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(71) Applicant: **Ray Technologies OÜ**
12616 Tallinn (EE)

(72) Inventor: **Nõps, Andres**
51008 Tartu (EE)

(74) Representative: **Koitel, Raivo et al**
Koitel Patent & Trademark Agency
Tina 26-2
10126 Tallinn (EE)

(54) **SURFBOARD WITH ELECTRIC PROPULSION MOUNTED ON ITS HYDROFOIL**

(57) The present invention discloses a hydrofoil mast that can be attached to a surfboard with a soleplate, wherein the mast comprises at least one waterproof internal cavity for housing at least one battery module and cabling, and the soleplate comprises at least one

control module. The preferred control modules are the control module for charging the battery or battery module, the control module for the motor and its operating speed, the remote control receiver, and the electrical charging interface for the waterproof battery.

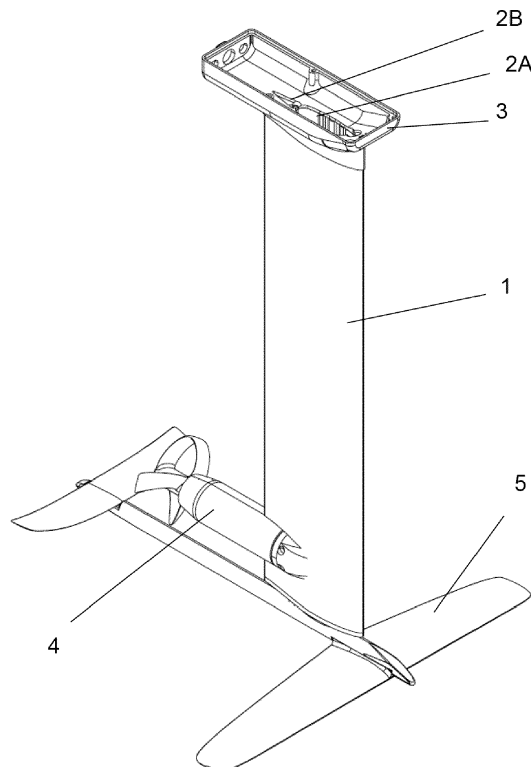


FIG 1

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Description

Technical Field

[0001] The present invention belongs to the field of water sports equipment, which improves the location of the electronic module of the surfboard, more precisely, the hydrofoil-type surfboard, and improves its environmental resistance and controllability of the surfboard.

Prior Art

[0002] Solutions known from prior art, where the hydrofoil-type (which solution is similar to the operating principle of hydrofoil ships, where the surfboard is supplemented with an underwater wing or wings attached to a mast) surfboard has an underwater mast with a wing equipped with an electric motor with an impeller and which is electrically connected to the surfboard, which has a control module and batteries that supply the control module as well as the electric motor with the necessary electrical energy.

[0003] As of the state of the art, the solution described in patent application US2022194525A1 (published June 23, 2022) is known, in which the batteries and control electronics modules are located in a closable opening inside the surfboard and which has an electrical connection to the underwater mast located under the surfboard, in which are installed an electric motor with an impeller and underwater wings.

[0004] As for the state of the art, the solution described in patent application AU2023100025A4 (published March 30, 2023) is known, which describes the fastening solution between the surfboard and its underwater mast, which, among other things, carries out electrical connections to the control system and the energy source (battery) located in the surfboard, and a thermal bridge for connecting the control system to the underwater mast. In this solution, both the battery and the control electronics module are placed inside the surfboard.

[0005] The main drawback of the known solutions is the location of both the batteries and the control electronics modules inside the surfboard, which in turn necessitates making electrical connections between the surfboard and the hydrofoil, which makes these connections dependent on wet environmental conditions (including the saltwater) and can cause corrosion and other problems. In addition, the batteries inside the surfboard, due to their weight, change the center of gravity of the hydrofoil-type surfboard and make the surfboard more difficult to control. The present invention eliminates the above-mentioned disadvantages.

Nature of the invention

[0006] The hydrofoil mast, according to the invention, comprises a waterproof longitudinal cavity and is connected to the surfboard by a soleplate. There are at least

two cavities, whereas the cavity with a larger cross-section is for housing at least one battery or battery module, and the cavity with a smaller cross-section is for housing cabling. The soleplate comprises different control modules. In addition, one or more wings and a motor with an impeller are to be attached to the mast. Various functionalities are integrated into the control modules, including the control of the operation of the hydrofoil motors and the charging of the batteries, the control panel receiver (preferably for wireless connection to the control panel used by the surfboard user) and the electrical charging interface for the battery or battery modules (both wired and wireless).

