PTO/AIA/15 (03-13)
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UTILITY PATENT APPLICATION TRANSMITTAL

(ONLY FOR NEW NONPROVISIONAL APPLICATIONS UNDER 37 CFR 1.53(B))

Attorney Docket No.	JWL-10002/36
First Named Inventor	Jacob Willem Langelaan
Title	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. [X] **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. [X] **Applicant asserts small entity status.** See 37 CFR 1.27
3. [ ] **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. [X] **Specification** [*Total Pages* 12] Both the claims and abstract must start on a new page. *(See MPEP § 608.01(a) for information on the preferred arrangement)*
5. [X] **Drawing(s)** (35 U.S.C. 113) [*Total Sheets* 4]
6. **Inventor's Oath or Declaration** [*Total Pages* 1] *(including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))*
   - a. [X] Newly executed (original or copy)
   - b. [ ] A copy from a prior application (37 CFR 1.63(d))
7. [X] **Application Data Sheet** ** See note below.* See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. **CD-ROM or CD-R** in duplicate, large table, or Computer Program (*Appendix*)
   - [ ] Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission** (*if applicable, items a. – c. are required*)
   - a. [ ] Computer Readable Form (CRF)
   - b. [ ] Specification Sequence Listing on:
     - i. [ ] CD-ROM or CD-R (2 copies); or
     - ii. [ ] Paper
   - c. [ ] Statements verifying identity of above copies

ADDRESS TO: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**

ACCOMPANYING APPLICATION PAPERS

10. [ ] **Assignment Papers** (cover sheet & document(s))
    Name of Assignee
11. [ ] **37 CFR 3.73(c) Statement** (*when there is an assignee*) [X] **Power of Attorney**
12. [ ] **English Translation Document** (*if applicable*)
13. [X] **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    - [ ] Copies of citations attached
14. [ ] **Preliminary Amendment**
15. [ ] **Return Receipt Postcard** (*MPEP § 503*) (*Should be specifically itemized*)
16. [ ] **Certified Copy of Priority Document(s)** (*if foreign priority is claimed*)
17. [ ] **Nonpublication Request** Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
18. [ ] **Other:**

***Note:** (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS

[X] The address associated with Customer Number: 25006 **OR** [ ] Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature	/Douglas L. Wathen/	Date	October 8, 2014
Name (Print/Type)	Douglas L. Wathen	Registration No. (Attorney/Agent)	41,369

BRP 1016

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FEE TRANSMITTAL

Complete if known	
Application Number	Not Yet Assigned
Filing Date	
First Named Inventor	Jacob Willem Langelaan
Examiner Name	Not Yet Assigned
Art Unit	N/A
Practitioner Docket No.	JWL-10002/36

[x] Applicant asserts small entity status. See 37 CFR 1.27.

[ ] Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

TOTAL AMOUNT OF PAYMENT ($) 730.00

METHOD OF PAYMENT (check all that apply) JWL-10002/36

[ ] Check [x] Credit Card [ ] Money Order [ ] None [ ] Other (please identify): _____

[ ] Deposit Account Deposit Account Number: 07-1180 Deposit Account Name: Gifford, Krass, Sprinkle, Anderson & Citkowski,

For the above-identified deposit account, the Director is hereby authorized to (check all that apply):

[ ] Charge fee(s) indicated below
[ ] Charge fee(s) indicated below, **except for the filing fee**
[x] Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17
[x] Credit any overpayment of fee(s)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)

	FILING FEES			SEARCH FEES			EXAMINATION FEES			
Application Type	U ($)	S ($)	M ($)	U ($)	S ($)	M ($)	U ($)	S ($)	M ($)	Fees Paid ($)
Utility	280	140*	70	600	300	150	720	360	180	730.00
Design	180	90	45	120	60	30	460	230	115	
Plant	180	90	45	380	190	95	580	290	145	
Reissue	280	140	70	600	300	150	2,160	1,080	540	
Provisional	260	130	65	0	0	0	0	0	0	

* The $140 small entity status filing fee for a utility application is further reduced to $70 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	Undiscounted Fee ($)	Small Entity Fee ($)	Micro Entity Fee ($)
Each claim over 20 (including Reissues)	80	40	20
Each independent claim over 3 (including Reissues)	420	210	105
Multiple dependent claims	780	390	195

Total Claims	Extra Claims	Fee ($)	Fee Paid ($)	Multiple Dependent Claims Fee ($)	Multiple Dependent Claims Fee Paid ($)
12 - 20 or HP =		x	=		

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims	Extra Claims	Fee ($)	Fee Paid ($)
1 - 3 or HP =		x	=

HP = highest number of independent claims paid for, if greater than 3.

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $400 ($200 for small entity) ($100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee ($)	Fee Paid ($)
12 - 100 =		/50 = (round **up** to a whole number) x		=

4. OTHER FEE(S)

	Fees Paid ($)
Non-English specification, $130 fee (no small or micro entity discount)	
Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small or micro entity)	
Other (e.g., late filing surcharge):	

SUBMITTED BY

Signature	/Douglas L. Wathen/	Registration No. (Attorney/Agent)	41,369	Telephone	(734) 913-9300
Name (Print/Type)	Douglas L. Wathen			Date	October 8, 2014

PTO/AIA/14 (12-13)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	JWL-10002/36
	Application Number	
Title of Invention	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Jacob	Willem	Langelaan	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	State College	State/Province	PA	Country of Residence	US

Mailing Address of Inventor:

Address 1	606 Devonshire Drive		
Address 2			
City	State College	State/Province	PA
Postal Code	16803	Country i	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	25006		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT		
Attorney Docket Number	JWL-10002/36	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	4	Suggested Figure for Publication (if any)	

Filing By Reference :

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	JWL-10002/36
	Application Number	
Title of Invention	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT	

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	25006		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Claims benefit of provisional	61889071	2013-10-10

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	JWL-10002/36
	Application Number	
Title of Invention	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT	

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	JWL-10002/36
	Application Number	
Title of Invention	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT	

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date o f filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◯ Assignee	◯ Legal Representative under 35 U.S.C. 117	◯ Joint Inventor
◯ Person to whom the inventor is obligated to assign.	◯ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	JWL-10002/36
	Application Number	
Title of Invention	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT	

Mailing Address Information For Applicant:			
Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:			
Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

PTO/AIA/14 (12-13)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	JWL-10002/36
	Application Number	
Title of Invention	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT	

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.					
Signature	/Douglas L. Wathen/			Date (YYYY-MM-DD)	2014-10-08
First Name	Douglas	Last Name	Wathen	Registration Number	41369
Additional Signature may be generated within this form by selecting the Add button.					

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

PTO/AIA/82C (07-13)
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date
Not Yet Assigned	

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

[X] I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 25006

OR

[ ] I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

[ ] The address associated with the above-mentioned Customer Number

OR

[ ] The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

[X] Inventor or Joint Inventor (title not required below)

[ ] Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

[ ] Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

[ ] Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Jacob Willem Langelaan, Ph.D.		
Title			

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

[ ] Total of 1 forms are submitted.

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [x] The attached application, or
- [ ] United States application or PCT international application number _____ filed on _____

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

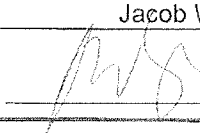
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Jacob Willem Langelaan Date (Optional) : _____

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	
	Filing Date	
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	JWL-10002/36

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5062378		1991-11-05	Bateman	
	2	3747138		1973-07-24	Morgan	
	3	7144285		2006-12-05	Hendricks	
	4	4508046		1985-04-02	Coulter et al.	
	5	7232355		2007-06-19	Woolley	
	6	7731555		2010-06-08	Railey	
	7	6702634		2004-03-09	Jung	
	8	3262413		1966-07-26	Bloomingdale et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	JWL-10002/36

	9	6192817		2001-02-27	Dec et al.	
	10	4971586		1990-11-20	Walsh	
	11	4274357		1981-06-23	Dawson	
	12	3227123		1966-01-04	Voigt	
	13	2931332		1960-04-05	Hebrank	
	14	7047901		2006-05-23	Chen	

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U.S.PATENT APPLICATION PUBLICATIONS

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	Application Number	
	Filing Date	
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	JWL-10002/36

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Signature	/Douglas L. Wathen/	Date (YYYY-MM-DD)	2014-10-08
Name/Print	Douglas L. Wathen	Registration Number	41369

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WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to U.S. Provisional Patent Application Serial No. 61/889,071, filed October 10, 2013, the contents of which are incorporated herein in their entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to personal watercraft; specifically, an electrically powered hydrofoil surfboard that is controlled by weight shift.

BACKGROUND OF THE INVENTION

[0003] Hydrofoils have been used on surfboards (U.S. Patent No. 5,062,378 A, Bateman; U.S. Patent 3,747,138, Morgan; U.S. Patent 7,144,285 B1, Tareah), sailboards (U.S. Patent 4,508,046 Shannon), water skis (U.S. Patent 7,232,355, Woolley), and devices for swimmers (U.S. Patent 2,931,332, Hebrank) as well as ships and boats (e.g. U. S. Patent 3,227,123 A Voigt). The purpose of hydrofoils on surfboards is typically to enable higher speeds and to lift the surfboard above the choppy, turbulent surface of the water, thus enabling surfing on larger waves. On sailboards and kiteboards, hydrofoils enable higher speeds; and on water skis hydrofoils enable new forms of trick skiing.

[0004] Powered surfboards have been developed for reducing the effort required in paddling (U.S. Patent No. 7,731,555 B2 Railey) and as personal watercraft (U.S. Patent No. 6,702,634 B2 Jung, U.S. Patent No. 3,262,413 A Bloomingdale et al., U.S. Patent 6,192,817 B1 Dec, U. S. Patent 4,971,586 A Walsh, U. S. Patent 4,274,357 A Dawson). A particularly well-designed example of this type is the Jet-Surf (http://www.jet-surf.es). However, significant power is required to achieve speeds typical of surfing (up to ten horsepower to achieve thirty miles per hour), precluding the use of battery-powered motors for operationally useful periods.

[0005] A major factor that distinguishes surfboards from other watercraft is that control (both speed and directional) is affected via weight shift rather than by moveable surfaces (such as rudders) or thrust vectoring. Indeed, other methods of transport (skateboards and snowboards) also rely heavily on weight shift, and this method of control is central to the experience of surfing, snowboarding, and skateboarding.

[0006] An electrically powered hydrofoil device is described in Chen (U.S. Patent 7,047,901 B2). The watercraft in that disclosure has two main disadvantages. First, the device in Chen requires a stabilizing component that controls the depth of the hydrofoil. Second, a steering mechanism is used for directional control. Therefore it does not (and cannot) accurately mimic the experience of surfing or snow boarding.

[0007] A need therefore exists for a personal watercraft that provides improved control and performance while providing a "surfing feel." In addition, this personal watercraft should be mechanically simple, easy to transport, and easy to maintain.

SUMMARY OF THE INVENTION

[0008] Embodiments of the present invention improve upon the powered surfboard by incorporating a hydrofoil. The hydrofoil greatly reduces the power required to travel at "fun" speeds (ranging from twenty to thirty miles per hour, but can be higher or lower depending on the user), so that a battery-powered electric motor (rather than an internal combustion engine) can be used to power the propulsion system. This results in reduced noise and vibration as well as reduced environmental impact.

[0009] Embodiments of the present invention also improve upon the powered hydrofoil surfboard. The hydrofoil of the present invention has been designed to provide passive stability in the longitudinal direction, making traditional altitude control systems based on moveable surfaces unnecessary. Further, both longitudinal and directional control of the board is via weight shift, so that riding the board is similar in feel to surfing or snowboarding, and the lack of a mechanical steering system makes the craft lighter, reduces parts count, and reduces the likelihood of a mechanical failure. Speed control is provided through a combination of throttle and weight shift.

[00010] The prior art in powered hydrofoil surfboards have all relied on moveable surfaces for control, and have ignored the possibility of designing the hydrofoil for passive static stability. The watercraft of the present invention is specifically designed to achieve desired levels of stability and controllability without the need for moveable surfaces. This is done through a combination of airfoil design, planform design, and tailoring the span-wise twist distribution to achieve desired outcomes.

[00011] Specific hydrofoils can be designed for different purposes: a larger foil results in lower speeds, more suitable for training; smaller foils operate at higher speeds for more advanced user; and tuning of the specific profile, twist, and dihedral can also be used to tailor the board to the user. A fixed canard or horizontal tail surface can also be added to further improve passive longitudinal stability as a

training aid while still requiring the use of weight shift for control. A fixed vertical tail can be added to improve lateral stability as a training aid while still requiring the use of weight shift for control.

BRIEF DESCRIPTION OF THE DRAWINGS

[00012] FIG. 1 is a perspective view of a personal hydrofoil watercraft in accordance with the present invention;

[00013] FIG. 2 is an exploded perspective view showing one embodiment of the hydrofoil and propulsion system assembly;

[00014] FIG. 3 is a perspective view from underneath a personal hydrofoil watercraft in accordance with the present invention;

[00015] FIG. 4 is an exploded perspective view showing an alternate embodiment of the hydrofoil and propulsion system assembly;

[00016] FIG. 5 is a perspective view from underneath a personal hydrofoil watercraft with the hydrofoil and propulsion system of Fig. 4;

[00017] FIG. 6 is a perspective view of an embodiment of the hydrofoil and propulsion system as an integrated body;

[00018] FIG. 7 is a perspective view from underneath a personal hydrofoil watercraft with the hydrofoil and propulsion system of Fig. 6;

[00019] FIG. 8 shows perspective views of alternate examples of hydrofoil planform designs;

[00020] FIG. 9 is a schematic illustrating hydrofoil flow definitions; and

[00021] FIG. 10 is a schematic showing hydrofoil geometry parameters

DETAILED DESCRIPTION OF THE INVENTION

[00022] Referring to FIG. 1, a perspective view of a hydrofoil watercraft 100 in accordance with an embodiment of the present invention is shown. Watercraft 100 may include a flotation board 101, a hydrofoil 102 spaced below the flotation board, a strut 103 connecting the hydrofoil to the board, a propulsion system 104, an electric motor 105, a battery 106, a motor speed controller 107, a throttle system 108, a throttle interface 109, and a spring-loaded trigger 110.

[00023] The flotation board 101 of FIG. 1 is similar to those used in surfing or sailboarding. In the illustrated embodiment, the flotation board has a fore-aft length L that is greater than its lateral width

W. Generally, the ratio of lateral width W to length L may be between 0.2 and 0.5. The length L will generally be in the range of 5 to 8 feet and the width W will generally be in the range of 1.5 to feet. The primary function of the flotation board is to provide flotation at low speeds, and it is preferentially configured with a flat upper surface to allow an adult human to lie prone, sit, kneel or stand on it and an opposed bottom surface facing the water. The lower surface may be almost flat to permit good hydroplaning.

[00024] The flotation board 101 can be made of foam, fiber-reinforced epoxy (using glass, carbon, or Kevlar fibers), or other suitable materials known to those of skill in the art. It may have a watertight compartment defined therein to contain the battery 106, motor speed controller 107 and throttle interface 109. The flotation board 101 provides an attachment structure for attaching the strut 103. The attachment structure may be a releasable mechanism to permit easy assembly and dis-assembly for transport. The flotation board 101 may be said to have a forward section F at the front end, a rear section R at the rear end and a middle section M intermediate the front and rear ends. Element M may also represent a midpoint that is halfway between the front and rear ends. As shown, the strut 103 is connected to the flotation board between the middle section M and the rear section R. The connection is behind the midpoint M and centered side to side. A throttle cable may connect the throttle module 108 to the throttle interface 109 or wireless communication may be provided between the throttle module 108 and throttle interface 109. In an alternate arrangement, the batteries 106 may be contained in the strut 103 or embedded in the hydrofoil 102. Each configuration has advantages and disadvantages ranging from ease of access for charging (in the case of a compartment in the flotation board) to reduction in the length of wires needed to connect the battery to the motor (in the case of containment in the strut or hydrofoil).

[00025] The strut 103 can be made of extruded aluminum, fiber-reinforced epoxy (using glass, carbon, or Kevlar fibers), or other suitable materials known to those of skill in the art. As shown, the strut is streamlined in cross-section to minimize drag. The strut may be constructed so as to allow passage of electrical wires from the motor speed controller 107 to the electric motor 105, such as inside or attached to the strut. The primary function of the strut is to rigidly connect the hydrofoil 102 at a fixed distance H from the board 101. The distance H will generally be in the range of 1 to 4 feet. In an alternative embodiment, more than one strut may be used or the strut may be shaped differently than shown.

[00026] The hydrofoil 102 of FIG. 1 is specifically designed to be statically stable in the longitudinal degrees of freedom via a combination of airfoil design, planform design and span-wise twist distribution. The hydrofoil 102 has a wingspan S (see Fig. 2). The wingspan will generally be in the

range of 1 to 4 feet. It is also designed to be stable in sideslip ("weathercock stability") either via planform design or via the addition of small vertical foils (winglets or fins). In some cases it may be advantageous to add a fixed canard or horizontal tail to further enhance static longitudinal stability (for example, for training purposes). The fixed distance H (see Fig. 2) of the strut 103 may be greater than the wingspan S of the hydrofoil 102 so that the hydrofoil remains fully submerged even when the user is leaning to turn.

[00027] The propulsion system 104 (discussed in more detail below) may comprise a ducted propeller or pump-jet, or may be of another type. The propulsion system is driven by the electric motor 105.

[00028] The electric motor 105 is connected to the motor speed controller 107 using wires sized to carry the required voltage and current. The motor speed controller 107 may include other functionality such as a low-voltage alarm or other protective circuitry for the battery 106; alternately, such circuitry may be included in the throttle interface 109. The main function of the throttle interface is to connect the motor speed controller 107 to the throttle module 108.

[00029] The throttle module 108 may be a hand-held device with a spring-loaded trigger 110 (so the throttle disengages automatically when it is released). Pulling or depressing the trigger causes the motor to turn a propeller or impeller in the propulsion system 104, with motor speed being proportional to the degree the trigger is pulled or depressed. The throttle module communicates the degree of trigger pull/depression to the throttle interface 109 via a cable or wirelessly. The throttle module may take other forms, such as being operated by other body parts.

[00030] The throttle interface 109 may in addition include circuitry and connections to permit charging of the battery 106. This would include battery protection circuits. The throttle interface may also include a means to display battery information to the user (for example, via LEDs to indicate charge state). Alternately, such information may be displayed on the throttle module 108.

[00031] To operate the watercraft 100, a user initially lies prone on the flotation board 101. The throttle is engaged, causing the craft to accelerate. As the craft gains speed the user may move to a kneeling or standing position. As the craft further gains speed the hydrofoil generates sufficient lift to raise the board above the water. The user controls altitude of the board by leaning back (to go up) and forward (to go down). The user can steer left or right by leaning in the appropriate direction. Releasing the throttle causes the motor to stop, reducing speed. The watercraft 100 may have other safety devices

and features which causes the electric motor 105 to stop when the rider falls off the flotation board 101. These devices may monitor the presence of a user on the flotation board 101.

[00032] FIG. 2 shows an exploded perspective view of one embodiment of the hydrofoil 102, strut 103, propulsion system 104, and electric motor 105. The electric motor 105 and propulsion system104 are integrated into a waterproof, streamlined pod 201 that is designed to be embedded in the hydrofoil 102. The pod 201 also defines the lower end of the strut 103. The streamlined pod performs two main structural functions: it transmits propulsion forces to the strut 103 and it transmits lift forces from the hydrofoil 102 to the strut 103. It may also contain provisions for cooling the electric motor 105. The pod 201 is connected to the hydrofoil 102 either by a fitting (so that the hydrofoil can be easily removed) or it is integrally manufactured with the hydrofoil 102.

[00033] In its preferential form the electric motor 105 is a high efficiency brushless motor. A gearbox may be provided to ensure that the propeller or impeller of the propulsion system 104 operates over an appropriate range of speeds.

[00034] The strut 103 contains at its upper end a fitting 202 to attach the strut to the flotation board 101 of FIG 1. This fitting fits into a complementary slot in flotation board 101 and may use one of several methods to attach the strut 103 to the flotation board 101: examples include bolts, pins, or latches. Any other attachment approach may be used, or the strut and/or foil and/or flotation board may be integrally formed or permanently interconnected.

[00035] FIG. 3 shows a perspective view of the watercraft 100 from below. In its preferred form the propulsion system 104 comprises a propeller 104a and a duct 104b. The duct has two purposes: it acts as a propeller guard and it is designed to increase propeller thrust. In an alternate form the propulsion system may comprise a pump-jet.

[00036] FIG. 4 shows an exploded perspective view of an alternative embodiment of the hydrofoil 102, strut 103, electric motor 105 and propulsion system 401. In this embodiment the propulsion system comprises a long duct and may contain a stator assembly. The duct functions both as a guard for the propeller (shown in FIG 3) and to improve hydrodynamic efficiency. A stator (not shown) aft of the propeller can also be included to improve propulsive efficiency. In this embodiment the electric motor 105 is enclosed in a streamlined pod embedded in the propulsion system. In the embodiment of FIG. 4, the propulsion system is mounted below the hydrofoil 102. FIG. 5 shows a perspective view of the watercraft 100 from below with the propulsion system 401 mounted below the hydrofoil 102.

[00037] FIG. 6 shows a perspective view of an alternative embodiment of the hydrofoil 102, strut 103, and propulsion system 601. In this embodiment the propulsion system is integrated in the hydrofoil so that the inlet is at or near the forward (leading) edge of the hydrofoil and the outlet is at or near the rear (trailing) edge of the hydrofoil. As in the embodiments of FIG. 2, FIG. 3, FIG. 4 and FIG. 5, the propulsion system comprises a duct, a propeller, electric motor, and may include a stator.

[00038] FIG. 7 shows a perspective view of the watercraft 100 from below with the propulsion system of FIG. 6 integrated in the hydrofoil.

[00039] FIG. 8 shows perspective views of alternative embodiments of the hydrofoil planform. Hydrofoil 801 includes a fixed canard that increases stability (suitable for training). Note that this canard is fixed, not movable: control still occurs through weight shift. Hydrofoil 102 is shown in earlier drawings, and can be considered a baseline "all around" hydrofoil (suitable for a wide range of abilities). Foils 802 and 803 are progressively higher performance, permitting higher speeds and/or greater maneuverability. Foil 803 includes winglets, which increase directional stability and decrease drag. Foil 804 includes a horizontal tail, which improves longitudinal stability (similar to 801, it is suitable for training). Foil 805 includes both a horizontal tail and a vertical tail, improving longitudinal stability and directional stability (suitable for training). These tails may be considered a secondary hydrofoil. Note that other versions of the hydrofoil are possible: the key is designing the hydrofoil for passive static stability via planform design, airfoil design, and span-wise twist distribution.

[00040] Preferred embodiments of the present invention provide a hydrofoil watercraft with a fixed hydrofoil connected to a flotation board by one or more struts, with the fixed hydrofoil having no movable or adjustable surfaces. No movable hydrofoil is provided, but secondary hydrofoils on one or more struts (as shown in 801, 804, and 805) may be included. Additionally, no movable steering system is provided, as the watercraft is maneuvered by weight shifts.

[00041] This invention exploits passive stability to obviate the necessity for mechanisms or active control systems to provide stability. This passive stability allows the watercraft to be controlled by weight shift rather than by mechanical systems. Fig. 9 and Fig. 10 show the hydrofoil flow definitions and hydrofoil geometry parameters respectively. For the hydrofoil, longitudinally trimmed motion occurs when the total pitching moment is zero. This trim condition is stable if a disturbance results in a restoring moment that returns the hydrofoil to its original condition. The pitching moment coefficient can be written as $C_m = C_{m0} + C_{m_\alpha}\alpha + C_{m_Q}Q$ where C_{m0} is the pitching moment coefficient at zero angle of attack

and zero pitch rate, C_{m_α} is the derivative of pitching moment coefficient with respect to angle of attack (called pitch stiffness), α is the angle of attack (the angle between the flow direction and the chord of the hydrofoil), C_{m_Q} is the derivative of pitching moment coefficient with respect to pitch rate (called pitch damping), and Q is the pitch rate. To ensure a trimmable, stable hydrofoil, the following conditions must be true: $C_{m0} > 0$, $C_{m_\alpha} < 0$, $C_{m_Q} < 0$. This is achieved with a combination of airfoil selection, hydrofoil sweep and span-wise twist. The exact ratios of wing sweep and twist are dependent on the degree of stability desired and are also affected by the pitching moment characteristics of the airfoil. The derivative C_{m_Q} determines the "quickness" of the longitudinal response. Typically it will lie between -2 and -20, with more negative values leading to a "sluggish" feel. In the steady state (when $Q = 0$) the angle of attack (and thus speed) at which trim occurs is a function of C_{m0} and C_{m_α}.

$$\alpha_{trim} = -\frac{C_{m0}}{C_{m_\alpha}}$$

C_{m0} is defined entirely by hydrofoil design parameters; C_{m_α} is defined by a combination of hydrofoil design parameters and the location of the center of gravity: this is the means by which weight shift enables longitudinal control of the hydrofoil watercraft.

[00042] Similarly for lateral motion, trim occurs when the yawing moment and rolling moment are zero. It is further desirable that this occurs at zero sideslip angle, so the hydrofoil "tracks straight" through the water. When the yaw rate is zero, rolling moment coefficient and yawing moment coefficient can be written as

$$C_l = C_{l0} + C_{l_\beta}\beta + C_{l_P}P$$
$$C_n = C_{n0} + C_{n_\beta}\beta + C_{n_P}P$$

where C_{l0} and C_{n0} are the roll rate and yaw rate at zero slideslip, respectively, C_{l_β} and C_{n_β} are the derivatives of roll rate and yaw rate with respect to sideslip angle, respectively, C_{l_p} and C_{n_p} are the derivatives of roll rate and yaw rate with respect to roll rate, respectively. Note that C_{n_β} is sometimes called weathercock stiffness and C_{l_p} is sometimes called roll damping. Trimmable, stable motion at zero sideslip is achieved by ensuring that the following conditions are true:

$$C_{l0} = 0$$
$$C_{n0} = 0$$

$$C_{l_\beta} < 0$$
$$C_{n_\beta} > 0$$

$$C_{l_p} < 0$$

This is achieved through a combination of sweep and dihedral and can also be influenced with the addition of winglets or a fin. The practical upper limit of C_{n_β} and practical lower limits of C_{l_β} and C_{l_p} are determined by the practicality of hydrofoil design. For example, sweep angles greater that 60 degrees are unlikely to lead to useable designs and twist of greater than 15 degrees is unlikely to lead to useable designs. Given these geometric limits and the subjective judgment of "ride quality" on the part of a user, bounds on the roll and yaw derivatives exist but are not quantifiable to a useful degree of precision.

[00043] Directional control is achieved by the weight shift and the weathercock stability stiffness. Shifting weight to one side causes the watercraft to roll to that side; this causes sideslip in the direction of the weight shift, and the C_{n_β} term causes the vehicle to turn in the direction of the lean. It should be noted that there is a trade-off between stability and maneuverability. More experienced users generally want a watercraft that is somewhat less stable to provide greater maneuverability. In contrast, less experienced users may want a watercraft that has more stability, and this may be done through appropriate design of the hydrofoil to give the desired stability and maneuverability characteristics.

[00044] As will be clear to those of skill in the art, the herein described embodiments of the present invention may be altered in various ways without departing from the scope or teaching of the present invention. It is the following claims, including all equivalents, which define the scope of the invention.

[00045] I claim:

CLAIMS

1. A passively stable, weight-shift controlled personal hydrofoil watercraft, comprising:

a flotation device that has a fore-aft length greater than a lateral width, the floating device having a top surface and a bottom surface, wherein a user can be disposed on the top surface of the floating device in a prone, kneeling, or standing position, the floatation device having a forward section, a middle section, and a rear section;

a strut having a upper end and a lower end, the upper end fixedly interconnected with the flotation device between the middle section and the rear section of the floating device;

a hydrofoil fixedly interconnected with the lower end of the strut, the hydrofoil having no movable surface;

a propulsion system for propelling the watercraft in a body of water, wherein the propulsion system is connected to the hydrofoil; and

the watercraft having no movable steering system.

2. A watercraft in accordance with claim 1, wherein the propulsion system comprises a battery, an electric motor, a motor speed controller, and a propulsor, the propulsor selected from a propeller, a ducted propeller, or a pump-jet.

3. A watercraft in accordance with claim 2, wherein the propulsor is disposed below the hydrofoil.

4. A watercraft in accordance with claim 1, wherein the propulsion system is integrated in the hydrofoil and has an inlet near a leading end of the hydrofoil and an outlet near a trailing edge of the hydrofoil.

5. A watercraft in accordance with claim 1, further comprising a fixed vertical tail connected to the hydrofoil.

6. A watercraft in accordance with claim 1, further comprising a fixed horizontal tail connected to the hydrofoil.

7. A watercraft in accordance with claim 1, further comprising a canard that extends forwardly of the hydrofoil, wherein the canard is fixedly connected with the hydrofoil.

8. A watercraft in accordance with claim 1, further comprising a tail that extends rear of the hydrofoil, wherein the tail is fixedly connected with the hydrofoil.

9. A watercraft in accordance with claim 1, wherein the hydrofoil is a generally flat wing having a curved front edge.

10. A watercraft in accordance with claim 1, wherein the hydrofoil includes winglets.

11. A watercraft in accordance with claim 1, further comprising a secondary hydrofoil that extends forwardly of the hydrofoil, wherein the secondary hydrofoil is fixedly connected with the hydrofoil.

12. A watercraft in accordance with claim 1, further comprising a secondary hydrofoil that extends rear of the hydrofoil, wherein the secondary hydrofoil is fixedly connected with the hydrofoil.

ABSTRACT

A passively stable personal hydrofoil watercraft that has a floation device, wherein a user can ride in a prone, kneeling, or standing position. The watercraft includes a strut having an upper end interconnected with the flotation device and lower end connected with a hydrofoil. The hydrofoil greatly reduces the power required to travel at higher speed. The watercraft also includes a propulsion system connected to the hydrofoil. Both longitudinal and directional control of the watercraft is via weight shift, eliminating the need of any movable surfaces. The floation device, strut, and hydrofoil may be permanently interconnected or may be detachable.

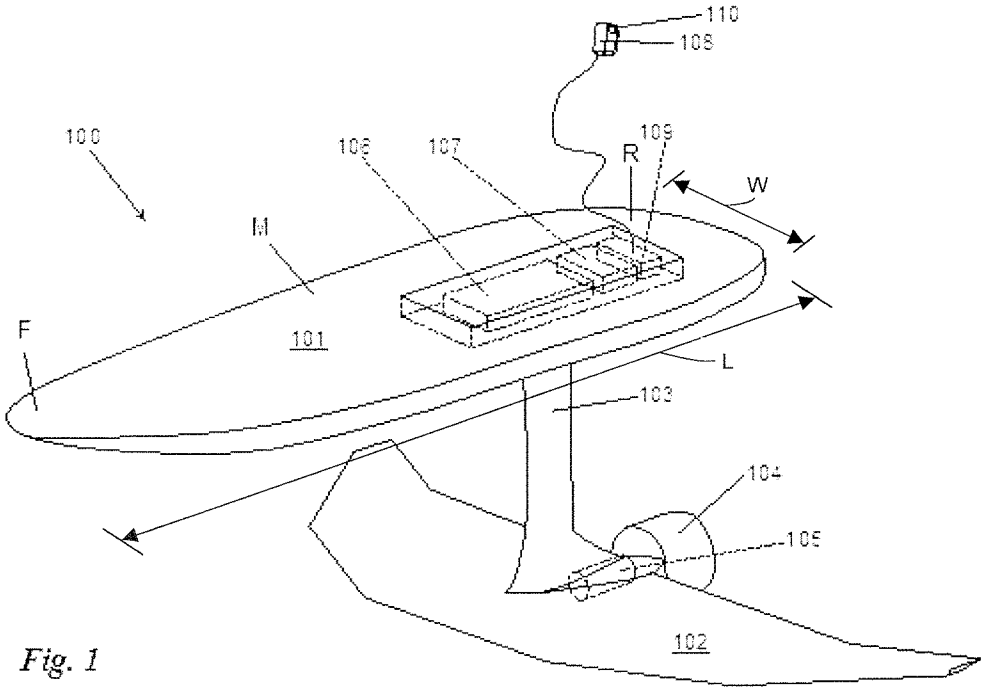

110
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Fig. 1

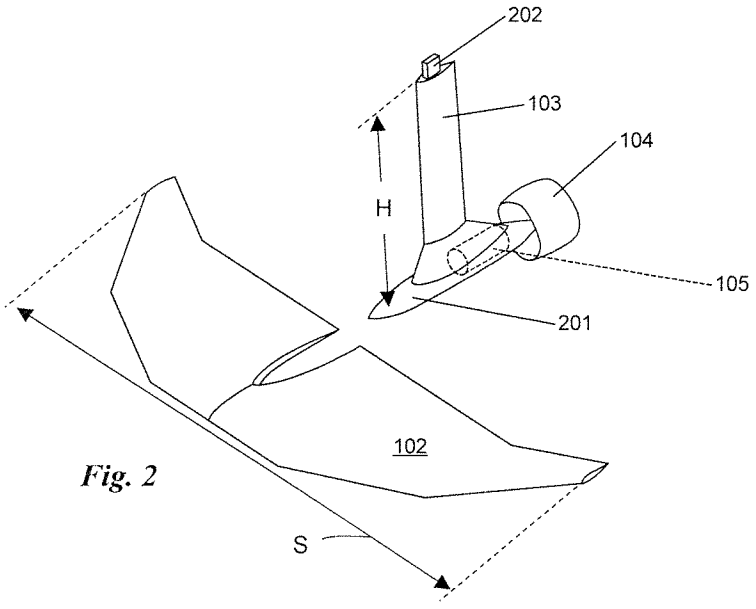

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Fig. 2

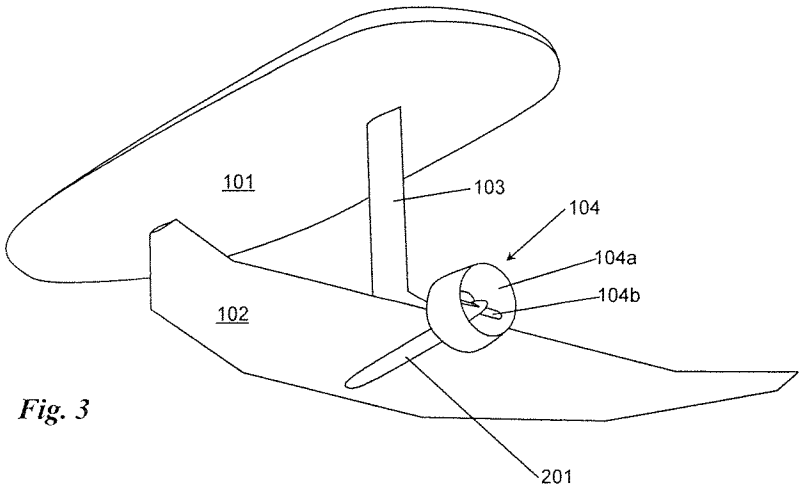


Fig. 3

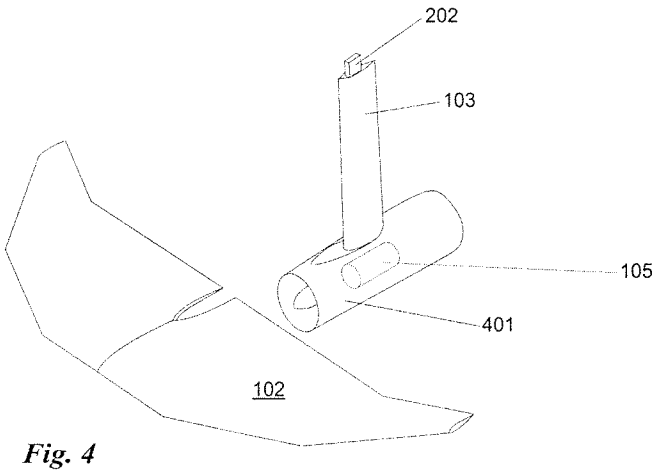


Fig. 4

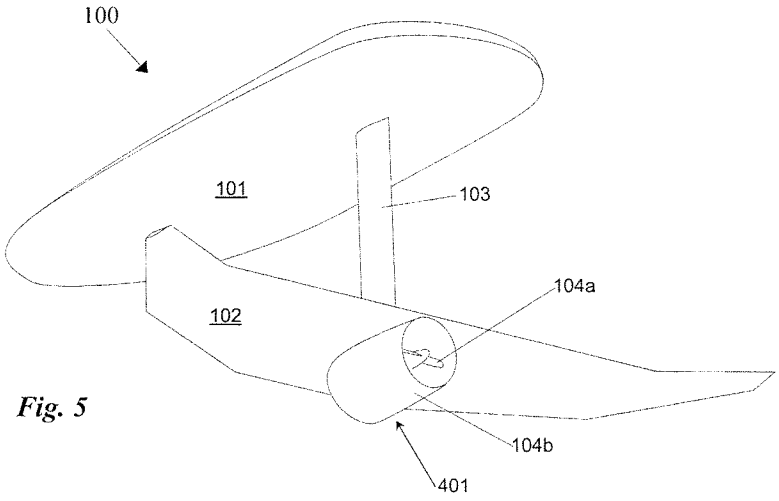


Fig. 5

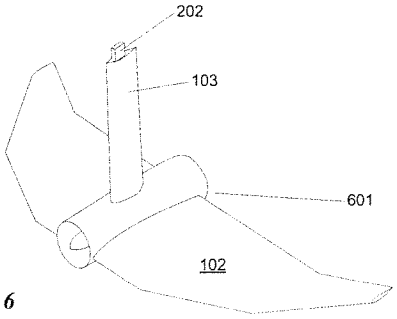


Fig. 6

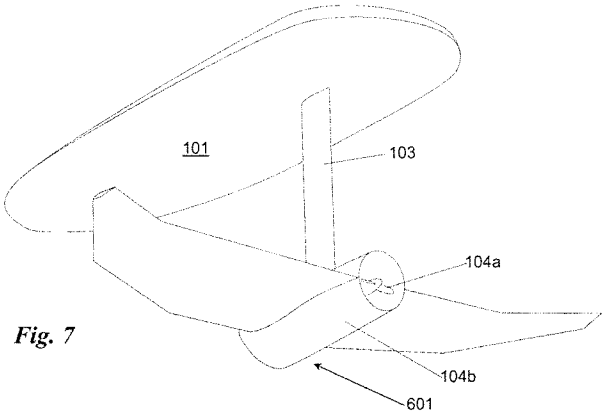


Fig. 7

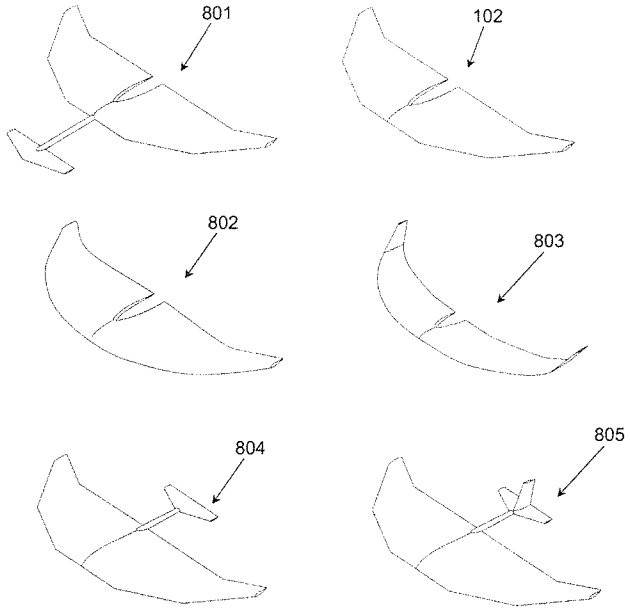


Fig. 8

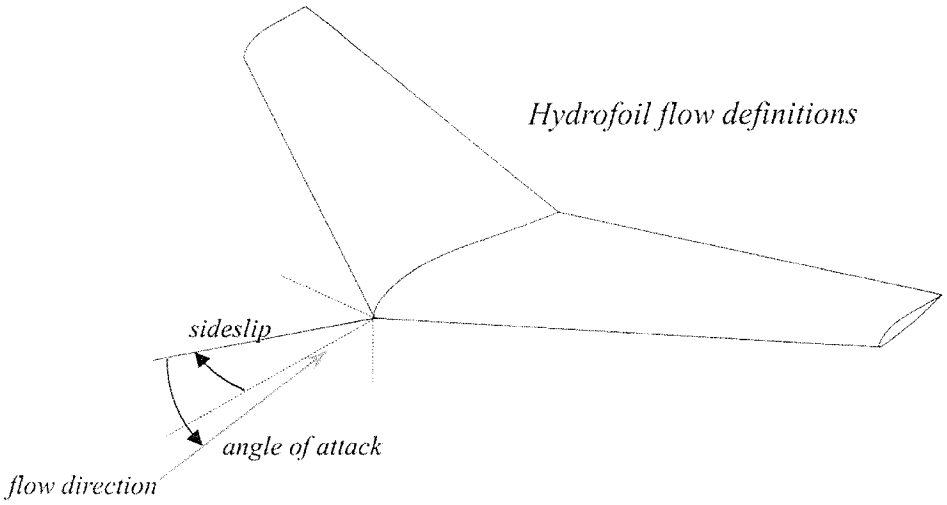

Hydrofoil flow definitions
sideslip
angle of attack
flow direction

Fig. 9

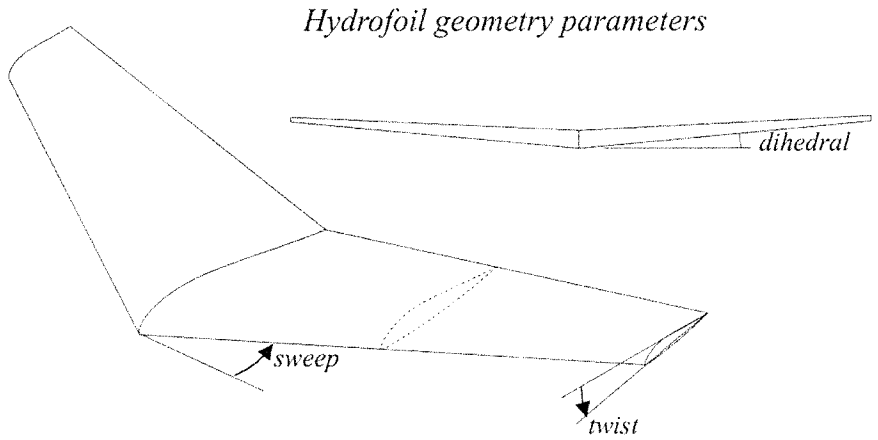

Hydrofoil geometry parameters
dihedral
sweep
twist

Fig. 10

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
First Named Inventor/Applicant Name:	Jacob Willem Langelaan
Filer:	Douglas Lessel Wathen/Ann Andrusiak
Attorney Docket Number:	JWL-10002/36

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	70	70
Utility Search Fee	2111	1	300	300
Utility Examination Fee	2311	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**730**

Electronic Acknowledgement Receipt

EFS ID:	20361183
Application Number:	14509289
International Application Number:	
Confirmation Number:	2924
Title of Invention:	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
First Named Inventor/Applicant Name:	Jacob Willem Langelaan
Customer Number:	25006
Filer:	Douglas Lessel Wathen/Ann Andrusiak
Filer Authorized By:	Douglas Lessel Wathen
Attorney Docket Number:	JWL-10002/36
Receipt Date:	08-OCT-2014
Filing Date:	
Time Stamp:	13:42:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$730
RAM confirmation Number	9902
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1		doc00039520141008123255.pdf	1825764 982440a08dc46709fee64bb883e989703d9465d3	yes	31

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Transmittal of New Application	1	1
Transmittal Letter	2	2
Application Data Sheet	3	8
Power of Attorney	9	9
Oath or Declaration filed	10	10
Information Disclosure Statement (IDS) Form (SB08)	11	15
Specification	16	24
Claims	25	26
Abstract	27	27
Drawings-only black and white line drawings	28	31

Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32893 ffb566998b16cdf20f251a124e70f1dc7e0e0e2c	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1858657		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/509,289

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	12 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	730		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/509,289	10/08/2014	3617	730	JWL-10002/36	12	1

CONFIRMATION NO. 2924

25006
GIFFORD, KRASS, SPRINKLE,ANDERSON & CITKOWSKI, P.C
PO BOX 7021
TROY, MI 48007-7021

FILING RECEIPT

OC000000071341047

Date Mailed: 10/16/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Jacob Willem Langelaan, State College, PA;

Applicant(s)

Jacob Willem Langelaan, State College, PA;

Power of Attorney: The patent practitioners associated with Customer Number 25006

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/889,071 10/10/2013

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 10/14/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/509,289**

Projected Publication Date: 04/16/2015

Non-Publication Request: No

Early Publication Request: No
** **SMALL ENTITY** **

Title

WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

Preliminary Class

114

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/509,289	10/08/2014	Jacob Willem Langelaan	JWL-10002/36

CONFIRMATION NO. 2924

25006
GIFFORD, KRASS, SPRINKLE,ANDERSON & CITKOWSKI, P.C
PO BOX 7021
TROY, MI 48007-7021

PUBLICATION NOTICE

OC000000074645284

Title:WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

Publication No.US-2015-0104985-A1
Publication Date:04/16/2015

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	10/08/2014	Jacob Willem Langelaan	JWL-10002/36	2924

25006 7590 08/17/2015

GIFFORD, KRASS, SPRINKLE,ANDERSON & CITKOWSKI, P.C
PO BOX 7021
TROY, MI 48007-7021

EXAMINER	
HAYES, JOVON E	

ART UNIT	PAPER NUMBER
3617	

NOTIFICATION DATE	DELIVERY MODE
08/17/2015	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket@patlaw.com

Office Action Summary	Application No. 14/509,289	Applicant(s) LANGELAAN, JACOB WILLEM	
	Examiner JOVON HAYES	Art Unit 3617	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/8/14*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-12* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-12* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *10/8/14* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *10/8/14*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

1. This is a first action on the merits of application 14509289.

2. Claims 1-12 are pending.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102 of this title, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-4, 7 and 9 are rejected under 35 U.S.C. 103 as being unpatentable over Kelsey (US 6019059) and further in view of Chen (7047901).**

5. As per claim 1, Kelsey discloses the limitations of a surfboard 30 (flotation device) having a forward, middle and rear section, and a strut 26 and a hydrofoil 22, see fig. 1a. He does not disclose that the hydrofoil has a propulsion system connected to it. Chen discloses a motorized surfboard with a strut, hydrofoil and propulsion system connected to the hydrofoil, see fig. 1. In view of the above disclosures, it would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to have combined the disclosures to attain the applicants' invention of a motorized surfboard wherein the propulsion system was part of the hydrofoil thus making the speed at which the user can travel increased.

6. As per claim 2, Chen discloses Craft 10 may include a board 12, a hydro foil or wing 14, a motor 16, a battery or other power source 20, and a propeller 22 in fig. 1, examiner notes though not explicitly stated in the reference motor controllers are well known in the art to vary the speed of the board and the throttle is the controller for the motor.

7. As per claim 3, Chen discloses the propulsor is at the same level as the hydrofoil and not below.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to place the propulsor below the hydrofoil, since it has been held that rearranging parts of an invention involves only routine skill in the art. In re Japikse, 86 USPQ 70. Please note that in the instant application, applicant has not disclosed any criticality for the claimed limitation. LOCATION OF PARTS: MPEP 2144.04 (VI-C).

8. As per claim 4, Chen discloses the propulsion system is integrated in the hydrofoil and has an inlet near a leading end of the hydrofoil and an outlet near a trailing edge of the hydrofoil, see figs. 1-2.

9. As per claim 7, Chen discloses in fig. 1 a surfboard with another hydrofoil that has a forwardly fixed connected canard.

10. As per claim 9, the claims states the hydrofoil is generally flat which Kelsey and Chen disclose but they do not disclose that the hydrofoil has a curved front edge, examiner takes notice that the limitation is of ordinary skill in the art and well known, and is just a mere design choice and actually shown in the Woolley reference.

11. **Claims 5-6, 8 and 11-12 are rejected under 35 U.S.C. 103 as being unpatentable over Kelsey (US 6019059) and further in view of Chen (7047901) and Woolley (US 7232355).**

12. As per claim 5, 6 and 8, Kelsey and Chen disclose the aforementioned limitations of claim 1; they do not disclose the hydrofoil has a vertical or horizontal tail connected to it. Woolley discloses the limitations of a hydrofoil with a vertical and horizontal tail, see figs. 35 and 39. In view of the above disclosures, it would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to have combined the disclosures to attain the said hydrofoil limitations to provide increased stability to the surfboard. REVERSAL OF PARTS: MPEP 2144 (VI-A)

13. As per claim 11-12, Kelsey and Chen disclose the aforementioned limitations of claim 1, they do not disclose the hydrofoil has a secondary hydrofoil. Woolley discloses the limitations of a hydrofoil with a vertical and horizontal tail (secondary hydrofoil), see figs. 35 and 39 at the rear but not at the front but having them in the front is just a rearrangement. It would have been obvious to one having ordinary skill in the art at the time the invention was made to reverse the parts, since it has been held that a mere reversal of the essential working parts of a device involves only routine skill in the art. In re Einstein, 8 USPQ 167. Please note that in the instant application, applicant has not disclosed any criticality for the claimed limitations.

14. **Claim 10 is rejected under 35 U.S.C. 103 as being unpatentable over Kelsey (US 6019059) and further in view of Chen (7047901) and Dansie (US 7832349).**

15. As per claim 10, Kelsey and Chen disclose the aforementioned limitations of claim 1, they do not disclose the hydrofoil has winglets. Dansie discloses the limitation of a hydrofoil with winglets 54 in fig. 2.

In view of the above disclosures, it would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to have combined the disclosures to attain the said hydrofoil limitations to provide increased stability to the surfboard.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOVON HAYES whose telephone number is (571)272-3115. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samuel (Joe) Morano can be reached on 5712726684. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOVON HAYES/
Examiner, Art Unit 3617

/Lars A. Olson/
Primary Examiner, Art Unit 3617

Notice of References Cited	Application/Control No. 14/509,289	Applicant(s)/Patent Under Reexamination LANGELAAN, JACOB WILLEM	
	Examiner JOVON HAYES	Art Unit 3617	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-3,265,027 A	08-1966	BROWN ARTHUR E et al.	114/278
*	B	US-3,405,677 A	10-1968	SMITH ROBERT C	114/55.53
*	C	US-5,809,926 A	09-1998	Kelsey, Kevin	114/274
*	D	US-6,019,059 A	02-2000	Kelsey, Kevin R	114/274
*	E	US-6,178,905 B1	01-2001	Dynes et al.	114/55.54
*	F	US-6,409,560 B1	06-2002	Austin, Shawn M.	441/74
*	G	US-2002/0124783 A1	09-2002	Dynes, Richard	114/55.54
*	H	US-2005/0109258 A1	05-2005	Smith, Timothy D.	114/274
*	I	US-7,047,901 B2	05-2006	Chen, Shane	114/281
*	J	US-7,232,355 B2	06-2007	Woolley, Robert C.	441/65
*	K	US-2007/0245943 A1	10-2007	Rice, Mark Shipley	114/272
*	L	US-7,731,555 B2	06-2010	Railey, Mike R.	441/74
*	M	US-2010/0167605 A1	07-2010	Schultz et al.	440/67

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 14/509,289	Applicant(s)/Patent Under Reexamination LANGELAAN, JACOB WILLEM	
	Examiner JOVON HAYES	Art Unit 3617	Page 2 of 2

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-7,832,349 B2	11-2010	Dansie, Stephen W.	114/361
*	B	US-2010/0323568 A1	12-2010	CHAMBERS, Tucker C.	441/79
*	C	US-7,854,637 B2	12-2010	Schultz et al.	440/67
*	D	US-2015/0104985 A1	04-2015	Langelaan, Jacob Willem	440/6
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14509289	LANGELAAN, JACOB WILLEM
	Examiner	Art Unit
	JOVON HAYES	3617

CPC- SEARCHED		
Symbol	Date	Examiner
b63b1/248	8/10/2015	jh

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
441	74, 79	8/10/2015	jh

SEARCH NOTES		
Search Notes	Date	Examiner
conducted class and text search.	8/10/2015	jh

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/JOVON HAYES/ Examiner.Art Unit 3617	

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Jacob Willem Langelaan
Art Unit	N/A
Examiner Name	Not Yet Assigned
Attorney Docket Number	JWL-10002/36

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5062378		1991-11-05	Bateman	
	2	3747138		1973-07-24	Morgan	
	3	7144285		2006-12-05	Hendricks	
	4	4508046		1985-04-02	Coulter et al.	
	5	7232355		2007-06-19	Woolley	
	6	7731555		2010-06-08	Railey	
	7	6702634		2004-03-09	Jung	
	8	3262413		1966-07-26	Bloomingdale et al.	

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	JWL-10002/36

	9	6192817		2001-02-27	Dec et al.	
	10	4971586		1990-11-20	Walsh	
	11	4274357		1981-06-23	Dawson	
	12	3227123		1966-01-04	Voigt	
	13	2931332		1960-04-05	Hebrank	
	14	7047901		2006-05-23	Chen	

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	JWL-10002/36

	1							☐

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

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EXAMINER SIGNATURE

Examiner Signature	/Jovon Hayes/	Date Considered	08/10/2015

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	JWL-10002/36

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☒ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☒ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Douglas L. Wathen/	Date (YYYY-MM-DD)	2014-10-08
Name/Print	Douglas L. Wathen	Registration Number	41369

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	26	("0857951" | "2593806" | "2931332" | "3456613" | "3465704" | "3650234" | "3722450" | "4349340" | "4711195" | "4972792" | "5083948" | "5117776" | "5136961" | "5362264" | "5413066" | "5448963" | "5471942" | "6178905" | "6409560" | "6468118").PN. OR ("7047901").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/10 08:38
L5	0	("2007/0245943").URPN.	USPAT	OR	OFF	2015/08/10 08:42
L8	5	"440"/ and (surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:44
L9	0	441/65 and (surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:46
L10	0	441/65 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:46
L11	35	441/and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:46
L12	14	"441"/ and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:46
L13	3	"441"/74 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:47
L14	7	"441"/79 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:47
L15	3	"441"/74 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:48
L16	18	"441"/74 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:49
L17	26	("0857951" | "2593806" | "2931332" | "3456613" | "3465704" | "3650234" | "3722450" | "4349340" | "4711195" |	US-PGPUB; USPAT;	OR	OFF	2015/08/10 08:50

		"4972792" | "5083948" | "5117776" | "5136961" | "5362264" | "5413066" | "5448963" | "5471942" | "6178905" | "6409560" | "6468118").PN. OR ("7047901").URPN.	USOCR			
L18	27	("3405677" | "3456613" | "3536025" | "4020782" | "4274357" | "5516126" | "D260797").PN. OR ("6409560").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/10 08:57
L19	4	(surfboard paddleboard waterboard) and hydrofoil with tail	USPAT	OR	OFF	2015/08/10 10:10
L20	19	(surfboard paddleboard waterboard) and hydrofoil with tail	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 10:11
L21	1	("2015/0017850").URPN.	USPAT	OR	OFF	2015/08/10 10:12
L22	7	("20050266746" | "20080305698" | "20150017850" | "2815518" | "7832349" | "7926437").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/10 10:13
S1	1	"14509289"	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 14:47
S2	0	b63b5/15.cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 14:48
S3	174	b63b1/248.cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 14:48
S4	18	("2747138" | "2931332" | "3227123" | "3262413" | "4274357" | "4508046" | "4971586" | "5062378" | "6192817" | "6702634" | "7047901" | "7144285" | "7232355" | "7731555").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 14:49
S5	26	(surfboard waterboard powerboard watercraft) and hydrofoil and strut and propulsion and (jet adj drive propulsor kort adj nozzle thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:03
S6	0	114/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and propulsion and (jet adj drive propulsor kort adj nozzle thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:07
S7	0	114/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and propulsion and (jet adj drive propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:07
S8	0	114/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and propulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:08
S9	0	114/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:08

S10	0	114/79 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:09
S11	14	"114"/ and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:09
S12	4	441/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:09
S13	0	441/77 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:10
S14	2	441/79 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:10
S15	1	440/6 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:11
S16	3	"440"/ and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:11
S17	14	"114"/ and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:12
S18	19	(surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:13
S19	6	114/274 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:15
S20	3	114/278 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:16
S21	0	board and hydrofoil and strut and proulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:17
S22	15	board and hydrofoil and strut and propulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:17
S23	3	surfboard and hydrofoil and strut and propulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:20
S24	15	watercraft and hydrofoil and strut and propulsion and (propulsor thruster)	US-PGPUB; USPAT;	OR	ON	2015/08/08 15:20

			USOCR			
S25	15	watercraft and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:20
S26	24	watercraft and (hydrofoil foil) and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:20
S27	10	surfboard and (hydrofoil foil) and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:21
S28	35	surfboard and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:22
S29	35	(surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:25
S30	29	"114"/ and (surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:27
S31	14	"441"/ and (surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:27

EAST Search History (Interference)

<This search history is empty>

8/ 10/ 2015 10:59:42 AM
C:\ Users\ jhayes\ Documents\ EAST\ Workspaces\ 14509289.wsp

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BIB DATA SHEET

CONFIRMATION NO. 2924

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/509,289	10/08/2014	440	3617	JWL-10002/36

APPLICANTS

INVENTORS

Jacob Willem Langelaan, State College, PA;

**** CONTINUING DATA ***************************

This appln claims benefit of 61/889,071 10/10/2013

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **

10/14/2014

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /JOVON E HAYES/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		PA	4	12	1

ADDRESS

GIFFORD, KRASS, SPRINKLE,ANDERSON & CITKOWSKI, P.C
PO BOX 7021
TROY, MI 48007-7021
UNITED STATES

TITLE

WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

FILING FEE RECEIVED		
730	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14509289	LANGELAAN, JACOB WILLEM
	Examiner	**Art Unit**
	JOVON HAYES	3617

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/10/2015								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								

Docket No.: JWL-10002/36
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Utility Application of:
Jacob Willem Langelaan

Application No.: 14/509,289 Confirmation No.: 2924

Filed: October 8, 2014 Art Unit: 3617

For: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT Examiner: J. E. Hayes

AMENDMENT IN RESPONSE TO NON-FINAL OFFICE ACTION UNDER 37 C.F.R. § 1.111

MS Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

INTRODUCTORY COMMENTS

In response to the Office Action dated August 17, 2015, please amend the above-identified U.S. patent application as follows:

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A passively stable, weight-shift controlled personal hydrofoil watercraft, comprising:

a flotation device that has a fore-aft length greater than a lateral width, the ~~floating~~ flotation device having a top surface and a bottom surface, wherein a user can be disposed on the top surface of the ~~floating~~ flotation device in a prone, kneeling, or standing position, the floatation device having a forward section, a middle section, and a rear section, and the flotation device being controlled via weight shift of the user;

a strut having [[a]]an upper end and a lower end, the upper end fixedly interconnected with the flotation device between the middle section and the rear section of the ~~floating~~ flotation device;

a hydrofoil fixedly interconnected with the lower end of the strut, the hydrofoil having no movable surface and designed to provide passive static stability controlled solely by weight shift of the user;

a propulsion system for propelling the watercraft in a body of water, wherein the propulsion system is connected to the hydrofoil; and

the watercraft having no movable steering system.

2. (Original) A watercraft in accordance with claim 1, wherein the propulsion system comprises a battery, an electric motor, a motor speed controller, and a propulsor, the propulsor selected from a propeller, a ducted propeller, or a pump-jet.

3. (Original) A watercraft in accordance with claim 2, wherein the propulsor is disposed below the hydrofoil.

4. (Original) A watercraft in accordance with claim 1, wherein the propulsion system is integrated in the hydrofoil and has an inlet near a leading end of the hydrofoil and an outlet near a trailing edge of the hydrofoil.

5. (Original) A watercraft in accordance with claim 1, further comprising a fixed vertical tail connected to the hydrofoil.

6. (Original) A watercraft in accordance with claim 1, further comprising a fixed horizontal tail connected to the hydrofoil.

7. (Original) A watercraft in accordance with claim 1, further comprising a canard that extends forwardly of the hydrofoil, wherein the canard is fixedly connected with the hydrofoil.

8. (Original) A watercraft in accordance with claim 1, further comprising a tail that extends rear of the hydrofoil, wherein the tail is fixedly connected with the hydrofoil.

9. (Original) A watercraft in accordance with claim 1, wherein the hydrofoil is a generally flat wing having a curved front edge.

10. (Original) A watercraft in accordance with claim 1, wherein the hydrofoil includes winglets.

11. (Original) A watercraft in accordance with claim 1, further comprising a secondary hydrofoil that extends forwardly of the hydrofoil, wherein the secondary hydrofoil is fixedly connected with the hydrofoil.

12. (Original) A watercraft in accordance with claim 1, further comprising a secondary hydrofoil that extends rear of the hydrofoil, wherein the secondary hydrofoil is fixedly connected with the hydrofoil.

13. (New) A watercraft in accordance with claim 1, wherein the design for providing the passive static stability is achieved through a combination of airfoil design, planform design and tailoring of span-wise twist distribution.

14. (New) A watercraft in accordance with claim 1, wherein the hydrofoil is wing shaped with a front edge and a rear edge that both curve rearwardly.

REMARKS

Interview Summary

Applicant thanks the Examiner for holding an interview on November 12. These remarks summarize the substance of the interview. It appears that amended claim 1 overcomes the rejection of record, as the art does not disclose control via weight shift. It is noted that the prior art also fails to show the combination of a fixed hydrofoil, a propulsion system, and the absence of a movable steering system, as required by claim 1.

It was also discussed to add a new claim 14 specifying that the hydrofoil is wing shaped with a front edge and rear edge both curved rearwardly.

Applicant asks that the Examiner contact Applicant's representative if further amendment is required.

The following remarks are duplicated from the proposed amendment, for completeness of the record.

Claim Rejections – 35 U.S.C. §103

Claims 1-4, 7 and 9 are rejected under 35 U.S.C. §103 as being unpatentable over Kelsey (US 6,019,059) and further in view of Chen (US 7,047,901).

Claim 1 specifies that the watercraft has no movable steering system and the hydrofoil is fixedly interconnected with the strut and has no movable surface. Claim 1 has been further amended to state that the hydrofoil is designed to provide passive static stability controlled solely by the weight shift of the user, which is supported in the specification at paragraphs [0009], [00010], [00026] and [00041]-[00043].

Applicant submits that Kelsey's hydrofoil is structurally different from the hydrofoil in the present invention as claimed in claim 1. Kelsey is directed to a sloped hydrofoil hingedly mounted to the bottom of a sailboard or surfboard vertical strut. (Kelsey, Abstract) The hinge joint allows the sloped hydrofoil to freely swing from side-to-side relative to the vertical strut in the intended direction under the influence of sideslip. (Kelsey, Col. 3, Lines 44-46; Col. 4, Lines

4-21) Claim 1 requires the hydrofoil fixedly interconnected with the strut, therefore not able to pivot relative to the strut, as does the sloped hydrofoil in Kelsey.

Further, control of Kelsey's sailboard or surfboard is distinguished from the control of the watercraft of the present invention. Kelsey's hull is controlled by having the hydrofoil sloped and hingedly connected to the lower end of the strut. In Kelsey, the hydrofoil is naturally sloped since Kelsey's hydrofoil is connected to the hinge joint at an asymmetric span position higher than the center of all forces to insure the hydrofoil to automatically slope in the intended direction. (Kelsey, Col. 4, Lines 4-21) The sideslip of hull causes the bottom wingtip of the sloped hydrofoil to swing to windward such that the strut then generates side force and the sloped hydrofoil then generates both side force and upward lift. When the sailor or sailboarder tacks or jibes, the new sideslip direction swings the sloped hydrofoil to the opposite side to provide stability of the sailboard or surfboard. (Kelsey, Col. 6, Lines 35-56)

In contrast, claim 1 requires that the hydrofoil is "fixedly interconnected with the strut" and has "no movable surface" therefore does not swing back and forth relative to the strut. The hydrofoil as claimed in claim 1 is specifically designed to provide static stability of the watercraft controlled by the weight shift of the user only without the need for moveable surfaces.

Chen discloses a motorized hydrofoil watercraft having a board, a primary hydrofoil and a steering mechanism. With sufficient speed, the board raises out of water riding primarily on the primary hydrofoil. (Chen, Col. 3, Lines 15-17) Stability and control of the watercraft is enabled by the movable steering mechanism. Chen's steering mechanism includes a steering shaft and a canard at the distal end. The canard includes a spoon and a relatively small foil. The spoon senses the water surface and controls the depth of the foil. The shaft may be extendable to permit the user to adjust the height of the canard. (Chen, Col. 2, Lines 49-65; claim 2; claim 3) The operator moves the upper shaft portion up, down, left and right to produce the opposite motion of the lower shaft portion, causing the board to move relative to the small foil. (Chen, Col. 2, Lines 57-62; claim 1)

Having a steering mechanism, Chen's primary hydrofoil alone does not provide control and stability of the watercraft, while claim 1 specifies that the watercraft has no movable steering system and the flotation device is controlled via weight shift of the user.

Being so significantly different from Kelsey's sailboard or surfboard structurally, it is not obvious to combine Chen with Kelsey as Kelsey's sloped hydrofoil would interfere with Chen's steering mechanism. Hence, it is not obvious for a person of skilled of art to look to Chen and take a component from Chen's watercraft such as a motor and combine it with Kelsey's craft.

Even if Chen were to be combined with Kelsey, the combination would create a Kelsey sailboard or surfboard with a motor. The resulting watercraft is still not the same as the watercraft of the present invention as claimed in claim 1, as the hydrofoil claimed in claim 1 is not movable relative to the other parts of the watercraft, and the stability and control of the watercraft in claim 1 are enabled solely by the weight shift of the user, as opposed to by the combination of the weight shift of the user and the movement of the hydrofoil relative to the other parts of the watercraft.

Claim 4

As can be seen from Chen's Figs 1-3, Chen's propulsion system is in the middle of the foil but extending beyond the width of foil. In contrast, claim 4 requires a propulsion system with an inlet near a leading end of the hydrofoil and an outlet near a trailing edge of the hydrofoil.

Claims 5-6, 8 and 11-12 are rejected under 35 U.S.C. §103 as being unpatentable over Kelsey (US 6,019,059) and further in view of Chen US 7,047,901) and Woolley (US 7,232,355).

Woolley's planning blade includes a fuselage connecting a front blade and a rear blade. The seat is connected through a strut to the fuselage. Yet, the board of present invention is connected to the hydrofoil itself. The secondary foil is connected to the hydrofoil, not to a fuselage.

Claim 10 is rejected under 35 U.S.C. §103 as being unpatentable over Kelsey (US 6,019,059) and further in view of Chen (US 7,047,901) and Dansie (US 7,832,349).

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Dated: November 16, 2015

Respectfully submitted,

Electronic signature: /Douglas L. Wathen/
Douglas L. Wathen
Registration No.: 41,369
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Troy, Michigan 48007-7021
(734) 913-9300
(734) 913-6007 (Fax)
Attorney for Applicant

Electronic Acknowledgement Receipt

EFS ID:	24096037
Application Number:	14509289
International Application Number:	
Confirmation Number:	2924
Title of Invention:	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
First Named Inventor/Applicant Name:	Jacob Willem Langelaan
Customer Number:	25006
Filer:	Douglas Lessel Wathen/Ann Andrusiak
Filer Authorized By:	Douglas Lessel Wathen
Attorney Docket Number:	JWL-10002/36
Receipt Date:	16-NOV-2015
Filing Date:	08-OCT-2014
Time Stamp:	16:40:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		doc00442220151116163648.pdf	435239 4d09987ad055de6fa86c74e61f64cd18be643729	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	1
	Amendment/Req. Reconsideration-After Non-Final Reject	2	9

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Information:

Total Files Size (in bytes):	435239

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

AMENDMENT TRANSMITTAL LETTER			Docket No. JWL-10002/36
Application No. 14/509,289-Conf. #2924	Filing Date October 8, 2014	Examiner J. E. Hayes	Art Unit 3617

Applicant(s): Jacob Willem Langelaan

Invention: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

TO THE COMMISSIONER FOR PATENTS

Transmitted herewith is an amendment in the above-identified application.

The fee has been calculated and is transmitted as shown below.

CLAIMS AS AMENDED					
	Claims Remaining After Amendment	Highest Number Previously Paid	Number Extra Claims Present	Rate	
Total Claims	14	- 20 =	0	x	
Independent Claims	1	- 3 =	0	x	
Multiple Dependent Claims (check if applicable)	☐				
Other fee (please specify):					
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT:					0.00

☐ Large Entity ☒ Small Entity

☒ No additional fee is required for this amendment.

☐ Please charge Deposit Account No. _____ in the amount of $ _____.

☐ A check in the amount of $ _____ to cover the filing fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☒ The Director is hereby authorized to charge and credit Deposit Account No. 04-1133 as described below. A duplicate copy of this sheet is enclosed.

☒ Credit any overpayment.

☒ Charge any additional filing or application processing fees required under 37 C.F.R. § 1.16 and 1.17.

/Douglas L. Wathen/ Dated: November 16, 2015

Douglas L. Wathen
Attorney/Agent Reg. No.: 41,369

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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/509,289	Filing Date 10/08/2014	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **11/16/2015**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $210 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/KAREN VESTAL/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	10/08/2014	Jacob Willem Langelaan	JWL-10002/36	2924

25006 7590 11/18/2015

DINSMORE & SHOHL LLP
PO BOX 7021
TROY, MI 48007-7021

EXAMINER
HAYES, JOVON E

ART UNIT	PAPER NUMBER
3617	

NOTIFICATION DATE	DELIVERY MODE
11/18/2015	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket@patlaw.com

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	14/509,289	LANGELAAN, JACOB WILLEM	
	Examiner	Art Unit	
	JOVON HAYES	3617	

All participants (applicant, applicant's representative, PTO personnel):

(1) *JOVON HAYES*.

(2) *DOUG WATSON*.

(3) *LARS OLSON*.

(4) _____.

Date of Interview: *12 November 2015*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☒102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1*.

Identification of prior art discussed: *YES*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Applicant and examiner discussed proposed claim amendments to claim 1, wherein the user's weight shift controls the movement of the watercraft. The limitation seems to overcome the prior art, examiner will research additional prior art. Examiner relayed to applicant that the hydrofoil wing profile appeared to be novel and may additionally add the limitation to the independent claim or write it as an additional claim. Examiner will wait for applicant's official amendment.

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/Lars A. Olson/
Primary Examiner, Art Unit 3617

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

25006 7590 12/04/2015

DINSMORE & SHOHL LLP
PO BOX 7021
TROY, MI 48007-7021

EXAMINER
HAYES, JOVON E

ART UNIT	PAPER NUMBER
3617	

DATE MAILED: 12/04/2015

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	10/08/2014	Jacob Willem Langelaan	JWL-10002/36	2924

TITLE OF INVENTION: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	03/04/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

25006 7590 12/04/2015
DINSMORE & SHOHL LLP
PO BOX 7021
TROY, MI 48007-7021

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	10/08/2014	Jacob Willem Langelaan	JWL-10002/36	2924

TITLE OF INVENTION: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	03/04/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
HAYES, JOVON E	3617	440-006000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	10/08/2014	Jacob Willem Langelaan	JWL-10002/36	2924

25006 7590 12/04/2015

DINSMORE & SHOHL LLP
PO BOX 7021
TROY, MI 48007-7021

EXAMINER	
HAYES, JOVON E	

ART UNIT	PAPER NUMBER
3617	

DATE MAILED: 12/04/2015

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/509,289	Applicant(s) LANGELAAN, JACOB WILLEM	
	Examiner JOVON HAYES	Art Unit 3617	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *an amendment received 11/16/15*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-14*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 10/8/14
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

DETAILED ACTION

1. This is an allowance of amended application 14/509,289.

2. Claims 1-14 are allowed.

REASONS FOR ALLOWANCE

3. The following is an examiner's statement of reasons for allowance: prior art search did not reveal the limitations of claim 1, wherein applicant's surfboard comprised a rear strut with a lower attached hydrofoil that encompassed a non-movable propulsion system that is controlled by the weight shift of the user on the board to provide passive static stability.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOVON HAYES whose telephone number is (571)272-3115. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samuel (Joe) Morano can be reached on 5712726684. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOVON HAYES/
Examiner, Art Unit 3617

/Lars A. Olson/
Primary Examiner, Art Unit 3617

Notice of References Cited	Application/Control No. 14/509,289	Applicant(s)/Patent Under Reexamination LANGELAAN, JACOB WILLEM	
	Examiner JOVON HAYES	Art Unit 3617	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-3,265,027 A	08-1966	BROWN ARTHUR E	B63H11/00	114/278
*	B	US-3,405,677 A	10-1968	SMITH ROBERT C	B63B35/7943	114/55.53
*	C	US-5,809,926 A	09-1998	Kelsey; Kevin	B63B1/286	114/274
*	D	US-6,019,059 A	02-2000	Kelsey; Kevin R	B63B1/28	114/274
*	E	US-6,178,905 B1	01-2001	Dynes; Richard	B63B1/285	114/55.54
*	F	US-6,409,560 B1	06-2002	Austin; Shawn M.	B63B35/7943	440/6
*	G	US-2002/0124783 A1	09-2002	Dynes, Richard	B63B1/285	114/55.54
*	H	US-2005/0109258 A1	05-2005	Smith, Timothy D.	B63B1/24	114/274
*	I	US-7,047,901 B2	05-2006	Chen; Shane	B63B1/246	114/274
*	J	US-7,232,355 B2	06-2007	Woolley; Robert C.	B63B1/248	114/253
*	K	US-2007/0245943 A1	10-2007	Rice; Mark Shipley	B60V1/08	114/272
*	L	US-7,731,555 B2	06-2010	Railey; Mike R.	B63B35/7943	440/6
*	M	US-2010/0167605 A1	07-2010	Schultz; Wilderich C.	B63H5/14	440/67

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 14/509,289	Applicant(s)/Patent Under Reexamination LANGELAAN, JACOB WILLEM	
	Examiner JOVON HAYES	Art Unit 3617	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-7,832,349 B2	11-2010	Dansie; Stephen W.	B63B1/24	114/274
*	B	US-2010/0323568 A1	12-2010	CHAMBERS; Tucker C.	B63B35/793	441/79
*	C	US-7,854,637 B2	12-2010	Schultz; Wilderich C.	B63H5/14	440/67
*	D	US-2015/0104985 A1	04-2015	Langelaan; Jacob Willem	B63H21/17	440/6
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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BIB DATA SHEET

CONFIRMATION NO. 2924

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/509,289	10/08/2014	440	3617	JWL-10002/36

APPLICANTS

INVENTORS

Jacob Willem Langelaan, State College, PA;

**** CONTINUING DATA ***************************

This appln claims benefit of 61/889,071 10/10/2013

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **

10/14/2014

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /JOVON E HAYES/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		PA	4	12	1

ADDRESS

DINSMORE & SHOHL LLP
PO BOX 7021
TROY, MI 48007-7021
UNITED STATES

TITLE

WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

FILING FEE RECEIVED		
730	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14509289	LANGELAAN, JACOB WILLEM
	Examiner	Art Unit
	JOVON HAYES	3617

CPC- SEARCHED		
Symbol	Date	Examiner
b63b1/248	8/10/2015	jh
b63b1/248	11/19/2015	jh

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
441	74, 79	8/10/2015	jh
441	74, 79	11/19/2015	jh

SEARCH NOTES		
Search Notes	Date	Examiner
conducted class and text search.	8/10/2015	jh
conducted class and text search.	11/19/2015	jh

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
b63b1/248		11/19/2015	jh
441	74	11/19/2015	jh

/JOVON HAYES/ Examiner.Art Unit 3617	

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Jacob Willem Langelaan
Art Unit	N/A
Examiner Name	Not Yet Assigned
Attorney Docket Number	JWL-10002/36

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5062378		1991-11-05	Bateman	
	2	3747138		1973-07-24	Morgan	
	3	7144285		2006-12-05	Hendricks	
	4	4508046		1985-04-02	Coulter et al.	
	5	7232355		2007-06-19	Woolley	
	6	7731555		2010-06-08	Railey	
	7	6702634		2004-03-09	Jung	
	8	3262413		1966-07-26	Bloomingdale et al.	

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	JWL-10002/36

	9	6192817		2001-02-27	Dec et al.	
	10	4971586		1990-11-20	Walsh	
	11	4274357		1981-06-23	Dawson	
	12	3227123		1966-01-04	Voigt	
	13	2931332		1960-04-05	Hebrank	
	14	7047901		2006-05-23	Chen	

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	First Named Inventor	Jacob Willem Langelaan
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	JWL-10002/36

	1							☐

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

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EXAMINER SIGNATURE

Examiner Signature	/Jovon Hayes/	Date Considered	11/19/2015

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	JWL-10002/36

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☒ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☒ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Douglas L. Wathen/	Date (YYYY-MM-DD)	2014-10-08
Name/Print	Douglas L. Wathen	Registration Number	41369

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H./

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14509289	LANGELAAN, JACOB WILLEM
	Examiner	Art Unit
	JOVON HAYES	3617

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/10/2015	11/19/2015							
	1	✓	=							
	2	✓	=							
	3	✓	=							
	4	✓	=							
	5	✓	=							
	6	✓	=							
	7	✓	=							
	8	✓	=							
	9	✓	=							
	10	✓	=							
	11	✓	=							
	12	✓	=							

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	"14509289"	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 14:47
S2	0	b63b5/15.cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 14:48
S3	174	b63b1/248.cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 14:48
S4	18	("2747138" | "2931332" | "3227123" | "3262413" | "4274357" | "4508046" | "4971586" | "5062378" | "6192817" | "6702634" | "7047901" | "7144285" | "7232355" | "7731555").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 14:49
S5	26	(surfboard waterboard powerboard watercraft) and hydrofoil and strut and propulsion and (jet adj drive propulsor kort adj nozzle thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:03
S6	0	114/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and propulsion and (jet adj drive propulsor kort adj nozzle thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:07
S7	0	114/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and propulsion and (jet adj drive propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:07
S8	0	114/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and propulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:08
S9	0	114/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:08
S10	0	114/79 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:09
S11	14	"114"/ and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:09
S12	4	441/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:09

S13	0	441/77 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:10
S14	2	441/79 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:10
S15	1	440/6 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:11
S16	3	"440"/ and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:11
S17	14	"114"/ and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:12
S18	19	(surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:13
S19	6	114/274 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:15
S20	3	114/278 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:16
S21	0	board and hydrofoil and strut and proulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:17
S22	15	board and hydrofoil and strut and propulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:17
S23	3	surfboard and hydrofoil and strut and propulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:20
S24	15	watercraft and hydrofoil and strut and propulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:20
S25	15	watercraft and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:20
S26	24	watercraft and (hydrofoil foil) and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:20
S27	10	surfboard and (hydrofoil foil) and strut and (propulsor thruster)	US-PGPUB; USPAT;	OR	ON	2015/08/08 15:21

			USOCR			
S28	35	surfboard and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:22
S29	35	(surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:25
S30	29	"114"/ and (surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:27
S31	14	"441"/ and (surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:27
S32	26	("0857951" | "2593806" | "2931332" | "3456613" | "3465704" | "3650234" | "3722450" | "4349340" | "4711195" | "4972792" | "5083948" | "5117776" | "5136961" | "5362264" | "5413066" | "5448963" | "5471942" | "6178905" | "6409560" | "6468118").PN. OR ("7047901").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/10 08:38
S33	0	("2007/0245943").URPN.	USPAT	OR	OFF	2015/08/10 08:42
S34	5	"440"/ and (surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:44
S35	0	441/65 and (surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:46
S36	0	441/65 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:46
S37	35	441/and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:46
S38	14	"441"/ and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:46
S39	3	"441"/74 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:47
S40	7	"441"/79 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:47
S41	3	"441"/74 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:48

S42	18	"441"/74 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:49
S43	26	("0857951" | "2593806" | "2931332" | "3456613" | "3465704" | "3650234" | "3722450" | "4349340" | "4711195" | "4972792" | "5083948" | "5117776" | "5136961" | "5362264" | "5413066" | "5448963" | "5471942" | "6178905" | "6409560" | "6468118").PN. OR ("7047901").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/10 08:50
S44	27	("3405677" | "3456613" | "3536025" | "4020782" | "4274357" | "5516126" | "D260797").PN. OR ("6409560").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/10 08:57
S45	4	(surfboard paddleboard waterboard) and hydrofoil with tail	USPAT	OR	OFF	2015/08/10 10:10
S46	19	(surfboard paddleboard waterboard) and hydrofoil with tail	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 10:11
S47	1	("2015/0017850").URPN.	USPAT	OR	OFF	2015/08/10 10:12
S48	7	("20050266746" | "20080305698" | "20150017850" | "2815518" | "7832349" | "7926437").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/10 10:13

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L10	759	114/274	USPAT	OR	OFF	2015/11/19 18:31
L11	825	114/274	US-PGPUB; USPAT	OR	OFF	2015/11/19 18:31
L12	33	surfboard and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT	OR	ON	2015/11/19 18:32
L13	163	b63b1/248.cpc.	US-PGPUB; USPAT	OR	ON	2015/11/19 18:32
L14	5	l11 and l12	US-PGPUB; USPAT	OR	ON	2015/11/19 18:33
L15	17	l13 and l12	US-PGPUB; USPAT	OR	ON	2015/11/19 18:33
L16	1445	441/74	US-PGPUB; USPAT	OR	ON	2015/11/19 18:48
L17	5	13 and 16	US-PGPUB; USPAT	OR	ON	2015/11/19 18:48

11/ 19/ 2015 6:49:46 PM
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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14509289	LANGELAAN, JACOB WILLEM
	Examiner	**Art Unit**
	JOVON HAYES	3617

CPC						
Symbol					**Type**	**Version**
B63B		1	/	248	F	2013-01-01
B63H		11	/	04	A	2013-01-01
B63H		1	/	16	A	2013-01-01
B63B		35	/	7926	I	2013-01-01
B63B		35	/	7943	I	2013-01-01
B63H		21	/	17	I	2013-01-01
B63H		21	/	21	I	2013-01-01
B63H		5	/	14	I	2013-01-01
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

/JOVON HAYES/ Examiner.Art Unit 3617	11/19/2015	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	14	
/LARS A OLSON/ Primary Examiner.Art Unit 3617	11/20/2015	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

99

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14509289	LANGELAAN, JACOB WILLEM
	Examiner	**Art Unit**
	JOVON HAYES	3617

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION	
CLASS	SUBCLASS	CLAIMED	NON-CLAIMED
441	75	B 6 3 B 1 / 248	

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
114	274				

/JOVON HAYES/ Examiner.Art Unit 3617	11/19/2015	Total Claims Allowed:	
(Assistant Examiner)	(Date)	14	
/LARS A OLSON/ Primary Examiner.Art Unit 3617	11/20/2015	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

100

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14509289	LANGELAAN, JACOB WILLEM
	Examiner	**Art Unit**
	JOVON HAYES	3617

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1														
2	2														
3	3														
4	4														
5	5														
6	6														
7	7														
8	8														
9	9														
10	10														
11	11														
12	12														
13	13														
14	14														

/JOVON HAYES/ Examiner.Art Unit 3617 (Assistant Examiner)	11/19/2015 (Date)	**Total Claims Allowed:** 14	
/LARS A OLSON/ Primary Examiner.Art Unit 3617 (Primary Examiner)	11/20/2015 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

101

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

DINSMORE & SHOHL LLP
2701 Troy Center Drive, Suite 330
Post Office Box 7021
Troy, Michigan 48007-7021

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Ann Andrusiak	(Depositor's name)
/Ann Andrusiak/	(Signature)
January 27, 2016	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	10/08/2014	Jacob Willem Langelaan	JWL-10002/36	2924

TITLE OF INVENTION: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480.00			$480.00	03/04/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
J. E. Hayes	3617	114-282

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Dinsmore & Shohl LLP
2 Douglas L. Wathen
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☒ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☒ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 04-1133 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ☐ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ☐ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Douglas L. Wathen/ Date January 27, 2016

Typed or printed name Douglas L. Wathen Registration No. 41,369

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Electronic Patent Application Fee Transmittal

Application Number:	14509289
Filing Date:	08-Oct-2014
Title of Invention:	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
First Named Inventor/Applicant Name:	Jacob Willem Langelaan
Filer:	Douglas Lessel Wathen/Ann Andrusiak
Attorney Docket Number:	JWL-10002/36

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	2501	1	480	480

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**480**

Electronic Acknowledgement Receipt

EFS ID:	24737593
Application Number:	14509289
International Application Number:	
Confirmation Number:	2924
Title of Invention:	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
First Named Inventor/Applicant Name:	Jacob Willem Langelaan
Customer Number:	25006
Filer:	Douglas Lessel Wathen/Ann Andrusiak
Filer Authorized By:	Douglas Lessel Wathen
Attorney Docket Number:	JWL-10002/36
Receipt Date:	27-JAN-2016
Filing Date:	08-OCT-2014
Time Stamp:	14:16:07
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$480
RAM confirmation Number	529
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	doc00203020160127140752.pdf	111636 7761e6375c26d46e1a20f6dcae159b2c93ca32ba	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30733 14d1c52395a272a2fa565d589dd11cb0c10ba392	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	142369		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	03/08/2016	9278729	JWL-10002/36	2924

25006 7590 02/17/2016

DINSMORE & SHOHL LLP
PO BOX 7021
TROY, MI 48007-7021

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Jacob Willem Langelaan, State College, PA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

Docket No.: JWL-10002/36
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Utility Application of:
Jacob Willem Langelaan

RECEIVED
MAR 04 2016
OFFICE OF PETITIONS

Application No.: 14/509,289 Confirmation No.: 2924

Filed: October 8, 2014 Art Unit: 3617

For: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT Examiner: J. E. Hayes

PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)

MS 313(c)
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

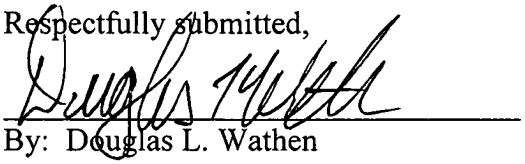
Applicant respectfully requests that the patent expected to issue on March 8, 2016 as U.S. Patent No. 9,278,729 be withdrawn from issue. The reason for the request is that Applicant wishes to file a Request for Continued Examination in compliance with 37 CFR 1.114 for the consideration of a Supplemental Information Disclosure Statement.

