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(54) **Steering device for a surfboard**

(57) A steering device for a surfboard (2) includes a steering unit (3), a driving unit (4) and a transmitting unit (5). The steering unit (3) is operable for controlling a movement of the surfboard (2). The driving unit (4) includes a base seat (41) secured to a board body (21) of the surfboard (2), a rotatable linking member (42) dis-

posed in the base seat (41), and a drive arm (44) mounted with a handle (46). The drive arm (44) is rotatable and substantially untwistable, is connected to the linking member (42), and extends outwardly of the base seat (41). Rotation of the drive arm (44) drives the linking member (42) to rotate, thereby driving operation of the steering unit (3) via the transmitting unit (5).

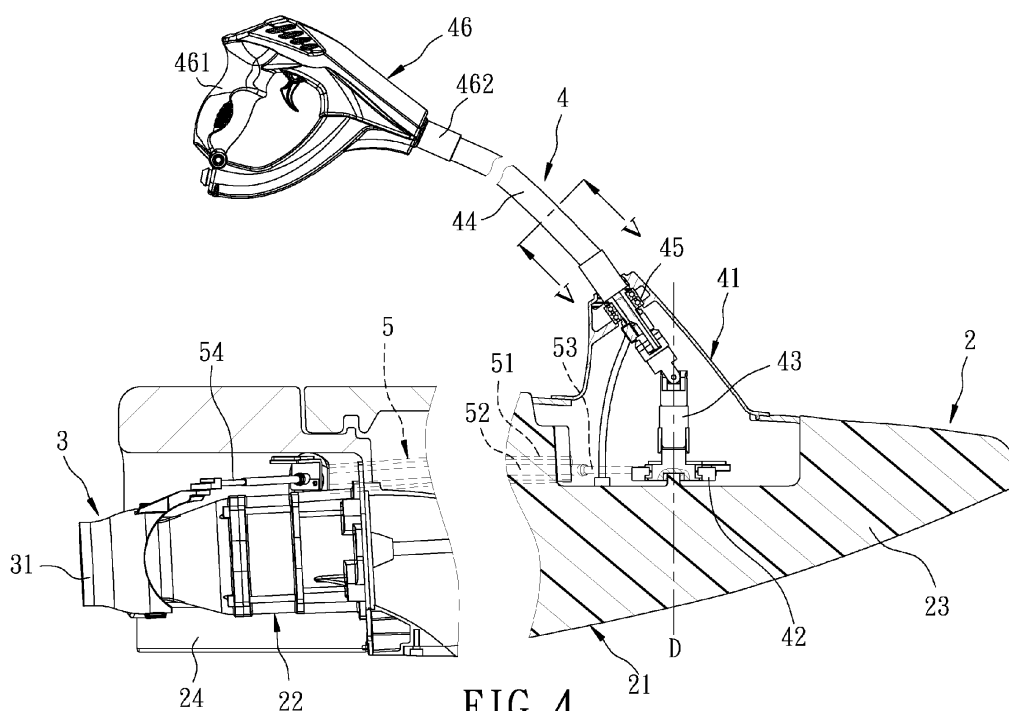


FIG. 4

Description

[0001] This invention relates to a steering device, more particularly to a steering device for a surfboard.

[0002] Referring to Fig. 1, United States Patent Application Publication No. US2001/0042498 discloses a conventional power surfboard including a board body 11, a jet pump 12, a steering device 13, and a driving unit 14. The board body 11 has a head 111 and a tail 112.

[0003] The jet pump 12 is mounted to the tail 112 for propelling the board body 11, and is formed with a water outlet (not shown) that opens rearward.

[0004] The steering device 13 has a fluid-guiding nozzle 131 that is connected pivotally to the jet pump 12 and that is disposed in fluid communication with the water outlet, and a guiding cable (not shown) that extends from the tail 112 to the head 111 and that has one end connected pivotally to the fluid-guiding nozzle 131.

[0005] The driving unit 14 includes a base seat 141, a linking member 143, and a rigid driving arm 144. The base seat 141 is secured to the head 111. The linking member 143 is disposed in the base seat 141, extends along a driving axis (DP), and is connected pivotally to another end of the guiding cable. The rigid driving arm 144 is secured to the linking member 143.

[0006] When using the conventional power surfboard, an operator stands on the board body 11 and holds a distal end of the driving arm 144 to maintain balance of the operator while controlling a moving direction of the conventional power surfboard.

[0007] To change the moving direction of the board body 11, the operator rotates the driving arm 144 to drive rotation of the linking member 143 about the driving axis (DP), such that the fluid-guiding nozzle 131 is driven to rotate oppositely via the guiding cable, thereby changing the moving direction of the conventional power surfboard.

[0008] However, when the operator rotates the driving arm 144 about the driving axis (DP), the body of the operator would simultaneously swing to a huge extent so that the operator has difficulty maintaining balance on the board body 11.

[0009] Therefore, an object of the present invention is to provide a steering device that can overcome the afore-said drawbacks of the prior art.

