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(54) **WATERSPORT PROPULSION SYSTEM FOR A MARINE WATERSPORT VESSEL**

(57) The present disclosure relates to a watersport propulsion system for a marine watersport vessel, comprising a drive unit arranged rotatable from a rearward-facing position to a forward-facing position, and vice versa, a control unit being operatively connected with the drive unit, the control unit is configurable in a nominal mode of operation and in a watersport mode of operation, wherein the control unit is configured to operate the drive unit in the forward-facing position when in the watersport mode of operation and in the rearward-facing position otherwise

EP 4 458 664 A1

Description

TECHNICAL FIELD

[0001] The disclosure relates generally to a propulsion system. In particular aspects, the disclosure relates to a watersport propulsion system for a marine watersport vessel. The disclosure can be applied to marine vessels, such as water crafts, motorboats, waterskiing vessels among other vessel types. Although the disclosure may be described with respect to a particular watersport marine vessel, the disclosure is not restricted to any particular marine vessel.

BACKGROUND

[0002] Propulsion systems for marine watersport vessels are known. Normally a drive unit having one or more propellers propelling the watersport vessel in normal manner. However, during watersports persons and/or equipment are often in the water around the watersport vessel which may have the severe consequence that the person and/or equipment may come in contact with the one or more propellers.

SUMMARY

[0003] According to a first aspect of the disclosure, a watersport propulsion system for a marine watersport vessel, comprising a drive unit arranged rotatable from a rearward-facing position to a forward-facing position, and vice versa, a control unit being operatively connected with the drive unit, the control unit is configurable in a nominal mode of operation and in a watersport mode of operation, wherein the control unit is configured to operate the drive unit in the forward-facing position when in the watersport mode of operation and in the rearward-facing position otherwise. The first aspect of the disclosure may seek to solve the risk that persons and/or equipment may be injured or damaged due to rotating propeller behind the watersport vessel. A technical benefit may include that the control unit ensures that the drive unit is moved into the forward-facing position whereby the risk for persons being injured and/or equipment being damaged are minimized under watersports.

[0004] Optionally in some examples, including in at least one preferred example, the drive unit comprises one or more propellers.

[0005] Optionally in some examples, including in at least one preferred example, the one or more propellers in the forward-facing position is/are in a pulling mode. A technical benefit may include that the one or more propellers is/are directed towards and/or under the watersports vessel and thereby the risk for coming in contact with the one or propeller is minimized.

[0006] Optionally in some examples, including in at least one preferred example, the one or more propellers in the rearward-facing mode is/are in a pushing mode. A technical benefit may include that the one or more propellers are efficient, silent and less exposed when the watersport vessel sail in the nominal mode of operation in shallow waters.

[0007] Optionally in some examples, including in at least one preferred example, the one or more propellers of the drive unit in the forward-facing position protrude towards and/or beneath a hull of the marine watersport vessel. A technical benefit may include that the one or more propellers is/are directed towards and/or under the watersports vessel and thereby the risk for coming in contact with the one or propeller is minimized.

[0008] Optionally in some examples, including in at least one preferred example, the drive unit is connected with a transom of the marine watersport vessel via a transom bracket. The risk for coming in contact with the one or more propellers are larger when the drive unit is connected with the transom since the drive unit is more accessible. Hence, by combining having the drive unit on the transom with ensuring that drive unit is operated in the watersport mode of operation when persons are in the water, the risk for persons being injured is minimized.

[0009] Optionally in some examples, including in at least one preferred example, the drive unit comprises a first part and a second part, the first part being connected with the marine watersport vessel and the second part is rotatable arranged in relation to the first part. A technical benefit may include that the drive unit may easily be rotated from a rearward-facing position to a forward-facing position, and vice versa. In addition, the rotation of the second part may also assist in maneuvering the watersport vessel. The first part may be connected with the transom.

[0010] Optionally in some examples, including in at least one preferred example, the second part comprises the one of more propellers. A technical benefit may include that it is the one or more propellers being rotated from a rearward-facing position to a forward-facing position, and vice versa.

[0011] Optionally in some examples, including in at least one preferred example, the drive unit is configured to be trimmed and/or tilted. A technical benefit may include that the drive unit is trimmed so as to improve the watersport vessel's performance and energy consumption to power the drive unit.

