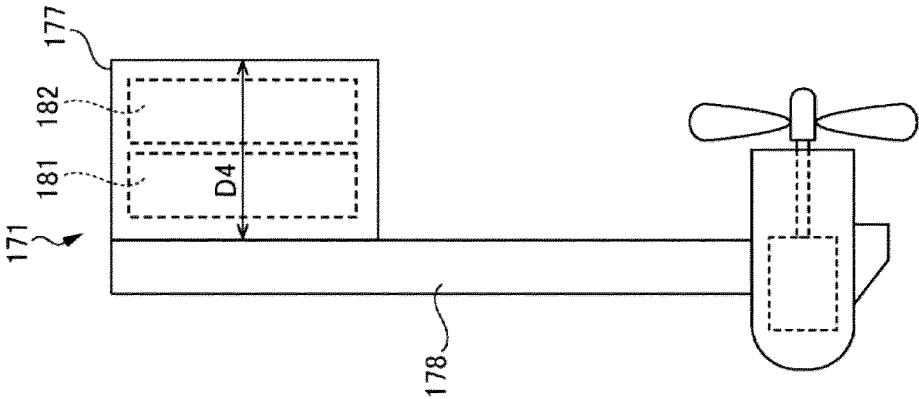


FIG. 2

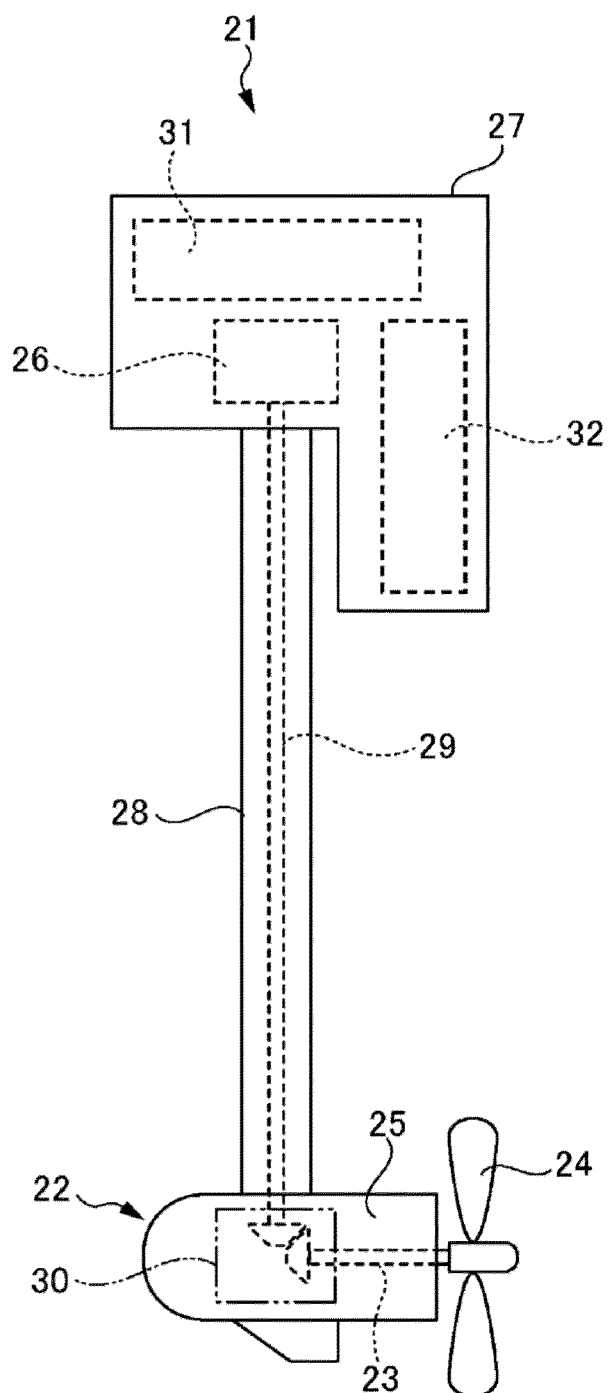


FIG. 3

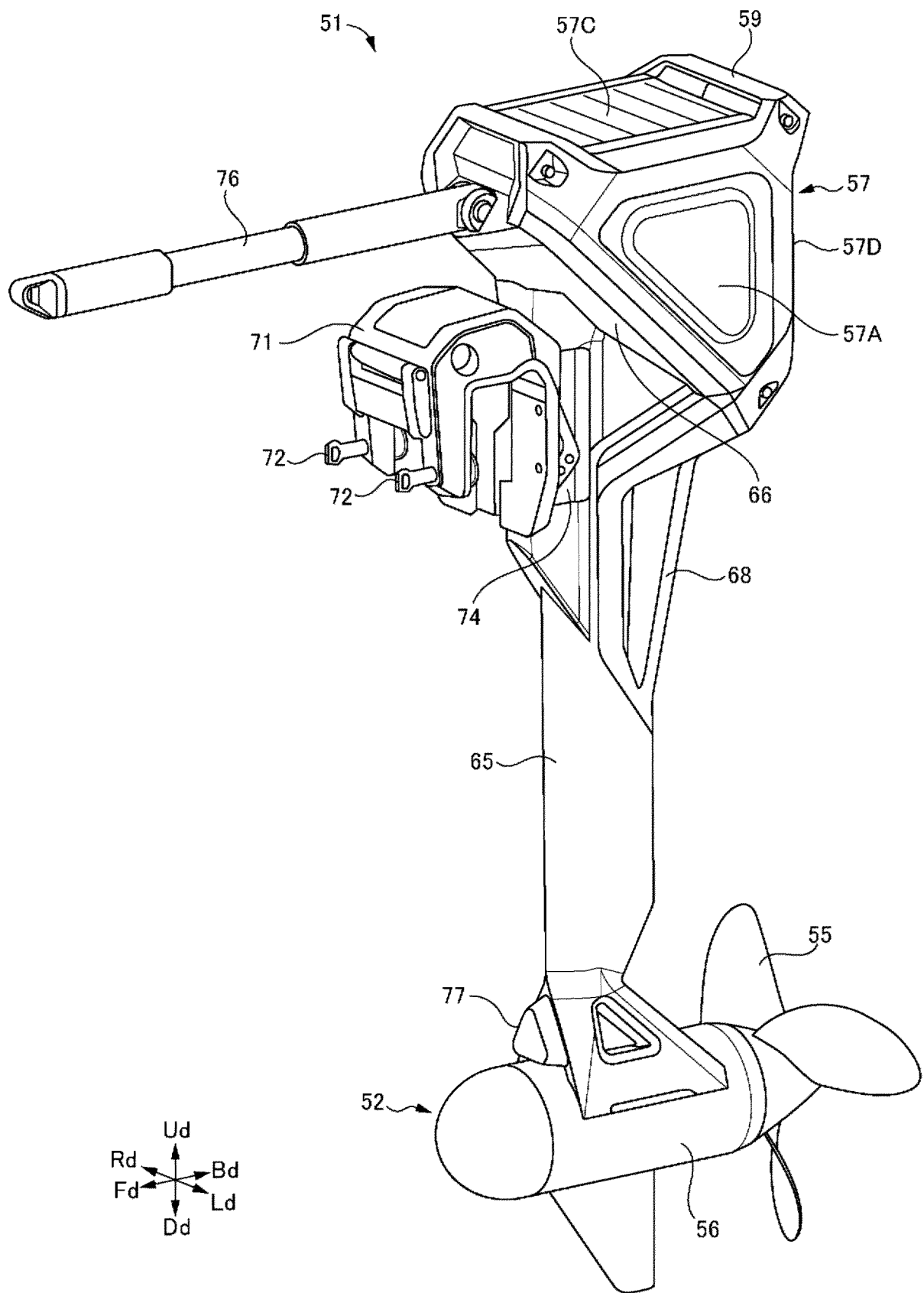


FIG. 4

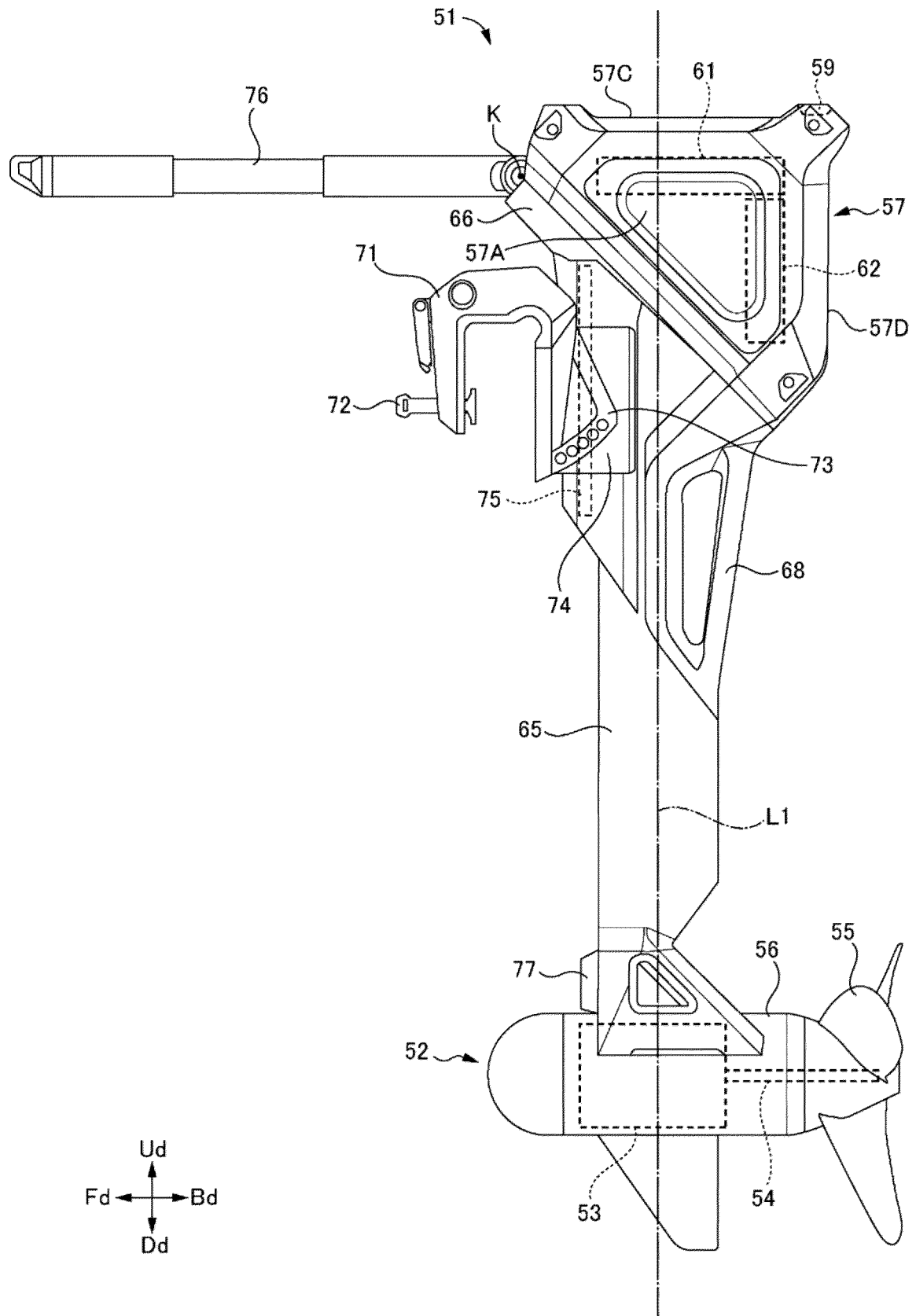


FIG. 5

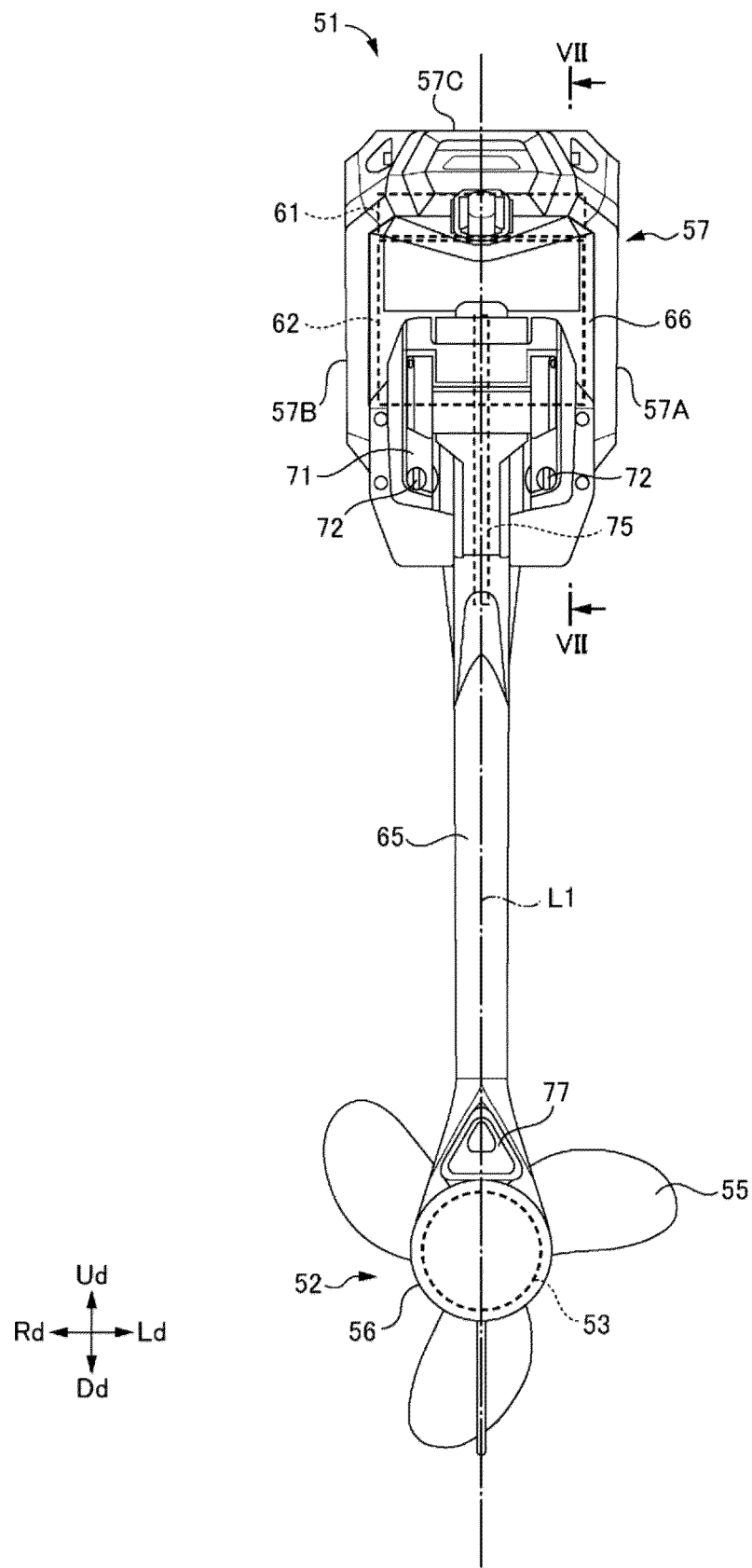




FIG. 6A

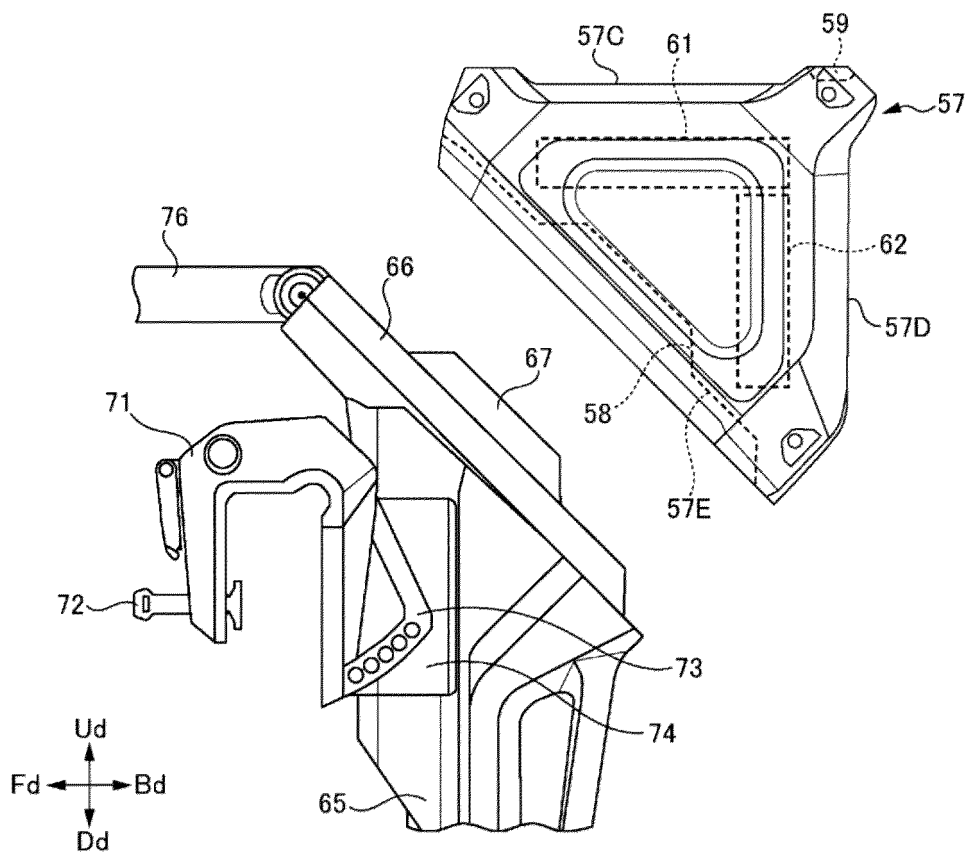


FIG. 6B

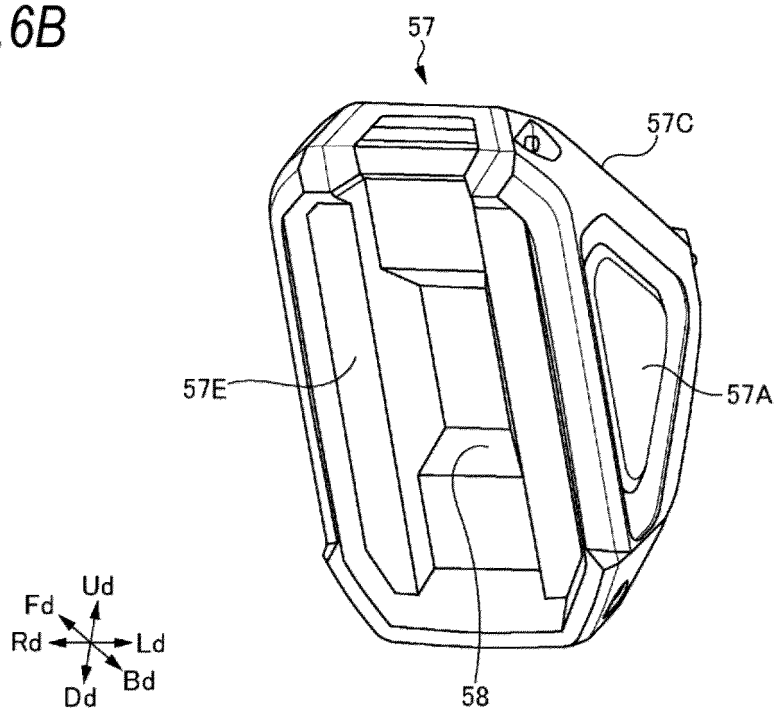


FIG. 7

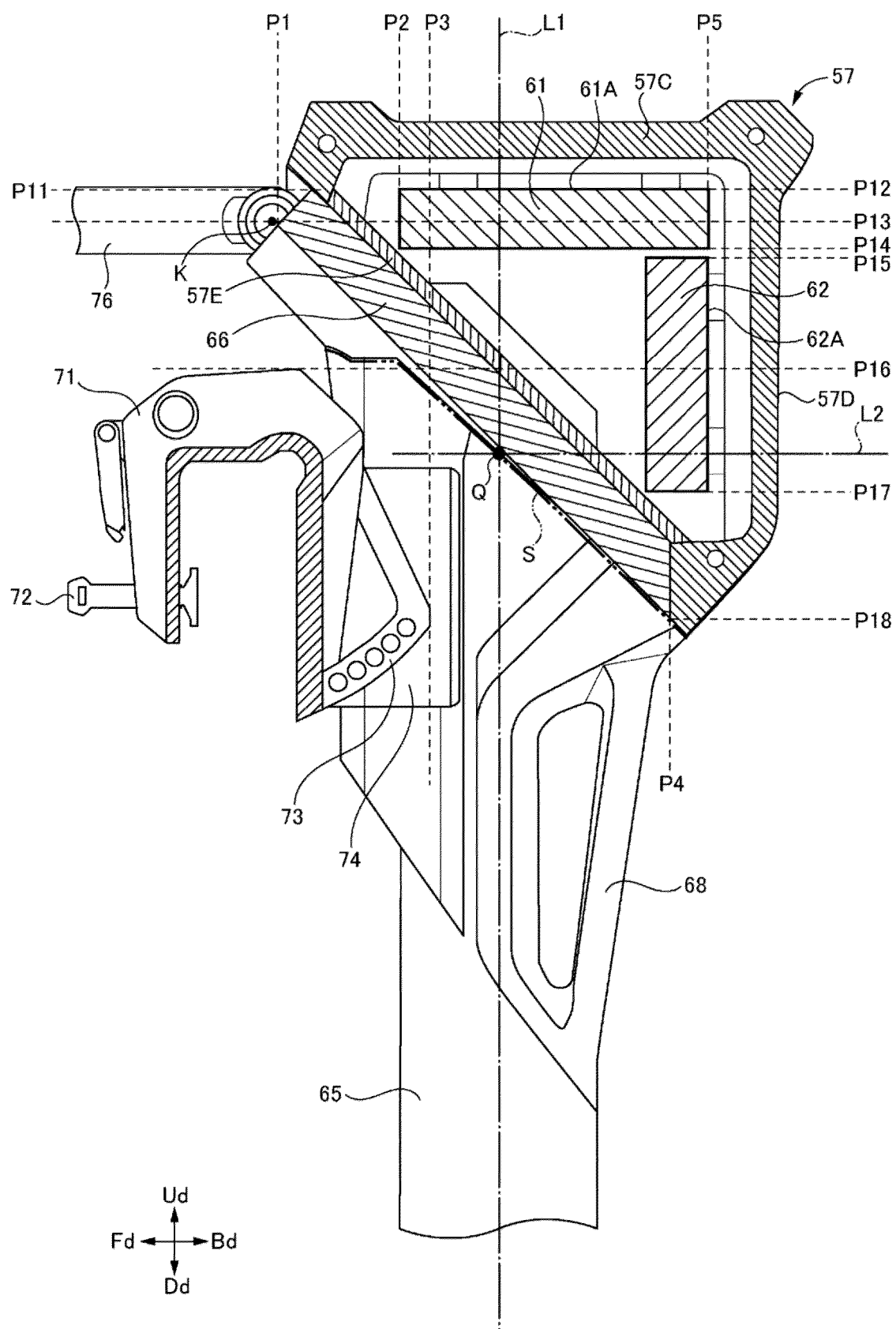


FIG. 8

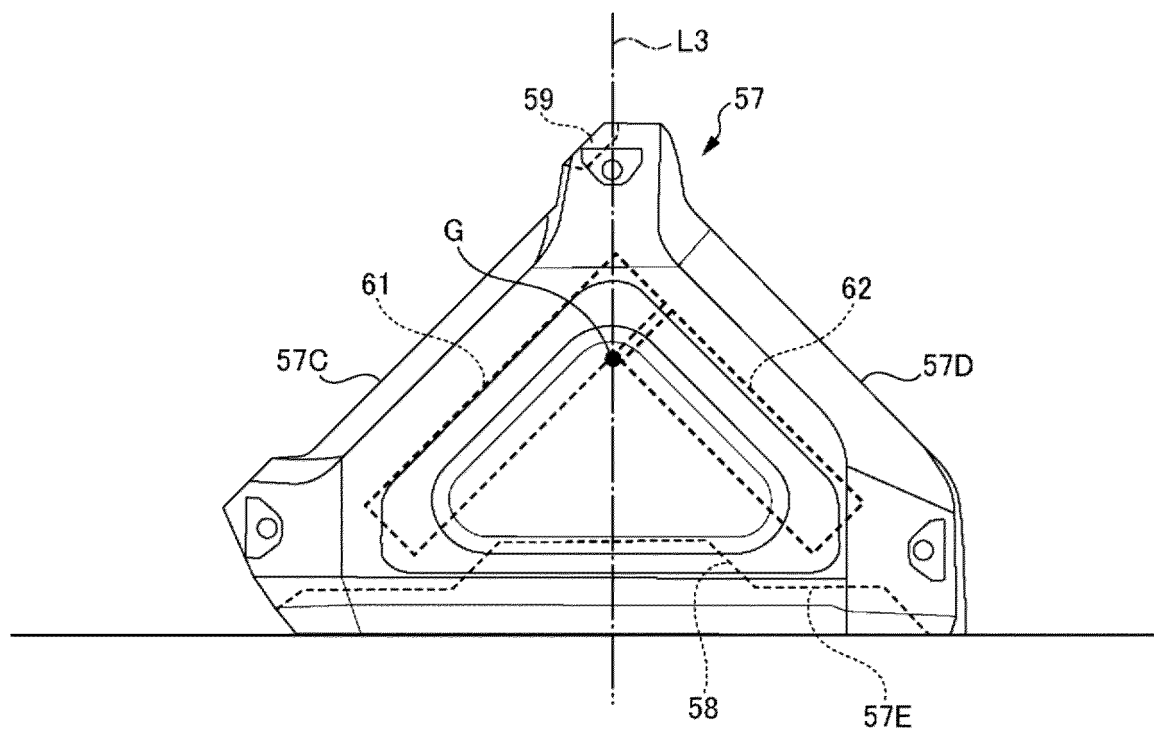


FIG.9A

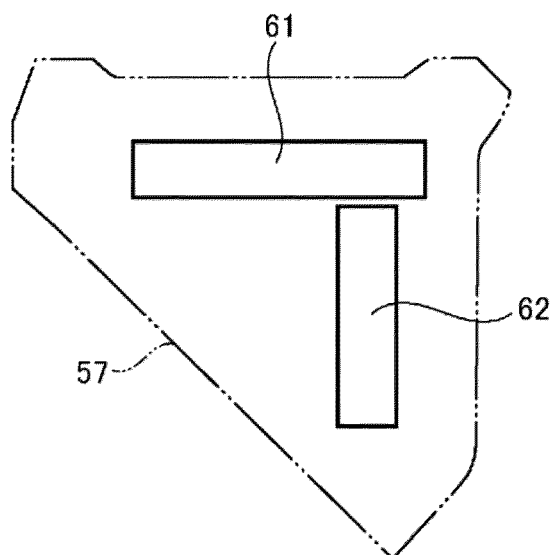


FIG.9B