[0010] Accordingly, a steering device is adapted to be used in a surfboard. The surfboard has a board body that has a head and a tail, and a power unit that is mounted to the tail for propelling the board body. The steering device includes:

- a steering unit operable for controlling a moving direction of the board body;
- a driving unit including
- a base seat that is adapted to be secured fixedly to the head of the board body,
- a linking member that is disposed in the base seat and that is rotatable about a driving axis,
- a drive arm that is flexible and substantially untwist-

able, and that has

a connecting end registered with the driving axis and connected to the linking member, and
 an access end opposite to the connecting end along a longitudinal axis of the drive arm and extending outwardly of the base seat, the drive arm being rotatable about the longitudinal axis for driving rotation of the linking member about the driving axis, and a handle that is secured fixedly to the access end of the drive arm; and
 a transmitting unit interconnecting the linking member and the steering unit, such that rotation of the linking member about the driving axis drives operation of the steering unit via the transmitting unit.

[0011] Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiment of the invention, with reference to the accompanying drawings, in which:

Fig. 1 is a schematic side view of a power surfboard that is mounted with a conventional steering device;
 Fig. 2 is a partly sectional view of a power surfboard mounted with a preferred embodiment of a steering device according to the invention;
 Fig. 3 is a schematic top view of the power surfboard mounted with the preferred embodiment;
 Fig. 4 is a fragmentary sectional view of Fig. 2;
 Fig. 5 is a sectional view taken along line V-V in Fig. 4;
 Fig. 6 is another schematic top view of the power surfboard, illustrating a drive arm of the preferred embodiment being rotated in a rotational direction; and
 Fig. 7 is a view similar to Fig. 6, but illustrating the drive arm of the preferred embodiment being rotated in an opposite rotational direction.

[0012] Referring to Figs. 2 to 4, a preferred embodiment of a steering device according to the present invention is adapted to be used in a surfboard 2. The surfboard 2 has a board body 21 that has a head 23 and a tail 24, and a power unit 22 that is mounted to the tail 24 for propelling the board body 21. The power unit 22 is configured as a jet pump having a water outlet 25 that opens rearward. The steering device includes a steering unit 3, a driving unit 4, and a transmitting unit 5.

[0013] The steering unit 3 is adapted to be coupled pivotally to the power unit 22, and is operable for controlling a moving direction of the board body 21.

[0014] The driving unit 4 includes a hollow base seat 41, a linking member 42, a drive seat 43, a drive arm 44, a bearing 45, and a handle 46. The base seat 41 is adapted to be secured fixedly to the head 23 of the board body 21. The linking member 42, in this embodiment, is formed as a plate, is disposed in the base seat 41 and is rotatable about a driving axis (D). The drive arm 44 is elongated and defines a longitudinal axis, and has a connecting end and an access end. The connecting end is registered

with the driving axis (D). The access end is opposite to the connecting end along the longitudinal axis and extends outwardly from the base seat 41. The drive arm 44 is substantially untwistable and is rotatable about the longitudinal axis for driving rotation of the linking member 42 about the driving axis (D). The drive seat 43 extends along the driving axis (D) and interconnects the connecting end of the drive arm 44 and the linking member 42 (i.e., the connecting end of the drive arm 44 is connected to the linking member 42). The bearing 45 is interposed between the base seat 41 and the drive arm 44. The handle 46 is secured fixedly to the access end of the drive arm 44.

[0015] Referring to Figs. 4 and 5, the drive arm 44 of the driving unit 4 has a flexible tubular wall 441 and a plurality of angularly spaced apart steel cables 442 that extend along and that are embedded in the tubular wall 441. In this embodiment, the tubular wall 441 is made of rubber. Each of the steel cables 442 is composed of a plurality of steel strands, or may have only one steel strand. The drive arm 44 has a torque tolerance along the longitudinal axis thereof within 5 degrees, which makes the drive arm 44 substantially untwistable.

[0016] The handle 46 of the driving unit 4 is ring-shaped, and has a holding section 461 substantially perpendicular to the longitudinal axis of the drive arm 44 at the access end of the drive arm 44.

[0017] Referring back to Figs. 2 to 4, the transmitting unit 5 interconnects the linking member 42 and the steering unit 3 such that the rotation of the linking member 42 about the driving axis (D) drives pivot operation of the steering unit 3 via the transmitting unit 5. The transmitting unit 5 includes a sleeve 51, a cable 52, a driving steering lever 53, and a driven steering lever 54. The sleeve 51 is adapted to be secured to the board body 21 and has opposite ends adjacent respectively to the driving unit 4 and the steering unit 3. The cable 52 extends through the sleeve 51 and has opposite ends. The driving steering lever 53 is connected to one of the opposite ends of the cable 52, and the driven steering lever 54 is connected to the other one of the opposite ends of the cable 52. The driven steering lever 54 has a distal end that is opposite to said other one of the opposite ends of the cable 52 and that is connected pivotally to the steering unit 3. The driving steering lever 53 has a distal end that is opposite to said one of the opposite ends of the cable 52 and that is connected pivotally to the linking member 42.