A Request for Continued Examination in compliance with 37 CFR 1.114 and a Supplemental Information Disclosure Statement, directed to Mail Stop RCE, is being filed concurrently herewith.

The petition fee set forth under 1.17(h) may be made to our firm's Deposit Account 04-1133 under order no. JWL-10002/36. In addition, any overpayments or underpayments may be made to our Deposit Account 04-1133 under order no. JWL-10002/36.

Dated: March 3, 2016

Respectfully submitted,



By: Douglas L. Wathen
Registration No.: 41,369
DINSMORE & SHOHL LLP
2701 Troy Center Drive, Suite 330
Post Office Box 7021
Troy, Michigan 48007-7021
(734) 913-9300
(734) 913-6007 (Fax)
Attorney for Applicant

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	14509289	Filing Date	2014-10-08	Docket Number (if applicable)	JWL-10002/36	Art Unit	3617
First Named Inventor	Jacob Willem Langelaan			Examiner Name	J. E. Hayes		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, to any international application that does not comply with the requirements of 35 U.S.C. 371, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV.

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

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MAR 04 2016
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☒ Enclosed

☐ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 04-1133

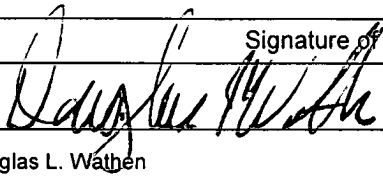
SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature		Date (YYYY-MM-DD)	2016-03-03
Name	Douglas L. Wathen	Registration Number	41369

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Docket No.: JWL-10002/36
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Utility Application of:
Jacob Willem Langelaan

Application No.: 14/509,289

Filed: October 8, 2014

For: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

RECEIVED
MAR 04 2016
OFFICE OF PETITIONS

Allowed: December 4, 2015

Confirmation No.: 2924

Art Unit: 3617

Examiner: J. E. Hayes

INFORMATION DISCLOSURE STATEMENT (IDS)

MS RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Pursuant to 37 C.F.R. § 1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement, pursuant to 37 C.F.R. § 1.114(c), accompanies the Request for Continued Examination (37 C.F.R. § 1.114) submitted herewith.

A summary/abstract translation of the non-English language references is enclosed.

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

In accordance with 37 C.F.R. § 1.97(g), the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made or that no other material information as defined in 37 C.F.R. § 1.56(a) exists. In accordance with 37 C.F.R. § 1.97(h), the filing of this Information Disclosure Statement shall not be construed to be an admission that any patent, publication or other information referred to therein is "prior art" for this invention unless specifically designated as such.

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 04-1133, under Order No. JWL-10002/36.

Dated: March 3, 2016

Respectfully submitted,

By _____
Douglas L. Wathen
Registration No.: 41,369
DINSMORE & SHOHL LLP
2701 Troy Center Drive, Suite 330
Post Office Box 7021
Troy, Michigan 48007-7021
(734) 913-9300
(734) 913-6007 (Fax)
Attorney for Applicant

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14509289
Filing Date	2014-10-08
First Named Inventor	Jacob Willem Langelaar
Art Unit	3617
Examiner Name	J. E. Hayes
Attorney Docket Number	JWL-10002/36

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U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	3405677		1968-10-15	Smith	
	2	6178905		2001-01-30	Dynes et al.	
	3	293133		1884-02-05	Applegate	
	4	322712		1885-07-21	Harris	
	5	326241		1885-09-15	Preston	
	6	374713		1887-12-13	Smith	
	7	427435		1890-05-06	Manville	
	8	497158		1893-05-09	Allen	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14509289
	Filing Date	2014-10-08
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

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MAR 04 2016
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	9	506237		1893-10-10	Kinsman	
	10	619281		1899-02-14	Cornish	
	11	670263		1901-03-19	Whiton	
	12	704790		1902-07-15	Gillinder	
	13	714428		1902-11-25	Wirth	
	14	723235		1903-03-24	Brachhausen	
	15	773155		1904-10-25	O'Neill	
	16	2110812		1938-03-08	Negri	
	17	2451781		1948-10-19	Steele	
	18	2748400		1956-06-05	James	
	19	2812736		1957-11-12	Fry	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14509289
	Filing Date	2014-10-08
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

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OFFICE OF PETITIONS

	20	2815518		1957-12-10	Kuehn	
	21	2840832		1958-07-01	Conger	
	22	2891259		1959-06-23	Perry	
	23	3019760		1962-02-06	Berliner	
	24	3105249		1963-10-01	Palmore	
	25	3150632		1964-09-29	Evans	
	26	3164119		1965-01-05	Emmanuel et al.	
	27	3213822		1965-10-26	Sawchuck	
	28	3254622		1966-06-07	Bramson	
	29	3294055		1966-12-27	Mcguire	
	30	3324822		1967-06-13	Carter	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14509289
	Filing Date	2014-10-08
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

RECEIVED
MAR 04 2016
OFFICE OF PETITIONS

	31	3340845		1967-09-12	Tyrack	
	32	3371646		1968-03-05	Mela	
	33	3380421		1968-04-30	Lstiburek	
	34	3456613		1969-07-22	Smith	
	35	3536025		1970-10-27	Tierney	
	36	3548778		1970-12-22	Von Smagala-Romanoff	
	37	3882815		1975-05-13	Bennett	
	38	3964417		1976-06-22	Williams et al.	
	39	4020782		1977-05-03	Gleason	
	40	5017166		1991-05-21	Chang	
	41	5471942		1995-12-05	Miller et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14509289
	Filing Date	2014-10-08
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

	42	5947788		1999-09-07	Derrah	
	43	6142840		2000-11-07	Efthymiou	
	44	6183333		2001-02-06	Hall	
	45	6311631		2001-11-06	Beecher	
	46	6568340		2003-05-27	Dec et al.	
	47	6901872		2005-06-07	Battle et al.	
	48	7089875		2006-08-15	Kurze	
	49	7207282		2007-04-24	Ruan et al.	
	50	7232350		2007-06-19	Krah	
	51	7298056		2007-11-20	Gizara	
	52	7930985		2011-04-26	Walworth et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14509289
	Filing Date	2014-10-08
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

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If you wish to add additional U.S. Patent citation information please click the Add button.

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14509289
	Filing Date	2014-10-08
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

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	First Named Inventor	Jacob Willem Langelaan
	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

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	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

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	Art Unit	3617
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	Attorney Docket Number	JWL-10002/36

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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	2	202264871	CN	U	2012-06-06	Zhenning, Guo		☒
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14509289
	Filing Date	2014-10-08
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

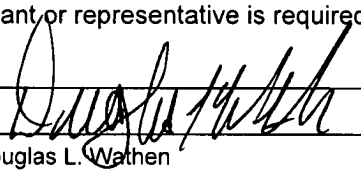
☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature		Date (YYYY-MM-DD)	2016-03-03
Name/Print	Douglas L. Wathen	Registration Number	41369

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

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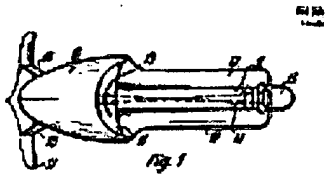
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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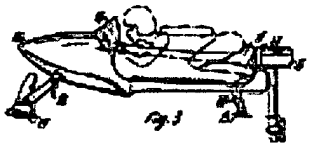
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

15 of 16 DOCUMENTS

CH591358A5 1977-09-15 **Light hydrofoil water craft - has front and rear skis and one piece hull and saddle** (en)







Applicants/Assignees: HENKING ROBERTO

Classifications: CPC: B63B1/24 (2013-01-01; I 2013-01-01; B, H, EP)
CPC: B63B35/731 (2013-01-01; I 2013-01-01; B, H, EP)
CPC: F02B61/045 (2013-01-01; A 2013-01-01; B, H, EP)
ECLA: B63B1/24; B63B35/73B
IPC[]: B63B1/24A B63B1#24A B63B1/24A
IPC[]: B63B35/72B B63B35#72B B63B35/72B
IPC[8]: B63B1/24 (2006-01-01; A, , I, 2005-10-08; R, M, EP)
IPC[8]: B63B1/26 (2006-01-01; A, , I, 2006-05-21; R, M, CH)
IPC[8]: B63B35/73 (2006-01-01; A, , I, 2005-10-08; R, M, EP)
IPC[8]: F02B61/04 (2006-01-01; A, , N, 2005-10-08; R, M, EP)
ICO: R02B61/04B

Priority Number and Date: CH00695675 1975-05-31

English Abstract:

The light water craft consists of a hull with a keel inside which is an elongated saddle which the ride straddles in a prone position with a conventional outboard motor for the drive unit, a steering handle connected to a front ski for steering, and a smaller ski at the rear. The two skis enable the hull to be raised substantially above the water level with a skimming effect, as the speed increases, thus reducing the resistance to the water to achieve high speeds. The hull and the saddle are moulded in one piece. The front ski forms part of a circle when viewed from behind. The starting gear and the fuel tank are housed inside the saddle. Another design has two side by side saddles, to accommodate a passenger.

CH 591 358

CONFÉDÉRATION SUISSE
BUREAU FÉDÉRAL DE LA PROPRIÉTÉ INTELLECTUELLE

(51) Int. Cl.²: B 63 B 1/24
B 63 B 35/72

ETH-BIBLIOTHEK ZÜRICH

(19) CH EXPOSÉ D'INVENTION A5 (11) 591 358
N

(21) Numéro de la demande: 6956/75

(61) Additionnel à:

(62) Demande scindée de:

(22) Date de dépôt: 31. 5. 1975, 11 h

(33) (32) (31) Priorité:

Brevet délivré le 30. 6. 1977

(45) Exposé d'invention publié le 15. 9. 1977

(54) Titre: **Canot automobile**

(73) Titulaire: Dr. Roberto Henking, Monthey

(74) Mandataire: Georges R. Charbonnier, Genève

(72) Inventeur: Dr. Roberto Henking, Monthey

La présente invention a pour objet un canot automobile, tenant du hors-bord et de la motocyclette, conçu de manière à rompre avec le rapport fixe existant entre la longueur d'un bateau et sa vitesse maximum («plus un bateau est long plus il va vite»), et permettre à son pilote de le conduire dans une nouvelle position plus sportive et plus sûre.

L'ensemble des innovations qu'il comporte le rend en outre plus rapide et plus agréable à piloter que les bâteaux à moteur de même puissance.

Le canot selon l'invention est caractérisé par le fait qu'il est constitué par une coque carénée, par au moins une selle allongée, s'apparentant à celle d'une moto, que le pilote enfourche, par des moyens de propulsion, par un guidon relié cinématiquement à un gouvernail de direction, et par un dispositif de sustentation destiné à soulever la coque hors de l'eau pour diminuer la résistance lorsque le canot acquiert de la vitesse.

Le dessin ci-annexé représente, à titre d'exemple, une forme d'exécution de l'objet de l'invention.

La fig. 1 en est une vue en plan,
la fig. 2 est une vue frontale,
la fig. 3 une vue de côté partiellement coupée.

Le canot automobile représenté, du type hors-bord, comprend une coque carénée 10, moulée en une pièce en matière plastique, dont la partie supérieure forme une selle allongée 11 que le pilote enfourche à la manière d'une selle de moto, et deux repose-pieds 12 situés de chaque côté et en contre-bas de la selle.

La propulsion du canot est assurée par un moteur hors-bord 15. Un guidon 13, relié à la partie pivotante de ce moteur par des câbles croisés 14, permet au pilote de diriger le canot.

La batterie de démarrage du moteur et le réservoir d'essence, non représentés au dessin, sont logés à l'intérieur de la selle 11.

Le pilote, allongé sur la selle, les pieds calés sur les repose-pieds 12, s'abrite derrière un pare-brise bombé 16 prolongeant le nez aérodynamique de la coque.

Le canot est équipé d'un dispositif de sustentation formé de deux ailes profilées 17 et 19, en forme d'arceaux, fixées à l'avant, respectivement à l'arrière de la carène de la coque par des bras 18 et 20. Ces bras traversent les ailes et forment des virures 23 et 24.

Ce dispositif permet d'obtenir, lorsque le canot est propulsé:

– un effet de portance grâce aux sections planes-convexes des ailes, la force dirigée vers le haut qui en résulte provoquant le soulèvement de la coque et à partir d'une certaine vitesse le canot glisse littéralement sur la surface de l'eau, seules les deux ailes restant au contact de cette dernière.

– le maintien de la direction du canot grâce aux bras 18 et 20, ainsi qu'aux tronçons latéraux de l'aile 17,

– un effet de stabilisation empêchant le roulis et le clapotement grâce au tronçon central de l'aile 17 qui reste toujours immergée,

– l'inclinaison latérale du canot au moment des virages,

– un déplacement plus doux, plus rapide et plus harmonieux que celui d'un bateau traditionnel de même puissance.

Equipé d'un moteur de 20 à 25 CV, le canot représenté est capable d'atteindre une vitesse de l'ordre de 100 km/h sur un plan d'eau calme.

La quille, incorporée à la carène comme dans un bateau à moteur classique, confère au canot une parfaite stabilité lorsqu'il flotte sans être propulsé ou se déplace à vitesse réduite.

L'invention n'est évidemment pas limitée à la forme d'exécution représentée au dessin. En particulier le canot pourrait être à plusieurs places, par exemple à deux places, l'une pour le pilote, l'autre pour un passager, placés l'un derrière l'autre sur la même selle, ou l'un à côté de l'autre sur deux selles parallèles.

Le canot pourrait aussi être équipé d'un moteur in-bord à la place d'un moteur hors-bord. Dans ce cas il serait doté d'un gouvernail de direction propre relié directement au guidon.

En outre la coque pourrait être exécutée en polyester stratifié, en polyéthylène centrifugé, en bois, en acier, etc.

REVENDICATION

Canot automobile, caractérisé par le fait qu'il est constitué par une coque carénée, par au moins une selle allongée que le pilote enfourche, par des moyens de propulsion, par un guidon relié cinématiquement à un gouvernail de direction, et par un dispositif de sustentation destiné à soulever la coque hors de l'eau pour diminuer la résistance lorsque le canot acquiert de la vitesse.

SOUS-REVENDICATIONS

1. Canot selon la revendication, caractérisé par le fait que la coque et la selle sont moulées en une pièce.

2. Canot selon la revendication, caractérisé par le fait que ledit dispositif de sustentation comprend une aile profilée, en forme d'arc de cercle, fixée sous la coque à l'avant du canot.

3. Canot selon la revendication et la sous-revendication 2, caractérisé par le fait que ledit dispositif de sustentation comprend également une aile fixée sous la coque à l'arrière du canot.

4. Canot selon la revendication, caractérisé par le fait que la batterie de démarrage et le réservoir d'essence sont logés à l'intérieur de la selle.

5. Canot selon la revendication, caractérisé par le fait qu'il comprend deux selles parallèles.

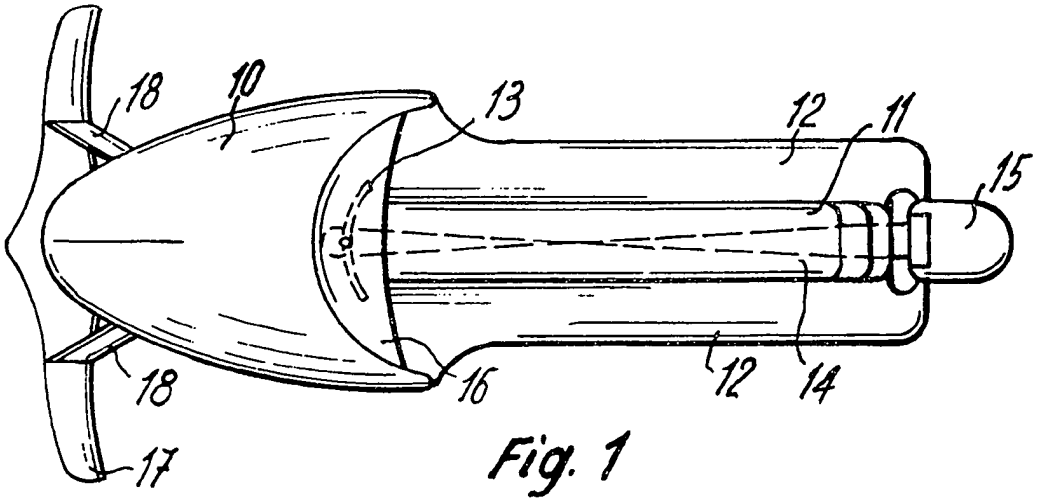


Fig. 1

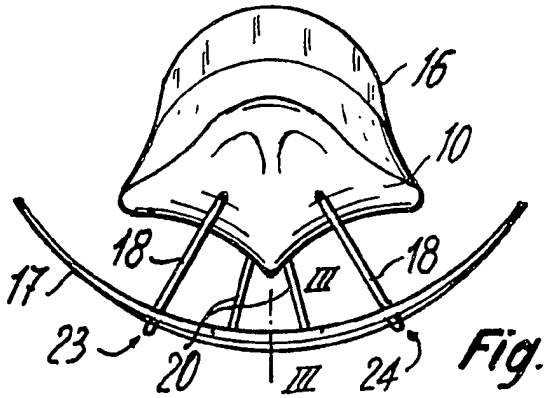


Fig. 2

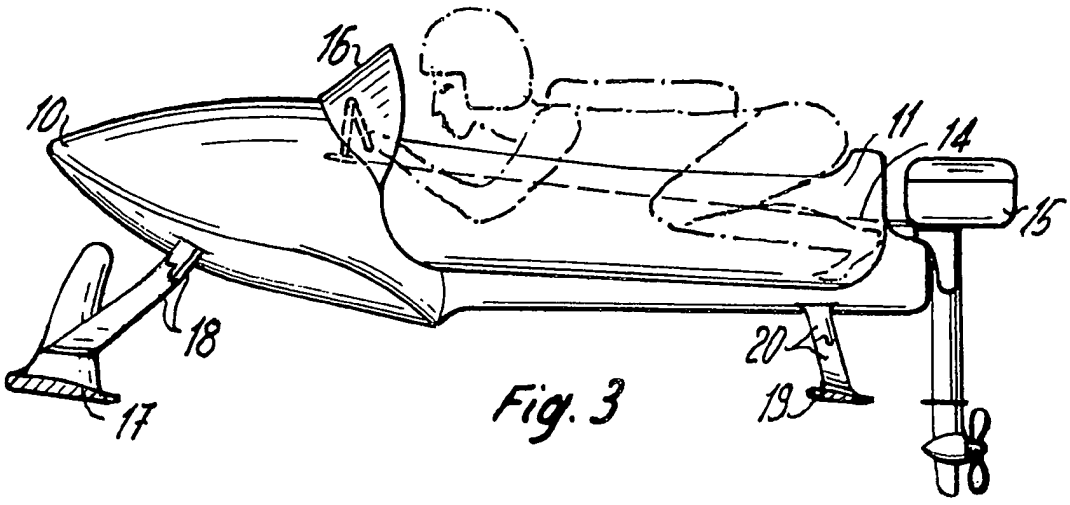
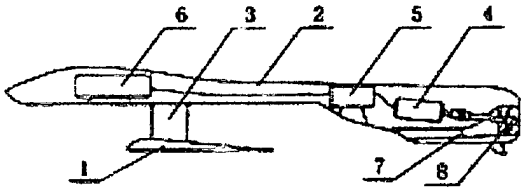


Fig. 3

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CN202264871U 2012-06-06 **Surfboard with engine-driven hydrofoil** (en)



Inventors: ZHENNING GUO;
ZHENCHUN HAN;
JIANHUA HE

Applicants/Assignees: ZHENNING GUO, 212000 江 苏 省 镇 江 市 京 口 区 学 府 路 301号 210幢 162室

Classifications: IPC[8]: B63B35/79 (2006-01-01; A, F, I, 2012-11-28; B, H, CN)
IPC[8]: B63B1/24 (2006-01-01; A, L, I, 2012-11-28; B, H, CN)

Priority Number and Date: CN201120392135 2011-10-12

English Abstract:

The utility model relates to a surfboard with an engine-driven hydrofoil, which comprises a hydrofoil board, a surfboard body, a support, a power device, an energy device, a control device, a flow channel and a propeller. The surfboard is characterized in that the hydrofoil board is connected with the support and mounted on the lower portion of the surfboard body through the support, the rear of the surfboard body downwardly projects in a streamline form, the flow channel is arranged in a projecting portion of the surfboard body, an inlet of the flow channel is positioned at the front end of the downwardly projecting portion in the rear of the surfboard body, an outlet of the flow channel is positioned at the tail end of the surfboard body, the power device, the energy device and the control device are arranged inside the surfboard body, the control device is connected with the energy device, the energy device is connected with the power device, and an extension shaft of an internal combustion engine in the power device is connected with the propeller. The surfboard body is more stable and suitable for a freshman to steer, and resistance of water to the surfboard body is decreased and the advancing speed of the surfboard is increased since the lower surface of the surfboard body leaves a water surface. Besides, 'soaring feeling' brought to a user during advancing of the surfboard increases surfing pleasure of the user.

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(12)实用新型专利

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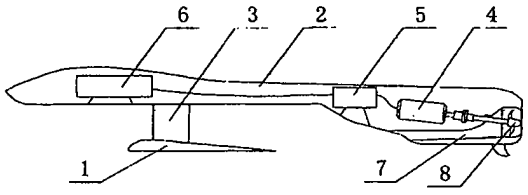
权利要求书 1 页 说明书 2 页 附图 2 页

(54)实用新型名称

机动水翼冲浪板

(57)摘要

本实用新型涉及机动水翼冲浪板，包括水翼板、板体、支撑架、动力装置、能源装置、控制装置、流道、螺旋桨，其特征在于水翼板与支撑架连接并通过支撑架安装在板体的下部，板体的后部呈流线型向下凸起并且在其凸起部分中设置一个流道，流道的进口位于板体后部向下凸起部分的前端，流道的出口位于板体的尾端，动力装置、能源装置、控制装置设置在板体的内部，控制装置与能源装置连接，能源装置与动力装置连接，动力装置中的内燃机的伸出轴连接有螺旋桨。本实用新型板体更加平稳，适合新手驾驭，冲浪板板体下表面离开水面，减小了水对冲浪板体的阻力，提高冲浪板的前进速度，而且冲浪板前行中给使用者带来的“腾空感”，增加了的冲浪乐趣。



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1. 机动水翼冲浪板，包括水翼板 (1)、板体 (2)、支撑架 (3)、动力装置 (4)、能源装置 (5)、控制装置 (6)、流道 (7)、螺旋桨 (8)，其特征在于水翼板 (1) 与支撑架 (3) 连接并通过支撑架 (3) 安装在板体 (2) 的下部，板体 (2) 的后部呈流线型向下凸起并且在其凸起部分中设置一个流道 (7)，流道 (7) 的进口位于板体 (2) 后部向下凸起部分的前端，流道 (7) 的出口位于板体 (2) 的尾端，动力装置 (4)、能源装置 (5)、控制装置 (6) 设置在板体 (2) 的内部，控制装置 (6) 与能源装置 (5) 连接，能源装置 (5) 与动力装置 (4) 连接，动力装置 (4) 中的内燃机的伸出轴连接有螺旋桨 (8)，螺旋桨 (8) 设置在流道 (7) 内。

机动水翼冲浪板

技术领域

[0001] 本实用新型专利涉及一种冲浪板，特别是一种机动水翼冲浪板。

背景技术

[0002] 现有技术中随着高性能船的迅速发展，水翼被越来越广泛地运用于这一领域。采用水翼装置的主要目的是，第一，改善艇的纵摇和横摇，减小升沉、减小加速度。因为水翼可产生反向升力，而且可增加附连水质量。第二，尾水翼提供部分支持力，可减少船体浸湿面积，从而减少水翼系统所增加的阻力。换句话说，利用水翼装置改善穿浪船的耐波性，提高穿浪船的舒适性。穿浪船与水翼船相比较。申请号为 CN200820059489.X 和 CN200720002144.6 的两篇专利提供了一种结构相似的动力冲浪板，但是此种冲浪板耐波性能比较欠缺，冲浪板耐波性差，水对板体的阻力大。

发明内容

[0003] 本实用新型所要解决的技术问题是克服现有技术的不足，提供一种机动水翼冲浪板，本实用新型解决其技术问题所采用的技术方案是：本实用新型的结构包括水翼板、板体、支撑架、动力装置、能源装置、控制装置、流道、螺旋桨，其特征在于水翼板与支撑架连接并通过支撑架安装在板体的下部，板体的后部呈流线型向下凸起并且在其凸起部分中设置一个流道，流道的进口位于板体后部向下凸起部分的前端，流道的出口位于板体的尾端，动力装置、能源装置、控制装置设置在板体的内部，控制装置与能源装置连接，能源装置与动力装置连接，动力装置中的内燃机的伸出轴连接有螺旋桨，螺旋桨设置在流道内。

[0004] 工作原理及使用说明：本实用新型包括一个水翼板、一个板体、支撑架、动力装置、能源装置以及控制装置。该水翼板与支撑架联接并通过支撑架安装在板体的下部，翼板截面结构与飞机机翼截面结构相似，在水中能产生向上的升力。该板体后部以流线型向下凸起并且在其凸起部分中存在一个流道，该流道的进口位于板体后部向下凸起部分的前端或者底面，流道的出口位于板体的尾端。动力装置，能源装置，控制装置安装在板体的内部，动力装置中的内燃机的伸出轴连接有螺旋桨，该螺旋桨置于流道内。动力装置的动力可以由内燃机或者电动机提供，能源装置可以是油箱或者电瓶。机动水翼冲浪板所用的水翼板是“半浸式”的“U”型水翼或者是“全浸式”的倒“T”型水翼。支撑水翼板的支撑架个数为一到两个。

[0005] 本实用新型的有益效果是，本实用新型当冲浪板在水中前进时，位于水中的翼板受到流体升力的作用向上托起冲浪板使之离开水面，从而提高冲浪板抗波浪摇摆的能力，使冲浪时板体更加平稳，适合新手驾驭。冲浪板板体下表面离开水面，减小了水对冲浪板体的的阻力，提高冲浪板的前进速度。而且冲浪板前行中给使用者带来的“腾空感”，增加了的冲浪乐趣。

附图说明

[0006] 图 1 :本实用新型实施例结构示意图 ;

[0007] 图 2 :本实用新型实施例流道入水口在底面的结构示意图 ;

[0008] 图 3 :本实用新型实施例水翼板为倒“T”型前视图结构示意图 ;

[0009] 图 4 :本实用新型实施例水翼板为倒“U”型前视图结构示意图 ;

[0010] 图 5 :本实用新型实施例三维结构示意图 ;

[0011] 图中 :水翼板 1、板体 2、支撑架 3、动力装置 4、能源装置 5、控制装置 6、流道 7、螺旋桨 8、水面 9。

具体实施方式

[0012] 参照附图说明对本实用新型作以下具体的详细说明 ;如附图所示,本实用新型的结构包括水翼板 1、板体 2、支撑架 3、动力装置 4、能源装置 5、控制装置 6、流道 7、螺旋桨 8,其特征在于水翼板 1 与支撑架 3 连接并通过支撑架 3 安装在板体 2 的下部,板体 2 的后部呈流线型向下凸起并且在其凸起部分中设置一个流道 7,流道 7 的进口位于板体 2 后部向下凸起部分的前端,流道 7 的出口位于板体 2 的尾端,动力装置 4、能源装置 5、控制装置 6 设置在板体 2 的内部,控制装置 6 与能源装置 5 连接,能源装置 5 与动力装置 4 连接,动力装置 4 中的内燃机的伸出轴连接有螺旋桨 8,螺旋桨 8 设置在流道 7 内。

[0013] 上面所述的实施例仅仅是对本实用新型的优选实施方式进行描述,并非对本实用新型的构思和范围进行限定,在不脱离本实用新型设计构思的前提下,本领域中普通工程技术人员对本实用新型的技术方案作出的各种变型和改进,均应落入本实用新型的保护范围,本实用新型请求保护的技术内容,已经全部记载在权利要求书中。

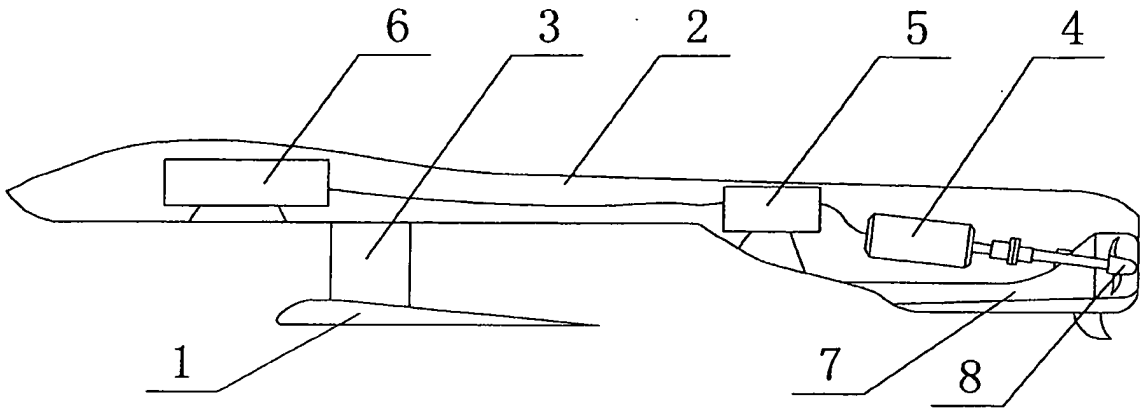


图 1

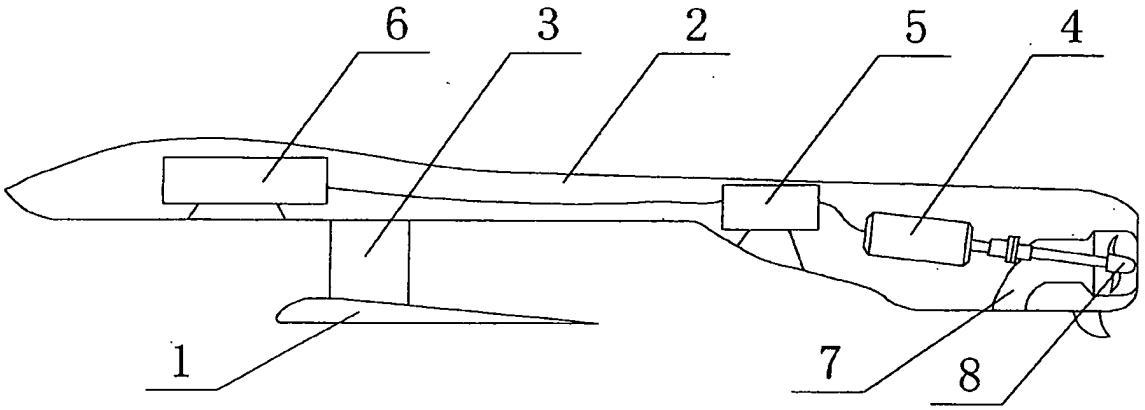


图 2

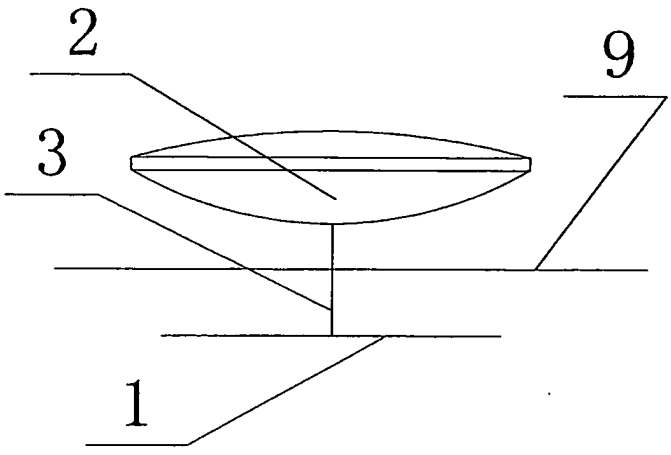


图 3

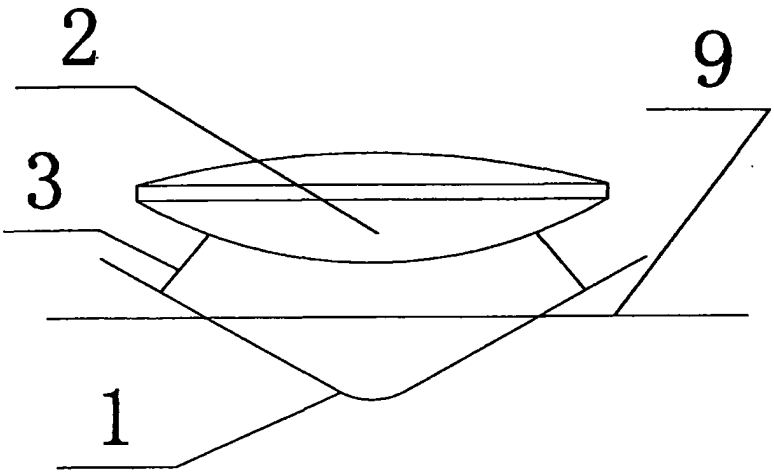


图 4

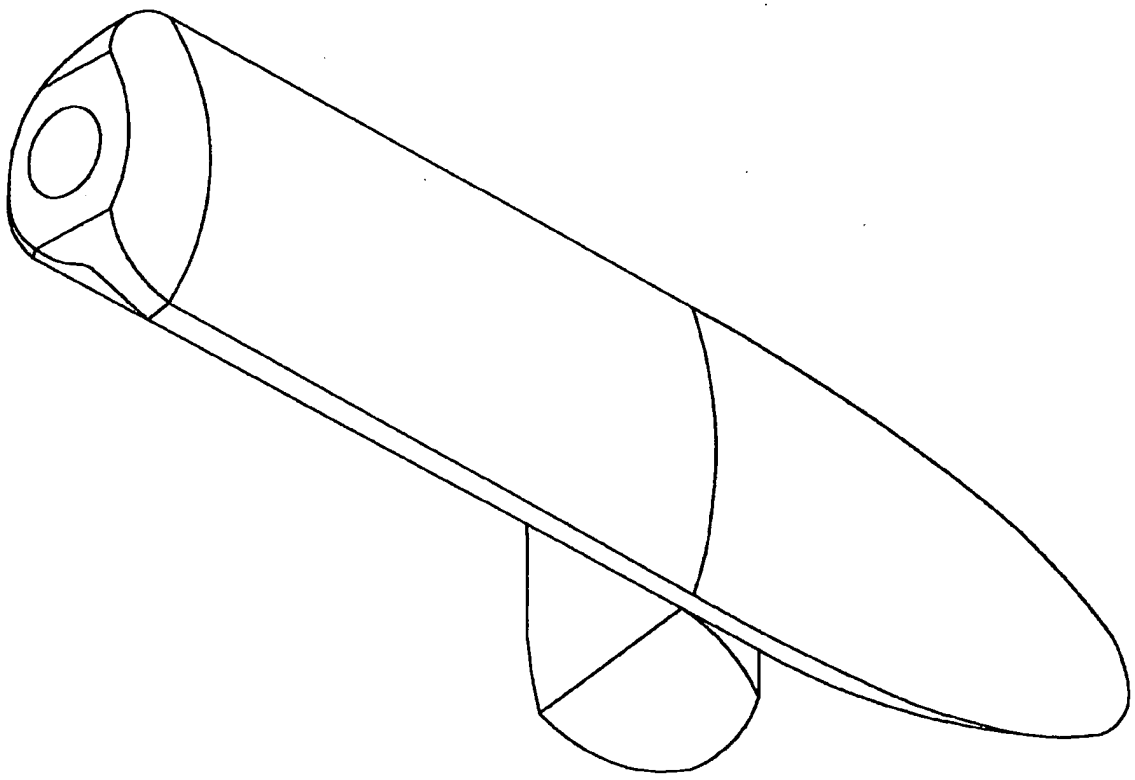
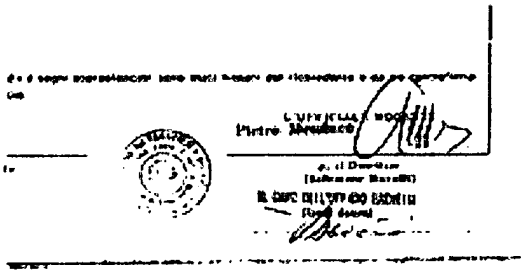


图 5

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DE3070662D1 1985-06-20 **POWER OPERATED SURFBOARD** (en)



Inventors: DAWSON EDWARD S

Applicants/Assignees: SURF JET CORP, United States of America

Classifications: CPC: F02B61/045 (2013-01-01; I 2013-01-01; B, H, EP)
CPC: B63B35/7943 (2013-01-01; I 2013-01-01; B, H, EP)
CPC: B63H11/08 (2013-01-01; I 2013-01-01; B, H, EP)
ECLA: B63B35/79M; B63H11/08; F02B61/04B
IPC[4]: 4B63H11/02A 4B63H11#02A 4B63H11/02A
IPC[4]: 4B63B35/84B 4B63B35#84B 4B63B35/84B
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IPC[8]: B63H11/08 (2006-01-01; A, , I, 2005-10-08; R, M, EP)
IPC[8]: F02B61/04 (2006-01-01; A, , I, 2005-10-08; R, M, EP)

English Abstract:

A power operated surfboard which has a raised rear hollow portion at the rear in which is disposed an impeller housing having an impeller therein and a water discharge passage extending rearwardly from the housing. An internal combustion engine is supported above the impeller housing and has a short vertical axis connected to the impeller which rotates about a vertical axis. Surrounding the impeller housing is an exhaust gas housing which communicates with the exhaust gas passage of the engine and with a discharge chamber beneath the floor of the surfboard. The exhaust gas housing is gas tight and provides a gas cushion which retards the entrance of water through the discharge chamber into the exhaust passage of the engine, when the surfboard is not being operated. This is aided by a flexible valve disposed at the discharge outlet of the discharge chamber to retard the entrance of water into the discharge chamber. Associated with the exhaust gas discharge chamber and forming a part of a two chamber is a water inlet chamber which communicates with the intake of the impeller through the floor of the boat and extends over the opening to the impeller to prevent accidental contact with the rotating impeller either by an occupant or by some foreign object. A belly pan has a bottom wall disposed between the engine and the impeller housing and surrounds the engine to form an engine compartment. Disposed at the bottom of the engine compartment is a one way valve which permits draining of water or fuel from the belly pan but hinders the access of water into the interior of the belly pan.

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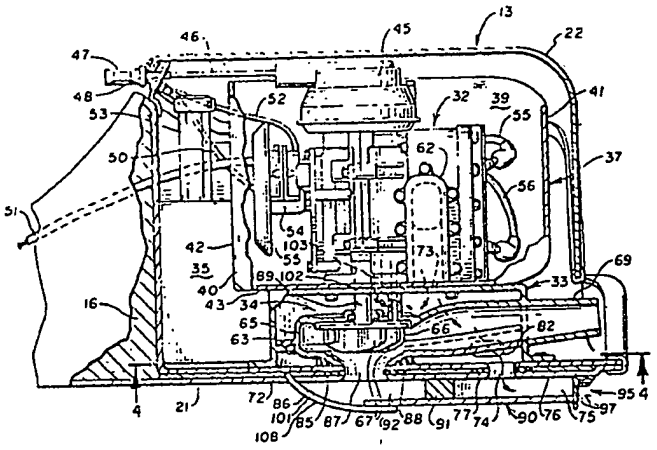
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(54) Title: POWER OPERATED SURFBOARD

(57) Abstract

A power operated surfboard which has a raised rear hollow portion (13) at the rear in which is disposed an impeller housing (34) having an impeller (66) therein and a water discharge passage (69) extending rearwardly from the housing. An internal combustion engine (32) is supported above the impeller having and as a short vertical axis connected to the impeller which rotates about a vertical axis. Surrounding the impeller housing is an exhaust gas housing (33) which communicates with the exhaust gas passage (62) of the engine and with a discharge chamber (75) beneath the floor of the surfboard. The exhaust gas housing is gastight and provides a gas cushion which retards the entrance of water through the discharge chamber into the exhaust passage of the engine, when the surfboard is not being operated. This is aided by a flexible valve (95) disposed at the discharge outlet of the discharge chamber to retard the entrance of water into the discharge chamber. Associated with the exhaust gas discharge and forming a part of a two part chamber is a water inlet chamber (92) which communicates with the intake of the impeller through the floor of the boat and extends over the opening (87) to the impeller to prevent accidental contact with the rotating impeller either by an occupant or by some foreign object. A belly pan (37) has a bottom all (43) disposed between the engine and the impeller housing and surrounds the engine to form an engine compartment. Disposed at the bottom of the engine compartment is a one way valve (105) which permits draining of water or fuel from the belly pan but hinders the access of water into the interior of the belly pan.



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POWER OPERATED SURFBOARD

BACKGROUND OF THE INVENTION

The present invention relates to a power operated surfboard and particularly to such a surfboard which may be used in a manner similar to a typical surfboard but with the advantage of having continuous power operation of the surfboard. In designing a powered surfboard, there are certain problems peculiar to a surfboard which are not present in connection with other watercraft construction. For one thing, the surfboard must be basically flat over the major portion of the upper surface to enable an operator to either stand or sit on the surfboard. The engine compartment must accordingly be relatively small and compact and at a position where it interferes as little as possible with the relatively flat upper surface desired for such a surfboard. Furthermore, it is imperative that the surfboard be as free of engine vibration as possible so as to enable the operator to manipulate the surfboard readily. In addition, it is highly desirable that the surfboard be relatively quiet since the operator is standing upon the surfboard and will be more disturbed by noise than an occupant of a boat. Moreover, it is highly desirable that water be kept out of the exhaust system of the engine as much as possible.

Motorized surfboards have previously been proposed. One such motorized surfboard is that shown in the Carter patent 3,324,822. This patent has the advantage that it provides for jet propulsion, thereby eliminating the need for a propeller which might cause injury to the operator or to someone in the water. The Carter patent, however, has a number of disadvantages including the fact that the drive shaft between the engine and the impeller is relatively long and horizontally disposed. This tends to make the surfboard relatively bulky in cross section throughout much of its length. Furthermore, the presence of such a long drive shaft will increase the tendency to vibration.

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The Dawson patent No. 3,463,116 overcomes the disadvantage of a long drive shaft by placing the impeller and the engine both at the rear of the surfboard. While the Dawson arrangement was a marked advance over some of the prior surfboards, it has certain disadvantages. In the first place, the engine rests upon an auxiliary molded floor located above the floor of the surfboard and the impeller is located beneath this floor. In addition, there is no effective means in the Dawson arrangement to prevent the entrance of water into the exhaust system while the board is standing still. Furthermore, Dawson shows no particular means for ensuring a relatively quiet operation of the surfboard. It is very important with such a power operated surfboard to minimize the noise as much as possible.

SUMMARY OF THE PRESENT INVENTION

The present invention is concerned with a power operated surfboard of the general type shown in the Dawson patent described above in which there is an exhaust gas chamber surrounding the impeller housing and which acts as a gas cushion to prevent the entrance of water through the exhaust gas outlet into the exhaust passage of the engine.

A further feature of the invention is the provision of an exhaust gas chamber beneath the boat through which the exhaust gas is discharged. This means that the exhaust gas is discharged beneath the boat in the water, thus minimizing the noise.

Preferably, the exhaust gas chamber has a valve associated therewith which is biased to closed position and retards the entrance of water into the exhaust gas chamber beneath the boat while the boat is standing still. This valve may take the form of a member of flexible plastic which has a downturned lip extending across the open end of the exhaust chamber and biased into engagement with it. As soon as the engine is operated, this lip is forced away by reason of the pressure of the exhaust gas and pressure of the water due to forward motion of the surfboard.

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The exhaust gas chamber beneath the surfboard can be part of a two compartment chamber with a partition wall therebetween, the other compartment of which has a forwardly facing opening and which overlies the inlet of the impeller. This other chamber with its forwardly facing opening directs water into the intake of the impeller and, at the same time, extends over the opening to the impeller to prevent accidental engagement with the impeller.

The exhaust gas housing surrounding the impeller housing is supported on the floor of the surfboard and in turn supports the engine, thus making unnecessary the molding of a false floor in the surfboard body.

A belly pan preferably surrounds the engine and has a bottom disposed between the engine and the exhaust gas housing. This belly pan preferably has a one-way valve disposed in its bottom to permit draining of water and any spilled fuel from the belly pan while, at the same time, preventing the admission of water into the belly pan.

Further features of the present invention will be apparent from a consideration of the accompanying specification, claims and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a pictorial view illustrating the manner in which the surfboard is used;

Figure 2 is a section taken along the line 2-2 of Figure 1;

Figure 3 is an elevational view of the interior of the rear interior hollow portion of the surfboard with portions in section;

Figure 4 is a sectional view taken along the line 4-4 of Figure 3, looking upwardly in the direction of the arrows to show the impeller pump, the fuel tank and the bottom of the belly pan;

Figure 5 is a rear elevational view with portions cut away and shown in section;

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Figure 6 is a perspective view of the housing secured to the underside of the floor of the surfboard for directing the intake of the water and the discharge of the exhaust gas; and

Figure 7 is a fragmentary view of the valve associated with the housing of Figure 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to Figure 1, the power operated surfboard of the present invention is shown being used by an operator standing on the surfboard, which is generally indicated by the reference numeral 10. The operator is shown as holding a cable 11 which not only helps support the operator but also contains a control handle 14 to control the throttle. The control handle may include a control member for controlling the throttle through a suitable hydraulic system. Such a control is common and is hence not shown in the present application. The surfboard is shown as comprising a main portion having a generally flat upper surface 12 and a relatively short raised rear portion 13 in which is housed the engine, the impeller and the various equipment associated therewith. The body of the surfboard, as shown in cross section in Figure 2, is formed of a shell 15, preferably of fiberglass, the shell being filled with a waterproof relatively light material 16 such as foamed polyurethane.

As will be evident from Figure 2, the bottom of the shell 15 has two concave portions 17 terminating at a center keel 18.

Referring now to Figures 3 and 5, the rear portion 13 is shown in more detail. As previously explained, it is this portion that houses the engine, the impeller and the associated equipment. As best shown in Figure 5, the rear portion 13 has two side walls 19 and 20, a bottom wall 21, and a cover 22. The two side walls 19 and 20 are hollow and filled with polyurethane foam. They have inner walls 23 and

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24 which extend vertically and are spaced from the outer surfaces of the walls 19 and 20. The cover 22 is spaced from the upper edges of the side walls 19 and 20. Any suitable means may be employed for retaining the cover 22 in position.

The inner side walls 23 and 24 together with the floor 21 form a hollow portion which is normally covered by the cover 22. This hollow portion houses the engine 32, an exhaust gas housing 33, an impeller housing 34 and a fuel tank 35. The engine 32 is enclosed by a belly pan 37 having side walls 39 and 40, a rear wall 41 and a front wall 42. The belly pan 37 has a bottom wall 43 which is disposed beneath the engine as best shown in Figures 3 and 5. The belly pan forms an engine compartment and prevents water from being splashed onto the engine so as to impair the operation of the ignition.

The engine 32 is a conventional internal combustion engine which is shown as a two cylinder engine. The engine has a retractable hand operated starting mechanism 45 with a starting cable 46 secured to a handle 47 extending forwardly and which can be pulled out to start the engine. This arrangement is a conventional arrangement and need not be described in any more detail. The engine is also provided with an ignition switch 48 connected through a cable 50 to the ignition system of the engine. The device also has a choke control 49 connected through a cable 52 to the choke of the engine. The throttle control in handle 14 is connected through a cable 51 to a hydraulic control for the throttle of the engine. The cable extends through the interior of the surfboard body and out through the area at which the cable is attached, as shown in Figure 1. Such a hydraulic control is common and does not form part of the present invention. The engine is provided with the usual carburetor 54 having an air intake through an air cleaner 55.

The engine is also provided with the usual spark plugs and ignition cables 55 and 56 leading to the spark plugs. Extending across the manifold cover is a conduit 58

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for conveying cooling water to a portion of the engine. The engine is provided with an exhaust manifold 61 having a conduit portion 62. The engine is provided with a vertical output shaft (not shown) which is connected to the shaft of the impeller, which will be presently described.

Referring now to the exhaust gas housing 33, this housing rests upon and is secured to the floor 21 of the hollow compartment of the surfboard body. The gastight housing 33 is preferably secured to the floor 21 by any suitable fastening means. The belly pan 37 rests upon and is secured to the housing 33. The housing 33 thus supports the engine, eliminating the need for a molded false floor as in the Dawson patent 3,463,116.

The exhaust gas chamber 33 is secured in a gas-tight manner to the impeller housing 34. Referring to the impeller housing, this is best shown in Figures 3, 4 and 5. It will be noted that it has a central portion 65 in which is housed the impeller 66. The impeller 66 is a centrifugal impeller having a plurality of vanes 67 which, upon rotation of the incoming water, throws it outwardly through a discharge nozzle 69 extending through the rear of the housing of the surfboard, slightly above the floor thereabove.

The impeller housing 34 has a flange 63 extending completely around the periphery of the housing 34 up to the point where it extends through the rear wall of housing 33. This flange is best shown in Figure 4. The flange is secured in a gastight manner, by bolts 70 or other suitable fastening means such as cap screws, to a flange 72 extending inwardly from the housing 33 and integral with the housing. The flanges 63 and 72 collectively form a partition, separating the upper portion of housing 33 from the lower portion.

The upper portion of the exhaust housing 33 has an opening 73 which communicates with the discharge opening of the exhaust manifold 62. Thus, the exhaust gas leaving the exhaust manifold 61 and passing through the conduit portion 62 enters the area above the impeller housing 34. The area of the exhaust gas housing 33 below the flanges 63 and 72

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and below the impeller housing 34 communicates through a passage 74 with the interior of an exhaust gas discharge chamber 75 which will be described presently. The opening 74 not only extends through the floor 21 of the hollow compartment but also through the lowermost floor 76 of the hollow compartment, there being a slight space between the floor of the hollow compartment 22 and the actual lower floor 76 of the surfboard which is filled with a rigid water resistant plastic material. A suitable gasket 77 is disposed between the floors 21 and 76 surrounding the opening 74 to prevent the escape of gas between the two floors.

The rear portion of the flange 63 of impeller housing 34 is flared outwardly towards the rear as best shown in Figure 5. This portion is designated by the reference numeral 80. It will be noted that this portion extends downwardly to the floor 21 of the hollow portion. In order to permit the exhaust gas entering the upper portion of exhaust gas chamber 33 to pass through the area beneath the wall of widened portion 80 and thus to enter the opening 74 into the exhaust gas discharge chamber 75, two apertures 81 and 82 are provided through the wall of the widened portion 80 of flange 63 of the impeller housing. These openings 81 and 82 permit gas to pass beneath the partition formed by the flanges 63 and 72 and through the opening 74.

Referring back to the intake to the impeller housing 34, this has a neck portion 85 which engages the floor 21 with a gasket 86 clamped therebetween. The gasket 86 is to prevent the escape of any water into the exhaust chamber. A passage 87 extends through the two floors 21 and 75 and communicates with the intake of the impeller 66. A gasket 88 is disposed between floors 21 and 75 adjacent the passage 87. The passage 87 thus constitutes the intake passage of the impeller.

The impeller has a vertical shaft 89 which is connected by means (not shown) to the vertical output shaft of the engine. Because the vertical shafts of the impeller

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and engine are very short and because the engine and impeller housing are both securely fastened to exhaust gas housing 33, there is a minimum of vibration.

The exhaust gas discharge chamber 75 forms part of a housing 90 resembling a skeg. This housing 90 is divided into two compartments by a partition 91 (as best shown in Figure 3) which divides the housing 90 into the gas discharge chamber 75 and a fluid intake chamber 92. The housing 90 has two side flanges 94, only one of which is shown in the drawing and which appears in Figure 6. These flanges are employed to mount the housing 90 to the underside of the surfboard.

Referring to the exhaust gas discharge chamber 75, it will be noted that the rear end of this chamber is open. Associated with the chamber, however, is a valve member generally designated by the reference numeral 95. This valve member is formed of a flexible resilient synthetic plastic material and has a horizontal flange 96 and a downwardly extending lip 97. As best shown in Figure 7, the lip 97 tends to be biased inwardly away from a line vertical to the axis of the flange 96. In mounting the same, the valve member 95 is secured to the underside of the surfboard by a plurality of screws 99. Preferably a washer strip 100 is interposed between the screws and the flange 96, The flange is mounted in such a position that, as shown in dotted lines in Figure 7, the lip 97 is deflected backwardly so that it abuts the open end of the housing 90, thus tending to prevent any water from entering the exhaust gas chamber 75. When, however, the engine is running so that exhaust gas pressure builds up within the exhaust gas housing 33 and hence in the exhaust gas discharge chamber 75, the lip 97 is deflected in a counterclockwise direction as shown in dotted lines in Figure 3 to permit the escape of exhaust gas.

This lip 97 extends downwardly slightly below the bottom of housing 90. This extension of the lip 97 is engaged by the water as the surfboard moves forwardly to

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further aid in moving the lip 97 away from the end of the housing 90. In other words, the resiliency of the valve member 95 is such that while the lip member 97 is normally held in engagement with the end of the exhaust gas discharge chamber 75, the lip member 97 can still readily be deflected to an open position by the gas pressure and by the forward motion of the surfboard.

Referring now to the fluid intake chamber 92, this is open at its front end and has a curved front wall 101. Curved bars 108 preferably extend longitudinally over the opening 101. Water is thus scooped up by the fluid intake chamber 92 and is directed upwardly through the opening 87 into the impeller 66. A very important function of the water intake chamber 92 is that it acts as a guard around the opening 87. If it were not for this, it would be possible for a foreign object to come into contact with the impeller. If it were the limb of a human being, this could cause severe injury to the human. On the other hand, if it were a hard foreign object, it could easily damage the impeller 66. By providing the water intake chamber 92 and the curved bars 108 across the opening, it would be difficult for a foreign object to directly enter through the opening 87. It would be almost impossible for an operator to insert his hand through the bars into the impeller.

Referring back to the gasoline tank 35, it will be noted that this is L-shaped in transverse cross-section, the major portion extending vertically between the front wall of the hollow compartment and the rear wall 37 of the belly pan with a shorter horizontal portion extending beneath the lower wall 43 of the belly pan. The gasoline tank is provided with a filler pipe 53 extending upwardly to an area readily accessible when the cover 22 is removed.

In order to cool the engine, a certain amount of the water is bled off from the top of the impeller 66 through a conduit 102 which leads into the cooling jacket of the engine. The engine is also provided with a return conduit

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for this cooling water which is shown in dotted lines and designated by the reference numeral 103. This return conduit opens into the exhaust gas housing 33 so that the cooling water is discharged into the exhaust gas and is carried out through the exhaust gas discharge chamber 75. The water passing in this manner into the exhaust gas tends to cool the exhaust gas somewhat.

The belly pan 37 has a drain valve 105 secured to the bottom wall 43 thereof. The function of the drain valve is to permit water and any spilled fuel accumulating in the belly pan 37 to escape. At the same time, the drain valve 105, having two lips 106 which are biased together, prevents the entrance of any water. The drain valve 105 is preferably molded of a suitable resilient material. Because of this, any water or spilled fuel that accumulates in the belly pan 37 during operation tends to be directed below and can be carried out through the rear of the surfboard.

OPERATION

When the operator desires to operate the surfboard, the ignition is turned on by actuation of the ignition button 48. The choke can be closed by pulling out the handle 49. The operator then pulls on the handle 47 in the usual manner to start an engine of this type. This can all be done while the operator is standing on the surfboard. The engine will presumably be placed into operation after one or more pulls of the handle 47. Thereafter, the choke can be opened and the surfboard is ready for use. The water will enter the fluid intake chamber 92 and be forced by the impeller 66 out through the discharge nozzle 69. This will cause the surfboard to move forward. The operator by manipulating the control in the handle 14 can through the cable 51 and a hydraulic control actuate the throttle of the engine. The operator is thus able to conveniently manipulate the speed. At this time, the operator is in the position shown in Figure 1. As the throttle operator in the handle 14 is depressed, the speed can be increased.

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As soon as the engine is placed in operation, the upper chamber of the exhaust gas housing 33 is filled with exhaust gas which enters through the openings 81 and 82 and through passage 74 into the exhaust gas discharge chamber 75. The pressure in the exhaust gas discharge chamber 75 quickly builds up causing the lip 97 of valve 95 to be deflected to the right as shown in Figure 3 to permit the escape of the exhaust gas. This action is aided by the water engaging the edge of the lip 97 as the surfboard moves forward.

Any foreign objects the surfboard tends to encounter will likely be deflected by the curved wall 101 and the rods therein and are unlikely, unless they are very small, to enter the fluid intake chamber 92 and hence the impeller 66. Furthermore, if the surfboard should tip over while the impeller is still running, it is almost impossible for any of the operator's hands or other appendages to get into the path of the impeller.

If the operator should fall off of the surfboard, the throttle control will be released and the throttle will be moved to closed position.

The exhaust gas chamber 33 performs two functions. In the first place, it tends to act as a muffler. By reason of its being relatively large and by reason of the fact that the gas must pass around through the wide portion 80 of the flange of the impeller housing and through the passages 81 and 82, considerable muffling effect takes place. This is further enhanced by the fact that the exhaust gas must then pass through passage 74 and out through the gas discharge chamber 75 underneath the water. Moreover, the downwardly extending lip 97, projecting below the housing 90, tends to carry the noise into the water. The result is that the engine is extremely quiet and very little noise is sensed by the operator.

The other function of the exhaust gas chamber is to provide a gas cushion to prevent the entry of water into the exhaust system of the engine while the surfboard is

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standing still. It will be obvious that if the occupant is standing on the surfboard and no means are provided to prevent this, water could enter through the exhaust chamber 75 and up into the exhaust chamber 62. This is obviously undesirable for several reasons. In the first place, it would be highly undesirable for water to enter the cylinders of the engine. Even if it does not, if there is a substantial amount of water accumulated in the exhaust system, it becomes rather difficult to start the engine because starting it requires that the water be forced out of the exhaust system before the engine can actually start.

With the present arrangement, the entry of water into the exhaust chamber 62 is effectively prevented. It will be noted that the exhaust housing 33 forms a gastight chamber. The entry of water, in the first place, into the exhaust gas discharge chamber 75 is retarded by the valve 95. Any water that does seep into this chamber, however, tends to compress the remaining exhaust gas in the chamber 33 and eventually the increased pressure in the exhaust gas chamber 33 prevents the admission of water into the chamber. Thus, when it is desired to start the engine, the exhaust system of the engine will be entirely clear of water and it becomes relatively easy for the operator to start the engine.

CONCLUSION

It will be seen that the present invention provides for a power operated surfboard which is extremely quiet and can be readily manipulated by the operator. Furthermore, it is very safe. Any access to the impeller is prevented by the water intake housing. The introduction of water to the exhaust system is effectively prevented. Any water or fuel that does enter the belly pan tends to drain out of it before accumulating to any great extent. The units are arranged so that the whole power portion of the surfboard is in a very compact area leaving the major portion of the surfboard available for the occupant.

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While a specific embodiment of the invention has been shown, it is to be understood that this is for purposes of illustration only and that the scope of the invention is to be limited solely by that of the appended claims.

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The embodiments of the invention in which an exclusive property or right is claimed are defined as follows:

1. A power operated surfboard with a body having a lower surface designed to move readily through the water and an upper surface which is relatively flat over the forward portion thereof to enable a rider to stand on the surfboard, the body having a floor and a raised rear hollow portion above said floor and containing an engine compartment therein,

an impeller housing rigidly secured to and resting within the raised rear hollow portion of said body below said engine compartment, with a water intake passage extending through the floor of the body and a water exhaust passage extending rearwardly from the rear hollow portion,

an impeller in said housing mounted for rotation about a vertical axis,

an internal combustion engine disposed in said engine compartment above said impeller housing, means securing said internal combustion engine and said impeller housing in rigid relationship to each other, said engine having a vertical output shaft connected to the drive shaft of the impeller for driving the same about its vertical axis, said internal combustion engine further having a cooling jacket and an exhaust passage,

an exhaust gas housing surrounding said impeller housing and having the walls thereof substantially spaced from the impeller housing to form a substantial gas chamber around said impeller housing, said exhaust gas housing being secured to said impeller housing in a substantially gastight manner, said gas chamber having an inlet opening communicating in a substantially gastight relation with the exhaust passage of the engine and having an outlet opening,

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and discharge means disposed adjacent the floor of the surfboard and connected to the outlet opening of the exhaust gas housing for discharging the exhaust gas rearwardly beneath the floor of the surfboard,

said exhaust gas chamber acting to provide a gas cushion therein to retard the entrance of water through said discharge means into the exhaust passage of the engine when the surfboard is not being operated.

2. The surfboard of claim 1 in which the discharge means is an exhaust gas discharge housing disposed beneath the floor and having a rearwardly disposed opening for discharging the exhaust gas.

3. The surfboard of claim 2 in which valve means are associated with the rearwardly disposed opening of the exhaust gas discharge housing, said valve means being biased to closed position to retard the entrance of water into said exhaust gas housing but movable to open position as the pressure of the exhaust gas tends to rise and the surfboard moves forward.

4. The surfboard of claim 1 in which there is a water intake housing beneath the floor of the surfboard communicating with the water intake passage of the impeller housing, said water intake housing extending beneath the water intake passage of the impeller housing and having a forwardly directed opening for the admission of water thereto.

5. The surfboard of claim 4 in which the discharge means and the water intake housing are both part of a housing having two compartments with a partition therebetween, one of said compartments constituting the discharge means and the other the water intake housing.

6. The surfboard of claim 1 in which the water exhaust passage extends rearwardly through the rear wall of the exhaust gas housing.

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7. The surfboard of claim 1 in which the means for securing said internal combustion engine and said impeller housing in rigid relationship to each other includes the exhaust gas housing which rests upon and is secured to the floor of the surfboard and supports the weight of the internal combustion engine.

8. The surfboard of claim 1 in which there is a belly pan forming the engine compartment, said belly pan being supported upon said exhaust gas housing and extending beneath and around the sides of the engine.

9. The surfboard of claim 8 in which there is a one way valve at the bottom of the belly pan, said valve acting to allow any water and fuel in said pan to drain through said valve but preventing the entrance of water into said belly pan through said valve.

10. The surfboard of claim 8 in which there is a fuel tank disposed between the front interior wall of said raised rear hollow portion and the front wall of the belly pan.

11. The surfboard of claim 3 in which said valve means is formed of a resilient material and has a downwardly extending flap which is biased against the rearwardly disposed opening of the housing.

12. A power operated surfboard with a body having a lower surface designed to move readily through the water and an upper surface which is relatively flat over the forward portion thereof to enable a rider to stand on the surfboard, the body having a floor and a raised rear hollow portion above said floor and containing an engine compartment therein,

an impeller housing rigidly secured to and resting within the raised rear hollow portion of said body below said engine compartment, with a water intake passage extending through the floor of the body and a water exhaust passage extending rearwardly from the rear hollow portion,

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an impeller in said housing mounted for rotation about a vertical axis,

an internal combustion engine disposed in said engine compartment above said impeller housing, means securing said internal combustion engine and said impeller housing in rigid relationship to each other, said engine having a vertical output shaft connected to the drive shaft of the impeller for driving the same about its vertical axis, said internal combustion engine further having a cooling jacket and an exhaust passage,

a gas discharge housing disposed adjacent the floor of the surfboard and connected to the exhaust passage of the engine, said housing having a rearwardly disposed opening for discharging the exhaust gas rearwardly beneath the floor of the surfboard, and

a valve means formed of a resilient material secured adjacent said rearwardly disposed opening, said valve means having a downwardly extending flap which is biased by reason of the resilience of said material against the rearwardly disposed opening of the housing, said flap extending slightly below said housing so that the flap is forced open during operation of said engine both by the exhaust gas pressure in said gas discharge housing and by the water pressure on the extending portion of the flap produced by forward movement of the surfboard,

said flap not only acting to retard the entrance of water into said exhaust gas discharge chamber when the surfboard is not moving but also to cause the noise of the discharged exhaust gas to be carried away when the surfboard is operating.

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Fig. 3

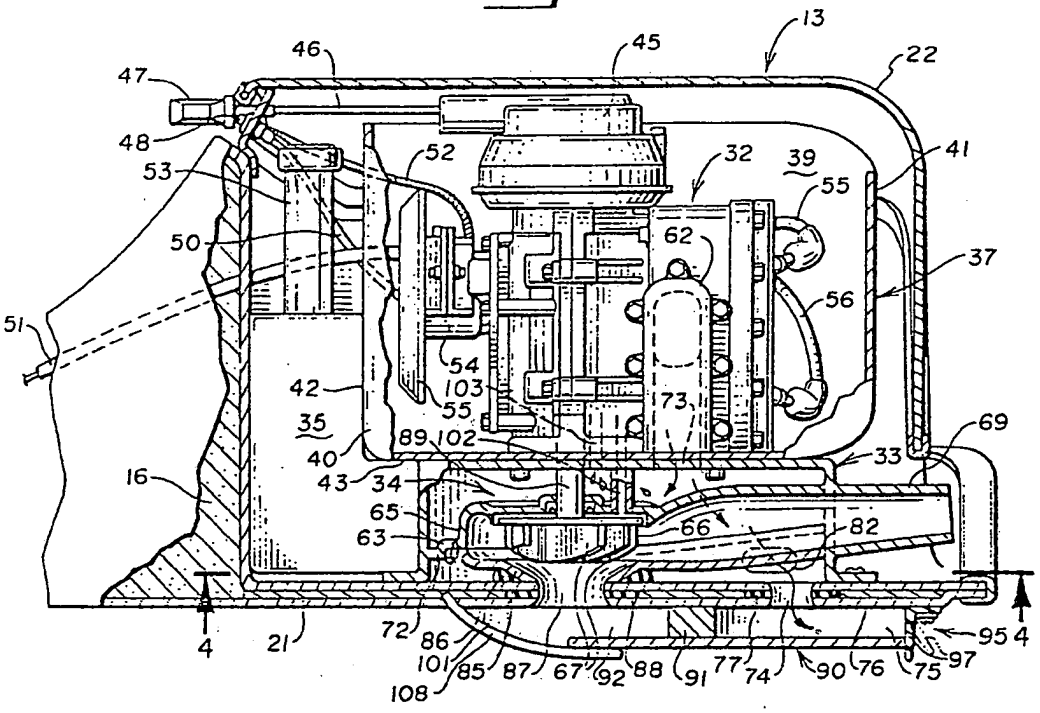


Fig. 6

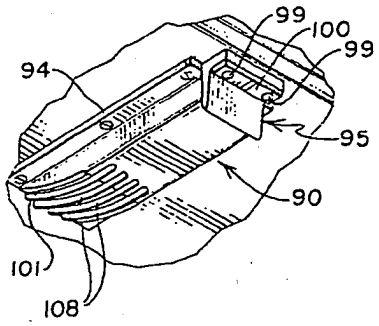


Fig. 1

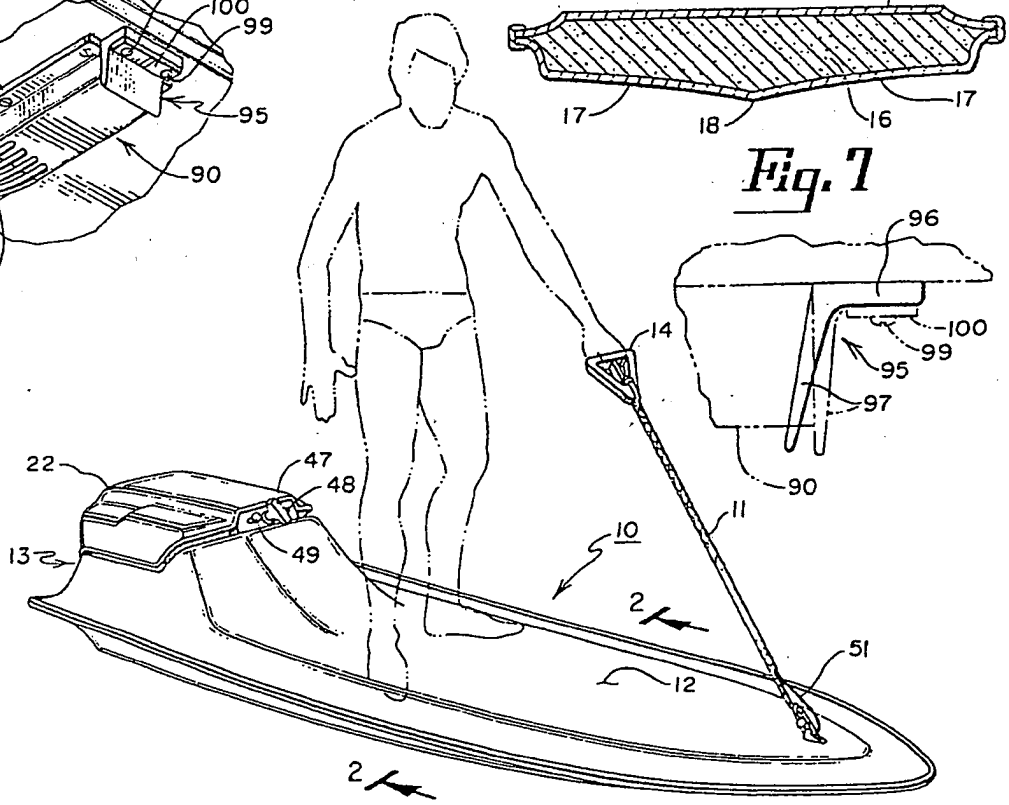


Fig. 2

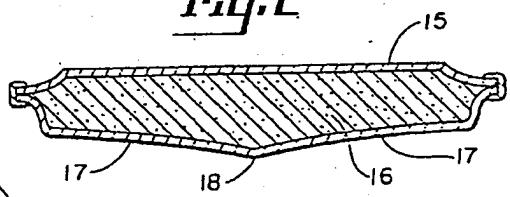


Fig. 7

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Fig. 4

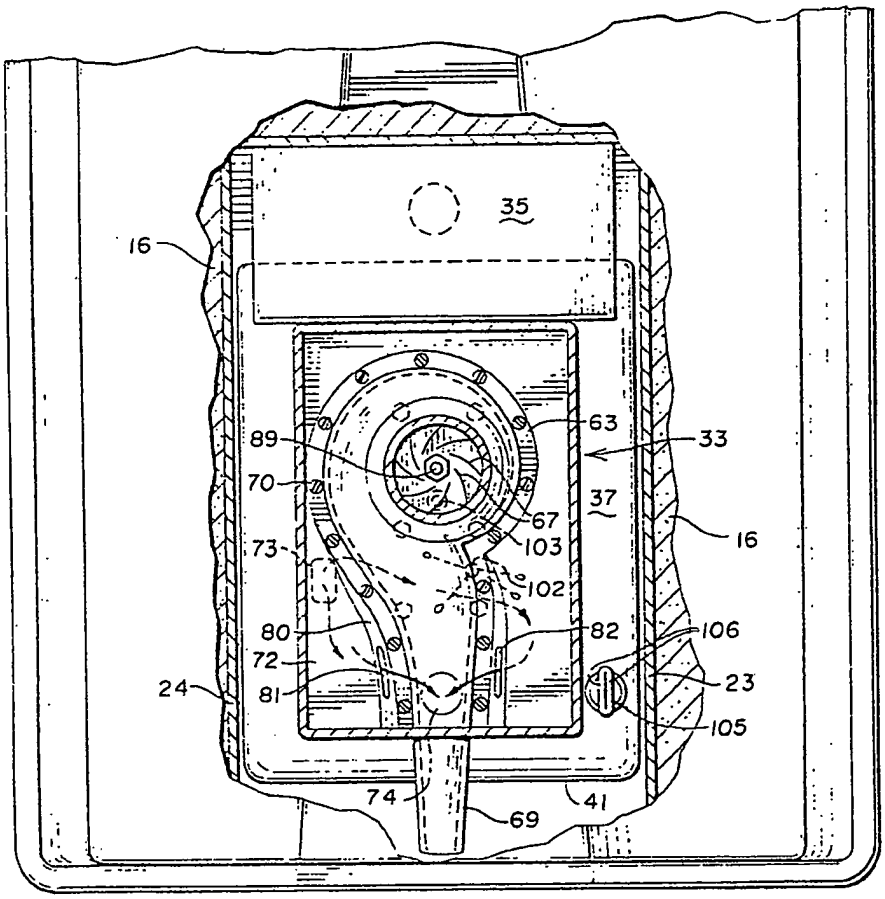
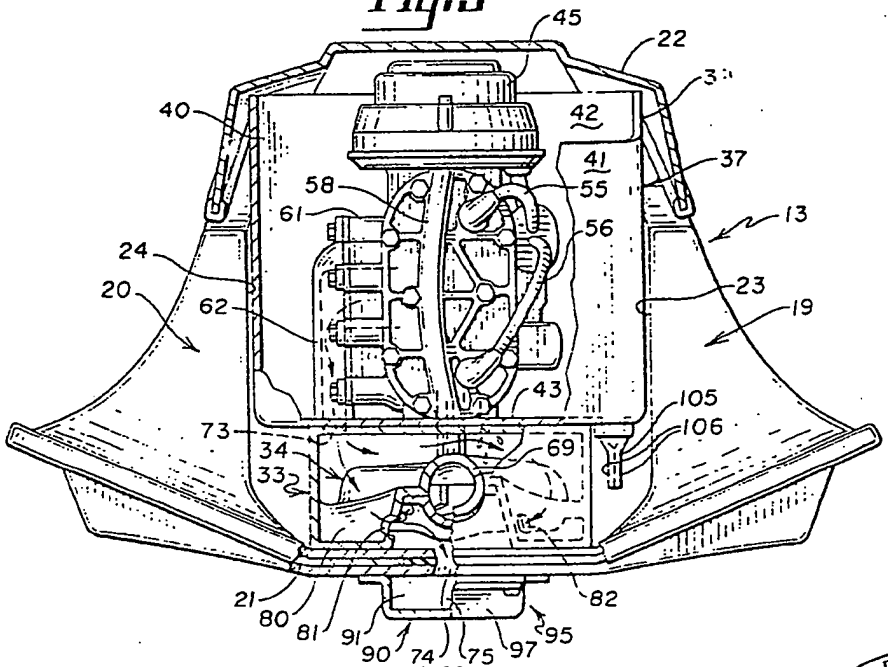


Fig. 5



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INTERNATIONAL SEARCH REPORT

International Application No PCT/US 80/01557

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[3] B63B 35/72; B63H 11/02
U.S. Cl. 114/270; 440/89

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
US	114/270 440/38, 39, 41, 46, 87-89

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
	US, A, 3,224,408, Published 21 December 1965, Sfredda	1-3,6,11-12
	US, A, 3,262,413, Published 26 July 1966, Douglas et al	1-2, 4, 12
	US, A, 3,324,822, Published 13 June 1967, Carter	1-2,-4,-12
	US, A, 3,463,116, Published 26 August 1969, Dawson	1-2,4,6,12
	US, A, 3,826,220, Published 30 July 1974, Jacobson	1, 12
	US, A, 3,889,623, Published 17 June 1975, Arnold	1, 4-6, 12
	US, A, 3,948,206, Published 06 April 1976, Tyler	1, 12

* Special categories of cited documents: [15]

"A" document defining the general state of the art

"E" earlier document but published on or after the international filing date

"L" document cited for special reason other than those referred to in the other categories

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but on or after the priority date claimed

"T" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention

"X" document of particular relevance

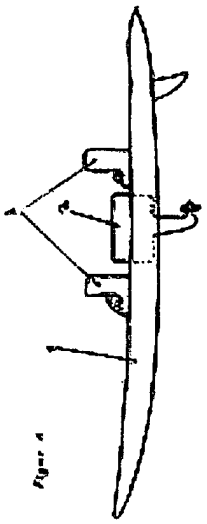
IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
24 February 1980	17 MAR 1980
International Searching Authority [1]	**Signature of Authorized Officer [20]**
ISA/US	Mel. D. Cherry

Form PCT/ISA/210 (second sheet) (October 1977)

13 of 16 DOCUMENTS

DE4100890A1 1992-07-16 **Motorised watercraft with surfboard hull - has foot holders for upright user, and pivoted engine** (en)



Inventors: Meier, Andreas

Applicants/Assignees: Meier, Andreas

Classifications: CPC: B63B35/7943 (2013-01-01; I 2013-01-01; B, H, EP)
ECLA: B63B35/79M
IPC[]: B63B35/79A B63B35#79A B63B35/79A
IPC[]: B63H5/15B B63H5#15B B63H5/15B; B63H21/24B B63H21#24B B63H21/24B
IPC[8]: B63B35/73 (2006-01-01; C, , I, 2005-10-08; R, M, EP)
IPC[8]: B63B35/79 (2006-01-01; A, , I, 2005-10-08; R, M, EP)

Priority Number and Date: DE4100890 1991-01-15

English Abstract:

The motorized water craft has a surfboard-like hull (1). A user can stand on the board, facing sidewards on a snowboard, or forward, as on a monoski approx. in the middle. The user`s feet are placed in foot holder devices (3). The hull surface can shim over the water at average speed of travel, and the drive acts in a pivot point about the vertical axis of the upright user`s body. The engine unit or tubeine drive, is positioned, so that its centre of gravity is located close to the pivot point of the hull about all axis, as determined for average speeds. Speed control is by regulation of motor output; direction control by weight displacement, and moment. USE - Motorised surfboard.

(19) BUNDESREPUBLIK DEUTSCHLAND

DEUTSCHES PATENTAMT

(12) **Offenlegungsschrift**

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(51) Int. Cl.[5]:
B 63 B 35/79
B 63 H 21/24
B 63 H 5/15

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(72) Erfinder:
gleich Anmelder

Prüfungsantrag gem. § 44 PatG ist gestellt

(54) Motorisiertes Wasserfahrzeug mit surfbrettähnlichem Rumpf

(57) Ein Wasserfahrzeug aus einem surfbrettähnlichen Rumpf mit Motor kann mit einem dem Snowboard- bzw. Monoskifahren ähnlichen Bewegungsablauf gesteuert und gefahren werden, wenn eine Person darauf seitlich oder wahlweise frontal zur Fahrtrichtung ungefähr in der Mitte der bei mittlerer Fahrtgeschwindigkeit auf dem Wasser aufliegenden Rumpffläche in den Fußbefestigungsvorrichtungen steht, und der Antrieb im Drehpunkt um die Hochachse des Körpers der stehenden Person wirkt. Der Motor ist dabei so angeordnet, daß sein Schwerpunkt sich möglichst nahe an dem für mittlere Geschwindigkeit ermittelten Drehpunkt des Rumpfes um alle Achsen befindet. Die Geschwindigkeit des Fahrzeugs wird über die Motorleistung geregelt, die Richtungssteuerung durch Gewichtsverlagerung und Bewegungstechnik erreicht.

DE 41 00 890 A 1

BUNDESDRUCKEREI 05. 92 208 029/223 12/50

Beschreibung

Die Erfindung betrifft ein Wasserfahrzeug nach dem Oberbegriff des Schutzanspruchs 1.

Es sind bereits motorisierte Surfbretter und ähnliche Wasserfahrzeuge bekannt. Dies entnahm ich meiner Recherche im Verein Deutscher Ingenieure am 03.12.1990.

Noch nicht bekannt ist ein motorisierter, surfbrettähnlicher Schwimmkörper, der von seinen Fahreigenschaften denen eines Snowboards, bzw. Monoski's entspricht und in ähnlicher Körperhaltung mit ähnlicher Stellung auf dem Rumpf und ähnlichem Bewegungsablauf gefahren wird.

Aufgabe der vorliegenden Erfindung ist es, ein Wasserfahrzeug zu entwickeln, welches sich mit einem, dem Snowboardfahren, bzw. Monoskifahren ähnlichem Bewegungsablauf steuern und fahren läßt.

Die Lösung ergibt sich aus den kennzeichnenden Merkmalen der Schutzansprüche.

Das dargestellte Wasserfahrzeug besteht im wesentlichen aus zwei Teilen, nämlich einem Rumpf 1 und der Antriebseinheit 2. **Fig.** 1 bietet eine Seitenansicht des Wasserfahrzeuges in dieser einfachen Form.