[0012] Optionally in some examples, including in at least one preferred example, the drive unit being rotatable connected with the transom bracket so as to be pivotable from a lowered position into a raised position, or vice versa. A technical benefit may include that the drive unit may be trimmed and/or tilted. In addition, it may also be tilted out of the water to a parked position above water, for instance when being in harbor or at the beach.

[0013] Optionally in some examples, including in at least one preferred example, the first part being rotatable connected with the transom bracket, the second part is following the first part when it is being pivotable from the lowered position into the raised position, or vice versa.

A technical benefit may include that the drive unit function as one unit even though the second part may be rotated in relation to the first part.

[0014] Optionally in some examples, including in at least one preferred example, the drive unit comprises an electric motor. A technical benefit may include to provide an environmental and sustainable power solution to drive unit while minimizing noise from the motor.

[0015] Optionally in some examples, including in at least one preferred example, the drive unit comprises one or more sensor(s) configured to detect the rearward-facing position and/or the forward-facing position of the drive unit. A technical benefit may include ensuring by detecting whether the drive unit is in the forward-facing position before activating the watersport mode of operation.

[0016] Optionally in some examples, including in at least one preferred example, the control unit is operatively connected with the sensor(s) so as to control that the drive unit is in the forward-facing position when the watersport propulsion system is set in the watersport mode of operation. A technical benefit may include that the drive unit is in the forward-facing position before activating the watersport mode of operation.

[0017] Optionally in some examples, including in at least one preferred example, the propellers are driven by the electrical motor, the electrical motor being configured to rotate in either clockwise direction and/or counterclockwise direction. A technical benefit may include that the drive unit is configured to be efficient in both the rearward-facing position and/or the forward-facing position.

[0018] Optionally in some examples, including in at least one preferred example, the control unit is configured to controls an angle of the second part of the drive unit and/or rotation speed, and/or rotation direction of the electric motor on basis of data received from the one or more sensor(s). A technical benefit may include that the drive unit is configured to be efficient in both the rearward-facing position and/or the forward-facing position.

[0019] Optionally in some examples, including in at least one preferred example, the drive unit has a first propeller and a second propeller. A technical benefit may include that the efficiency of the drive unit may be enhanced.

[0020] According to a second aspect of the disclosure, a marine watersport vessel comprising a watersport propulsion system as described above.

[0021] According to a third aspect of the disclosure, a method of operating a watersport propulsion system as described above, comprising

providing a watersport propulsion system as described above, on a marine watersport vessel, setting the watersport propulsion system in a watersport mode of operation,

arranging the drive unit in the forward-facing position when setting the watersport mode of operation,

detecting that the drive unit is in the forward-facing position before activating the watersport propulsion system in the watersport mode of operation.

[0022] The disclosed aspects, examples (including any preferred examples), and/or accompanying claims may be suitably combined with each other as would be apparent to anyone of ordinary skill in the art. Additional features and advantages are disclosed in the following description, claims, and drawings, and in part will be readily apparent therefrom to those skilled in the art or recognized by practicing the disclosure as described herein.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] Examples are described in more detail below with reference to the appended drawings.

FIG. 1 is an exemplary watersport propulsion system in a nominal mode of operation according to an example.

FIG. 2 is an exemplary watersport propulsion system in a watersport mode of operation according to an example.

DETAILED DESCRIPTION

[0024] The detailed description set forth below provides information and examples of the disclosed technology with sufficient detail to enable those skilled in the art to practice the disclosure.

[0025] **FIG. 1** is an exemplary watersport propulsion system in a nominal mode of operation according to an example. The watersport propulsion system 1 for a marine watersport vessel 100, comprising a drive unit 3 arranged rotatable from a rearward-facing position R as shown in **FIG. 1** to a forward-facing position F, and vice versa. In addition, a control unit 5 being operatively connected with the drive unit 3, the control unit 5 is configurable in a nominal mode of operation and in a watersport mode of operation. In **FIG. 1**, the control unit 5 is arranged on the watersport vessel 100, however, in other examples the control unit may be arranged in the drive unit 3 or at/in the transom bracket 2. The control unit 5 may be wirely connected with the drive unit 3 or otherwise connected.