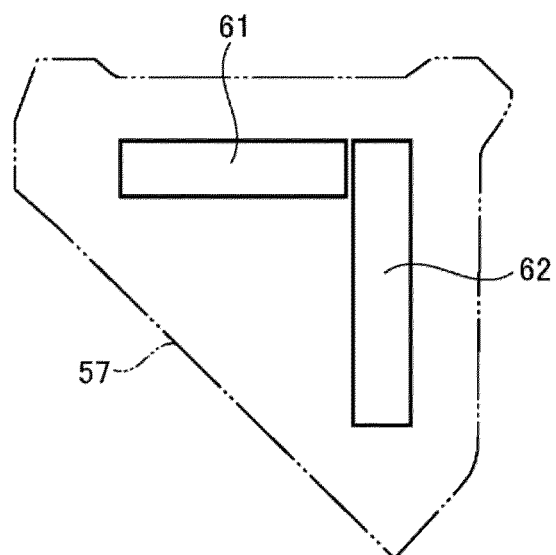


FIG.9C

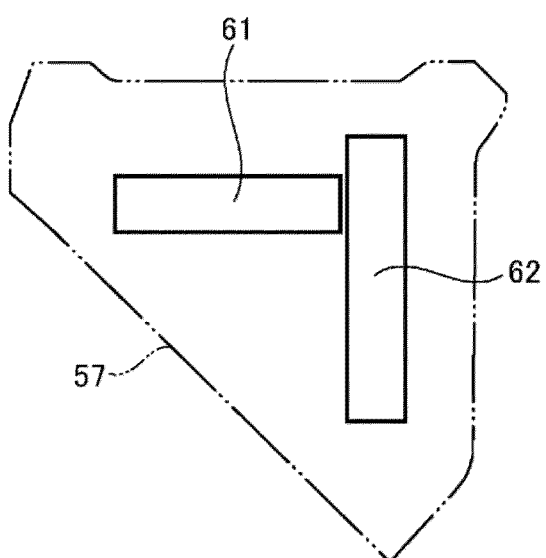


FIG.9D

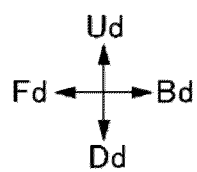
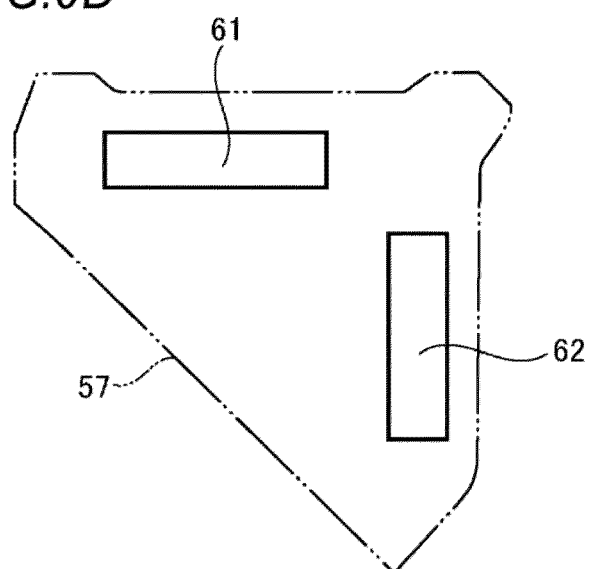
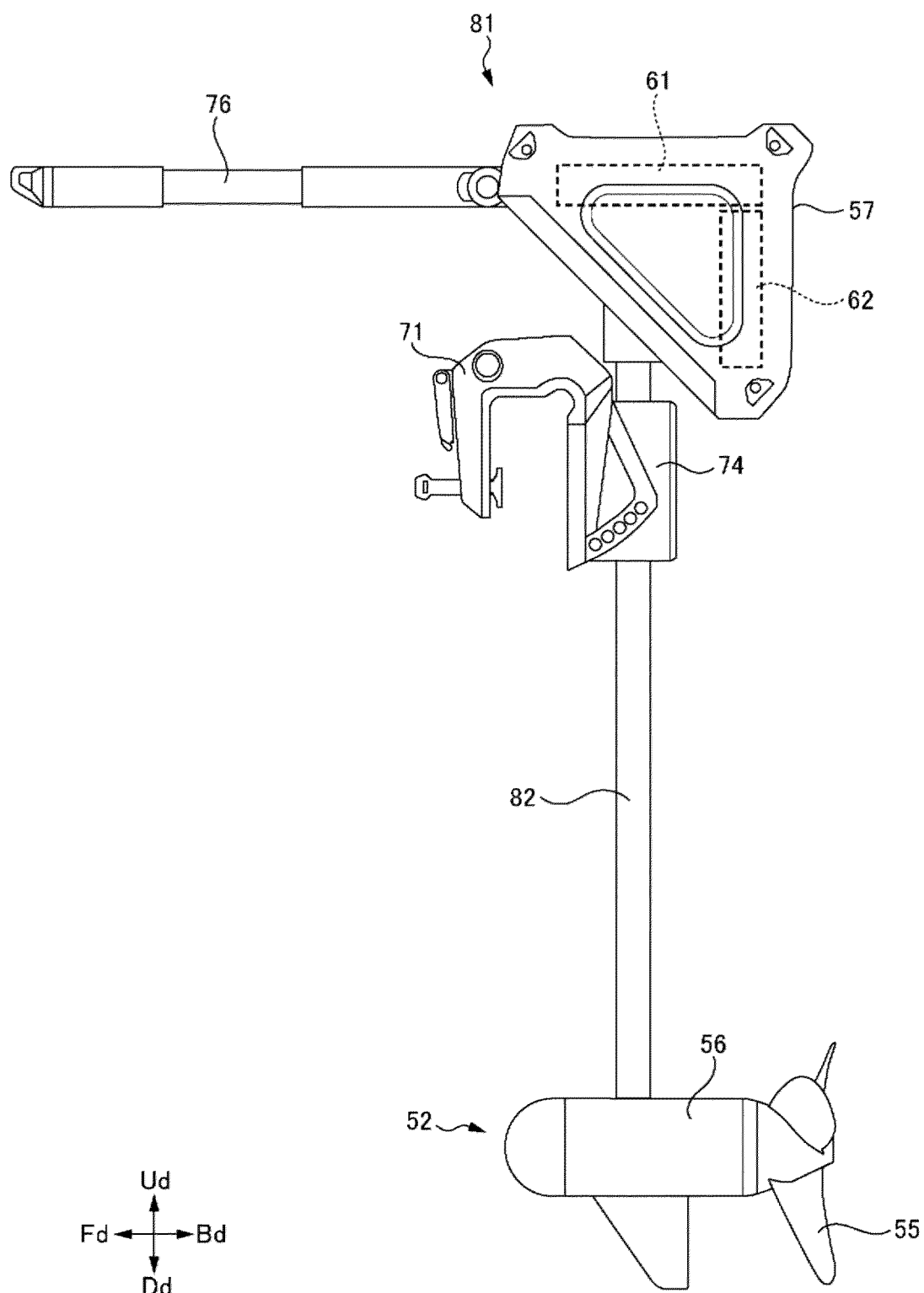


FIG. 10





## EUROPEAN SEARCH REPORT

Application Number

EP 24 19 6840

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| Category                                                                                                                                                                                                                                                                     | Citation of document with indication, where appropriate, of relevant passages                                                                                        | Relevant to claim                | CLASSIFICATION OF THE APPLICATION (IPC) |
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| Y                                                                                                                                                                                                                                                                            | US 2022/219798 A1 (ACHARD PAUL [CA] ET AL)<br>14 July 2022 (2022-07-14)<br>* paragraph [0048] *<br>* paragraph [0059] *                                              | 1-10                             | INV.<br>B63H20/00<br>B63H21/17          |
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|                                                                                                                                                                                                                                                                              |                                                                                                                                                                      |                                  | B63H                                    |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                   |                                                                                                                                                                      |                                  |                                         |
| Place of search                                                                                                                                                                                                                                                              |                                                                                                                                                                      | Date of completion of the search | Examiner                                |
| The Hague                                                                                                                                                                                                                                                                    |                                                                                                                                                                      | 7 February 2025                  | Barré, Vincent                          |
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| T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                                                      |                                  |                                         |

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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