[0018] Referring to Figs. 3, 6 and 7, the steering unit 3 includes a fluid-guiding tube 31 that is connected pivotally to the power unit 22, that is adapted to be disposed in fluid communication with the water outlet 25 of the surfboard 2, and that is connected pivotally to the distal end of the driven steering lever 54 so that the rotation of the linking member 42 about the driving axis (D) in a rotational direction drives the fluid-guiding tube 31 to rotate in an opposite rotational direction.

[0019] To change the moving direction of the surfboard 2, as shown in Fig. 6, an operator standing on the board

body 21 holds the holding section 461 of the handle 46 and rotates the drive arm 44, so that the linking member 42 spins in a first rotational direction (R1). Consequently, the driving steering lever 53 is moved and moves the driven steering lever 54 via the cable 52, thereby driving the fluid-guiding tube 31 to pivot in a second rotational direction (R2) opposite to the first rotational direction (R1). On the contrary, referring to Fig. 7, when the drive arm 44 is rotated to drive the rotation of the linking member 42 in the second rotational direction (R2), the fluid-guiding tube 31 is pivoted in the first rotational direction (R1). Since the operation of the driving unit 4 actuates the operation of the steering unit 3 through the transmitting unit 5, water flowing from the water outlet 25 is guided by the fluid-guiding tube 31 to turn the board body 21 in the rotational directions (R1, R2).

[0020] It is noted that the transmitting unit 5 may be a wireless signal control system that includes a sensor. The sensor detects the rotational angle and rotational direction of the linking member 42. The fluid-guiding tube 31 may be mounted with a receiver to receive a signal transmitted from the sensor of the transmitting unit 5 for controlling rotation of the fluid-guiding tube 31.

[0021] To sum up, since the drive arm 44 is untwistable and is retained by the base seat 41, the drive arm 44 can spin about its own axis without significant swinging so that the operator can easily maintain balance when controlling the moving direction of the surfboard 2. In addition, due to the flexibility of the drive arm 44, the surfboard can withstand relative displacements between the drive arm 44 and the board body 21 when, e.g., the operator moves on the surfboard 2 due to waves better than the rigid driving arm 144 (see Fig. 1) of the prior art, thereby enhancing operability by the operator.

Claims

1. A steering device adapted to be used in a surfboard (2), the surfboard (2) having a board body (21) that has a head (23) and a tail (24), and a power unit (22) that is mounted to the tail (24) for propelling the board body (21), said steering device **characterized by:**

a steering unit (3) operable for controlling a moving direction of the board body (21);
a driving unit (4) including
a base seat (41) that is adapted to be secured fixedly to the head (23) of the board body (21),
a linking member (42) that is disposed in said base seat (41) and that is rotatable about a driving axis (D),
a drive arm (44) that is flexible and substantially untwistable, and that has
a connecting end registered with the driving axis (D) and connected to said linking member (42), and
an access end opposite to said connecting end

- along a longitudinal axis of said drive arm (44) and extending outwardly of said base seat (41), said drive arm (44) being rotatable about the longitudinal axis for driving rotation of said linking member (42) about the driving axis (D), and a handle (46) that is secured fixedly to said access end of said drive arm (44); and a transmitting unit (5) interconnecting said linking member (42) and said steering unit (3), such that the rotation of said linking member (42) about the driving axis (D) drives operation of said steering unit (3) via said transmitting unit (5).
2. The steering device of claim 1, **characterized in that** said handle (46) of said driving unit (4) is ring-shaped, and has a holding section (461) substantially perpendicular to the longitudinal axis of said drive arm (44) at said access end of said drive arm (44).
 3. The steering device of any one of claims 1 to 2, **characterized in that** said transmitting unit (5) includes a sleeve (51) adapted to be secured to the board body (21), a cable (52) extending through said sleeve (51) and having opposite ends, a driving steering lever (53) connected to one of the opposite ends of said cable (52), and a driven steering lever (54) connected to the other one of the opposite ends of said cable (52), said driven steering lever (54) having a distal end that is opposite to said one of the opposite ends of said cable (52) and that is connected pivotally to said steering unit (3), said driving steering lever (53) having a distal end that is opposite to the other one of the opposite ends of said cable (52) and that is connected pivotally to said linking member (42), said driving steering lever (53) being movable by said linking member (42) to move said driven steering lever (54) via said cable (52) when said linking member (42) is rotated by rotation of said drive arm (44) in a rotational direction (R1), thereby actuating the operation of said steering unit (3) to turn the board body (21) in the rotational direction (R1).
 4. The steering device of any one of claims 1 to 3, the power unit (22) being configured as a jet pump having a water outlet (25), **characterized in that** said steering unit (3) including a fluid-guiding tube (31) that is adapted to be connected pivotally to jet pump and that is adapted to be in fluid communication with the water outlet (25), and that is connected pivotally to said distal end of said driven steering lever (54), such that rotation of said linking member (42) in a rotational direction (R1) drives said fluid-guiding tube (31) to rotate in an opposite rotational direction (R2).
 5. The steering device of claim 4, **characterized in that** said drive arm (44) of said driving unit (4) has a torque tolerance along the longitudinal axis of said drive arm (44) within 5 degrees.
 6. The steering device of any one of claims 1 to 5, **characterized in that** said drive arm (44) of said driving unit (4) has a flexible tubular wall (441) and a plurality of angularly spaced apart steel cables (442) that extend along and that are embedded in said tubular wall (441).
 7. The steering device of claim 6, further **characterized in that** each of said steel cables (442) is composed of a plurality of steel strands.
 8. The steering device of any one of claims 6 to 7, further **characterized in that** said tubular wall (441) of said driving unit (4) is made of rubber.
 9. The steering device of any one of claims 1 to 8, **characterized in that** said driving unit (4) further includes a drive seat (43) extending along the driving axis (D) and interconnecting said connecting end of said drive arm (44) and said linking member (42).
 10. The steering device of any one of claims 1 to 9, **characterized in that** said driving unit (4) further includes a bearing (45) interposed between said base seat (41) and said drive arm (44).