15 List of Figures

[0007]

Figure 1 shows an axonometric view of the hydrofoil mast with its attachment to the surfboard.

Figure 2 shows a cross-section of a hydrofoil mast.

Figure 3 shows a cross-section of the part of the hydrofoil mast facing the surfboard.

Preferred embodiment of the invention

[0008] The hydrofoil, according to the invention, uses a surfboard in common use on the market (not shown in the figure) and a fastening interface common on surfboards between the surfboard and the of the underwater hydrofoil mast 1 (for example, a 165x90 mm bolt fastening).

[0009] The hydrofoil mast 1 is made in such a way that it has at least one internal cavity in which are placed at least one battery or battery module and the cables. At the junction of the hydrofoil mast 1 and the surfboard, there is a soleplate 3, inside which the control modules of the control electronics are located, which are the battery controller and the motor controller, in addition to the receiver of the control panel, a waterproof electric charging socket (interface). A motor 4 with an impeller is attached to the hydrofoil mast 1, and one or more wings 5 are attached to the bottom of the hydrofoil mast 1. The cavity of the hydrofoil mast 1 is water-tightly resealable. The control modules are located inside the soleplate 3, which is attached to the hydrofoil mast 1, not on top of or inside the surfboard.

[0010] The soleplate 3 is equipped with a control module 6 for charging waterproof battery(s) or battery module(s). Batteries or battery modules can be removed and replaced by the user, which ensures longer usability of the hydrofoil-type surfboard if, for example, when the batteries or battery modules are discharged, empty batteries or battery modules are replaced by full batteries or battery modules by a body of water and the use of the surfboard is continued. At the same time, the removed batteries or battery modules can be charged separately.

Batteries or battery modules can also be charged when installed inside the hydrofoil mast 1 through the waterproof charging socket on the soleplate 3.

[0011] The location of the battery(ies) or battery module(s) inside the hydrofoil mast 1 and the location of the various control modules in the soleplate 3 next to the hydrofoil mast 1 lowers the center of gravity of the hydrofoil type surfboard, and this makes the hydrofoil type surfboard more controllable.

[0012] In the preferred embodiment, the hydrofoil mast 1 has two longitudinal cavities of different sizes, of which cavity 2A, with a larger cross-section, is used for placing at least one battery or battery module, and cavity 2B, with a smaller cross-section for placing cables.

[0013] In the preferred embodiment, soleplate 3 is equipped with two multifunctional control modules, one of which is the control module 6 for charging the battery(s) or battery module(s), and the other is the control module 7 for the motor and its operating speed.

[0014] In addition, there is a remote control receiver in the soleplate 3, which is wirelessly connected to the remote control.

[0015] In one embodiment, the soleplate 3 has an electrical cabled charging socket with a waterproof connection for charging the battery(ies) or battery module(s) inside the hydrofoil mast 1.

[0016] In yet another embodiment, soleplate 3 has an interface for wireless (e.g., inductance-based) charging of the battery(ies) or battery module(s).

1, **characterized in that** the control modules are a battery or battery module charging control module (6), a motor and its operating speed control module (7), a remote control receiver and an electrical charging interface for a waterproof battery.

6. A hydrofoil mast (1) of a surfboard, according to claim 5, **characterized in that** the control panel receiver is in wireless connection with the control panel.

7. A hydrofoil mast (1) of a surfboard, according to claim 5, **characterized in that** the charging interface of the battery module is wired.

8. A hydrofoil mast (1) of a surfboard, according to claim 5, **characterized in that** the charging interface of the battery module is wireless.

9. A hydrofoil mast (1) of a surfboard, according to claim 5, **characterized in that** the battery or battery module charging control module (6) supports battery charging and the motor and its operating speed control module (7) supports the control of the motor and its operating speed.