[0026] The control unit 5 is configured to operate the drive unit 3 in the forward-facing position F when in the watersport mode of operation and in the rearward-facing position R otherwise. Hereby the control unit ensures that the drive unit is moved into the forward-facing position whereby the risk for persons being injured and/or equipment being damaged are minimized under watersports.

[0027] The drive unit 3 is connected with a transom 102 of the marine watersport vessel 100 via a transom bracket 2. Hence, the drive unit 3 is connected to the marine watersport vessel near a waterline of the marine watersport vessel. In an example, the drive unit 3 may

comprise one or more propellers 10. In **FIG. 1**, the drive unit 3 has a first propeller 10a and a second propeller 10b.

[0028] In **FIG. 1**, the one or more propellers 10 when in the rearward-facing mode are in a pushing mode, whereby the propellers 10a, 10b are efficient, silent and less exposed when the watersport vessel sail in the nominal mode of operation in shallow waters. In shallow water or near the beach there is a higher risk to hit obstacles and rocks and thereby damaging the one or more propellers.

[0029] Furthermore, the drive unit 3 comprises a first part 6 and a second part 7, the first part being connected with the marine watersport vessel via the transom bracket 2 and the second part is rotatable arranged in relation to the first part. The second part 7 comprises the one of more propellers 10.

[0030] In **FIG. 2**, the watersport propulsion system 1 is shown in a watersport mode of operation according to an example. The one or more propellers 10 are shown in the forward-facing position F where the first propeller 10a and second propeller 10B are in a pulling mode. As seen in **FIG. 2**, the first propeller 10a and the second propeller 10b of the drive unit 3 are in the forward-facing position F and protrude towards and/or beneath a hull 101 of the marine watersport vessel 100. Hereby the risk for coming in contact with the one or propeller is minimized.

[0031] Furthermore, the drive unit 3 may be rotatable connected with the transom bracket 2 so as to be pivotable from a lowered position into a raised position, or vice versa. In addition, the drive unit 3 may be configured to be trimmed and/or tilted. Hence, the drive unit can be moved in and out of the water. The drive unit 3 may be trimmed in both the watersport mode of operation and the nominal mode of operation. In addition, the drive unit 3 may also be tilted in both the watersport mode of operation and the nominal mode of operation.

[0032] In an example, the first part 6 may be rotatable connected with the transom bracket 2, the second part 7 is following the first part when it is being pivotable from the lowered position into the raised position, or vice versa.

[0033] In an example, the drive unit 3 may comprise one or more sensor(s) configured to detect the rearward-facing position R and/or the forward-facing position F of the drive unit. The control unit 5 may be operatively connected with the sensor(s) so as to control that the drive unit 3 is in the forward-facing position F when the watersport propulsion system 1 is set in the watersport mode of operation, and/or before the drive unit is activated.

[0034] Moreover, the drive unit 3 comprises an electric motor. The propellers 10 are driven by the electrical motor, the electrical motor being configured to rotate in either clockwise direction and/or counterclockwise direction.

[0035] In an example, the drive unit 3, when running in rearward-facing position R, the electric motor is configured to rotate clockwise. In addition, the drive unit 3, when running the forward-facing position F, the electric motor is configured to rotate counterclockwise.

[0036] The control unit 5 is configured to control an angle of the second part 7 of the drive unit and/or rotation speed, and/or rotation direction of the electric motor on basis of data received from the one or more sensor(s).

[0037] As mentioned earlier, the drive unit 3 may have a first propeller 10a and a second propeller 10b. In an example, the first propeller 10a may have a first torque and a first rotation speed, the second propeller 10b has a second torque and a second rotation speed. The first torque is equal to or different from the second torque. The first rotation speed is equal to or different from the second rotation speed. Hereby is obtained that the drive unit 3 may be set to run in optimum irrespective if it is in the rearward-facing position R as shown in **FIG. 1** or the forward-facing position F as shown in **FIG. 2.**

[0038] Hence, the control unit 5 may be arranged to optimize torque and/or rotation speed of the first propeller 10a and/or the second propeller 10b, respectively, in dependence of the mode of operation.