Die Antriebseinheit besteht in einer sinnvollen Ausprägung aus einem modifiziertem Außenbordmotor für Schlauchboote, welcher dahingehend verändert wurde, daß er sich auf einer Achse, welche in Fahrtrichtung verläuft, um diese drehbar befestigen läßt, daß er eine Schnur besitzt, welche, sobald sie gezogen wird, die Schiffsschraube zum Stillstand bringt, und, daß die Fahrtgeschwindigkeit mit Hilfe eines Bowdenzugs (nach dem Prinzip des Motorradgaszugs) verändert werden kann.

Die Fußhalterungen 3 sind in **Fig.** 1 so angeordnet, daß sie eine Fußstellung und den Bewegungsablauf ähnlich dem Snowboardfahren ermöglichen.

Fig. 2 zeigt verschiedene Ausgestaltungsformen dieser Fußhalterungen.

Die Fußhalterung 4 ähnelt einer Snowboard-Soft-Bindung, unterscheidet sich jedoch von dieser dadurch, daß sie eine Bodenplatte 4a) besitzt, die eine Befestigung in der skibindungsähnlichen Bindung 7 ermöglicht. Die Fußhalterung 4 ist von innen gepolstert und kann sowohl barfüßig, als auch mit geeignetem Schuhwerk benutzt werden, in diesem Fall sind die herausnehmbaren Polster auf deren bildliche Darstellung ich hier verzichte, zu entfernen.

Jede Fußhalterung besitzt mindestens eine Fußbefestigungsschnalle 4b).

Es ist im weiteren möglich original Snowboard-Soft-Bindungen zu verwenden, welche dann auf die Adapterplatte 6 aufgeschraubt werden um in die Bindung 7 zu passen. Die Bodenplatte der Bindung 7 weist Löcher in verschiedenen Abständen auf, um die Bindung individuell auf der Basisplatte 9 verschieben und drehen zu können.

Die Bindung 7 besitzt einen Öffnungshebel mit einem Loch darin. Ein Ziehen dieses Hebels bewirkt die Öffnung der Bindung 7 und gibt somit den Fuß mitsamt der Fußhalterung frei. Zwischen der Bindung 7 und der Basisplatte 9 kann noch ein Keil 15, **Fig.** 11 eingefügt werden, welcher ein angenehmeres Stehen auf dem Rumpf ermöglicht.

Die Basisplatte 9 ist fest auf dem Rumpf befestigt und weist Löcher in verschiedenen Abständen auf, welche mit einem Gewinde versehen sind (sogenannte Inserts) und welche eine Befestigung der Bindung in verschiedenen Positionen ermöglichen. Es gibt insgesamt zwei Basisplatten 9, eine vor und eine hinter der Antriebseinheit. Es ist auch möglich zwei Bindungen auf einer Basisplatte zu befestigen um den Bewegungsablauf des Monoskifahrens zu ermöglichen. **Fig.** 3 zeigt diese Anordnungsmöglichkeiten.

Um ein erleichtertes kippen und somit besseres Kurvenfahren zu ermöglichen, kann die Motoreinheit auf einer Achse 2a), welche in Fahrtrichtung verläuft um diese eingeschränkt drehbar befestigt werden. **Fig.** 7 zeigt dieses im Querschnitt aus der seitlichen Betrachtung, **Fig.** 5 zeigt es in der Draufsicht. **Fig.** 6 zeigt dieses ein weiteres Mal im Querschnitt durch den Rumpf.

Der Dämpfer 13 kann verwendet werden, um die Pendelbewegung der Motoreinheit 1 zu dämpfen. Er wird rechts und links von dieser angebracht und kann in verschiedenen Härtegraden ausgeführt werden.

Der Rahmen 10 dient zur Stabilisierung des Rumpfes. Er ist aus leichtem, bruchstabilen Material hergestellt. Eine weitere sinnvolle Ausgestaltung zur Erhöhung der Rumpfstabilität wäre, einen stabilen Rumpfrahmen 11 **Fig.** 7 zu benutzen, in welchem zugleich der Rahmen 10 und die Achse 2a) integriert sind.

Die Rumpfnase 12 kann, um Verletzungen und Beschädigungen bei Kollisionen zu mindern aus elastischem Material bestehen. **Fig.** 8 zeigt dieses nocheinmal.

Zur Vermeidung von Verletzungen durch die Schiffsschraube kann diese mit einer Ummantelung 14, **Fig.** 9 versehen werden.

Fig. 10 zeigt diese im seitlichen Querschnitt. Die Ummantelung 14 kann hierbei stromlinienförmig ausgestaltet sein und in ihrem vorderen Teil 14a) aus elastischem Material bestehen.

Fig. 11 zeigt eine räumliche Darstellung der wesentlichen Merkmale des Wasserfahrzeugs.

Zur Regelung der Geschwindigkeit dient der Drehhebel 16 welcher an einem breiten, elastischen Band befestigt ist, welches am Oberschenkel oder an der Hüfte des Fahrers befestigt wird.

Die Hebelbewegung wird durch den Bowdenzug 18 übertragen, dieser ähnelt einem bei einer Fahrradhandbremse bekannten Bowdenzug.

Ein Ziehen an der Schnur 19 bringt die Schiffsschraube z. B. durch Abschalten des Motors zum Stillstand. Ein Ziehen an der Schnur 20 öffnet die Bindungen 7 und bringt gleichzeitig die Schiffsschraube zum Stillstand.

Patentansprüche

1. Wasserfahrzeug aus einem surfbrettähnlichen Rumpf mit Motor, **dadurch gekennzeichnet,** daß eine Person darauf seitlich (wie auf einem Snowboard) oder wahlweise frontal zur Fahrtrichtung (wie auf einem Monoski im Wintersport) ungefähr in der Mitte, der bei mittlerer Fahrtgeschwindigkeit auf dem Wasser aufliegenden Rumpffläche in den Fußbefestigungsvorrichtungen stehen kann, und der Antrieb im Drehpunkt um die Hochachse des Körpers der stehenden Person wirkt. Die Motoreinheit ist dabei so angeordnet, daß deren Schwerpunkt sich möglichst nahe an dem, für mittlere Geschwindigkeit ermitteltem Drehpunkt des Rumpfes um alle Achsen befindet. Die Motoreinheit kann auch aus einem Turbinenantrieb bestehen. Die Geschwindigkeitsregelung des Fahrzeugs erfolgt durch Regulierung der Motorleistung, die Richtungssteuerung durch Gewichtsverlagerung und Bewegungstechnik.

2. Wasserfahrzeug nach Anspruch 1, dadurch gekennzeichnet, daß die Motoreinheit um die Längsachse des Rumpfes in einem eingeschränkten Maße pendeln kann, die Motoreinheit ist hierbei drehbar an einer Achse befestigt, welche sich inmitten des Rumpfes befindet und in dessen Längsrichtung verläuft.

3. Wasserfahrzeug nach Anspruch 1, dadurch gekennzeichnet, daß die Nase des Rumpfes aus elastischem Material besteht, welches bei Kollisionen vor Personen und Sachschäden schützt.

4. Wasserfahrzeug nach Anspruch 1, dadurch gekennzeichnet, daß es ein Fußbefestigungssystem gibt, welches aus folgenden Komponenten besteht

1. Einer Fußhalterung, welche gepolstert ist und die barfüßig oder mit geeignetem Schuhwerk benutzt werden kann (im letzteren Fall ist das herausnehmbare Polster zu entfernen) und welche an die Softbindung bei Snowboards angelehnt ist, sich jedoch von diesen dadurch unterscheidet, daß sie eine Bodenplatte aufweist, welche die Befestigung in einer, an die Skibindung angelehnten Bindung ermöglicht. Es ist ebenfalls möglich, eine original Snowboard-Soft-Bindung zu benutzen, wobei eine, unter diese zu schraubende Adapterplatte zu verwenden ist, welche die Befestigung in der Bindung ermöglicht.

2. Einer Bindung, welche aus einer, an eine Skibindung angelehnten Vorrichtung besteht, welche auf einer Lochplatte befestigt ist, und somit für jeden Fuß aus je einem Teil besteht und welche zur Aufnahme je einer Fußbefestigung vorgesehen ist. Die Bindungen besitzen je einen Hebel mit Loch (ein Ziehen an diesem öffnet die Bindung), durch welches eine Schnur geführt wird, die die Hebel beider Bindungen verbindet. Ein Ziehen an dieser Schnur öffnet beide Bindungen und gibt die Füße mitsamt der Fußhalterung frei. Unter der Bindung können Keile angebracht werden, die ein seitliches Neigen der Füße, und damit ein angenehmeres Stehen ermöglichen.

3. Einer Basislochplatte, welche fest mit dem Rumpf verbunden ist und die Verbindung zwischen diesem und der Bindung mit ggf. benutztem Keil darunter darstellt. Die Löcher sind so angeordnet, daß die Bindung auf der Basislochplatte verschoben und gedreht werden kann, wobei ebenfalls die Möglichkeit besteht, beide Bindungen zusammen auf entweder der vorderen oder hinteren Platte zu befestigen. Die Löcher besitzen ein Gewinde (sogenannte Inserts).

5. Wasserfahrzeug nach Anspruch 1, dadurch gekennzeichnet, daß es eine Schnur gibt, die aus der Antriebseinheit herausführt, wobei ein Ziehen an der Schnur einen Stillstand des Antriebsaggregates oder der Schiffsschraube bewirkt. Diese Schnur ist verbunden, mit der Schnur, welche die Öffnungshebel der beiden Bindungen verbindet, so daß ein Ziehen an dieser Schnur zugleich die Bindungen öffnet und die Schiffsschraube zu Stillstand bringt.

6. Wasserfahrzeug nach Anspruch 1, dadurch gekennzeichnet, daß eine oder mehrere Vorrichtungen am Rumpf besitzt, welche eine Richtungsstabilisierung bei Geradeausfahrt ermöglichen, welches z. B. durch Finnen oder die besondere Ausgestaltung, des sich unter Wasser befindlichen Teils der Antriebseinheit, erreicht werden kann.

7. Wasserfahrzeug nach Anspruch 1, dadurch gekennzeichnet, daß es einen Geschwindigkeitsregler besitzt, welcher die Leistung des Antriebsaggregates und somit die Geschwindigkeit regelt. Eine sinnvolle Ausprägung dieses Reglers besteht aus einem drehbaren Hebel, welcher auf einem breiten elastischen Band befestigt ist, welches um einen Oberschenkel oder die Hüfte geschnallt werden kann. Der Hebel ist mit einem Bowdenzug verbunden, das andere Ende des Bowdenzugs ist mit der Antriebseinheit verbunden und steuert dort die Antriebsleistung. Ein Drehen am Hebel bewirkt somit eine Veränderung der Leistung der Antriebseinheit und damit eine Veränderung der Geschwindigkeit (ähnlich dem Prinzip des Gaszugs bei einem Motorrad). Der Bowdenzug ist hierbei biegsam, wie der einer Fahrradhandbremse.

8. Wasserfahrzeug nach Anspruch 1, dadurch gekennzeichnet, daß die Motoreinheit z. B. aus einem modifizierten Motor für Schlauchboote besteht, welcher in der technischen Funktionsweise mit einem herkömmlichen Außenbordmotor übereinstimmt, jedoch in seinen äußeren Maßen auf die Belange dieses Wasserfahrzeuges abgestimmt wurde, u. a. durch die Verringerung des Abstandes zwischen Tank und Schiffsschraube, dem Hinzufügen einer Schnur, deren Ziehen den Schiffsschraubenstillstand bewirkt und die Verwendung des unter 7. beschriebenen Geschwindigkeitsregelmechanismus.

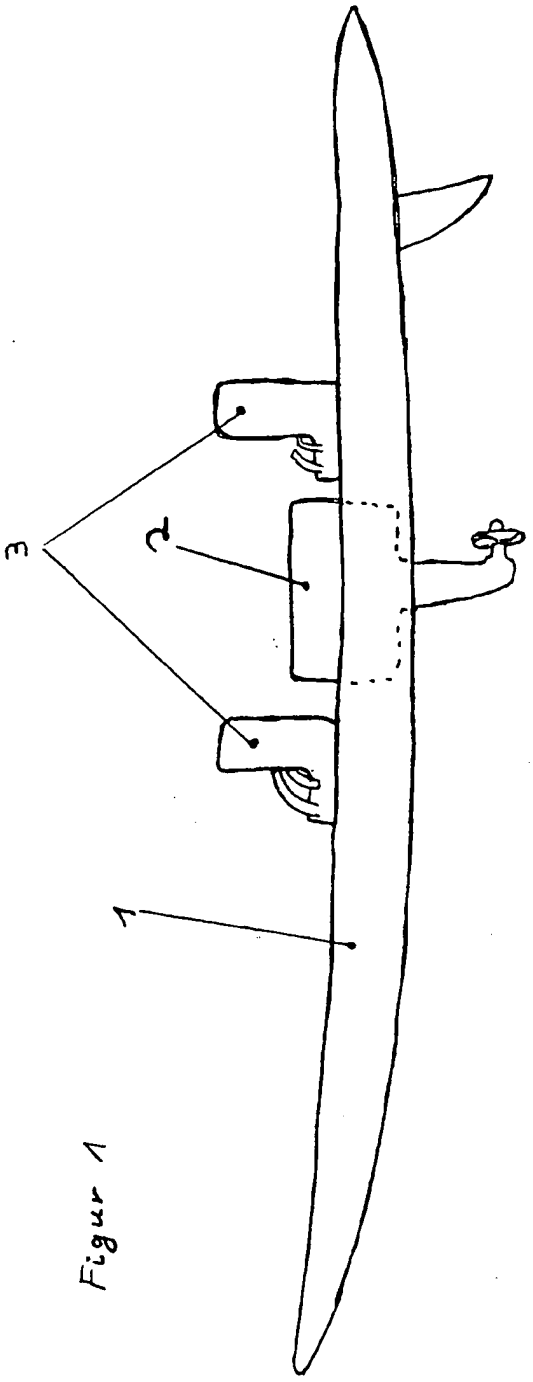
9. Wasserfahrzeug nach Anspruch 1, dadurch gekennzeichnet, daß es eine Ummantelung der Schiffsschraube besitzt, welche vor Verletzungen schützen soll.

10. Wasserfahrzeug nach Anspruch 9, dadurch gekennzeichnet, daß die Ummantelung nach Anspruch 9 stromlinienförmig ausgestaltet ist, und in der vorderen Hälfte aus elastischem Material besteht, um Verletzungen zu verhindern.

Hierzu 8 Seite(n) Zeichnungen

— Leerseite —

Nummer: DE 41 00 890 A1
Int. Cl.[5]: B 63 B 35/79
Offenlegungstag: 16. Juli 1992

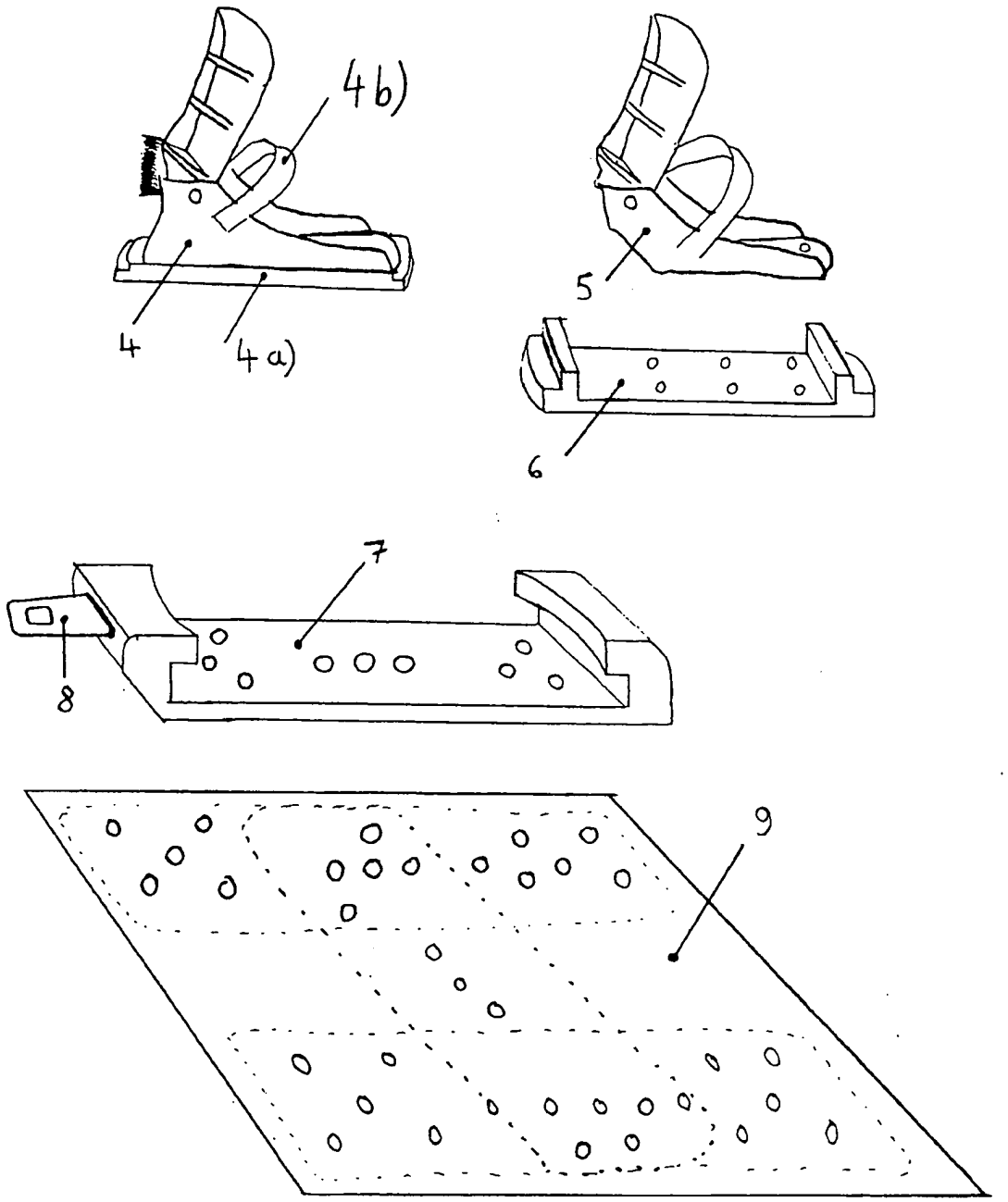


Figur 1

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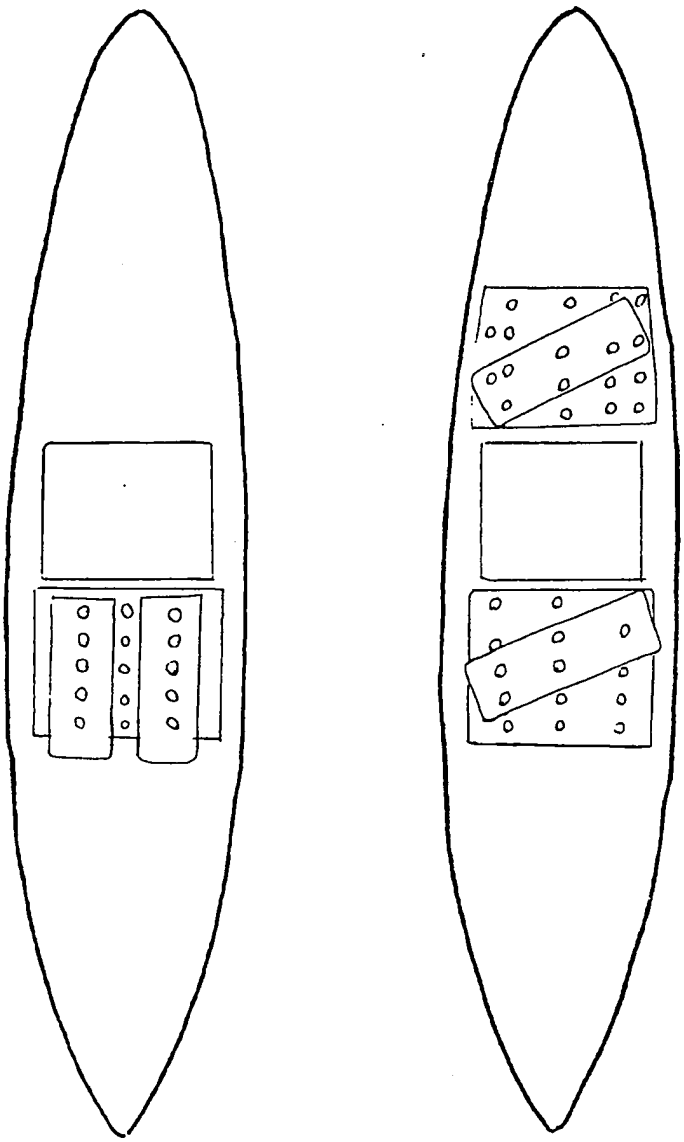
Figur 2



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Fig. 3



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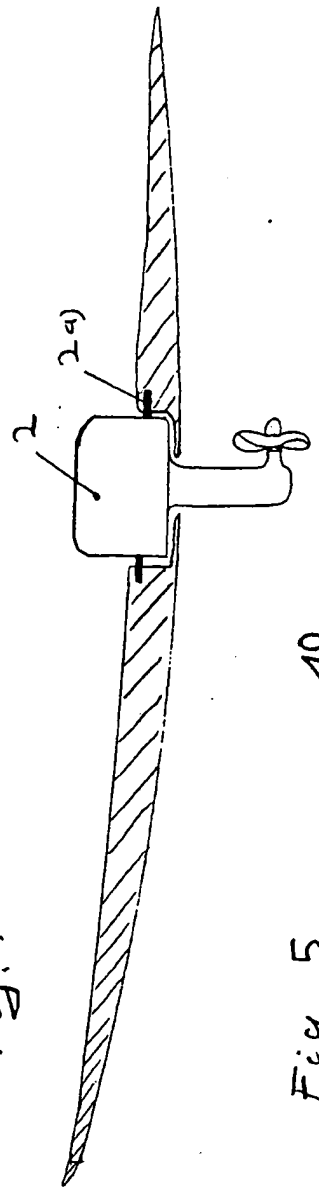


Fig. 4

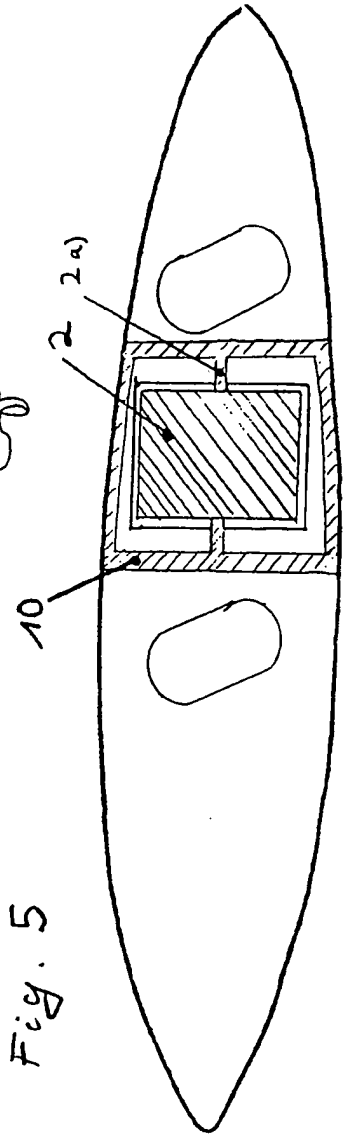


Fig. 5

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Offenlegungstag: 16. Juli 1992

Fig. 6

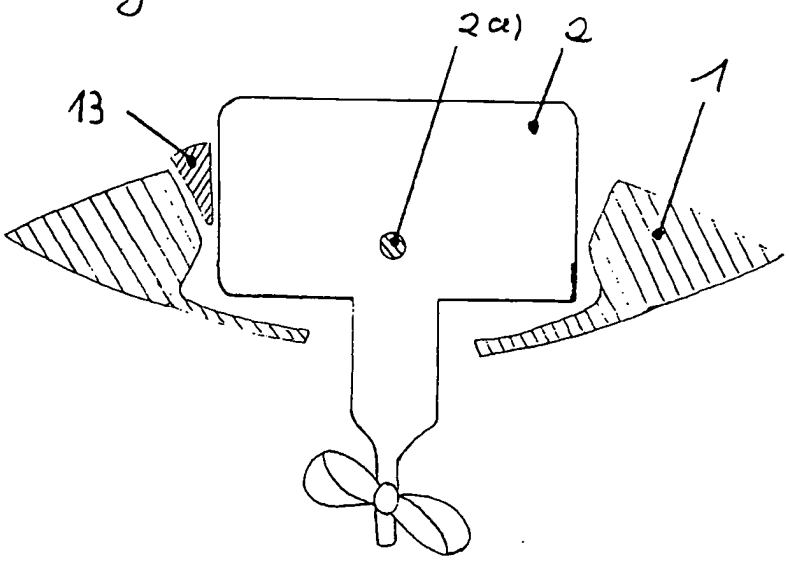


Fig. 10

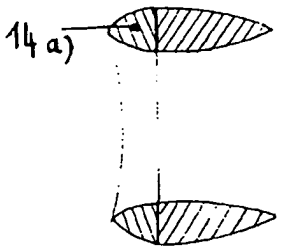
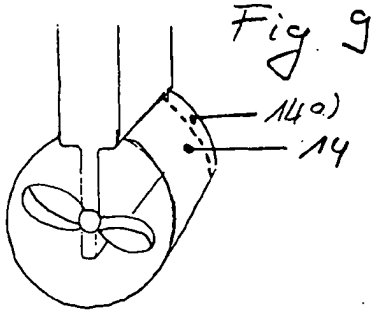


Fig. 9



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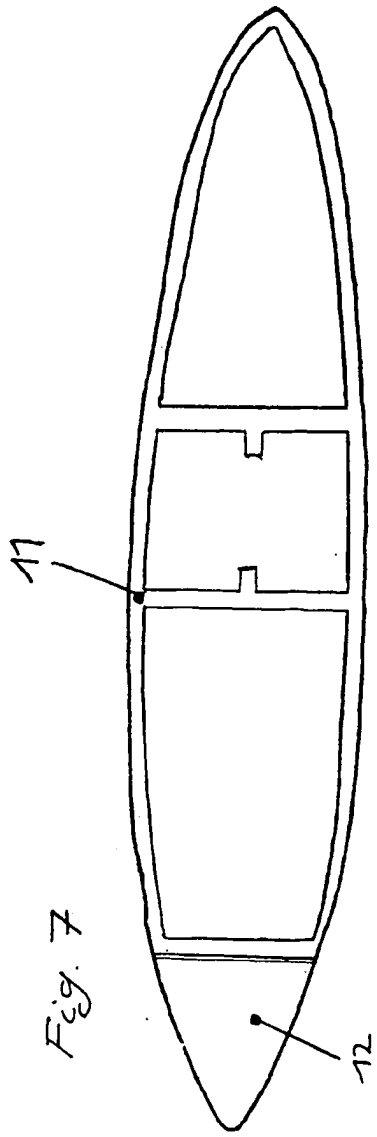


Fig. 7

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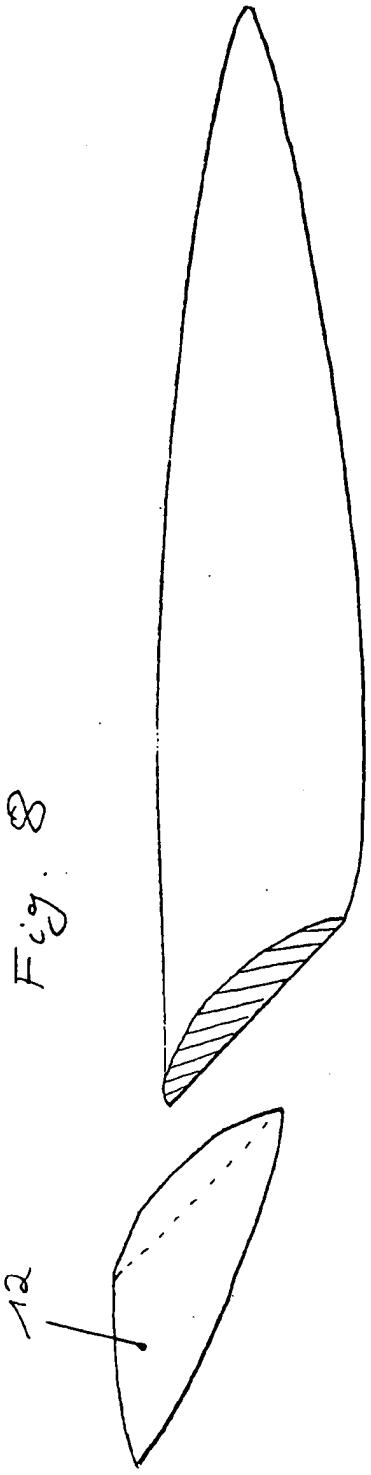


Fig. 8

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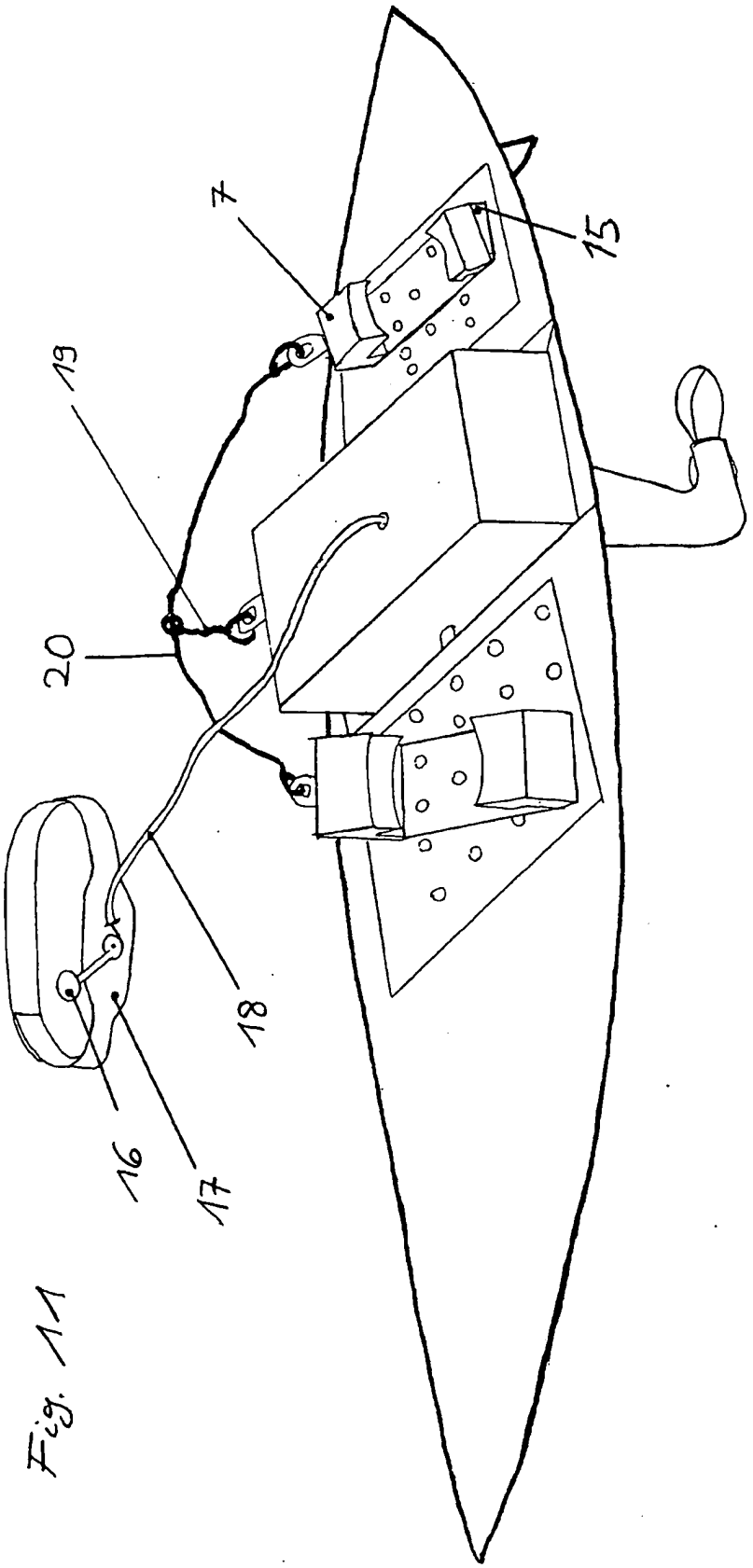
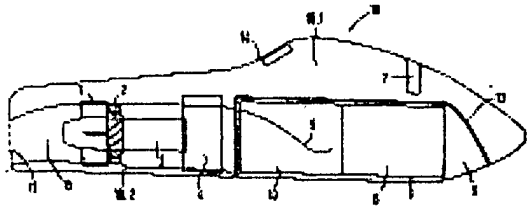


Fig. 11

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DE102004049615B4 2009-03-05 **Engine vessel** (en)



Inventors: GRIMMEISEN JUERGEN, Federal Republic of Germany;
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Applicants/Assignees: ROTINOR GMBH, Federal Republic of Germany

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CPC: A63B35/12 (2013-01-01; I 2014-07-28; B, H, EP)
CPC: B60L3/0046 (2013-01-01; I 2014-07-28; B, H, EP)
CPC: B60L11/1874 (2013-01-01; I 2014-07-28; B, H, EP)
CPC: B60L2240/36 (2013-01-01; A 2014-07-28; B, H, EP)
CPC: B63B35/731 (2013-01-01; A 2014-07-28; B, H, EP)
CPC: B63C11/46 (2013-01-01; A 2014-07-28; B, H, EP)
CPC: H01M2/1077 (2013-01-01; I 2014-07-28; B, H, EP)
CPC: H01M10/613 (2015-04-01; I 2015-04-13; B, H, EP)
CPC: H01M10/625 (2015-04-01; I 2015-04-13; B, H, EP)
CPC: H01M10/6554 (2015-04-01; I 2015-04-13; B, H, EP)
CPC: H01M10/6567 (2015-04-01; I 2015-04-13; B, H, EP)
CPC: H02K5/124 (2013-01-01; I 2014-07-28; B, H, EP)
CPC: H02K11/20 (2016-01-15; I 2016-01-18; B, H, EP)
CPC: H02K11/33 (2016-01-15; I 2016-01-18; B, H, EP)
CPC: H02K11/35 (2016-01-15; I 2016-01-18; B, H, EP)
CPC: Y02T10/641 (2013-01-01; A 2014-07-28; B, H, EP)
CPC: Y02T10/7005 (2013-01-01; A 2014-07-28; B, H, EP)
CPC: Y02T10/705 (2013-01-01; A 2014-07-28; B, H, EP)
ECLA: B63H21/17; A63B35/12; B60L3/00F6; B60L11/18M34D; H01M2/10C4B; H01M10/50C2; H01M10/50D4; H01M10/50K10H; H01M10/50K12D; H02K5/124; H02K11/00F; H02K11/00H1; H02K11/00H2
IPC[8]: B63H11/08 (2006-01-01; A, F, I, 2005-10-17; B, H, DE)
IPC[8]: B63H20/00 (2006-01-01; A, L, I, 2005-10-17; B, H, DE)
IPC[8]: B63H21/17 (2006-01-01; A, L, I, 2005-10-17; B, H, DE)
ICO: L60L240/36
ICO: L63B35/73B
ICO: L63C11/46
ICO: Y02E60/12
ICO: Y02T10/64B
ICO: Y02T10/70B
ICO: Y02T10/70H4

Priority Number and Date: DE102004049615 2004-10-12

English Abstract:

An electric motor-driven water craft including a fuselage, on which a user can at least partially lie or stand. The fuselage has a flow channel with a screw that is driven by an electric motor and contains the electric motor and batteries, in addition to a control device for the electric motor and the screw, and those items are housed at least partially in the flow channel. This invention provides a higher power for motor-driven water craft of this type by locating the batteries in a water-tight housing. At least some sections of the batteries are in thermally conductive contact with the housing. The housing can be at least partially of a thermally conductive material and/or the electric motor is an internal-rotor motor. The stator is in thermal conductive contact with a housing of the electric motor by a heat conducting unit. At least part of the region of the housing that is assigned to the heat conducting unit can be of a thermally conductive material and the housing can be located at least partially in the flow channel.

(19) Bundesrepublik Deutschland
Deutsches Patent- und Markenamt

(10) **DE 10 2004 049 615 B4** 2009.03.05

(12) # Patentschrift

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(45) Veröffentlichungstag der Patenterteilung: **05.03.2009**

(51) Int Cl.[8]: ***B63H 11/08*** (2006.01)
B63H 21/17 (2006.01)
B63H 20/00 (2006.01)

Innerhalb von drei Monaten nach Veröffentlichung der Patenterteilung kann nach § 59 Patentgesetz gegen das Patent Einspruch erhoben werden. Der Einspruch ist schriftlich zu erklären und zu begründen. Innerhalb der Einspruchsfrist ist eine Einspruchsgebühr in Höhe von 200 Euro zu entrichten(§ 6 Patentkostengesetz in Verbindung mit der Anlage zu § 2 Abs. 1 Patentkostengesetz).

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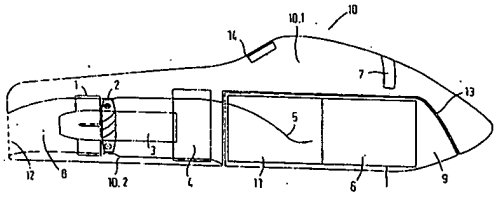
(74) Vertreter:
Jeck · Fleck · Herrmann Patentanwälte, 71665 Vaihingen

(72) Erfinder:
Grimmeisen, Jürgen, 70469 Stuttgart, DE;
Walpurgis, Peter, Kitzbühel, AT

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(54) Bezeichnung: **Motorwasserfahrzeug**

(57) Hauptanspruch: Motorwasserfahrzeug mit einem Fahrzeugrumpf auf dem der Benutzer zumindest teilweise aufliegt oder sich aufstellt, mit einem im Fahrzeugrumpf verlaufenden Strömungskanal mit einer von einem Elektromotor getriebenen Wasserschraube, wobei der Fahrzeugrumpf den Elektromotor und Batterien sowie ein Steuergerät für den Elektromotor und die Wasserschraube aufnimmt, die zumindest bereichsweise im Strömungskanal untergebracht sind,
dadurch gekennzeichnet,
dass der Elektromotor (3) als Innenläufermotor ausgebildet ist,
dass der Stator (21) des Elektromotors (3) mittels einer Wärmeleiteinheit (22) im Wärme führenden Kontakt mit einem Aufnahmegehäuse (3.5) des Elektromotors (3) steht,
dass das Aufnahmegehäuse (3.5) zumindest teilweise in dem der Wärmeleiteinheit (22) zugeordneten Bereich aus wärmeleitfähigem Material besteht, dass das Aufnahmegehäuse (3.5) zumindest teilweise im Strömungskanal (8) angeordnet ist,
dass der Rotor (20) und der Stator (21) in dem gegenüber der Umgebung wasserdicht verschlossenen Aufnahmegehäuse (3) untergebracht sind,
dass die Antriebswelle (3.1) über eine Dichtkassette (40) aus dem Aufnahmegehäuse (3.5)...



Beschreibung

[0001] Die Erfindung betrifft ein Motorwasserfahrzeug mit einem Fahrzeugrumpf auf dem der Benutzer zumindest teilweise aufliegt oder sich aufstellt, mit einem im Fahrzeugrumpf verlaufenden Strömungskanal mit einer von einem Elektromotor getriebenen Wasserschraube, wobei der Fahrzeugrumpf den Elektromotor und Batterien sowie ein Steuergerät für den Elektromotor und die Wasserschraube, zumindest bereichsweise im Strömungskanal untergebracht sind.

[0002] Ein solches Motorwasserfahrzeug ist aus der DE 100 09 278 A1 bekannt.

[0003] In diesem Dokument ist ein Wasserfahrzeug beschrieben. Es hat einen Fahrzeugrumpf in dem ein Strömungskanal eingeformt ist. In dem Strömungskanal ist eine Unterwasser-Einheit, bestehend aus Elektromotor, Motorsteuerung und Wasserschraube untergebracht.

[0004] Im Bereich des Wassereintritts in den Strömungskanal ist eine Eintiefung im Fahrzeugrumpf vorgesehen, in die ein Batteriegehäuse austauschbar eingesetzt ist. In dem Batteriegehäuse sind die Batterien zur Versorgung des Elektromotors eingebaut.

[0005] Aus der WO 96/30087 A1 ein Motorwasserfahrzeug bekannt, bei dem ein Elektromotor im Fahrzeugrumpf untergebracht ist. Über einen Transmissionsantrieb wird eine Wasserschraube angetrieben, die in einem Strömungskanal des Fahrzeugrumpfes angeordnet ist.

[0006] Mit diesem Wasserfahrzeug können nur begrenzte Vortriebsgeschwindigkeiten erreicht werden, da der Antriebsstrang den Wirkungsgrad nicht unerheblich beeinflusst. Insbesondere ist darauf zu achten, dass der Elektromotor nicht überhitzt, was aufgrund der wassergeschützten Unterbringung im Fahrzeugrumpf problematisch ist. Insbesondere ist hier eine ausreichende Wärmeabfuhr nur aufwändig erreichbar.

[0007] Die DE 196 27 323 A1 offenbart einen Schiffsmotor der gondelartig an den Rumpf eines Schiffes angehangen werden kann. Der Schiffsmotor umfasst einen Elektromotor, der als Innenläufermotor ausgebildet ist. Der Stator des Elektromotors ist in ein Motorgehäuse eingepresst und steht mit diesem im wärmeleitenden Kontakt. Das Motorgehäuse steht an seiner Außenseite in Kontakt mit dem strömenden Wasser, so dass ein Wärmeübertrag vom Stator stattfinden kann.

[0008] Solche Schiffsmotoren mit 10 MW Leistung sind für den Einsatz in Wassersportfahrzeugen nicht konzipiert und auch nicht geeignet.

[0009] Ein weiterer Schiffsantrieb dieser Art ist aus der DE 101 58 320 A1 bekannt. Auch hier wird der Elektromotor vom vorbeiströmenden Wasser gekühlt.

[0010] In der DE 296 00 675 U1 ist ein Wasserantrieb für Luftmatratzen beschrieben. Der Wasserantrieb umfasst ein Gehäuse, in dem ein Elektromotor und ein Akku eingebaut sind.

[0011] Die JP 2002 2362488 A offenbart ein akkubetriebenes Wassersportfahrzeug. Dabei ist der Akku wassergeschützt im Fahrzeugrumpf eingebaut. Um Stöße und Schwingungen vom Akku fernzuhalten, ist dieser federnd gegenüber der Fahrzeugrumpf-Gehäusewand abgestützt.

[0012] Die DE 31 39 816 C2 beschreibt ein Segelbrett, an dessen Unterseite ein Elektromotor angebaut ist. Die Stromversorgung erfolgt über eine Batterie, die auf der Oberseite des Segelbrettes angebaut ist.

[0013] Aus der DE 1 100 493 A ist ein Außenbordantrieb für Boote bekannt.

[0014] Es ist Aufgabe der Erfindung, ein Motorwasserfahrzeug der im Oberbegriff des Anspruches 1 erwähnten Art zu schaffen, das sich bei kompakter Bauweise durch einen hohen Wirkungsgrad auszeichnet.

[0015] Diese Aufgabe wird durch die kennzeichnenden Merkmale des Anspruchs 1 gelöst.

[0016] Bei dieser Anordnung kann der Elektromotor seine Verlustwärme zumindest teilweise zuverlässig an das strömende Wasser abgeben. Dies wird insbesondere durch die Anordnung des Aufnahmegehäuses im Strömungskanal unterstützt, da dort ein hoher Volumenstrom durchgesetzt wird, der zielgerichtet am Aufnahmegehäuse vorbei geleitet werden kann. Die Wärmeleiteinheit sorgt dabei für einen Wärmekontakt zwischen Stator und Aufnahmegehäuse.

[0017] An dieser Stelle sei erwähnt, dass unter dem Begriff Batterien im Sinne der Erfindung auch Akkumulatoren zu verstehen sind.

[0018] Gemäß einer bevorzugten Erfindungsausgestaltung kann es vorgesehen sein, dass die Batterien in einem wasserdichten Gehäuse untergebracht sind und zumindest bereichsweise im wärmeleitenden Kontakt mit dem Gehäuse stehen, dass das Gehäuse zumindest teilweise aus wärmeleitfähigem Material besteht und dass das Gehäuse im wärmeleitenden Kontakt mit dem strömenden Wasser steht.

[0019] Hierbei kann die bei hohen elektromotori-

schen Leistungen zwangsläufig entstehende Wärmeentwicklung in den Batterien zuverlässig und auf einfache Weise an das Wasser abgegeben werden. Dieses steht als praktisch unbegrenztes Kühlreservoir zur Verfügung.

[0020] Um einen guten Wärmeübergang auf das Wasser zu ermöglichen, kann es bevorzugt vorgesehen sein, dass das Gehäuse zumindest teilweise aus Aluminium besteht. Das Aluminium-Material ist dabei auch insbesondere im Meerwasserbereich ausreichend korrosionsbeständig. Um auch im Schadensfall ausreichend anwendersicher zu bleiben, ist es gemäß einer möglichen Erfindungsvariante vorgesehen, dass die Batterien eine Spannung kleiner oder gleich 60 V aufweisen. Dabei ist die erfindungsgemäße Kühlung für die Abfuhr der entstehenden Wärme in besonderer Weise geeignet, wie das nachstehende Beispiel erläutert:
Bei 4 kW Abgabeleistung an der Antriebswelle und ca. 85% Gesamtwirkungsgrad des Antriebssystems (90% Motor + 5% Elektronik = 85% Ges.) sind dies 4,7 kW aufgenommene Leistung aus den Batterien. Bei 45 V/über 100 A möglicher Dauer-Stromfluss erwärmt sich das Gesamtsystem. Das heißt, 700 W müssen trotz hohen erreichten technischen Wirkungsgrads gut gekühlt werden.

[0021] Eine weitere Erfindungsgestaltung kann dadurch gekennzeichnet sein, dass das Gehäuse mit den Batterien zumindest teilweise im Bereich des Strömungskanals angeordnet ist. In diesem Bereich liegt ein hoher Volumenstrom kühlenden Wassers vor, was eine effektive Kühlung unterstützt.

[0022] Gemäß einer weiteren bevorzugten Erfindungsgestaltung kann es vorgesehen sein, dass das Gehäuse mit den Batterien in einer in der Unterseite des Fahrzeugrumpfes ausgeformte Ausnehmung angeordnet ist, die zumindest teilweise außerhalb des Strömungskanals und der Einströmöffnung des Strömungskanals angeordnet ist und dass das Gehäuse zumindest back- und steuerbordseitig und/oder kielseitig, teilweise im strömenden Wasser angeordnet ist. Bei dieser Anordnung ist eine großflächige Wasseranströmung möglich. Die Gewichtstarierung des Motorwasserfahrzeuges kann im Hinblick auf den optimalen Schwerpunkt auf einfache Weise dadurch unterstützt werden, dass das Gehäuse sich um dem zwischen Bug und Heck gebildeten Mittenbereich des Fahrzeugrumpfes in Richtung zum Bug erstreckt.

[0023] Die Batterien sind für den Ladevorgang leicht zugänglich oder herausnehmbar und durch ein neues Gehäuse mit geladenen Batterien ersetzbar. Die Batterien des entnommenen Gehäuses können nachgeladen werden. Damit ist das Motorwasserfahrzeug stets benutzerfreundlich einsatzbereit, was für Verleihstationen von besonderem Vorteil ist. Das Gehäuse für die Batterien ist wasserdicht und weist vorzugsweise auch eine wasserdichte Ladebuchse auf.

[0024] Im Rahmen der Erfindung kann im Bedarfsfall auch das elektronische Steuergerät, welches die Schaltelektronik und gegebenenfalls Leistungsteile aufweist, im Wasser gekühlt werden.

[0025] Bevorzugt bilden die Elektronik und der Motor eine Einheit, in der diese Einheiten ggf. thermisch gekoppelt sein können.

[0026] Gemäß einer bevorzugten Erfindungsgestaltung kann es vorgesehen sein, dass die Wärmeleiteinheit als wärmeleitende Vergussmasse ausgebildet ist, die mit dem Aufnahmegehäuse stoffschlüssig verbunden ist. Auf diese Weise wird ein guter Wärmeübergang zwischen dem Stator und dem Aufnahmegehäuse des Elektromotors geschaffen.

[0027] Um den Elektromotor auf einfache Weise auf verschiedene Leistungsstufen umbauen zu können, kann es vorgesehen sein, dass das Gehäuse des Elektromotors eine Statoraufnahme bildet, in der bausatzartig verschiedene Statoren einbaubar sind, wobei die Statoren entsprechend unterschiedlichen Leistungsbereichen eine unterschiedliche Erstreckung in Achsrichtung der Antriebswelle des Rotors aufweisen.

[0028] Die erfindungsgemäß versetzbare Dichtkassette ermöglicht es, die Dichtringe unterschiedlichen Wellenbereichen zuzuordnen. Dies kann beispielsweise dann erforderlich sein, wenn die Dichtringe sich nach gewisser Betriebsdauer in die Oberfläche der Antriebswelle eingearbeitet haben und dann die Gefahr einer Leckage auftritt.

[0029] Die Standzeit der Antriebswelle kann dadurch erhöht werden, dass die Lauffläche der Antriebswelle, auf der die Dichtringe ablaufen, oberflächenvergütet, beispielsweise hartstoffbeschichtet sind. Eine einfache Leckage-Überwachung ist dadurch möglich, dass zwischen zwei Dichtringen oder vorzugsweise nach den redundanten Dichtringen ein Leckagesensor angeordnet ist.

[0030] Erfindungsgemäß kann auch die Zusammenfassung von Wasserschraube, Elektromotor und Steuergerät für den Elektromotor zu einer Unterwasser-Einheit und deren Unterbringung im Strömungskanal vorgesehen sein.

[0031] Dies bringt eine wesentliche Vereinfachung im Aufbau der Teile, insbesondere des Fahrzeugrumpfes und für die Wartung des Motorwasserfahrzeuges.

[0032] Ist nach einer Ausgestaltung vorgesehen, dass der Fahrzeugrumpf über dem Strömungskanal

eine Liegefläche oder eine Plattform für den Benutzer aufweist, dann ist es in zwei Nutzungsarten verwendbar.

[0033] Der konstruktive Aufbau lässt sich dadurch noch vereinfachen, dass der Strömungskanal einstückig in dem Fahrzeugrumpf ausgeformt ist.

[0034] Als besonders vorteilhaft hat sich eine Ausführung erwiesen, die dadurch gekennzeichnet ist, dass der Strömungskanal mit einer Einströmöffnung im Bereich des Buges des Fahrzeugrumpfes ausgeht und mit einer Ausströmöffnung im Bereich des Hecks des Fahrzeugrumpfes endet und dass die Unterwasser-Antriebs-Einheit als Schub- und Sauggerät in den Strömungskanal eingebaut ist.

[0035] Für die beiden unterschiedlichen Verwendungsarten des Motorwasserfahrzeuges im Liegen oder im Stehen ist eine Ausgestaltung von Vorteil, die dadurch gekennzeichnet ist, dass der Unterwasser-Antriebs-Einheit ein Fernsteuergerät zugeordnet ist, das am Fahrzeugrumpf lösbar angebracht und über eine drahtlose Übertragungsstrecke mit dem Steuergerät der Unterwasser-Einheit in Wirkverbindung bringbar ist.

[0036] Für eine einfache Wartung oder Reparatur der Unterwasser-Antriebs-Einheit ist zusätzlich vorgesehen, dass der Fahrzeugrumpf unterhalb der Unterwasser-Antriebs-Einheit im Strömungskanal eine zu öffnende Platte, Klappe oder dergleichen aufweist, über die Zugang zur Unterwasser-Einheit besteht.

[0037] Gemäß einer bevorzugten Ausgestaltungsvariante der Erfindung kann es vorgesehen sein, dass der Wasserschraube im Strömungskanal in Strömungsrichtung vor- oder nachgelagert ein Strömungsstator zugeordnet ist, der die im Strömungskanal erzeugte rotierende Wasserströmung zumindest teilweise gerade richtet.

[0038] Der Strömungsstator nimmt die Rotationsbewegung des von der Wasserschraube beschleunigten Wassers auf und wandelt diese in eine zusätzliche Schubkraft um. Der erzeugte Wasserstrahl trifft ohne schubkraftzehrende spiralförmige Rotationsströmung auf das umgebende Wasser, wodurch sich ein effektiver Betrieb mit hohem Wirkungsgrad ergibt.

[0039] Der Strömungsstator ist bevorzugt ortsfest direkt mit dem Fahrzeugrumpf verbunden.

[0040] Eine einfache Bauweise für den Strömungsstator ergibt sich dann, wenn vorgesehen ist, dass der Strömungsstator eine Vielzahl von Leitschaufeln aufweist, die konzentrisch im Strömungskanal angeordnet sind. Die Leitschaufeln können um einen Konus herum strömungsgünstig angeordnet sein.

[0041] Um eine optimale Beschleunigung des im Strömungskanal bewegten Wassers zu erreichen, kann es vorgesehen sein, dass der Strömungsstator im Bereich einer sich im Querschnitt verjüngenden Wasseraustrittsdüse (Diffusor) des Strömungskanals angeordnet ist.

[0042] Die Erfindung, wird im Folgenden anhand eines in den Zeichnungen dargestellten Ausführungsbeispieles eines Motorwasserfahrzeuges näher erläutert. Es zeigen:

[0043] Fig. 1 in Seitenansicht das Motorwasserfahrzeug und

[0044] Fig. 2 einen Elektromotor des Motorwasserfahrzeuges in Seitenansicht und im Schnitt.

[0045] Die Außenkontur des Fahrzeugrumpfes **10** entspricht im Wesentlichen der Außenkontur des Fahrzeugrumpfes des aus der WO 96/30087 A1 bekannten Motorwasserfahrzeuges. Der Strömungskanal **8** erstreckt sich von der Einströmungsöffnung **11** im Bereich des Buges bis zum Strömungsaustritt **12** im Heckbereich des Fahrzeugrumpfes **10**. Die Einströmöffnung **11** erstreckt sich dabei ausgehend von einem Mittenbereich des Fahrzeugrumpfes **10** in Richtung zum Bug. In den Strömungskanal **8**, der im Bereich der Einströmungsöffnung **11** und der Ausströmungsöffnung **12** leicht nach unten gekrümmt ist, ist eine Unterwasser-Antriebs-Einheit aus Strömungsstator **1**, Elektromotor **3**, Wasserschraube **2** und Motorsteuergerät **4** eingebaut. Vorliegend ist der Strömungsstator ortsfest mit dem Fahrzeugrumpf **10** verbunden. Er hat die Aufgabe, die im Strömungskanal **8** erzeugte, rotierende Wasserströmung möglichst drallfrei gerade zu richten. Dadurch wird eine Wirkungsgradverbeserung erreicht. Das Motorwasserfahrzeug ist so auslegbar, dass ihr Einsatz im strömenden Wasser ohne Bedenken vorgenommen werden kann. Der Fahrzeugrumpf **10** kann daher außerhalb des Strömungskanals **8** freizügig vorgenommen werden und so einfach wie möglich, jedoch strömungsgünstig und benutzerfreundlich so gut wie möglich gestaltet werden.

[0046] Der Strömungskanal kann einstückig in dem Fahrzeugrumpf **10** ausgeformt sein. Im vorliegenden Ausführungsbeispiel wird der Störmungskanal **8** von einer Oberschlale **10.1** und einer Unterschale **10.2** gebildet. Die Bauteile sind mittels geeigneter Befestigungsmittel miteinander verbunden. Für die Wartung der Unterwasser-Antriebs-Einheit wird der Strömungskanal **8** durch Abnehmen der Unterschale **10.2** zugänglich gemacht. Unterhalb der Unterwasser-Antriebs-Einheit kann aber auch eine Platte, Klappe oder dergleichen vorgesehen sein, über die Zugang zur Unterwasser-Antriebs-Einheit besteht.

[0047] Im Bereich des Buges der Oberschale **10.1**

des Fahrzeugrumpfes **10** ist in der Unterseite eine Ausnehmung **13** eingeformt, in die ein Gehäuse **9** mit den Batterien **5** und **6** lösbar eingesetzt ist. Das Gehäuse **9** mit den aufladbaren Batterien **5** und **6** ist leicht und schnell austauschbar und kann durch ein Gehäuse **9** mit geladenen Batterien **5** und **6** ersetzt werden, so dass das Motorwasserfahrzeug stets einsatzfähig ist.

[0048] Der Bereich der Einströmöffnung **11** des Strömungskanales **8** kann mittels des Gehäuses **9** derart überlagert, dass der freie Zugriff zu dem Rotor **2** verhindert ist, jedoch Wasser mit ausreichendem Volumenstrom förderbar ist. Mit dieser einfachen Maßnahme wird erreicht, dass der Rotor **2** erst bei abgenommenem Gehäuse **9** zugänglich ist, also dann, wenn der Elektromotor **3** stromlos ist.

[0049] Es kann auch vorgesehen sein, dass der Zugriff in den Strömungskanal **8** mittels Sperrelementen, die im Bereich der Einström- und/oder Ausströmöffnung angeordnet sind, verhindert ist.

[0050] Das Gehäues **9** ist längs seiner beiden Seiten (backbord und steuerbord) und kielseitig gemäß strömenden Wasser ausgesetzt und kann hier optimal gekühlt werden, um eine unzulässige Erwärmung der Batterien **5** und **6** im Betrieb auszuschließen. Liegt der Benutzer auf dem Fahrzeugrumpf **10**, dann kann er sich an Griffelementen **7** oder Griffmulden festhalten. In eines oder beide Griffelemente **7** sind Bedienorgane eines Handsteuergerätes **14** integriert.

[0051] Ebenso kann auch ein drahtloses Fernsteuergerät vorgesehen sein. Dieses steht über eine Funkstrecke in Verbindung mit dem Motorsteuergerät **4**. Das Handsteuergerät **14**, das mit dem Motorsteuergerät **4** kommuniziert, ist im Sichtfeld des Benutzers am Fahrzeugrumpf **10** gehalten. Steht der Benutzer auf dem Fahrzeugrumpf **10**, dann kann das Handsteuergerät **14** vom Fahrzeugrumpf **10** gelöst und benutzt werden. In diesem können verschiedene Betriebszustände, beispielsweise die aktuelle Fahrgeschwindigkeit, die Tauchtiefe oder der Ladezustand der Batterien **5** und **6** angezeigt werden.

[0052] Der Elektromotor ist als Innenläufermotor ausgebildet. Er ist direkt im Strömungskanal **8** eingebaut und gibt seine Wärme hier an das strömende Wasser ab, wie dies später noch näher erläutert wird.

[0053] Ebenso kann auch das Motorsteuergerät, das die Leistungselektronik und/oder einen Mikroprozessor aufweisen kann, im Strömungskanal **8** angeordnet und hier gekühlt sein. Alternativ kann das Motorsteuergerät **4** auch außerhalb des Strömungskanals **8** im Wasser angeordnet sein.

[0054] In der **Fig. 2** ist der Elektromotor **3** im Detail dargestellt. Demnach weist der Elektromotor **3** eine Antriebswelle **3.1** auf, die mittels zweier Lager **3.2** gelagert ist. Die Antriebswelle **3.1** ist an einem Wellenende mit einem Sitzabschnitt versehen, auf dem die Wasserschraube **2** montiert ist. Die Wasserschraube **2** ist dabei mit einem Grundkörper **2.1** auf der Antriebswelle **3.1** gehalten. Der Grundkörper **2.1** besitzt Steckaufnahmen, in die Propellerblätter **2.2** eingesetzt sind. Zur Fixierung der Propellerblätter **2.2** in den Steckaufnahmen ist eine Abdeckung **2.3** verwendet. Diese ist mit dem Grundkörper **2.1** verschraubt (Verschraubung **2.4**).

[0055] Die Antriebswelle **3.1** weist endseitig einen Gewindeabschnitt **3.4** auf. Auf diesen kann eine Mutter aufgedreht und die Wasserschraube **2** so festgelegt werden.

[0056] Die Antriebswelle trägt einen Rotor **20** des als Innenläufer ausgebildeten Antriebsmotors. Diesem ist ein ortsfester Stator **21** zugeordnet. Der Stator **21** ist mittels einer als Vergussmasse ausgebildeten Wärmeleiteinheit **22** mit der Innenwandung eines Aufnahmegehäuses **3.5** vergossen.

[0057] Das Aufnahmegehäuse **3.5** kann mittels eines, auf der der Wasserschraube **2** abgewandten Seite der Antriebswelle **3.1** angeordneten Gehäusedeckels **3.10** verschlossen werden. Auf der dem Gehäusedeckel **3.10** abgekehrten Seite schließt ein Gehäuseteil **3.6** das Aufnahmegehäuse **3.5** ab (Verschraubung **3.7**). Der Gehäusedeckel **3.10** und das Gehäuseteil **3.6** weisen Lageraufnahmen für die beiden Lager **3.2** auf.

[0058] In dem Aufnahmegehäuse **3.5** ist eine Statoraufnahme **3.11** gebildet. Diese erstreckt sich über einen größeren als den von dem Stator **21** abgedeckten Bereich. Diese Bauweise erlaubt auch den Einbau größerer Statoren **21** (und Rotoren **20**), so dass unterschiedliche Leistungsvarianten geschaffen werden können.

[0059] Im Bereich des Gehäuseteils **3.6** ist glockenartig ein Teilgehäuse **30** über die Antriebswelle **3.1** gesetzt. Innerhalb von dem Teilegehäuse **30** umschlossenen Raum ist eine Dichtkassette **40** angeordnet. Diese umgibt die Antriebswelle **3.1** und dichtet diese mittels dreier Dichtringe **3.3** (Radialwellendichtringe) ab.

[0060] Die Dichtkassette **40** ist mit dem Gehäuseteil **3.6** unter Zwischenlage einer Distanzscheibe **3.8** abgedichtet verbunden (Verschraubung **3.9**). Das Teilegehäuse **30** ist mit dem Aufnahmegehäuse **3.5** abgedichtet verbunden. Hierzu wird das Teilegehäuse **30** mit der Dichtkassette **40** verspannt (Verschraubung **45**).

[0061] Wie die **Fig. 2** erkennen läßt, sind im Bereich

zwischen den Dichtringen **3.3** Räume angeordnet, in die Sensoren, welche in Sensorenaufnahmen **41** montierbar sind, ragen. Diese detektieren im Leckagefall eindringendes Wasser.

[0062] Um ein Einlaufen der Dichtringe **3.3** in die zugeordnete Lauffläche der Antriebswelle **3.1** zu verhindern, kann die Distanzscheibe **3.8** nach einer gewissen Einsatzdauer gegen eine Distanzscheibe **3.8** mit variierender Dicke ersetzt werden. Die Dichtringe **3.3** gelangen dann in einen unbenutzten Wellenbereich. Wie die **Fig. 2** weiter erkennen läßt, kann auch alleine der, der Wasserschraube **2** zugewandte Dichtring **3.3** verlagert werden (Distanzscheibe **43**).

Patentansprüche

1. Motorwasserfahrzeug mit einem Fahrzeugrumpf auf dem der Benutzer zumindest teilweise aufliegt oder sich aufstellt, mit einem im Fahrzeugrumpf verlaufenden Strömungskanal mit einer von einem Elektromotor getriebenen Wasserschraube, wobei der Fahrzeugrumpf den Elektromotor und Batterien sowie ein Steuergerät für den Elektromotor und die Wasserschraube aufnimmt, die zumindest bereichsweise im Strömungskanal untergebracht sind, **dadurch gekennzeichnet,**
dass der Elektromotor (**3**) als Innenläufermotor ausgebildet ist,
dass der Stator (**21**) des Elektromotors (**3**) mittels einer Wärmeleiteinheit (**22**) im Wärme führenden Kontakt mit einem Aufnahmegehäuse (**3.5**) des Elektromotors (**3**) steht,
dass das Aufnahmegehäuse (**3.5**) zumindest teilweise in dem der Wärmeleiteinheit (**22**) zugeordneten Bereich aus wärmeleitfähigem Material besteht, dass das Aufnahmegehäuse (**3.5**) zumindest teilweise im Strömungskanal (**8**) angeordnet ist,
dass der Rotor (**20**) und der Stator (**21**) in dem gegenüber der Umgebung wasserdicht verschlossenen Aufnahmegehäuse (**3**) untergebracht sind,
dass die Antriebswelle (**3.1**) über eine Dichtkassette (**40**) aus dem Aufnahmegehäuse (**3.5**) herausgeführt ist,
dass die Dichtkassette (**40**) die Antriebswelle (**3.1**) mittels wenigstens zwei Dichtringen (**3.3**) abdichtet,
dass die Dichtkassette (**40**) in Achsrichtung verstellbar der Antriebswelle (**3.1**) in unterschiedlichen Montagepositionen zuordenbar ist und
dass die Lauffläche der Antriebswelle (**3.1**), auf der die Dichtringe (**3.3**) ablaufen oberflächenvergütet, beispielsweise Hartstoff beschichtet ist.

2. Motorwasserfahrzeug nach Anspruch 1,
dadurch gekennzeichnet,
dass die Batterien (**5**, **6**) in einem wasserdichten Gehäuse (**9**) untergebracht sind und zumindest bereichsweise im wärmeleitenden Kontakt mit dem Gehäuse (**9**) stehen,
dass das Gehäuse (**9**) zumindest teilweise aus wärmeleitfähigem Material besteht und
dass das Gehäuse (**9**) im wärmeleitenden Kontakt mit dem strömenden Wasser steht.

3. Motorwasserfahrzeug nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass das Gehäuse (**9**) zumindest teilweise aus Aluminium besteht.

4. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, dass die Batterien (**5**, **6**) eine Spannung kleiner oder gleich 60 V aufweisen.

5. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, dass das Gehäuse (**9**) zumindest teilweise im Bereich des Strömungskanals (**8**) angeordnet ist.

6. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 5,
dadurch gekennzeichnet,
dass das Gehäuse (**9**) mit den Batterien (**5**, **6**) in einer in der Unterseite des Fahrzeugrumpfes (**10**) ausgeformte Ausnehmung (**13**) angeordnet ist, die zumindest teilweise außerhalb des Strömungskanals (**8**) und der Einströmöffnung (**11**) des Strömungskanals (**8**) angeordnet ist und
dass das Gehäuse (**9**) zumindest back- und steuerbordseitig und/oder kielseitig, teilweise im strömenden Wasser angeordnet ist.

7. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, dass das Gehäuse (**9**) sich um den zwischen Bug und Heck gebildeten Mittenbereich des Fahrzeugrumpfes (**10**) in Richtung zum Bug erstreckt.

8. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, dass das Gehäuse (**9**) auswechselbar mit dem Fahrzeugrumpf (**10**) verbunden ist.

9. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 8, dadurch gekennzeichnet, dass die Wärmeleiteinheit (**22**) als wärmeleitende Vergussmasse ausgebildet ist, die mit dem Aufnahmegehäuse (**3.5**) stoffschlüssig verbunden ist.

10. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 9, dadurch gekennzeichnet, dass das Gehäuse des Elektromotors (**3**) eine Statoraufnahme (**3.11**) bildet, in der bausatzartig verschiedene Statoren (**21**) einbaubar sind, wobei die Statoren (**21**) entsprechend unterschiedlichen Leistungsbereichen eine unterschiedliche Erstreckung in Achsrichtung der Antriebswelle (**3.1**) des Rotors (**20**) aufweisen.

11. Motorwasserfahrzeug nach einem der Ansprüche 8 bis 10, dadurch gekennzeichnet, dass zwischen oder nach zwei oder mehr Dichtringen (**3.3**) ein

Leckagesensor angeordnet ist.

12. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 11, dadurch gekennzeichnet, dass der Strömungskanal (**8**) einstückig in dem Fahrzeugrumpf (**10**) ausgeformt ist.

13. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 12,
dadurch gekennzeichnet,
dass der Strömungskanal (**8**) mit einer Einströmöffnung (**11**) im Bereich des Buges des Fahrzeugrumpfes (**10**) ausgeht und mit einer Ausströmöffnung (**12**) im Bereich des Hecks des Fahrzeugrumpfes (**10**) endet und
dass die Unterwasser-Antriebs-Einheit als Schub- und Sauggerät in den Strömungskanal (**8**) eingebaut ist.

14. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 13, dadurch gekennzeichnet, dass der Unterwasser-Antriebs-Einheit ein Fernsteuergerät zugeordnet ist, das am Fahrzeugrumpf (**10**) lösbar angebracht und über eine drahtlose Übertragungsstrecke mit dem Steuergerät (**4**) der Unterwasser-Einheit in Wirkverbindung bringbar ist.

15. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 14, dadurch gekennzeichnet, dass der Fahrzeugrumpf (**10**) unterhalb der Unterwasser-Antriebs-Einheit im Strömungskanal eine zu öffnende Platte, Klappe oder dergleichen aufweist, über die Zugang zur Unterwasser-Einheit besteht.

16. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 15,
dadurch gekennzeichnet,
dass Wasserschraube (**2**), Elektromotor (**3**) und Steuergerät (**4**) als Unterwasser-Antriebs-Einheit ausgebildet und im Strömungskanal (**8**) untergebracht ist
und
dass die Batterien (**5**, **6**) für den Elektromotor (**3**) in ein getrenntes Gehäuse (**9**) eingebracht sind, das fest- oder austauschbar im Fahrzeugrumpf (**10**) eingebaut ist.

17. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 16, dadurch gekennzeichnet, dass der Wasserschraube (**2**) im Strömungskanal (**8**) in Strömungsrichtung vor- oder nachgelagert ein Strömungsstator (**1**) zugeordnet ist, der die im Strömungskanal erzeugte rotierende Wasserströmung zumindest teilweise gerade richtet.

18. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 17, dadurch gekennzeichnet, dass der Strömungsstator (**1**) ortsfest mit dem Fahrzeugrumpf (**10**) verbunden ist.

19. Motorwasserfahrzeug nach einem der Ansprüche 1 bis 18, dadurch gekennzeichnet, dass der Strömungsstator (**1**) eine Vielzahl von Leitschaufeln aufweist, die konzentrisch im Strömungskanal (**8**) angeordnet sind.

Es folgen 2 Blatt Zeichnungen

Anhängende Zeichnungen

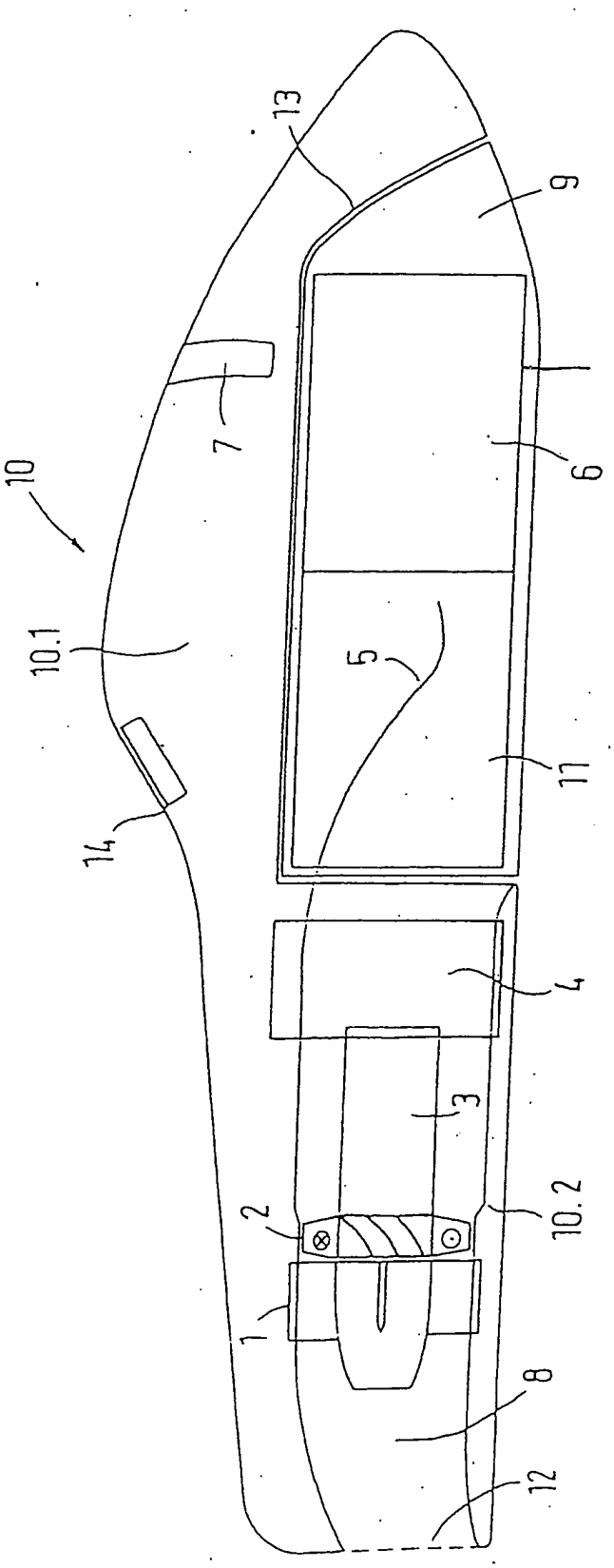


Fig. 1

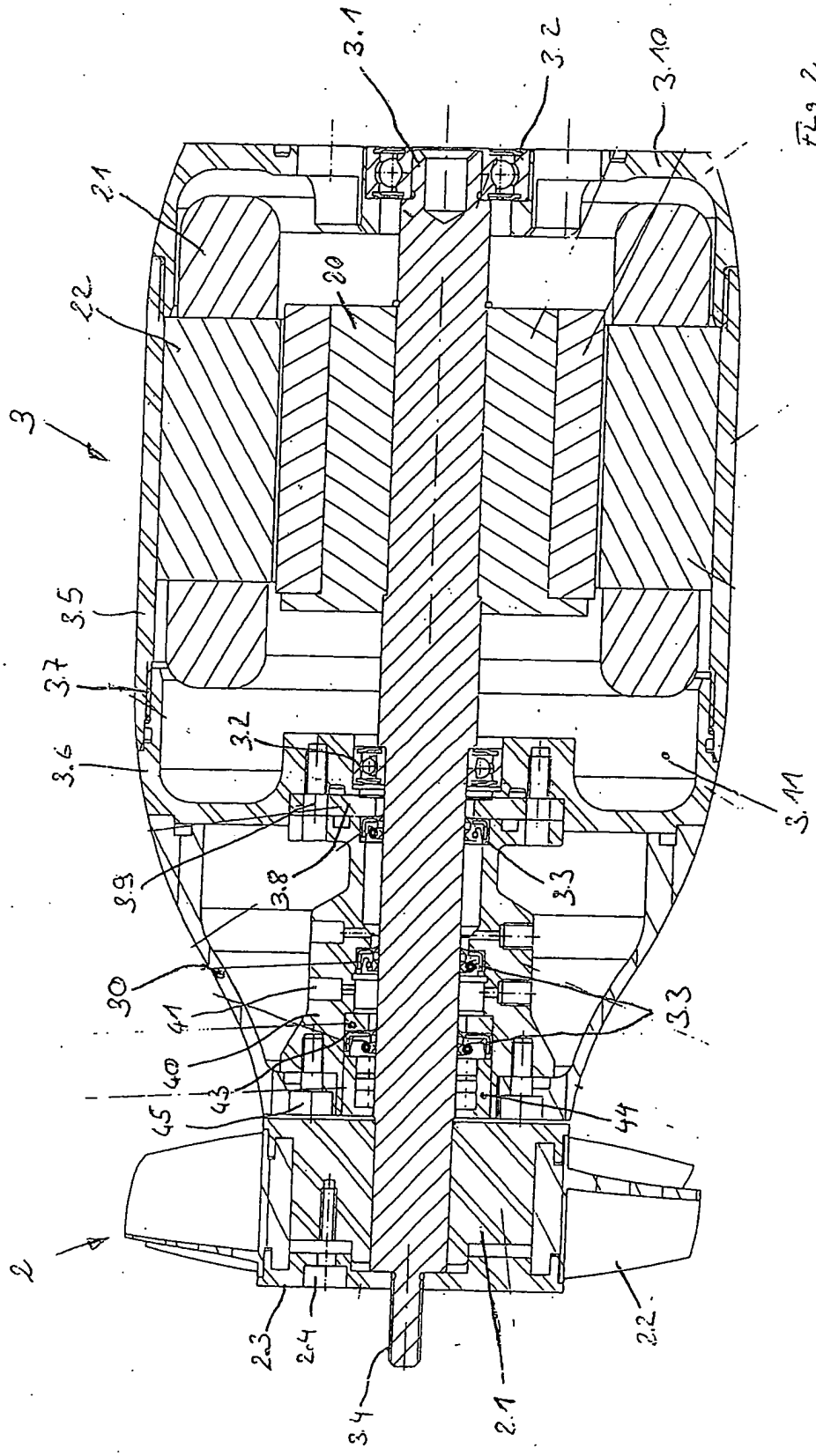
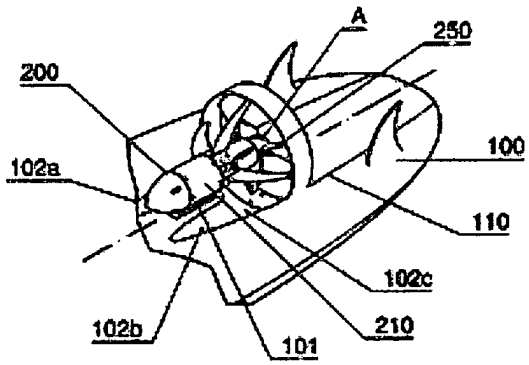

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Fig. 2

1 of 16 DOCUMENTS

DE102013218735A1 2015-03-19 **Surfboard with drive** (en)



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IPC[8]: B63B35/79 (2006-01-01; A, F, I, 2015-03-19; B, H, DE)
IPC[8]: B63H5/16 (2006-01-01; A, L, I, 2015-03-19; B, H, DE)

Priority Number and Date: DE102013218735 2013-09-18

English Abstract:

The water craft, in particular piece of water sports equipment, comprises: a) a surfboard (100), the upper side of which is provided to accommodate a person, and b) a drive (200) which is arranged on the underside of the surfboard (100), wherein the drive (200) has a propeller (250), c) wherein a depression (110) is provided on the underside of the surfboard (100), which depression (110) forms a channel which extends along the longitudinal axis (L) of the surfboard (100) and is open towards the underside, d) wherein the drive (200) is arranged in such a way that the area which is swept over by the propeller (250) runs partially through the depression (110).

(19) Deutsches Patent- und Markenamt

(10) **DE 10 2013 218 735 A1** 2015.03.19

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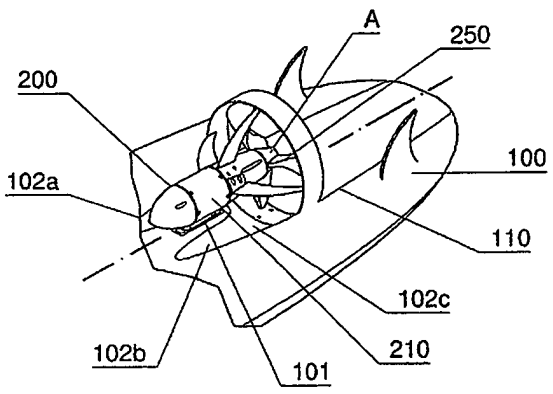
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gleich Anmelder

Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: **Surfboard mit Antrieb**

(57) Zusammenfassung: Das Wasserfahrzeug, insbesondere Wassersportgerät, umfasst:
a) ein Surfboard (100), dessen Oberseite zur Aufnahme einer Person vorgesehen ist, und
b) einen Antrieb (200), der an der Unterseite des Surfboards (100) angeordnet ist, wobei der Antrieb (200) einen Propeller (250) aufweist,
c) wobei an der Unterseite des Surfboards (100) eine Vertiefung (110) vorgesehen ist, die einen sich entlang der Längsachse (L) des Surfboards (100) erstreckenden, zur Unterseite hin offenen Kanal bildet,
d) wobei der Antrieb (200) so angeordnet ist, dass die von dem Propeller (250) überstrichene Fläche teilweise durch die Vertiefung (110) verläuft.



Beschreibung

[0001] Die Erfindung betrifft ein Wasserfahrzeug, insbesondere ein Wassersportgerät, welches ein Surfboard, dessen Oberseite zur Aufnahme einer Person vorgesehen ist und einen Antrieb an der Unterseite des Surfboards aufweist. Mit dem Antrieb, der einen Propeller aufweist, kann das Surfboard an der Oberfläche eines Gewässers fahren.

[0002] Aus dem Stand der Technik, wie zum Beispiel der US 2011/0003521 A1, ist ein Surfboard bekannt, in welche ein Antrieb in Form von beispielsweise einem Jetantrieb integriert ist.

[0003] Die DE 44 04 241 A1 zeigt ein Surfboard mit einem motorischen Antrieb. Der Antrieb umfasst einen Verbrennungsmotor, der mit einem an der Unterseite des Surfboards befestigen Propeller verbunden ist.

[0004] Windsurfen und Wellenreiten ist sehr stark von dem Vorhandensein eines Windes bzw. von Wellen abhängig, wobei nur der Wind bzw. die Wellen als Antrieb für das Surfboard dienen. Durch die Anwendung der Erfindung wird diese Abhängigkeit beim Surfen beseitigt, wobei das Surfboard auch unter Wetterbedingungen genutzt werden kann, die für herkömmliche Surfboards ungeeignet sind.

[0005] Das in der DE 44 04 241 A1 gezeigte Surfboard weist einen Verbrennungsmotor auf, der über einen integrierten Kraftstofftank mit Kraftstoff versorgt wird. Der an der Unterseite des Surfboards angeordnete Propeller ist über eine Fliegkraftkupplung und einen Antrieb mit dem Verbrennungsmotor verbunden. Die gesamte Antriebseinheit ist an einer Grundplatte befestigt und weist die Komponenten vom Motor, einschließlich Kraftstofftank, bis zum Propeller auf. Die gesamte Antriebseinheit kann als Modul in das Surfboard eingesetzt und auch entnommen werden. Somit kann das Surfboard von einer Konfiguration für den Segelbetrieb, in der ein Segel an dem Surfboard befestigt ist und das Antriebsmodul aus dem Surfboard entnommen ist, zu einer Konfiguration für das sogenannte Motorsurfen umgerüstet werden, in der das Segel entfernt und die Antriebseinheit in den dafür vorgesehenen Hohlraum des Surfboards eingesetzt ist. Zuvor müssen an der Unterseite und an der Oberseite des Surfboards angeordnete Verschlussdeckel, welche den für die Antriebseinheit vorgesehenen Hohlraum verschließen, entfernt werden. Der für die Antriebseinheit vorgesehene Hohlraum erstreckt sich durchgehend von der Oberseite bis zur Unterseite des Surfboards.

[0006] Die Komponenten, wie zum Beispiel der Motor, die Fliegkraftkupplung, der Tank und der als Antrieb dienende Zahnriementrieb sind im Vergleich zu dem Surfboard relativ schwer. Aufgrund der Anordnung der Komponenten des Antriebs in einer Antriebseinheit beeinflusst die Position der Antriebseinheit maßgeblich die Lage des Schwerpunkts des Surfboards. Die Lage des Schwerpunkts beeinflusst die Fahreigenschaft des Surfboards erheblich. Durch die Anordnung des Propellers direkt unterhalb des Antriebsmoduls wird der Tiefgang des Surfboards vergrößert. Ferner würde der Abstand der Wirklinie der Antriebskraft des Propellers in Bezug auf das Surfboard vergrößert, wodurch das Moment, welches auf das Surfboard durch die Antriebskraft ausgeübt wird, groß, wodurch das vordere Ende des Surfboards aus dem Wasser gehoben wird.