Claims

1. A hydrofoil mast (1) of a surfboard connected to a surfboard by a soleplate (3), wherein the hydrofoil mast (1) comprises a cavity, at least one wing (5), a motor with an impeller (4), **characterized in that** into the cavity of the hydrofoil mast (1) is installed at least one battery or battery module and the cabling and the soleplate (3) comprise at least one control module and that the cavity of the hydrofoil mast (1) is re-openable and water-tightly resealable.
2. A hydrofoil mast (1) of a surfboard, according to claim 1, **characterized in that** the hydrofoil mast (1) has two longitudinal cavities of different sizes.
3. A hydrofoil mast (1) of a surfboard, according to claim 2, **characterized in that** the cavity (2A) with a larger cross-section is meant for housing at least one battery or battery module.
4. A hydrofoil mast (1) of a surfboard, according to claim 2, **characterized in that** the cavity (2B) with a smaller cross-section is meant for accommodating cables.
5. A hydrofoil mast (1) of a surfboard, according to claim

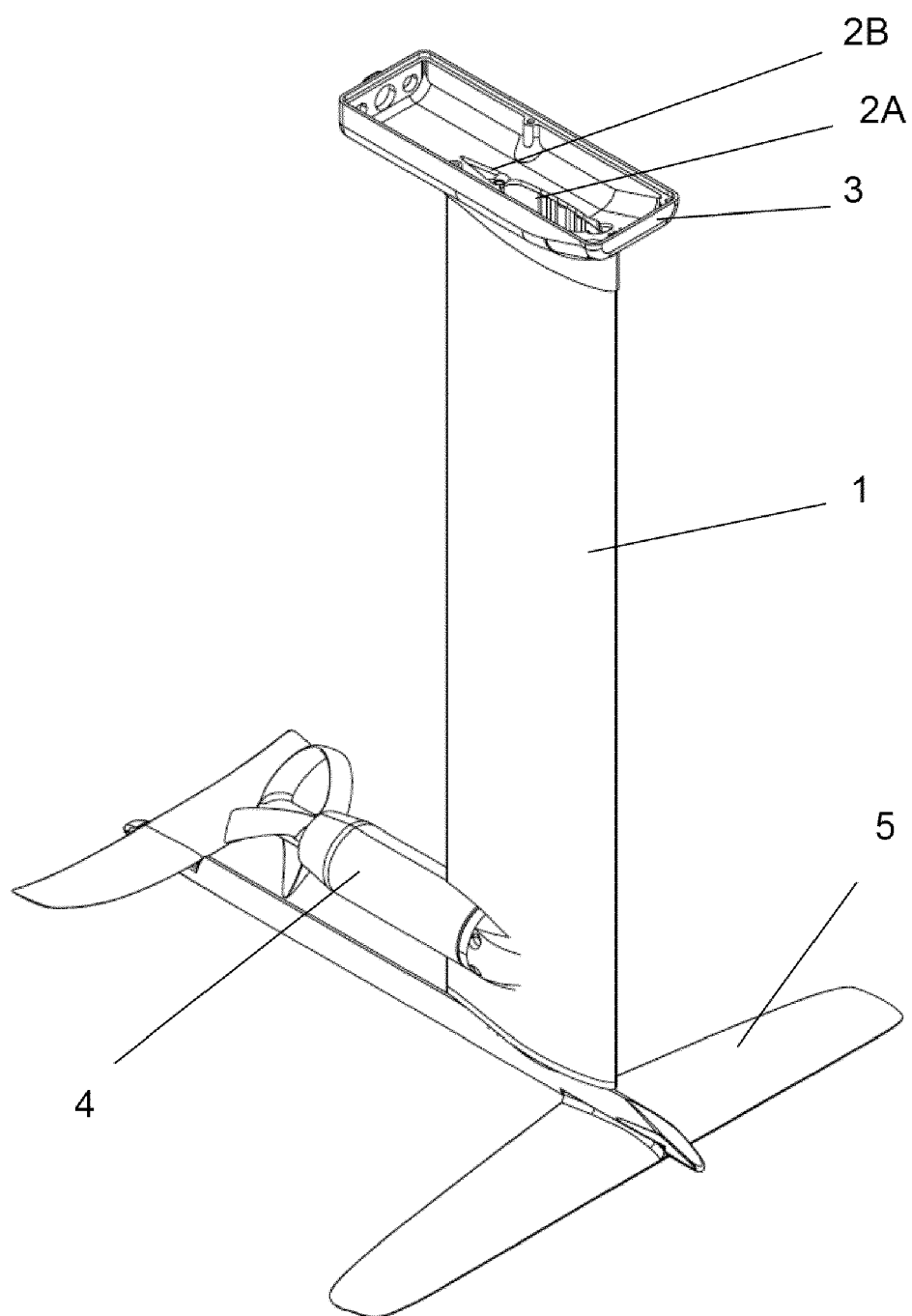


FIG 1

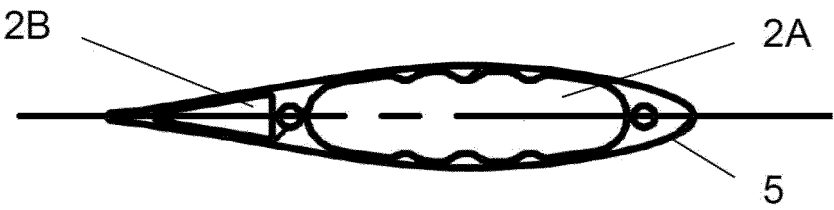