[0039] In another example, a system sensor is arranged on the marine watersport vessel or the drive unit 3, the system sensor being configured to detect if a person or obstacle is present around the drive unit. The system sensor may be operatively connected with the control unit. The control unit is configured to move the drive unit into the forward-facing position if a person or obstacle is detected near the drive unit.

[0040] Furthermore, the watersport mode of operation may be activated by an operator of the marine watersport vessel, and/or automatically by the control unit.

[0041] The present disclosure also relates to a marine watersport vessel 100 comprising a watersport propulsion system 1 as described above.

[0042] The present disclosure also relates to a method of operating a watersport propulsion system 1 as described above. The method comprising

providing a watersport propulsion system 1 as described above, on a marine watersport vessel 100,
setting the watersport propulsion system 1 in a watersport mode of operation,
arranging the drive unit 3 in the forward-facing position F when setting the watersport mode of operation,
detecting that the drive unit is in the forward-facing position before activating the watersport propulsion system in the watersport mode of operation.

[0043] Hereby it is ensured that it is detecting whether the drive unit is in the forward-facing position before activating the watersport mode of operation and thereby the drive unit, so that the risk for persons being injured and/or equipment being damaged are minimized under watersports due to coming into contact with the propellers when the drive unit is in the reward-facing position R.

[0044] Moreover, the drive unit may be hindered for providing the propulsion if it is detected that the drive unit is not in the forward-facing position after the watersport mode of operation is activated. Hereby an additional se-

curity is added to the system which also is minimizing the risk for persons being injured during watersports.

[0045] Certain aspects and variants of the disclosure are set forth in the following examples numbered consecutive below.

[0046] Example 1: A watersport propulsion system (1) for a marine watersport vessel (100), comprising

a drive unit (3) arranged rotatable from a rearward-facing position (R) to a forward-facing position (F), and vice versa,
a control unit (5) being operatively connected with the drive unit (3), the control unit (5) is configurable in a nominal mode of operation and in a watersport mode of operation,
wherein the control unit (5) is configured to operate the drive unit (3) in the forward-facing position (F) when in the watersport mode of operation and in the rearward-facing position (R) otherwise.

[0047] Example 2: The watersport propulsion system (1) of example 1, wherein the drive unit (3) comprises one or more propellers (10).

[0048] Example 3: The watersport propulsion system (1) of example 2, wherein the one or more propellers (10) in the forward-facing position is/are in a pulling mode.

[0049] Example 4: The watersport propulsion system (1) of example 2, wherein the one or more propellers (10) in the rearward-facing mode is/are in a pushing mode.

[0050] Example 5: The watersport propulsion system (1) of example 2 and/or 3, wherein the one or more propellers (10) of the drive unit (3) in the forward-facing position protrude towards and/or beneath a hull (101) of the marine watersport vessel.

[0051] Example 6: The watersport propulsion system (1) of any of the preceding examples, wherein the drive unit (3) is connected with a transom (102) of the marine watersport vessel via a transom bracket (2).

[0052] Example 7: The watersport propulsion system (1) of any of the preceding examples, wherein the drive unit (3) comprises a first part (6) and a second part (7), the first part being connected with the marine watersport vessel and the second part is rotatable arranged in relation to the first part.

[0053] Example 8: The watersport propulsion system (1) of example 7, wherein the second part (7) comprises the one of more propellers (10).

[0054] Example 9: The watersport propulsion system (1) of any of the preceding examples, wherein the drive unit (3) is configured to be trimmed and/or tilted.

[0055] Example 10: The watersport propulsion system (1) of example 6, wherein the drive unit (3) being rotatable connected with the transom bracket (2) so as to be pivotable from a lowered position into a raised position, or vice versa.

[0056] Example 11: The watersport propulsion system (1) of example 10, wherein the first part (6) being rotatable connected with the transom bracket (2), the second part (7) is following the first part when it is being pivotable from the lowered position into the raised position, or vice versa.

[0057] Example 12: The watersport propulsion system (1) of any of the preceding examples, wherein the drive unit (3) comprises an electric motor.