[0007] Der vorliegenden Erfindung liegt die Aufgabe zu Grunde, ein Wasserfahrzeug, insbesondere Wassersportgerät anzugeben, welches verbesserte Fahreigenschaften aufweist.

[0008] Die Aufgabe wird mit dem Wasserfahrzeug nach Anspruch 1 gelöst. Vorteilhafte Weiterentwicklungen ergeben sich aus den abhängigen Ansprüchen, der Beschreibung und den Figuren.

[0009] Das erfindungsgemäße Wasserfahrzeug umfasst einen vorzugsweise flach ausgestalteten Schwimmkörper, der als Surfboard ausgestalt ist. Ein Surfboard, das auch als Surfbrett bezeichnet wird, ist ein aus einem schwimmförmigen Material hergestelltes Brett, das auch als Sportgerät zum Wellenreiten oder zum Windsurfen dienen kann. Bekannte Surfboards werden zum größten Teil aus einem Schwimmkörper, der zum Beispiel aus Hartschaum hergestellt sein kann, gebildet, auf dessen Oberseite eine Person, das heißt ein Surfer Platz nehmen kann, wobei hierfür an der Oberseite Fußschlaufen angeordnet sein können, und an dessen Unterseite, insbesondere im Heckbereich, ein Schwert oder mehrere, wie zum Beispiel zwei oder drei Finnen für die Richtungsstabilität angeordnet sein können. Das Surfboard oder der Schwimmkörper haben in der Regel eine längliche Form, wobei die Längsachse des Boards im Wesentlichen der Fahrtrichtung entspricht. Die Bereite des Boards ist im Vergleich zu seiner Länge klein. Die Dicke des Boards ist bezogen auf die Länge und die Bereite des Boards gering, wodurch sich die für ein Surfboard oder Surfbrett brettartige Form ergibt. Das Surfboard oder deren Schwimmkörper hat einen positiven statischen Auftrieb der Insbesondere so groß ist, dass sie den Surfer mit samt Surfboard und dem weiter unten beschriebenen Antrieb über Wasser hält.

[0010] Obwohl die Oberseite des Surfboards zur Aufnahme einer Person vorgesehen ist, ist nicht ausgeschlossen, dass das Surfboard alternativ oder in Kombination mit einer Person zum Transport von Lasten verwendet wird, wie es zum Beispiel bei militärischen Anwendung der Fall sein könnte.

[0011] Das Wasserfahrzeug umfasst ferner einen Antrieb, der an der Unterseite des Surfboards angeordnet ist, wobei der Antrieb einen Propeller aufweist. Der Antrieb umfasst eine Propellerwelle, die um eine Propellerwellendrehachse drehbar ist und an der der Propeller, der auch als Schraube oder Wasserschraube bezeichnet werden kann, befestigbar oder befestigt ist. Der Propeller weist mindestens einen, vorzugsweise mehrere von der Propellerdrehachse, welche der Propellerwellendrehachse entspricht, abragende Flügel auf, wobei der Propeller oder die Flügel so ausgestaltet sind, dass bei Drehung des Propellers bzw. der Propellerwelle um die Propellerwellendrehachse Wasser von der Propellervorderseite angesaugt und an der Propellerrückseite mit einem Impuls ausgestoßen wird, wodurch ein Vortrieb entlang der Propellerwellendrehachse erzeugt wird. Die Propellerwellendrehachse ist parallel zur Längsachse des Surfboards, wodurch ein Vortrieb entlang, insbesondere parallel zu der Längsachse des Surfboards erzeugt wird. Die Propellerwelle kann so ausgestaltet sein, dass die Flügel des Propellers radial von der Propellerwelle abragen. Alternativ kann die Propellerwelle eine Hohlwelle sein, sodass die Flügel des Propellers bezogen auf die Propellerwelle radial nach innen ragen. Die Propellerwellendrehachse entspricht insbesondere der Mittelachse in der Propellerwelle. Der Propeller ist insbesondere für den Betrieb in Wasser angepasst.

[0012] Der Antrieb kann vorzugsweise einen Elektromotor aufweisen, wobei dessen Motorwellendrehachse und die Propellerwellendrehachse zueinander fluchten. Mit anderen Worten liegen die Motorwellendrehachse und die Propellerwellendrehachse auf einer gemeinsamen Achse. Bevorzugt kann der Elektromotor vor dem Propeller, das heißt auf der Saugseite oder der Propellervorderseite angeordnet sein. Anders ausgedrückt, kann sich der Motor zwischen dem vorderen Ende des Surfboards und dem Propeller befinden. Das Motorengehäuse, welches die Motorwellendrehachse und den Motor insbesondere wasserdicht aufnimmt, kann vorzugsweise eine Spindel- oder einen Torpedoform aufweisen, um den Strömungswiderstand gering zu halten.

[0013] Die Propellerwelle kann zum Beispiel mittelbar oder unmittelbar mit dem Motor, insbesondere einer Motorwelle verbunden sein. Beispiel für eine mittelbare Verbindung ist die Verbindung über ein Zwischengetriebe, welches die Drehzahl des Motors bzw. der Motorwelle unter Drehzahlerhöhung oder Drehzahlverringerung an die Propellerwelle abgibt und/oder eine Drehzahlerhöhung von der Motorwelle zu der Propellerwelle ermöglicht, wenn die Motorwelle und die Antriebswelle nicht miteinander fluchten. Das Zwischengetriebe kann zum Beispiel mindestens ein Planetengetriebe aufweisen. In Ausführungen ohne Zwischengetriebe, insbesondere bei einer unmittelbaren Verbindung der Motorwelle mit der Propellerwelle, kann die Propellerwelle die Motorwelle sein oder umgekehrt.

[0014] Die Motorwelle ist so mit der Propellerwelle verbunden, dass eine Drehung der Motorwelle um ihre Motorwellendrehachse und insbesondere relativ zu dem Surfboard, eine Drehung der Propellerwelle um ihre Propellerwellendrehachse und insbesondere relativ zu dem Surfboard, bewirkt. Eine Drehung des Motors kann somit eine Drehung der Propellerwelle und somit des Propellers bewirken, wenn dieser an der Propellerwelle befestigt ist, sodass ein Vortrieb für das Wasserfahrzeug bewirkt wird.

[0015] An der Unterseite des Surfboards ist erfindungsgemäß eine Vertiefung vorgesehen, die einen sich entlang der Längsachse des Surfboards erstrecken zur Unterseite hin offenen Kanal bildet. Insbesondere ist die Vertiefung über ihre gesamte Länge zur Unterseite hin offen. Somit wird ein über die gesamte Länge der Vertiefung zur Unterseite hin offener Kanal gebildet. Die Vertiefung beziehungsweise der Kanal ist länglich ausgestalt und erstreckt sich entlang der Längsachse des Surfboards. Insbesondere ist die Länge der Vertiefung entlang der Längsachse größer als die Breite, insbesondere die größte Bereite der Vertiefung quer zur Längsachse.

[0016] Erfindungsgemäß ist der Antrieb so angeordnet, dass die von dem Propeller überstrichene Fläche teilweise durch die Vertiefung verläuft. Unter der von dem Propeller überstrichenen Fläche wird die kreisförmige Scheibe verstanden, innerhalb der die Flügel des Propellers bei dessen Drehung bewegt werden. Die von dem Propeller überstrichene Fläche steht somit senkrecht oder normal auf die Propellerwellendrehachse. Während einer vollständigen Umdrehung rotiert ein Flügel während eines Teils der Umdrehung durch die Vertiefung und während eines anderen Teils der Umdrehung außerhalb der Vertiefung. Die von dem Propeller überstrichene Fläche ist quer zur Längsrichtung der Vertiefung bzw. des Kanals angeordnet.

[0017] Vorzugsweise verläuft die von dem Propeller überstrichene Fläche teilweise außerhalb der Vertiefung, wobei bevorzugt ist, dass der Anteil der von dem Propeller überstrichenen Fläche, der außerhalb der Vertiefung ist, größer ist als der Anteil der von dem Propeller überstrichenen Fläche, der durch die Vertiefung verläuft. Der größte Teil der überstrichenen Fläche befindet sich somit außerhalb der Vertiefung, wobei sich der kleinere Teil innerhalb der Vertiefung befindet. Besonders bevorzugt kann die von dem Propeller überstrichene Fläche bis zu 30 %, insbesondere von 10 bis 30 % durch die Vertiefung verlaufen. Als besonders vorteilhaft hinsichtlich Festigkeit des Surfboards und Fahrdynamik hat sich herausgestellt, dass ca. 15 bis 25 % der vom Propeller

überstrichenen Fläche durch die Vertiefung verlaufen können.

[0018] Der besondere Vorteil, dass die von dem Propeller überstrichene Fläche teilweise durch die Vertiefung verläuft ist der, dass die Propellerwellendrehachse und somit auch die Resultierende des Schubvektors näher an der Unterseite des Surfboards ist als bei herkömmlichen, insbesondere der aus der DE 44 04 241 A1 bekannten Surfboards. Durch den geringeren Abstand wird bewirkt, dass die Fahrdynamik verbessert wird. Da der Abstand zur Unterseite des Surfboards geringer ist, wird das Drehmoment um die Nickachse des Surfboards verringert, wodurch das Surfboard nicht so stark aus dem Wasser gehoben wird wie das Surfboard aus DE 44 04 241 A1. Wenn der an der Unterseite des Surfboards angeordnete Motor vor dem Propeller angeordnet ist, besteht zudem der Vorteil, dass die Vertiefung des Surfboards keine übermäßige Verdickung des Surfboards erfordert, da anders als bei der DE 44 04 241 die Motor- und Getriebeelemente, die überhalb des Propellers in den Surfboard integriert sind, entfallen oder zumindest anders angeordnet werden können.

[0019] Wie bereits erwähnt, kann der Antrieb eine Propellerwelle aufweisen, die um eine Propellerwendrehachse drehbar ist und an welcher der Propeller befestigt ist. Insbesondere ist die Propellerwellendrehachse parallel zur Längsachse des Surfboards und/oder außerhalb der Vertiefung angeordnet. Vorzugsweise kann der Abstand von der Unterseite des Surfboards zu der Propellerwellendrehachse kleiner sein als der Abstand der Propellerwellendrehachse zu dem tiefsten Punkt der Vertiefung.

[0020] Die Vertiefung kann einen vorderen Vertiefungsbereich und einen hinteren Vertiefungsbereich aufweisen. Der Propeller kann zwischen dem vorderen Vertiefungsbereich und dem hinteren Vertiefungsbereich angeordnet sein. Dieser Bereich kann zum Beispiel Propeller- oder Zwischenbereich genannt werden. Der vordere Vertiefungsbereich beginnt oder startet vorzugsweise in der hinteren Hälfte des Surfboards, in der auch der Antrieb angeordnet ist. Grundsätzlich könnte der vordere Vertiefungsbereich auch in der vorderen Hälfte des Surfboards beginnen, wobei es für die Wendigkeit des Surfboards vorteilhaft ist, den vorderen Vertiefungsbereich erst in der hinteren Hälfte des Surfboards beginnen zu lassen. Der hintere Vertiefungsbereich kann sich bis zum Heck des Surfboards erstrecken. Vorzugsweise nimmt die Tiefe der Vertiefung von dem Beginn des vorderen Vertiefungsabschnitts zu dem Propeller hin zu. Vorzugsweise nimmt die Tiefe des hinteren Vertiefungsbereiches von dem Propeller bis zum Heck des Surfboards hin ab. Die Tiefe der Vertiefung kann insbesondere im Bereich des Propellers am größten sein.

[0021] Insbesondere kann die Breite der Vertiefung vom Beginn des vorderen Vertiefungsbereichs zum Propeller hin zunehmen. Insbesondere kann die Bereite des hinteren Vertiefungsbereichs vom Propeller bis zum Heck hin abnehmen. Die Breite der Vertiefung kann im Bereich des Propellers am größten sein.

[0022] Der Querschnitt der Vertiefung kann von dem Beginn des vorderen Vertiefungsbereichs zu dem Propeller hin zunehmen, wobei der Querschnitt der Vertiefung im hinteren Vertiefungsbereich von dem Propeller bis zum Heck hin abnehmen kann. Vorzugsweise ist der Querschnitt der Vertiefung im Bereich des Propellers am größten.

[0023] Allgemein lässt sich sagen, dass wenigstens eines aus Querschnitt, Tiefe und Breite der Vertiefung im Bereich des Propellers am größten sein kann. Insbesondere kann die Querschnittsfläche, die Tiefe und/oder die Breite des vorderen Vertiefungsbereichs von dessen Beginn bis zum Propeller hin zunehmen, insbesondere monoton zunehmen. Alternativ kann die Form des ersten und zweiten Vertiefungsabschnitts so sein, dass die Breite zum Propeller hin abnimmt oder zumindest gleich bleibt, wodurch vorteilhaft eine noch bessere Anströmung des Propellers erreicht wird. Die Querschnittsfläche, die Tiefe und/oder die Breite des hinteren Vertiefungsbereichs können vom Propeller bis zum Ende des hinteren Vertiefungsbereichs abnehmen, insbesondere monoton abnehmen. Durch die Gestaltung der Vertiefung wird es ermöglicht, dass das Wasser durch den vorderen Vertiefungsbereich zu dem Propeller hin und durch den zweiten Vertiefungsbereich von dem Propeller weg strömen kann. Der vordere und hintere Vertiefungsbereich, insbesondere die gesamte Vertiefung ist vorzugsweise strömungsoptimiert gestaltet, sodass Verwirbelungen möglichst vermieden werden.

[0024] In bevorzugten Ausführungsformen kann der vordere Vertiefungsbereich einen ersten Vertiefungsabschnitt und einen zweiten Vertiefungsabschnitt aufweisen, zwischen denen ein Steg angeordnet ist, der den ersten Vertiefungsabschnitt und den zweiten Vertiefungsabschnitt voneinander trennt. Vorzugsweise verlaufen der erste Vertiefungsabschnitt und der zweite Vertiefungsabschnitt, die jeweils länglich gebildet sein können, entlang der Längsachse, des Surfboards, insbesondere parallel zueinander oder zumindest in etwa parallel zueinander. Insbesondere können der erste Vertiefungsabschnitt und der zweite Vertiefungsabschnitt in Bezug auf die Längsachse des Surfboards spiegelsymetrisch angeordnet sein. Der zwischen dem ersten und zweiten Vertiefungsabschnitt gebildete Steg kann zum Beispiel länglich sein, wobei das zu dem Propeller weisende Ende des Stegs abgerundet sein kann. Vorzugsweise kann der Beginn des ersten Vertiefungsabschnitts und/oder des zweiten Vertiefungsabschnitts den Beginn des vorderen Vertiefungsbereichs bilden. Der Beginn

des ersten Vertiefungsabschnitts und der Beginn des zweiten Vertiefungsabschnitts kann jeweils abgerundet sein, insbesondere eine in etwa parabolische, hyperbolische oder elliptische Form aufweisen.

[0025] Der erste Vertiefungsabschnitt und/oder der zweite Vertiefungsabschnitte kann eine konkave Form des Grundes des Vertiefungsabschnitts aufweisen. Beispielsweise kann der erste Vertiefungsabschnitt und/oder der zweite Vertiefungsabschnitt jeweils einen Scheitelpunkt aufweisen, welcher im Querschnitt den tiefsten Punkt des Vertiefungsabschnitts bildet, wobei der Scheitelpunkt asymmetrisch in Bezug auf die Mittelachse des jeweiligen Vertiefungsabschnitts angeordnet sein kann. Dies hat den Vorteil, dass die ersten und zweiten Vertiefungsabschnitte strömungsoptimiert in einen Sammelabschnitt münden können.

[0026] Bevorzugt kann zwischen dem Propeller und dem Steg und/oder zwischen dem Propeller und dem ersten und zweiten Vertiefungsabschnitt ein Sammelabschnitt des ersten Vertiefungsbereichs angeordnet sein, in den der erste Vertiefungsabschnitt und der zweite Vertiefungsabschnitt münden.

[0027] Der Steg kann eine Befestigungseinrichtung, insbesondere eine Aufnahme für den Antrieb aufweisen, an welcher der Antrieb mechanisch mit dem Surfboard verbunden ist oder verbunden werden kann. Die Befestigungseinrichtung ist vorzugsweise so gestaltet, dass der Antrieb an der Befestigungseinrichtung lösbar, wie zum Beispiel durch Lösen einer Schraube lösbar angeordnet ist.

[0028] In bevorzugten Ausführungen kann der Propeller über seinen Rotationsumfang von einem in Bezug auf das Antriebsgehäuse und/oder das Surfboard feststehenden Ring umgeben sein. Der Ring kann, aber muss nicht abnehmbar sein. Der Propeller ist relativ zu dem Ring drehbar. Vorzugsweise umgibt der Ring die Propellerwellendrehachse konzentrisch. Insbesondere kann der Ring geschlossen sein. Der Ring kann zum Beispiel über mindestens einen Steg, der an dem Antriebsgehäuse und an dem Ring befestigt ist, mit dem Antriebsgehäuse verbunden sein.

[0029] Der Ring kann zum Beispiel eine zylindrische Form aufweisen, wobei sich die Mantelfläche des Zylinders entlang der und um die Propellerwellendrehachse erstrecken kann.

[0030] Der Ring kann eine Wandstärke aufweisen, die im Vergleich zu dem Innendurchmesser des Rings klein ist. Die Vertiefung kann eine sich um die Propellerwellendrehachse erstreckende Nut, die zum Beispiel kreisringabschnittsförmig sein kann, aufweisen. Die Nut kann eine Nuttiefe aufweisen, die in etwa der Wandstärke des Rings entspricht. Der Ring ist vorzugsweise in der Nut angeordnet. Der Vorteil, dass die Nuttiefe in etwa der Wandstärke des Rings entspricht, liegt darin, dass der Boden oder Grund der Vertiefung und der Innenumfang des Rings in etwa gleichmäßig ineinander über gehen, sodass Verwirbelungen in der Strömung, die von dem Boden oder Grund in den Ring übergeht, vermieden werden können. Insbesondere kann die Nut eine Nutbereite, die sich entlang der Propellerwellendrehachse oder der Längsachse des Surfboards erstreckt, aufweisen, wobei die Nutbreite in etwa der Breite des feststehenden Rings entspricht. Die Breite des feststehenden Rings erstreckt sich ebenfalls entlang der Propellerwellendrehachse oder/und der Längsachse des Surfboards.

[0031] In Ausführungen, in denen der Ring kreisringförmig ist, ist es bevorzugt, dass sich die Nut um die Propellerwellendrehachse kreisringabschnittsförmig erstreckt. Vorzugsweise ist die Kante, welche die Nut mit dem vorderen Vertiefungsbereich, insbesondere mit dem Sammelabschnitt, bildet, kreisringabschnittsförmig um die Rotationswellendrehachse angeordnet. Insbesondere ist die Kante, welche die Nut mit dem hintern Vertiefungsbereich bildet, kreisringabschnittsförmig um die Propellerwellendrehachse gebildet. Der Vorteil hierbei ist, dass die Übergänge zwischen dem vorderen Vertiefungsbereich und dem Ring bzw. zwischen dem Ring und dem hinteren Vertiefungsbereich Verwirbelungen in der Strömung verhindern können, das heißt strömungsoptimiert sind.

[0032] Der Ring kann zum Beispiel mittels mindestens eines Befestigungselements, wie zum Beispiel einer Schraube oder einem Niet, welches die Wand des Rings durchsetzt, mit dem Surfboard verbunden sein. Hierdurch werden Vibrationen zwischen Ring und Surfboard vermieden oder allgemein die Stabilität erhöht. Zum Beispiel kann die Wand des Rings zwischen einem Schraubenkopf oder einer Mutter und dem Surfboard, in dem die Schraube verankert ist, eingeklemmt sein.

[0033] In bevorzugten Ausführungen kann der Ring, der den Propeller über seinen Umfang umgibt, zumindest über einen ersten Flügel und einen zweiten Flügel mit dem Antriebsgehäuse verbunden sein. Der erste Flügel und der zweite Flügel können jeweils an dem Ring und dem Antriebsgehäuse befestigt sein. Der erste Flügel und der zweite Flügel können so konfiguriert, insbesondere profiliert und/oder gegenüber der Strömung angestellt sein, dass die in dem Propeller einströmende, die Flügel umströmende Strömung einen dynamischen Auftrieb erzeugt, der insbesondere in Richtung zu der Unterseite des Surfboards wirkt. Der dynamische Auftrieb ist somit ein positiver Auftrieb, der in die gleiche Richtung wirkt, wie der statische Auftrieb des Surfboards. Hierdurch wird im Fahrbetrieb des Wasserfahrzeugs in Abhängigkeit von der Fahrtgeschwindigkeit relativ zum Wasser eine Auftriebskraft erzeugt. Beispielsweise können die

Flügel sich in etwa parallel zu der Unterseite des Surfboards erstrecken.

[0034] In bevorzugten Ausführungen kann der Antrieb einen Elektromotor aufweisen, wobei eine Steuerung zur Steuerung, insbesondere zur Drehzahlsteuerung, des Elektromotors vorgesehen ist, wobei bevorzugt ist, dass die Steuerung in das Surfboard integriert ist. Insbesondere kann die Steuerung in eine Vertiefung des Surfboards integriert sein, die mit einem Deckel verschlossen ist, der auf der Oberseite des Surfboards angeordnet ist. An der Unterseite des Surfboards kann mindestens eine Wärmetauscherfläche angeordnet sein, die thermisch leitend mit der Steuerung verbunden ist. Der Wärmeübertragungskoeffizient zwischen der Steuerung und der Wärmetauscherfläche ist höher, insbesondere deutlich höher als der Wärmeübertragungskoeffizient zwischen der Steuerung und der die Wärmetauscherfläche umgebenen Unterseite des Surfboards. Die Wärmetauscherfläche, die eben oder mit Rippen ausgestaltet sein kann, erlaubt vorteilhaft, dass die Steuerung des Elektromotors von dem Wasser, in dem das Wasserfahrzeug benutzt wird, gekühlt wird.

[0035] Der Vorteil, dass die Steuerung des Elektromotors in das Surfboard integriert ist und der Elektromotor an der Unterseite des Wasserfahrzeugs angeordnet ist, ist, dass der Schwerpunkt des Wasserfahrzeugs optimiert positioniert werden kann. Die Steuerung kann über mindestens einen elektrischen Leiter, wie zum Beispiel ein Kabel, mit dem Elektromotor verbunden sein. Zwischen der Steuerung und dem Elektromotor kann zum Beispiel ein Stecker angeordnet sein, der erlaubt, dass der Elektromotor auf eine einfache Weise mit der Steuerung verbunden und von der Steuerung gelöst werden kann, wenn der Elektromotor an dem Surfboard befestigt bzw. von dem Surfboard gelöst wird. Zum Beispiel kann der Stecker im Bereich der Befestigungseinrichtung des Stegs angeordnet sein, wobei bevorzugt ist, dass der Stecker in Bezug auf die Umgebung des Wasserfahrzeugs, das heißt wasserdicht, abgedichtet ist.

[0036] In bevorzugten Ausführungen kann der Antrieb einen Elektromotor aufweisen, dessen Motorengehäuse vor dem Propeller mechanisch mit dem Surfboard verbunden ist, insbesondere über die Befestigungseinrichtung des Stegs. Insbesondere kann der Elektromotor elektrisch mit einer elektrischen Energiequelle, die in dem Surfboard integriert ist, verbunden sein. Die elektrische Energiequelle kann zum Beispiel ein Akkumulator oder eine Batterie oder eine Brennstoffzelle sein. Vorzugsweise ist die Steuerung zwischen die elektrische Energiequelle und den Motor geschaltet. Die elektrische Energiequelle kann über einen elektrischen Leiter, insbesondere ein Kabel, mit dem Motor und/oder der Steuerung verbunden sein. Das Surfboard kann eine Ausnehmung ausweisen, in welcher die elektrische Energiequelle angeordnet ist. Die Ausnehmung kann mit einem Deckel verschlossen sein, wobei der Deckel an der Oberseite des Surfboards angeordnet sein kann. Die Ausnehmung für die elektrische Energiequelle kann die Ausnehmung für die Steuerung des Elektromotors sein. Alternativ können die Ausnehmung für die elektrische Energiequelle und die Ausnehmung für die Steuerung separate Ausnehmungen sein. Vorzugsweise ist die elektrische Energiequelle vor dem Propeller, insbesondere auch vor der Steuerung angeordnet. Hierdurch lässt sich die Lage des Schwerpunkts des Wasserfahrzeugs noch besser optimieren.

[0037] Insbesondere erlaubt die elektrische Energiequelle mit einem Klicksystem einen einfachen Einbau der elektrischen Energiequelle in seine Ausnehmung und ein einfaches Entnehmen der elektrischen Energiequelle aus seiner Ausnehmung.

[0038] Die Erfindung wurde anhand mehrerer bevorzugter Ausführungsformen beschrieben. Im Folgenden wird eine besonders bevorzugte Ausführungsform anhand von Figuren beschrieben. Die dabei offenbarten Merkmale bilden den Gegenstand einzeln und in jeglicher Merkmalskombination vorteilhaft weiter. Es zeigen:

[0039] **Fig.** 1A die Ansicht auf ein erfindungsgemäßes Wassersportgerät von unten,

[0040] **Fig.** 1B eine Querschnittsansicht durch den Schnitt B1-B1 aus **Fig.** 1A,

[0041] **Fig.** 1C eine Querschnittsansicht durch den Schnitt 1C-1C aus **Fig.** 1C,

[0042] **Fig.** 1D eine Querschnittsansicht durch den Schnitt 1D-1D aus **Fig.** 1A,

[0043] **Fig.** 1E eine Seitenansicht durch den Schnitt 1E-1E aus **Fig.** 1A,

[0044] **Fig.** 1F eine perspektivische Ansicht auf die Unterseite des Wassersportgeräts, an der ein Elektromotor mit Propeller angeordnet ist,

[0045] **Fig.** 1G eine perspektivische Ansicht auf die Unterseite des Wassersportgeräts, wobei der Elektromotor mit Propeller entfernt wurde,

[0046] **Fig.** 1H eine Querschnittsansicht durch die Längsachse des Surfboards,

[0047] **Fig.** 2A–**Fig.** 2E verschiedene Ansichten eines Antriebs für das Wassersportgerät aus den **Fig.** 1A–H.

[0048] In den **Fig.** 1A bis H wird ein Surfboard **100** und in den **Fig.** 2A bis **Fig.** 2E der für das Surfboard bevorzugte Antrieb **200** dargestellt. Das Surf-

board **100** ist brettförmig und länglich. Das Surfboard **100** weist eine Längsachse L (**Fig.** 1G) auf, wobei die entlang der Längsachse L erstreckte Länge Lboa des Surfboards **100** größer ist als seine quer zur Längsachse L erstreckte Bereite Bboa und/oder Dicke Tboa. Das Surfboard **100** weist ein vorderes Ende und eine hinteres Ende auf. Zu dem hinteren Ende hin versetzt sind zwei Flossen oder Finnen angeordnet, welche von der Unterseite des Surfboards **100** abragen und der Richtungsstabilität des Surfboards **100** dienen. Das Surfboard **100** ist aus einem Material gebildet, welches ihm einen positiven statischen Auftrieb verleiht. Mit anderen Worten schwimmt das Surfboard **100** auf Wasser. Die Oberseite des Surfboards **100** ist zur Aufnahme einer Person und/oder von Lasten ausgestaltet.

[0049] An der Unterseite, die insbesondere durch eine Unterseitenfläche gebildet wird, ist eine Vertiefung **110** angeordnet, die einen sich entlang der Längsachse L des Surfboards **100** erstreckenden, zur Unterseite hin offenen Kanal bildet, der insbesondere von dem vorderen Ende d, c der Vertiefung **110** bis zum hinteren Ende T der Vertiefung **110** zur Unterseite hin offen ist. Die Vertiefung **110** wird von der Unterseite bzw. der Unterseitenfläche eingefasst. Die zum Beispiel in **Fig.** 1A ersichtliche Umrandung der Vertiefung wird durch den Übergang der Vertiefung bzw. der Vertiefungsfläche, die als Grund oder Boden bezeichnet wird, in die Unterseite bzw. die Unterseitenfläche gebildet.

[0050] Die Vertiefung **110** bzw. der durch sie gebildete Kanal ist länglich und erstreckt sich mit seiner Längsrichtung entlang der Längsachse L. Insbesondere ist die entlang der Längsachse L erstreckte Länge der Vertiefung **110** größer als die quer zur Längsachse L erstreckte Breite und/oder Tiefe.

[0051] Die Vertiefung **110** weist einen vorderen Vertiefungsbereich **102** und einen hinteren Vertiefungsbereich **104** auf. Ein Propeller **250** eines Antriebs **200** ist zwischen dem vorderen Vertiefungsbereich **102** und dem hinteren Vertiefungsbereich **104** angeordnet. Das vordere Ende B, C des vorderen Vertiefungsbereichs **102** bzw. der Vertiefung **110** beginnt in der hinteren Hälfte des Surfboards **100**. Das hintere Ende T des hinteren Vertiefungsbereichs **104** bzw. der Vertiefung **110** endet am hinteren Ende, das auch als Heck bezeichnet wird, des Surfboards **100**.

[0052] Der vordere Vertiefungsbereich **102** weist einen ersten Vertiefungsabschnitt **102a** und einen zweiten Vertiefungsabschnitt **102b** auf, die länglich sind und sich nebeneinander entlang der Längsachse L erstrecken. Der erste Vertiefungsabschnitt **102a** ist seitlich versetzt auf einer ersten Seite der Längsachse L angeordnet, wobei der zweite Vertiefungsabschnitt **102b** auf der anderen, gegenüberliegenden Seite der Längsachse L versetzt angeordnet ist. Das vordere Ende C des Vertiefungsabschnitts **102a** und das vordere Ende B des Vertiefungsabschnitts **102b** bilden das vordere Ende des vorderen Vertiefungsbereichs **102** bzw. der Vertiefung **110**. Zwischen dem ersten Vertiefungsabschnitt **102a** und dem zweiten Vertiefungsabschnitt **102b** ist ein Steg **101** angeordnet, der länglich ausgestaltet ist und sich entlang der Längsachse L erstreckt. Der Steg **101** trennt den ersten Vertiefungsabschnitt **102a** von dem zweiten Vertiefungsabschnitt **102b**. Der erste Vertiefungsabschnitt **102a** und der zweite Vertiefungsabschnitt **102b** münden in einen gemeinsamen Sammelabschnitt **102c** des vorderen Vertiefungsbereichs **102**. Der Sammelabschnitt **102c** ist zwischen den Propeller **250** und einerseits und dem ersten Vertiefungsabschnitt **102a**, dem zweiten Vertiefungsabschnitt **102b** und dem Steg **101** andererseits angeordnet.

[0053] Das vordere Ende B, C wird durch den Scheitelpunkt einer Kurve gebildet, welche sich vom Scheitelpunkt zu dem hinteren Ende des Surfboards **100** erstreckt. Die Kurve wird durch den Übergang, insbesondere die Kante oder Rundung; der Vertiefung mit der Unterseite bzw. der Unterseitenfläche des Surfboards **100** gebildet.

[0054] Die Tiefe, die Breite und/oder der Querschnitt des ersten Vertiefungsabschnitts **102a** und des zweiten Vertiefungsabschnitts **102b** nehmen von seinem vorderen Ende B, C zu dem Propeller **250** hin zu.

[0055] Die Tiefe, die Breite und/oder der Querschnitt des hintern Vertiefungsbereichs **104** nehmen von dem Propeller **250** bis zu dem hinteren Ende T hin ab.

[0056] Zwischen dem hinteren Vertiefungsbereich **104** und dem vorderen Vertiefungsbereichs **102** ist eine Nut **103** gebildet, welche sich kreisringabschnittsförmig um eine Propellerwellendrehachse R_P (**Fig.** 2D) des Propellers **250** erstreckt und eine Nuttiefe aufweist. Die Nuttiefe wird von der Oberkante der Nut **103**, die sie mit dem vorderen Übergangsbereich **102** oder dem hinteren Übergangsbereich **104** bildet, gemessen.

[0057] Die Bodenfläche des Vertiefungsabschnitts **102a**, **102b** ist konkav geformt, wobei der Scheitelpunkt der konkaven Form in Bezug auf die Oberkanten, welche den Vertiefungsabschnitt **102a** oder **102b** einfassen, asymmetrisch oder zu der Längsachse L hin versetzt angeordnet ist (**Fig.** 1B). Dies ermöglicht einen strömungsoptimierten Übergang von dem ersten und zweiten Vertiefungsabschnitt **102a**, **102b** in den Sammelabschnitt **102c**.

[0058] Die Nut **103** weist eine sich entlang der Längsachse L erstreckte Nutbreite B_{103} auf, die in etwa der sich entlang der Längsachse L erstreckte Breite L_3 des Rings **201** aufweist.

[0059] An der Unterseite des Surfboards **100** ist ein Antrieb **200**, der einen Elektromotor aufweist, so angeordnet, das die von dem Propeller **250** des Antriebs **200** überstrichene Fläche A_P (stichpunktierter Kreis in **Fig.** 1C) teilweise durch die Vertiefung **110**, insbesondere durch den Bereich zwischen dem vorderen Vertiefungsbereich **102** und dem hintern Vertiefungsbereich **104**, verläuft. Die von dem Propeller **250** überstrichene Fläche A_P verläuft mit einem Anteil A_P2 außerhalb der Vertiefung und mit einem Anteil A_P1 der von dem Propeller **250** überstrichenen Fläche A_p durch die Vertiefung **110**. Der Anteil A_P2 ist größer als der Anteil A_p1 (**Fig.** 1C).

[0060] Der den Elektromotor umfassende Antrieb **200** weist eine Motorwellendrehachse R_M (**Fig.** 2D) auf, welche mit der Propellerwellendrehachse R_P fluchtet, d. h. auf einer gemeinsamen Achse liegt und parallel zu der Propellerwellendrehachse R_P ist. Das spindel- oder torpedoförmige Antriebsgehäuse **210** ist mit einem zylindrischen Ring **201** über mehrere Stege **202a**, **202b** und **202c** unbewegbar verbunden. Zwei der Stege sind als Flügel ausgestaltet, nämlich als erster Flügel **202a** und als zweiter Flügel **202b**. Die ersten und zweiten Flügel **202a**, **202b** sind waagerecht, insbesondere in etwa parallel zu der Unterseite des Surfboards. Die ersten und die zweiten Flügel **202a**, **202b** weisen ein Querschnittsprofil auf, welches einen positiven dynamischen Auftrieb A_D, d. h. einen zu dem Surfboard **100** gerichteten dynamischen Auftrieb A_D bewirkt, wenn das in den Propeller **250** einströmende Wasser die Flügel **202a**, **202b** umströmt. Die ersten und zweiten Flügel **202a**, **202b** sind vor dem Propeller **250**, d. h. auf der Saugseite des Propellers **250** angeordnet. Die Flügel **202a**, **202b** und der Steg **202c** sind jeweils an dem zylindrischen Ring **201** und an dem Antriebsgehäuse **210** befestigt. Der Ring **201** umgibt den Propeller **250** über seinen Umfang und schützt vor einem radialen Zugriff auf den Propeller **250** und somit vor Verletzungen durch den Propeller **250**. Der Ring **201** weist eine Wandstärke W_S auf, die im Vergleich zu dem Durchmesser DR gering ist und in etwa der Tiefe der Nut **103** entspricht, in welcher der Ring **201** zumindest teilweise angeordnet ist. Hierdurch wird ein gleichmäßiger Übergang von den vorderen und hinteren Vertiefungsbereichen auf den Innenumfang des Rings **201** gewährleistet. Die Breite L3 des Rings **201** entspricht in etwa der Breite B_{103} der Nut **103**. Hierdurch werden Verwirbelungen noch besser vermieden. Der Ring **201** ist mittels Schraubbolzen **207**, welche sich durch den Ring **201** und radial zu dessen Mittelachse erstrecken, an dem Surfboard **100** befestigt. Die Ringwand ist zwischen dem Schraubenkopf des Schraubbolzens **207** und dem Surfboard **100**, insbesondere dem Nutgrund der Nut **103** eingeklemmt.

[0061] Das Antriebsgehäuse **210** ist über eine Befestigungseinrichtung **101a**, die an dem Steg **101** gebildet ist, unverschiebbar und unschwenkbar mit dem Surfboard **100** mechanisch verbunden. Der Antrieb **200** kann zum Beispiel mittels Gewindebolzen an dem Surfboard **100**, insbesondere an der Befestigungseinrichtung **101a** befestigt sein. Diese Befestigung kann durch Lockern der Schraubbolzen lösbar sein, so dass der Antrieb **200** von dem Surfboard abgenommen und ggf. gegen einen anderen ausgetauscht werden kann.

[0062] Die Befestigungseinrichtung **101a** bildet ferner ein erstes elektrisches Steckverbindungsteil **101b**, wobei der Antrieb **200** ein zweites elektrisches Steckverbindungsteil **211** aufweist, welches mit dem ersten elektrischen Steckverbindungsteil **101b** elektrisch kontaktierbar oder konnektierbar ist, so dass eine elektrische Energiequelle **400** und/oder eine Steuerung **300** (**Fig.** 1H) elektrisch leitend mit dem Motor des Antriebs **200** verbindbar ist. Durch das Befestigen des Antriebs **200** an der Befestigungseinrichtung **101a** wird somit neben der mechanischen Verbindung auch eine elektrische Verbindung zu dem Surfboard **100** hergestellt. Vorzugsweise ist eine Dichtung vorgesehen, welche zumindest die elektrische Steckverbindung **101b**, **211** wasserdicht abdichtet.

[0063] Der Propeller **250** weist mehrere, in diesem Beispiel drei Flügel auf, welche von der Rotorwelle nach außen, insbesondere radial nach außen abragen. Die Rotorwelle ist zusammen mit dem Flügeln des Rotors **250** um die Rotorwellendrehachse R_P relativ zu dem Antriebsgehäuse **210** drehbar.

[0064] Das Wasserfahrzeug weist ferner eine Steuerung **300** auf, welche elektrisch zwischen eine elektrische Energiequelle **400** und den Antrieb **200** geschaltet ist. Die für den Antrieb benötigte Energie wird durch die elektrische Energiequwelle **400** bereitgestellt, welche in dem gezeigten Beispiel ein Akkumulator ist. Die Drehzahl des Propellers **250** wird durch die Steuerung **300** gesteuert. Die Steuerung **300** kann zum Beispiel ein Fernsteuerungselement aufweisen, an dem der Benutzer, insbesondere der Surfer, die Drehzahl des Motors einstellen kann. Zum Beispiel kann die Fernsteuerung kabelgebunden oder mittels Funk mit der Steuerung **300** verbunden sein, so dass mit der Fernsteuerung die Steuerung **300** ansteuerbar ist.

[0065] Das Surfboard **100** weist eine Ausnehmung für die Energiequelle **400** und eine weitere Ausnehmung, die von der ersten Ausnehmung getrennt ist, für die Steuerung **300** auf. Der Zugriff zu der Steuerung **300** und die elektrische Energiequelle **400** sind von der Oberseite des Surfboards **100** her möglich. Die zur Oberseite weisende Öffnung der Ausnehmung für die elektrische Energiequelle **400** ist mittels eines abnehmbaren Deckels verschlossen und gegenüber der Umgebung wasserdicht abgedichtet. Die zur Oberseite des Surfboards **100** weisende Öff-

nung der Ausnehmung für die Steuerung **300** ist mittels eines abnehmbaren Deckels, verschlossen und gegenüber der Umgebung wasserdicht abgedichtet.

[0066] Die Energiequelle **400** ist mit der Steuerung **300** über mindestens ein Kabel elektrisch verbunden. Die Steuerung **300** ist mit dem Antrieb **200** über mindestens ein Kabel und die elektrische Steckverbindung **101b**, **211** elektrisch verbunden.

[0067] Die Steuerung **300** ist über eine Wärmeleitverbindung mit mindestens einer Wärmetauscherfläche **500**, in diesem Beispiel zwei Wärmetauscherflächen **500**, die an der Unterseite des Surfboards **100** angeordnet ist (**Fig.** 1G) thermisch leitend verbunden. Von der Steuerung **300** erzeugte Wärme kann über die mindestens eine Wärmetauscherfläche **500** an das an der Unterseite des Surfboards **100** strömende Wasser abgeleitet werden, wodurch die Steuerung **300** gekühlt wird.

[0068] Während des Betriebs des Wasserfahrzeugs strömt Wasser an der Unterseite des Surfboards **100** in etwa entlang der Längsachse L entlang. Ein Teil des entlang strömenden Wassers strömt durch den vorderen Vertiefungsbereich **102** durch den Propeller **250** und wird entlang der Längsachse L zu dem hinteren Ende des Surfboards **100** hin ausgestoßen und durchfließt dabei den hinteren Vertiefungsbereich **104**. Ein anderer Teil des an der Unterseite des Surfboards **100** entlang strömenden Wassers umströmt das Antriebsgehäuse **210** und die Flügel **202a**, **202b**, wodurch ein positiver dynamischer Auftrieb erzeugt wird. Schließlich durchströmt dieser Teil den Propeller **250** und wird ebenfalls zu dem hinteren Ende des Surfboards **100** und entlang der Längsachse L aus dem Propeller **250** ausgestoßen.

[0069] Das von dem Propeller **250** entlang der Längsachse L ausgestoßene Wasser treibt das Surfboard **100** in Fahrrichtung an. Durch Gewichtsverlagerung der auf der Oberseite des Surfboards **100** befindlichen Person kann das Surfboard Kurven fahren oder geradeausfahren.

[0070] Die im Folgenden beschriebenen speziellen Konstruktionsmerkmale für das in den Figuren dargestellte Wasserfahrzeug sind lediglich beispielhaft zu verstehen und beschränken die Erfindung nicht zwangsläufig auf die angegebenen Dimensionen.

[0071] Der Abstand Lmin, der den Abstand der Befestigungseinrichtung **101a** von dem ersten und zweiten Verbindungsabschnitt **102a**, **102b**, bezeichnet, ist vorzugsweise größer als 5mm. Insbesondere kann der Abstand Lmin kleiner als 50mm sein.

[0072] Die Länge LA, welche den Abstand zwischen dem hinteren Ende T des Surfboards **100** und dem Krafteinleitungspunkt A des Propellers **250** oder dem Propeller **250** bezeichnet, beträgt in etwa das 0,2- bis 0,3-fache der Gesamtlänge Lboa des Surfboards **100**. Der Krafteinleitungspunkt A ist der gemittelte Punkt der Propellersteigung oder der Propellernabenlänge projiziert auf die Längsachse L.

[0073] Die Länge L1 bezeichnet den Abstand des ersten oder zweiten Vertiefungsabschnitts **102a**, **102b** von dem Krafteinleitungspunkt A oder dem Propeller **250** von der Stelle, an welcher der erste oder zweite Vertiefungsabschnitt **102a**, **102b** eine quer zur Längsachse L erstreckte Breite L6 aufweist, die in etwa dem 0,3- bis 0,5-fachen der quer zur Längsachse L erstreckten Breite L7 der Vertiefung **110** im Bereich des Propellers **250** entspricht. Vorzugsweise ist die maximale Breite des ersten und/oder zweiten Vertiefungsabschnitts **102a**, **102b** größer als die Breite L6, d.h. größer als das 0,3- bis 0,5-fache der quer zur Längsachse L erstreckten Breite L7 der Vertiefung **110** im Bereich des Propellers **250**.

[0074] Der Abstand L5 zwischen den als Scheitelpunkte gebildeten vorderen Enden des ersten und zweiten Vertiefungsabschnitts **102a**, **102b** entspricht in etwa dem 0,5- bis 0,9-fachen der quer zur Längsachse L erstreckten Breite L7 der Vertiefung **110** im Bereich des Propellers **250**.

[0075] Der Gesamtschwerpunkt des Wasserfahrzeugs ist vorzugsweise durch die Verteilung der Komponenten **200**, **300** und **400** so, dass er in etwa in der Mitte, insbesondere in etwa im mittleren Drittel oder mittleren Fünftel, zwischen dem vorderen und dem hinteren Ende des Surfboards **100** liegt.

[0076] Hinsichtlich der Lage des Krafteinleitungspunkts A bzw. des Propellers **250** sollte z.B. beachtet werden, dass wenn dieser zu weit hinten liegt, das vordere Ende des Surfboards **100** stark aus dem Wasser steigt, wodurch der Strömungswiderstand ansteigt, was eine verminderte Geschwindigkeit zur Folge hat. Wenn der Krafteinleitungspunkt A bzw. der Propeller **250** zu weit vorne ist, steigt ebenfalls der Strömungswiderstand an und ist das Wasserfahrzeug schlechter durch Gewichtsverlagerung zu lenken.

[0077] Die Breite L7 beträgt in etwa, insbesondere ±5%, $2 \cdot \sqrt{L9 \cdot (DRa - L9)}$, wobei L9 die Tiefe der Vertiefung **110** im Bereich des Propellers **250** und DRa den Außendurchmesser des Rings **201** bezeichnen.

[0078] Die Tiefe L9 der Vertiefung **110** im Bereich der Nut **103** ist vorzugsweise so, dass die minimale Boardstärke, die sich aus der Differenz aus der Dicke Tboa des Boards **100** und der Tiefe L9 ergibt, mindestens 10 mm, vorzugsweise zwischen 10 und 40 mm beträgt. Hierdurch wird die Stabilität des Boards **100** nicht gefährdet und verbleibt noch genügend sta-

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tischer Auftrieb, speziell im Heckbereich des Surfboards **100**.

[0079] Die Tiefe der Nut **103**, die in etwa der Wandstärke Ws des Rings **201** entspricht, beträgt ca. 2 bis 5 mm, vorzugsweise 2,5 mm.

[0080] Die Breite L3 des Rings **201**, die in etwa der Breite B103 der Nut **103** entspricht, ist insbesondere abhängig von wenigstens einem aus der Steigung des Propellers **201**, der entlang der Längsachse L erstreckten Breite des Propellers **201** und der Gesamtnabenlänge.

[0081] Der Ringinnendurchmesser DRi ergibt sich vorzugsweise aus der Summe aus Propellerdurchmesser Dpro und einem Ringspalt zwischen Propeller **201** und Ring **201**. Es hat sich herausgestellt, dass der Ringspalt abhängig ist von der Propellersteigung und der Propellerdrehzahl. Der Ringspalt kann ca. 1 bis 10 mm betragen, insbesondere für einen Drehzahlbereich von 1000 bis 3000 1/min. Insbesondere ermöglicht der Ringspalt, dass eine Berührung der Propellerspitzen mit dem Innenumfang des Rings **201** bei Kurvenfahrt aufgrund der möglichen Verwindung des Rings **201** verhindert wird.

[0082] Beispielsweise kann der Propeller wenigstens eines aus einem Durchmesser von ca. 178 mm bis 305 mm, eine Steigung von 178 bis 254 mm und eine Propellernabenlänge von ca. 40 bis 70 mm aufweisen.

[0083] Ab dem Punkt G verläuft die Vertiefung in einem Winkel α2 und β2 bis zum Punkt H bzw. vom Punkt J zum Punkt K. Der Punkte H bzw. K werden in einem Abstand L4 vom Punkt A gemessen.

[0084] Die Breite L8 des Vertiefungsbereichs **104** in dem entlang der Längsachse L erstreckten Abstand L4 von dem Propeller **250** bzw. dem Kraftangriffspunkt A kann insbesondere zwischen 0,4 bis 0,8 mal der Breite L7 betragen. Die Länge L4 kann z.B. LA minus ca. 80 bis 120mm, vorzugsweise 100mm, betragen.

[0085] Die Geometrie der Austrittsöffnung ab den Punkten H bzw. K ergibt sich aus der Heckgeometrie des Surfboards **100** und der Winkel α2 und β2. Die Winkel α2 und β2 stehen vorzugsweise in direkter Beziehung zu L7 und L9 (**Fig.** 1C).

ZITATE ENTHALTEN IN DER BESCHREIBUNG

Diese Liste der vom Anmelder aufgeführten Dokumente wurde automatisiert erzeugt und ist ausschließlich zur besseren Information des Lesers aufgenommen. Die Liste ist nicht Bestandteil der deutschen Patent- bzw. Gebrauchsmusteranmeldung. Das DPMA übernimmt keinerlei Haftung für etwaige Fehler oder Auslassungen.

Zitierte Patentliteratur

- US 2011/0003521 A1 [0002]
- DE 4404241 A1 [0003, 0005, 0018, 0018]
- DE 4404241 [0018]

Patentansprüche

1. Wasserfahrzeug, insbesondere Wassersportgerät, umfassend:
a) ein Surfboard (**100**), dessen Oberseite zur Aufnahme einer Person vorgesehen ist, und
b) einen Antrieb (**200**), der an der Unterseite des Surfboards (**100**) angeordnet ist, wobei der Antrieb (**200**) einen Propeller (**250**) aufweist,
c) wobei an der Unterseite des Surfboards (**100**) eine Vertiefung (**110**) vorgesehen ist, die einen sich entlang der Längsachse (L) des Surfboards (**100**) erstreckenden, zur Unterseite hin offenen Kanal bildet,
d) wobei der Antrieb (**200**) so angeordnet ist, dass die von dem Propeller (**250**) überstrichene Fläche (A_P) teilweise durch die Vertiefung (**110**) verläuft.

2. Wasserfahrzeug nach Anspruch 1, **dadurch gekennzeichnet,** dass die von dem Propeller (**250**) überstrichene Fläche (A_P) teilweise außerhalb der Vertiefung(**110**) verläuft, wobei bevorzugt ist, dass der Anteil (A_P2) der von dem Propeller (**250**) überstrichenen Fläche (A_P), der außerhalb der Vertiefung (**110**) ist, größer ist als der Anteil (A_P1) der von dem Propeller (**250**) überstrichenen Fläche (A_P), der durch die Vertiefung verläuft.

3. Wasserfahrzeug nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** dass die von dem Propeller überstrichene Fläche (A_P) zu ca. 10 bis 30%, vorzugsweise zu ca. 15 bis 25% durch die Vertiefung (**110**) verläuft.

4. Wasserfahrzeug nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** dass, der Antrieb (**200**) eine Propellerwelle aufweist, die um eine Propellerwellendrehachse (R_P) drehbar ist und an welcher der Propeller (**250**) befestigt ist, wobei die Propellerwellendrehachse (R_P) parallel zu der Längsachse L des Surfboards (**100**) ist und/oder außerhalb der Vertiefung (**100**) angeordnet ist.

5. Wasserfahrzeug nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** dass die Vertiefung (**110**) einen vorderen Vertiefungsbereich (**102**) und einen hinteren Vertiefungsbereich (**104**) aufweist, wobei der Propeller (**250**) zwischen dem vorderen Vertiefungsbereich (**102**) und dem hinteren Vertiefungsbereich (**104**) angeordnet ist, wobei bevorzugt ist, dass der vordere Vertiefungsbereich (**102**) in der hinteren Hälfte des Surfboards (**100**) beginnt und/oder der hintere Vertiefungsbereich (**104**) sich bis zum Heck des Surfboards (**100**) erstreckt.

6. Wasserfahrzeug nach Anspruch 5, **dadurch gekennzeichnet,** dass der vordere Vertiefungsbereich (**102**) einen ersten Vertiefungsabschnitt (**102a**) und einen zweiten Vertiefungsabschnitt (**102b**) aufweist, zwischen denen ein Steg (**101**) angeordnet ist, der den ersten Vertiefungsabschnitt (**102a**) und den zweiten Vertiefungsabschnitt (**102b**) voneinander trennt, wobei der erste Vertiefungsabschnitt (**102a**) und der zweite Vertiefungsabschnitt (**102b**) in Bezug auf die Längsachse (L) des Surfboards (**100**) bevorzugt spiegelsymmetrisch sind.

7. Wasserfahrzeug nach Anspruch 6, **dadurch gekennzeichnet,** dass der Steg (**101**) eine Befestigungseinrichtung (**101a**) aufweist, an welcher der Antrieb (**200**) mechanisch mit dem Surfboard (**100**) verbunden ist.

8. Wasserfahrzeug nach Anspruch 6 oder 7, **dadurch gekennzeichnet,** dass zwischen dem Propeller (**250**) und dem Steg (**101**) oder/und zwischen dem Propeller (**250**) und dem ersten und zweiten Vertiefungsabschnitt (**101a**, **101b**) ein Sammelabschnitt (**102c**) angeordnet ist, in den der erste Vertiefungsabschnitt (**101a**) und der zweite Vertiefungsabschnitt (**101b**) münden.

9. Wasserfahrzeug nach einem der Ansprüche 5 bis 8, **dadurch gekennzeichnet,** dass die Querschnittsfläche des vorderen Vertiefungsbereichs (**102**) von dessen Beginn bis zum Propeller (**250**) hin zunimmt, insbesondere monoton zunimmt, und/oder dass die Querschnittsfläche des hinteren Vertiefungsbereichs (**104**) vom Propeller (**250**) bis zum Ende des hinteren Vertiefungsbereichs (**104**) abnimmt, insbesondere monoton abnimmt.

10. Wasserfahrzeug nach einem der Ansprüche 5 bis 9, **dadurch gekennzeichnet,** dass wenigstens eines aus Querschnitt, Tiefe und Breite der Vertiefung (**110**) im Bereich des Propellers (**250**) am größten ist.

11. Wasserfahrzeug nach einem der Ansprüche 6 bis 10, **dadurch gekennzeichnet,** dass der erste Vertiefungsabschnitt (**102a**) und/oder der zweite Vertiefungsabschnitt (**102b**) so geformt sind, dass seine quer zur Längsachse (L) erstreckte Breite zu dem Propeller (**250**) hin abnimmt, insbesondere zumindest abschnittsweise abnimmt.

12. Wasserfahrzeug nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** dass der Propeller (**250**) über seinen Rotationsumfang von einem in Bezug auf das Antriebsgehäuse (**210**) und/oder das Surfboard (**100**) feststehenden Ring (**201**) umgeben ist, der eine Wandstärke (W_S) aufweist, wobei die Vertiefung (**110**) eine sich um die Propellerwellendrehachse (R_P) erstreckende Nut (**103**) aufweist, die eine Nuttiefe aufweist, die in etwa der Wandstärke (W_S) des feststehenden Rings (**201**) entspricht, wobei der feststehende Ring (**201**) in der Nut (**103**) angeordnet ist, wobei bevorzugt ist, dass die Nutbreite (B_{103}) in etwa der Breite des feststehenden Rings entspricht.

13. Wasserfahrzeug nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** dass der Antrieb (**200**) einen Elektromotor aufweist, wobei dessen Motorwellendrehachse (R_M) und die Propellerwellendrehachse (R_P) zueinander fluchten, wobei der Elektromotor bevorzugt vor dem Propeller (**250**) angeordnet ist.

14. Wasserfahrzeug nach dem vorhergehenden Anspruch, **dadurch gekennzeichnet,** dass der Propeller (**250**) über seinen Rotationsumfang von einem in Bezug auf das Antriebsgehäuse (**210**) und/oder das Surfboard (**100**) feststehenden Ring (**201**) umgeben ist, wobei der Ring (**201**) über mindestens einen ersten Flügel (**201a**) und einen zweiten Flügel (**202b**) mit dem Antriebsgehäuse (**210**) verbunden ist, wobei der erste Flügel (**202a**) und der zweite Flügel (**202b**) so konfiguriert, insbesondere profiliert und/oder angestellt, sind, dass die in den Propeller (**250**) einströmende, die Flügel (**202a, 202b**) umströmende Strömung einen dynamischen Auftrieb (A_D) erzeugt, der insbesondere in Richtung zu der Unterseite des Surfboards (**100**) hinwirkt.

15. Wasserfahrzeug nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** dass der Antrieb (**200**) einen Elektromotor aufweist und dass in das Surfboard eine Steuerung zur Steuerung (**300**) des Elektromotors integriert ist, wobei an der Unterseite des Surfboards (**100**) mindestens eine Wärmetauscherfläche (**500**) angeordnet ist, die thermisch leitend mit der Steuerung (**300**) verbunden ist.

16. Wasserfahrzeug nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** dass der Antrieb (**200**) einen Elektromotor aufweist, dessen Motorengehäuse (**210**) vor dem Propeller (**250**) mechanisch mit dem Surfboard (**100**) verbunden ist, wobei der Elektromotor elektrisch mit einer elektrischen Energiequelle (**400**), die in dem Surfboard (**100**) integriert ist, verbunden ist wobei bevorzugt ist, dass die elektrische Energiequelle (**400**) z. B. mit einem Klicksystem auswechselbar ist.

Es folgen 4 Seiten Zeichnungen

Anhängende Zeichnungen

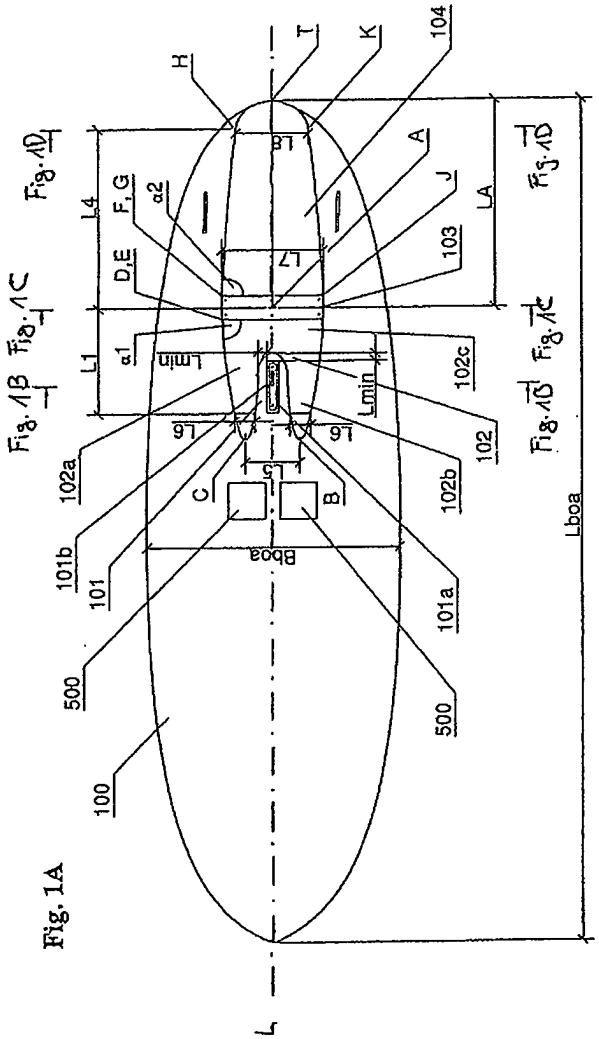


Fig. 1A

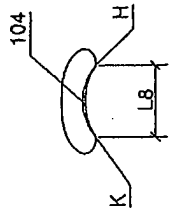


Fig. 1D

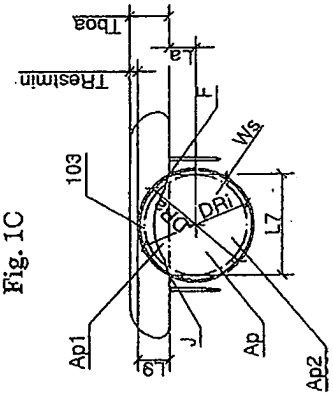


Fig. 1C

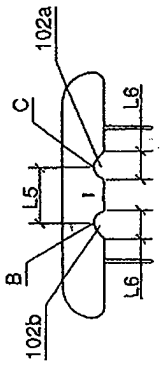


Fig. 1B

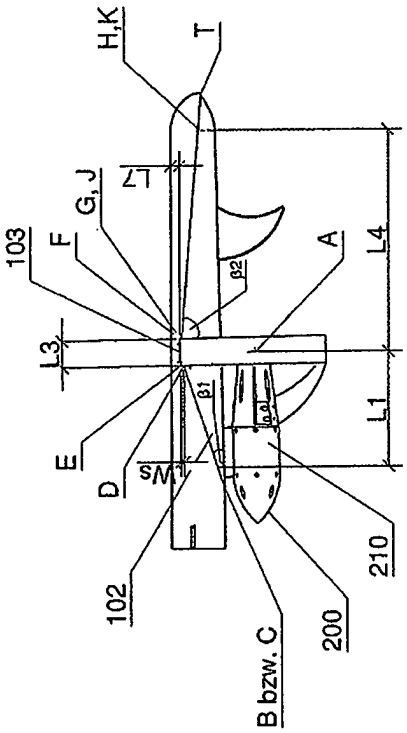


Fig. 1E

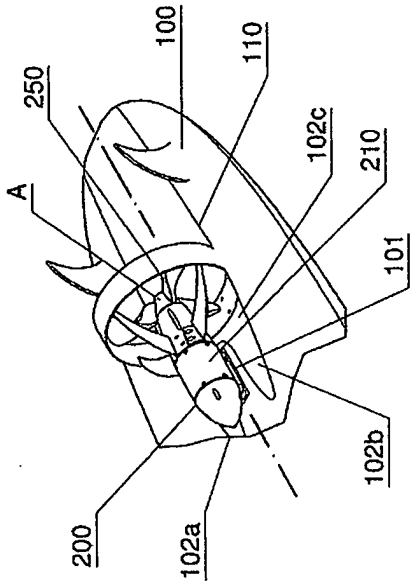


Fig. 1F

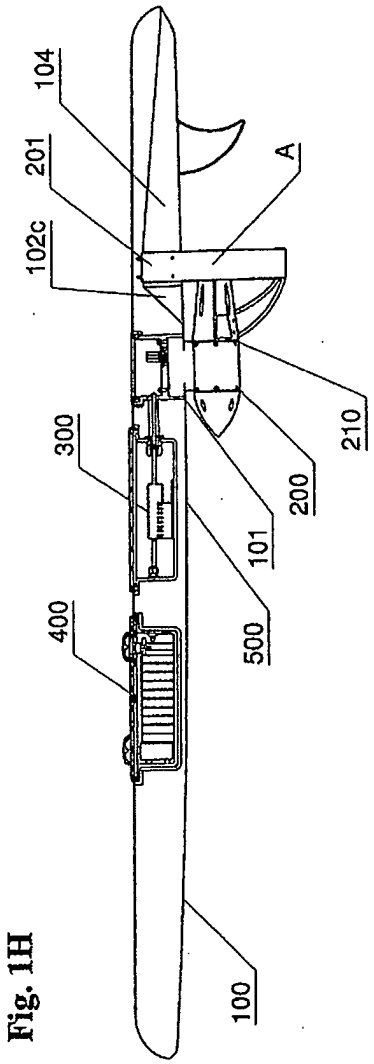


Fig. 1H

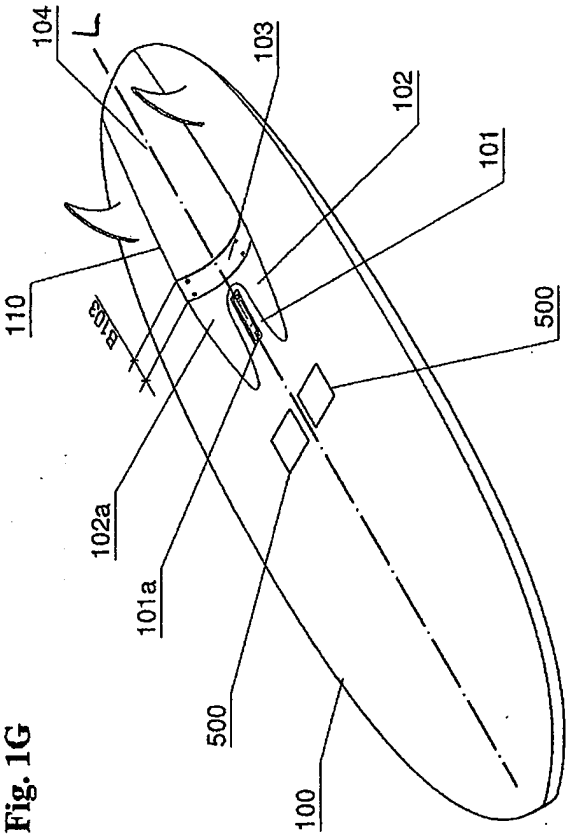


Fig. 1G

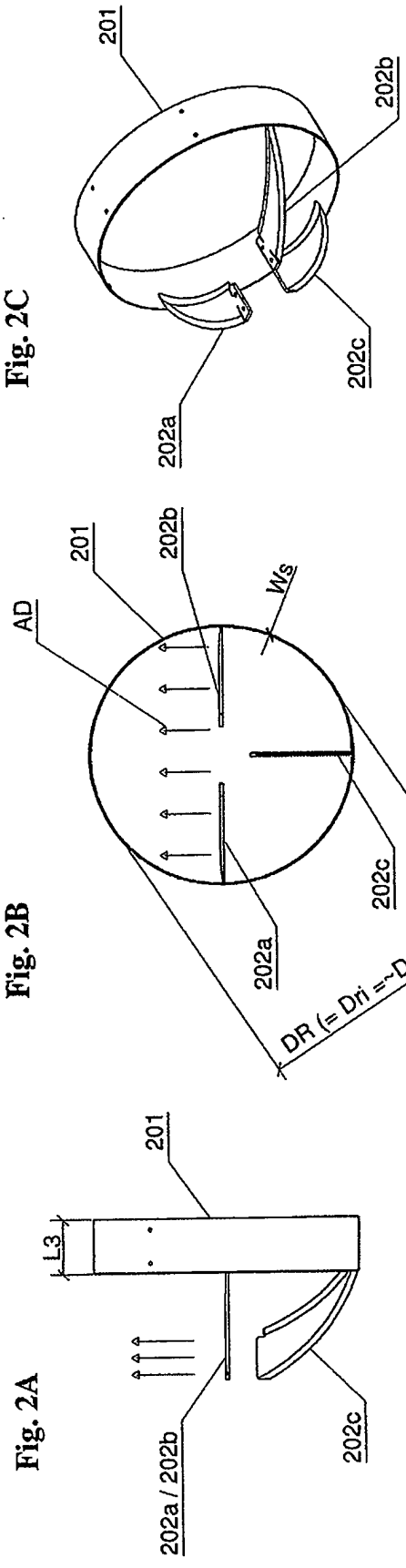


Fig. 2A

Fig. 2B

Fig. 2C

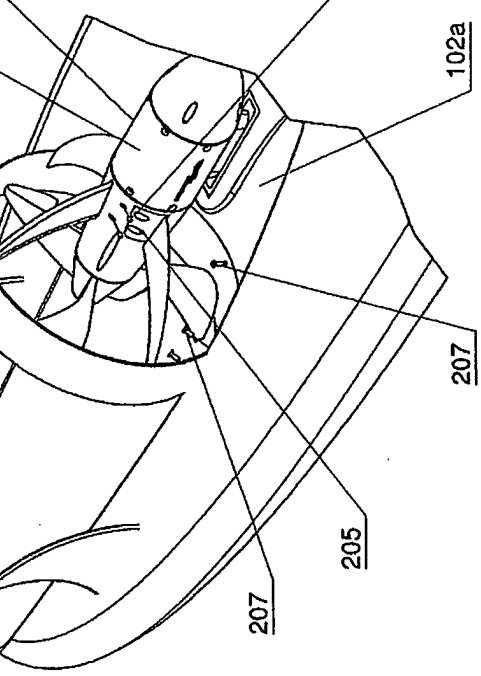


Fig. 2E

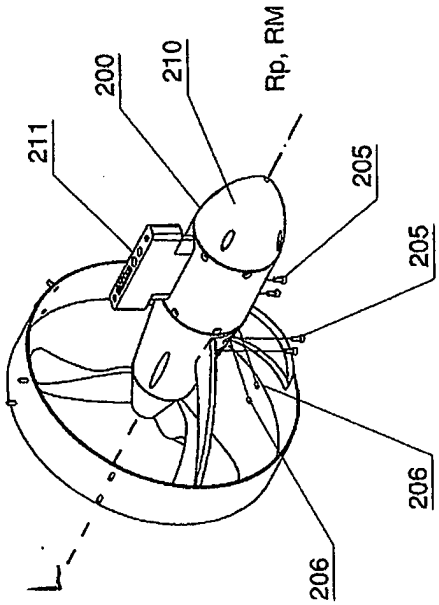
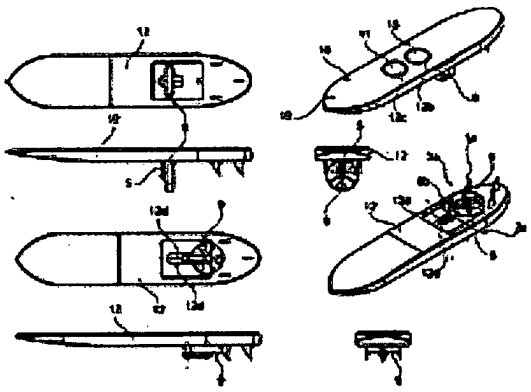


Fig. 2D

2 of 16 DOCUMENTS

DE202012012844U1 2014-06-12 **Watercraft, such as surfboard with a drive unit** (en)



Applicants/Assignees: Markus Schilcher, 82487, Oberammergau, Federal Republic of Germany

Classifications: CPC: B63B35/7943 (2013-01-01; I 2014-08-06; B, H, EP)
CPC: B63H5/14 (2013-01-01; I 2014-07-09; B, H, EP)
CPC: B63H21/17 (2013-01-01; I 2014-08-06; B, H, EP)
CPC: B63H2005/1256 (2013-01-01; A 2014-07-09; B, H, EP)
CPC: B63H2005/1258 (2013-01-01; A 2014-07-09; B, H, EP)
IPC[8]: B63H5/20 (2006-01-01; A, F, I, 2014-06-12; B, H, DE)
IPC[8]: B63B35/79 (2006-01-01; A, L, I, 2014-06-12; B, H, DE)
IPC[8]: B63H5/125 (2006-01-01; A, L, I, 2014-06-12; B, H, DE)

Priority Number and Date: DE202012012844 2012-03-26

English Abstract:

Drive unit for a watercraft, in particular a Water sport device, preferably a surfboard, comprising:
a) a propeller shaft (1), the b about a propeller shaft axis of rotation (1a) is rotatable and on which a propeller (9) is fastened or fastenable,
) a drive shaft (2), the d c about an actuator shaft axis of rotation (2a) rotatable and having an engine (10) is connectable or connected,
) wherein the drive shaft (2) so to the propeller shaft (1) is connected that a rotation of the drive shaft (2) about its actuator shaft axis of rotation (2a) a rotation of the propeller shaft (1) about their propeller shaft axis of rotation (1a) effected,
cheracterised in that
) the propeller shaft axis of rotation (1a) skewed with respect to the actuator shaft axis of rotation (2a) is arranged and the propeller shaft axis of rotation (1a) around the actuator shaft axis of rotation (2a) is pivotable.

(19) Deutsches Patent- und Markenamt

(10) **DE 20 2012 012 844 U1** 2014.06.12

(12) # Gebrauchsmusterschrift

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(47) Eintragungstag: **11.02.2014**
(45) Bekanntmachungstag im Patentblatt: **12.06.2014**

(51) Int Cl.: ***B63H 5/20*** (2006.01)
B63H 5/125 (2006.01)
B63B 35/79 (2006.01)

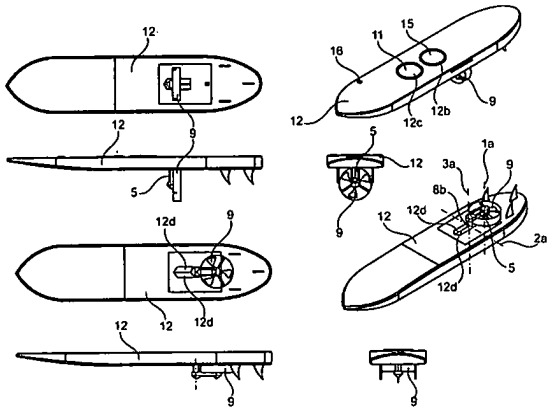
(73) Name und Wohnsitz des Inhabers:
Schilcher, Markus, Dipl.-Ing., 82487, Oberammergau, DE

(74) Name und Wohnsitz des Vertreters:
Schwabe Sandmair Marx, 81677, München, DE

Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: **Wasserfahrzeug, wie zum Beispiel Surfboard mit einer Antriebseinheit**

(57) Hauptanspruch: Antriebseinheit für ein Wasserfahrzeug, insbesondere ein Wassersportgerät, vorzugsweise ein Surfboard, umfassend:
a) eine Propellerwelle (1), die um eine Propellerwellendrehachse (1a) drehbar ist und an der ein Propeller (9) befestigbar oder befestigt ist,
b) eine Antriebswelle (2), die um eine Antriebswellendrehachse (2a) drehbar und mit einem Motor (10) verbindbar oder verbunden ist,
c) wobei die Antriebswelle (2) so mit der Propellerwelle (1) verbunden ist, dass eine Drehung der Antriebswelle (2) um ihre Antriebswellendrehachse (2a) eine Drehung der Propellerwelle (1) um ihre Propellerwellendrehachse (1a) bewirkt, dadurch gekennzeichnet, dass
d) die Propellerwellendrehachse (1a) windschief in Bezug auf die Antriebswellendrehachse (2a) angeordnet ist und die Propellerwellendrehachse (1a) um die Antriebswellendrehachse (2a) schwenkbar ist.



Beschreibung

[0001] Die Erfindung betrifft eine Antriebseinheit für ein Wasserfahrzeug, insbesondere ein Wassersportgerät, vorzugsweise ein Surfboard. Die Erfindung betrifft demnach auch ein solches Wasserfahrzeug mit einer Antriebseinheit.

[0002] Aus dem Stand der Technik, nämlich der US 2011/0003521 A1 ist ein Surfboard bekannt, welches einen Antrieb in Form von beispielsweise einem Jetantrieb integriert hat. Aus der DE 44 31 186 B4 geht ein Unterwasserantriebssystem für ein Unterwasserfahrzeug hervor, bei dem ein Motor, auf dessen Motorwelle ein Propeller sitzt, mittels eines Arms von einem Rumpf eines Unterwasserfahrzeugs weggeschwenkt wird.

[0003] Die DE 44 04 241 A1 zeigt ein Surfboard mit einem motorischen Antrieb. Der Antrieb umfasst einen Verbrennungsmotor, der mit einem an der Unterseite des Surfboards befestigten Propeller verbunden ist. Der Propeller ist nicht schwenkbar an der Unterseite des Surfboards angeordnet.

[0004] In der DE 203 09 755 U1 wird ein Hilfsantrieb für ein Boot beschrieben, bei dem eine Propellerwelle gelenkig mit einer Motorwelle verbunden ist, wobei dieses Gelenk erlaubt, dass die Propellerwelle von der Unterseite des Boots wegschwenkbar und an die Unterseite des Boots hinschwenkbar ist.

[0005] Aus der DE 20 2005 004 406 U1 geht ein Antrieb für ein Schiff hervor, bei dem ein Schieberohr an der Unterseite eines Rumpfs aus dem Rumpf mit einer Axialbewegung ausfahrbar und in den Rumpf einfahrbar ist. Senkrecht zur Verschieberichtung des Schieberohrs ist, in das Schieberohr integriert, ein Kanal gebildet, in dem ein Propeller angeordnet ist.

[0006] Es ist eine Aufgabe der Erfindung, eine Antriebseinheit für ein Wasserfahrzeug oder ein Wasserfahrzeug mit einer Antriebseinheit anzugeben, die dem Wasserfahrzeug erlaubt, widerstandsarm durchs Wasser bewegt zu werden, wenn die Antriebseinheit nicht benutzt wird, und Platz sparend ausgestaltet ist, um die Antriebseinheit auch in kleinen Wasserfahrzeugen, wie z. B. Surfboards unterbringen zu können.

[0007] Die Aufgabe wird durch die Merkmale der unabhängigen Ansprüche gelöst. Vorteilhafte Weiterentwicklungen ergeben sich aus den abhängigen Ansprüchen, der Beschreibung und den Figuren.

[0008] Die Erfindung geht von einer Antriebseinheit für ein Wasserfahrzeug, insbesondere ein Wassersportgerät, vorzugsweise ein Surfboard aus. Im Grunde eignet sich die Antriebseinheit auch für Boote oder Schiffe, wobei sie insbesondere für Wassersportgeräte, insbesondere Surfboards geeignet ist, da sie kompakt baut und Wassersportgeräte oder Surfboards in der Regel beschränktere Platzverhältnisse als Schiffe haben. Ein Surfboard, das auch als Surfbrett bezeichnet wird, ist ein aus einem schwimmfähigen Material hergestelltes Brett, das auch als Sportgerät zum Wellenreiten oder zum Windsurfen dient. Bekannte Surfboards werden zum größten Teil aus einem Schwimmkörper, der z. B. aus Hartschaum hergestellt sein kann, gebildet, auf dessen Oberseite eine Person, d. h. ein Surfer Platz nehmen kann, wobei hierfür an der Oberseite Fußschlaufen angeordnet sein können, und an dessen Unterseite, insbesondere im Heckbereich, ein Schwert oder mehrere, wie z. B. zwei oder drei Finnen für die Richtungsstabilität angeordnet sein können. Das Surfboard oder der Schwimmkörper haben in der Regel eine längliche Form, wobei die Längsachse des Boards im Wesentlichen der Fahrtrichtung entspricht. Die Breite des Boards ist im Vergleich zu seiner Länge kleiner. Die Dicke des Boards ist bezogen auf die Länge und die Breite des Boards gering, wodurch sich die für ein Surfboard oder Surfbrett brettförmige Form ergibt. Das Surfboard oder deren Schwimmkörper hat einen positiven statischen Auftrieb, der insbesondere so groß ist, dass sie den Surfer mitsamt Surfboard über Wasser hält.

[0009] Das Wasserfahrzeug umfasst einen vorzugsweise flach ausgestalteten Schwimmkörper und eine daran befestigte Antriebseinheit. Obwohl der Schwimmkörper selbst bereits als Surfboard bezeichnet werden kann, bilden die Antriebseinheit und das Surfboard bzw. der Schwimmkörper das Surfboard.

[0010] Die Antriebseinheit umfasst eine Propellerwelle, die um eine Propellerwellendrehachse drehbar ist und an der ein Propeller, der auch als Schraube bezeichnet werden kann, befestigbar oder befestigt ist. Der Propeller weist mindestens einen, vorzugsweise mehrere von der Propellerdrehachse, welche der Propellerwellendrehachse entspricht, abragende Flügel auf, wobei der Propeller oder die Flügel so ausgestaltet sind, dass bei Drehung des Propellers um die Propellerwellendrehachse oder Propellerdrehachse Wasser von der Propellervorderseite angesaugt und an der Propellerrückseite mit einem Impuls ausgestoßen wird, wodurch ein Vortrieb entlang der Propellerwellendrehachse erzeugt wird. Die Propellerwelle kann so ausgestaltet sein, dass die Flügel des Propellers radial von der Propellerwelle abragen. Alternativ kann die Propellerwelle eine Hohlwelle sein, so dass die Flügel des Propellers bezogen auf die Propellerwelle radial nach innen ragen. Die Propellerwellendrehachse entspricht insbesondere der Mittelachse der Propellerwelle. Der Propeller ist insbesondere für Betrieb in Wasser angepasst.

[0011] Die Antriebseinheit umfasst ferner eine Antriebswelle, die um eine Antriebswellendrehachse,

die vorzugsweise der Mittelachse der Antriebswelle entspricht, drehbar und mit einem Motor verbindbar oder verbunden ist. Die Antriebswelle kann z. B. mittelbar oder unmittelbar mit dem Motor, insbesondere der Motorwelle verbunden sein. Beispiel für eine mittelbare Verbindung ist die Verbindung der Antriebswelle über ein Zwischengetriebe, welches die Drehzahl des Motors unter Drehzahlerhöhung oder Drehzahlverringerung an die Antriebswelle abgibt und/ oder eine Drehzahlübertragung von der Motorwelle zu der Antriebswelle erst ermöglicht, wenn die Motorwelle und die Antriebswelle nicht miteinander fluchen. Bei dem Motor kann es sich z. B. um einen Verbrennungsmotor handeln, wobei ein Elektromotor bevorzugt wird, da dieser insbesondere einfacher steuer- oder regelbar ist.

[0012] Die Antriebswelle ist so, insbesondere über mindestens ein Zwischengetriebe, wie z. B. einen Zugmitteltrieb und/oder ein Zahnradgetriebe, insbesondere ein Kegelradgetriebe, mit der Propellerwelle verbunden, das eine Drehung der Antriebswelle um ihre Antriebswellendrehachse und insbesondere relativ zu dem Schwimmkörper, eine Drehung der Propellerwelle um ihre Propellerwellendrehachse und insbesondere relativ zu dem Schwimmkörper, bewirkt. Vorzugsweise ist der Motor so mit der Antriebswelle verbunden oder verbindbar, dass eine Drehung der Motorwelle um ihre Längsachse eine Drehung der Antriebswelle um ihre Antriebswellendrehachse bewirkt. Eine Drehung des Motors kann somit eine Drehung der Propellerwelle und somit des Propellers bewirken, wenn dieser an der Propellerwelle befestigt ist, so dass ein Vortrieb für das Wasserfahrzeug bewirkt wird.

[0013] Die Propellerwellendrehachse und insbesondere auch die Propellerwelle ist windschief in Bezug auf die Antriebswellendrehachse oder die Antriebswelle angeordnet. Windschief ist im mathematischen Sinne auszulegen, was bedeutet, dass die Propellerwellendrehachse die Antriebswellendrehachse, wenn diese Drehachsen als Geraden im Raum betrachtet werden, nicht schneidet und nicht parallel zu der Antriebswellendrehachse angeordnet ist. Durch die windschiefe Anordnung der Propellerwellendrehachse in Bezug auf die Antriebswellendrehachse lässt sich vorteilhaft ein Schwenkmechanismus erzeugen, der eine Platz sparende Unterbringung der Antriebseinheit an dem Wasserfahrzeug erlaubt und gleichzeitig eine Durch- oder Umströmung des Propellers verhältnismäßig wenig behindert.

[0014] Insbesondere sind die Propellerwellendrehachse und/oder der Propeller von der Unterseite des Schwimmkörpers wegschwenkbar oder/und zu der Unterseite des Schwimmkörpers hinschwenkbar. Der Schwimmkörper kann an seiner Unterseite eine Ausnehmung aufweisen, die angepasst ist, zumindest den Propeller vorzugsweise zumindest teilweise aufzunehmen. Durch Hinschwenken des Propellers oder der Propellerwellendrehachse zu der Unterseite des Schwimmkörpers kann der Propeller in dieser Aufnehmung zumindest teilweise aufgenommen werden. Durch Wegschwenken des Propellers oder der Propellerwellendrehachse von der Unterseite des Schwimmkörpers kann der Propeller aus der Ausnehmung heraus bewegbar oder entfernbar sein. Die Ausnehmung ist insbesondere deshalb von Vorteil, da der Propeller, wenn dieser für den Antrieb des Wasserfahrzeugs nicht benötigt wird, in der Ausnehmung einen verringerten Wasserwiderstand bietet. Optional kann der Schwimmkörper an der Unterseite keine besondere Ausnehmung für den Propeller aufweisen, wobei in einer solchen Ausführung des Schwimmkörpers der Propeller lediglich an die Unterseite des Schwimmkörpers angeklappt oder angelegt wird. Trotz fehlender Ausnehmung bietet das Anklappen oder Ablegen an die Unterseite des Schwimmkörpers dennoch eine Verringerung des Strömungswiderstands. Sofern eine Ausnehmung an der Unterseite vorgesehen ist, kann diese z. B. topfförmig ausgestaltet sein.