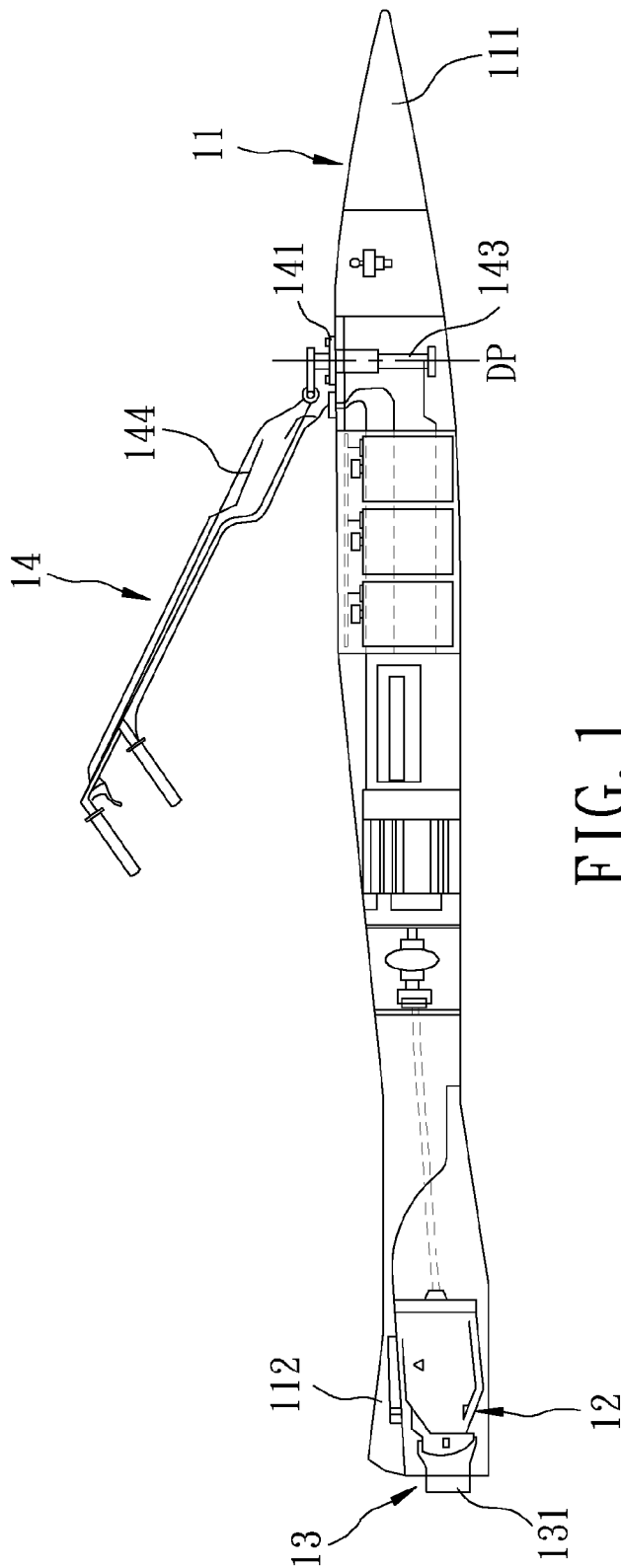


FIG. 1
PRIOR ART