[0058] Example 13: The watersport propulsion system (1) of any of the preceding examples, wherein the drive unit (3) comprises one or more sensor(s) configured to detect the rearward-facing position and/or the forward-facing position of the drive unit.

[0059] Example 14: The watersport propulsion system (1) of example 13, wherein the control unit (5) is operatively connected with the sensor(s) so as to control that the drive unit (3) is in the forward-facing position when the watersport propulsion system is set in the watersport mode of operation.

[0060] Example 15: The watersport propulsion system (1) of example 12, wherein the propellers (10) are driven by the electrical motor, the electrical motor being configured to rotate in either clockwise direction and/or counterclockwise direction.

[0061] Example 16: The watersport propulsion system (1) of any of the preceding examples, wherein the control unit (5) is configured to controls an angle of the second part (7) of the drive unit and/or rotation speed, and/or rotation direction of the electric motor on basis of data received from the one or more sensor(s).

[0062] Example 17: The watersport propulsion system (1) of example 12, wherein the drive unit (3), when running in rearward-facing position, the electric motor is configured to rotate clockwise.

[0063] Example 18: The watersport propulsion system (1) of example 12, wherein the drive unit (3), when running the forward-facing position, the electric motor is configured to rotate counterclockwise.

[0064] Example 19: The watersport propulsion system (1) of example 1, wherein the drive unit (3) has a first propeller (10a) and a second propeller (10b).

[0065] Example 20: The watersport propulsion system (1) of example 19, wherein the first propeller (10a) has a first torque and a first rotation speed, the second propeller (10b) has a second torque and a second rotation speed.

[0066] Example 21: The watersport propulsion system (1) of example 20, wherein the first torque is equal to or different from the second torque.

[0067] Example 22: The watersport propulsion system (1) of example 20, wherein the first rotation speed is equal to or different from the second rotation speed.

[0068] Example 23: The watersport propulsion system (1) of any of the examples 19-22, wherein the control unit (5) is arranged to optimize torque and/or rotation speed of the first propeller (10a) and/or the second propeller (10b), respectively, in dependence of the mode of operation.

[0069] Example 24: The watersport propulsion system (1) of any of the examples 1-23, further comprising a

system sensor, the system sensor being configured to detect if a person or obstacle is present around the drive unit.

[0070] Example 25: The watersport propulsion system (1) of example 24, wherein the system sensor is operatively connected with the control unit.

[0071] Example 26: The watersport propulsion system (1) of example 25, wherein the control unit is configured to move the drive unit into the forward-facing position if a person or obstacle is detected near the drive unit.

[0072] Example 27: The watersport propulsion system (1) of any of the examples 1-26, wherein the watersport mode of operation is activated by an operator of the marine watersport vessel, and/or automatically by the control unit.

[0073] Example 28: A marine watersport vessel (100) comprising a watersport propulsion system (1) of any of the examples 1-27.

[0074] Example 29: A method of operating a watersport propulsion system (1) of any of the examples 1 to 27, comprising

- providing a watersport propulsion system (1) of any of the examples 1 to 23, on a marine watersport vessel,
- setting the watersport propulsion system (1) in a watersport mode of operation,
- arranging the drive unit (3) in the forward-facing position F when setting the watersport mode of operation,
- detecting that the drive unit is in the forward-facing position before activating the watersport propulsion system in the watersport mode of operation.

[0075] Example 30: The method of example 31, wherein the drive unit is hindered for providing the propulsion if it is detected that the drive unit is not in the forward-facing position after the watersport mode of operation is activated.

[0076] The terminology used herein is for the purpose of describing particular aspects only and is not intended to be limiting of the disclosure. As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items. It will be further understood that the terms "comprises," "comprising," "includes," and/or "including" when used herein specify the presence of stated features, integers, actions, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, actions, steps, operations, elements, components, and/or groups thereof.

[0077] It will be understood that, although the terms first, second, etc., may be used herein to describe various elements, these elements should not be limited by these terms. These terms are only used to distinguish one element from another. For example, a first element could be termed a second element, and, similarly, a second element could be termed a first element without departing from the scope of the present disclosure.