[0015] Vorzugsweise kann die Schwenkbewegung des Propellers oder der Propellerwellendrehachse zumindest in eine Schwenkrichtung, wie z. B. das Anklappen, vorzugsweise auch das Ausklappen motorisch, insbesondere mit einem separaten oder dem für die Drehung des Propellers um die Propellerwellendrehachse vorgesehenen Motor erfolgen. Optional kann das Wegklappen des Propellers von der Unterseite des Schwimmkörpers durch die Schwerkraft, d. h. ohne Motor und das Anklappen motorisch erfolgen. Insbesondere kann die Antriebseinheit so ausgestaltet sein, dass sie das Drehmoment des Motors wahlweise in eine Drehung des Propellers oder der Propellerwelle um die Propellerwellendrehachse überträgt oder die Schwenkbewegung des Propellers zu dem Schwimmkörper hin und optional von dem Schwimmkörper weg bewirkt.

[0016] Insbesondere kann der Motor ein Verbrennungs- oder Elektromotor sein und zum Antrieb des Propellers und der Schwenkbewegung dienen. Der Motor ist vorzugsweise in den Schwimmkörper integriert. Hierdurch wird die zu schwenkende oder klappende Masse verringert, da der Motor eine verhältnismäßig hohe Masse aufweist.

[0017] Insbesondere kann in dem Schwimmkörper eine Batterie integriert sein, wobei unter einer Batterie insbesondere auch ein Akkumulator oder eine Brennstoffzelle verstanden werden kann. Die Batterie ist so mit dem Elektromotor verbunden, dass sie diesen antreiben kann. Alternativ, wenngleich weniger bevorzugt, kann in den Schwimmkörper ein Kraftstofftank für einen als Verbrennungsmotor ausgestalteten Motor zum Antrieb des Propellers und der Schwenkbewegung integriert sein.

[0018] Das Wasserfahrzeug kann ein lösbares, insbesondere mechanisches oder magnetisches Haltemittel aufweisen, welches den Propeller in der an den Schwimmkörper angeklappten Position hält. Dieses Haltemittel kann vorzugsweise so betätigt werden, dass der Propeller gelöst wird, wodurch dieser durch die Schwerkraft oder/und den Motor von der Unterseite des Schwimmkörpers insbesondere um etwa 90° wegklappbar ist.

[0019] Das Wasserfahrzeug kann eine Steuereinrichtung für den Motor aufweisen, die es erlaubt, den Motor ein- und auszuschalten und insbesondere hinsichtlich seiner Drehzahl zu steuern oder zu regeln. Insbesondere ist die Steuereinrichtung so ausgestaltet, dass sie den Motor für die Schwenkbewegung des Propellers an die oder von der Unterseite des Schwimmkörpers mit einer verringerten Drehzahl wie z. B. mit 1/10 der Maximaldrehzahl betreibt als für den Betrieb des Propellers mit z. B. seiner Maximaldrehzahl. Die Steuereinrichtung kann insbesondere so ausgestaltet sein, dass sie das Haltemittel für den Propeller steuern kann, wobei die Steuereinrichtung das Haltemittel lösen kann.

[0020] Bevorzugt ist der Schwimmkörper flach, insbesondere länglich entlang einer Längsachse, die im Wesentlichen der Fahrachse entspricht, ausgestaltet. Die flache Ausgestaltung bewirkt, dass der Schwimmkörper flach auf der Wasseroberfläche liegt. Insbesondere ist es bevorzugt, dass die Antriebswelle und/oder die Antriebswellendrehachse quer, insbesondere senkrecht zu der Längsachse und entlang des flachen Schwimmkörpers, insbesondere parallel zur Wasseroberfläche angeordnet sind. Allgemein ist es bevorzugt, dass die Antriebswellendrehachse innerhalb des Schwimmkörpers angeordnet ist. Hierdurch lässt sich eine sehr kompakte Bauweise realisieren.

[0021] In bevorzugten Ausführungen kann das Wasserfahrzeug nicht nur eine einzige Antriebseinheit mit einem Propeller sondern zwei nebeneinander angeordnete, klapp- oder schwenkbare Propeller, vorzugsweise mit jeweils einer Antriebseinheit und jeweils einem Motor, aufweisen. Die Propellerwellendrehachsen sind vorzugsweise parallel zueinander und voneinander beabstandet angeordnet. Die Propeller sind allgemein bevorzugt relativ zueinander mit gleichen und unterschiedlichen Drehzahlen betreibbar, wodurch ein Giermoment um die Hochachse des Wasserfahrzeugs erzeugbar ist. Somit erlaubt das Wasserfahrzeug ein einfaches Kurvenfahren, das nicht notwendigerweise eine Gewichtsverlagerung voraussetzt, wie es bei Ausführungen mit nur einem einzigen Propeller oder mit einer einzigen Antriebseinheit der Fall wäre. Optional kann das Wasserfahrzeug einen Sensor aufweisen, welcher eine Rollbewegung oder einen Rollwinkel um die Längsachse des Wasserfahrzeugs ermittelt, wobei die Steuereinrichtung einen der beiden Propeller mit einer höheren Drehzahl als den anderen Propeller betreibt, wodurch das Wasserfahrzeug eine Kurve fährt. Alternativ kann eine solche Kurvenfahrt bei zwei Propellern mit einer vom Bediener z. B. in der Hand gehaltenen Steuerung eingeleitet werden.

[0022] Optional, insbesondere zur Erhöhung der Sicherheit, kann eine an den Benutzer des Wasserfahrzeugs befestigbare Reißleine angeordnet sein, die lösbar an dem Wasserfahrzeug befestigt ist, wobei ein Lösen der Reißleine von dem Wasserfahrzeug ein Abschalten des Motors bewirkt. Hierdurch wird verhindert, dass das Wasserfahrzeug dem Benutzer davonfährt, wenn dieser herunterfällt.

[0023] Neben der Tatsache, dass die Propellerwellendrehachse windschief in Bezug auf die Antriebswellendrehachse angeordnet ist, ist die Propellerwellendrehachse vorzugsweise um die Antriebswellendrehachse schwenkbar, insbesondere relativ zu dem Schwimmkörper oder einem Antriebswellengehäuse. Das Schwenken der Propellerwellendrehachse um die Antriebswellendrehachse erfolgt in eine Schwenkrichtung, insbesondere einer Schwenkebene, welche z. B. normal auf die Antriebswellendrehachse steht und/oder parallel zur Längsrichtung des Wasserfahrzeugs oder/und horizontal zur Wasseroberfläche angeordnet ist. Insbesondere kann der Propeller aus der angeklappten Position in Richtung vorderem Ende des Wasserfahrzeugs von der Unterseite des Schwimmkörpers weggeklappt werden und beim Anklappen in Richtung Heck des Wasserfahrzeugs, das z. B. die Finnen aufweist, an die Unterseite des Schwimmkörpers angeklappt werden.

[0024] In einer bevorzugten Ausführung kann die Propellerwellendrehachse oder die Propellerwelle in Schwenkrichtung relativ zu der Antriebswelle feststehen, wenn die Propellerwellendrehachse oder die Propellerwelle um die Antriebswellendrehachse geschwenkt wird. Hierdurch wird vorteilhaft erreicht, dass eine Drehung der Antriebswelle um ihre Antriebswellendrehachse eine Schwenkbewegung der Propellerwellendrehachse oder der Propellerwelle oder des Propellers um die Antriebswellendrehachse bewirkt.

[0025] Besonders bevorzugt umfasst die Antriebseinheit eine insbesondere elektrisch, elektromechanisch oder mechanisch betätigbare Kupplung, welche in einem eingekuppelten Zustand die Antriebswelle mit der Propellerwelle so koppelt, dass die Propellerwellendrehachse in Schwenkrichtung um die Antriebswellendrehachse drehfest mit der Antriebswelle verbunden ist, und in einem ausgekuppelten Zustand die Antriebswelle von der Propellerwelle so entkoppelt, dass die Antriebswelle in Schwenkrichtung um die Antriebswellendrehachse und relativ zu der Propellerwellendrehachse oder dem Propeller

drehbar ist. Mit anderen Worten bewirkt die ausgekuppelte Kupplung, dass die Drehung der Antriebswelle um ihre Antriebswellendrehachse eine Drehung der Propellerwelle um ihre Propellerwellendrehachse bewirkt, insbesondere ohne eine Schwenkbewegung der Propellerwelle um die Antriebswellendrehachse zu bewirken. Die eingekuppelte Kupplung bewirkt insbesondere, dass eine Drehung der Antriebswelle um ihre Antriebswellendrehachse die Schwenkbewegung der Propellerwelle um die Antriebswellendrehachse bewirkt und insbesondere keine Drehung der Propellerwelle um ihre Propellerwellendrehachse bewirkt. Hierdurch lässt sich vorteilhaft erreichen, dass das Drehmoment eines einzigen Motors wahlweise für die Drehbewegung der Propellerwelle um ihre Propellerwellendrehachse oder der Schwenkbewegung der Propellerwellendrehachse um die Antriebswellendrehachse bewirkt. Die Kupplung kann insbesondere eine Magnetkupplung sein, die z. B. durch Beaufschlagung eines Elektromagneten mit elektrischer Spannung das Einkuppeln der Kupplung bewirkt. Eine solche Kupplung lässt sich vorteilhaft mit einer Steuereinrichtung des Wasserfahrzeugs steuern.

[0026] Die Kupplung kann z. B. ein erstes Kupplungsglied und ein zweites Kupplungsglied sowie ein Stellglied aufweisen, wobei das Stellglied das erste Kupplungsglied und das zweite Kupplungsglied und aus einem Kupplungseingriff bringen kann. Im Kupplungseingriff ist die Kupplung in ihrem eingekuppelten Zustand. Das Stellglied kann z. B. ein Magnet, insbesondere ein Elektromagnet, oder ein mechanisch betätigbarer Schieber sein.

[0027] Vorzugsweise kann das erste Kupplungsglied relativ zu dem zweiten Kupplungsglied im ausgekuppelten Zustand, insbesondere um die Antriebswellendrehachse verdrehbar sein und im eingekuppelten Zustand drehfest mit dem zweiten Kupplungsglied verbunden sein. Vorzugsweise ist das erste Kupplungsglied insbesondere permanent drehfest mit der Antriebswelle verbunden. Das zweite Kupplungsglied kann insbesondere permanent drehfest mit einem Schwenkgehäuse und/oder der Propellerwellendrehachse bezüglich einer Schwenkbewegung um die Antriebswellendrehachse verbunden sein. Die Kupplung ist vorzugsweise so ausgestaltet, dass die Kuppelbewegung des Stellglieds eine Bewegung des ersten Kupplungsglieds relativ zu dem zweiten Kupplungsglied oder eine Bewegung des zweiten Kupplungsglied relativ zu dem ersten Kupplungsglied insbesondere entlang der Antriebswellendrehachse bewirkt.

[0028] Das Schwenkgehäuse ist zur Schwenkung der Propellerachse relativ zu einem Antriebswellengehäuse, das insbesondere drehfest mit dem Motor und/oder dem Schwimmkörper verbunden ist, schwenkbar. Das Schwenkgehäuse ist insbesondere mit der Lagerung, welche die Propellerwelle um ihre Propellerwellendrehachse drehbar lagert, so verbunden, dass eine Schwenkbewegung des Schwenkgehäuses um die Antriebswellendrehachse eine Schwenkbewegung der Rotorwellenlagerung bewirkt. Allgemein ist bevorzugt, dass die Propellerwelle von einer Propellerwellenlagerung drehbar gelagert ist und die Propellerwellenlagerung zusammen mit der Propellerwelle und/oder der Propellerwellendrehachse um die Antriebswellendrehachse insbesondere relativ zu dem Antriebswellengehäuse schwenkbar ist. Im weiteren Sinne können die optional zwischen dem Schwenkgehäuse und der Propellerwellenlagerung angeordneten Gehäuse ebenfalls als Teil des Schwenkgehäuses bezeichnet werden, da sie vorzugsweise mitverschwenkt werden. Das Antriebswellengehäuse kann z. B. mittels eines Flansches drehfest mit dem Motorgehäuse verbunden sein.

[0029] In bevorzugten Ausführungen ist die Antriebswelle über einen Zugmitteltrieb mit der Propellerwelle verbunden. Bei dem Zugmitteltrieb kann es sich z. B. um einen Kettentrieb, einen Keilriementrieb, einen Zahnriementrieb oder dergleichen handeln. Der Zugmitteltrieb umfasst das Zugmittel, insbesondere eine Kette, einen Keilriemen oder einen Zahnriemen, welches ein erstes Treibrad und ein zweites Treibrad umschlingt, wobei das zweite Treibrad drehfest auf der Propellerwelle angeordnet ist und das erste Treibrad um eine Achse, insbesondere eine Abtriebswellendrehachse drehbar angeordnet ist, die vorzugsweise parallel zu und beabstandet von der Propellerwellendrehachse angeordnet ist. Das erste Treibrad ist vorzugsweise so mit der Antriebswelle verbunden, dass eine Rotation der Antriebswelle eine Drehung des ersten Treibrads um die Abtriebswellendrehachse bewirkt, wodurch über das Zugmittel eine Drehbewegung des zweiten Treibrades und somit der Propellerwelle bewirkt wird. Insbesondere kann die Drehachse, auf welcher das erste Treibrad angeordnet ist, die Antriebswellendrehachse in einem Punkt schneiden, insbesondere senkrecht zu der Antriebswellendrehachse angeordnet sein. Das erste Treibrad sitzt vorzugsweise drehfest auf einer Abtriebswelle.

[0030] Alternativ oder zusätzlich zu dem Zugmitteltrieb kann die Antriebswelle über eine Abtriebswelle mit der Propellerwelle verbunden sein, wobei die Antriebswelle und die Abtriebswelle so miteinander verbunden sind, dass eine Drehung der Antriebswelle um ihre Antriebswellendrehachse eine Rotation der Abtriebswelle um ihre Abtriebswellendrehachse, die vorzugsweise die Antriebswellendrehachse in einem Punkt schneidet und insbesondere senkrecht zu der Antriebswellendrehachse angeordnet sein kann, bewirkt. Z. B. können die Antriebswelle und die Abtriebswelle über ein Zahn-, insbesondere Kegelradgetriebe verbunden sein. Das Kegelradgetriebe kann

ein erstes Kegelrad und ein zweites Kegelrad aufweisen, wobei das erste Kegelrad insbesondere permanent drehfest an der Antriebswelle und das zweite Kegelrad, welches mit dem ersten Kegelrad kämmt, auf der Abtriebswelle vorzugsweise permanent drehfest angeordnet ist.

[0031] Besonders bevorzugt weist die Antriebseinheit den Zugmitteltrieb und das Kegelradgetriebe auf. Insbesondere können das zweite Kegelrad und das erste Treibrad drehfest auf einer gemeinsamen Welle, nämlich der Abtriebswelle angeordnet sein. Vorzugsweise sind die Abtriebswelle zwischen dem Zugmitteltrieb und der Antriebswelle und/oder der Zugmitteltrieb zwischen der Abtriebswelle und der Propellerwelle angeordnet. Dies bewirkt, dass für den Antrieb des Propellers die Drehung des Motors über die Antriebswelle, von der Antriebswelle über das Kegelradgetriebe auf die Abtriebswelle und von der Abtriebswelle über den Zugmitteltrieb auf die Propellerwelle übertragen wird.

[0032] Vorzugsweise ist das Kegelradgetriebe in dem Schwenkgehäuse aufgenommen. An dem Schwenkgehäuse kann insbesondere ein Antriebswellendrehlager, welches die Antriebswelle um ihre Antriebswellendrehachse drehbar lagert, und/oder ein Antriebswellendrehlager, welches die Abtriebswelle um die Abtriebswellendrehachse drehbar lagert, angeordnet sein. Insbesondere kann das Schwenkgehäuse zwei in Richtung der Antriebswelle voneinander beabstandete Antriebswellendrehlager aufweisen, wobei zwischen denen das erste Kegelrad angeordnet sein kann. Alternativ zu der Anordnung der Antriebswellendrehlager an dem Schwenkgehäuse kann das Antriebswellendrehlager für die Antriebswelle an dem Antriebswellengehäuse gebildet sein.

[0033] Das Schwenkgehäuse kann z. B. einen T-förmig von einem die Antriebswelle umgebenden Gehäuseteil abzweigenden Gehäuseteil aufweisen, welcher die Abtriebswelle umgibt.

[0034] Das Zugmitteltriebgehäuse kann vorzugsweise eine erste Zugmitteldurchführung für den ersten Zugmittelstrang und eine zweite, von der ersten Zugmitteldurchführung separate Zugmitteldurchführung für den zweiten Zugmittelstrang bilden, wobei vorzugsweise zwischen der ersten Zugmitteldurchführung und der zweiten Zugmitteldurchführung ein Kanal gebildet ist, der von entlang der Propellerwellendrehachse fließendem Wasser durchströmbar ist. Das Schwenkgehäuse, insbesondere das Zugmitteltriebgehäuse ist wie vorzugsweise das gesamte Schwenkgehäuse wasserdicht, um die darin enthaltenen Getriebekomponenten zu schonen.

[0035] In bevorzugten Weiterbildungen der Antriebseinheit oder des Wasserfahrzeugs kann eine Einrichtung zur aktiven Richtungssteuerung des Wasserfahrzeugs vorgesehen sein.

[0036] Beispielsweise kann die Propellerwellendrehachse um eine Ruderachse und insbesondere relativ zu dem Schwimmkörper hin und her schwenkbar sein, wobei die Ruderachse in etwa vertikal verläuft oder in etwa senkrecht auf die Unterseite des Schwimmkörpers steht.

[0037] Alternativ oder zusätzlich kann in der hinteren Hälfte des Schwimmkörpers wenigstens eine Finne um eine Ruderachse und insbesondere relativ zu dem Schwimmkörper hin und her schwenkbar sein, wobei die Ruderachse in etwa vertikal verläuft oder in etwa senkrecht auf die Unterseite des Schwimmkörpers steht.

[0038] Die Erfindung wurde anhand mehrerer bevorzugter Ausführungen beschrieben. Im Folgenden werden bevorzugte Ausführungen der Erfindung anhand von Figuren beschrieben. Die dabei offenbarten Merkmale bilden den Gegentand der unabhängigen Ansprüche in jeglicher Merkmalskombination auch mit den zuvor beschriebenen Merkmalen vorteilhaft weiter. Es zeigen:

[0039] **Fig.** 1 mehrere Ansichten eines Surfboards nach einer ersten Ausführungsform,

[0040] **Fig.** 2 mehrere Ansichten eines Surfboards nach einer zweiten Ausführungsform,

[0041] **Fig.** 3 mehrere Ansichten insbesondere der Antriebseinheit für das Surfboard aus **Fig.** 1,

[0042] **Fig.** 4 das Surfboard aus **Fig.** 1 oder **Fig.** 2 mit einem Surfer,

[0043] **Fig.** 5 eine bevorzugte Ausführungsform einer erfindungsgemäßen Antriebseinheit in perspektivischer Ansicht,

[0044] **Fig.** 6 mehrere Ansichten eines Teils der Antriebseinheit aus **Fig.** 5,

[0045] **Fig.** 7 mehrere Ansichten eines Teils der Antriebseinheit aus **Fig.** 5,

[0046] **Fig.** 8 eine dritte Ausführungsform eines Surfboards,

[0047] **Fig.** 9 mehrere Ansichten eines Surfboards nach einer vierten Ausführungsform,

[0048] **Fig.** 10 mehrere Ansichten insbesondere der Antriebseinheit für das Surfboard aus **Fig.** 9,

[0049] **Fig.** 11 mehrere Ansichten eines Surfboards nach einer fünften Ausführungsform und

[0050] **Fig.** 12 mehrere Ansichten eines Drehsockels mit Finnen für das Surfboard aus **Fig.** 11.

[0051] Die **Fig.** 1 und **Fig.** 2 zeigen jeweils ein Surfboard, welches einen brettförmigen Schwimmkörper **12** aufweist, in den eine erfindungsgemäße Antriebseinheit integriert ist. Die Ausführung aus den **Fig.** 1 und **Fig.** 2 haben gemeinsam, dass ein von der Unterseite des Schwimmkörpers **12** abragender Propeller **9** mit einer Schwenkbewegung um eine Antriebswellendrehachse **2a** zu der Unterseite hin anklappbar ist. Der Propeller **9** aus **Fig.** 1 liegt angeklappt lediglich an der Unterseite des Schwimmkörpers **12** an, wobei der Propeller **9** aus **Fig.** 2 angeklappt in einer an der Unterseite des Schwimmkörpers **12** gebildeten Ausnehmung **12a** angeordnet ist oder in diese Ausnehmung **12a** einklappbar ist.

[0052] Wie aus den **Fig.** 1 und **Fig.** 2 erkennbar ist, weist das Surfboard am hinteren Ende oder dem Heck an der Unterseite des Schwimmkörpers **12** gebildete Finnen auf, welche zur Richtungsstabilisierung dienen. Auf der Oberseite des Schwimmkörpers **12** sind mit jeweils einem Deckel wasserdicht verschlossene Kammern **12b**, **12c** gebildet, wobei in der Steuerkammer **12b** die Steuereinrichtung **15** für die Antriebseinheit und den an der Antriebseinheit angeordneten Motor **10** angeordnet ist und in der Batteriekammer **12c** die Batterie oder der Akkumulator **11** für die Energieversorgung des Motors **10** und der Steuereinrichtung **15** angeordnet ist. Nicht gezeigt sind optional vorgesehene Fußschlaufen an der Oberseite des Schwimmkörpers **12**.

[0053] Ferner ist an der Unterseite des Schwimmkörpers **12** eine Ausnehmung gebildet, welche durch flexible Klappen **12d**, die insbesondere in der Gestalt von Gummilippen gebildet sind, verschlossen ist, um den Strömungswiderstand des Surfboards herabzusetzen. Beim Wegschwenken des Propellers **9** von der Unterseite des Schwimmkörpers **12** um die Antriebswellendrehachse **2a** wird ein Schwenkgehäuse **8** einschließlich eines Abtriebswellengehäuses **8b** der Antriebseinheit durch die Klappen **12d** hindurch in die Ausnehmung geschwenkt. Beim Schwenken des Propellers **9** an die Unterseite des Schwimmkörpers **12** um die Antriebswellendrehachse **2a** wird das Abtriebswellengehäuse **8b** aus der Ausnehmung heraus geschwenkt, insbesondere durch die Klappen **12d** hindurch.

[0054] An der Oberseite des Schwimmkörpers **12** ist ein Bedienmittel **16** in der Gestalt eines Bedienknopfs, insbesondere eines Startknopfs angeordnet, mit dem der Surfer die Drehzahl des Motors **10** und das An- oder Ausklappen des Propellers **9** steuern kann.

[0055] Die Antriebswelle **2** und der Motor **10** sind in dem Schwimmkörper **12** integriert, wobei die Antriebswellendrehachse **2a** parallel zur Wasseroberfläche und senkrecht zur Längsrichtung L des Surfboards bzw. des Schwimmkörpers **12** angeordnet ist.

[0056] In **Fig.** 3 werden die Komponenten gezeigt, die in den Schwimmkörper **12**, der vorzugsweise aus einem Hartschaumstoff gebildet wird und vorzugsweise mit einer Deckschicht überzogen ist, integriert werden, um den Schwimmkörper **12** zur Bildung des Surfboards mit einer Antriebseinheit auszustatten. In **Fig.** 3 werden die Komponenten mit einem an- oder eingeklappten Propeller **9** gezeigt. Der Propeller **9** befindet sich in der Ausnehmung **12a**, welche topfförmig ausgestaltet ist, um dem Propeller **9** zu erlauben, an der Unterseite des Surfboards in die Ausnehmung **12a** mit einer Schwenkbewegung um die Antriebswellendrehachse **2a** angeklappt zu werden. In der angeklappten Position wird der Propeller **9** von einem Haltemittel **13** gehalten, damit er nicht ungewollt aus der Ausnehmung **12a** herausgeschwenkt wird oder herausklappt. Das Haltemittel **13** ist in dem gezeigten Beispiel ein Magnet. Ferner umfasst die Anordnung eine Antriebseinrichtung, die als Klappmechanismus wirkt und die in den **Fig.** 5 bis **Fig.** 7 detailliert dargestellt wird. Wie in **Fig.** 3 zu sehen ist, ist ein Elektromotor **10** mittels eines Flansches **7a** an ein Antriebswellengehäuse **7** angeflanscht. Der Klappmechanismus umfasst ferner ein Schwenkgehäuse **8**, welches um die Antriebswellendrehachse **2a** relativ zu dem Antriebswellengehäuse **7** dreh- oder schwenkbar ist, wodurch der Propeller **9** mit seiner Propellerwellendrehachse **1a** aus der Ausnehmung **12a** herausgeschwenkt wird, insbesondere um 90°, so dass die Propellerwellendrehachse **1a** in etwa parallel zur Unterseite und in Längsrichtung des Schwimmkörpers **12** oder des Surfboards ist. Das Schwenkgehäuse **8** ist zumindest zum Teil in der Ausnehmung angeordnet, die zur Unterseite des Surfboards oder des Schwimmkörpers mündet und mit Klappen **12d** verschlossen ist. Zu dem Schwenkgehäuse **8** gehören das Zugmitteltriebgehäuse **8a** und ein z. B. in **Fig.** 5 dargestelltes Abtriebswellengehäuse **8b**.

[0057] In den zur Oberseite des Surfboards hin mündenden Kammern oder Ausnehmungen **12b** und **12c** sind die Batterien **11** und die Steuerungseinheit **15** angeordnet. Die Batteriekammer **12c** und die Steuerungskammer **12b** sind – wie bereits erwähnt – mittels eines Deckels wasserdicht verschlossen, um ein Eindringen von Wasser in die Kammern **12b**, **12c** zu verhindern. Mit der Steuerungseinheit **15** verbunden ist ein Bedienmittel **16** in der Gestalt eines Startknopfs, der in **Fig.** 3 detailliert dargestellt wird.

[0058] Der Funktionsablauf ist vorzugsweise wie folgt, in einer Ausgangsposition befindet sich der Startknopf in seiner Nullstellung. In dieser Stellung wird der Propeller **9** in seiner angeklappten Position aufgrund des Haltemittels **13**, nämlich des Elektromagneten gehalten.

[0059] Durch Drehen des Startknopfes von der Nullstellung in die Pos. A wird mittels der Steuereinheit **15** bewirkt, dass das Haltemittel **13**, nämlich der Magnet, den Propeller **9** freigibt, wodurch der Propeller **9** aus der Ausnehmung **12a** herausschwenkbar ist. Das Herausschwenken kann mit dem Motor **10** optional unterstützt durch die Schwerkraft oder nur durch die Schwerkraft oder durch Drehen des Propellers um seine Propellerwellendrehachse erfolgen. Wenn der Propeller **9** um ca. 90° herausgeklappt wurde, d. h. seine Betriebsposition oder seinen ausgeklappten Zustand erreicht hat, entkoppelt ein Magnet eine Kupplung **6**, wie weiter unten beschrieben wird.

[0060] Durch Drehen des Startknopfes in die Pos. B wird der Propeller **9** um seine Propellerdrehachse **1a** gedreht, wodurch der Propeller **9** einen Impuls erzeugt, der das Board in Fahrtrichtung beschleunigt. In **Fig.** 4 wird z. B. das Board mit einem darauf stehenden Surfer gezeigt, wobei auch ersichtlich ist, dass der Propeller **9** in etwa 90° von der Unterseite weggeklappt wurde, d. h., dass die Propellerdrehachse **1a** in Fahrtrichtung zeigt. An dem Surfer ist eine Reißleine **14** befestigt, die ebenfalls an dem Board oder Schwimmkörper **12** befestigt ist und mit der Steuereinheit **15** zusammenwirkt, insbesondere derart, dass durch unbeabsichtigtes Verlassen des Boards, wie z. B. durch Herunterfallen des Surfers die Reißleine **14** sich von dem Board löst oder zumindest die Steuereinheit **15** so betätigt, dass der Motor **10** stoppt und optional der Propeller **9** in seine eingeklappte Ausgangsposition zurückklappt.

[0061] Wird im ausgeklappten Zustand des Propellers **9** der Startknopf in seine Position Nullstellung gedreht, kuppelt der Magnet die Kupplung **6** ein, wobei mittels des Motors **10** das Schwenkgehäuse **8** und somit den Propeller **9** um 90° in die Ausgangsposition zurückschwenkt, wobei der Propeller **9** wieder von dem Befestigungsmittel **13** in dieser Ausgangsposition gehalten wird.

[0062] Mit Bezug auf die **Fig.** 5 bis **Fig.** 7 wird die Antriebseinheit, welche die Schwenkbarkeit des Propellers **9** bewirkt, im Detail beschrieben. Das Gehäuse des Motors **10** und das Antriebswellengehäuse **7** sind ortsfest, insbesondere drehfest in oder an dem Schwimmkörper **12** befestigt oder integriert. Die in Bezug auf das Gehäuse des Motors **10** antreibbare Motorwelle fluchtet mit der Antriebswelle **2**, welche um die Antriebswellendrehachse **2a** drehbar ist. Relativ zu dem Antriebswellengehäuse **7** ist das Schwenkgehäuse **8** um die Antriebswellendrehachse **2a** schwenkbar. Wie am besten aus **Fig.** 6 erkennbar ist, weist das Schwenkgehäuse **8** zwei Lagerelemente auf, welche die Antriebswelle **2** drehbar lagert, insbesondere mittels Wälzlagern. Zwischen den zwei Lagerelementen ist ein drehfest auf der Antriebswelle **2** angeordnetes erstes Kegelrad **4a** befestigt, welches sich mit der Antriebswelle **2** mitdreht. Ferner ist an der Antriebswelle **2** ein erstes Kupplungsglied **6a** drehfest befestigt, welches sich mit der Antriebswelle **2** um ihre Antriebswellendrehachse **2a** mitdreht. Die drehfeste Verbindung kann z. B. über eine Verzahnung oder eine Passfeder erreicht werden, ebenso für das Kegelrad **4a**. An dem Schwenkgehäuse **8** ist ein zweites Kupplungsglied **6b** drehfest angeordnet, welches zusammen mit dem ersten Kupplungsglied **6a** eine Kupplung **6** bildet. Die Kupplung **6** ist vorzugsweise durch einen Elektromagneten ein- und auskuppelbar. Im eingekuppelten Zustand ist das erste Kupplungsglied **6a** drehfest in Bezug auf das zweite Kupplungsglied **6b**, im ausgekuppelten Zustand ist das erste Kupplungsglied **6a** in Bezug auf das zweite Kupplungsglied **6b** drehbar. Das bedeutet, dass die Antriebswelle **2** für eine Drehung um ihre Antriebswellendrehachse **2a** drehfest in Bezug auf das Schwenkgehäuse **8** ist, wenn die Kupplung **6** eingekuppelt ist und in Bezug auf das Schwenkgehäuse **8** drehbar ist, wenn die Kupplung **6** ausgekuppelt ist. Ist die Kupplung **6** eingekuppelt, bewirkt eine Drehung der Antriebswelle **2** um die Antriebswellendrehachse **2a** ebenfalls eine Drehung des Schwenkgehäuses **8**, wodurch der Propeller **9** ausgeklappt wird, wenn die Antriebswelle **2** in eine erste Drehrichtung gedreht wird, und eingeklappt wird, wenn die Antriebswelle **2** in eine zweite, der ersten Drehrichtung entgegengesetzte Drehrichtung gedreht wird.

[0063] Das erste Kupplungsglied **6a** ist zwischen dem zweiten Kupplungsglied **6b** und einer Sensorplatte angeordnet, an der mindestens ein Sensor angeordnet ist, welcher der Steuereinheit **15** Rückmeldungen über den Betriebszustand oder Schaltzustand der Kupplung **6** geben kann, insbesondere, ob der Propeller an- oder ausgeklappt ist.

[0064] Das Antriebswellengehäuse **7** ist rohrförmig. Ein Teil des Schwenkgehäuses **8** ist ebenfalls rohrförmig und umgibt die Antriebswelle **2** insbesondere konzentrisch. An dem rohrförmigen Teil des Schwenkgehäuses **8** ist ein Rohransatz gebildet, welcher in etwa um 90° von dem rohrförmigen Teil abzweigt. Der Rohransatz umgibt eine Abtriebswelle **3**, deren Abtriebswellendrehachse **3a** in etwa senkrecht auf die Antriebswellendrehachse **2a** steht und die Antriebswellendrehachse **2a** in einem Punkt schneidet. Der Rohransatz bildet ein Drehlager einschließlich Kugellager, um der Abtriebswelle **3** zu erlauben, relativ zu dem Ansatzstück gedreht zu werden. Der Rohransatz bildet mit dem rohrförmigen Teil von dem er abzweigt, eine insbesondere T-förmige Form.

[0065] Auf der Abtriebswelle **3** ist ein zweites Kegelrad **4b** drehfest befestigt, welches mit dem ersten Kegelrad **4a** kämmt, wodurch eine Drehung der Antriebswelle **2** eine Drehung der Abtriebswelle **3** bewirken kann. Das erste Kegelrad **4a** und das zweite Kegelrad **4b** können geradverzahnte Kegelräder sein, wobei sie vorzugsweise schräg- oder spiralverzahn-

te Kegelräder sind, da sich herausgestellt hat, dass schräg- oder spiralverzahnte Kegelräder eine bessere Kraftübertragung zulassen.

[0066] Die Abtriebswelle **3** wird von einem Abtriebswellengehäuse **8b** insbesondere konzentrisch oder rohrförmig umgeben. Auf der Abtriebswelle **3** ist ferner ein erstes Treibrad **5b** drehfest angeordnet, welches sich bei Drehung der Abtriebswelle **3** mit diesem mitdreht. Das erste Treibrad **5b** ist Teil eines Zugmitteltriebs **5**, welcher ein zweites Treibrad **5c** und ein das erste Treibrad **5b** mit dem zweiten Treibrad **5c** verbindendes als Endloselement gebildetes Zugmittel **5a** verbindet. Das Zugmittel **5a** ist in dem gezeigten Beispiel eine Kette, kann aber auch ein Zahnriemen oder ein Keilriemen sein. Im Gegensatz zu einem Keilriemen hat eine Kette keinen Schlupf.

[0067] Das zweite Treibrad **5c** sitzt drehfest auf einer Propellerwelle **1**, so dass eine Drehung des zweiten Treibrads **5c** um die Propellerwellendrehachse **1a** bewirkt, dass sich die Propellerwelle **1a** mit dem zweiten Treibrad **5c** mitdreht. Auf der Propellerwelle **1** ist der Propeller **9** angeordnet, der sich bei Drehung der Propellerwelle **1** mit dieser mitdreht und somit einen Vortrieb erzeugt. Die Propellerwellendrehachse **1a** ist parallel und beabstandet zu der Abtriebswellendrehachse **3a** angeordnet. Ferner ist die Propellerwellendrehachse **1a** windschief, d. h. nicht parallel und überschneidungsfrei in Bezug auf die Antriebswellendrehachse **2a** angeordnet.

[0068] Der Propeller **9** wird über seinen Umfang von einem Schutzring umgeben, der einen radialen Zugriff auf den Propeller **9** verhindert. Der Schutzring umgibt den Propeller **9** konzentrisch und wird insbesondere von dem Zugmitteltriebgehäuse **8a** einschließlich zwei Speichen gehalten. Das Zugmitteltriebgehäuse **8a** haust den Zugmitteltrieb **5** wasserdicht ein. Das Zugmittel **5a** weist zwei Stränge auf, nämlich einen von dem ersten Treibrad **5b** ablaufenden und einen zu dem ersten Treibrand **5b** hinlaufenden Strang. Jeder dieser Stränge ist von jeweils einer Zugmitteldurchführung **8c** umgeben. Zwischen der Zugmitteldurchführung **8c** für den ablaufenden Zugmittelstrang und der Zugmitteldurchführung **8c** für den hinlaufenden Zugmittelstrang ist ein Kanal **8d** gebildet, der entlang der Propellerwellendrehachse **1a** von einer Flüssigkeit durchströmbar ist. Dadurch, dass der Kanal **8d** von der Flüssigkeit durchströmbar ist und nicht geschlossen ist, kann eine größere Wassermenge an den Propeller **9** gelangen, wodurch dieser einen stärkeren Vortrieb erzeugt. Der in Fahrtrichtung weisende Einlauf des Kanals **8d** ist insbesondere keil- oder trichterförmig ausgestaltet, um eine noch bessere Strömungsführung zu erreichen. Die trichterförmige Ausgestaltung ist so, dass sie sich in Strömungsrichtung verjüngt oder in Fahrtrichtung aufweitet. Diese Form kann insbesondere auch als Doppelkeilform bezeichnet werden und hat sich in einem Test für die Strömungsführung als besonders geeignet erwiesen.

[0069] Das Zugmitteltriebgehäuse **8a** ist vorzugsweise in Fahrtrichtung vor dem Propeller **9** angeordnet.

[0070] Aufgrund der Kupplung **6** lässt sich mit einem einzigen Motor **10** sowohl der Propeller **9** für die Vorwärtsfahrt antreiben als auch der Propeller **9** aus der ausgeklappten Position in die angeklappte Position und aus der angeklappten Position in die ausgeklappte Position schwenken. Durch die gezeigte Ausgestaltung der Antriebseinheit lässt sich diese so kompakt aber dennoch so leistungsstark bauen, dass sie in ein Surfboard integrierbar ist.

[0071] Dieses Surfboard lässt sich auf mehrere Arten verwenden. Z. B. kann es auf einem ruhigen See verwendet werden, um mit dem Antrieb auf dem See herumzufahren. Alternativ kann der Antrieb z. B. im Meer verwendet werden, um auch bei relativ starker anlandiger Strömung sich vom Strand zu entfernen, um eine geeignete Position zum Abpassen einer perfekten Welle zum Wellenreiten einzunehmen. Durch Anklappen des Propellers **9** an die Unterseite des Schwimmkörpers lässt sich der Strömungswiderstand des Antriebs soweit verringern, dass mit dem Surfboard Wellenreiten möglich ist. Da mit dem Antrieb Muskelkraft des Surfers gespart wird, kann auch ein weniger konditionsstarker Surfer öfter hinaus fahren, wodurch er in den intensiven Genuss des Wellenreitens kommen kann.

[0072] In **Fig.** 8 wird eine Ausführungsform eines erfindungsgemäßen Surfboards gezeigt, wobei an der Unterseite des Schwimmkörpers **12** zwei nebeneinander angeordnete Propeller **9** schwenkbar befestigt sind. Die Propellerwellendrehachsen **1a** der beiden Propeller **9** sind voneinander beabstandet und verlaufen in Fahrtrichtung. Vorzugsweise ist jeder der Propeller **9** über eine eigene, z. B. in den **Fig.** 5 bis **Fig.** 7 dargestellte Antriebseinheit einschließlich jeweils eines eigenen Motors **10** antreibbar und schwenkbar. Vorteilhaft lassen sich die beiden Propeller **9** mit gleichen oder unterschiedlichen Drehzahlen betreiben, wobei beim Betrieb mit unterschiedlichen Drehzahlen ein Giermoment um die Hochachse des Surfboards erzeugt wird, welches bewirkt, dass das Surfboard eine Kurve fährt.

[0073] Die Richtungssteuerung des Surfboards lässt sich, wie in den **Fig.** 9 bis **Fig.** 12 dargestellt, auch auf andere Weise bewerkstelligen.

[0074] Z. B. kann die Propellerwellendrehachse **1a** oder der Propeller **9** um eine Ruderachse **19b** und insbesondere relativ zu dem Schwimmkörper **12**, insbesondere zwischen einer ersten Endposition (Pos.1) und einer zweiten Endposition (Pos.2), hin

und her, d. h. in eine erste Drehrichtung und in eine zweite Drehrichtung geschwenkt werden. Wie am besten aus **Fig.** 10 erkennbar ist, lässt sich die Propellerwellendrehachse **1a** oder der Propeller **9** ausgehend von einer Nullstellung (Pos.0) um einen ersten Ruderwinkel in Richtung erste Endposition und um einen zweiten Ruderwinkel in Richtung zweite Endposition um die Ruderachse **19b** schwenken. Die Ruderachse **19b** verläuft in etwa vertikal oder in Bezug auf die Unterseite des Schwimmkörpers **12** in etwa senkrecht..

[0075] Der maximale Schwenkwinkel, insbesondere die Summe aus erstem maximalen Ruderwinkel und zweitem maximalen Ruderwinkel, um den die Propellerwellendrehachse **1a** um die Ruderachse **19b** hin und her schwenkbar ist, ist vorzugsweise kleiner als 180° und noch bevorzugter kleiner als 120°, wie z. B. 90° oder noch kleiner. Die Längsachse des Surfboards oder des Schwimmkörpers **12** bildet vorzugsweise die Winkelhalbierende des maximalen Schwenkwinkels. Weist die Propellerwellendrehachse **1a** in Längsrichtung des Surfboards oder des Schwimmkörpers **12** nimmt die Propellerwellendrehachse **1a** oder der Propeller **9** die in **Fig.** 10 gezeigte Nullstellung (Pos.0) ein. Der Propeller kann in der Nullstellung (Pos.0) vorzugsweise einen Impuls parallel zur Längsrichtung des Surfboards erzeugen. Wird der Propeller **9** oder die Propellerdrehachse **1a** um die Ruderachse **19b** geschwenkt, insbesondere in die in **Fig.** 10 gezeigte Position 1 oder Position 2, kann der Propeller **9** einen Impuls erzeugen, dessen Richtung spitzwinklig auf die Längsrichtung des Surfboards oder des Schwimmkörpers **12** steht. Dadurch lässt sich eine vorteilhafte Kurvenfahrt erreichen.

[0076] Vorzugsweise sind zusätzlich zu dem Propeller **9** oder der Propellerwellendrehachse **1a** der Motor **10** und insbesondere die zwischen dem Motor **10** und dem Propeller **9** angeordneten Komponenten der Antriebseinheit um die Ruderachse **19b** und relativ zu dem Schwimmkörper **12** hin und her schwenkbar. Insbesondere können der Motor **10**, und/oder das Antriebswellengehäuse **7** an oder auf einem Drehsockel **19**, insbesondere ortsfest montiert sein, wobei der Drehsockel **19**, der insbesondere als Drehscheibe ausgestaltet sein kann, um die Ruderachse **19b** und relativ zu dem Schwimmkörper **12** schwenkbar ist. Der Drehsockel **19** weist einen Umfang auf, über den zumindest abschnittsweise eine Verzahnung **19a** insbesondere zur Bildung eines Drehkranzabschnitts angeordnet ist. In diese Verzahnung **19a** greift ein kinematisch mit einem Motor **18**, insbesondere einem Stell- oder Rudermotor verbundenes Zahnrad **18a** ein. Der Motor **18** ist vorzugsweise ein Elektromotor und in beide Drehrichtungen antreibbar, wobei durch Drehung des Motors **18** in eine erste Drehrichtung der Drehsockel **19** in Richtung der ersten Endposition (Pos.1) und bei Drehung des Motors **18** in eine zweite Drehrichtung der Drehsockel **19** in Richtung der zweiten Endposition (Pos.2) um die Ruderachse **19b** geschwenkt wird. Der Motor **18** ist vorzugsweise ortsfest in Bezug auf den Schwimmkörper **12**, insbesondere in dem Schwimmkörper **12** aufgenommen. Alternativ kann der Motor **12** ortsfest an dem Drehsockel **19** befestigt sein, wobei die Verzahnung **19a** an dem Schwimmkörper **12** gebildet sein kann, wodurch sich der Drehsockel **19** ebenfalls wie oben beschrieben schwenken lässt.

[0077] In vorteilhaften Weiterbildungen kann an der Antriebseinheit oder dem Wasserfahrzeug mindestens ein Sensor (nicht gezeigt) vorgesehen sein, der mit der Steuerung **15** gekoppelt ist, wobei der Sensor signalisiert, wenn der Propeller **9** oder die Propellerwellendrehachse **1a** in der Nullstellung (Pos.0) ist, wobei die Steuerung **15** ein Anklappen des Propellers **9**, d.h. durch Schwenken des Propellers **9** um die Antriebswellendrehachse **2a**, an die Unterseite des Surfboards **12** nur dann erlaubt, wenn der Propeller **9** oder die Propellerwellendrehachse **1a** in ihrer Nullstellung (Pos.0) sind.

[0078] In einer weiteren Ausführungsform (**Fig.** 11 und **Fig.** 12), bei der die Propellerwellendrehachse **1a** insbesondere nicht um die Ruderachse **19b** schwenkbar ist, d. h. vorzugsweise permanent parallel zur Längsachse des Surfboards weist, kann in der hinteren Hälfte des Schwimmkörpers **12** oder des Surfboards, z.B. zwischen dem hinteren Ende und dem Propeller **9**, wenigstens eine Finne **17** um eine Ruderachse **20b** und insbesondere relativ zu dem Schwimmkörper **12**, insbesondere zwischen einer ersten Endposition (Pos.1) und zweiten Endposition (Pos.2), hin und her schwenkbar sein. Die Ruderachse **20b** kann in etwa vertikal verlaufen oder in etwa senkrecht auf die Unterseite des Schwimmkörpers **12** stehen, insbesondere wie die Ruderachse **19b**. Zum Beispiel kann die wenigstens eine Finne **17**, insbesondere eine einzige, zwei oder drei oder noch mehr Finnen **17**, auf einem Drehsockel **20**, der in der Art einer Drehscheibe ausgebildet ist, angeordnet sein. Alternativ können mehrere Finnen **17** vorgesehen sein, von denen jede auf einem eignen Drehsockel **20** angeordnet ist.

[0079] Z. B. kann die mindestens eine Finne **17** um eine Ruderachse **20b** und insbesondere relativ zu dem Schwimmkörper **12**, insbesondere zwischen einer ersten Endposition (Pos.1) und einer zweiten Endposition (Pos.2), hin und her, d. h. in eine erste Drehrichtung und in eine zweite Drehrichtung geschwenkt werden. Die mindestens eine Finne **17** lässt sich ausgehend von einer Nullstellung (Pos.0) um einen ersten Ruderwinkel in Richtung erste Endposition (Pos.1) und um einen zweiten Ruderwinkel in Richtung zweite Endposition (Pos.2) um die Ruderachse **20b** schwenken.

[0080] Der maximale Schwenkwinkel, insbesondere die Summe aus erstem maximalen Ruderwinkel und zweitem maximalen Ruderwinkel, um den die mindestens eine Finne **17** um die Ruderachse **20b** hin und her schwenkbar ist, ist vorzugsweise kleiner als 180° und noch bevorzugter kleiner als 120°, wie z. B. 90° oder noch kleiner. Die Längsachse des Surfboards oder des Schwimmkörpers **12** bildet vorzugsweise die Winkelhalbierende des maximalen Schwenkwinkels. Weist die mindestens eine Finne **17** in Längsrichtung des Surfboards oder des Schwimmkörpers **12** nimmt sie die in den **Fig.** 11 und **Fig.** 12 gezeigte Nullstellung (Pos.0) ein. Die Finne **17** unterstützt in der Nullstellung (Pos.0) eine Geradeausfahrt. Wird die Finne **17** ausgehend von ihrer Nullstellung (Pos.0) um die Ruderachse **20b** geschwenkt, so dass die mindestens eine Finne **17** spitzwinklig auf die Längsrichtung des Surfboards oder des Schwimmkörpers **12** steht, wird eine Kurvenfahrt unterstützt.

[0081] Der Drehsockel **20** weist einen Umfang auf, über den zumindest abschnittsweise eine Verzahnung **20a** insbesondere zur Bildung eines Drehkranzabschnitts angeordnet ist. In diese Verzahnung **20a** greift ein kinematisch mit einem Motor **18**, insbesondere einem Stell- oder Rudermotor verbundenes Zahnrad **18a** ein. Der Motor **18** ist vorzugsweise ein Elektromotor und in beide Drehrichtungen antreibbar, wobei durch Drehung des Motors **18** in eine erste Drehrichtung der Drehsockel **20** in Richtung der ersten Endposition (Pos.1) und bei Drehung des Motors **18** in eine zweite Drehrichtung der Drehsockel **20** in Richtung der zweiten Endposition (Pos.2) um die Ruderachse **20b** geschwenkt wird. Der Motor **18** ist vorzugsweise ortsfest in Bezug auf den Schwimmkörper **12**, insbesondere in dem Schwimmkörper **12** aufgenommen. Alternativ kann der Motor **12** ortsfest an dem Drehsockel **20** befestigt sein, wobei die Verzahnung **20a** an dem Schwimmkörper **12** gebildet sein kann, wodurch sich der Drehsockel **20** ebenfalls wie oben beschrieben schwenken lässt.

[0082] Insbesondere lässt sich der Motor **18** aus den **Fig.** 9 bis **Fig.** 12 vorteilhaft mit einer Fernbedienung oder alternativ mit der hierin beschriebenen Winkelsteuerung um die Längsachse (Rollwinkel) steuern. Bei einer Steuerung mit Rollwinkel werden die Propellerwellendrehachse **1a** bzw. der Propeller **9** oder die Finnen **17** so verschwenkt, dass ein Impuls zur Kurveninnenseite oder zu der Seite, zu der der Schwimmkörper **12** um die Längsachse hin geneigt oder gerollt wird, erzeugt wird.

Bezugszeichenliste

1	Propellerwelle
1a	Propellerwellendrehachse
1b	Propellerwellenlagerung
2	Antriebswelle
2a	Antriebswellendrehachse
3	Abtriebswelle
3a	Abtriebswellendrehachse
4	Kegelradgetriebe
4a	erstes Kegelrad
4b	zweites Kegelrad
5	Zugmittelgetriebe
5a	Zugmittel/Kette
5b	erstes Treibrad
5c	zweites Treibrad
6	Kupplung
6a	erstes Kupplungsglied
6b	zweites Kupplungsglied
7	Antriebswellengehäuse
7a	Befestigungsflansch
8	Schwenkgehäuse
8a	Zugmitteltriebgehäuse
8b	Abtriebswellengehäuse
8c	Zugmitteldurchführung
8d	Kanal
9	Propeller
10	Motor/Antriebsmotor
11	Batterie
12	Surfboard/Schwimmkörper
12a	Aussparung/Vertiefung/Ausnehmung
12b	Steuerkammer
12c	Batteriekammer
12d	Klappen
13	Haltemittel
14	Reißleine
15	Steuerung/Steuerungs-einrichtung/Steuerungseinheit
16	Bedienmittel
17	Finne/Schwert
18	Motor/Stell- oder Rudermotor
18a	Zahnrad
19	Drehsockel/Drehscheibe
19a	Verzahnung
19b	Ruderachse
20	Drehsockel/Drehscheibe
20a	Verzahnung
20b	Ruderachse
L	Längsachse/Längsrichtung

ZITATE ENTHALTEN IN DER BESCHREIBUNG

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Schutzansprüche

1. Antriebseinheit für ein Wasserfahrzeug, insbesondere ein Wassersportgerät, vorzugsweise ein Surfboard, umfassend:
a) eine Propellerwelle (**1**), die um eine Propellerwellendrehachse (**1a**) drehbar ist und an der ein Propeller (**9**) befestigbar oder befestigt ist,
b) eine Antriebswelle (**2**), die um eine Antriebswellendrehachse (**2a**) drehbar und mit einem Motor (**10**) verbindbar oder verbunden ist,
c) wobei die Antriebswelle (**2**) so mit der Propellerwelle (**1**) verbunden ist, dass eine Drehung der Antriebswelle (**2**) um ihre Antriebswellendrehachse (**2a**) eine Drehung der Propellerwelle (**1**) um ihre Propellerwellendrehachse (**1a**) bewirkt,
dadurch gekennzeichnet, dass
d) die Propellerwellendrehachse (**1a**) windschief in Bezug auf die Antriebswellendrehachse (**2a**) angeordnet ist und die Propellerwellendrehachse (**1a**) um die Antriebswellendrehachse (**2a**) schwenkbar ist.

2. Antriebseinheit nach dem vorhergehenden Anspruch, **dadurch gekennzeichnet,** dass die Propellerwellendrehachse (**1a**) in Schwenkrichtung relativ zu der Antriebswelle (**12**) feststeht, wenn die Propellerwellendrehachse (**1a**) um die Antriebswellendrehachse (**2a**) geschwenkt wird.

3. Antriebseinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** dass die Antriebswelle (**2**) über einen Zugmitteltrieb (**5**) mit der Propellerwelle (**1**) verbunden ist.

4. Antriebseinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** dass die Antriebswelle (**2**) über eine Abtriebswelle (**3**) mit der Propellerwelle (**1**) verbunden ist, wobei die Abtriebswellendrehachse (**3a**) die Antriebswellendrehachse (**1a**) vorzugsweise in einem Punkt schneidet.

5. Antriebseinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** dass die Antriebswelle (**2**) über eine Abtriebswelle (**3**) mit der Propellerwelle (**1**) verbunden ist, wobei die Abtriebswelle (**3**) mit der Antriebswelle (**2**) über ein Kegelradgetriebe (**4**) verbunden ist.

6. Antriebseinheit nach den Ansprüchen 3 und 4 oder nach den Ansprüchen 3 und 5, **dadurch gekennzeichnet,** dass die Abtriebswelle (**3**) zwischen dem Zugmitteltrieb (**5**) und der Antriebswelle (**2**) und/oder der Zugmitteltrieb (**5**) zwischen der Abtriebswelle (**3**) und der Propellerwelle (**1**) angeordnet sind.

7. Antriebseinheit nach einem der vorhergehenden Ansprüche, gekennzeichnet durch eine Kupplung (**6**), insbesondere eine elektrisch oder elektromechanisch betätigbare Kupplung, welche in einem eingekuppelten Zustand die Antriebswelle (**2**) mit der Propellerwelle (**1**) so koppelt, dass die Propellerwellendrehachse (**1a**) in Schwenkrichtung um die Antriebswellendrehachse (**2a**) drehfest mit der Antriebswelle (**2**) verbunden ist, und in einem ausgekuppelten Zustand die Antriebswelle (**2**) von der Propellerwelle (**1**) so entkoppelt, dass die Antriebswelle (**2**) in Schwenkrichtung um die Antriebswellendrehachse (**2a**) relativ zu der Propellerwellendrehachse (**1a**) drehbar ist.

8. Antriebseinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** dass die Propellerwelle (**1**) von einer Propellerwellenlagerung (**1b**) drehbar gelagert ist und die Propellerwellenlagerung (**1b**) zusammen mit der Propellerwelle (**1**) oder/und der Propellerwellendrehachse (**1a**) um die Antriebswellendrehachse (**2a**) insbesondere relativ zu einem Antriebswellengehäuse (**7**) schwenkbar ist.

9. Wasserfahrzeug, insbesondere Wassersportgerät, vorzugsweise Surfboard, umfassend eine Antriebseinheit, insbesondere nach einem der vorhergehenden Ansprüche, das Wasserfahrzeug umfassend:
a) einen insbesondere flach ausgestalteten Schwimmkörper (**12**), insbesondere Surfboard, und die Antriebseinheit, wobei die Antriebseinheit aufweist:
b) eine Propellerwelle (**1**), die um eine Propellerwellendrehachse (**1a**) drehbar ist und an der ein Propeller (**9**) befestigbar oder befestigt ist,
c) eine Antriebswelle (**2**), die um eine Antriebswellendrehachse (**2a**) drehbar und mit einem Motor (**10**) verbindbar oder verbunden ist,
d) wobei die Antriebswelle (**2**) so mit der Propellerwelle (**1**) verbunden ist, dass eine Drehung der Antriebswelle (**2**) um ihre Antriebswellendrehachse (**2a**) und relativ zu dem Schwimmkörper (**12**) eine Drehung der Propellerwelle (**1**) um ihre Propellerwellendrehachse (**1a**) und relativ zu dem Schwimmkörper (**12**) bewirkt,
dadurch gekennzeichnet, dass
e) die Propellerwellendrehachse (**1a**) windschief in Bezug auf die Antriebswellendrehachse (**2a**) angeordnet ist und die Propellerwellendrehachse (**1a**) von der Unterseite des Schwimmkörpers (**12**) wegschwenkbar oder zu der Unterseite des Schwimmkörpers (**12**) hinschwenkbar ist.

10. Wasserfahrzeug nach dem vorhergehenden Anspruch, gekennzeichnet durch wenigstens eines der folgenden Merkmale:
– eine in dem Schwimmkörper (**12**) integrierte Batterie (**11**), insbesondere Akkumulator, oder einen in den Schwimmkörper (**12**) integrierten Kraftstofftank;
– einen in den Schwimmkörper (**12**) integrierten Motor (**10**), insbesondere Verbrennungs- oder Elektromotor zum Antrieb des Propellers (**9**) und der Schwenkbewegung;
– eine längliche Ausgestaltung des flachen Schwimmkörpers (**12**) entlang einer Längsachse (L), wobei die Antriebswelle (**2**) und/oder die Antriebs-

wellendrehachse (**2a**) quer, insbesondere senkrecht zu der Längsachse (L) und entlang des flachen Schwimmkörpers (**12**) angeordnet sind;
– eine Ausnehmung (**12a**) an der Unterseite des Schwimmkörpers (**12**), die angepasst ist, wenigstens den Propeller (**9**) zumindest teilweise aufzunehmen, und in die der Propeller (**9**) durch das Hinschwenken der Propellerwellendrehachse (**1a**) zu der Unterseite des Schwimmkörpers (**12**) aufnehmbar ist und aus der der Propeller (**9**) durch das Wegschwenken der Propellerwellendrehachse (**1a**) von der Unterseite des Schwimmkörpers (**12**) entfernbar ist;
– ein lösbares insbesondere mechanisches oder magnetisches Haltemittel (**13**), welches den Propeller (**9**) in der an den Schwimmkörper (**12**) angeklappten Position hält;
– eine Steuereinrichtung (**15**) für den Motor (**10**);
– zwei nebeneinander angeordnete klappbare Propeller (**9**), die relativ zueinander mit gleichen und unterschiedlichen Drehzahlen betreibbar sind, wodurch ein Giermoment um die Hochachse des Wasserfahrzeugs erzeugbar ist;
– eine an dem Benutzer des Wasserfahrzeugs befestigbare Reißleine (**14**), die lösbar an dem Wasserfahrzeug befestigt ist, wobei ein Lösen der Reißleine (**14**) ein Abschalten des Motors (**10**) bewirkt.

11. Wasserfahrzeug nach einem der zwei vorhergehenden Ansprüche, **dadurch gekennzeichnet,**
dass die Propellerwellendrehachse (**1a**) um eine Ruderachse (**19b**) und insbesondere relativ zu dem Schwimmkörper (**12**) hin und her schwenkbar ist, wobei die Ruderachse (**19b**) in etwa vertikal verläuft oder in etwa senkrecht auf die Unterseite des Schwimmkörpers (**12**) steht oder
dass in der hinteren Hälfte des Schwimmkörpers (**12**) wenigstens eine Finne (**17**) um eine Ruderachse (**20b**) und insbesondere relativ zu dem Schwimmkörper (**12**) hin und her schwenkbar ist, wobei die Ruderachse (**20b**) in etwa vertikal verläuft oder in etwa senkrecht auf die Unterseite des Schwimmkörpers (**12**) steht.

Es folgen 12 Seiten Zeichnungen

Anhängende Zeichnungen

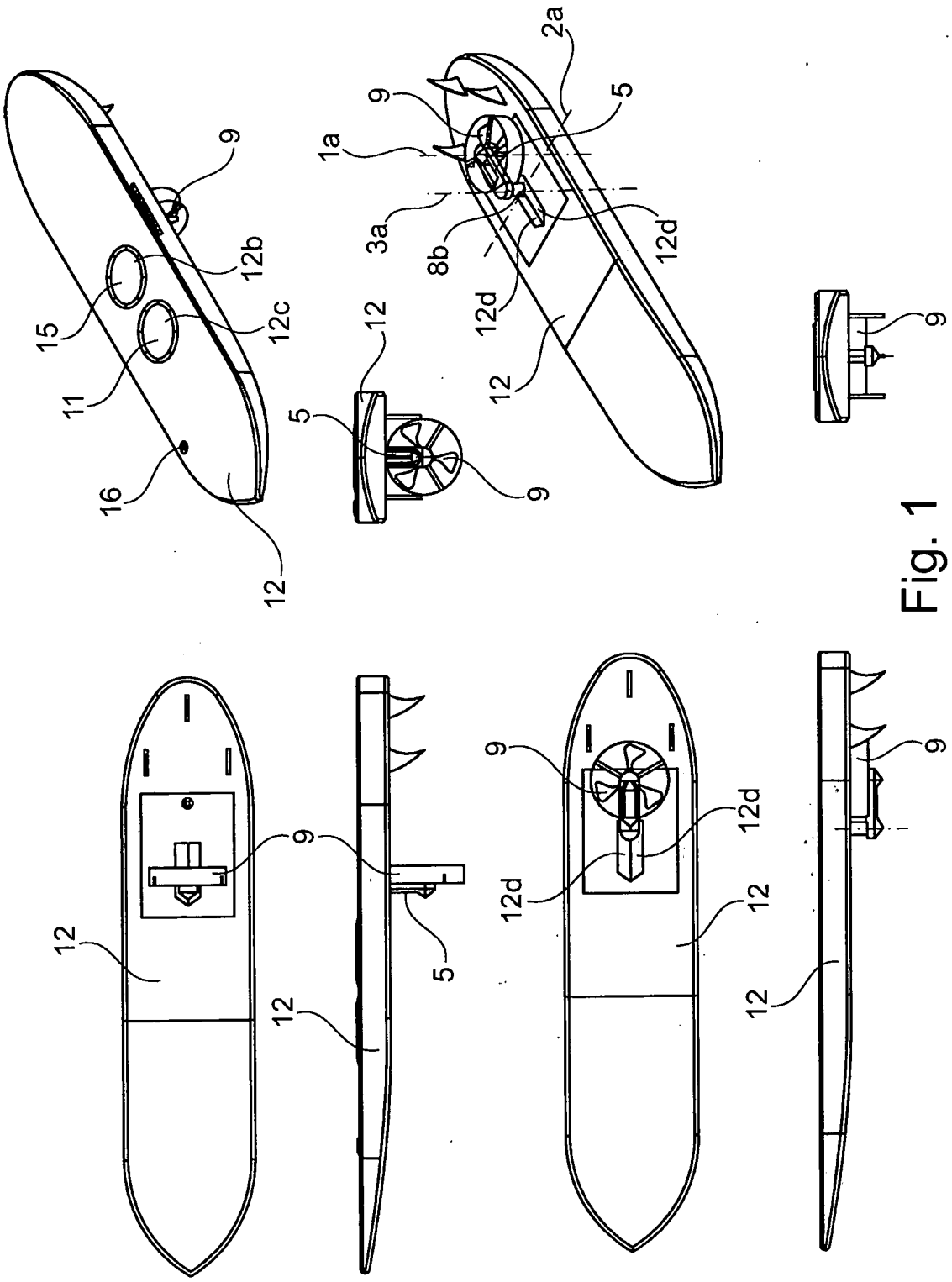


Fig. 1

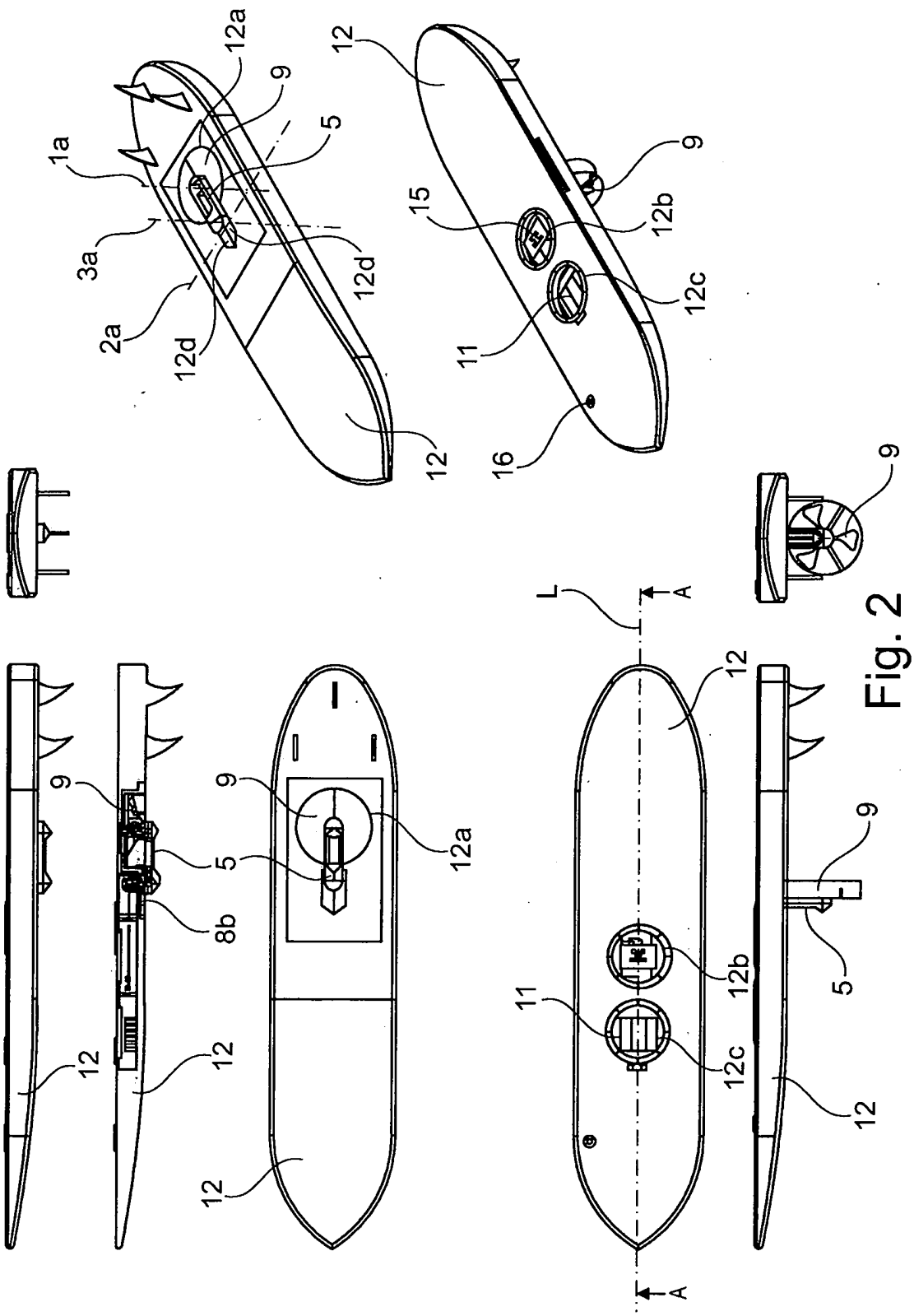


Fig. 2

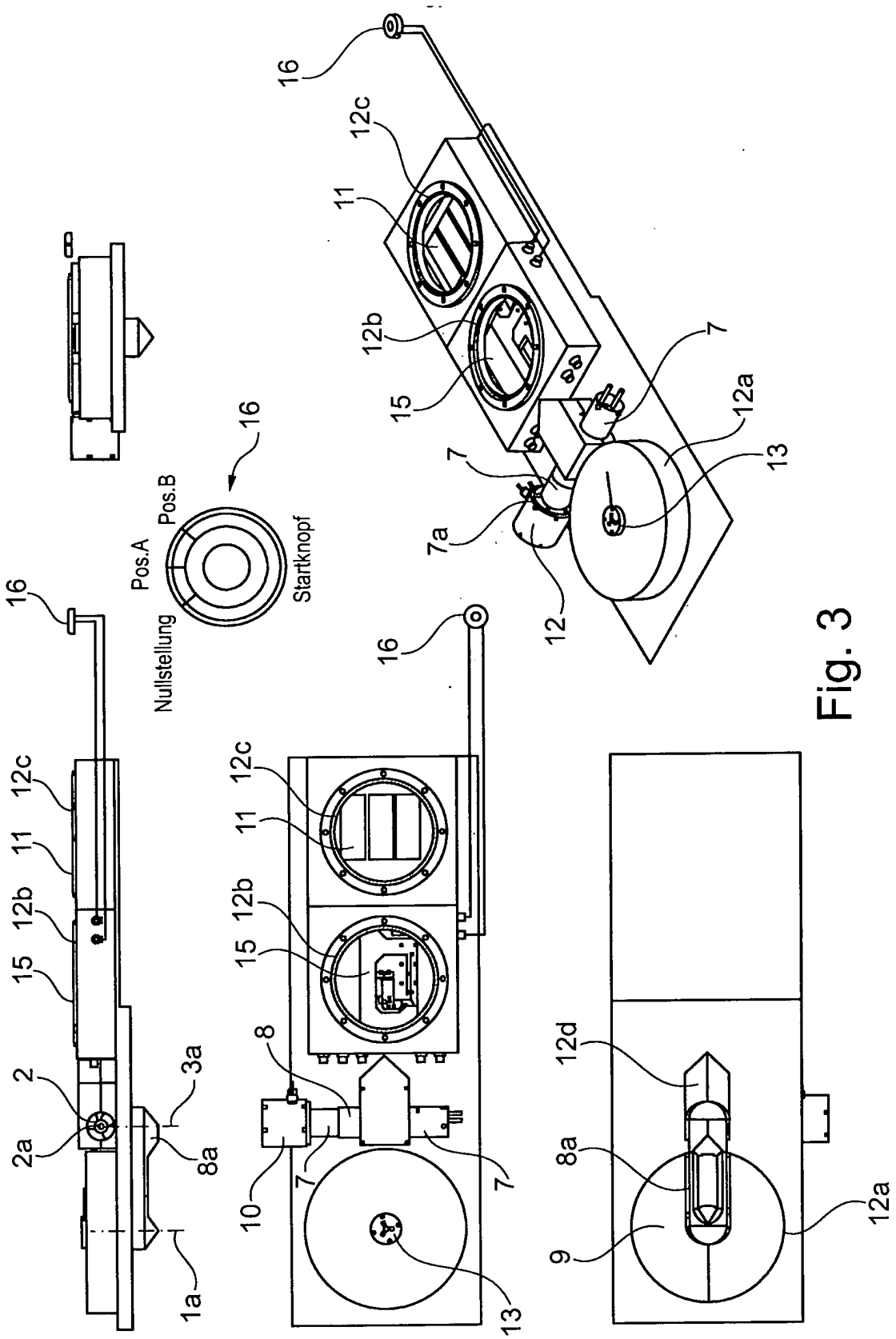

16
12c
11
12b
15
7
12a
13
7a
12
Pos.A
Pos.B
Nullstellung
Startknopf
2
2a
3a
8a
1a
8
10
12d
9

Fig. 3

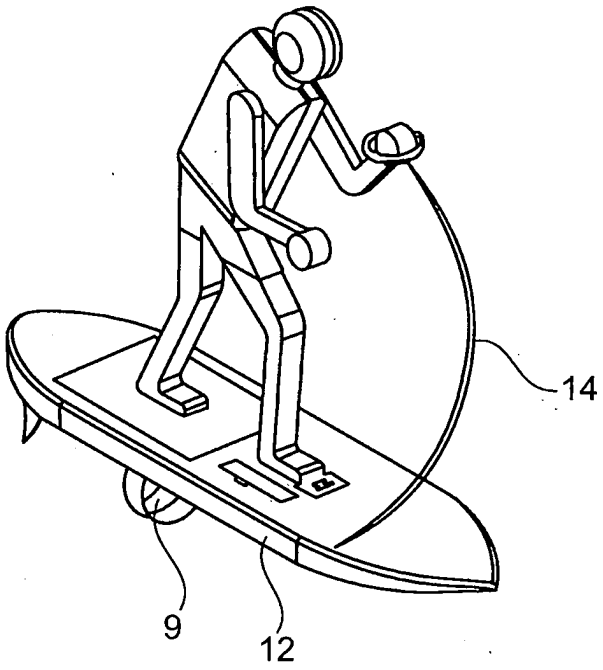


Fig. 4

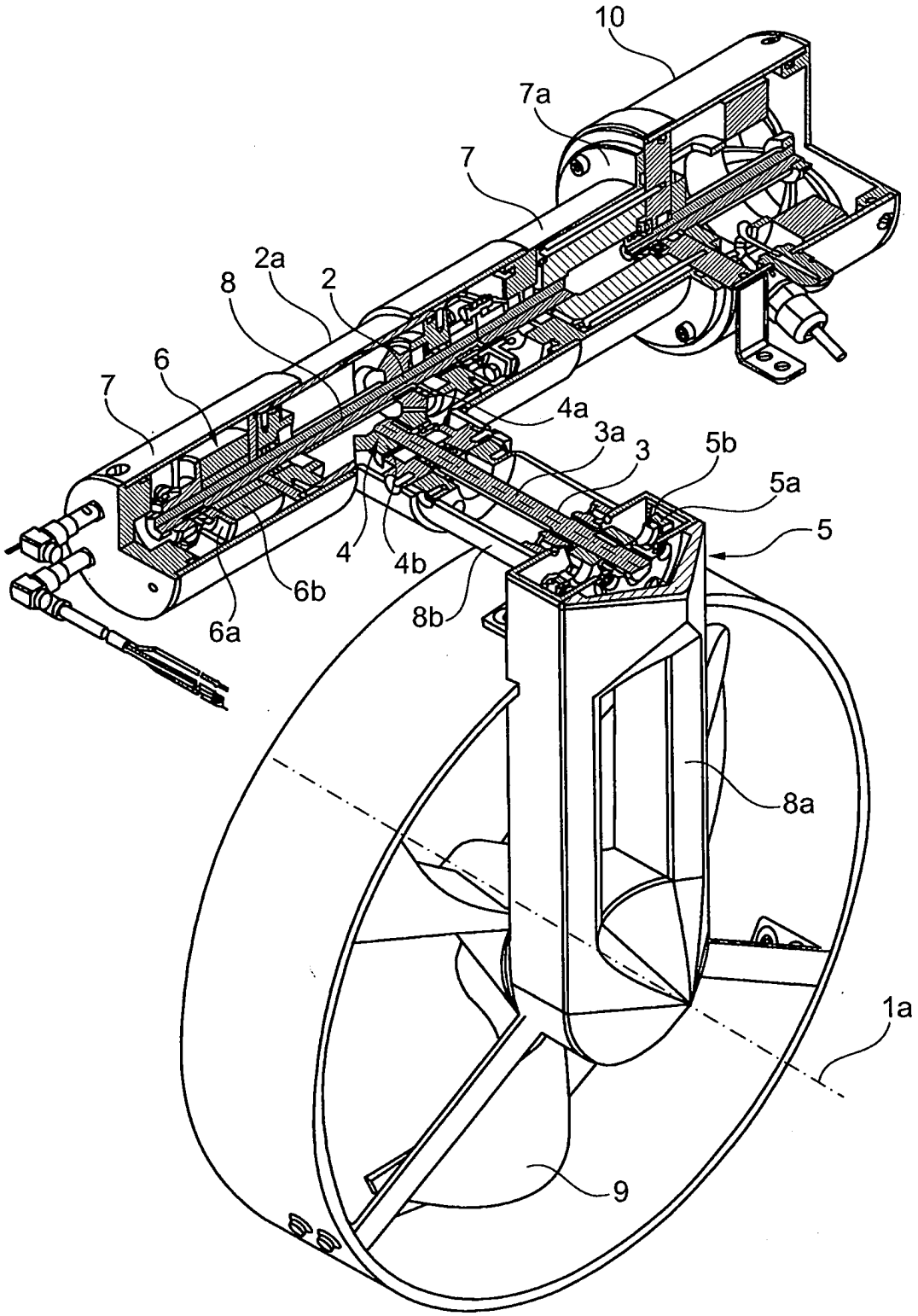


Fig. 5

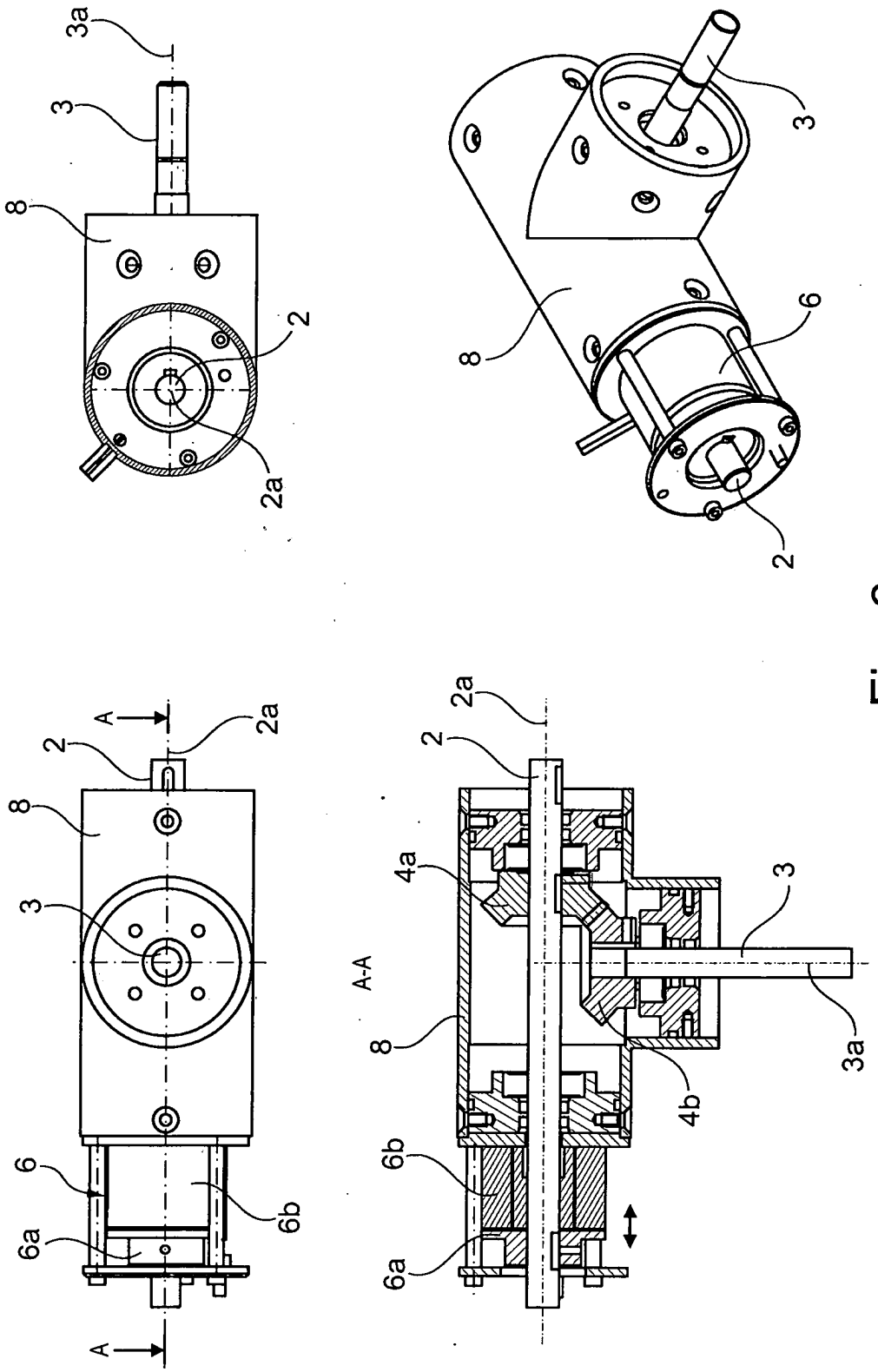


Fig. 6

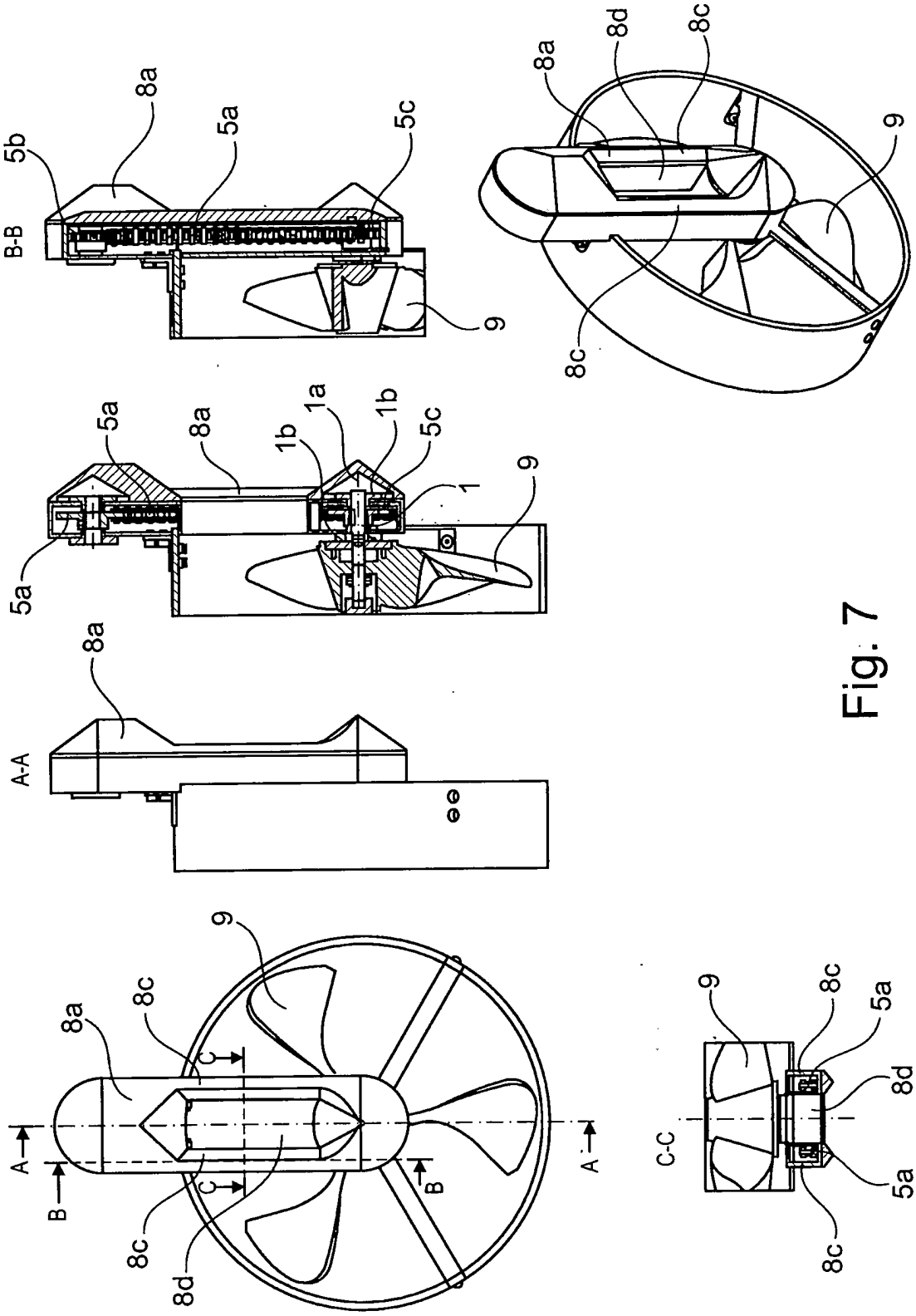

B-B
5b
8a
5a
5c
9
8a
8d
8c
9
8c
5a
8a
1a
1b
1b
5c
1
9
5a
A-A
8a
9
8a
8c
C
A
B
B
A
C
8c
8d
C-C
9
8c
5a
8d
5a
8c