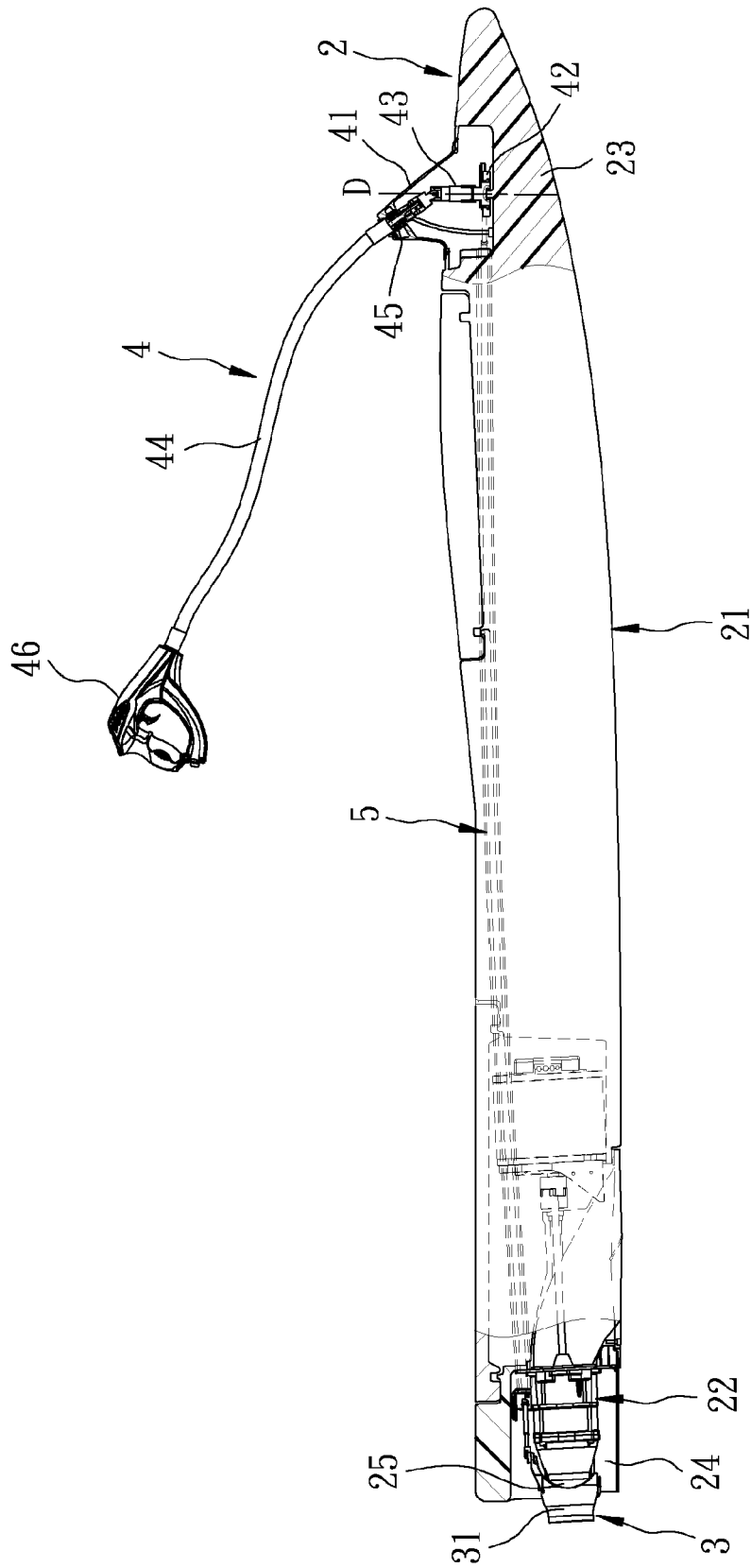


FIG. 2