[0078] Relative terms such as "below" or "above" or "upper" or "lower" or "horizontal" or "vertical" may be used herein to describe a relationship of one element to another element as illustrated in the Figures. It will be understood that these terms and those discussed above are intended to encompass different orientations of the device in addition to the orientation depicted in the Figures. It will be understood that when an element is referred to as being "connected" or "coupled" to another element, it can be directly connected or coupled to the other element, or intervening elements may be present. In contrast, when an element is referred to as being "directly connected" or "directly coupled" to another element, there are no intervening elements present.

[0079] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this disclosure belongs. It will be further understood that terms used herein should be interpreted as having a meaning consistent with their meaning in the context of this specification and the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0080] It is to be understood that the present disclosure is not limited to the aspects described above and illustrated in the drawings; rather, the skilled person will recognize that many changes and modifications may be made within the scope of the present disclosure and appended claims. In the drawings and specification, there have been disclosed aspects for purposes of illustration only and not for purposes of limitation, the scope of the disclosure being set forth in the following claims.

Claims

1. A watersport propulsion system (1) for a marine watersport vessel (100), comprising

   - a drive unit (3) arranged rotatable from a rearward-facing position (R) to a forward-facing position (F), and vice versa,
   - a control unit (5) being operatively connected with the drive unit (3), the control unit (5) is configurable in a nominal mode of operation and in a watersport mode of operation,

   wherein the control unit (5) is configured to operate the drive unit (3) in the forward-facing position (F) when in the watersport mode of operation and in the rearward-facing position (R) otherwise.

2. The watersport propulsion system (1) of claim 1, wherein the drive unit (3) comprises one or more

propellers (10).

3. The watersport propulsion system (1) of claim 2, wherein the one or more propellers (10) in the forward-facing position is/are in a pulling mode.

4. The watersport propulsion system (1) of claim 2, wherein the one or more propellers (10) in the rearward-facing mode is/are in a pushing mode.

5. The watersport propulsion system (1) of claim 2 and/or 3, wherein one or more propellers (10) of the drive unit (3) in the forward-facing position protrude towards and/or beneath a hull (101) of the marine watersport vessel.

6. The watersport propulsion system (1) of any of the claims 1-5, wherein the drive unit (3) is connected with a transom (102) of the marine watersport vessel via a transom bracket (2).

7. The watersport propulsion system (1) of any of the claims 1-6, wherein the drive unit (3) comprises a first part (6) and a second part (7), the first part being connected with the marine watersport vessel and the second part is rotatable arranged in relation to the first part.

8. The watersport propulsion system (1) of claim 7, wherein the second part (7) comprises the one of more propellers (10).

9. The watersport propulsion system (1) of any of the claims 1-8, wherein the drive unit (3) comprises an electric motor.

10. The watersport propulsion system (1) of any of the claims 1-9, wherein the drive unit (3) comprises one or more sensor(s) configured to detect the rearward-facing position and/or the forward-facing position of the drive unit.

11. The watersport propulsion system (1) of claim 10, wherein the control unit (5) is operatively connected with the sensor(s) so as to control that the drive unit (3) is in the forward-facing position when the watersport propulsion system is set in the watersport mode of operation.

12. The watersport propulsion system (1) of claim 9, wherein the propellers (10) are driven by the electrical motor, the electrical motor being configured to rotate in either clockwise direction and/or counterclockwise direction.

13. The watersport propulsion system (1) of any of the claims 1-12, wherein the control unit (5) is configured to control an angle of the second part (7) of the drive unit and/or rotation speed, and/or rotation direction of the electric motor on basis of data received from the one or more sensor(s).

14. A marine watersport vessel (100) comprising a watersport propulsion system (1) of any of the claims 1-13.

15. A method of operating a watersport propulsion system (1) of any of the claims 1 to 13, comprising

- providing a watersport propulsion system (1) of any of the claims 1 to 13, on a marine watersport vessel,
- setting the watersport propulsion system (1) in a watersport mode of operation,
- arranging the drive unit (3) in the forward-facing position F when setting the watersport mode of operation,
- detecting that the drive unit is in the forward-facing position before activating the watersport propulsion system in the watersport mode of operation.