FIG 2

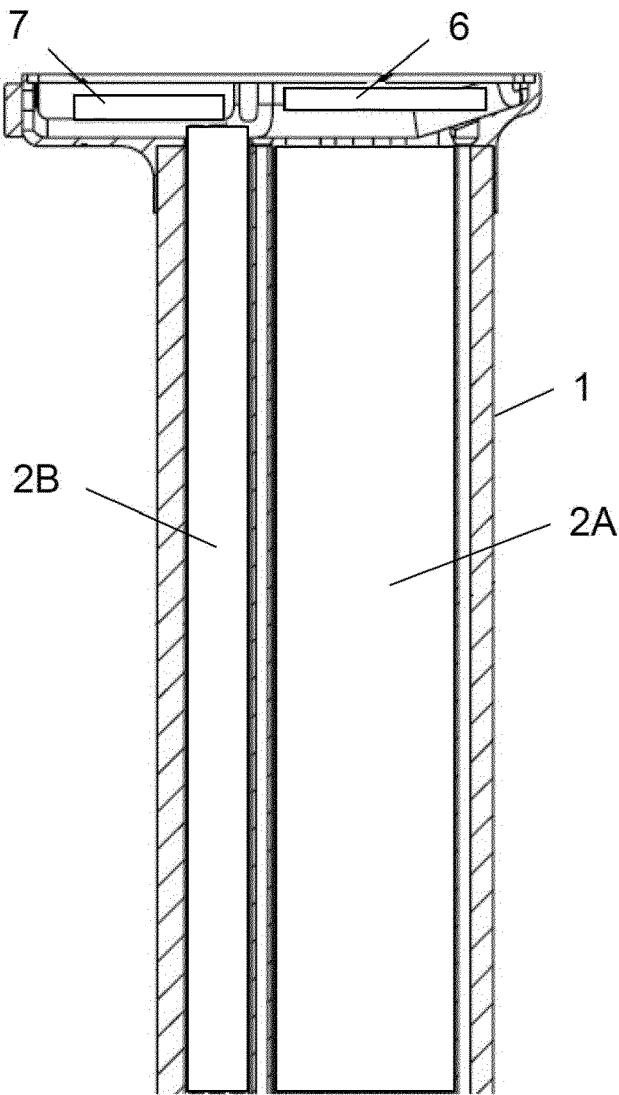


FIG 3



EUROPEAN SEARCH REPORT

Application Number

EP 23 02 0477

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	DE 10 2018 113137 A1 (KATZKE MICHAEL [DE]) 14 February 2019 (2019-02-14) * paragraphs [0008], [0010], [0022], [0027]; figures 1-3 *	1-9	INV. B63B1/24 B63B32/60
A	US 2022/315174 A1 (SEWELL SAM [AU]) 6 October 2022 (2022-10-06) * paragraphs [0014] - [0017], [0058] - [0061]; figures 6-12 *	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			B63B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		28 March 2024	Mauriès, Laurent
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ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 23 02 0477

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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28-03-2024

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102018113137 A1	14-02-2019	NONE	

US 2022315174 A1	06-10-2022	AU 2020288446 A1	16-12-2021
		US 2022315174 A1	06-10-2022
		WO 2020243769 A1	10-12-2020

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2022194525 A1 [0003]
- AU 2023100025 A4 [0004]