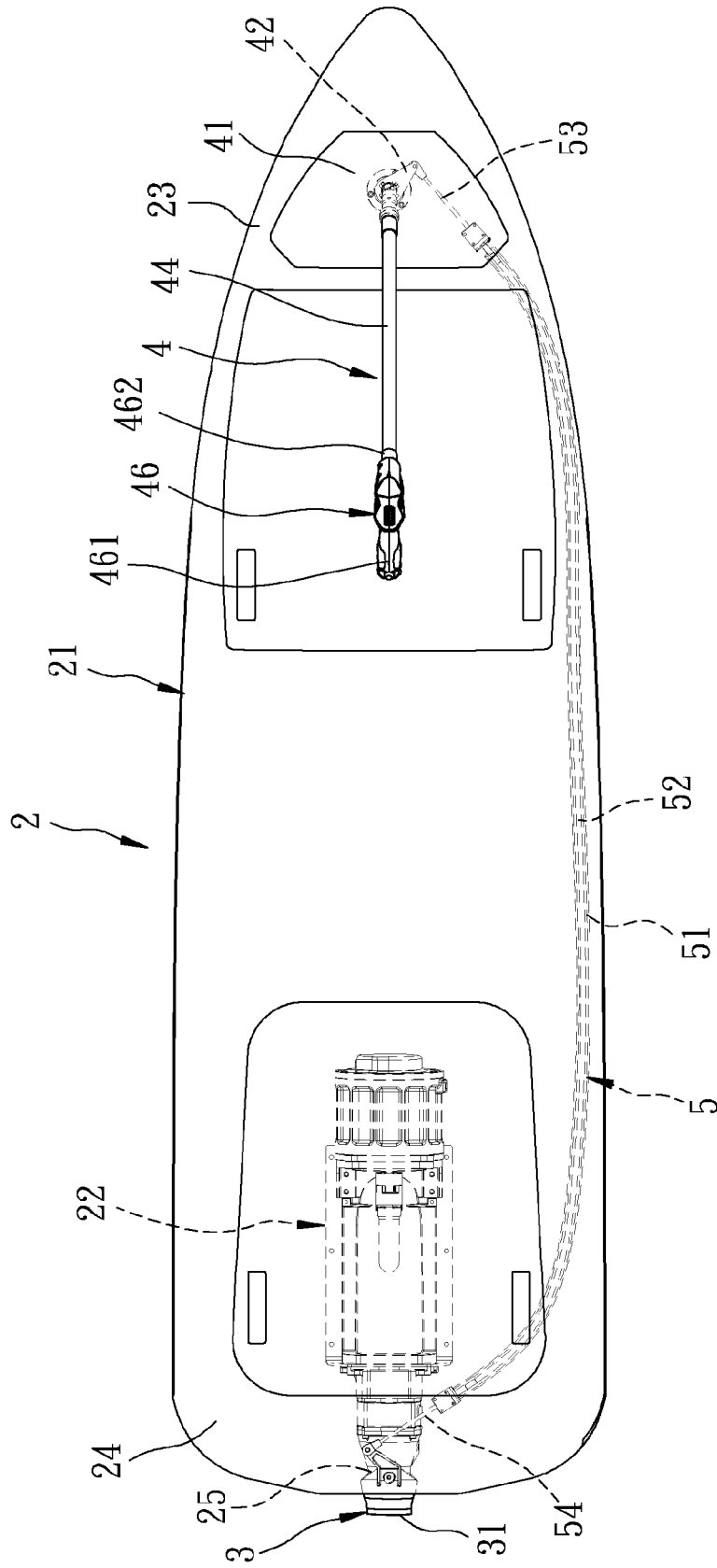
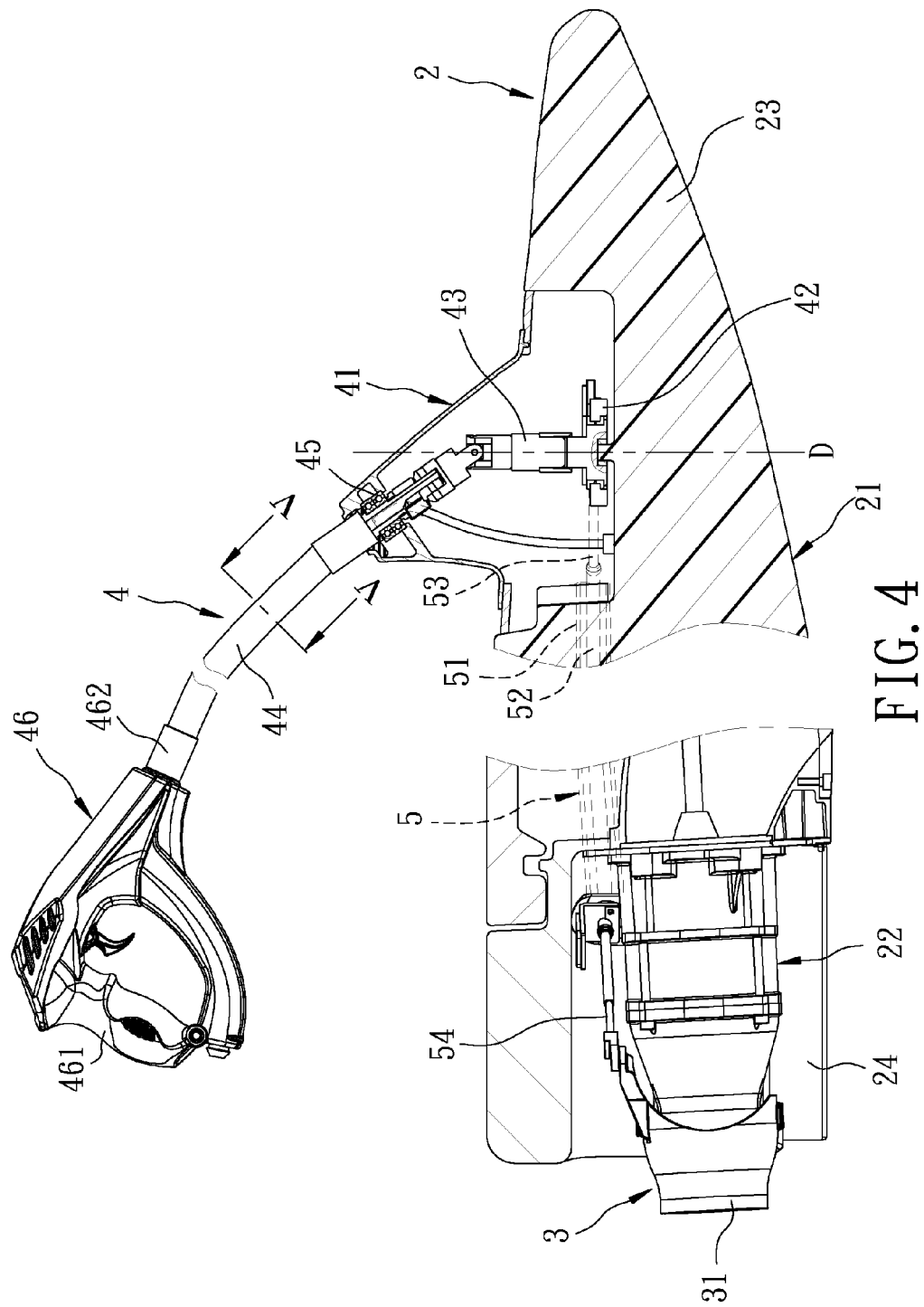