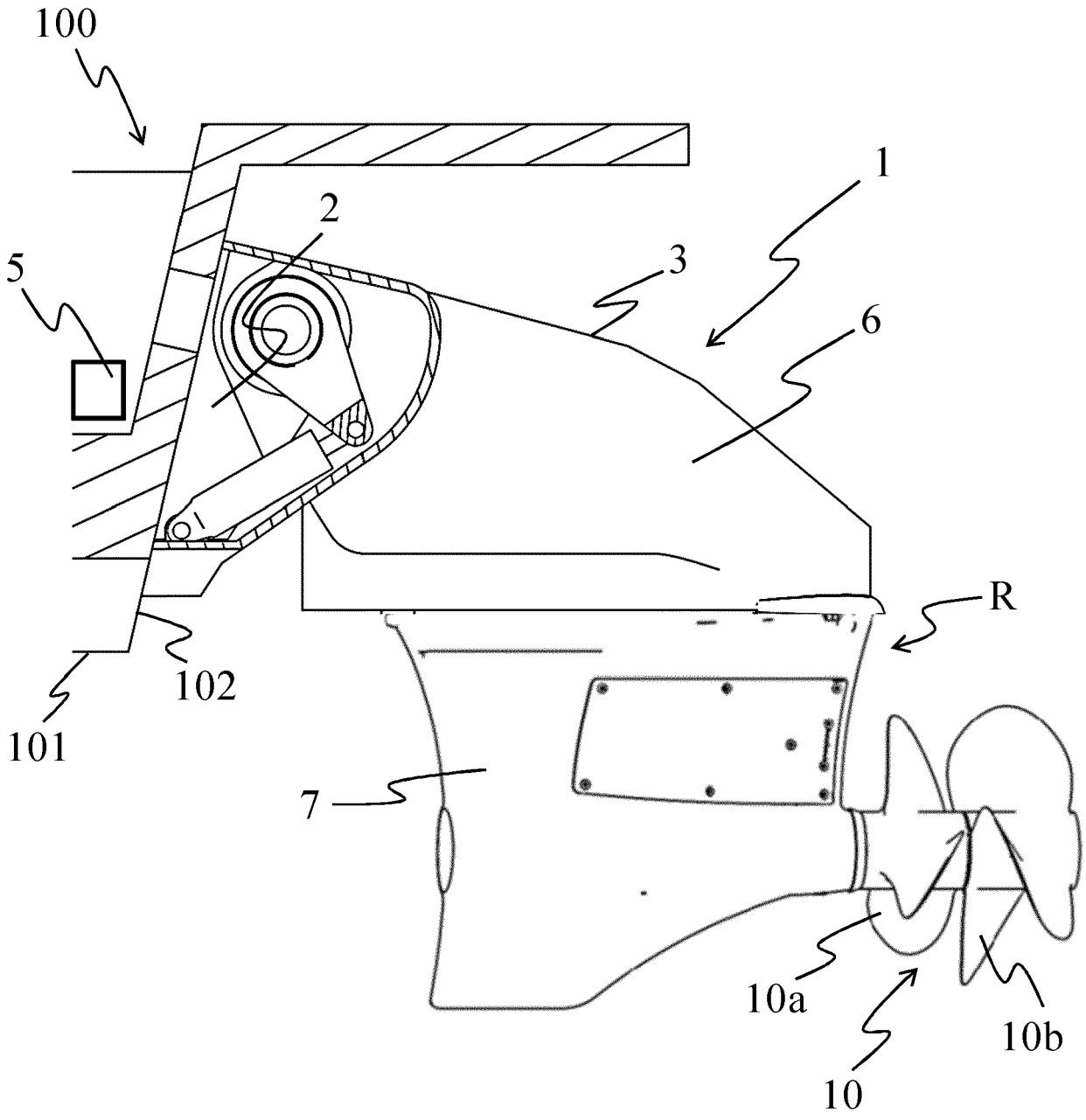

FIG. 1

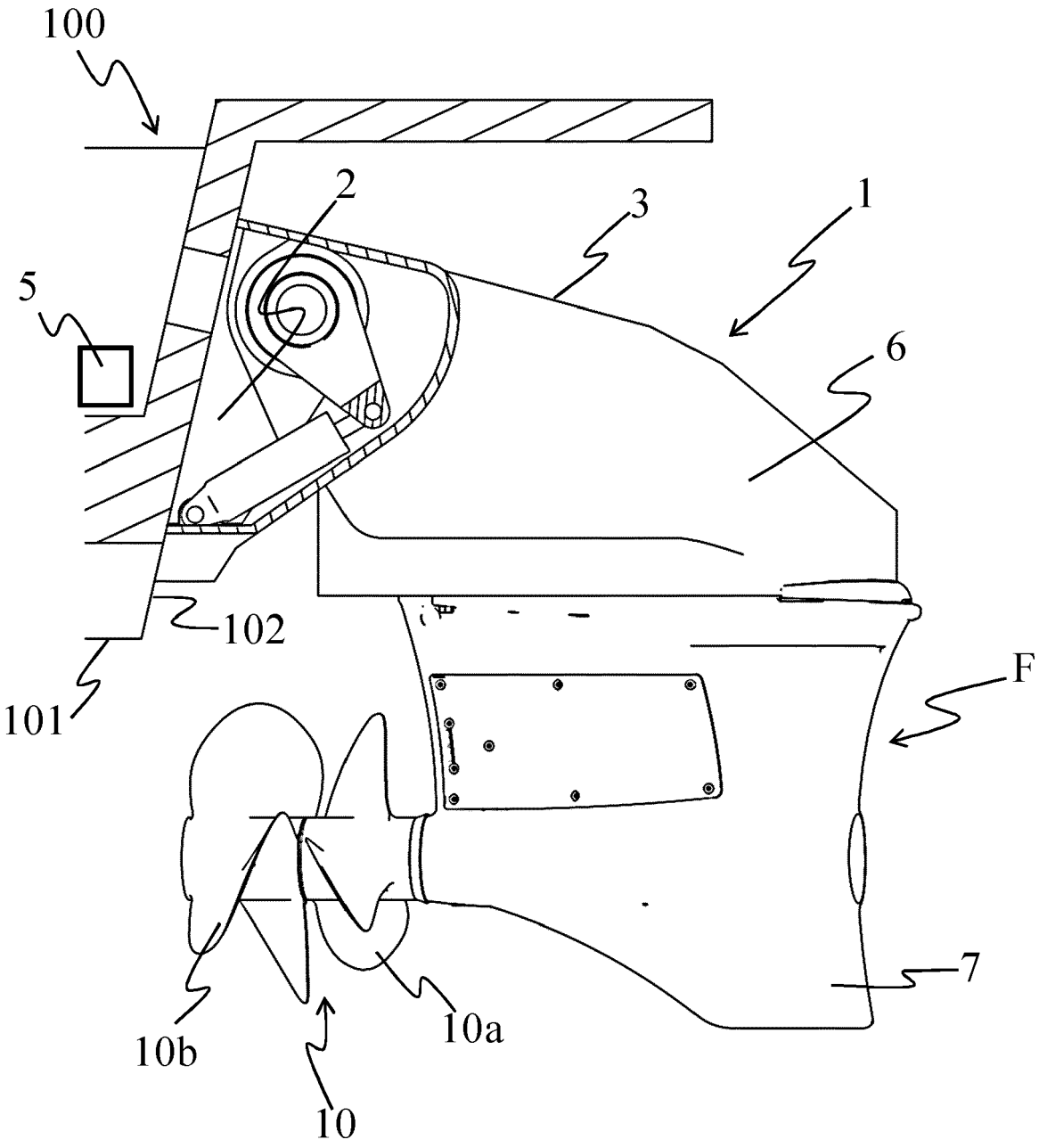

FIG. 2

Europäisches Patentamt
European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 24 16 9835

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	EP 2 993 122 A1 (ABB OY [FI]) 9 March 2016 (2016-03-09) * figures 1-2 * * paragraphs [0006] - [0009], [0022] * -----	1-15	INV. B63H20/12 B63H20/16 B63H20/20
X	US 2006/258233 A1 (WILSON JIM [US] ET AL) 16 November 2006 (2006-11-16) * figure 11 * * paragraphs [0018], [0019], [0031] * -----	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

B63H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 September 2024	Freire Gomez, Jon

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