Fig. 7

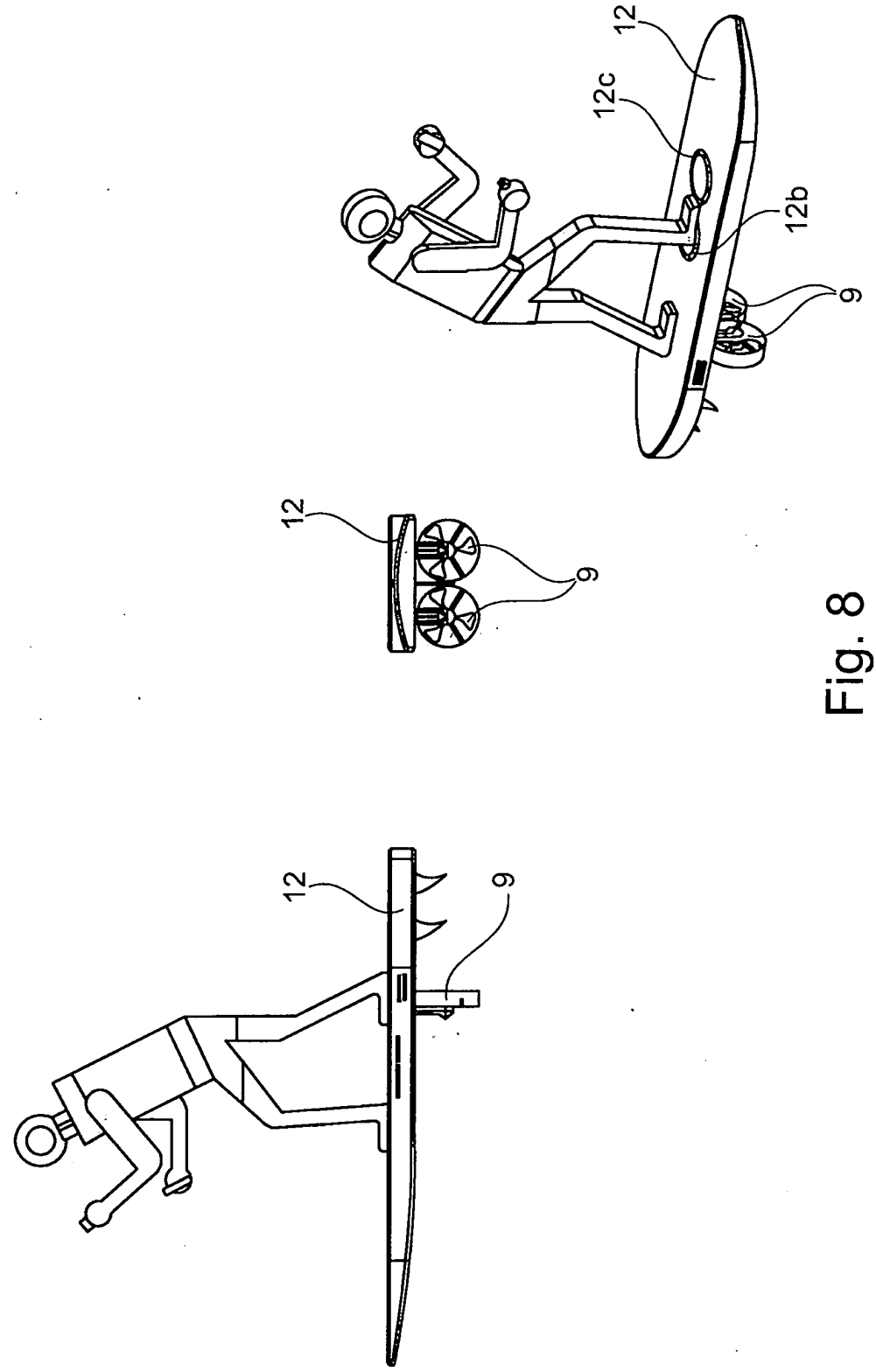


Fig. 8

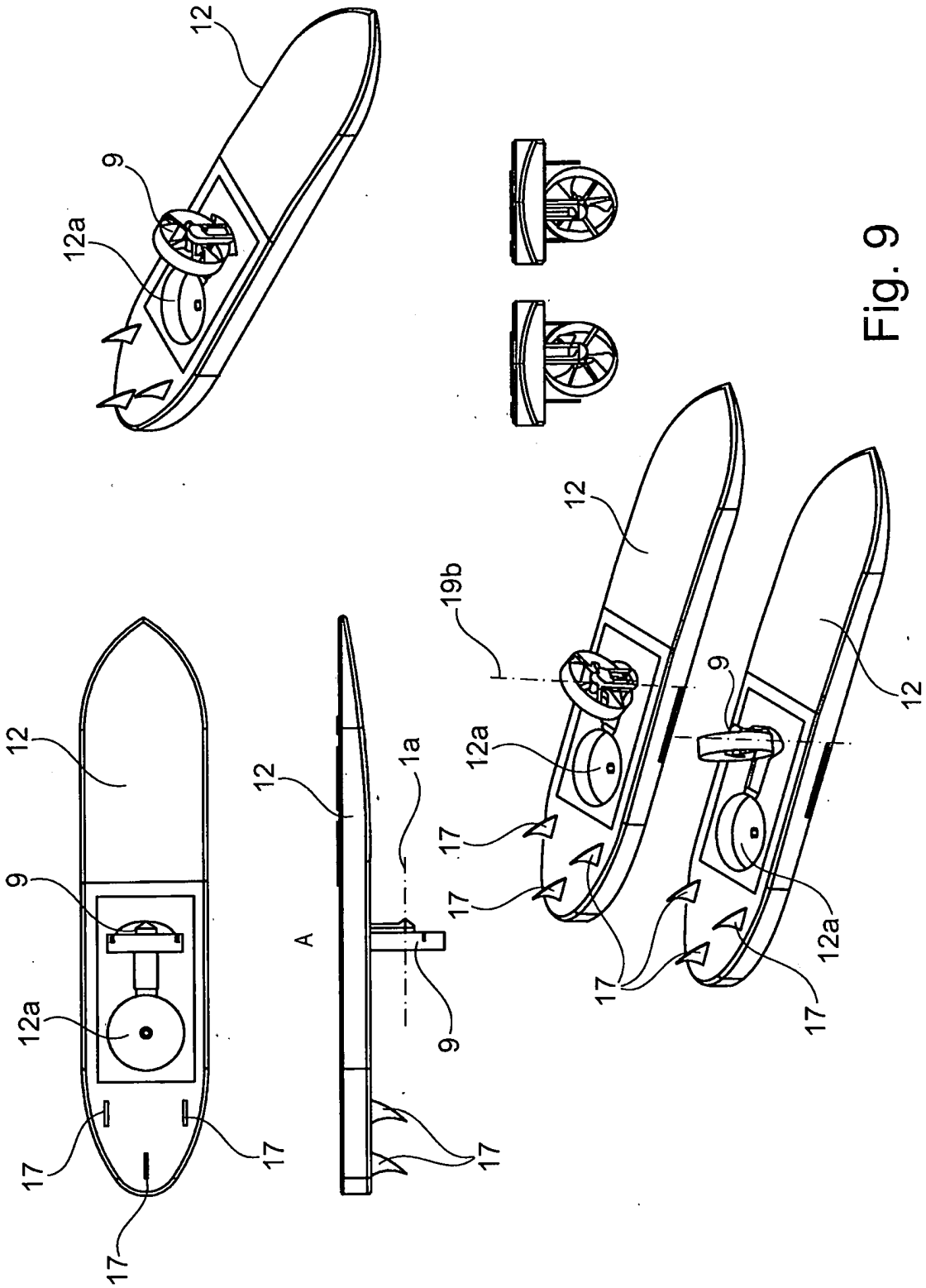


Fig. 9

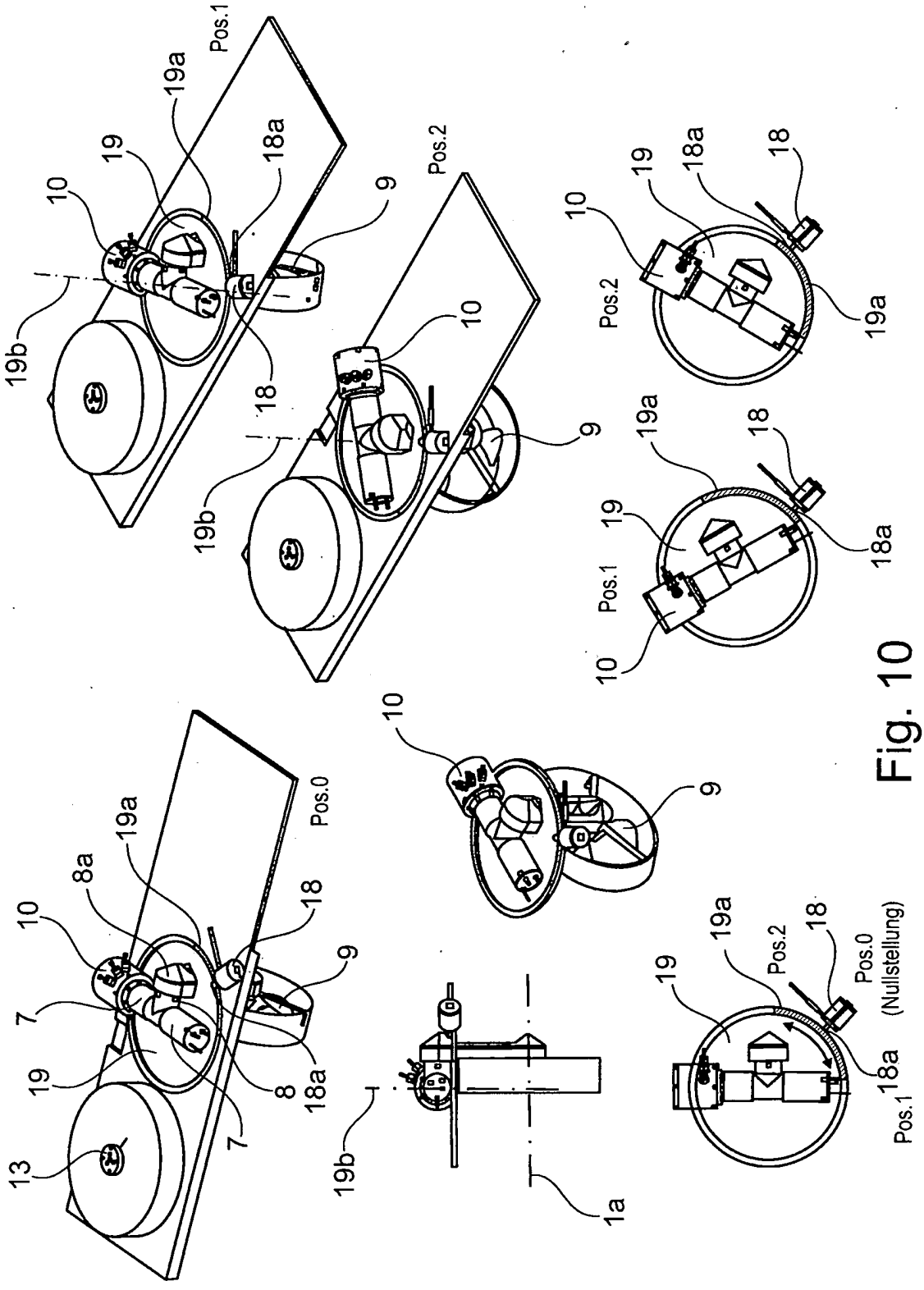

Pos.1
19a
19
18a
10
9
Pos.2
19b
18
10
9
19b
Pos.2
19
18a
18
10
19a
19a
18
19
Pos.1
18a
10
Pos.0
19a
8a
18
10
9
7
19
18a
8
7
13
19b
10
9
1a
19a
19
Pos.2
18
Pos.0
(Nullstellung)
18a
Pos.1

Fig. 10

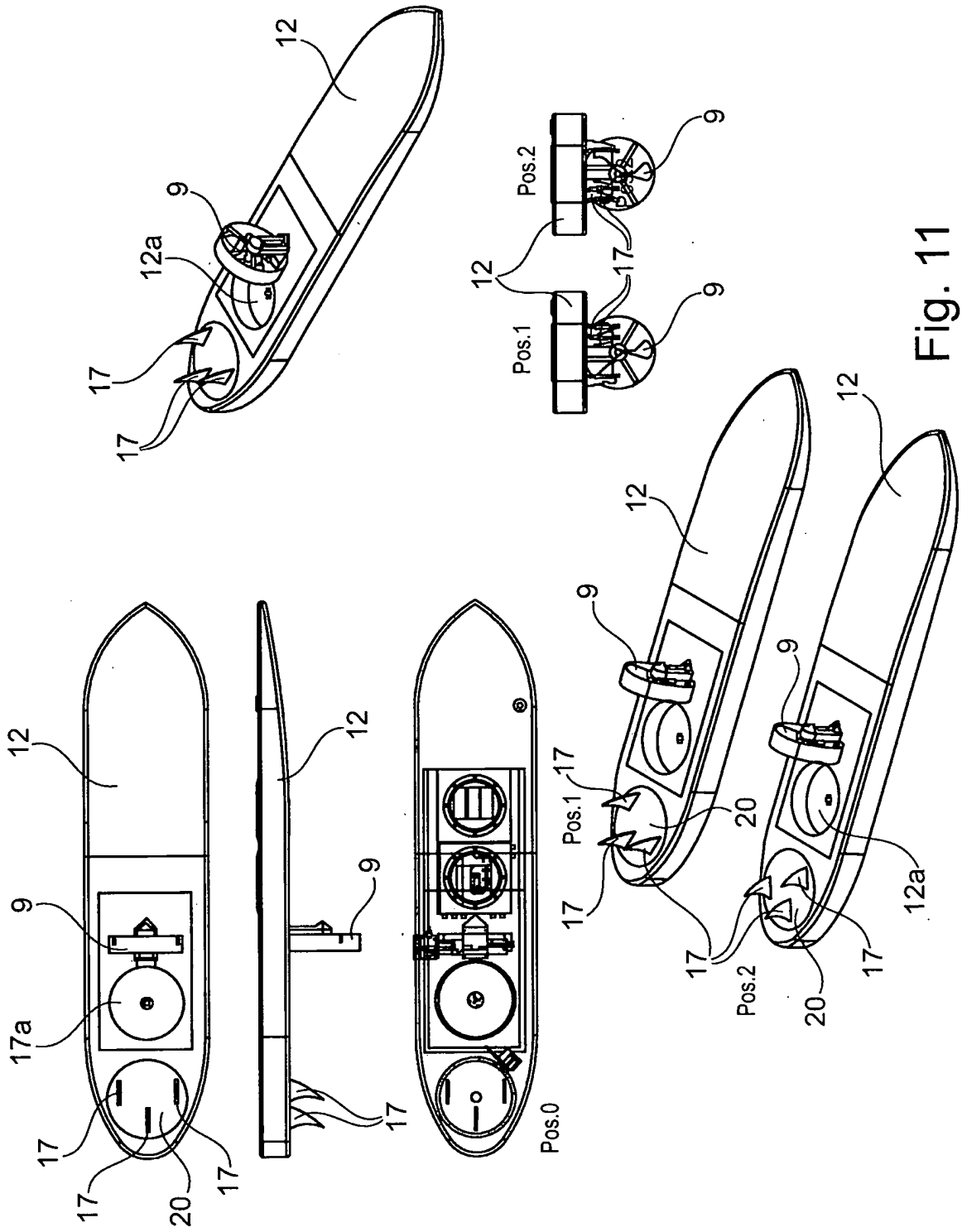

12
9
12a
17
17
Pos.2
Pos.1
12
17
9
9
12
12
9
17
Pos.1
20
17
17
Pos.2
20
17
12a
12
9
17a
17
17
17
20
17
12
9
17
Pos.0

Fig. 11

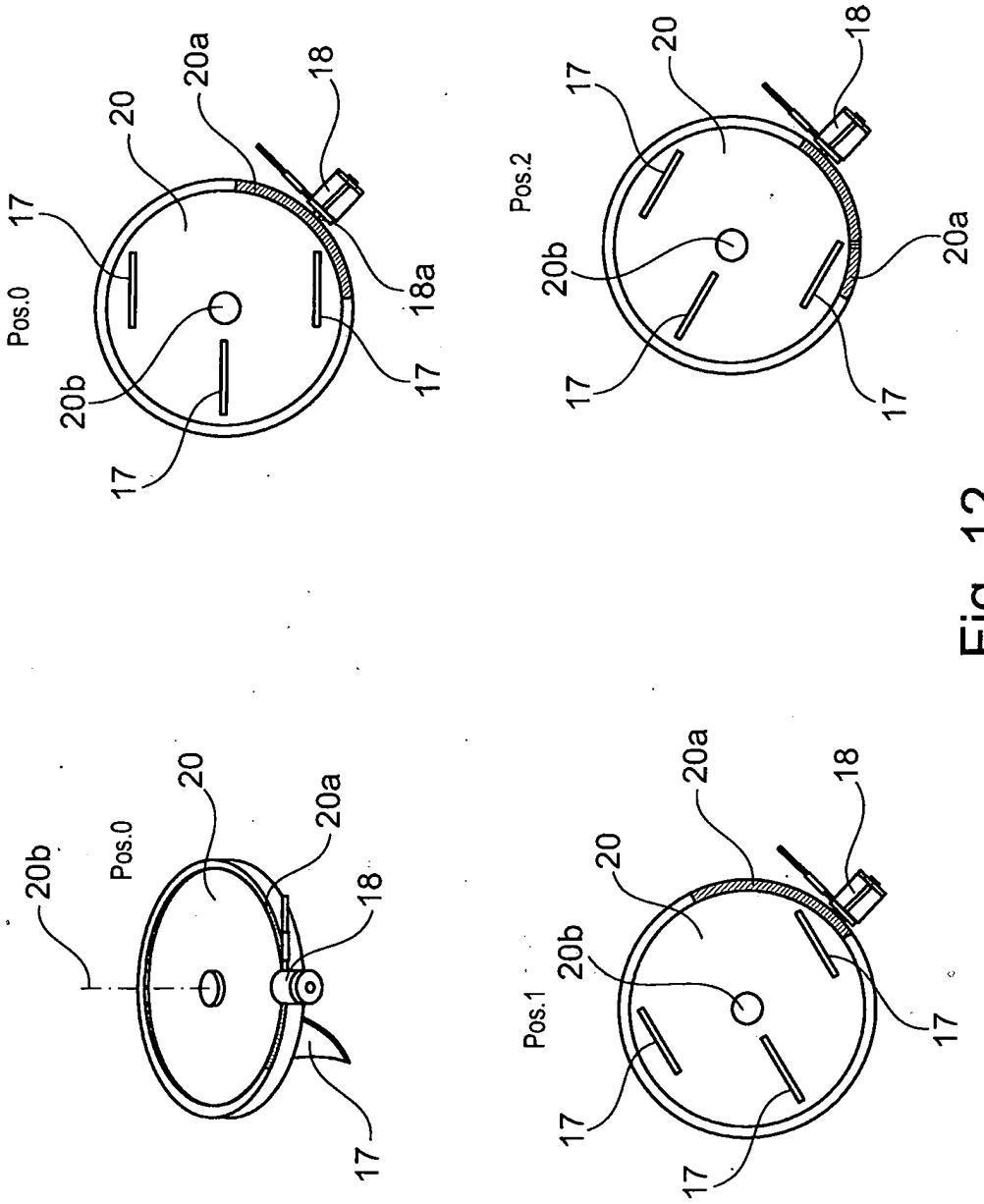

Pos.0
17
20
20a
18
18a
20b
17
17
Pos.2
17
20
18
20b
20a
17
17
Pos.0
20b
20
20a
18
17
Pos.1
20a
18
20
20b
17
17
17

Fig. 12

4 of 16 DOCUMENTS

EP2700571A2 2014-02-26 **Steering device for a surfboard** (en)

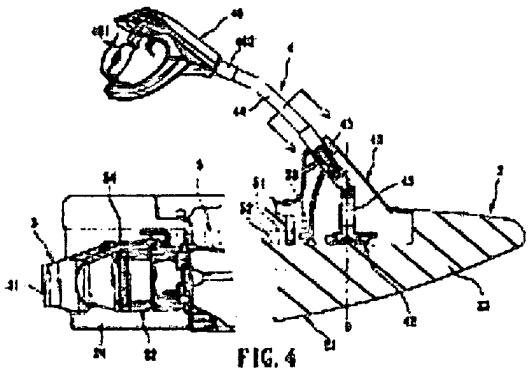


FIG. 4

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Classifications: CPC: B63H25/46 (2013-01-01; I 2014-02-20; B, H, EP)
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IPC[8]: B63B35/79 (2006-01-01; A, F, I, 2013-10-21; B, H, EP)

Priority Number and Date: TW101130248 2012-08-21

English Abstract:

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) disposed 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).

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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) disposed 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).

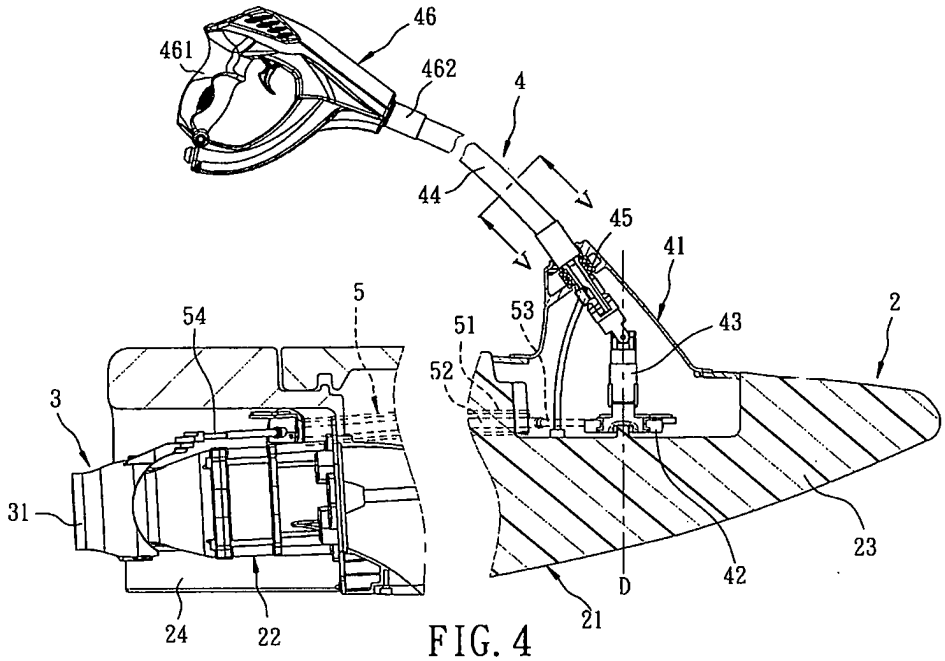


FIG. 4

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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 aforesaid 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 untwistable, 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 move 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).

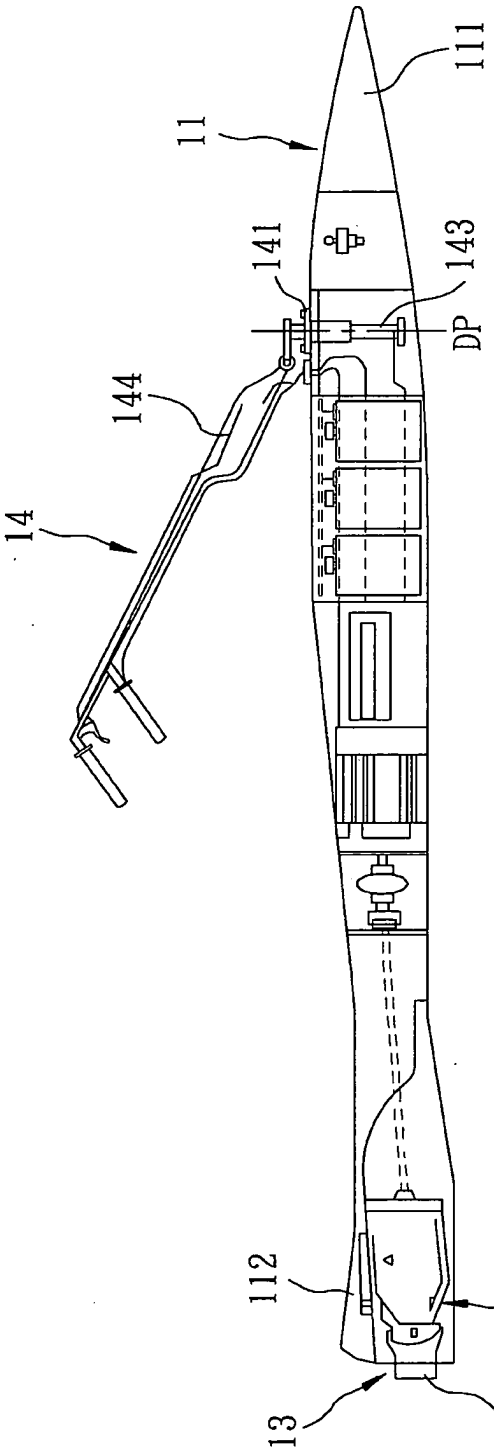


FIG. 1
PRIOR ART

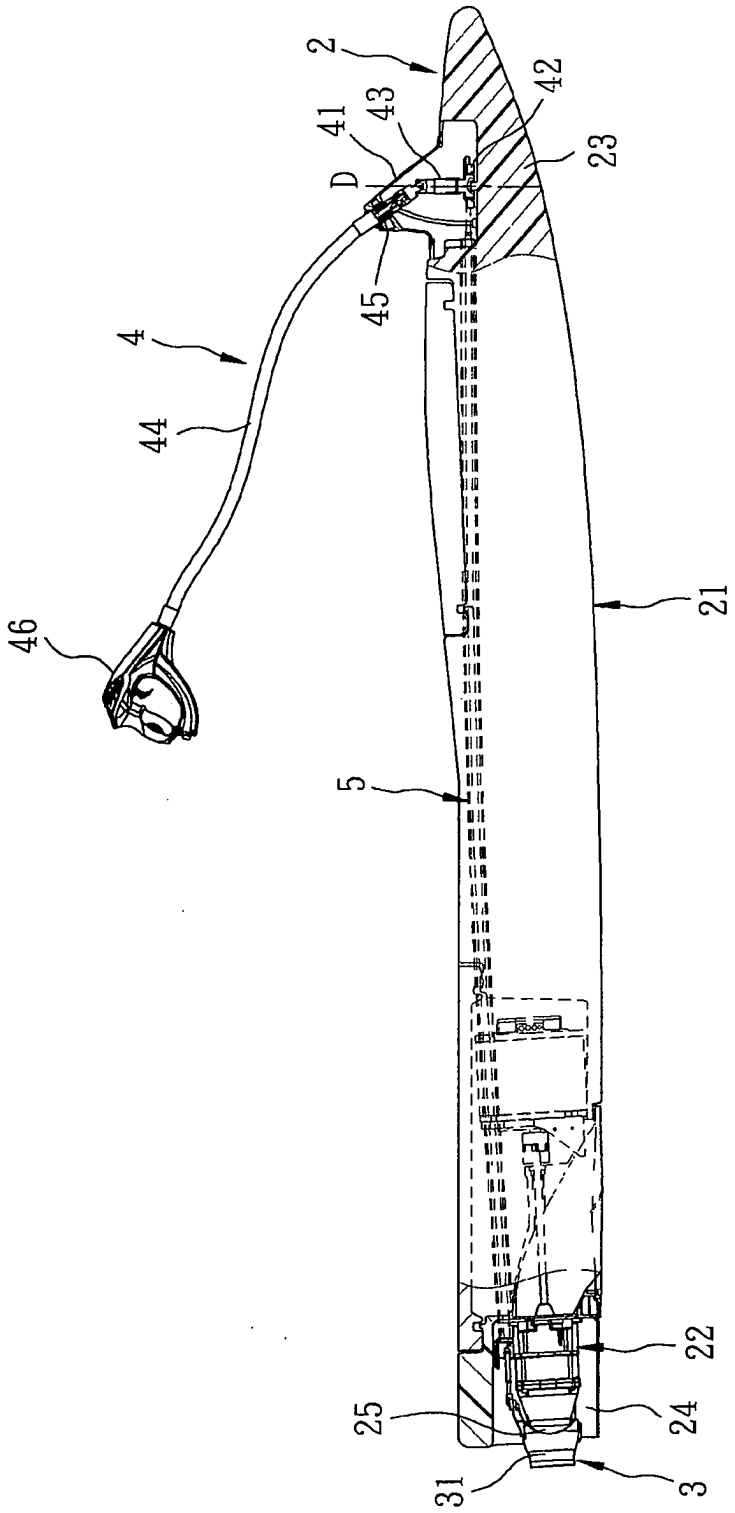


FIG. 2

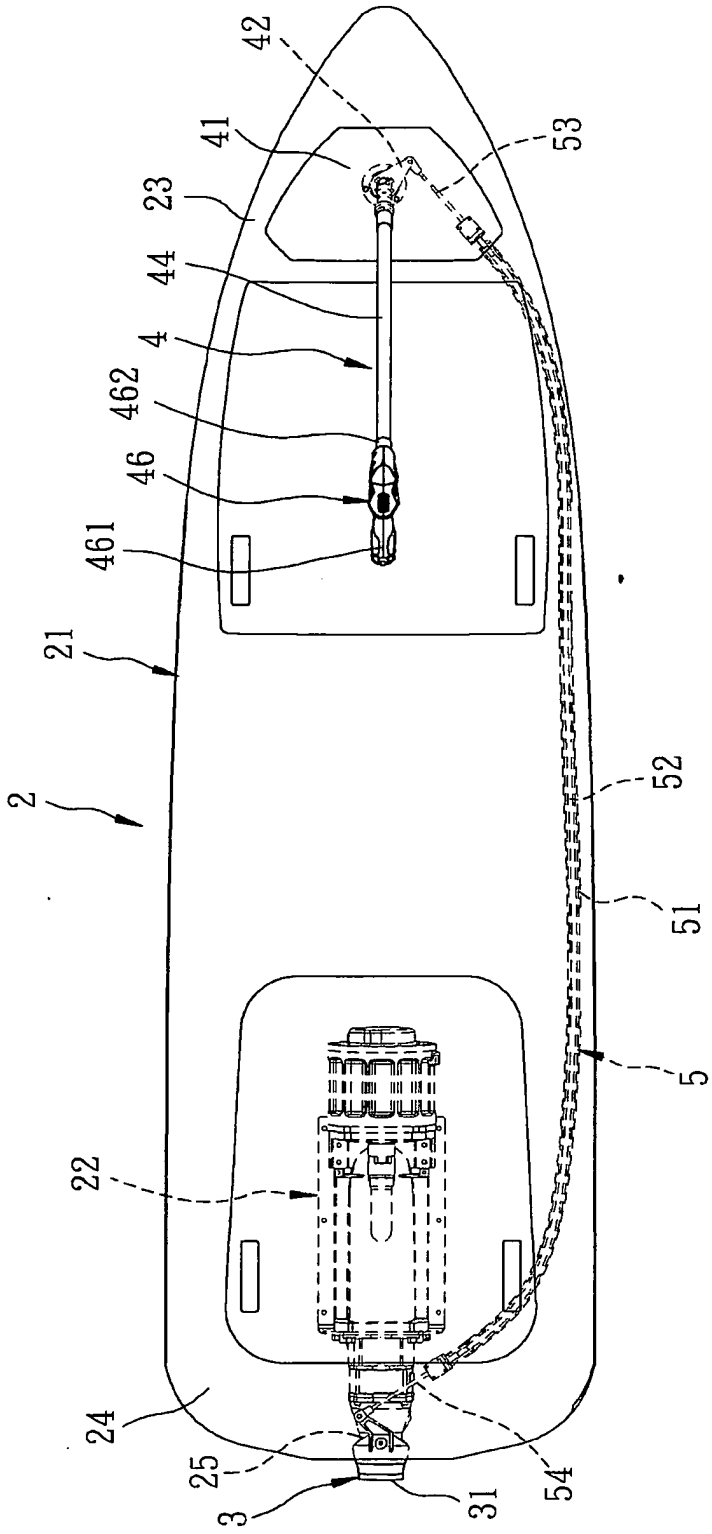


FIG. 3

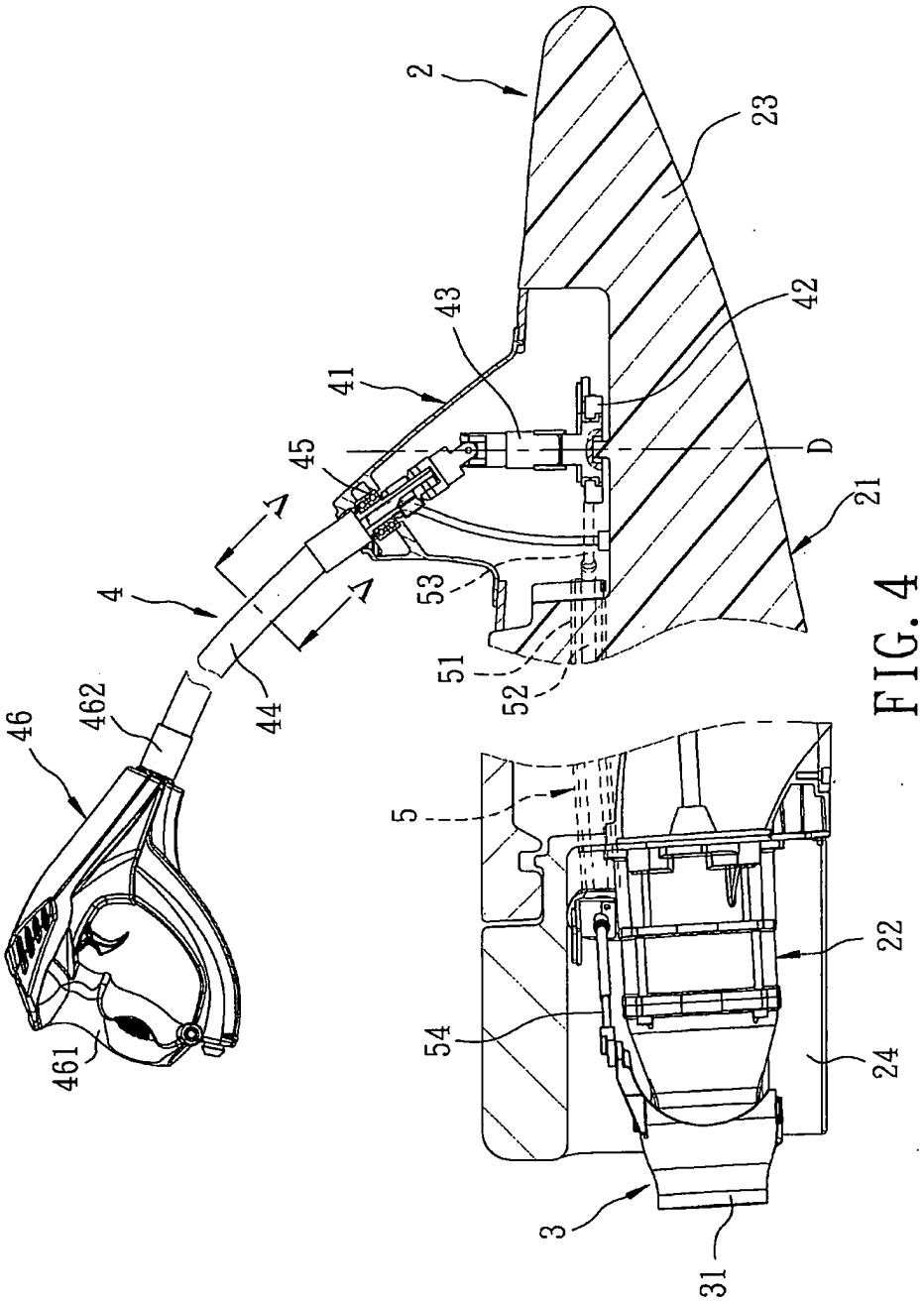


FIG. 4

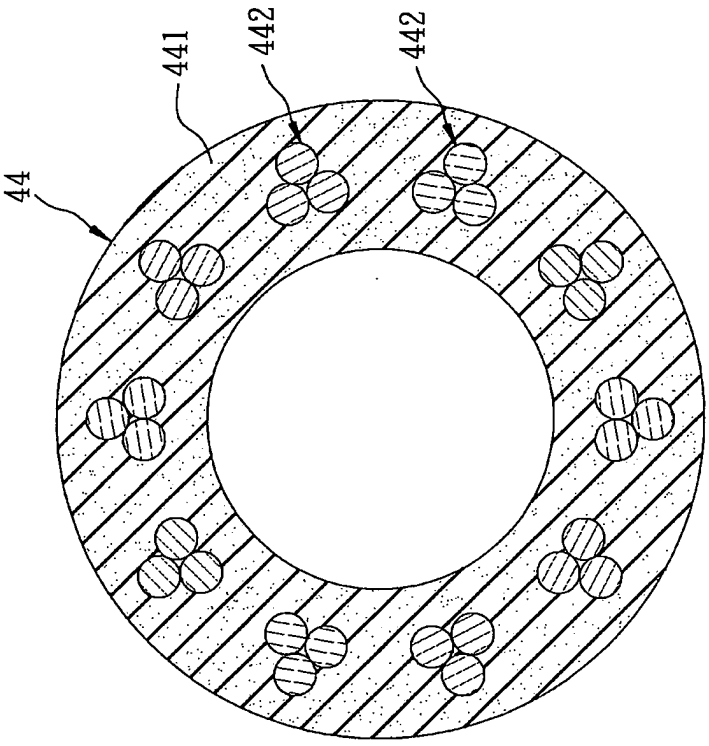


FIG. 5

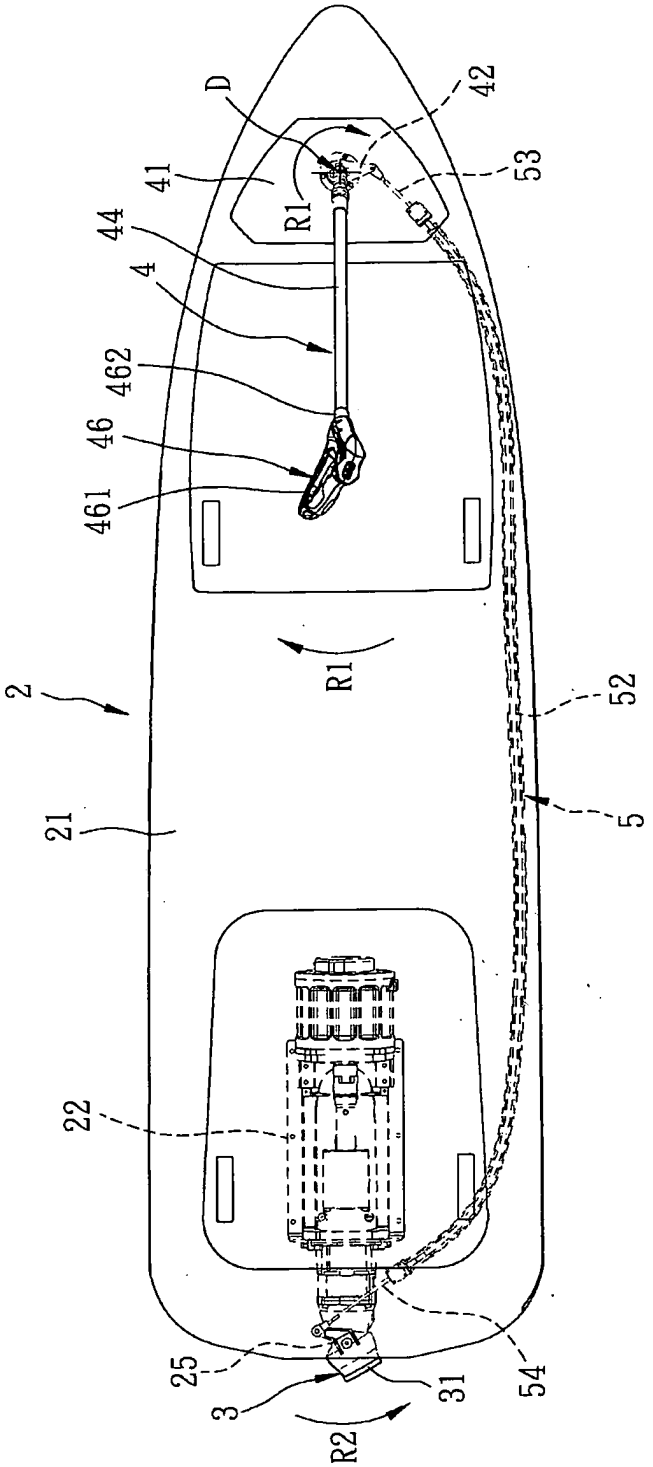


FIG. 6

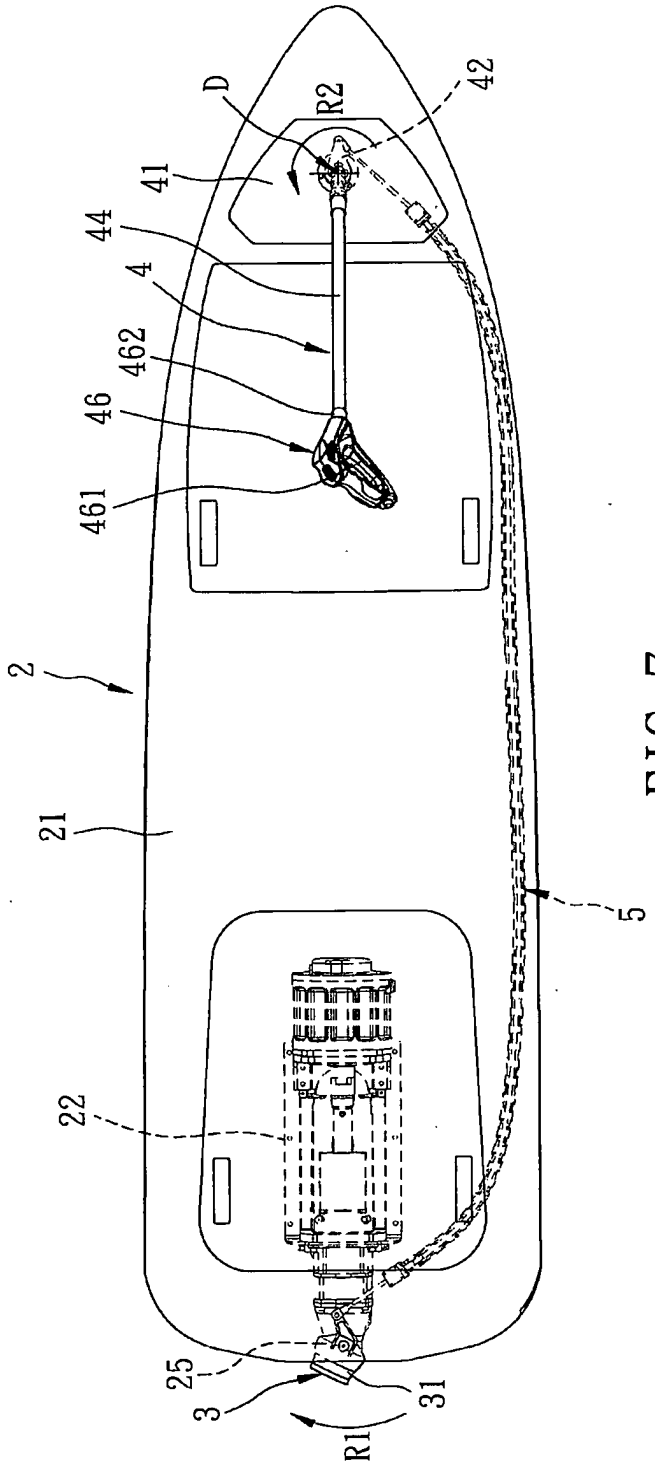


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

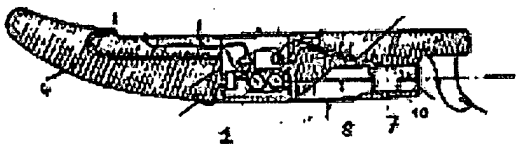
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- US 20010042498 A **[0002]**

12 of 16 DOCUMENTS

FR2728863A1 1996-07-05 **Surfboard with integral IC engine and propeller** (en)



Applicants/Assignees: BOURGAULT YVES MARIE ROGER, French Republic

Classifications: CPC: B63B35/7943 (2013-01-01; I 2013-01-01; B, H, EP)
ECLA: B63B35/79M
IPC[6]: 6B63B35/79A 6B63B35#79A 6B63B35/79A
IPC[8]: B63B35/73 (2006-01-01; C, , I, 2005-10-08; R, M, EP)
IPC[8]: B63B35/79 (2006-01-01; A, , I, 2005-10-08; R, M, EP)

Priority Number and Date: FR94016035 1994-12-30

English Abstract:

The board has a hollow hull (4) which contains a motor (1) and a propeller (7) enclosed within its thickness. The propeller is housed in a tunnel, and sucks water into the front of the tunnel before forcing it out through a cylindrical passage (10). The water inlet to the front end of the tunnel is through a series of slots (12). The outlet of the cylindrical passage delivers a water stream between two downwardly-directed stabilising fins (11). The motor is a two-stroke water-cooled IC engine, mounted on an aluminium support via intermediate shock absorbers (3), and controlled by a throttle cable (13) held in the user's hand.

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PARIS

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(21) N° d'enregistrement national : **94 16035**

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(12) DEMANDE DE BREVET D'INVENTION A1

(22) Date de dépôt : 30.12.94.

(30) Priorité :

(43) Date de la mise à disposition du public de la demande : 05.07.96 Bulletin 96/27.

(56) Liste des documents cités dans le rapport de recherche préliminaire : *Ce dernier n'a pas été établi à la date de publication de la demande.*

(60) Références à d'autres documents nationaux apparentés :

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(72) Inventeur(s) :

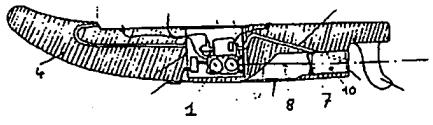
(73) Titulaire(s) :

(74) Mandataire :

(54) PLANCHE A MOTEUR.

(57) L'invention concerne une planche à moteur destinée à la pratique de sports nautiques.

Le moteur 1 est logé dans la coque 4 spécialement conçue entraîne la turbine 7 dans la tuyère 10 par l'intermédiaire d'un arbre de transmission 8. Ce qui a pour effet d'aspirer l'eau sous la coque pour la refouler à l'arrière provoquant une poussée de l'engin vers l'avant.



FR 2 728 863 - A1

La présente invention concerne une planche à moteur destinée à la pratique de certaines activités nautiques. Cette planche à moteur se situe entre l'embarcation à moteur hors-bord et la planche à voile classique.

Il existe déjà des planches à moteur réalisées sur le même principe, parmi lesquelles on peut citer celles décrites dans les brevets français :

- FR-A.2.416833 ayant pour objet une planche nautique, conçue pour la navigation tant à voile qu'au moteur, qui se caractérise par le fait qu'elle comporte un bloc amovible, muni d'un aileron qui, une fois retiré, permet le passage du pied d'hélice d'un moteur hors-bord qui se fixe à la planche par l'intermédiaire d'une chaise intégrée à la planche, ou amovible par rapport à celle-ci.

-FR-A.2.470047 concernant une planche à moteur qui se caractérise principalement en ce que la propulsion est obtenue par l'intermédiaire d'une roue à aubes, montée dans une enveloppe munie d'orifices permettant l'aspiration et le refoulement d'eau. La commande du moteur est assurée par l'intermédiaire d'un câble sortant sur l'avant de la planche.

La planche à moteur décrite dans le brevet FR-A.2.416833 présente l'inconvénient d'être équipée d'un moteur hors-bord dont l'hélice non carénéee fait courir de graves dangers à l'utilisateur de la planche et aux baigneurs qui peuvent se trouver à proximité, en cas de renversement ou de perte de contrôle de cet engin peu stable. Par contre, il offre l'avantage de permettre une rapide reconversion de l'engin en planche à voile classique, après avoir remplacçé le moteur par un bloc amovible muni d'un aileron.

La planche à moteur décrite dans le brevet FR-A.2.470047 présente par rapport à l'engin décrit ci-dessus, l'avantage de ne faire courir aucun risque à l'utilisateur ou aux baigneurs en cas de perte de contrôle, puisque la traditionnelle hélice est, dans ce mode de conception, remplaçée par un système à réaction, animé par une roue à aubes montée dans une enveloppe ; ce qui permet d'obtenir un très faible tirant d'eau et de rendre l'échouage direct possible sur les plages sans aucun risque de détérioration du système de propulsion. Toutefois, cet engin présente comme inconvénient de manquer de stabilité latérale, étant donné la position de son centre de gravité, et de manquer de stabilité directionnelle étant donné l'absence d'aileron. Par ailleurs, le câble de commande du moteur débouche sur l'avant de la planche, ce qui nécessite son encastrement ou sa fixation sur toute la longueur de celle-ci.

La planche à moteur décrite dans le brevet FR-2580580 A1 présente l'inconvénient de manquer de stablilité, d'être très encombrante compte tenu de sa motorisation type automobile ou industrielle. On peut voir aussi que rien n'a été prévu pour remédier aux problèmes liés au fonctionnement d'un moteur en milieu marin. Elle présente aussi comme inconvénient d'être une planche déjà existente où on a adapté un moteur. La flottabilité de la planche n'est pas suffisante pour porter le moteur et l'utilisateur.

La planche à moteur, selon l'invention, remédie aux inconvénients des engins évoqués ci-dessus tout en combinant leurs avantages respectifs. La stabilité directionnelle est assurée par l'intrermédiaire d'ailerons dont le profil, les dimensions et la position tant longitudinale que transversale ont été conçus pour faire partie intégrante du carénage situé sous la planche. La propulsion est assurée par l'intermédiaire d'une turbine située sous la planche et intégrée totalement dans celle-ci. Cela permet d'obtenir à la fois une bonne

stabilité directionnelle et l'élimination totale des risques d'accidents dûs à l'utilisation d'une hélice, sans que cela élimine la possibilité d'échouer l'engin sur une plage. Le moteur, type marin, est totalement intégré dans l'épaisseur de la planche. Il est fixé à la planche par l'intermédiaire d'un support en aluminium noyé dans la coque de la planche. Ceci permet d'avoir une bonne résistance des fixations tout en ayant la possibilité de le démonter. Le tout est recouvert d'un capot étanche et insonorisé qui ne dépasse pas au dessus de la planche. La coque nous permet ces adaptations particulières parce qu'elle a été moulée spécialement pour.

D'autres caractéristiques apparaitront dans la description qui va suivre d'une planche à moteur réalisée selon l'invention, au regard des annexes représentant une vue de côté en coupe, une vue de dessous et une vue de derrière.

En examinant la vue en coupe on remarque que le moteur 1 est fixé sur la planche 4 par l'intermédiaire d'un support en aluminium 2 et de silentblocs 3 et que ce moteur est logé dans un compartiment étanche 5 à l'intérieur de la coque recouvert d'un capot insonorisé 6. Ce moteur est relié à la turbine 7 par l'intermédiaire d'un arbre de transmission 8 ; L'étanchéité du compartiment étanche 5 est assurée par des joints 9.

La turbine 7 est logée dans la coque 4 à l'intérieur d'un conduit cylindrique d'un diamètre identique. A la sortie de ce conduit on peut remarquer les deux ailerons 11 placés de part et d'autre de l'orifice de sortie d'eau. A l'entrée et à la sortie du conduit d'eau 10, on peut voir les ailettes de protection 12 contre tout corps étranger.

Ainsi comme on le voit, la turbine 7 est située dans un conduit permettant la libre circulation de l'eau à l'intérieur sous l'effet de la rotation de la turbine. Cette conception permet l'utilisation d'un système de propulsion très simple et d'éliminer tout risque de contact accidentel de la turbine avec des baigneurs ou des corps étrangers, tout en rendant possible l'échouage de l'engin sur une plage et la mise en fonction du moteur hors de l'eau.

La commande du moteur 1 est assurée par une poignée 13 et un câble 14 étant reliés directement au carburateur. On peut aussi envisager d'assurer les principales commandes de la planche (accélération, démarrage et arrêt) par un boitier de télécommande tenu dans la main de l'utilisateur.

La sécurité en cas de chute est assurée par le coupe circuit 15, relié à la cheville de l'utilisateur. Il permet l'arrêt immédiat du moteur en cas de séparation du pilote et de sa planche.

L'échappement du moteur 16 est immergé pour diminuer au maximum le bruit, la prise d'air du moteur 17 se situe à l'avant de la planche ce qui permet un moindre risque d'absorbtion d'eau. Le captage d'eau de refroidissement 18 se situe sous la planche.

Cette planche forme un ensemble compact et léger qui est destiné à être utilisé dans divers sports nautiques. Sa pratique s'avoisine à celle du surf.

REVENDICATIONS

1) Planche à moteur caractérisée par le fait que sa coque 4 intègre un moteur 1 et une hélice 7 dans son épaisseur, et que sa propulsion est assurée par l'hélice 7 aspirant l'eau sous la coque pour la refouler à l'arrière dans un conduit cylindrique 10.

2) Planche à moteur selon la revendication 1 caractérisée en ce que le carénage à l'intérieur duquel est située l'hélice est constitué, à l'avant, de fentes 12 par lesquelles l'eau peut rentrer, d'un tube 10 débouchant à l'arrière de la planche, et d'ailerons 11 type surf placés derrière la sortie d'eau pour assurer la maniabilité.

3) Planche à moteur selon les revendications 1 et 2 caractérisée en ce que le moteur 1 du type marin deux temps à refroidissement à eau 18 est fixé sur un support en aluminium 2 à l'aide d'amortisseurs de vibrations 3, l'accélération pouvant se faire par un câble gainé 13 qui se tiend dans la main.

4) Planche à moteur selon l'une quelconque des revendications précédentes caractérisée en ce que la liaison moteur-hélice est assurée directement par un arbre de transmission 8, l'étanchéité entre le compartiment moteur 5 et la tuyère 10 où est logée l'hélice 7 étant assurée sur l'arbre de transmission par des joints 9.

5) Planche à moteur selon l'une quelconque des revendications précédentes caractérisée en ce que l'hélice 7 est réalisée en aluminium.

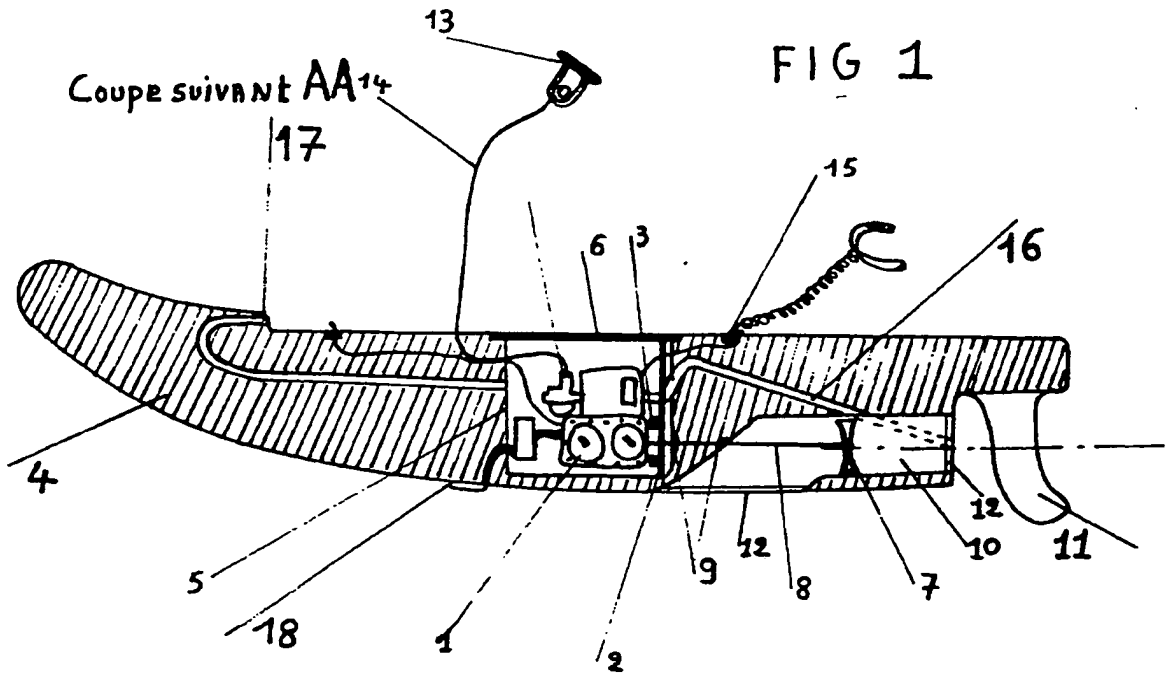


FIG 1

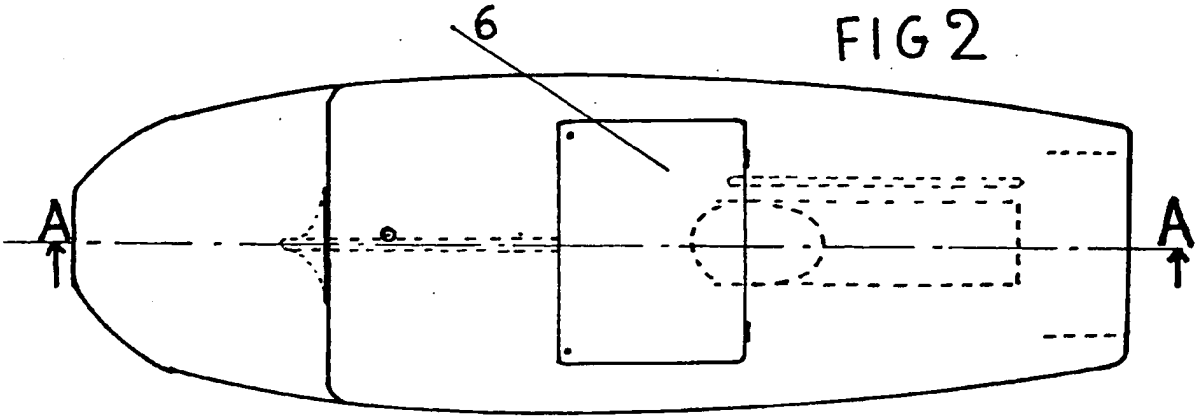


FIG 2

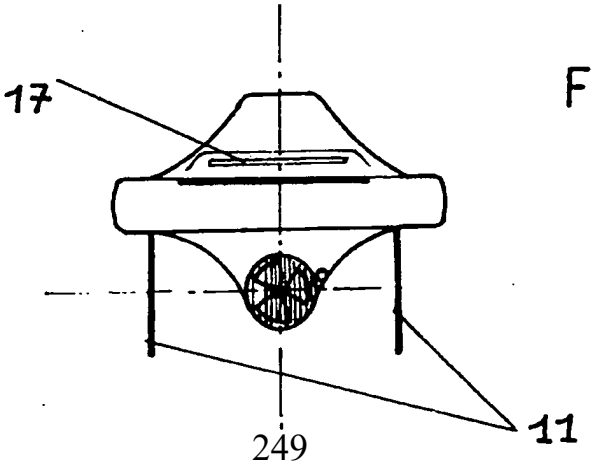
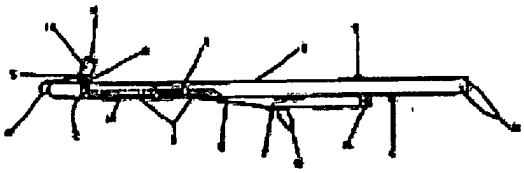


FIG 3

11 of 16 DOCUMENTS

FR2755090A1 1998-04-30 **System for driving float board in standing position** (en)



Applicants/Assignees: MAGNANI IVAN JOSEPH, French Republic

Classifications: CPC: B63B35/7943 (2013-01-01; I 2013-01-01; B, H, EP)
ECLA: B63B35/79M
IPC[6]: 6B63B35/79A 6B63B35#79A 6B63B35/79A
IPC[8]: B63B35/73 (2006-01-01; C, , I, 2005-10-08; R, M, EP)
IPC[8]: B63B35/79 (2006-01-01; A, , I, 2005-10-08; R, M, EP)

Priority Number and Date: FR96013108 1996-10-28

English Abstract:

The system for driving a motorised float board in a standing position comprises a float board (1). On the board lower part (6) is fixed a winder casing (4) enabling the unwinding and automatic re-winding of a driving wire (3). The board has a hole (2) through which is passed one of the two ends (5) of the wire onto the board upper part (9). This end of the wire is screwed to a casing (10) whose circumference is greater than that of the hole. This casing has a push button (11) which allows the activation of the screw (12) of an engine (7). The other end (8) of the wire, in the board lower part, is connected to the engine.

(19) RÉPUBLIQUE FRANÇAISE

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(60) Références à d'autres documents nationaux apparentés :

(71) Demandeur(s) : *MAGNANI IVAN JOSEPH* — FR.

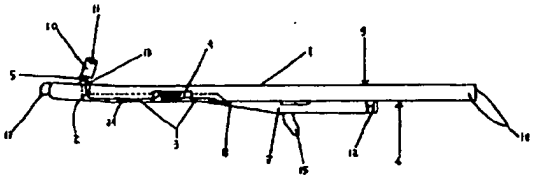
(72) Inventeur(s) :

(73) Titulaire(s) : .

(74) Mandataire :

(54) DISPOSITIF POUR CONDUIRE EN POSITION DEBOUT UNE PLANCHE FLOTTANTE MOTORISEE SUR UNE SURFACE LIQUIDE.

(57) Dispositif pour conduire en position debout une planche motorisée sur une surface liquide, caractérisé en ce qu'il comprend une planche (1) flottante sur laquelle sur sa partie inférieure (6) est fixé un "boîtier enrouleur" (4) permettant la sortie et le rembobinage automatique d'un "fil conducteur" (3); la planche comporte un orifice (2) par lequel est passée une des deux extrémités (5) du "fil conducteur" (3) sur la partie supérieure (9) de la planche (1), cette extrémité (5) du "fil conducteur" (3) est vissé à un boîtier (10) dont la circonférence est plus grande que celle de l'orifice (2), ce boîtier est pourvu d'un "bouton de pression" (11) qui permet d'actionner l'hélice (12) d'un moteur (7) l'autre extrémité (8) du "fil conducteur" (3) en partie inférieure (6) de la planche (1) est relié au moteur (7).



FR 2 755 090 - A1

La présente invention concerne un dispositif pour conduire en position debout une planche flottante motorisée pour permettre à son utilisateur de se déplacer sur une surface liquide.

Le déplacement sur l'eau en position debout est traditionnellement effectué soit par l'élan que procurent les vagues lorsque la mer est agitée, ou soit par le vent soufflant sur une voile fixée sur la planche.

L'utilisation sportive de ces planches pour une personne peu habitué à son fonctionnement n'est pas forcément d'une facilité évidente, surtout pour se rendre en un endroit précis, généralement celui d'où l'on est parti. Lorsque les conditions météorologiques ne sont pas favorables à l'utilisation de ces deux catégories de planches (avec ou sans voile), quand il n'y a pas assez de vagues en bord de mer concernant le type de planche sans voile, ou quand il y a peu ou pas de vent pour la catégorie de planches avec voile, il demeure impossible de pratiquer un sport apportant des sensations identiques: se deplacer en position debout sur l'eau sur une planche.

L'invention permet de remédier à ces inconvénients. Elle comporte en effet selon une première caractéristique une planche comprenant un orifice par lequel peut être passé un fil conducteur passant dans un boîtier enrouleur dont l'autre extrémité du fil conducteur est relié à un moteur fixé sous la planche. L'extrémité du fil conducteur passée dans l'orifice, et se retrouvant sur la partie supérieure de la planche peut être vissé à un boîtier de circonférence plus grande que l'orifice. Ce boîtier est pourvu d'un bouton de pression qui permet d'actionner l'hélice du moteur. Ainsi lorsque l'utilisateur est en position debout sur la planche le boîtier en main et appuyant du doigt sur le bouton de pression, le fil conducteur est déroulé du boîtier enrouleur et l'hélice du moteur en rotation ; si l'utilisateur lâche le boîtier, n'ayant plus de pression du doigt sur le bouton de pression l'hélice stoppe sa rotation et le boîtier n'étant plus tenu par l'utilisateur le fil conducteur se rembobine dans le boîtier enrouleur, la circonférence du boîtier vissé au fil conducteur étant plus grande que l'orifice, le fil conducteur arrête son rembobinage lorsque le boîtier vient en butée contre le rebord de l'orifice. Le boîtier comme le fil conducteur ne pouvant entrer en contact avec l'hélice.

Selon des modes particuliers de réalisation:

- l'orifice peut comporter un rebord de mise en butée du boîtier.

- le dispositif en état de veille, le fil conducteur est enroulé dans le boîtier enrouleur et le boîtier en butée contre le rebord de l'orifice.

- le dispositif en état de marche, l'utilisateur est en position debout sur la planche le boîtier en main, le fil conducteur est déroulé du boîtier enrouleur ; dans le cas ou l'utilisateur lâche le boîtier, le fil conducteur se rembobine dans le boîtier enrouleur jusqu'à ce que le boîtier arrive en butée contre le rebord de l'orifice, le dispositif revenant en état de veille. Pour remettre le dispositif en marche il suffit à l'utilisateur de tirer sur le boîtier de nouveau en butée contre l'orifice jusqu'à ce qu'il ait le boîtier en main en position debout sur la planche.

- l'axe de l'orifice par rapport à la planche, peut être prévu incliné.

- la planche peut comporter sur sa partie inférieure des cavités pour le passage du fil conducteur et la fixation du boîtier enrouleur.

- les éléments formant le dispositif peuvent être étanches et/ou submersibles.

- le boîtier enrouleur comme les quilles peuvent faire partie intégrante du moteur.

- l'orifice qui permet le passage du fil conducteur peut être remplacé par un anneau fixé sur les côtés de la planche ou selon une variante non représentée de l'invention, si le boîtier enrouleur est fixé au moteur qui dépasse des côtés de la planche, l'utilisateur a directement à portée de main, sans besoin de l'orifice ou de l'anneau pour le passage du fil conducteur.

Le dessin annéxé illustre l'invention:
la figure illustre en coupe, le dispositif selon l'invention.

En référence au dessin, la planche (1) est munie à l'une de ses extrémités d'un orifice (2) ayant une forme correspondante à celle d'un "fil conducteur" (3), le "fil conducteur" (3) est pourvu d'un "boîtier enrouleur" (4) permettant la sortie et le rembobinage du "fil conducteur" (3); une extrémité (5) du "fil conducteur" (3) en partie inférieure (6) de la planche (1) est relié à un moteur (7) fixé préférentiellement sur la partie inférieure (6) de la planche (1); l'autre extrémité (8) du "fil conducteur" (3) passée dans l'orifice (2) et se retrouvant sur la partie supérieure (9) de la planche (1) est adaptée pour être vissée à un boîtier (10) de circonférence plus grande que l'orifice(2) ce boîtier (10) est pourvu d'un "bouton de pression" (11) qui permet d'actionner l'hélice (12) du moteur (7).

Dans la forme de réalisation selon la figure, l'orifice (2) comporte en partie supérieure de la planche (1) un rebord (13) extérieur contre lequel le boîtier (10) vient en butée lorsque le "fil conducteur" (3) est en position rembobinée.

Ainsi, l'utilisateur en position debout sur la planche (1) le boîtier (10) en main et appuyant du doigt sur le "bouton de pression" (11) le dispositif est en marche, le "fil conducteur (3) est déroulé et l'hélice (12) en rotation ; si l'utilisateur lâche le boîtier (10), celui-ci n'étant plus tenu par l'utilisateur, le "fil conducteur" (3) se rembobine dans le "boîtier enrouleur" (4), la circonférence du boîtier (10) étant plus grande que l'orifice (2) le "fil conducteur" (3) termine son rembobinage lorsque le boîtier (10) arrive en contact du rebord (13) de l'orifice (2), le "fil conducteur" (3) comme le boîtier (10) ne pouvant entrer en contact avec l'hélice (12) ; n'y ayant plus de pression du doigt par l'utilisateur sur le bouton (11) de pression, l'hélice (12) stoppe sa rotation, le dispositif est en veille ; pour remettre le dispositif en marche il suffit à l'utilisateur debout sur la planche (1) de se baisser pour prendre en main le boîtier (10) en butée contre le rebord (13) de l'orifice (2) et de tirer sur celui-ci afin de l'avoir de nouveau en main en position debout sur la planche (1) ; le "fil conducteur" (3) se déroule du "boîtier enrouleur" (4) tant que l'utilisateur tire sur le boîtier (10) le dispositif étant revenu en état de marche.

La planche (1) peut comporter des cavités (14) sur sa partie inférieure (6) pour permettre la fixation du "boîtier enrouleur" (4) et le passage du "fil conducteur" (3).

Les éléments formant l'invention peuvent être étanches et/ou submersibles.

Le "boîtier enrouleur" (4) comme la quille (15) qui permet une stabilité à la planche (1), peuvent être rattachés au moteur (7) dans le cas où celui-ci prend une place trop importante sous la planche (1).

L'orifice (2) qui permet le passage du "fil conducteur" (3) de la partie inférieure (6) à la partie supérieure (9) de la planche (1) peut être remplacée par un anneau (17) fixé sur les côtés (18) de la planche (1).

Selon une variante non représenté de l'invention:

- le "boîtier enrouleur" (4) peut être fixé sur l'un des côtés (18) ou sur la partie supérieure (9) de la planche (1) ; dans ce mode de réalisation le dispositif est en veille lorsque le boîtier (10) est en contact avec le "boîtier enrouleur" (4) ou n'importe quel autre élément formant l'invention.

- le boîtier (10) muni du "bouton de pression" (11) peut actionner l'hélice (12) du moteur (7) par télécommande, le boîtier étant submersible.

Il est du reste bien entendu que de nombreuses modifications peuvent être apportée au mode de réalisation de ce dispositif, sans que l'on s'écarte pour cela de la présente invention.

Le dispositif est parfaitement adapté pour se déplacer sur une surface liquide en position debout sur une planche.

- R E V E N D I C A T I O N S -

1 - Dispositif pour conduire en position debout une planche motorisée sur une surface liquide, caractérisé en ce qu'il comprend une planche (1) flottante sur laquelle sur sa partie inférieure (6) est fixé un "boîtier enrouleur" (4) permettant la sortie, et le rembobinage automatique d'un "fil conducteur" (3) ; la planche (1) comporte un orifice (2) par lequel est passée une des deux extrémités (5) du "fil conducteur" (3) sur la partie supérieure (9) de la planche (1), cette extrémité (5) du "fil conducteur" (3) est vissée à un boîtier (10) dont la circonférence est plus grande que celle de l'orifice (2), ce boîtier (10) est pourvu d'un "bouton de pression" (11) qui permet d'actionner l'hélice (12) d'un moteur (7) ; l'autre extrémité (8) du "fil conducteur" (3) en partie inférieure (6) de la planche (1) est relié au moteur (7).

2 - Dispositif selon la revendication 1, caractérisé en ce que l'orifice (2) comporte un rebord (13) de mise en butée du boîtier (10).

3 - Dispositif selon la revendication 1 ou la revendication 2, caractérisé en ce que le dispositif en état de veille le "fil conducteur" (3) est enroulé dans le "boîtier enrouleur" (4) et le boîtier (10) en butée contre le rebord (13) de l'orifice (2).

4 - Dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que l'axe de l'orifice (2) est incliné par rapport à la planche (1).

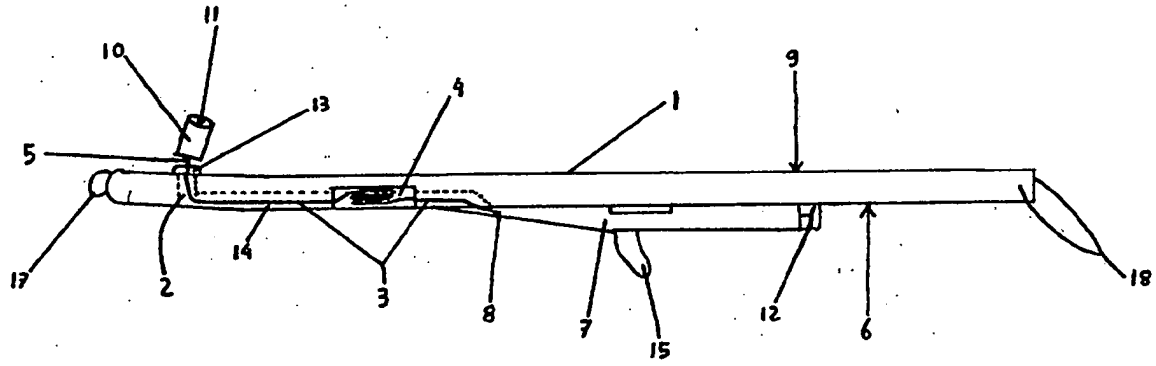
5 - Dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que la planche (1) comporte sur sa partie inférieure (6) des cavités (14) pour la fixation du "boîtier enrouleur" (4) et le passage du "fil conducteur" (3).

6 - Dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que le moteur (7), le "boîtier enrouleur" (4), le "fil conducteur" (3) et le boîtier (10) sont étanches et/ou submersibles.

7 - Dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que le "boîtier enrouleur" (4) comme la quille (15) peuvent faire partie intégrante du moteur (7).

8 - Dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que l'orifice (2) permettant le passage du "fil conducteur" (3) de la partie inférieure (6) à la partie supérieure (9) de la planche (1) peut être remplacé par un anneau (17) fixé sur l'un des côtés (18) de la planche (1).

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RAPPORT DE RECHERCHE PRELIMINAIRE

établi sur la base des dernières revendications déposées avant le commencement de la recherche

2755090
N° d'enregistrement national

FA 536305
FR 9613108

DOCUMENTS CONSIDERES COMME PERTINENTS

Catégorie	Citation du document avec indication, en cas de besoin, des parties pertinentes	Revendications concernées de la demande examinée
A	US 3 548 778 A (E.VON SMALAGA-ROMANOFF) * colonne 3, ligne 72 - colonne 4, ligne 2; figures *	1
A	FR 2 728 863 A (Y.BOURGAULT) * page 2, ligne 31 - ligne 34; figures *	1
A	WO 81 01540 A (SURF-JET CORPORATION) * page 4, ligne 9 - ligne 15; figure 1 *	1
A	US 4 938 725 A (S.BECK) * abrégé; figures *	1,3

DOMAINES TECHNIQUES RECHERCHES (Int.CL.6)

B63B

Date d'achèvement de la recherche: 9 Juillet 1997

Examinateur: Stierman, E

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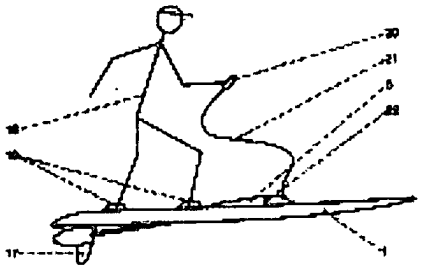
& : membre de la même famille, document correspondant

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EPO FORM 1503 03.82 (P04C13)

9 of 16 DOCUMENTS

FR2766154B1 1999-09-17 **NAUTICAL SURFING HAS DRIVING** (en)



Inventors: VEREL FRANCOIS

Applicants/Assignees: VEREL FRANCOIS, French Republic

Classifications: CPC: B63B35/7943 (2013-01-01; I 2013-01-01; B, H, EP)
ECLA: B63B35/79M
IPC[6]: 6B63B35/79A 6B63B35#79A 6B63B35/79A
IPC[6]: 6B63H5/14B 6B63H5#14B 6B63H5/14B; 6B63H21/14B 6B63H21#14B 6B63H21/14B
IPC[8]: B63B35/73 (2006-01-01; C, , I, 2005-10-08; R, M, EP)
IPC[8]: B63B35/79 (2006-01-01; A, , I, 2005-10-08; R, M, EP)

Priority Number and Date: FR97009386 1997-07-18

English Abstract:

The surf board has a float (1) with a flat lower surface which is slightly raised towards the front and has a cavity (2) to receive a motor (3) driving a turbine (9) mounted at the rear of the hull (4). The float can have bindings for the users feet. The motor and accessories are positioned as low as possible above the lower surface of the hull.

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(51) Int Cl[6] : **B 63 B 35/79**, B 63 H 5/14, 21/14

(12) DEMANDE DE BREVET D'INVENTION A1

(22) **Date de dépôt :** 18.07.97.

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(56) **Liste des documents cités dans le rapport de recherche préliminaire :** *Se reporter à la fin du présent fascicule*

(60) **Références à d'autres documents nationaux apparentés :**

(71) **Demandeur(s) :** *VEREL FRANCOIS* — FR.

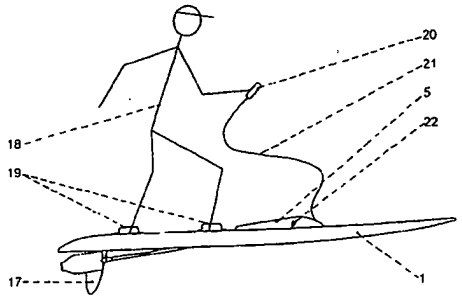
(72) **Inventeur(s) :** VEREL FRANCOIS.

(73) **Titulaire(s) :**

(74) **Mandataire(s) :**

(54) SURF NAUTIQUE A MOTEUR.

(57) Le surf nautique à moteur est un engin monoplace destiné à retrouver les sensations de surf sans la nécessité des vagues. Il permet un pilotage sportif et rapide avec de brusques changements de direction. Il est composé d'un flotteur (1) comportant une cavité (2) en partie centrale recevant un moteur (3) entraînant une turbine (9) située à l'arrière sous le flotteur (1). Le pilote (18) dirige le surf par le déplacement de son corps, les actions de ses pieds et le contrôle du régime moteur au moyen d'une poignée (20) reliée au flotteur (1) par un flexible (21).



FR 2 766 154 - A1

La présente invention concerne un surf nautique à moteur. Il s'agit d'un engin monoplace destiné à retrouver les sensations de surf sans la nécessité des vagues. Il permet un pilotage sportif et rapide avec de brusques changements de direction.

L'idée de munir un flotteur d'un moyen de propulsion intégré a déjà fait l'objet de recherches.

Plusieurs solutions ont été proposées pour tenter de résoudre les problèmes posés, mais aucune ne permet d'obtenir l'ensemble des particularités de la présente invention.

La solution qui consiste uniquement à fixer un moteur de hors-bord à l'extrémité arrière d'un flotteur, si elle a l'avantage de la simplicité, ne résiste pas longtemps à la critique. En effet le poids important du moteur va déplacer le centre de gravité de l'ensemble beaucoup trop sur l'arrière du flotteur, d'autre part le centre de gravité du moteur lui-même est situé très au dessus de la planche ce qui immanquablement va perturber l'équilibre de l'ensemble.

Une solution a été de placer un groupe propulseur, constitué d'un moteur entrainant une turbine, disposé au centre du flotteur dans l'épaisseur de celui-ci, Si du point de vue du poids cette solution est satisfaisante, on a du mal à imaginer comment un tel ensemble pourrait avoir une épaisseur suffisamment faible pour ne pas dépasser du flotteur. Surtout, l'entrée d'eau dans la turbine se faisant environ au centre de la planche, ceci ne permettra pas au pilote de faire évoluer son engin en déjaugeant avec des changements brusques de direction ou d'assiette car il est certain qu'il y aura des rentrées d'air dans la turbine et comme conséquence une perte très importante de poussée (United States Patent : 3,548,778).

Pour remédier au problème de la hauteur du centre de gravité une solution a été de placer l'ensemble de propulsion dans une cavité sous le flotteur. Cette solution ne permet pas de conserver la forme plane du dessous de la planche, ce qui augmente la traînée et empêche la navigation en déjaugeant (FR : 87 09726).

Il existe des solutions qui sembleraient performantes mais qui toutes présentent une grande complexité technique, donc un coût élevé et certainement un poids excessif (PCT : WO 95/23731).

Le surf nautique à moteur objet de la présente invention propose des solutions simples aux problèmes évoqués ci-dessus et présente les avantages suivants : légèreté, maniabilité, sécurité.

L'élément principal est un flotteur dont les formes s'apparentent à celles d'un flotteur de planche à voile ou de surf. Le flotteur comporte un ou plusieurs ailerons fixes positionnés sous l'arrière et un système de liaison avec les pieds du pilote. Celui-ci dirige son engin par le déplacement de son corps, les actions de ses pieds pour modifier l'assiette et les prises de carres du flotteur et le contrôle du régime moteur. Le pilotage de l'engin se rapproche de celui d'un surf.

La partie propulsion est constituée d'un moteur thermique entrainant une turbine située à l'arrière sous le flotteur. Le moteur de petite cylindrée présente une puissance suffisante pour un fonctionnement en déjaugeant. Le moteur et ses accessoires sont insérés dans le fond du flotteur en zone centrale. Ceci permet d'obtenir la position correcte du centre de gravité de l'ensemble.

L'entrée d'eau de la turbine est dans une zone qui est toujours immergée quel que soit l'état du plan d'eau et l'assiette du flotteur pour éviter l'aspiration néfaste d'air.

La commande des gaz se fait par un accélérateur à main relié au flotteur.

L'engin est conçu pour pouvoir se retourner, il est étanche et insubmersible.

La planche 1/4 montre l'ensemble du surf : la figure 1 représente la vue de côté, la figure 2 représente la vue de dessus, la figure 3 représente la vue de dessus capot enlevé.

La planche 2/4 : la figure 4 représente le compartiment moteur.

La planche 3/4 : la figure 5 représente la transmission et la turbine.

La planche 4/4 : la figure 6 représente la phase de démarrage, la figure 7 représente le surf et le pilote en évolution.

La partie principale est un flotteur (1) dont les formes s'apparentent à celles d'un flotteur de planche à voile ou de surf. Sa partie inférieure est plane et légèrement relevée sur l'avant. Un peu en avant du centre du flotteur (1) se trouve une cavité (2) qui reçoit le moteur (3) et ses accessoires. Le moteur (3) est positionné le plus bas possible sans qu'aucun élément ne dépasse le dessous de la carène (4) afin de conserver à celle-ci sa forme plane. La cavité (2) est recouverte par un capot (5) profilé et insonorisé qui dépasse légèrement du pont (6). La liaison entre le capot (5) et le flotteur (1) est étanche.

Le moteur (3) de petite cylindrée possède une puissance suffisante pour permettre au surf de déjauger. Il peut être un moteur de hors bord, monté en position couchée, dont on utilise uniquement le bloc moteur sans sa transmission classique. L'intérêt de ce moteur de hors bord conçu pour le milieu marin serait d'être fiable, léger et compact. On peut utiliser tout type de moteur présentant des caractéristiques similaires.