FIG. 3



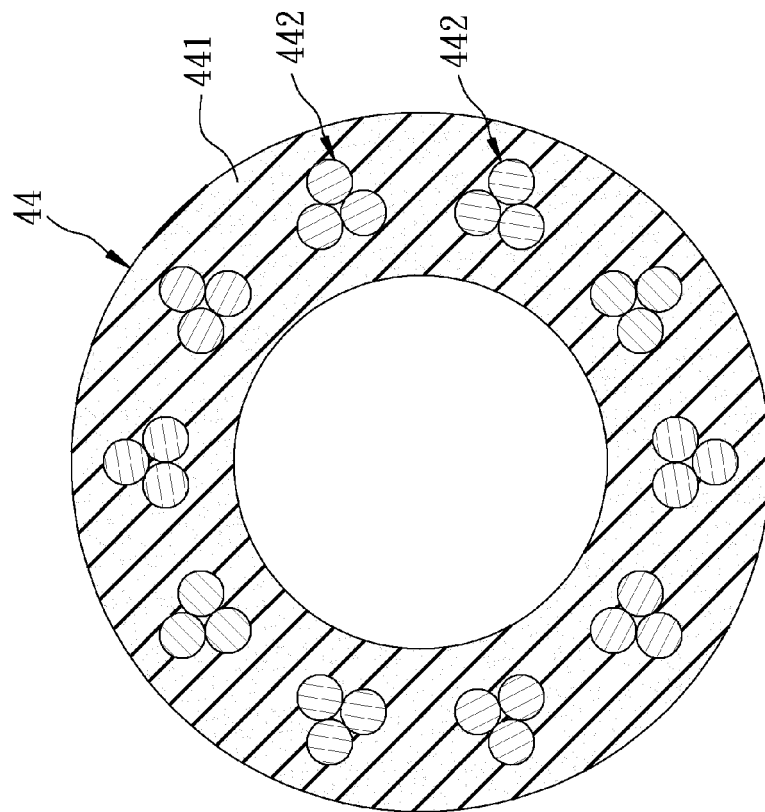


FIG. 5

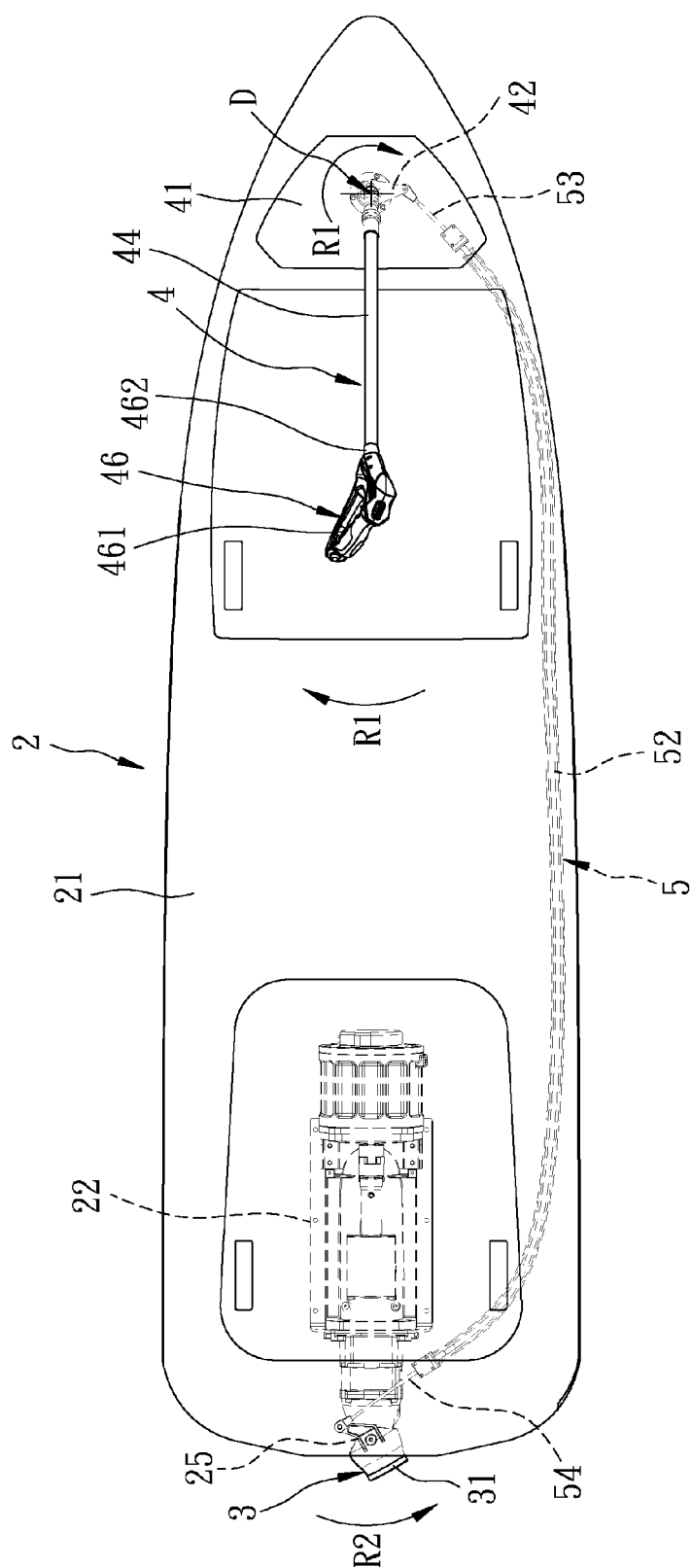


FIG. 6

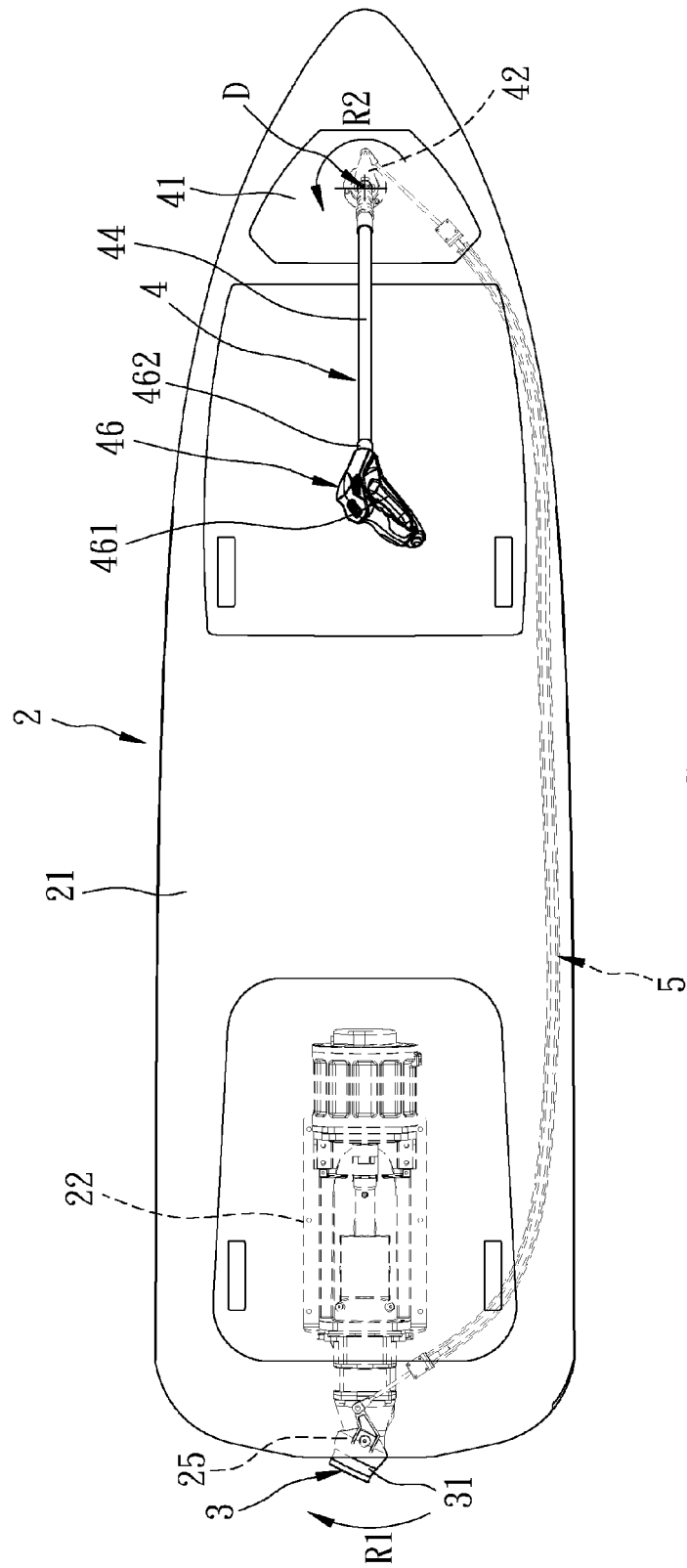


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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