Le moteur (3) refroidi par eau est fixé au flotteur (1) par l'intermédiaire d'éléments déformables (7) pour limiter les vibrations et le bruit. Une des sorties de l'eau de refroidissement se fait sur l'extérieur de la planche pour contrôler visuellement le bon fonctionnement.

La sortie du pot d'échappement (8) est sous la planche afin de diminuer le bruit. Un système anti retour évite que de l'eau atteigne le moteur en cas d'arrêt de celui-ci ou de retournement du flotteur (1). Ce système peut être constitué de chicanes ou d'un clapet déformable. On injecte une partie de l'eau de refroidissement du moteur (3) dans le pot d'échappement (8) pour en limiter la température.

Le moteur (3) entraine une turbine (9), située à l'arrière sous le flotteur (1), par l'intermédiaire d'un arbre de transmission (10). L'entrée d'eau (11) de la turbine (9) est située à une profondeur suffisante pour éviter les aspirations intempestives d'air quelles que soient les conditions de navigation. Cette entrée d'eau (11) est munie d'une grille de protection (23) assurant la sécurité. A la place de la turbine (9) on peut utiliser une hélice carénée.

La transmission est conçue pour permettre les déformations du flotteur (1) au cours des évolutions et les déplacements du moteur (3) dûs à ses vibrations sans qu'il y ait altération du fonctionnement. Ceci peut être obtenu par un centrage de l'arbre de transmission (10) côté moteur par l'arbre du moteur (3) lui-même, un accouplement d'arbres (13) permet la transmission de la rotation. Côté turbine (9), l'arbre de transmission (10) est guidé par un palier oscillant (12) fixé dans le support (14). On peut utiliser d'autres solutions comme celle qui consiste à fixer l'arbre de transmission dans le flotteur, sa liaison avec l'arbre moteur se faisant au moyen d'une transmission souple.

Si le palier (12) côté turbine (9) forme butée axiale il dégage l'arbre de transmission (10) de tout effort de compression ce qui permet d'en diminuer le diamètre donc le poids. Pour la sécurité l'arbre de transmission (10) est placé dans un tube non tournant (15). Ce tube (15) peut être centré sur l'arbre de transmission (10), il comporte des contacts élastiques (16) avec le flotteur (1).

Un ou plusieurs ailerons (17) sont positionnés à l'arrière sous le flotteur (1).

Le système de liaison des pieds du pilote (18) avec le flotteur (1) peut être réalisé par des sangles (19), par des coques s'adaptant à la forme des pieds ou tout autre moyen permettant de maintenir la liaison. L'emplacement du système de liaison est réglable pour permettre différentes positions du pilote (18) par rapport au flotteur (1).

Le moteur (3) est commandé au moyen d'une poignée (20) comportant un accélérateur et un coupe circuit. Cette poignée reliée au flotteur (1) par un flexible (21) sert uniquement à la commande du moteur. Le surf comporte deux logements (22) symétriques qui permettent au pilote (18) de s'agripper pendant la phase de démarrage. La forme des logements (22) permet aussi de recevoir la poignée (20).

L'utilisation du surf est la suivante:

Le pilote (18) est assis sur le surf, il tire sur le lanceur manuel dont est muni le moteur (3) pour le démarrer. Ensuite il se place en position couchée, la poignée (20) étant positionnée dans un des logements (22) suivant qu'il est droitier ou gaucher. Il peut alors accélérer en se tenant efficacement des deux mains. Quand il juge la vitesse suffisante pour rendre le surf stable, il se relève en conservant la poignée (20) dans la main et place les pieds dans les sangles (19). Ensuite il peut commencer ses évolutions en contrôlant le flotteur (1) et le régime moteur.

REVENDICATIONS

1--Surf nautique à moteur destiné à fonctionner en déjaugeant caractérisé en ce qu'il comporte un flotteur (1) présentant une surface inférieure plane légèrement relevée sur l'avant et une cavité (2) recevant un moteur (3) et ses accessoires entrainant une turbine (9) disposée à l'arrière sous la carène (4).

2--Surf nautique à moteur selon la revendication 1 caractérisé en ce qu'il comporte un système de liaison (19) des pieds du pilote (18) avec le flotteur (1).

3--Surf nautique à moteur selon la revendication 1 caractérisé en ce que le moteur (3) et ses accessoires sont positionnés le plus bas possible sans dépasser la surface inférieure du flotteur (1).

4--Surf nautique à moteur selon la revendication 1 caractérisé en ce que la cavité (2) recevant le moteur (1) et ses accessoires est recouverte par un capot (5) profilé démontable dépassant légèrement du pont (6) et lié d'une manière étanche à celui-ci.

5--Surf nautique à moteur selon la revendication 1 caractérisé en ce que la turbine (9) comporte une grille de protection (23).

6--Surf nautique à moteur selon la revendication 1 caractérisé en ce l'arbre de transmission (10) est guidé côté moteur par l'arbre du moteur (3) et côté turbine (9) par un palier oscillant (12) formant butée axiale.

7--Surf nautique à moteur selon la revendication 1 caractérisé en ce que l'arbre de transmission (10) est placé dans un tube (15) non tournant.

8--Surf nautique à moteur selon la revendication 1 caractérisé en ce que la commande du moteur (3) se fait au moyen d'une poignée (20), reliée au surf par un flexible (21), comportant un accélérateur et un coupe circuit.

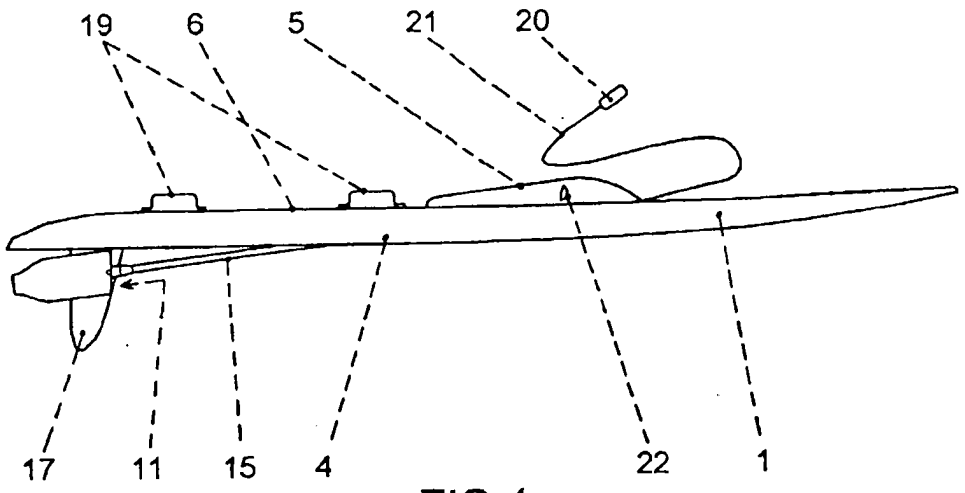


FIG.1

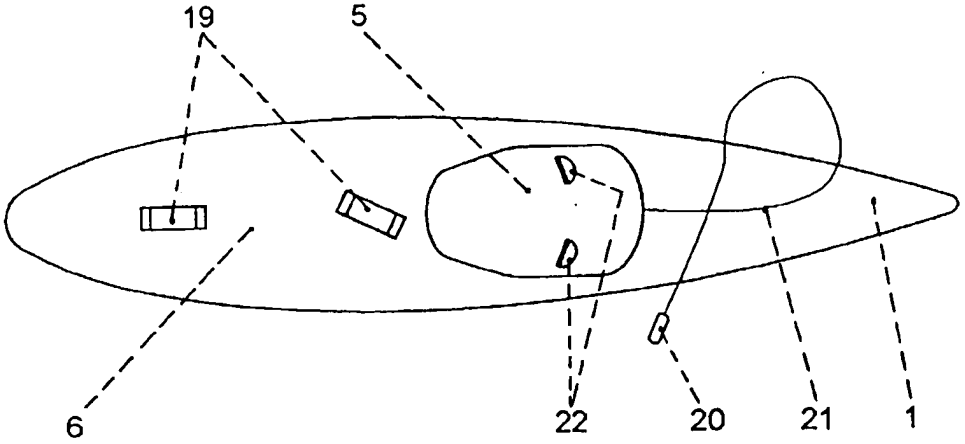


FIG.2

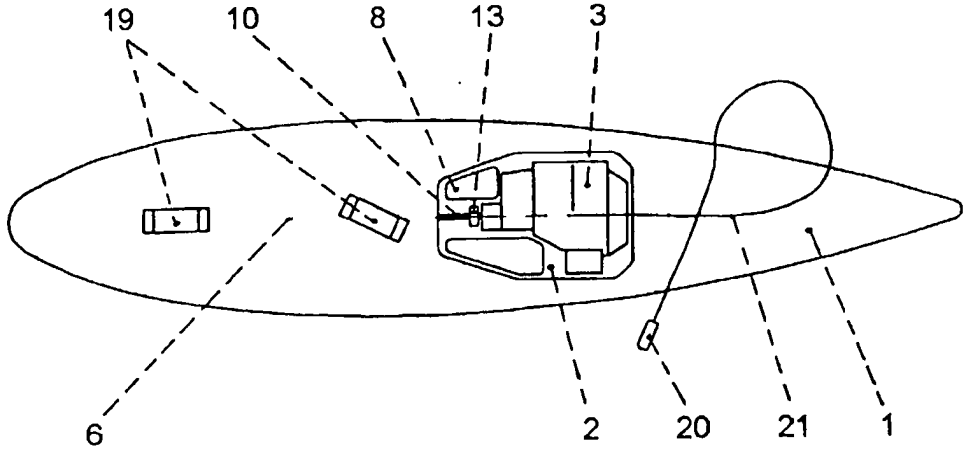


FIG.3

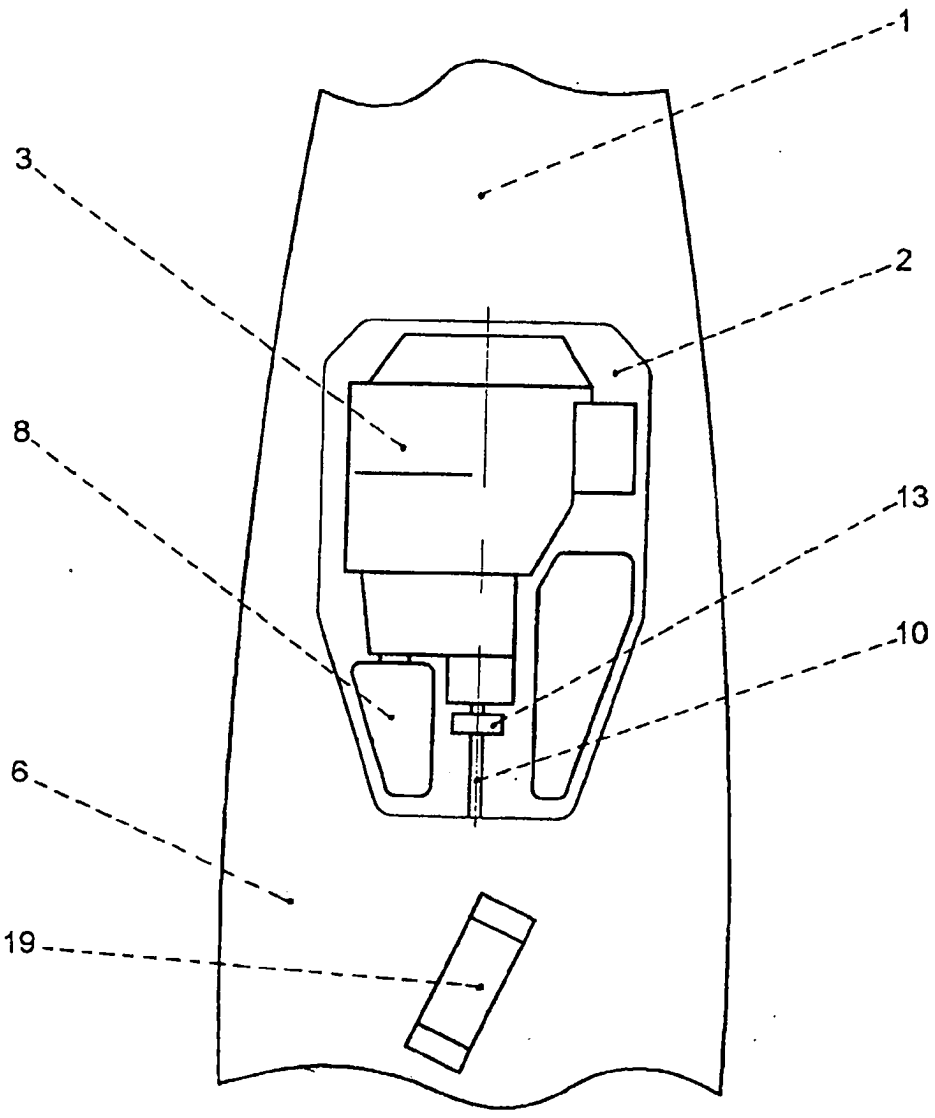


FIG.4

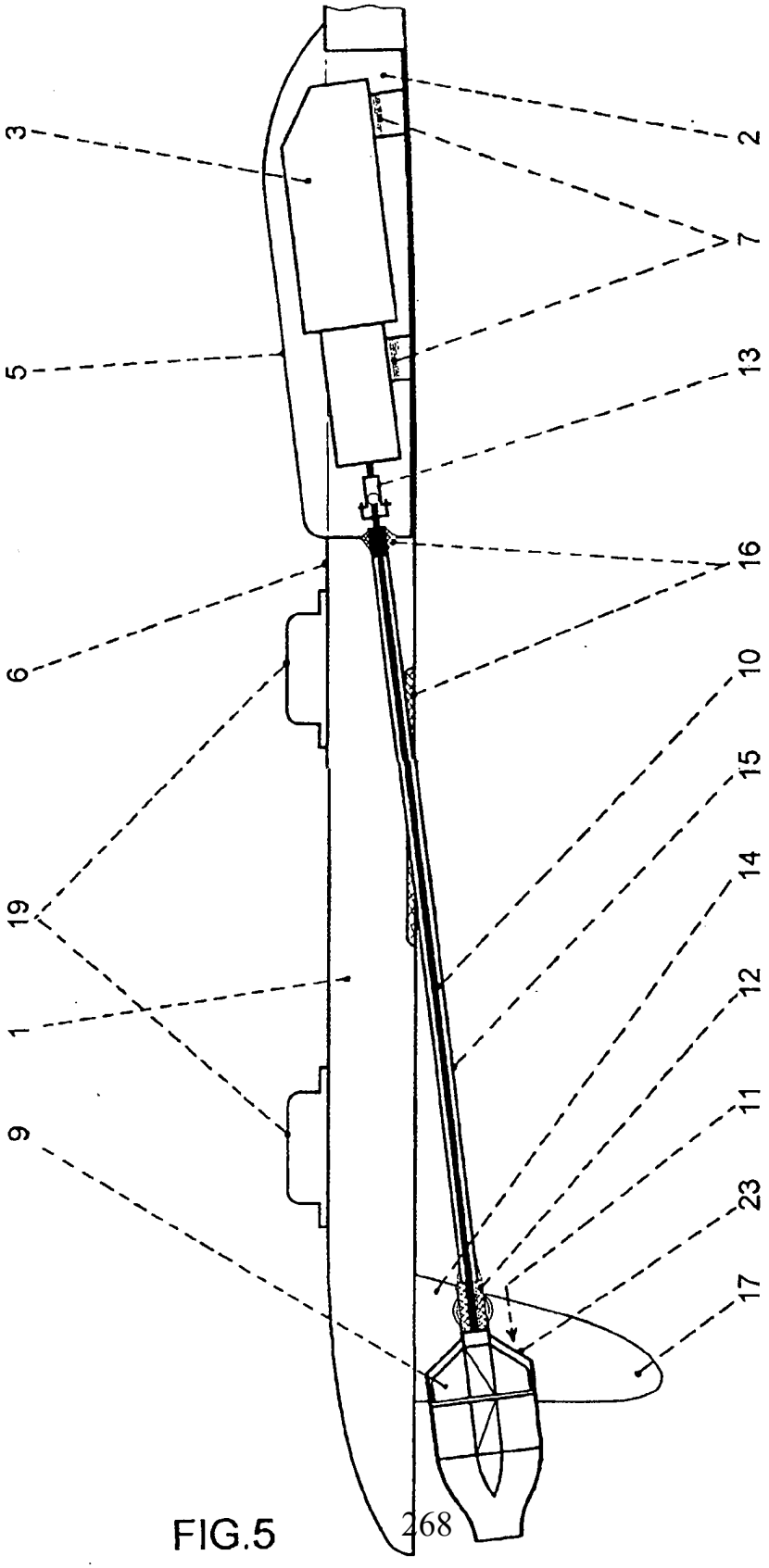


FIG.5

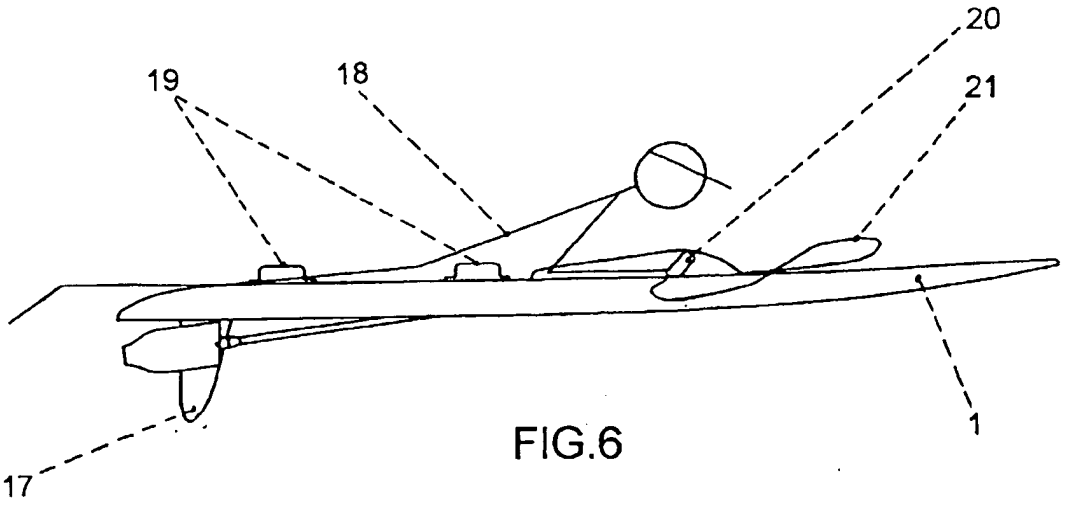


FIG.6

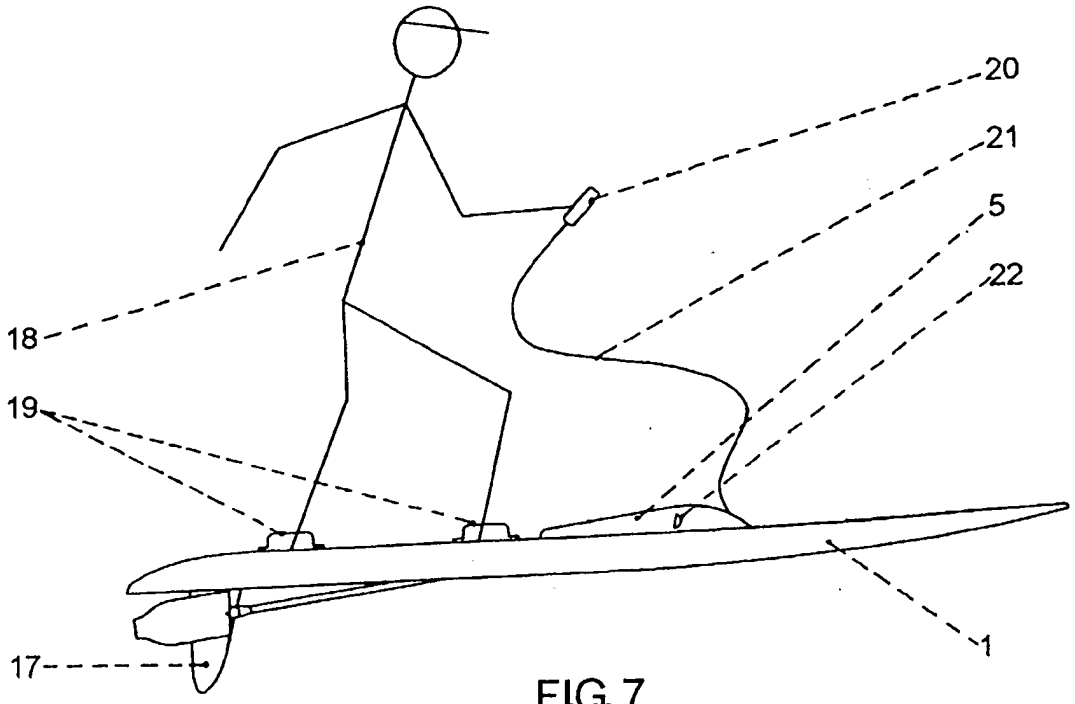


FIG.7

REPUBLIQUE FRANÇAISE

INSTITUT NATIONAL
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RAPPORT DE RECHERCHE PRELIMINAIRE

établi sur la base des dernières revendications déposées avant le commencement de la recherche

2766154

N° d'enregistrement national

FA 547455
FR 9709386

DOCUMENTS CONSIDERES COMME PERTINENTS		Revendications concernées de la demande examinée
Catégorie	Citation du document avec indication, en cas de besoin, des parties pertinentes	
X Y	US 3 324 822 A (CARTER III) * colonne 2, ligne 41 - colonne 3, ligne 50; figures 1-9 *	1,3,4,8 5,6
Y A	US 5 017 166 A (CHANG) * colonne 2, ligne 3 - ligne 10; figure 2 *	5,6 1
X	BE 732 146 A (DAWSON) * page 3, dernier alinéa - page 7, alinéa 2; figures 1-3 *	1,3,4,8
X	WO 81 01540 A (SURF-CORPORATION) * page 10, ligne 20 - page 12, ligne 24; figures 1-7 *	1,3,4,8
X	DE 35 03 046 A (ZARM) * page 6, ligne 1 - ligne 16; figures 1-3 *	1,2
X	DE 23 63 255 A (SELDMAIR) * page 3, ligne 6 - ligne 14; figures 1-6 *	1,7
X	GB 2 090 213 A (FUJI JUKOGYO KABUKISHI KAISHA) * page 1, ligne 69 - page 3, ligne 17; figures 1-4 *	1,3,4,8

DOMAINES TECHNIQUES RECHERCHES (Int.CL.6)

B63B

Date d'achèvement de la recherche: 3 avril 1998

Examinateur: DE SENA, A

CATEGORIE DES DOCUMENTS CITES

X : particulièrement pertinent à lui seul
Y : particulièrement pertinent en combinaison avec un autre document de la même catégorie
A : pertinent à l'encontre d'au moins une revendication ou arrière-plan technologique général
O : divulgation non-écrite
P : document intercalaire

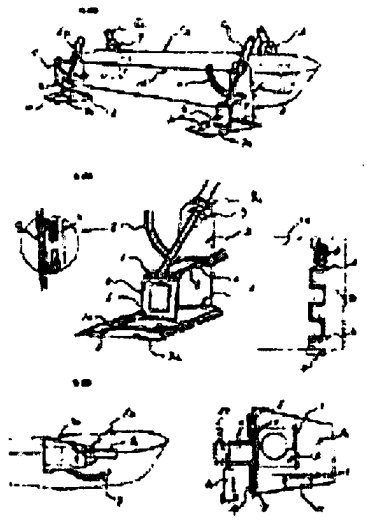
T : théorie ou principe à la base de l'invention
E : document de brevet bénéficiant d'une date antérieure à la date de dépôt et qui n'a été publié qu'à cette date de dépôt ou qu'à une date postérieure.
D : cité dans la demande
L : cité pour d'autres raisons

& : membre de la même famille, document correspondant

EPO FORM 1503 03.82 (P04C13)

6 of 16 DOCUMENTS

JP2012025293A 2012-02-09 **TRIM HYDROFOIL DEVICE** (en)



Inventors: 川 西　英 治 , 川 崎 市 川 崎 区 夜 光 1 - 2 - 1

Applicants/Assignees: KAWANISHI EIJI, 神 奈 川 県 横 浜 市 瀬 谷 区 三 ッ 境 8 4 番 地 2 三 ッ 境 南 住 宅　6 棟 2 0 4 号

Classifications: CPC: Y02T70/146 (2013-01-01; A 2013-07-23; B, H, EP)
IPC[8]: B63B1/30 (2006-01-01; A, F, I, 2012-01-13; B, H, JP)
IPC[8]: B63B1/26 (2006-01-01; A, L, I, 2012-01-13; B, H, JP)
IPC[8]: B63B9/04 (2006-01-01; A, L, I, 2012-01-13; B, H, JP)
IPC[8]: B63B39/06 (2006-01-01; A, L, I, 2012-01-13; B, H, JP)
JP-FI-CLASS: B63B1/30
JP-FI-CLASS: B63B1/26
JP-FI-CLASS: B63B39/06.C
JP-FI-CLASS: B63B9/04.Z

Priority Number and Date: JP2010166701 2010-07-26

English Abstract:

PROBLEM TO BE SOLVED: To provide a simple trim hydrofoil device which can be stored above water and be mounted to an existing boat to achieve the trim, increase speed and reduce fuel consumption.

SOLUTION: In the hydrofoil device which is independent on right and left sides with one side board 12 out of right and left side boards being the axis 7 of bearing turning, a support plate 2 and each hydrofoil plate 3a for turning and lift angle adjustment are stored in a turning axis board by the use of a hydraulic cylinder and a hydraulic and electric motor. A stable navigation is abled by having a constitution including equipment for a fixed navigation, consisting of a secured support pole, a four-section link support plate, a flap 10 and devices for controlling a hydraulic actuator.

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(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2012-25293
(P2012-25293A)
(43)公開日　平成24年2月9日(2012.2.9)

(51)Int.Cl.		F I		テーマコード（参考）
B63B 1/30	(2006.01)	B63B	1/30	
B63B 1/26	(2006.01)	B63B	1/26	
B63B 39/06	(2006.01)	B63B	39/06	C
B63B 9/04	(2006.01)	B63B	9/04	Z

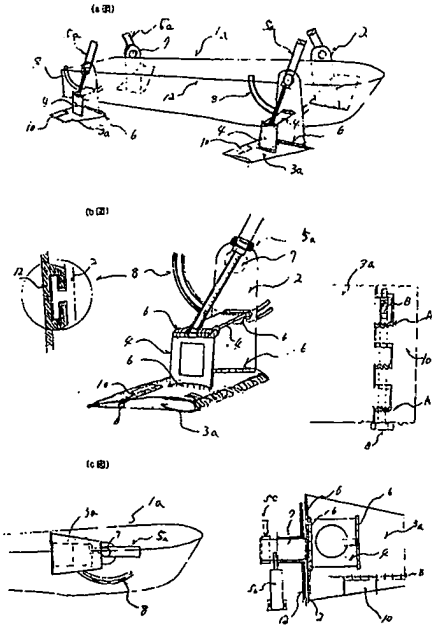
審査請求 有　請求項の数 3　OL　（全 16 頁）

(21)出願番号　特願2010-166701 (P2010-166701)
(22)出願日　平成22年7月26日 (2010.7.26)
(11)特許番号　特許第4653255号 (P4653255)
(45)特許公報発行日　平成23年3月16日 (2011.3.16)

(71)出願人　503111894
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(72)発明者　川西　英治
川崎市川崎区夜光１－２－１

(54)【発明の名称】トリム水中翼装置

(57)【要約】　（修正有）
【課題】既製船に設けることのでき、トリムと、速度アップと、省燃費となる簡易で水上収納の出来るトリム水中翼装置を提供する。
【解決手段】左右の片側舷１２を軸受回動の軸心７にして、左右独立の水中翼装備にして、油圧シリンダー、油圧及び電機モータの使用から支柱板２と各水中翼板３ａは、回動と、揚力角度調整と、回動軸舷に収納構成して、安定航行は、支柱の固定と、四節リンク支持板と、フラップ１０と、油圧アクチュエータ制御の各機器の装備のものから、固定航走と成す構成のものとした。
【選択図】図１



【特許請求の範囲】
【請求項１】
トリム水中翼装置は、既製船の船首と船尾の左右舷にそれぞれを別作動の水中翼装備のものにして、喫水上の側壁舷（12）の軸受台（7）で回動する支柱板（2）と、ヒンジ連結（6）の揚力水中翼板は、四節リンク支持固定（4）機構で折畳み構造にして、それぞれのアクチュエータとの連係装備と、制御機器とから軸受台側壁舷に回動と、折畳み収納の構成にして、その作動は、適宜の支柱板の水中角度と、任意の水中翼面角度から自由な没水型のトリムと揚力浮上角度調整のものとなって、そして、半浮上の安定航行は、支柱軸受台面積と、アクチュエータと、水面上側壁のスライド雌雄受台（8）との三点で支柱板と水中翼板を支持固定にして、出力調整から安定トリムと任意のフラップ板（10）の揚力浮上は、スタビライザーとスピードアップ及び省燃費となり、各制御機器の具備から、折畳み左右舷に回動収納の出来るトリム水中翼装置。
【請求項２】
請求項1に記載のトリム水中翼装置において、
前記、半浮上とするトリム水中翼装置を船体の前後重心部の左右舷に一枚のトリム水中翼船にして、その構成は、支柱板と水中翼板をヒンジ連結にして、揚力翼面と前後のフラップをヒンジ連結にして、前後の油圧機器及び手動でフラップのトリムと浮上調整の出来る構成にして、そして、支柱の複数のアクチュエータでリンク支持固定機構で折畳みと浮上固定と、舷の軸受のアクチュエータで回動させる支柱板のものとし、その作動は、前記と同じものであって、水中部でフラップ制御機器の具備から可変翼調整と、前記各摩擦支持固定から安定した半浮上航行と成る左右舷一枚のトリム水中翼装置。
【請求項３】
請求項1と2に記載のトリム水中翼装置において、
支柱の無いトリム水中翼装置は、左右舷の喫水部の適宜の位置を任意形状と材質のトリム水中翼板のヒンジ取付けの位置にして、揚力翼面とフラップ構成にして、舷中間部と、水中翼中間部をリンク支持固定機構で折畳み構造にして、舷上部のアクチュエータと、制御機器を具備から側壁舷に折畳み収納することを特長のトリム水中翼装置。

【発明の詳細な説明】
【技術分野】
【０００１】
船舶を速度アップと省燃費にする半浮上の水中トリム翼船に関する。
【背景技術】
【０００２】
車両は、世界的をエコブームから急速な構造変化となっていて、燃費向上の車両開発となっている。
船舶は、過去に帰れば水流、風速、手漕ぎとなるが、現況では、ヨット、競技用となっている。
【先行技術文献】
【特許文献】
【０００３】
【特許文献１】実開平5-58597　船体トリム制御および船体減揺装置
【特許文献２】特開2003-54492　滑走艇
【特許文献３】特許第3803251号　改良された水中翼装置
【特許文献４】特開2009-96396　水中航走体既存の全浮上の全没水型の水中翼船は、50ノット程のものであり、高出力、高燃費のものであって、翼板を水中固定の接岸等に不便な特殊な船舶である。本願は、既製大小船舶にトリム水中翼装置を設置して、荒天時、接岸時には、折畳み回動の水上に収納して、スピードアップと、省燃費を目的

の安全な構造と、自由な角度調整の没水型と成る半浮上航行のトリム水中翼船とした。
【発明の概要】
【発明が解決しようとする課題】
【０００４】
昨今の油脂の値上がりは、将来においても、値下がりの要素はなくて、小型船舶の利用者の減少となっている。燃料の値上がりから車両等は、ハイブリット、ストップ走行、電気自動車となっていて、船舶にも低燃費エンジンが求められている。しかし、船は、長期間の使用のものであり、水の抵抗を船体で受けての浮上航走であり、タイヤ走行のように抵抗を減らす翼面浮上の水中翼船が客船等に使用されているが、常時浮上させてのエンジン出力は、大出力のエンジンが必要となる。
そして、航走には大出力でのスピードで船体を全面浮上としているため、高出力の高燃費と成っていて、客船、艦船等以外での採用は無くて、
【０００５】
既製のプロペラ推進船舶等の速度アップは、船体重量を軽くする半浮上のトリム水中翼面航走にして、舳先と艫の左右舷別々の回動支柱と折畳水中翼面は、喫水上の側壁舷を固定軸受にして、アクチュエータで収納する構成にして、金属平板の支柱板と水中翼面の構造は、ヒンジ連結にして、翼面の固定は、支柱と翼面に支柱のトラニオン型シリンダーロッドと四節リンクの支持固定板の連結の折畳みの構成にして、航走時の固定は、喫水上面近くの前部側壁に支柱を差込む受台と、或いは、側壁と支柱の回転をスライドファスナー形状の支持固定と、軸心の軸受パイプ台の油圧、電機アクチュエータとの支持固定として、水中翼面装備は、支柱角度と、水中翼板折畳み角度と、フラップの揚力翼面積と、の適宜の揚力角度調整から自由な没水型の水中翼面航走となり、出力調整と舳先と艫の翼角度のトリムから最適の浮上翼角度にして、少なくても30％のスピードアップ及び燃費の向上のものとして、
【０００６】
既製船舶の小型船から大型船に簡易に設置出来て、取り外しの出来る構造と、航行時の天候の急変にも、高速航走から数秒で水中翼面を畳み、同時に支柱を回動させる構成のものとし、薄く、軽く、速くする目的の既存FRP船の左右側面舷の厚さは、薄いものであり、支柱を固定する喫水上のパイプ軸受は、内部の船倉部の固定板と完全固定の防水のものにして、船型によって、喫水上船倉からの油空圧および電機アクチュエータのものとして、大形鋼船の高速航行の貨物船、客船等は、支柱は、必要で無
くて、水中翼板を水面下にヒンジ板の溶接して、トリムとスタビライザーとフラップ水中翼の半浮上船として、四節リンクで側壁舷に折畳みの簡易なものとした。
【０００７】
そして、船型形状よって、船体の前後の重心部となる中央部の左右舷の一枚の半浮上のトリム水中翼板装備は、幅と面積のものであり、水中翼固定板と前後のフラップ板をヒンジ連結にして、小型のFRP船等では、手動で浮上角度調整の出来るヒンジのネジシャフトの噛合わせ固定のフラップ板の可変翼構成にして、そして、鋼船等では、既製技術の油圧機器の遠隔操作にして、採用は、任意のものものとして、舷の軸心パイプのシリンダーで回動させる支柱板と、支柱の複数の油圧シリンダーと、ヒンジ連結のリンク支持固定板と、水中翼板の折畳みと、回動と、支持固定と、収納は、前記、油圧機器等の装備と同様のものである。
【０００８】
前記するトリム水中翼装置は、支柱板と水中翼板を折畳み回動から収納と成す構成のものであり、より簡易な支柱板の無い側壁舷に水中翼板を直接ブラケット及びヒンジ連結として、前記と共に支柱軸受パイプ及びヒンジ可動部軸受部には、衝撃吸収のゴムパイプ材等を使用して、FRP船は、側壁の喫水上のボルト固定のヒンジ台のものであり、鋼船等は、水面下の溶接台のものから、水中翼板の材質は、金属（鋼、アルミ、合金ステンレス等）、或いは、樹脂、フォーム、ゴム材及び複合材、そして金属と合成材の接着の揚力翼構成にして、波浪等の衝撃、流木等の衝突で船体の破損、漏水等は、あってはならない大事故

となり、その設置場所は、魚倉、船倉等の安全な位置に二重三重の安全対策のものにして、収納時の水中翼板は、出来るだけ側壁舷と一体となる曲がり形状のものにした。そして、前記する既存の大形鋼船の側壁舷の設置は、鋼溶接の簡単なものであり、リンク支持固定機構の強度で波浪、浮上抵抗を受ける構造のもので、特に複数のシリンダーのヘッド室の受圧面積と、水中部のヒンジ板の溶接固定部と、で浮上圧力を受けるものとなる。

【０００９】

本発明の特長は、支柱と水中翼を喫水上に収納するものであり、全面浮上船の高速固定水中翼船と違って、油圧パイプ、ホースの揚力翼内に配管してのフラップ翼面でも良いが、ヒンジ部のくり返す曲がり部の疲労は出来るだけ避けるものとし、万一の破損等の漏れは、事故原因となり、平板金属の翼板面に揚力形状の樹脂板、フォーム板材の適宜に上下面に接着して、抗力を少なくする揚力翼面状にして、設定する船速度と回動と水翼面角度からと、手動でネジ固定するフラット板装備にして極力簡易なものとした。

そして、既製の漁船、コンテナ船、タンカー船等をトリム水中翼船にするものとした。

【課題を解決するための手段】

【００１０】

請求項1の発明は、

船舶を半浮上のトリム水中翼船にして、各船の舳先と艫の左右舷に別々の水中翼装備のものにして、その水中翼板と支柱板は、左右片側舷で支柱とヒンジ連結の水中翼板を折畳み、喫水上の舷と前後に回動するピン止め支柱構造にして、航走時以外は、支柱と翼面板は、喫水上に収納の接岸に支障の無い構成にした。

その作動は、支柱上部のトラニオン型油圧シリンダーで支柱中間部のリンク支持固定板と、水中翼板中間部のリンク支持固定板と、の連結部をシリンダーの伸縮で折畳み支柱と一体と成る四節のリンク構成にして、収納から喫水下に回動する支柱は、側面舷の固定パイプを軸受台にして、回動する中心軸心部にして、その回動軸受部の舷及びデッキ部は、水中翼の衝撃を受ける軸受パイプ台であり、油圧シリンダー、若しくは、油圧及び電機モータの伸縮と回転で水中まで回動と、支柱上部の水中翼油圧シリンダーと、の連係作動で適宜に半没水型及び全没水型水中翼角度となって、エンジン出力の船速度から船体浮上揚力角度と最適トリム角度調整は、舳先と艫の支柱角度と、水中翼面角度と、適宜のフラップで微調整にして、最適翼面角度の半浮上航行と、トリムと、のものから速度アップと成る左右片側舷独立収納にして、そして、喫水（デッキ、船倉）上で左右舷の支柱を連結すると、一つの油圧装備で回動する簡易な構造のものとなって、その支柱板及び水中翼板等の材質は、小型及び大形船の船質により、各種（鋼、ステン、アルミ、FRP、複合材）のものであって、水中翼面の揚力面構成は、飛行機翼形状、若しくは、金属平板に安価、簡易なゴム、フォーム、樹脂等の適宜の体積と面積の揚力板を接着する簡単な揚力調整板のものにして、そして、航走時の安定した支柱の支持と固定は、油圧及び電機アクチュエータと、舷のパイプ軸受部のパイプ接触摩擦面積の二点での支持では完全な支持固定には成らず、水面近くの喫水上の舷に回動する支柱板の適宜の位置と、幅と、面積のスライド支持固定台は、支柱面と、側壁面のいずれかを雌雄固定台とするスライドする摩擦板構成にして、水流、水圧による振れを止めて、適宜の支柱角度の三点の摩擦力で支持固定のトリム水中翼装置のものとした。

【００１１】

請求項2の発明は、請求項1に記載のトリム水中翼装置において、

船体の舳先と艫間の重心部の左右舷にそれぞれ一枚のトリム水中翼装備にして、回動する支柱と水中翼板をヒンジ連結にして、水中翼面の中央部の広い面積の固定部水中翼板と、前後の二つの可変フラップ翼板をヒンジ連結にして、前後二つのフラップで浮上調整の出来る翼構成にして、そして、支柱の中央部のリンク支持固定板と、中央部の水中翼面のリンク支持固定板を複数の油圧シリンダーロッドで連結して、伸縮から折畳み、舷の喫水上の回動軸を収納位置とする支柱板と、ヒンジ連結のリンク支持固定板とする水中翼板は、油圧制御機器の装備から、前後トリム、フラップ翼板の作動として、安定航走は、前記、摩擦支持固定台のものとする半浮上船体の上275ム調整にして、小型FRP船等ではフラップ

形状として、大形鋼船ではトリム構成にして、一枚の水中翼面を前後の可変翼面からの揚力翼と、トリムと、自由な没水角度の安定航行の出来る油空圧制御機器を具備からのトリム水中翼装置の構成のものとした。即ち本発明は、前後舳先と艫の全浮上及び半浮上の水中翼船と違って、軽い小型船及び短い船長の既存船の中央部に一枚の広い面積の水中トリム翼としたものであって、高速航走での浮上翼とトリム翼を兼ねるものとして、安定と、浮上と、航行時間の短縮と、燃費の向上となる構成のものである。

【００１２】

請求項3の発明は、請求項1と2に記載のトリム水中翼装置において、

金属船及びFRP船等の側壁舷の形状に合わせるトリム水中翼板を、左右舷の水面上、或いは、鋼船等では水中部の適宜の位置を任意形状と材質の水中翼のヒンジ部固定にして、揚力翼面とフラップ構成にして、舷中間部と、水中翼中間部をリンク支持固定機構で折畳み構造にして、舷上部の油圧シリンダーと、制御機器を具備から側面舷に折畳み収納することを特長のトリム水中翼装置を構成した。即ち本発明は、喫水から側壁舷幅のある船体、特に大型鋼船の喫水下の舷に直接に水中翼ヒンジ板を溶接するものであり、トリムと、スタビライザーと、半浮上から速度アップと、省燃費と、荒天の波高と接岸時の収納と、旧船等にも簡易に改造設置のトリム水中翼装置を構成のものである。

【発明の効果】

【００１３】

あえて、既存船を半浮上のトリム浮上翼船とすることで航走の安定とスピードアップとなり、そのメリットは、新規船及び旧船に設置の出来るものであって、大小船舶（漁船、遊漁船、大形高速船）の燃料の節減となり、昨今の油脂の値上がりは、長期に及ぶ現況であり、低燃費のエンジンと、高速性と、を船体形状で実現しなければならなくて、又、長期間航行の既存の大形船にも簡単に改造の出来る設置構成のものにして、現況の既存船舶のトリムと半浮上の航走は、トリム板とスタビライザーの改造のものであって、強度のあるリンク構成から水上収納の出来るトリム水中翼装置のものとした。

【図面の簡単な説明】

【００１４】

【図１】船首と船尾のトリム水中翼船の簡単な構成図である。　［実施例1］（a図）上記の全体の概略図。（b図）上記の水中翼装置の詳細図。（c図）側壁舷に回動と折畳み収納図と、デッキ上の片側舷軸受パイプと回動油圧シリンダーの詳細図。

【図２】小型ボート等に設置するトリム水中翼装置の概略図である。　［実施例2］（d図）上記の前方向からの左右トリム水中翼装置の概略図。（e図）上記の左右の水中翼の変速調整航走の概略図。（f図）上記の前方向からの左右トリム水中翼装置の回動と折畳みと収納の概略図。

【図３】船体重心中央部の一枚のトリム水中翼船の概略図である。　［実施例3］（g図）上記の正面図。（h図）上記の側面図。

【図４】大形貨物船等に支柱の無い水中翼装置の簡単な構成図である。　［実施例4］（i図）上記の正面図。（j図）上記の船底からの平面図。（k図）上記の水中翼を収納する平面図。（l図）上記の航走時の側面図

【図５】回動支柱、水中翼の油圧機器装備の基本回路図。　［実施例1.2.3.4］　（m図）上記水中翼の折畳み用トラニオン型シリンダーへの回路図。（n図）上記の支柱の回動用の油圧モータとブレーキバンド用シリンダーへの回路図。（o図）上記の側壁舷に支柱回動とデッキ上と舷軸受パイプと連結する油圧モータの平面図。

【発明を実施するための形態】

【００１５】

図面と符号に基づいて説明する。

【実施例１】

【００１６】

［図1］は、既製の軽い船、既存の小型FRP船体等の適宜の船首と船尾の場所に、FRP及び鋼、アルミ合金材の片面翼の水中翼装備を船体側面とデッキ面に固定して、その固定の方法として、それぞれの船体構造に合う左右舷片面の水中翼装備は、左右舷側面（12）部からの支柱のパイプ軸（7）は、舷側面及びデッキ面にパイプ軸受の固定台として、回転構造の油空圧及び電機モータにして、若しくは、油
圧シリンダー（5b）の伸縮から支柱板の回動として、支柱（2）と水中翼（3a）の連結は、ヒンジ連結（6）の回動の折畳み構造にして、船体舷形状に合わせる平板面支柱は、回動させて、制御弁の固定、ブレーキライニングシリンダー（5c）で固定、水面上の舷と支柱の雌雄ファスナーのスライド支持固定（8）のものとして、既製船には油圧の舵等の油圧制御機器、始動用のバッテリー電源等が備わっていて、左右舷の支柱軸を連結し、一つのアクチュエータで同時回動の方法と、（c図）の左右別々の作動方法は既製の技術のものであって、
［図2］の支柱板は、平金属板をデッキから喫水下の船底部まで側面舷（12）形状に合わせての曲げ加工のものであり、水中翼の幅面積は、支柱とほぼ同幅として、翼形状と面積は、船体重量、出力、船型に合わせて、支柱板の中間部のリンク連結支持板と翼面上のリンク連結支持板は、油圧シリンダーの伸縮からの4節リンク機構で折畳みの構造の波等の衝撃を分散構成にして、支柱上部のトラニオン型油圧シリンダー（5a）のロッドの伸縮で自由な角度調整の水中翼面角度となり、支柱板の自由な回動角度とで揚力と抗力の切換え翼面となる。

【００１７】

そして、水中翼面の構造枠材は、アルミ合金、ステンレス等にして、翼面は、FRP材とブラケット部にアルミ材を組み合わせて、フォーム材等の充填の揚力翼構造で軽くして、左右の船体側面と、デッキ面とで完全固定する支柱材質には、硬い金属材を使用して、水中翼の金属平板に簡易な軽い揚力形状のプラスチック、フォーム、ゴム等を適位置に、各船の出力に合わせての接着にして、揚力フラップを設けて、簡易な手動のヒンジ連結のフラップ板にして、ヒンジ固定翼板とフラップ板をスピードの揚力角度に船上で固定調整するボルトネジ（B）で噛合せ（A）揚力角度調整のトリム水中翼にした。
水中から水上に折畳み回動の収納は、航走しながら支柱の回動と同時に翼を畳むもので、数秒で収納となって接岸時の支柱と翼板は、舷と一体になり、防舷材等で岸壁との接触を無くすものとした。

【実施例２】

【００１８】

［図3］は、小型船の中央部を一枚のトリム水中翼板を喫水上にヒンジ取付けとしたもので、喫水面からデッキ面の側壁舷の距離内に支柱板幅と水中翼板幅が収まれば、前記と同様に支柱の回動と折畳む構成とするが、しかし、水中翼面の幅が喫水下で抵抗となものから、支柱を無くして、適宜の側壁舷に舷の曲がりに合わせて水面上の舷でヒンジ固定の折畳み収納の水中翼面にした。
そして、前後のフラップ板の面積は、トリム調整の出来るものであって、船型により適宜幅のものにして、既製技術の油空圧機器の遠隔操作と、前記、手動のネジ調整のものとして、そして、簡易な、金属板に軽いプラスチック、フォーム、ゴム等の揚力板を接着の揚力板構成にして、FRP船では新規船以外は、安心な喫水上の船倉（生簀等）からの固定のものとして、仮にFRP船等には、衝撃を吸収する弾性材（硬質エラストマー、ゴム材）等を各リンク連結部のクッション部に使用して、波、流木等の衝突から船体への衝撃は少なくなるものとした。

【実施例３】

【００１９】

［図4］は、大形鋼船（1b）等の支柱板の必要の無い側壁舷形状では、船首と船尾の水中翼面を舷の水面下の適位置にヒンジ取付け部にして、中間舷と翼面中間の適位置にリンク支持板のヒンジ取付けの四節のリンク機構にして、舷の上部にフレキシブルな複数のトラニオン型油圧シリンダー設置して、四節リンク支持板のヒンジとロッドは、同じピン連結

のシリンダーの油圧力で水中固定と、伸縮で折畳み収納となり、回動支柱板の無い構造は、揚力調整をフラップ機能として、フラップを油空圧機器での遠隔制御、若しくは、前記の簡単な手動のヒンジ連結のフラップ板とした。

【００２０】

大形のコンテナ船の舷は、平面であり、水中翼板のヒンジを舷に溶接して、前記の揚力構造と、波浪、荒天時の折畳み収納航行で速度の落ちない支障の無い収納部構造にして、金属船の溶接では浸水、漏水の心配は無くて、揚力水中翼の構造は、簡単な一枚の金属板に前記の揚力板の接着、若しくは飛行機翼状の中空の浮力構造にして、接岸時の岸壁との接触等の支障の無い構成とした。

仮に喫水下6m、船長180m、幅20m、船体重量5000t、25ノットのコンテナ船を1mの浮上とトリムとスタビライザーは、1000t分が軽くなり、同速度で燃料費の削減となる。

【００２１】

ヒンジ固定強度と、翼面にかかる抵抗と負担は、上記コンテナ船の舳先と艫の4基の水中翼には、1000tの四分の一の250t以上の浮力を支える強度のリンク支持固定とヒンジ連結部にして、仮に三本のシリンダーのヘッド室受圧面積3000平方cmで受けるものとして、航走しながら収納出来て、フラップ調整も簡単な前記ネジ調整のものにして、旧船に簡単に設置出来る構造のものとした。

【００２２】

そして、小型の10t程のFRP船を前記の回動支柱と折畳む水中翼は、強度負担、速度、燃費もおよそ前記と比例するものであって、難点は半浮上航走のため波浪時には、収納しての航走のものとなる。

10t程の船体（15m×4m×1.3m）の30cm程の半浮上航走は、支柱と水中翼に固定する軸心部、ヒンジ部、スライド枠材部は、左右、前後翼それぞれに1.0t程の波の力が係り、薄い旧船体のFRP材の固定ボルトと、支柱と、翼面板の強度は、十分なもので無くて、デッキ外面と、船倉、及び生簀等内面とで左右船体側面の支柱のスライド枠材は、破損浸水しても安心な固定場所にして、翼と支柱とは、適宜の位置でヒンジ連結にして、翼面の適宜の位置で四節リンクとヒンジ固定とする翼先端部は、水上部側面のスライド部で固定方法のものとした。

そして、10t重畳船の半浮上航走は、既存出力20ノットから25ノット程のスピードアップとなり、目的地に早く着くこととなり、又、出力と浮上調整から省燃費となる。

【産業上の利用可能性】

【００２３】

既存船は、接岸、係船とするため、水中翼船は、特殊な高速度を必要とする客船、艦船等に採用のものとなっていて、接岸時に翼板を支障無く畳めて収納出来れば、大半の小型、大形船舶にも採用のものとなり、仮にコンテナ船等は、スピードを必要としていて、省燃費は全体コストの重要部分であって、簡易な半浮上の水中翼の設置から30ノット航行と、燃費が30％の向上となれば、既製鋼船の設備費用は、新規船、又は、改造設置も簡易な設計施工の溶断のものであり、費用対効果の比較のものから必然にして、数年で回収出来るものとなって、そして、現況の35ノット航走の艦船等に任意な形状の水中翼設備とすると45ノット航行も可能となり、トリムと、スタビライザーと、スピードアップは、航空母艦等に最適な構成のものとなって、現況の燃料費の値上がりを解決する一つの手段にもなり、新規船をトリム水中翼船として設計すると、より安定した構造と、船種により長期間の水中翼航行から高速と低燃費を併用出来るトリム型、浮上型の構成に出来るトリム水中翼装置。

【符号の説明】

【００２４】

1a 小型ボート

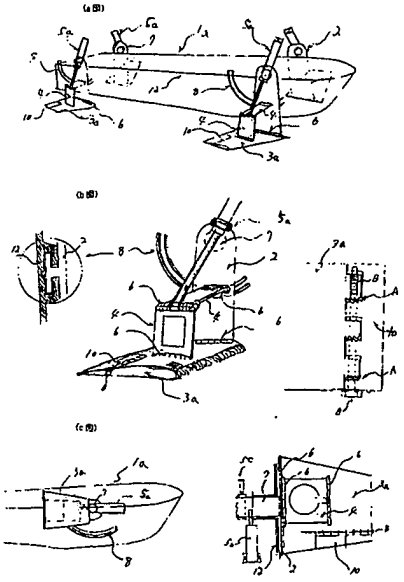
1b 大形貨物船

2 回動支柱（ストラット）

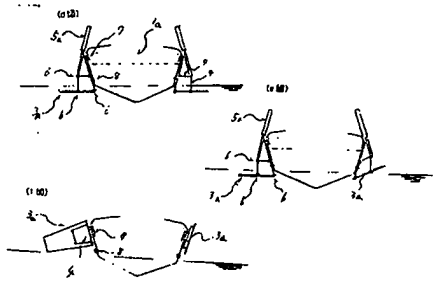
3a トリム水中翼板 3b 小型船中央部の前後のフラップと一体の水中翼板 3c 大

形鋼船の水中側壁
　舷ヒンジ固定の水中翼板
4　支持固定板とシリンダーとの折畳み機構（四節リンク機構）
5a 水中翼折り畳み用の油圧トラニオン型シリンダー　5b支柱回動用の油圧シリンダー
5cブレーキ用
　油圧シリンダー
6　折畳みヒンジ部
7　支柱回動軸心（軸受パイプ）
8　船体と支柱のスライド回動支持固定板
9　水中翼板の船体収納部
10　フラップ
11　手動フラップの角度調整（ボルトネジB）の固定部（噛合い固定A）
12　側壁舷
13 リミットスイッチ
14 油圧モータ
15 ギアボックス

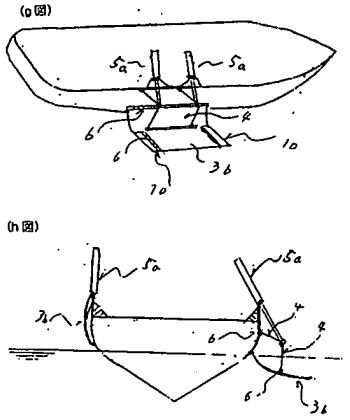
【図１】



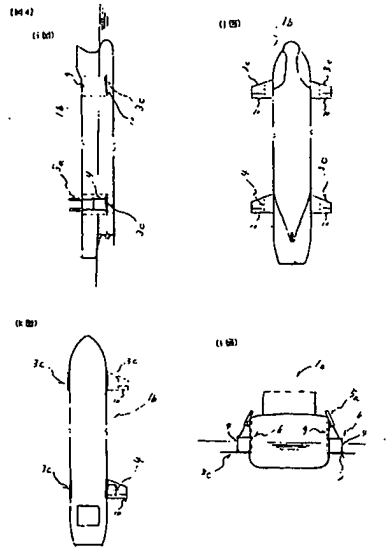
【図２】



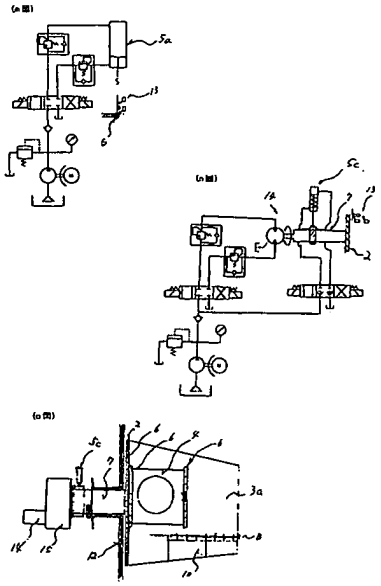
【図３】



【図４】



【図５】



【手続補正書】
【提出日】平成22年10月12日(2010.10.12)
【手続補正１】
【補正対象書類名】明細書
【補正対象項目名】全文
【補正方法】変更
【補正の内容】
【発明の詳細な説明】
【技術分野】
【０００１】
船舶を速度アップと省燃費にする半浮上のトリム水中翼船に関する。
【背景技術】
【０００２】
車両は、世界的をエコブームから急速な構造変化となっていて、燃費向上の車両開発となっている。船舶は、過去に帰れば水流、風速、手漕ぎとなるが、現況では、ヨット、競技用となっている。
【先行技術文献】
【特許文献】
【０００３】
【特許文献１】実開平5-58597　船体トリム制御および船体減揺装
【特許文献２】特開2003-54492　滑走艇
【特許文献３】特許第3803251号　改良された水中翼装置
【特許文献４】特開2009-96396　水中航走体既存の全浮上の全没水型の水
中翼船は、50ノット程のものであり、高出力、高燃費のものであって、翼板を水中固定の接岸等に不便な特殊な船舶である。本願は、既存大小船舶にトリム水中翼装置を設置して

、荒天時、接岸時には、折畳み回動の水上に収納して、スピードアップと、省燃費を目的の安全な構造と、自由な角度調整の没水型と成る半浮上航行のトリム水中翼船とした。

【発明の概要】

【発明が解決しようとする課題】

【０００４】

昨今の油脂の値上がりは、将来においても、値下がりの要素はなくて、小型船舶の利用者の減少となっている。燃料の値上がりから車両等は、ハイブリット、ストップ走行、電気自動車となっていて、船舶にも低燃費エンジンが求められている。しかし、船は、長期間の使用のものであり、水の抵抗を船体で受けての浮上航走であり、タイヤ走行のように抵抗を減らす翼面浮上の水中翼船が客船等に使用されているが、常時浮上させてのエンジン出力は、大出力のエンジンが必要となる。

そして、航走には大出力でのスピードで船体を全面浮上としているため、高出力の高燃費と成っていて、客船、艦船等以外での採用は無くて、

【０００５】

既製のプロペラ推進船舶等の速度アップは、船体重量を軽くする半浮上のトリム水中翼面航走にして、舳先と艫の左右舷別々の回動支柱と折畳水中翼面は、喫水上の側壁舷を固定軸受にして、アクチュエータで収納する構成にして、

金属平板の支柱板と水中翼面の構造は、ヒンジ連結にして、翼面の固定は、支柱と翼面に支柱のトラニオン型シリンダーロッドと四節リンクの支持固定板の連結の折畳みの構成にして、航走時の固定は、喫水上面近くの前部側壁に支柱を差込む受台と、或いは、側壁と支柱の回転をスライドファスナー形状の支持固定と、軸心の軸受パイプ台の油圧、電機アクチュエータとの支持固定として、水中翼面装備は、支柱角度と、水中翼板折畳み角度と、フラップの揚力翼面積と、の適宜の揚力角度調整から自由な没水型の水中翼面航走となり、出力調整と舳先と艫の翼角度のトリムから最適の浮上翼角度にして、少なくても30％のスピードアップ及び燃費の向上のものとして、

【０００６】

既製船舶の小型船から大型船に簡易に設置出来て、取り外しの出来る構造と、航行時の天候の急変にも、高速航走から数秒で水中翼面を畳み、同時に支柱を回動させる構成のものとし、薄く、軽く、速くする目的の既存FRP船の左右側面舷の厚さは、薄いものであり、支柱を固定する喫水上のパイプ軸受は、内部の船倉部の固定板と完全固定の防水のものにして、船型によって、喫水上船倉からの油空圧および電機アクチュエータのものとして、大形鋼船の高速航行の貨物船、客船等は、支柱は、必要で無くて、水中翼板を水面下にヒンジ板の溶接して、トリムとスタビライザーとフラップ水中翼の半浮上船として、四節リンクで側壁舷に折畳みの簡易なものとした。

【０００７】

そして、船型形状よって、船体の前後の重心部となる中央部の左右舷の一枚の半浮上のトリム水中翼板装備は、幅と面積のものであり、水中翼固定板と前後のフラップ板をヒンジ連結にして、小型のFRP船等では、手動で浮上角度調整の出来るヒンジのネジシャフトの噛合わせ固定のフラップ板の可変翼構成にして、そして、鋼船等では、既製技術の油圧機器の遠隔操作にして、採用は、任意のものものとして、舷の軸心パイプのシリンダーで回動させる支柱板と、支柱の複数の油圧シリンダーと、ヒンジ連結のリンク支持固定板と、水中翼板の折畳みと、回動と、支持固定と、収納は、前記、油圧機器等の装備と同様のものである。

【０００８】

前記するトリム水中翼装置は、支柱板と水中翼板を折畳み回動から収納と成す構成のものであり、より簡易な支柱板の無い側壁舷に水中翼板を直接ブラケット及びヒンジ連結として、前記と共に支柱軸受パイプ及びヒンジ可動部軸受部には、衝撃吸収のゴムパイプ材等を使用して、FRP船は、側壁の喫水上のボルト固定のヒンジ台のものであり、鋼船等は、水面下の溶接台のものから、水中翼板の材質は、金属（鋼、アルミ、合金ステンレス等）、或いは、樹脂、フォーム、ゴム材及び複合材、そして金属と合成材の接着の揚力翼

構成にして、波浪等の衝撃、流木等の衝突で船体の破損、漏水等は、あってはならない大事故となり、その設置場所は、魚倉、船倉等の安全な位置に二重三重の安全対策のものにして、収納時の水中翼板は、出来るだけ側壁舷と一体となる曲がり形状のものにした。そして、前記する既存の大形鋼船の側壁舷の設置は、鋼溶接の簡単なものであり、リンク支持固定機構の強度で波浪、浮上抵抗を受ける構造のもので、特に複数のシリンダーのヘッド室の受圧面積と、水中部のヒンジ板の溶接固定部と、で浮上圧力を受けるものとなる。

【０００９】

本発明の特長は、支柱と水中翼を喫水上に収納するものであり、全面浮上船の高速固定水中翼船と違って、油圧パイプ、ホースの揚力翼内に配管してのフラップ翼面でも良いが、ヒンジ部のくり返す曲がり部の疲労は出来るだけ避けるものとし、万一の破損等の漏れは、事故原因となり、平板金属の翼板面に揚力形状の樹脂板、フォーム板材の適宜に上下面に接着して、抗力を少なくする揚力翼面状にして、設定する船速度と回動と水中翼面角度からと、手動でネジ固定するフラップ板装備にして極力簡易なものとした。

そして、既製の漁船、コンテナ船、タンカー船等をトリム水中翼船にするものとした。

【課題を解決するための手段】

【００１０】

請求項1の発明は、船舶を半浮上のトリム水中翼船にして、各船の舳先と艫の左右舷に別々の水中翼装備のものにして、その水中翼板と支柱板は、左右片側舷で支柱とヒンジ連結の水中翼板を折畳み、喫水上の舷と前後に回動するピン止め支柱構造にして、航走時以外は、支柱と翼面板は、喫水上に収納の接岸に支障の無い構成にした。

その作動は、支柱上部のトラニオン型油圧シリンダーで支柱中間部のリンク支持固定板と、水中翼板中間部のリンク支持固定板と、の連結部をシリンダーの伸縮で折畳み支柱と一体と成る四節のリンク構成にして、収納から喫水下に回動する支柱は、側面舷の固定パイプを軸受台にして、回動する中心軸心部にして、その回動軸受部の舷及びデッキ部は、水中翼の衝撃を受ける軸受パイプ台であり、油圧シリンダー、若しくは、油圧及び電機モータの伸縮と回転で水中まで回動と、支柱上部の水中翼油圧シリンダーと、の連係作動で適宜に半没水型及び全没水型水中翼角度となって、エンジン出力の船速度から船体浮上揚力角度と最適トリム角度調整は、舳先と艫の支柱角度と、水中翼面角度と、適宜のフラップで微調整にして、最適翼面角度の半浮上航行と、トリムと、のものから速度アップと成る左右片側舷独立収納にして、そして、喫水（デッキ、船倉）上で左右舷の支柱を連結すると、一つの油圧装備で回動する簡易な構造のものとなって、その支柱板及び水中翼板等の材質は、小型及び大形船の船質により、各種（鋼、ステン、アルミ、FRP、複合材）のものであって、水中翼面の揚力面構成は、飛行機翼形状、若しくは、金属平板に安価、簡易なゴム、フォーム、樹脂等の適宜の体積と面積の揚力板を接着する簡単な揚力調整板のものにして、そして、航走時の安定した支柱の支持と固定は、油圧及び電機アクチュエータと、舷のパイプ軸受部のパイプ接触摩擦面積の二点での支持では完全な支持固定には成らず、水面近くの喫水上の舷に回動する支柱板の適宜の位置と、幅と、面積のスライド支持固定台は、支柱面と、側壁面のいずれかを雌雄固定台とするスライドする摩擦板構成にして、水流、水圧による振れを止めて、適宜の支柱角度の三点の摩擦力で支持固定のトリム水中翼装置のものとした。

【００１１】

請求項2の発明は、請求項1に記載のトリム水中翼装置において、船体の舳先と艫間の重心部の左右舷にそれぞれ一枚のトリム水中翼装備にして、回動する支柱と水中翼板をヒンジ連結にして、水中翼面の中央部の広い面積の固定部水中翼板と、前後の二つの可変フラップ翼板をヒンジ連結にして、前後二つのフラップで浮上調整の出来る翼構成にして、そして、支柱の中央部のリンク支持固定板と、中央部の水中翼面のリンク支持固定板を複数のトラニオン型油圧シリンダーロッドで連結して、伸縮から折畳み、舷の喫水上の回動軸を収納位置とする支柱板と、ヒンジ連結の四節リンク支持固定板とする水中翼板は、油圧制御機器の装備から、前後トリム、フラップ翼板の作動として、安定航走は、前記、摩擦支持固定台のものとする半浮上船体のトリム調整として、小型FRP船等ではフラップ形状と

して、大形鋼船ではトリム構成にして、一枚の水中翼面を前後の可変翼面からの揚力翼と、トリムと、自由な没水角度の安定航行の出来る油空圧制御機器を具備からのトリム水中翼装置の構成のものとした。
即ち本発明は、前後舳先と艫の全浮上及び半浮上の水中翼船と違って、軽い小型船及び短い船長の既存船の中央部に一枚の広い面積の水中トリム翼としたものであって、高速航走での浮上翼とトリム翼を兼ねるものとして、安定と、浮上と、航行時間の短縮と、燃費の向上となる構成のものである。
【００１２】
請求項3の発明は、金属船及びFRP船等の側壁舷の形状に合わせるトリム水中翼板を、左右舷の水面上、或いは、鋼船等では水中部の適宜の位置を任意形状と材質の水中翼のヒンジ部固定にして、揚力翼面とフラップ構成にして、舷中間部と、水中翼中間部を四節リンク支持固定機構で折畳み構造にして、舷上部のトラニオン型油圧シリンダーと、制御機器を具備から側面舷に折畳み収納することを特長のトリム水中翼装置を構成した。即ち本発明は、喫水から側壁舷幅のある船体、特に大型鋼船の喫水下の舷に直接に水中翼ヒンジ板を溶接するものであり、トリムと、スタビライザーと、半浮上から速度アップと、省燃費と、荒天時及び接岸時の収納と、旧船等にも簡易に改造設置のトリム水中翼装置を構成のものである。
【発明の効果】
【００１３】
あえて、既存船を半浮上のトリム浮上翼船とすることで航走の安定とスピードアップとなり、そのメリットは、新規船及び旧船に設置の出来るものであって、大小船舶（漁船、遊漁船、大形高速船）の燃料の節減となり、昨今の油脂の値上がりは、長期に及ぶ現況であり、低燃費のエンジンと、高速性と、を船体形状で実現しなければならなくて、又、長期間航行の既存の大形船にも簡単に改造の出来る設置構成のものにして、現況の既存船舶のトリムと半浮上の航走は、トリム板とスタビライザーの改造のものであって、強度のある四節リンク構成から水上収納の出来るトリム水中翼装置のものとした。
【図面の簡単な説明】
【００１４】
【図１】船首と船尾のトリム水中翼船の簡単な構成図である。　［実施例1］（a図）上記の全体の概略図。（b図）上記の水中翼装置の詳細図。（c図）側壁舷に回動と折畳み収納図と、デッキ上の片側舷軸受パイプと回動油圧シリンダーの詳細図。
【図２】小型ボート等に設置するトリム水中翼装置の概略図である。　［実施例1］（d図）上記の前方向からの左右トリム水中翼装置の概略図。（e図）上記の左右の水中翼の変速調整航走の概略図。（f図）上記の前方向からの左右トリム水中翼装置の回動と折畳みと収納の概略図。
【図３】船体重心中央部の一枚のトリム水中翼船の概略図である。　［実施例2］
（g図）上記の正面図。　（h図）上記の側面図。
【図４】大形貨物船等に支柱の無い水中翼装置の簡単な構成図である。　［実施例3］（i図）上記の正面図。（j図）上記の船底からの平面図。（k図）上記の水中翼を収納する平面図。（l図）上記の航走時の側面図
【図５】回動支柱、水中翼の油圧機器装備の基本回路図。　［実施例1.2.3］
（m図）上記水中翼の折畳み用トラニオン型シリンダーへの回路図。
（n図）上記の支柱の回動用の油圧モータとブレーキバンド用シリンダーへの回路図。
（o図）上記の側壁舷に支柱回動とデッキ上と舷軸受パイプと連結する油圧モータの平面図。
【発明を実施するための形態】
【００１５】
図面と符号に基づいて説明する。
【実施例１】

【００１６】
［図1］は、既製の軽い船、既存の小型FRP船体等の適宜の船首と船尾の場所に、FRP及び鋼、アルミ合金材の片面翼の水中翼装備を船体側面とデッキ面に固定して、その固定の方法として、それぞれの船体構造に合う左右舷片面の水中翼装備は、左右舷側面（12）部からの支柱のパイプ軸（7）は、舷側面及びデッキ面にパイプ軸受の固定台として、回転構造の油空圧及び電機モータにして、若しくは、油圧シリンダー（5b）の伸縮から支柱板の回動として、支柱（2）と水中翼（3a）の連結は、ヒンジ連結（6）の回動の折畳み構造にして、船体舷形状に合わせる平板面支柱は、回動させて、制御弁の固定、ブレーキライニングシリンダー（5c）で固定、水面上の舷と支柱の雌雄ファスナーのスライド支持固定（8）のものとして、既製船には油圧の舵等の油圧制御機器、始動用のバッテリー電源等が備わっていて、左右舷の支柱軸を連結し、一つのアクチュエータで同時回動の方法と、（c図）の左右別々の作動方法は既製の技術のものであって、［図2］の支柱板は、平金属板をデッキから喫水下の船底部まで側面舷（12）形状に合わせての曲げ加工のものであり、水中翼の幅面積は、支柱とほぼ同幅として、翼形状と面積は、船体重量、出力、船型に合わせて、支柱板の中間部のリンク連結支持板と翼面上のリンク連結支持板は、油圧シリンダーの伸縮からの4節リンク機構で折畳みの構造の波等の衝撃を分散構成にして、支柱上部のトラニオン型油圧シリンダー（5a）のロッドの伸縮で自由な角度調整の水中翼面角度となり、支柱板の自由な回動角度とで揚力と抗力の切換え翼面となる。
【００１７】
そして、水中翼面の構造枠材は、アルミ合金、ステンレス等にして、翼面は、FRP材とブラケット部にアルミ材を組み合わせて、フォーム材等の充填の揚力翼構造で軽くして、左右の船体側面と、デッキ面とで完全固定する支柱材質には、硬い金属材を使用して、水中翼の金属平板に簡易な軽い揚力形状のプラスチック、フォーム、ゴム等を適位置に、各船の出力に合わせての接着にして、揚力フラップを設けて、簡易な手動のヒンジ連結のフラップ板にして、ヒンジ固定翼板とフラップ板をスピードの揚力角度に船上で固定調整するボルトネジ（B）で噛合せ（A）揚力角度調整のトリム水中翼にした。
水中から水上に折畳み回動の収納は、航走しながら支柱の回動と同時に翼を畳むもので、数秒で収納となって接岸時の支柱と翼板は、舷と一体になり、防舷材等で岸壁との接触を無くすものとした。
【実施例２】
【００１８】
［図3］は、小型船の中央部を一枚のトリム水中翼板を喫水上にヒンジ取付けとしたもので、喫水面からデッキ面の側壁舷の距離内に支柱板幅と水中翼板幅が収まれば、前記と同様に支柱の回動と折畳む構成とするが、しかし、水中翼面の幅が喫水下で抵抗となるものから、支柱を無くして、適宜の側壁舷に舷の曲がりに合わせて水面上の舷でヒンジ固定の折畳み収納の水中翼面にした。
そして、前後のフラップ板の面積は、トリム調整の出来るものであって、船型により適宜幅のものにして、既製技術の油空圧機器の遠隔操作と、或いは、手動のネジ調整(A.B)のものとして、そして、簡易な、金属板に軽いプラスチック、フォーム、ゴム等の揚力板を接着の揚力板構成にして、FRP船では新規船以外は、安心な喫水上の船倉（生簀等）からの固定のものとして、仮にFRP船等には、衝撃を吸収する弾性材（硬質エラストマー、ゴム材）等を各リンク連結部のクッション部に使用して、波、流木等の衝突から船体への衝撃は少なくなるものとした。
【実施例３】
【００１９】
［図4］は、大形鋼船（1b）等の支柱板の必要の無い側壁舷形状では、船首と船尾の水中翼面を舷の水面下の適位置にヒンジ取付け部にして、中間舷と翼面中間の適位置にリンク支持板のヒンジ取付けの四節のリンク機構にして、舷の上部にフレキシブルな複数のトラニオン型油圧シリンダー設置して、四節リンク支持板のヒンジとロッドは、同じピン連結のシリンダーの油圧力で水中固定と、伸縮で折畳み収納となり、回動支柱板の無い構造は

、シリンダーロッドの伸縮から水面下の角度の揚力調整角度となり、前記、フラップ機能とから、フラップは、微調整用の便利なものとなって、油空圧機器での遠隔制御、若しくは、前記の簡単な手動のヒンジ連結のフラップ板とした。

【００２０】

大形のコンテナ船の舷は、平面であり、水中翼板のヒンジを舷に溶接して、前記の揚力構造と、波浪、荒天時の折畳み収納航行で速度の落ちない支障の無い収納部構造にして、金属船の溶接では浸水、漏水の心配は無くて、揚力水中翼の構造は、簡単な一枚の金属板に前記の揚力板の接着、若しくは飛行機翼状の中空の浮力構造にして、接岸時の岸壁との接触等の支障の無い構成とした。

仮に喫水下6m、船長180m、幅20m、船体重量5000t、25ノットのコンテナ船を1mの浮上とトリムとスタビライザーは、1000t分が軽くなり、同速度で燃料費の削減となる。

【００２１】

ヒンジ固定強度と、翼面にかかる抵抗と負担は、上記コンテナ船の舳先と艫の4基の水中翼には、1000tの四分の一の250t以上の浮力を支える強度のリンク支持固定とヒンジ連結部にして、仮に三本のシリンダーのヘッド室受圧面積3000平方cmで受けるものとして、航走しながら収納出来て、フラップ調整も簡単な前記ネジ調整のものにして、旧船に簡単に設置出来る構造のものとした。

【００２２】

そして、小型の10t程のFRP船を前記の回動支柱と折畳む水中翼は、強度負担、速度、燃費もおよそ前記と比例するものであって、難点は半浮上航走のため波浪時には、収納しての航走のものとなる。

10t程の船体（15m×4m×1.3m）の30cm程の半浮上航走は、支柱と水中翼に固定する軸心部、ヒンジ部、スライド枠材部は、左右、前後翼それぞれに1.0t程の波の力が係り、薄い旧船体のFRP材の固定ボルトと、支柱と、翼面板の強度は、十分なもので無くて、デッキ外面と、船倉、及び生簀等内面とで左右船体側面の支柱のスライド枠材は、破損浸水しても安心な固定場所にして、翼と支柱とは、適宜の位置でヒンジ連結にして、翼面の適宜の位置で四節リンクとヒンジ固定とする翼先端部は、水上部側面のスライド部で固定方法のものとした。

そして、10t重量船の半浮上航走は、既存出力20ノットから25ノット程のスピードアップとなり、目的地に早く着くこととなり、又、出力と浮上調整から省燃費となる。

【産業上の利用可能性】

【００２３】

既存船は、接岸、係船とするため、水中翼船は、特殊な高速度を必要とする客船、艦船等に採用のものとなっていて、接岸時に翼板を支障無く畳めて収納出来れば、大半の小型、大形船舶にも採用のものとなり、仮にコンテナ船等は、スピードを必要としていて、省燃費は全体コストの重要部分であって、簡易な半浮上の水中翼の設置から30ノット航行と、燃費が30％の向上となれば、既製鋼船の設備費用は、新規船、又は、改造設置も簡易な設計施工の溶断のものであり、費用対効果の比較のものから必然にして、数年で回収出来るものとなって、そして、現況の35ノット航走の艦船等に任意な形状の水中翼設備とすると45ノット航行も可能となり、トリムと、スタビライザーと、スピードアップは、航空母艦等に最適な構成のものとなって、現況の燃料費の値上がりを解決する一つの手段にもなり、新規船をトリム水中翼船として設計すると、より安定した構造と、船種により長期間の水中翼航行から高速と低燃費を併用出来るトリム型、浮上型の構成に出来るトリム水中翼装置。

【符号の説明】

【００２４】

1a 小型ボート　　1b 大形貨物船

2 回動支柱（ストラット）

3a トリム水中翼板　　3b 小型船中央部の前後のフラップと一体の水中翼板　　3c 大形鋼船の水中側壁舷ヒンジ固定の水中翼板 285

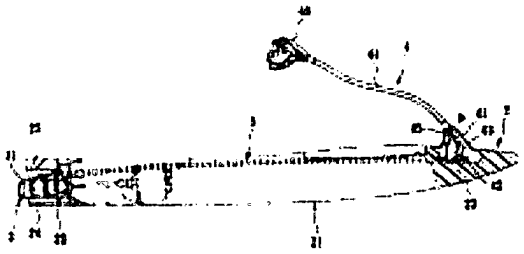
4　支持固定板とシリンダーとの折畳み機構（四節リンク機構）
5a 水中翼折り畳み用の油圧トラニオン型シリンダー　5b支柱回動用の油圧シリンダー
5cブレーキ用油圧シリンダー
6　折畳みヒンジ部
7　支柱回動軸心（軸受パイプ）
8　船体と支柱のスライド回動支持固定板
9　水中翼板の船体収納部
10　フラップ
11　手動フラップの角度調整（ボルトネジB）の固定部（噛合い固定A）
12　側壁舷
13 リミットスイッチ
14 油圧モータ
15 ギアボックス

【手続補正２】
【補正対象書類名】特許請求の範囲
【補正対象項目名】全文
【補正方法】変更
【補正の内容】
【特許請求の範囲】
【請求項１】
トリム水中翼装置は、船舶の船首と船尾の左右舷にそれぞれを別作動の半浮上航走の水中翼装備のものにして、喫水上の側壁舷（12）の軸受台（7）で回動する支柱板（2）と、支柱板の下部でヒンジ連結（6）の揚力水中翼板（3a）は、それぞれのアクチュエータの連係装備から、水中から水上の軸受台（7）の側壁舷(12)に回動と、折畳みの収納が遠隔操作の出来る構成にして、その作動は、支柱板(2)上部と連結のトラニオン型油圧シリンダー(5a)で支柱中間部のリンク支持固定板(4)と、水中翼板中間部のリンク支持固定板(4)と、の連結部をシリンダーロッドの伸縮で折畳み支柱と一体と成る四節のリンク構成にして、収納から喫水下に回動する支柱は、側面舷の固定パイプを軸受台(7)にして、回動する中心軸心部にして、航走時の水中翼装備の固定は、支柱軸受台（7）との支柱パイプ外周面積と、側壁舷(12)のスライド雌雄受台（8）と、支柱板(2)のアクチュエータ（5b.5c.14）の制御固定と、の摩擦固定とし、トラニオン型油圧シリンダー（5a）の制御から四節リンクの支持固定板（4）で上下連結の揚力水中翼板（3a）は、固定となって、エンジン出力調整からの安定トリムの半浮上航行は、自由な水中角度調整の出来る支柱板(2)と水中翼面になって、揚力の微調整は、簡易な手動固定(A.B)のフラップ（10）角度にして、スタビライザーと、スピードアップと、省燃費となり、各制御機器の具備から、展開から折畳み左右舷に回動収納の出来る船首と船尾のトリム水中翼装置。
【請求項２】
請求項1に記載のトリム水中翼装置において、船体の重心部の左右舷に設ける別作動の一枚翼のトリム水中翼装備は、前記、支柱板の回動と、水中翼板をヒンジ連結(6)の折畳み収納の構成にして、揚力翼面の前後に微調整の簡易な手動固定(A.B)のフラップ（10）をヒンジ連結にし、トリムと浮上調整の出来る構成にして、支柱の複数のトラニオン型油圧シリンダー（5a）と四節リンク支持固定板(4)を連結して、折畳み固定と、舷の軸受台（7）のアクチュエータ（5b.14）で回動させる支柱板(2)のものとし、その作動からの半浮上航走は、前記する制御機器の具備から支柱と、水中翼板は各摩擦支持固定となって、各アクチュエータの調整から安定した半浮上航走と成る左右舷の重心部の一枚翼のトリム水中翼装置。
【請求項３】
トリム水中翼装置は、大小船舶(1a.1b)の船首と船尾及び中央重心部に設ける左右舷の喫水部及び喫水下の位置を水中翼板（3b.3c）の286ジ取付けの位置にして、航走時の水中

翼装備の作動と、固定は、舷中間部と水中翼中間部の四節リンク支持固定板(4)の結合部と、舷上部に取り付ける複数のトラニオン型油圧シリンダー（5a）と、を連結して、ロッドの伸縮制御から水中翼板の展開と、折畳みと、自由な没水翼面と、浮上揚力固定にして、エンジン出力調整からの安定トリムの半浮上航行は、自由な水中角度調整の出来る揚力水中翼面と、微調整用の簡易な手動固定(A.B)のフラップ(10)構成にして、スタビライザーと、スピードアップと、省燃費となり、制御機器の具備から左右側壁舷(12)の収納部(9)に折畳み収納と展開の出来る四節リンク支持固定板（4）とヒンジ連結(6)の水中翼装備(3b.3c)は、大小船舶の(1a.1b)の半浮上航走と成すトリム水中翼装置。

3 of 16 DOCUMENTS

KR1020140024816A 2014-03-03 **Steering device for a surfboard** (en)



Inventors: RUAN CHIA WEN, [#45824][#47564], [#45212][#53552] [#52852][#50868][#54000], [#45212][#53552] [#49884][#54000], [#45212][#52873] 3[#47196][#46300], [#45336][#48260] 20, Taiwan, Republic of China (R.O.C.);
LIAO MING CHEN, [#45824][#47564], [#45212][#53552] [#52852][#50868][#54000], [#45212][#53552] [#49884][#54000], [#45212][#52873] 3[#47196][#46300], [#45336][#48260] 20 ([#50864][#54200][#48264][#54840]: 540), Taiwan, Republic of China (R.O.C.)

Applicants/Assignees: JOY RIDE TECHNOLOGY CO., LTD., [#45824][#47564], [#45212][#53552] [#52852][#50868][#54000], [#45212][#53552] [#49884][#54000], [#45212][#52873] 3[#47196][#46300], [#45336][#48260] 20, Taiwan, Republic of China (R.O.C.);
RUAN CHIA WEN, [#45824][#47564], [#45212][#53552] [#52852][#50868][#54000], [#45212][#53552] [#49884][#54000], [#45212][#52873] 3[#47196][#46300], [#45336][#48260] 20, Taiwan, Republic of China (R.O.C.)

Classifications: IPC[8]: B63H11/107 (2006-01-01; A, F, I,, , KR)
IPC[8]: B63B35/73 (2006-01-01; A, L, I,, , KR)
IPC[8]: B63H25/52 (2006-01-01; A, L, I,, , KR)

Priority Number and Date: TW101130248 2012-08-21

English Abstract:

A steering device for a surfboard includes a steering unit, a driving unit, and a transmitting unit. The steering unit controls the movement of a surfboard. The driving unit includes a base seat secured to the board body of the surfboard, a linking member on the base seat, and a driving arm with a handle. The driving arm is rotatable and substantially untwistable, is connected to the linking member, and extends outwards from the base seat. Rotation of the driving arm drives the linking member to rotate, thereby the operation of the steering unit via the transmitting unit.
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리아오, 밍-첸
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(74) 대리인
권혁수, 송윤호, 오세준

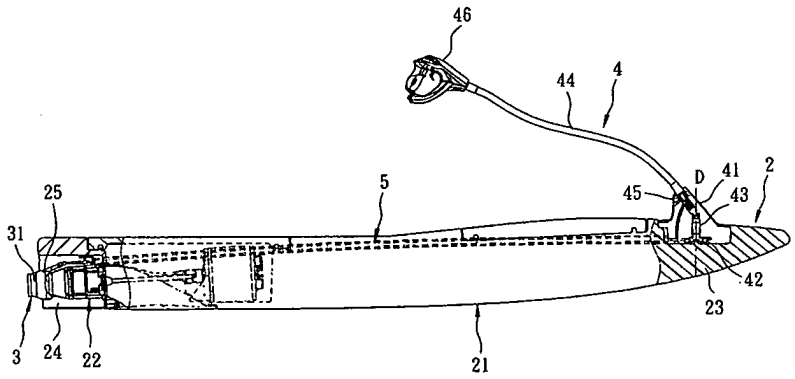
전체 청구항 수 : 총 10 항

(54) 발명의 명칭 **서핑 보드용 조향장치**

(57) 요 약

서핑 보드용 조향장치는, 조향 유닛, 구동 유닛, 그리고, 전달 유닛을 포함한다. 조향 유닛은 서핑 보드의 이동 방향을 제어한다. 구동 유닛은 서핑 보드의 보드 몸체에 고정된 기반 좌석, 기반 좌석에 배치된 연결 부재, 손잡이가 장착된 구동 팔을 포함한다. 구동 팔은 회전가능하고 실질적으로 꼬이지 않으며 연결 부재에 연결되고 기반 좌석으로부터 바깥으로 신장한다. 구동 팔의 회전은 연결 부재를 구동하여 회전하도록 하고 이로써 전달 유닛을 통해서 조향 유닛의 동작을 구동한다.

대 표 도



특허청구의 범위

청구항 1

서핑 보드에 사용되는 조향장치로서, 상기 서핑 보드는 머리 및 꼬리를 갖는 몸체와 상기 꼬리에 장착되고 상기 보드 몸체를 추진하기 위한 파워 유닛을 포함하고,

상기 조향장치는:

보드 몸체의 이동 방향을 제어하는 조향 유닛;

구동 유닛; 그리고,

전달 유닛을 포함하고,

상기 구동 유닛은 기반 좌석, 연결 부재, 구동 팔 그리고 손잡이를 포함하고,

상기 기반 좌석은 보드 몸체의 머리에 고정되고,

상기 연결 부재는 상기 기반 좌석 내에 배치되고 구동축 주위를 회전하고,

상기 구동 팔은 유연하고 실질적으로 꼬이지 않으며,

상기 구동 팔은 상기 구동축에 체결되고 상기 연결 부재에 연결되는 연결 단 그리고 상기 구동 팔의 장축을 따라서 상기 연결 단 반대 편의 접근 단을 구비하고, 상기 접근 단은 상기 기반 좌석으로부터 바깥으로 신장하며,

상기 구동 팔은 상기 구동축 주위를 연결 부재가 회전하도록 구동하기 위해서 장축 주위를 회전할 수 있고,

상기 손잡이는 상기 구동 팔의 접근 단에 고정되고,

상기 전달 유닛은 상기 연결 부재와 상기 조향 유닛을 서로 연결하여 상기 구동축 주위의 상기 연결 부재의 회전이 상기 전달 유닛을 통해 조향 유닛의 동작을 구동하는 조향장치.

청구항 2

제1항에 있어서,

상기 구동 유닛의 상기 손잡이는 고리 형태이고 상기 구동 팔의 상기 접근 단에서 상기 구동 팔의 상기 장축에 실질적으로 수직인 파지부를 갖는 조향장치.

청구항 3

제1항에 있어서,

상기 전달 유닛은 상기 보드 몸체에 고정되는 슬리브, 상기 슬리브를 통과해 신장하고 양 끝단을 갖는 케이블, 상기 케이블의 양 끝단 중 일 단에 연결된 구동 조향 레버, 그리고 상기 케이블의 양 끝단 중 타 단에 연결된 구동된 조향 레버를 포함하고, 상기 구동된 조향 레버는 상기 케이블의 상기 일 단 맞은 편이고 상기 조향 유닛에 회전가능하게 연결된 원위단을 구비하고, 상기 구동 조향 레버는 상기 케이블의 상기 타 단 맞은 편이고 상기 연결 부재에 회전가능하게 연결된 원위단을 구비하고, 상기 구동 조향 유닛은 상기 연결 부재가 상기 구동 팔에 의해서 제1 회전 방향으로 회전할 때 상기 연결 부재에 의해서 이동가능하고 상기 케이블을 통해서 상기 구동된 조향 레버를 이동하여 상기 조향 유닛의 동작을 작동시켜 상기 보드 몸체를 상기 제1 회전 방향으로 회전시키는 조향장치.

청구항 4

제1항에 있어서,

상기 파워 유닛은 물 출구를 구비하는 제트 펌프로 구성되고,

상기 조향 유닛은 상기 제트 펌프에 회전가능하게 연결되고 상기 물 출구와 유체소통하고 상기 구동된 조향 레버의 상기 원위단에 회전가능하게 연결된 유체 안내 관을 포함하여, 상기 제1 회전 방향으로 상기 연결 부재의 회전이 상기 유체 안내 관을 구동하여 상기 제1 회전 방향과 반대 방향인 제2 회전 방향으로 회전시키는 조향장

치.

청구항 5

제1항에 있어서,

상기 구동 유닛의 상기 구동 팔은 상기 장축을 따라서 5도 이내로 토크 공차를 갖는 조향장치.

청구항 6

제1항에 있어서,

상기 구동 유닛의 상기 구동 팔은 유연한 관 모양 벽 및 각이 지게 서로 떨어진 다수의 강철 케이블을 포함하고, 상기 다수의 강철 케이블은 상기 관 모양 벽을 따라 신장하고 상기 관 모양 벽 내에 매립된 조향장치.

청구항 7

제6항에 있어서,

상기 다수의 강철 케이블 각각은 다수의 강철 스트랜드로 구성되는 조향장치.

청구항 8

제6항에 있어서,

상기 구동 유닛의 상기 관 모양 벽은 고무로 만들어진 조향장치.

청구항 9

제1항에 있어서,

상기 구동 유닛은 상기 구동축을 따라 신장하고 상기 구동 팔의 상기 연결 단 및 상기 연결 부재를 서로 연결하는 구동 좌석을 더 포함하는 조향장치.

청구항 10

제1항에 있어서,

상기 구동 유닛은 상기 기반 좌석 및 상기 구동 팔 사이에 배치된 베어링을 더 포함하는 조향장치.

명 세 서

기 술 분 야

[0001] 본 발명은 조향장치에 대한 것으로서, 더욱 상세하게는 서핑 보드용 조향장치에 대한 것이다.

배 경 기 술

[0002] 도 1을 참조하면, 미국 특허출원 공개번호 US2001/0042498호는, 보드 몸체(11), 제트 펌프(12), 조향장치(13), 그리고 구동 유닛(14)을 포함하는 종래의 파워 서핑 보드를 개시한다. 보드 몸체(11)는 머리(111) 및 꼬리(112)를 구비한다.

[0003] 제트 펌프(12)는 보드 몸체(11)를 추진하기 위해 꼬리(112)에 장착되고, 뒤쪽으로 열린 물 출구(미도시)를 구비한다.

[0004] 조향장치(13)는 유체 안내 노즐(131) 및 안내 케이블(미도시)을 구비한다. 유체 안내 노즐(131)은 회전가능하게 제트 펌프(12)에 연결되고 물 출구와 유체 소통한다. 안내 케이블은 꼬리(112)에서 머리(111)로 신장하고 유체 안내 노즐(131)에 회전가능하게 연결되는 일단을 갖는다.

[0005] 구동 유닛(14)은 기반 좌석(base seat, 141), 연결 부재(143) 그리고 강성 구동 팔(144)을 갖는다. 기반 좌석(141)은 머리(111)에 고정된다. 연결 부재(143)는 기반 좌석(141)에 배치되고, 구동축(DP)을 따라 신장하고 안내 케이블의 타 단에 회전가능하게 연결된다. 강성 구동 팔(144)은 연결 부재(143)에 고정된다.

[0006] 종래의 파워 서핑 보드를 사용할 때, 서핑 보더는 보드 몸체(11)에 타고 구동 팔(144)의 원위단을 잡아서 파워 서핑 보드의 이동 방향을 제어하면서 균형을 유지한다.

[0007] 서핑 보드(11)의 이동 방향을 변경하기 위해서는, 서핑 보더는 구동 팔(144)을 회전시켜 연결 부재(143)를 구동축(DP) 주위로 회전하도록 구동하며, 안내 노즐(131)은 안내 케이블을 통해 반대 방향으로 회전되고 이에 따라 파워 서핑 보드의 이동 방향이 변한다.

[0008] 하지만, 서핑 보더가 구동축(DP) 주위로 구동 팔(144)을 회전시킬 때, 서핑 보더의 몸은 동시에 크게 흔들리어 서핑 보더는 보드 몸체(11) 위에서 균형을 유지하는데 어려움을 겪는다.

발명의 내용

해결하려는 과제

[0009] 따라서, 본 발명의 목적은 전술한 종래 기술의 문제점을 극복할 수 있는 조향장치를 제공하는 것이다.

과제의 해결 수단

[0010] 상기 목적을 달성하기 위한 본 발명의 일 실시 예에 따른 조향장치는 서핑 보드에 사용될 수 있다. 서핑 보드는 머리 및 꼬리를 갖는 보드 몸체, 그리고 보드 몸체를 추진하기 위해 꼬리에 장착된 파워 유닛을 포함한다.

[0011] 조향장치는, 보드 몸체의 이동 방향을 제어하는 조향 유닛, 구동 유닛, 그리고, 전달 유닛을 포함한다. 구동 유닛은 기반 좌석, 연결 부재, 구동 팔 그리고 손잡이를 포함한다. 기반 좌석은 보드 몸체의 머리에 고정되고, 연결 부재는 기반 좌석 내에 배치되고 구동축 주위를 회전한다. 구동 팔은 유연하고 실질적으로 꼬이지 않으며, 구동축에 체결되고 연결 부재에 연결되는 연결 단 그리고 구동 팔의 장축을 따라서 이 연결 단 반대 편의 접근 단을 갖는데, 접근 단은 기반 좌석으로부터 바깥으로 신장하며, 구동 팔은 구동축 주위를 연결 부재가 회전하도록 구동하기 위해서 장축 주위를 회전할 수 있다. 손잡이는 구동 팔의 접근 단에 고정된다. 전달 유닛은 연결 부재와 조향 유닛을 서로 연결하여 구동축 주위의 연결 부재의 회전이 전달 유닛을 통해 조향 유닛의 동작을 구동한다.

발명의 효과

[0012] 본 발명의 실시 예에 따르면, 구동 팔은 심각한 흔들림 없이 자신의 축 주위를 회전할 수 있고, 서핑 보더는 서핑 보드(2)의 이동 방향을 제어할 때 쉽게 균형을 유지할 수 있다.

[0013] 본 발명의 실시 예에 따르면 서핑 보더의 조작성을 향상시킬 수 있다.

도면의 간단한 설명

[0014] 본 발명의 다른 특징들 및 이점들은 첨부된 도면을 참조한 이하의 본 발명의 실시 예에 대한 상세한 설명으로부터 명백해질 것이다.

도 1은 종래의 조향장치에 장착되는 파워 서핑 보드의 개략적인 측면도이다.

도 2는 본 발명의 일 실시 예에 따른 조향장치가 장착된 파워 서핑 보드의 부분 단면도이다.

도 3은 본 발명의 일 실시 예에 따른 파워 서핑 보드의 개략적인 상면도이다.

도 4는 도 2에 대한 단편 단면도이다.

도 5는 도 4의 V-V 선을 따라 절취했을 때의 단면도이다.

도 6은 본 발명의 일 실시 예에 파워 서핑 보드의 또 다른 개략적인 상면도로서, 본 발명의 일 실시 예에 따른 회전 방향으로 회전하는 구동 팔을 도시한다.

도 7은 도 6과 비슷한 도면이나, 반대 방향으로 회전하는 구동 팔을 도시한다.

발명을 실시하기 위한 구체적인 내용

[0015] 본 출원은 2012년 8월 21일자로 출원된 대만 특허출원 번호 101130248호를 우선권 주장한다.

[0016] 도 2 내지 도 4를 참조하면, 본 발명의 일 실시 예에 따른 조향장치는 서핑 보드에 사용된다. 서핑 보드(2)는

머리(23) 및 꼬리(24)를 갖는 보드 몸체(21) 그리고 보드 몸체(21)를 추진하기 위해 꼬리(24)에 장착된 파워 유닛(power unit, 22)을 포함한다. 파워 유닛(22)은 뒤쪽으로 열린 물 출구(25)를 갖는 제트 펌프로 구성된다. 조향장치는 조향 유닛(steering unit, 3), 구동 유닛(4), 그리고 전달 유닛(5)을 포함한다.

[0017] 조향 유닛(3)은 파워 유닛(22)에 회전가능하게(pivotally) 결합하고 보드 몸체(21)의 이동 방향을 제어한다.

[0018] 구동 유닛(4)은 중공 기반 좌석(hollow base seat, 41), 연결 부재(42), 구동 좌석(43), 구동 팔(44), 베어링(45), 그리고 손잡이(46)를 포함한다. 기반 좌석(41)은 보드 몸체(21)의 머리(23)에 고정된다. 연결 부재(42)는 본 실시 예에서는 판(plate)으로 형성되고 기반 좌석(41) 내에 배치되며 구동축(D) 주위를 회전한다. 구동 팔(44)은 가늘고 길며 장축을 정의하고, 연결 단 및 접근 단을 갖는다. 연결 단은 구동축(D)에 체결된다. 접근 단은 장축을 따라서 연결 단의 반대편이고 기반 좌석(41)으로부터 바깥으로 신장한다. 구동 팔(44)은 실질적으로 꼬이지 않고, 구동축(D) 주위를 연결 부재(42)가 회전하도록 구동하기 위해 장축 둘레를 회전한다. 구동 좌석(43)은 구동축(D)을 따라 신장하고 구동 팔(44)의 연결 단과 연결 부재(42)를 서로 연결한다(즉, 구동 팔(44)의 연결 단이 연결 부재(42))에 연결된다). 베어링(45)은 기반 좌석(41) 및 구동 팔(44) 사이에 배치된다. 손잡이(46)는 구동 팔(44)의 접근 단에 고정된다.

[0019] 도 4 및 도 5를 참조하면, 구동 유닛(4)의 구동 팔(44)은 유연한 관 모양 벽(441) 및 각지게 서로 떨어진 다수의 강철 케이블(442)을 구비한다. 다수의 강철 케이블(442)은 신장하며 관 모양 벽(441)에 매설된다. 본 실시 예에서는, 관 모양 벽(441)은 고무로 만들어진다. 각각의 강철 케이블(442)은 다수의 강철 스트랜드(strand)로 구성되거나 도는 단지 한 개의 강철 스트랜드로 구성될 수 있다. 구동 팔(44)은 그 장축을 따라서 5도(5 degrees) 이내로 토크 공차(torque tolerance)를 가지며, 이는 구동 팔(44)이 실질적으로 꼬이지 않도록 한다.

[0020] 구동 유닛(4)의 손잡이(46)는 고리 형태이며 구동 팔(44)의 접근 단에 구동 팔의 장축에 실질적으로 수직인 파지부(holding section)를 갖는다.

[0021] 다시 도 2 내지 도 4를 참조하면, 전달 유닛(5)은, 구동축(D) 주위로 연결 부재(42)의 회전이 전달 유닛(5)을 통해서 조향 유닛(3)의 회전 동작을 구동하도록, 연결 부재(42)와 조향 유닛(3)을 서로 연결한다. 전달 유닛(5)은 슬리브(sleeve, 51), 케이블(52), 구동 조향 레버(53) 그리고 구동된 조향 레버(54)를 포함한다. 슬리브(51)는 보드 몸체(21)에 고정되고 각각 구동 유닛(4) 및 조향 유닛(3)에 인접한 끝단을 구비한다. 케이블(52)은 슬리브(51)를 통해 신장하고 양 끝단을 갖는다. 구동 조향 레버(53)는 케이블(52)의 일 단에 연결되고 구동된 조향 레버(54)는 케이블(52)의 타 단에 연결된다. 구동된 조향 레버(54)는 케이블(52)의 양 끝단 중 타 단 맞은 편인 원위단을 구비하고 조향 유닛(3)에 회전가능하게 연결된다. 구동 조향 레버(53)는 케이블(52)의 양 끝단 중 일단 맞은 편인 원위단을 가지며 연결 부재(42)에 회전가능하게 연결된다.

[0022] 도 3, 도 6 및 도 7을 참조하면, 조향 유닛(3)은 유체 안내 관(31)을 포함하는데, 이 유체 안내 관(31)은 파워 유닛(22)에 회전가능하게 연결되고, 서핑 보드(2)의 물 출구(25)와 유체 소통하도록 배치되고, 그리고 구동된 조향 레버(54)의 원위단에 회전가능하게 연결되어, 회전 방향에서 구동축(D) 주위의 연결 부재(42)의 회전은 유체 안내 관(31)이 반대 회전 방향에서 회전하도록 구동한다.

[0023] 서핑 보드(2)의 이동 방향을 변경하기 위해서, 도 6에 도시된 바와 같이, 보드 몸체(21)에 서 있는 서핑 보더는 손잡이(46)의 파지부(461)를 잡고 구동 팔(44)을 회전시키며, 이로써 연결 부재(42)는 제1 회전 방향(R1)으로 회전한다. 그 결과 구동 조향 레버(53)는 이동되고 케이블(52)을 통해서 구동된 조향 레버(54)를 이동하며 이에 따라 유체 안내 관(31)을 구동하여 제1 회전 방향(R1)의 반대 방향인 제2 회전 방향(R2)으로 회전하도록 한다. 반대로, 도 7을 참조하면, 구동 팔(44)이 회전하여 제2 회전 방향(R2)으로 연결 부재(42)의 회전을 구동할 때, 유체 안내 관(31)은 제1 회전 방향(R1)으로 회전한다. 구동 유닛(4)의 동작이 전달 유닛(5)을 통해 조향 유닛(3)의 동작을 작동시키기 때문에, 물 출구(25)로부터 흐르는 물은 물 안내 관(31)에 의해 안내되어 보드 몸체(21)를 회전 방향(R1, R2)으로 돌린다.

[0024] 주목할 만한 점은 전달 유닛(5)은 센서를 포함하는 무선 신호 제어 시스템일 수 있다는 것이다. 센서는 연결 부재(42)의 회전 각도 및 회전 방향을 검출한다. 유체 안내 관(31)의 회전을 제어하기 위해, 유체 안내 관(31)에는 전달 유닛(5)의 센서로부터 전달되는 신호를 받는 수신기가 장착될 수 있다.

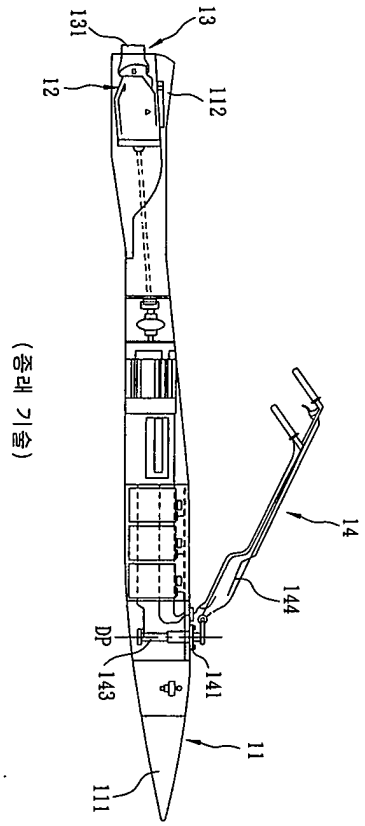
[0025] 요약하면, 구동 팔(44)이 꼬이지 않고 기반 좌석(41)에 의해 유지되기 때문에, 구동 팔(44)은 심각한 흔들림 없이 자신의 축 주위를 회전할 수 있고, 서핑 보더는 서핑 보드(2)의 이동 방향을 제어할 때 쉽게 균형을 유지할 수 있다. 또한, 구동 팔(44)의 유연성으로 인해서, 예를 들어 서핑 보더가 파도 때문에 서핑 보드에서 움직일 때, 종래 기술의 강성 구동 팔(144)(도 1 참조)과 비교해서 더 좋게 구동 팔(44) 및 보드 몸체(21) 사이의 상대

적인 변위(displacement)를 견딜 수 있고, 따라서 서핑 보더의 조작성을 향상시킨다.

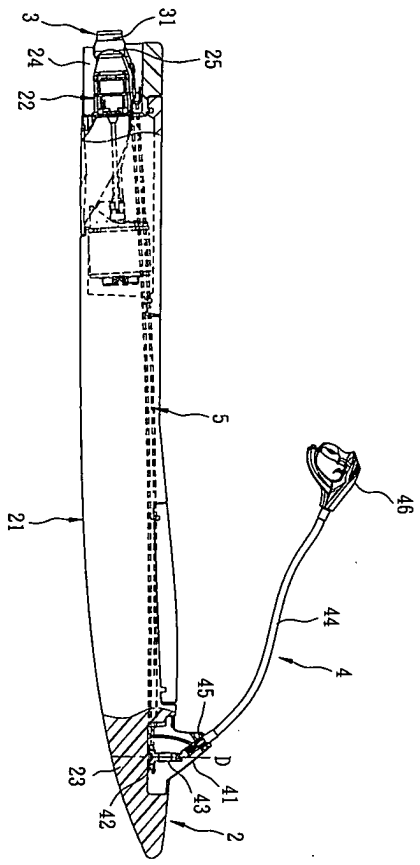
[0026] 실용적이고 바람직하다고 생각되는 실시 예를 통해서 본 발명이 설명되었지만, 본 발명은 본 명세서에 개시된 실시 예로 한정되는 것은 아니며 가장 넓은 해석의 사상 및 범위 내에 포함된 다양한 실시 예 및 균등한 실시 예를 포함한다.

도면

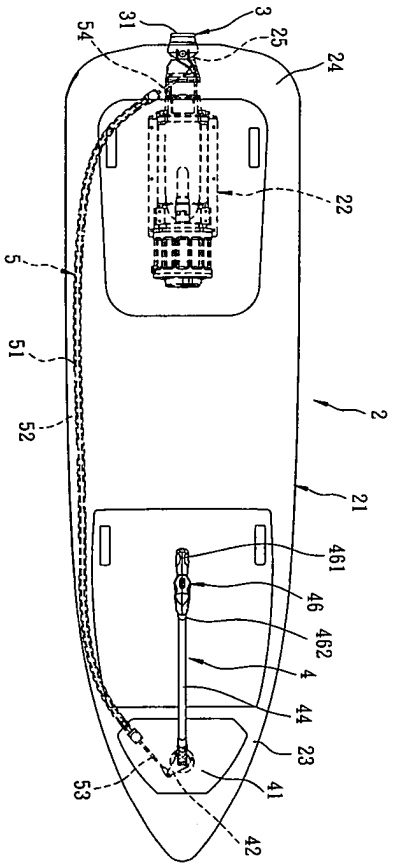
도면1



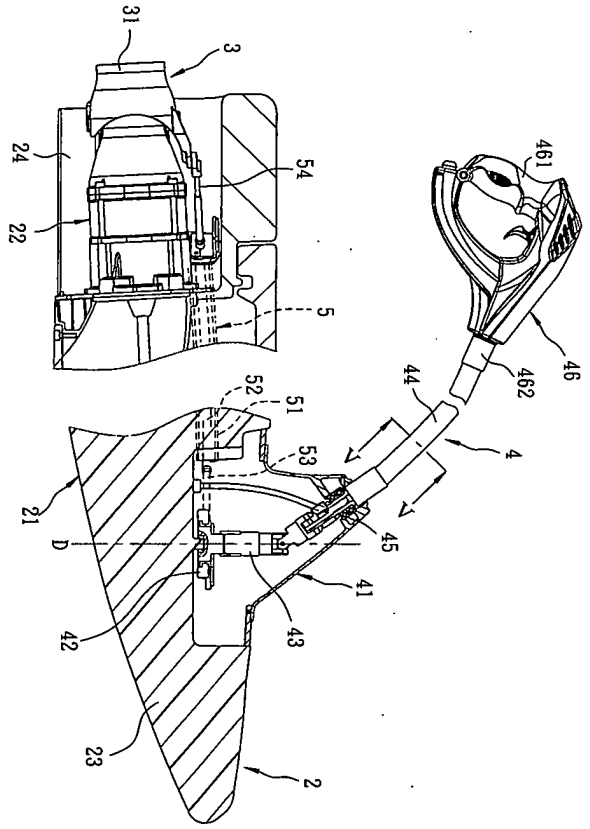
도면2



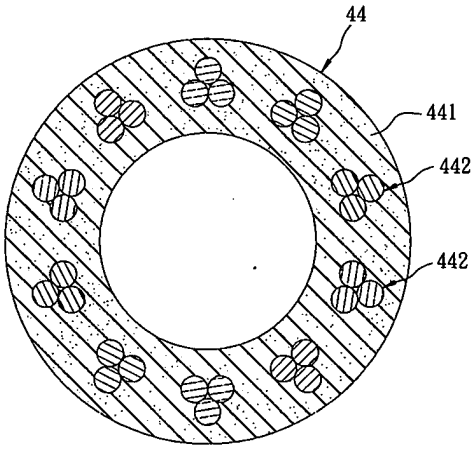
도면3



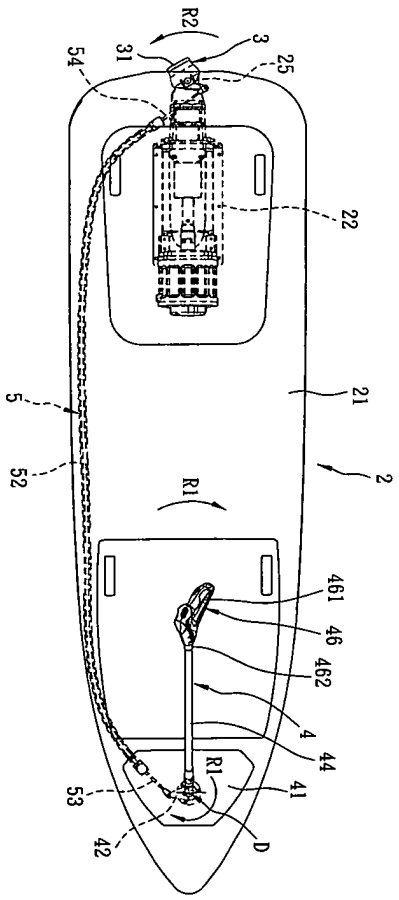
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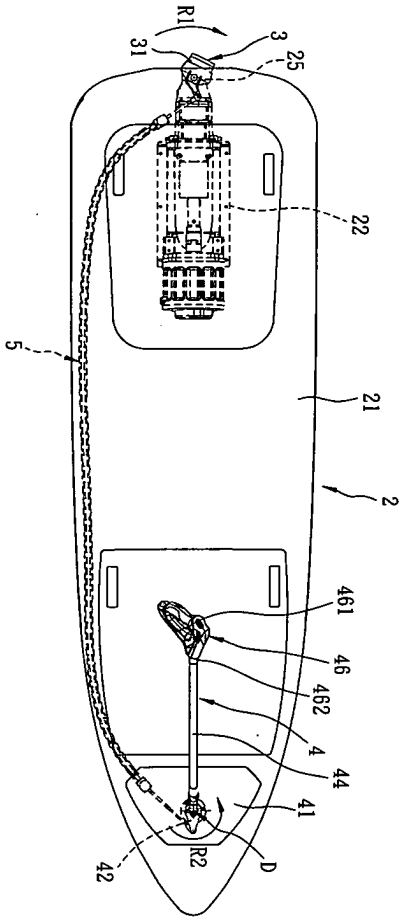
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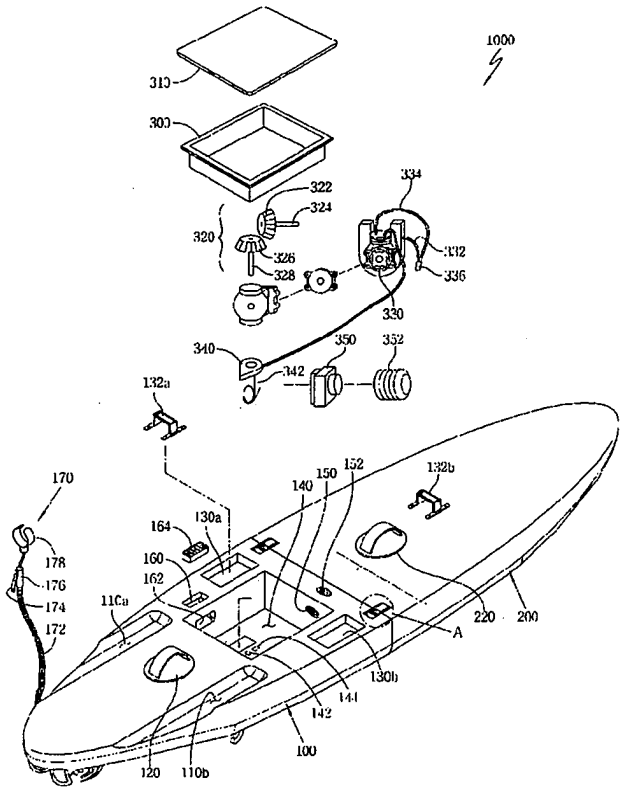
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(54) Title: THE SURFBOARD, AND THE BOAT USING THE SURFBOARD

(57) Abstract: An improved water surfboard and a surfboat using the same are disclosed, which are capable of enjoying surfing in water without wind and waves by installing an engine at a water surfboard, and a water surfboard is inserted into and engaged at an engaging part of a boat, so that it can be used as a driving force source of a surfboard.



WO 2006/014085 A1

Description

THE SURFBOARD, AND THE BOAT USING THE SURFBOARD

Technical Field

[1] The present invention relates to a water surfboard and a surfboat using the same, and in particular to an improved water surfboard and a surfboat using the same which are capable of enjoying surfing in water without wind and waves by installing an engine at a water surfboard, and a water surfboard is inserted into and engaged at an engaging part of a boat, so that it can be used as a driving force source of a surfboard.

[2]

Background Art

[3] As the standard of life advances, people, who enjoy outdoor leisure and sports, increase. The leisure has been diversified and has changed with big attentions. As a representative leisure sport which can be performed in water, there is a surfing. In Korea, since there are not many water waves, people are tend to enjoy a wind surfing.

[4] However, people cannot enjoy windsurfing in weather with weak wind or no wind. Since a surfing gear is large, carrying the same results in many inconveniences. In addition, the surfing gear is too expensive, there are many problems so that ordinary people can enjoy the windsurfing. In order to enjoy windsurfing, it is needed to learn how to use sail based on the direction of wind. As a result, much efforts and many time are needed so that ordinary people can enjoy windsurfing.

[5]

Disclosure of Invention

Technical Problem

[6] In the conventional art, a certain surfboard is disclosed, which has an engine at a conventional water surfboard, so that a user can enjoy surfing at a place without wind and waves. However, the conventional water surfboard has a big size and volume, so that an additional transportation apparatus is needed in order to move the water surfboard for thereby causing many difficulties. In view of cost, the cost of the water surfboard is too expensive as compared when suing a pump engine as an engine of a surfing surfboard.

[7] In addition, a conventional leisure boat is also too expensive so that ordinary people cannot enjoy. Therefore, an additional surfing gear and storing place are additionally needed, so that there are many limits for fabricating and distributing the same.

[8] Therefore, there have been many demands so that the surfboard and surfboard having a conventional engine are directed to overcoming the problems encountered in

a conventional art in view of a size, transportation, purchase cost, storing and maintenance. Ordinary people can easily enjoy water surfboard and water surfboat.

[9]

Technical Solution

[10] Accordingly, it is an object of the present invention to provide a water surfboard by which people can enjoy surfing without wind and waves by installing an engine at a water surfboard. The weight of equipment is light, and the volume of the same is small. An assembling and transportation are easier, and a fabrication cost is low, so that ordinary people can enjoy at lower cost.

[11] It is another object of the present invention to provide a water surfboard, which can be used as a water surfboard and a surfboat by fabricating it in such a manner that a water surfboard is engaged at a rear end of a water surfboat, so that a water surfboard operates as an engine part of a boat.

[12]

Advantageous Effects

[13] As described above, in the present invention, people can enjoy a water surfing without wind and waves by installing an engine at a water surfboard. The weight and volume of the whole parts of equipment are small, so that a transportation and storage are easy. The fabrication and maintenance are low, so that ordinary people can easily enjoy water surfing. The present invention may contribute to public use of surfing.

[14] In the present invention, when a surfboard is capsized, a surfer is prevented from being directly exposed to a screw. A quick acceleration of a screw is prevented. With the above construction, it is possible to fully prevent a surfer from being damaged when a water surfboard is capsized.

[15] A water surfing can be enjoyed using an improved water surfboard according to the present invention. A water surfboard can be engaged at a water surfboard with a simple operation and can be used as a driving force source of a surfboard.

[16]

Brief Description of the Drawings

[17] Figure 1 is a disassembled perspective view illustrating an upper construction of a water surfboard according to an embodiment of the present invention;

[18] Figure 2 is a perspective view illustrating a lower construction of a water surfboard according to an embodiment of the present invention;

[19] Figure 3 is a perspective view illustrating the whole construction of a water surfboard according to an embodiment of the present invention;

[20] Figure 4 is a perspective view illustrating a folded state of a water surfboard according to an embodiment of the present invention;

[21] Figure 5A is a partial enlarged view of a portion A of Figure 1, and Figure 5B is a partial enlarged view of a portion B of Figure 2;

[22] Figure 6 is a partial enlarged view of a portion C of Figure 3;

[23] Figure 7A is a side cross sectional view illustrating a state that an air discharge path of a water surfboard is sealed according to an embodiment of the present invention, and Figure 7B is a side cross sectional view illustrating a state that an air discharge path of a water surfboard is opened according to an embodiment of the present invention;

[24] Figure 8 is a partial enlarged view of a portion D of Figure 3;

[25] Figure 9 is a partial enlarged view of a portion E of Figure 3;

[26] Figure 10 is a perspective view illustrating a propelling part installed at a lower side of a rear end of a water surfboard according to an embodiment of the present invention;

[27] Figure 11 is a disassembled perspective view illustrating a propelling part of Figure 10;

[28] Figures 12A and 12B are perspective views illustrating a skeg unit of a water surfboard according to an embodiment of the present invention;

[29] Figure 13 is a view illustrating a state that an upward force is generated at a skeg unit when a water surfboard surfs according to an embodiment of the present invention;

[30] Figure 14 is a disassembled perspective view illustrating a quick acceleration prevention system of a water surfboard according to an embodiment of the present invention;

[31] Figure 15A is a side cross sectional view illustrating an engaged state of a weight pin at a normal mode in a quick acceleration prevention system according to the present invention, and Figure 15B is a side cross sectional view illustrating an engaged state of a weight pin when a surfboard is capsized;

[32] Figures 16A is a view of a brief description of a state that a semiautomatic choke opening and closing unit is closed according to the present invention, and Figure 16B is a view of a brief description of a state that a semiautomatic choke opening and closing unit is opened as a wire is pulled according to the present invention;

[33] Figure 17 is a view illustrating a use state of a water surfboard according to an embodiment of the present invention;

[34] Figure 18 is a perspective view illustrating the whole parts of a water surfboat using a water surfboard according to another embodiment of the present invention;

[35] Figure 19 is a separated perspective view illustrating the whole parts of a water surfboat using a water surfboard according to another embodiment of the present invention;

[36] Figure 20 is an enlarged perspective view illustrating a handle mounting part of a water surfboat according to another embodiment of the present invention; and

[37] Figure 21 is a partial enlarged view of a portion F of Figure 18.

[38]

Best Mode for Carrying Out the Invention

[39] To achieve the above objects, there is provided a water surfboard, comprising a board body which includes a sealed compartment at one side of the same, an air suction path for inputting an external air into the sealed compartment, and a discharge path for discharging a fluid of the sealed compartment to the outside; an engine part which is provided in the sealed compartment of the board body; a fuel tank that supplies a fuel to the engine part; a driving force transfer unit which is connected with the engine part for transferring a driving force to a screw shaft; a cooling unit which is provided in the sealed compartment of the board body and cools the engine part; an engine acceleration unit which is attached at one side of a rear end of the board body and controls a performance of the engine part; at least one screw fixing member which is fixed at a groove formed at a lower surface of the board body and includes an engaging hole at one side of an intermediate portion of the same; and a propelling screw which is connected with an end portion of the screw shaft engaged at the engaging hole of the screw fixing member for thereby generating a propelling force.

[40] To achieve the above objects, in a surfboat which is designed to detachably engage at least one surfboard, there is provided an improved water surfboat, comprising at least one engaging part which is formed at a rear end portion of the water surfboat for inserting the water surfboard and engaging the same; a handle part which is rotatably engaged at the inner surfaces of both sides of the water surfboat, with a surfer being capable of holding the handle part together with the engine acceleration unit of the water surfboard, and with the handle part being folded and stored into the handle receiving part formed at the inner surfaces of both sides of the water surfboat; a chair which is fixedly installed at an upper plate of the water surfboat, so that a boat driver can sit thereon; and a fixing member which engages the water surfboard to the engaging part of the water surfboat for thereby preventing the water surfboard from being disengaged from the water surfboat.

[41]

Mode for the Invention

[42] Embodiments of water surfboard

[43] Figure 1 is a disassembled perspective view illustrating an upper construction of a water surfboard according to an embodiment of the present invention; Figure 2 is a perspective view illustrating a lower construction of a water surfboard according to an

embodiment of the present invention; Figure 3 is a perspective view illustrating the whole construction of a water surfboard according to an embodiment of the present invention; and Figure 4 is a perspective view illustrating a folded state of a water surfboard according to an embodiment of the present invention.

[44] The method of using a water surfboard according to the present invention will be briefly described with reference to the above-drawings prior to the detailed descriptions of the technical features of the present invention. When using a surfboard according to the present invention, a surfer stands on a water surfboard with his two feet being placed thereon in balance for thereby enjoying a surfing. In another method of using a surfboard, a surfer surfs, with a handle being held using two hands in a posture that two knees are fallen down. The present invention is basically designed to well adapt to the above two methods.

[45] As shown in Figures 1 through 4, a water surfboard 1000 according to an embodiment of a present invention includes a sealed compartment 140 formed at one side of the same. An air suction path 152 is provided so as to suck an external air into the sealed compartment 140. A board body 100, 200 includes a discharge path 142 so as to discharge a fluid of the sealed compartment 140 to the outside. An engine part 330 is installed in the sealed compartment 140 of the board body 100, 200. A fuel tank 300 is provided for supplying fuel to the engine part 330. A driving force transfer unit 320 is connected with the engine part 330 for transferring a driving force to a screw shaft. In addition, a cooling unit 350 is installed in the sealed compartment 140 of the board body for cooling the engine part 330. An engine acceleration unit 170 is engaged at one side of a rear end of the board body and is connected with a surfer for thereby controlling an output of the engine part 330. There is further provided at least a screw fixing member 400 which is fixed at a groove formed at a lower side of the board body and includes an engaging hole formed at one side of an intermediate portion. A propelling screw 456 is connected with an end portion of the screw shaft engaged at the engaging hole of the screw fixing member 400 for thereby generating a propelling force. The preferred embodiment of the present invention includes a board body formed of a first body 100 and a second body 200. Here, the first body 100 and the second body 2 are foldable. The board body is formed in a stream shape, with a pair of foot hangers being installed at an upper side of the same, and with the positions of the foot hangers being variable in the longitudinal directions. A handle groove 130a, 130b is formed at an upper surface of the first body 100. A handle hanger 132a, 132b is provided at an inner side of the handle groove 130a, 130b, so that a surfer holds the same. A pair of knee rests 110a and 110b are provided at an upper surface of the first body 100, so that a surfer's knee can get rest. Although it is not shown in the drawings, a certain inflammable filler having a buoyant force is filled in an inner space of each

first body 100 and second body 200. With the above construction, it is possible to prevent a sinking of a board with a buoyant force of an inflammable force when a board body is damaged or a fire occurs.

[46]

[47] Foldable structure

[48] As shown in Figures 1 and 2, the water surfboard 1000 according to the present invention is formed of the first body 100 and the second body 200. As shown in Figure 2, the first body 100 and the second body 200 are connected with a foldable hinge B installed at the lower sides of the board bodies. Figure 5B shows a structure of the foldable hinge B. As shown in Figure 1, an engaging member 184 and an engaging ring 284 are provided at the upper surface of the board body 110. With the above construction, it is possible to maintain the board in an unfolded state in such a manner that the engaging ring 284 is engaged at the engaging member 184. Namely, when folding the boards, the engaging ring 284 is disengaged from the engaging member 184, and then the first body 100 and the second body 200 are folded, so that the surfboard can be easily transported and stored. When unfolding the boards, the first body 100 and the second board 200 are fully unfolded, and the engaging ring 284 is engaged at the engaging member 184, so that the unfolded states of the first body 100 and the second body 200 are maintained.

[49]

[50] Structure of foot hanger

[51] As shown in Figure 1, when a surfer enjoys surfing, as a member for fixing a surfer's feet at the upper surfaces of the board bodies, there are provided a pair of foot hangers 120 and 220 at an upper surface of the board body. The foot hangers 120 and 220 are provided at the upper surfaces of the first body 100 and the second body 200. The positions of the foot hangers 120 and 220 are movable in the longitudinal directions of the boards based on the standing width of the surfer. The positions of the foot hangers 120 and 220 can be adjusted in the longitudinal direction based on the foot sizes of the surfer. Therefore, the surfer can easily adjust the foot hangers based on the standing width and the sizes of the feet.

[52]

[53] Knee rest and handle structure

[54] When a surfer enjoys surfing in a posture that surfer's knees are fallen down, a pair of knee support members 110a and 110b capable of supporting surfer's knees are formed at both sides of an upper surface of the first body 100 in the longitudinal direction of the board. A pair of handle hangers 132a and 132b are provided at both sides of an upper surface of the first body 100 so that a surfer holds in a knee-fallen state. Preferably, the knee support members 110a and 110b are provided at the rear end

of the first body 100. Handle grooves 130a and 130b are formed at an upper surface of the first body 100. Handle hangers 132a and 132b are provided in the inner sides of the handle grooves 130a and 130b so that the surfer holds the same. A certain space is formed at each handle groove 130a, 130b so that the handle support members 174 are received, with acceleration levers 176 being supported by the handle support members 174. A surfer can hold the handle hangers 132a and 132b in a state that the surfer holds the handle support member 174 with hands. As shown in Figure 9, the surfer can hold the handle support member 174 and the handle hanger 132b, with the handle support member 174 being covered at the handle hanger 132b. Therefore, the surfer can easily adjust the speed of the board by operating the accelerating lever 174 installed in the handle groove 130, 130b in a case that the surfer's knees are fallen down and surfer holds the handle hanger 132a, 132b.

[55]

[56] Structure of sealed compartment and engine cooling method

[57] The sealed compartment 140 is provided at one side of the first body 100. An air and water cooling-combined engine part 330 is provided at the sealed compartment 140. Here, the air and water cooling-combined engine part 330 adapts a method of cooling the engine part using both air and water. The cooling method of using air and water will be described.

[58]

[59] (1) Cooling method using air

[60] Air is inputted through the air suction path 152, and the inputted air is supplied to the engine part 330 by a cooling fan 350 provided in the sealed compartment 140 for thereby cooling the engine part 330.

[61]

[62] (2) Cooling method using water

[63] With a water pump 340, the cooling water is supplied to the engine part through a cooling line provided at an engine head block. Here, the water pump 340 is connected with a driving shaft 328 of the driving force transfer unit 320. The water pump 340 is driven by a driving force from the driving shaft 328 of the driving force transfer unit 320. In this case, the water pump 340 sucks water through a water suction port, and the sucked water is supplied through a cooling line provided at the engine head block of the engine part through the cooling water supply line 338 connected with the engine part, for thereby cooling the engine part 330. The cooling water passed through the cooling line flows through a cooling water discharge line 334 and is discharged through a discharge path 142 to which a discharge collection pipe 336 is fixedly inserted.

[64]

[65] Air suction and discharge path structure

[66] An air suction path 152 is provided at one side of an upper surface of the first body 100 for thereby sucking an external air into the sealed compartment 140. A discharge path 142 is provided so as to discharge air or water from the sealed compartment 140 to the outside. Here, the air sucked through the air suction path 152 operates a function of cooling the engine part when it is supplied to the cooling fan 350 installed in the sealed compartment 140 with the cooling fan 350 being operated based on a forced cooling method. As shown in Figure 8, a plurality of partition walls 154 are provided at an inner wall of the air suction path 152 since water may be inputted through the air suction path 152 together with air for thereby preventing a direct input of water. In addition, with the above construction, air inputted in mixture with water is rotated, and water having high a density is centrifugally processed and condensed and dropped at an inner wall of the partition walls. Preferably, the partition walls 154 are formed in spiral shapes. The fallen water is collected at the water collection groove 144 formed in the interior of the sealed compartment through a drainage path 156. The water collected at the water collection groove 144 is drained through an exhaust gas line 332 communicating with the water collection groove, and the discharge collection pipe 336. The discharge collection pipe 336 passes through the discharge port 142 of the sealed compartment and is extended from a lower surface of the board body.

[67] The principle that the air and water inputted through the air suction path 152 are discharged to the outside through the discharge collection pipe 336 based on Verneuil law. This principle will be described in detail.

[68] As shown in Figure 1, the exhaust gas line 332 and the cooling water discharge line 334 are inserted into the discharge collection pipe 336. Here, the inner diameter of the discharge collection pipe 336 is determined based on a principle that a certain space (gap) is the same as the size formed at an inner side of the discharge collection pipe, with the space being determined so that the water and air are discharged from the interior of the sealed compartment when the exhaust cooling water discharge line 332 and the cooling water discharge line 334 are inserted into the discharge collection pipe 336. The exhaust gas of the engine part is exhausted through the exhaust gas line 332, and the cooling water, which cooled the engine part, is discharged through the cooling water discharge line 334. In this case, as the discharge speed of the exhaust gas exhausted from the exhaust gas line 332 increases, the pressure in the interior of the discharge collection pipe 336 decreases, so that the air of the interior of the sealed compartment is discharged through the gap of the discharge collection pipe 336. In the same method, the water collected at the water collection groove 144 of the interior of the sealed compartment is discharged through the gap of the discharge collection pipe.

[69]

[70] Structure of air discharge path

[71] Figure 6 is a partial enlarged view of a portion C of Figure 3, Figure 7A is a side cross sectional view illustrating a state that an air discharge path of a water surfboard is sealed according to an embodiment of the present invention, and Figure 7B is a side cross sectional view illustrating a state that an air discharge path of a water surfboard is opened according to an embodiment of the present invention.

[72] As shown in Figure 6, an air discharge cover 164 is installed at a discharge port of the air discharge path 147. A support upper plate 166a, a rubber membrane 166b, and a support lower plate 166c are sequentially installed in the interior of the air discharge cover 164. Here, one side surface of the rubber membrane 166b is fixed based on an engagement of the support upper plate 166a and the support lower plate 166c. The othe r side surface of the rubber membrane 166b is not fixed, so that the air of the sealed compartment is freely discharged. As shown in Figure 7B, when the air is discharged through the sealed compartment, the rubber membrane 166b is opened in the air discharge direction, so that the air is discharged from the sealed compartment. When the air is not discharged from the sealed compartment or the water is inputted from the outside, as shown in Figure 7A, the rubber membrane 166b is closely contacted with the support lower plate 166c, so that it is possible to prevent the input of water from the outside.

[73]

[74] Structure of driving force transfer

[75] As shown in Figure 1, the driving force transfer unit 320, which is connected with the engine part, is provided in the sealed compartment 140 for thereby transferring a driving force to the propelling screw. The driving force transfer operation of the driving force transfer unit 320 will be described in detail. As the engine part 330 starts operating, a rotational force is transferred to a first driving shaft 324. The thusly transferred rotational force rotates a cooperating gear 322 engaged at an end portion of the first driving shaft and a driving sprocket 326 engaged with the cooperating gear 322, so that a second driving shaft 328 connected with a first driving sprocket 326 is driven. The rotational force transferred by the driving force transfer unit 320 is transferred to a screw shaft 450, so that the propelling screw 456 engaged at the end portion of the screw shaft 450 is rotated for hereby generating a propelling force. When the rotational force of the driving force transfer unit 320 is transferred, a certain driving force transfer unit like a universal joint 450 may be used.

[76]

[77] Structures of screw fixture, screw protection wing and screw protection member

[78] Figure 10 is a perspective view illustrating a propelling part installed at a lower side of a rear end of a water surfboard according to an embodiment of the present

invention, and Figure 11 is a disassembled perspective view illustrating a propelling part of Figure 10. As shown in Figure 10, a groove 105 is formed at a lower surface of the board body in the longitudinal direction of the surfing board for installing various parts therein, with the groove 105 being formed in a spiral concave shape. In the groove 105 formed in the longitudinal direction of the surfboard, at least one screw fixture 400 is fixed by fixing members 412 and 422. An engaging hole 426 is formed at one side of an intermediate portion of the screw fixture 400. The screw shaft 450 is inserted into the engaging hole 426. The rotational force from the engine part rotates the screw shaft 450, so that the propelling screw 456 fixed at the end portion of the screw shaft 450 is rotated for thereby generating a propelling force. In the drawings, reference numeral 107 represents a fluid inlet portion. A groove is formed so as to enable a smooth flow of water inputted in the direction of the screw, with the groove being formed at a certain slope. The fluid inlet part 107 is designed so as to minimize a resistance force caused owing to water curving flow and friction. As shown in Figures 10 and 11, a pair of screw protection wings 430 are provided at one side of the screw fixture 400. Here, the screw protection wings 430 may be fixedly engaged at one side of the screw fixture 400 using a certain engaging member such as bolt and the like. Preferably, the screw protection wings 430 are formed in blade shapes so as to minimize the resistance with respect to fluid. More preferably, the screw protection blades 430 may have varying operation angles with respect to the engaging member, with the angles being changed based on the angle of the input of the fluid. Therefore, the screw protection wings 430 are capable of minimizing the resistance of fluid using their free angle adjusting functions with respect to non-uniform fluid flows. In addition, at least one screw protection member 440 is provided at one side of a lower surface of a rear end portion of the board body. The variable screw protection wings 430 and the screw protection member 40 are capable of preventing the damages of the propelling screw 456 by foreign substances suspended in water, so that a surfer can be protected from damages when contacting with the variable screw protection wings 430 or the screw protection member 440. Namely, the variable screw protection wings 430 and the screw protection member 440 are basically directed to keeping the surfer safe and are installed at the lower side of the board body like surrounding the propelling screw 450 for thereby being protected when the propelling screw contacts with foreign substances. Reference numeral 452 of Figure 11 represents a universal joint.

[79]

[80] Quick acceleration prevention system when surfboard is capsized

[81] Figure 14 is a disassembled perspective view illustrating a quick acceleration prevention system according to the present invention. As shown therein, a first acceleration lever 2700 and a second acceleration lever 2600 are rotatably engaged at an

acceleration body 2510 of the engine using an engaging member 2830. A quick acceleration prevention pin 2800 passes through the first and second quick acceleration levers 2700 and the 2600. A weight pin 2810, which is movable upwards and downwards by gravitation, is installed in the casing. In the normal operation mode, the weight pin 2810 engages the first acceleration lever 2700 and the second acceleration lever 2800, so that an acceleration signal is transmitted from the first acceleration lever 2700 to the engine part for thereby accelerating the engine. In the capsized mode, the weight pin 2800 disengages the first acceleration lever 2700 from the second acceleration lever 2600, so that the engine quick acceleration is prevented when the surfboard is capsized. Figure 15A is a side cross sectional view illustrating an engaged state of a weight pin at a normal mode in a quick acceleration prevention system according to the present invention, and Figure 15B is a side cross sectional view illustrating an engaged state of a weight pin when a surfboard is capsized. As shown therein, when a first lever 2700 is rotated as a wire 2710 is pulled by an acceleration lever of the engine acceleration unit, in the normal operation mode, the second acceleration lever 2600 engaged by the weight pin 2810 rotates for thereby accelerating the engine. In the capsized mode, the weight pin 2810 is disengaged from the second lever 2600, so that only the first lever 2700 is rotated, namely, the second lever 2600 is not rotated, whereby the engine is not accelerated. Therefore, there is an error operation that the acceleration lever is pushed because the wires of the engine acceleration unit or the like are entangled when the surfboard is capsized, the signal is not transmitted to the engine part, so that it is possible to prevent the surfer from being damaged owing to the quick acceleration of the screw. As shown in Figures 15A and 15B, power contact portions 2610 and 2620 are provided at the portions where the front end of the weight pin 2810 contacts. Therefore, in the normal operation mode, the weight pin 2810 connects the power contact portions 2610 and 2620, so that the engine part operates normally. In the capsized mode, the weight pin 2810 is disengaged from the power contact portions 2610 and 2620, so that the power supply is automatically disconnected. Therefore, in the water surfboard 1000 according to the present invention, in the normal operation mode, the weight pin 2810 connects the power contact portions 2610 and 2620, so that the power is normally supplied to the engine part. In the capsized mode, the power supply is automatically disconnected, and the engine stops for thereby preventing any damages.

[82]

[83] Semiautomatic choke opening and closing unit

[84] Figures 16A is a view of a brief description of a state that a semiautomatic choke opening and closing unit is closed according to the present invention, and Figure 16B is a view of a brief description of a state that a semiautomatic choke opening and

closing unit is opened as a wire is pulled according to the present invention. As shown in Figure 16A, one end of the wire 2710 is wound on an outer surface of the first acceleration lever 2700, and the other end of the same is inserted into a wire casing 2770. A choke opening and closing lever 2740 is provided at an upper side of the wire casing 2770. A choke valve 2750 is integrally provided at the opposite side of the choke opening and closing lever 2740. The integral choke opening and closing lever 2740 and choke valve 2750 are operable-engaged at an outer side surface of an evaporator 2760 by an engaging member 2745. As shown in Figure 16A, in a state that the wire 2710 is not pulled, the choke opening and closing lever 2740 is supported by the wire casing 2770, and the choke valve 2750 provided at the opposite side of the same is closed. As shown in Figure 16B, as the wire 2710 in the wire casing 2770 is pulled, the wire casing 2770 directly applies a certain force to the choke opening and closing lever 2740, so that the choke opening and closing lever 2740 moves upwards. As a result, the choke valve 2750 provided at the opposite side of the choke opening and closing lever 2740 moves downwards and is automatically opened. Therefore, the choke valve 2750 is semi-automatically opened and closed based on a simple structure without using an additional choke valve opening and closing member.

[85]

[86] Structure of Skeg

[87] Figures 12A and 12B are perspective views illustrating a skeg unit of a water surfboard according to an embodiment of the present invention, and Figure 13 is a view illustrating a state that an upward force is generated at a skeg unit when a water surfboard surfs according to an embodiment of the present invention.

[88] As shown in Figure 2, a pair of skeg units 460 are provided at a lower surface of the board body. Here, the skeg units 460 are designed to obtain a straight line construction of the board body and to decrease a friction with water surface by lifting the front end of the board body based on an upward force occurring in water when the surfboard surfs at a high speed. As a result, the speed of the surfboard is increased. As shown in Figures 12A and 12B, the skeg unit 460 is formed of a skeg pin 462 and a skeg receiving unit 464. The skeg pin 462 is formed in a streamline shape like the cross section of an airplane wing for thereby generating an upward force. The skeg pin 462 is designed to be supported by an elastic spring, so that even when it is folded in a rearward direction when collided with a person or other foreign substances, it is automatically recovered naturally. In particular, the skeg pin 462 is received in a skeg receiving part 464 when transporting the same, so that it is possible to prevent any damage of the skeg. As shown in Figure 13, when the water surfboard 1000 surfs at a high speed, the skeg units 460 provided at both sides of the propelling screw generate an upward force by which the front end of the water surfboard 1000 is lifted upwards.

[89]

[90] Engine acceleration unit

[91] As shown in Figure 1, the engine acceleration unit 170 is engaged at a rear end of the first body 100 for thereby adjusting a performance of the engine. The engine acceleration unit 170 includes a wire 172 connected with the engine part 330, an acceleration lever 174 capable of adjusting a performance of the engine, a handle support member 176 for supporting the acceleration lever 174, and a wrist-worn member 178 detachable engaged at one side of the handle support member. Here, the wrist-worn member 178 is designed to prevent a surfer from being separated from the board when the surfboard is capsized and is worn by the hand of the surfer. Preferably, the engine acceleration unit 170 is engaged at a left lower end of the vertical surface of the rear end of the first body 100. With the above construction, it is possible to fully recover the surfboard with a simple operation that the surfer pulls the engine acceleration unit 170 by changing the position of the force applied to the surfboard when the surfer is fully separated from the board. The acceleration lever 174 is hinged at one side of the handle support member 176. The wire 172 is connected at one side of the acceleration lever 174. An accelerator of the engine is operated by pulling the wire 172 based on a seesaw principle for thereby accelerating the engine. The wrist-worn member 178 is detachably engaged at one side of the handle support member 176, so that a surfer can hold the handle support member 176 even when the surfer misses the same.

[92]

[93] Embodiment of water surfboat using water surfboard

[94] Figure 19 is a separated perspective view illustrating the whole parts of a water surfboat using a water surfboard according to another embodiment of the present invention, and Figure 20 is an enlarged perspective view illustrating a handle mounting part of a water surfboat according to another embodiment of the present invention.

[95] In this embodiment of the present invention, in a surfboat 2000 which is designed to detachably engage at least one surfboard 1000, there is provided an improved water surfboat, comprising at least one engaging part 2400 which is formed at a rear end portion of the water surfboat 2000 for inserting the water surfboard 1000 and engaging the same; a handle part 2110 which is rotatably engaged at the inner surfaces of both sides of the water surfboat 2000, with a surfer being capable of holding the handle part together with the engine acceleration unit of the water surfboard 1000, and with the handle part being folded and stored into the handle receiving part 2100 formed at the inner surfaces of both sides of the water surfboat 2000; a chair 2200 which is fixedly installed at an upper plate of the water surfboat 2000, so that a boat driver can sit thereon; and a fixing member 2300 which engages the water surfboard 1000 to the engaging part 2400 of the water surfboat 2000 for thereby preventing the water

surfboard 1000 from being disengaged from the water surfboat 2000.

[96]

[97] Structure of engaging part

[98] As shown in Figures 19 and 20, at least one engaging part 2400 is provided at a rear end portion of the water surfboard 2000 with the water surfboard 1000 being inserted into the water surfboat 2000. The engaging part 2400 includes a certain space-like receiving portion, so that a front end of the water surfboard 1000 is inserted.

[99]

[100] Structure of handle receiving part

[101] A handle receiving part 2100 is provided at both inner side surfaces of a boat body, so that a boat rider can hold the same. A handle part 2110 is received into the handle receiving part 2100. A boat rider unfolds the handle part 2110 received in the handle receiving part 2100 in the leftward direction and then holds the handle part 2110 together with the engine acceleration unit, so that it is possible to freely adjust the performance of the engine acceleration unity in a state that the rider holds the same. Figure 20 is a view of a use state that the handle part 2110 is unfolded from the handle receiving part 2100.

[102]

[103] Structure of chair

[104] As shown in Figures 19 and 20, there is provided a chair 2200 at an upper plate of the water surfboat 2000, so that a boat driver can sit thereon. As shown by the dotted line of Figures 19 and 20, the chair 2200 is designed to be foldable, so that the driver of the boat can fold or unfold the chair based on his selection.

[105] A fixing member 2300 is provided at an upper plate of the water surfboat 2000 in order to prevent the water surfboard 1000 from being escaped from the water surfboat 2000 after the water surfboard 1000 is engaged at the engaging part 2400 of the water surfboat 2000. Here, the fixing member 2300 is engaged over the water surfboard 1000 engaged at the engaging part 2400 of the water surfboat 2000, so that the water surfboard 1000 is prevented from being escaped from the water surfboat 2000.

[106]

[107] Direction change method of boat

[108] As shown in Figures 19 and 20, in the case that two water surfboards 1000 are engaged at the water surfboat 2000, the running direction of the boat can be easily changed by differently accelerating two boards. In the case that one water surfboard is engaged, a steering rudder is engaged at a lower side of the water surfboat 2000, so that it is possible to change the running direction of the boat by operating the rubber.

[109]

[110]

Claims

[1] A water surfboard, comprising:
a board body which includes a sealed compartment at one side of the same, an air suction path for inputting an external air into the sealed compartment, and a discharge path for discharging a fluid of the sealed compartment to the outside;
an engine part which is provided in the sealed compartment of the board body;
a fuel tank that supplies a fuel to the engine part;
a driving force transfer unit which is connected with the engine part for transferring a driving force to a screw shaft;
a cooling unit which is provided in the sealed compartment of the board body and cools the engine part;
an engine acceleration unit which is attached at one side of a rear end of the board body and controls a performance of the engine part;
at least one screw fixing member which is fixed at a groove formed at a lower surface of the board body and includes an engaging hole at one side of an intermediate portion of the same; and
a propelling screw which is connected with an end portion of the screw shaft engaged at the engaging hole of the screw fixing member for thereby generating a propelling force.

[2] The surfboard of claim 1, wherein said board body includes a first body and a second body with the first and second bodies being foldable.

[3] The surfboard of either claim 1 or claim 2, wherein said cooling unit is arranged to cool the engine part based on either a method in which air sucked through the air suction path is supplied to the engine part by the cooling fan for thereby cooling the engine part or a method in which cooling water is supplied to the engine part through a cooling line provided at an engine head block for thereby cooling the engine part with the cooling water being connected with the driving shaft of the driving force transfer unit and being supplied by a water pump operated based on a driving force from the driving shaft.

[4] The surfboard of either claim 1 or claim 2, wherein in said driving force transfer unit, a rotational force transferred from the engine part through a first driving shaft is transferred to a second driving shaft in cooperation with a cooperation gear engaged at an end portion of the first driving shaft and at least one sprocket engaged with the cooperation gear for thereby rotating a screw shaft engaged at the second driving shaft.

[5] The surfboard of either claim 1 or claim 2, wherein said engine acceleration unit includes a wire of which one end is connected with a left end of a rear end

portion of the board body, an acceleration lever which is engaged at the other end of the wire for adjusting a performance of the engine, a handle support member for supporting the acceleration lever, and a handle support member which is detachably engaged at one side of the handle support member.

[6] The surfboard of either claim 1 or claim 2, wherein a pair of foot hangers are provided at an upper surface of the board body with the foot hangers being variable in the longitudinal direction of the board body based on the standing width of a surfer, and with the lengths of the foot hangers being adjusted based on the foot size of the surfer.

[7] The surfboard of either claim 1 or claim 2, wherein a pair of knee rests are provided at an upper surface of the board body so that surfer's knees can be rested thereon when the surfer surfs in a posture that the surfer's knees fall down, and a pair of handle hangers are provided at an upper surface of the board body, so that the surfer can easily hold the same.

[8] The surfboard of either claim 1 or claim 2, wherein a plurality of partition walls are formed at an inner surface of the board body for detouring air inputted in a direction of the inner walls of the air suction path and for falling water, and a drainage path is formed for guiding the fallen water to the sealed compartment.

[9] The surfboard of either claim 1 or claim 2, wherein an air discharge path is formed at one side surface of the board body for discharging an inner air of the sealed compartment to the outside, and an air discharge cover is installed at a discharge port of the air discharge path, and a support upper plate, a rubber membrane, and a support lower plate are sequentially installed in the interior of the air discharge cover, and one side surface of the rubber membrane is fixed based on an engagement of the support upper and lower plates, and the other side surface of the rubber membrane is not fixed, so that air discharges freely.

[10] The surfboard of either claim 1 or claim 2, wherein a pair of skeg units are installed at a lower surface of a rear end of the board body for thereby guiding a straight line surfing of the board body and lifting a front end of the board body in cooperation with a upward force occurring in water when the surfboard surfs at a high speed for thereby decreasing a speed by decreasing a friction with respect to a water surface.

[11] The surfboard of claim 10, wherein said skeg unit includes a streamline shaped skeg pin and a skeg receiving part, and said skeg unit is received in the skeg receiving part when transporting the skeg.

[12] The surfboard of claim 1, further comprising a pair of screw protecting wings which are formed at one side of the screw fixing member in a knife blade shape.

[13] The surfboard of either claim 1 or claim 12, further comprising at least one screw

protection member at one side of a lower surface of a rear end portion of the board body.

[14] The surfboard of claim 1, wherein a first acceleration lever and a second acceleration lever are engaged at the acceleration body of the engine part and are rotatable with respect to an engaging member, and a quick acceleration prevention pin passes through the first and second acceleration levers.

[15] The surfboard of claim 14, wherein in said quick acceleration prevention pin, a weight pin, which is movable upwards and downwards by gravitation, is installed in a casing, and in the normal operation mode, the weight pin engages the first and second acceleration levers for thereby transferring an acceleration signal from the first acceleration lever to the engine part and accelerating the engine part, and in the capsized operation mode, the weight pin disengages the first acceleration lever from the second acceleration lever.

[16] The surfboard of claim 15, wherein power contact parts are provided at a portion where a top portion of the weight pin contacts, and in the normal operation mode, the weight pin connects the power contact portions for thereby driving the engine part, and in the capsized operation mode, the weight pin is separated from the power contact portions for thereby automatically disconnecting a power supply inputted into the engine part.

[17] In a surfboat which is designed to detachably engage at least one surfboard, an improved water surfboat, comprising:

at least one engaging part which is formed at a rear end portion of the water surfboat for inserting the water surfboard and engaging the same;

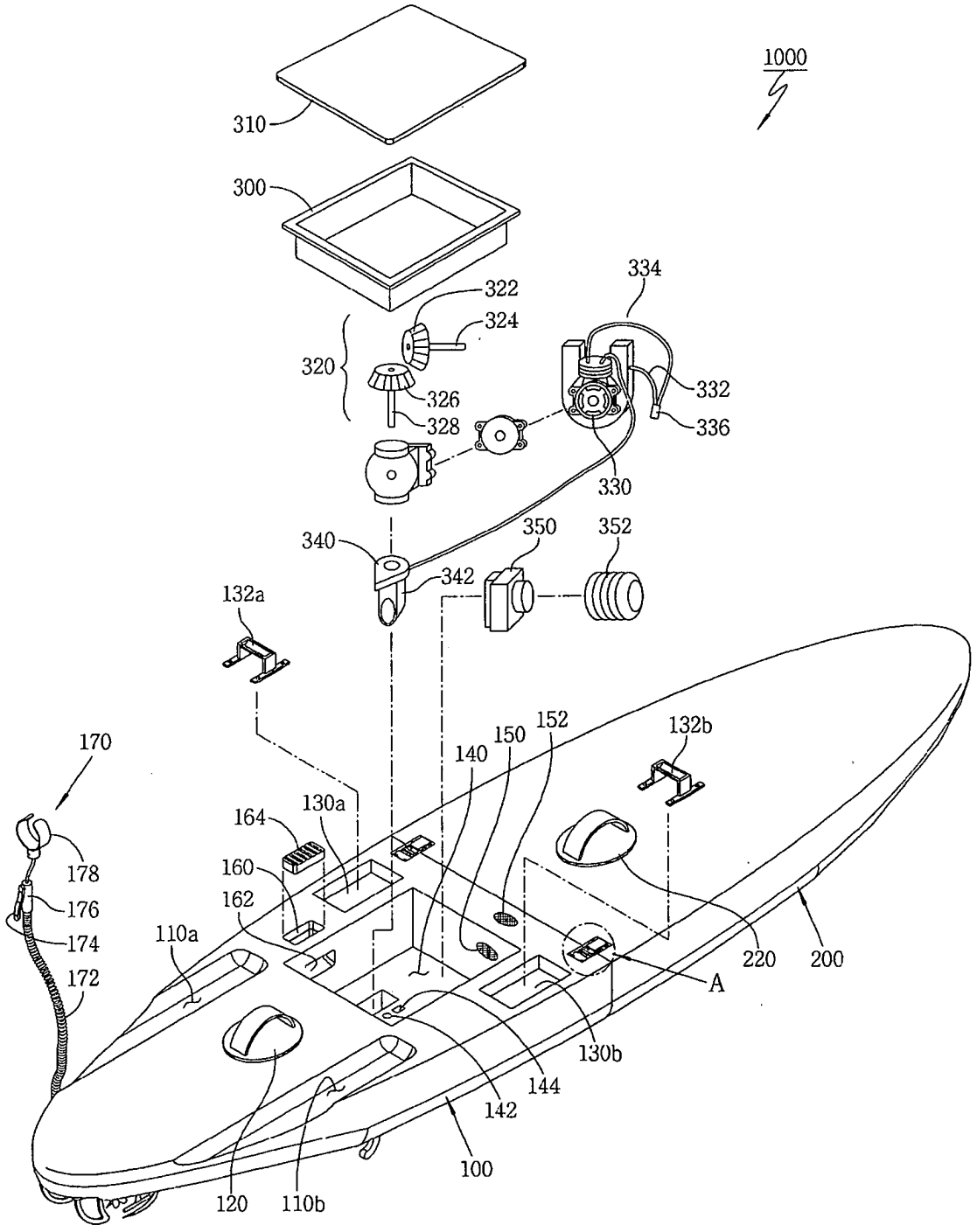
a handle part which is rotatably engaged at the inner surfaces of both sides of the water surfboat, with a surfer being capable of holding the handle part together with the engine acceleration unit of the water surfboard, and with the handle part being folded and stored into the handle receiving part formed at the inner surfaces of both sides of the water surfboat;

a chair which is fixedly installed at an upper plate of the water surfboat, so that a boat driver can sit thereon; and

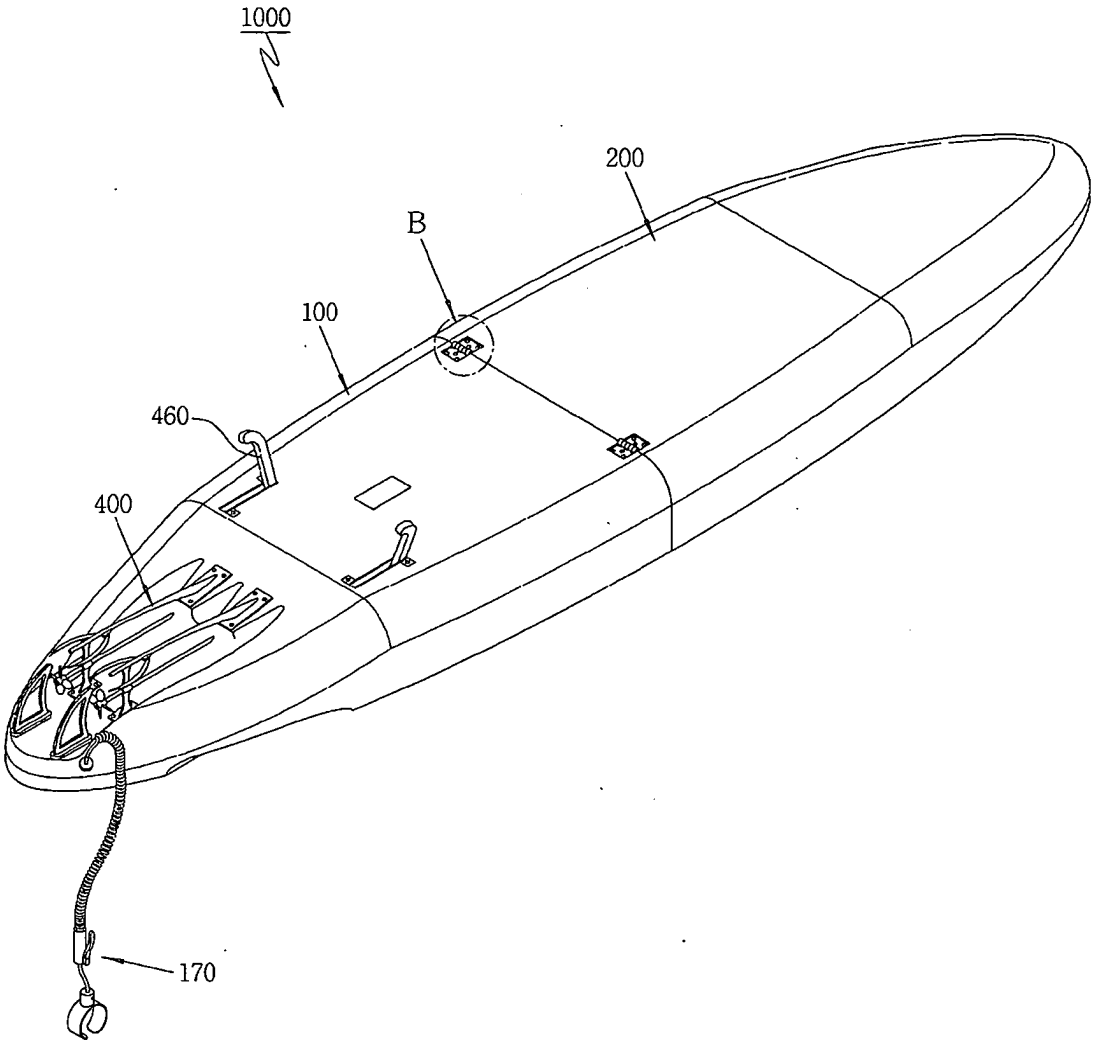
a fixing member which engages the water surfboard to the engaging part of the water surfboat for thereby preventing the water surfboard from being disengaged from the water surfboat.

[18] The surfboat of claim 17, further providing a chair at an upper plate of the water surfboat with a boat driver being sit on the chair, and with the chain being foldable.

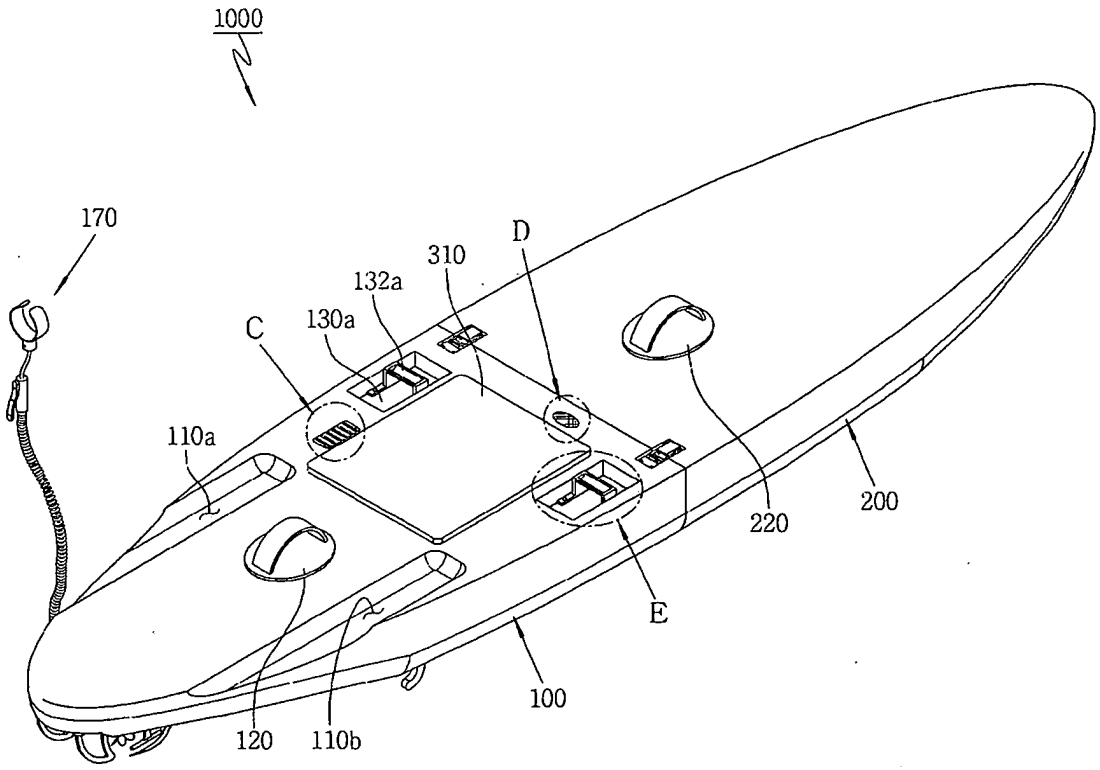
[Fig. 1]


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130b
A
220
200
100
120
110b

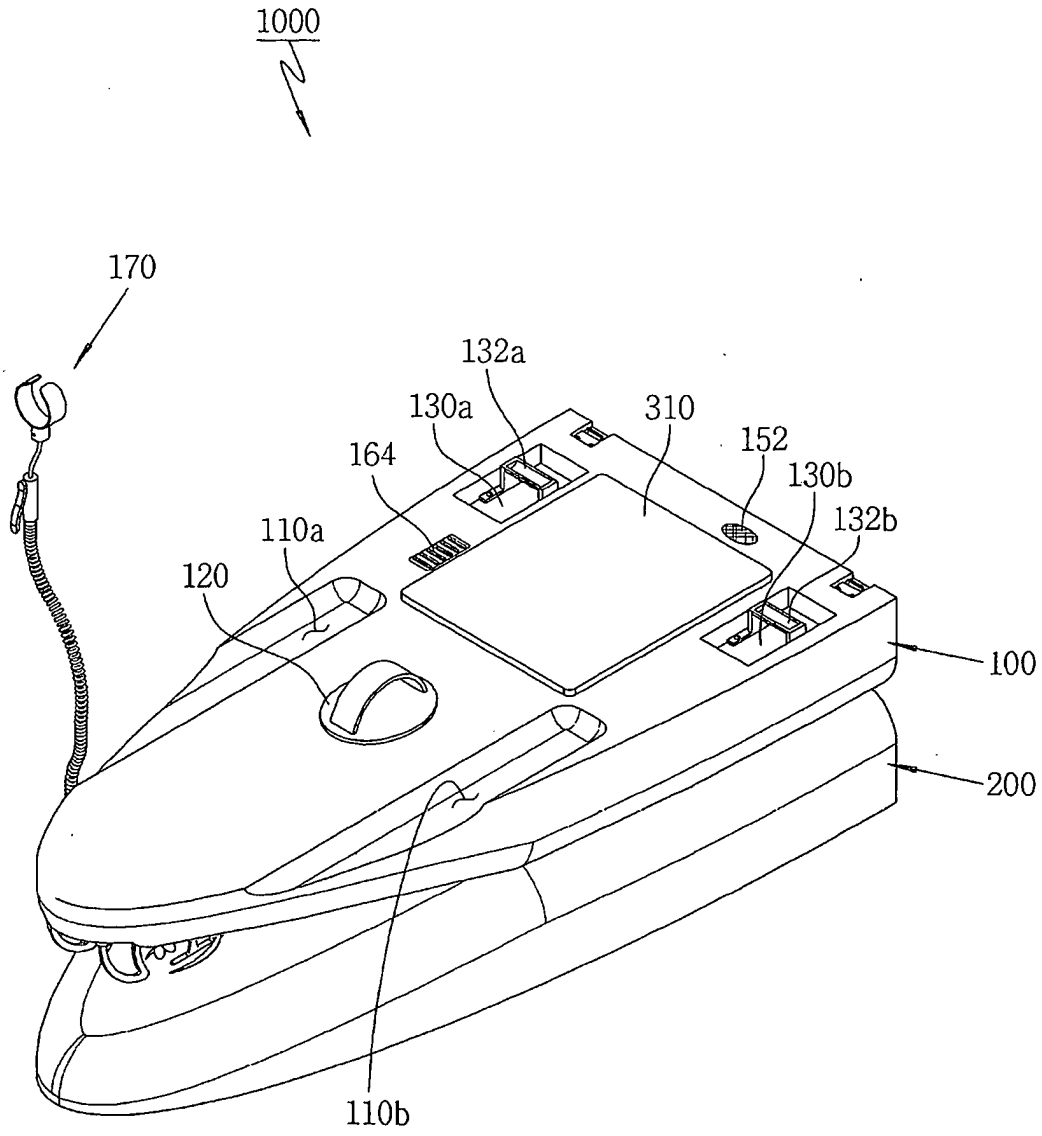
[Fig. 2]



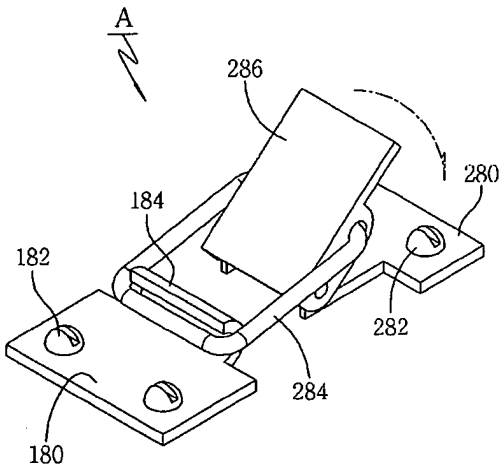
[Fig. 3]



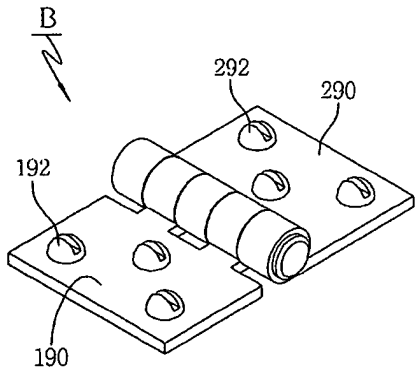
[Fig. 4]



[Fig. 5]

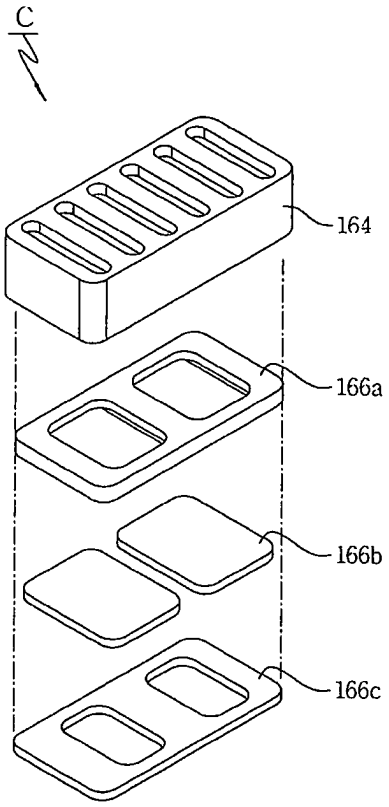


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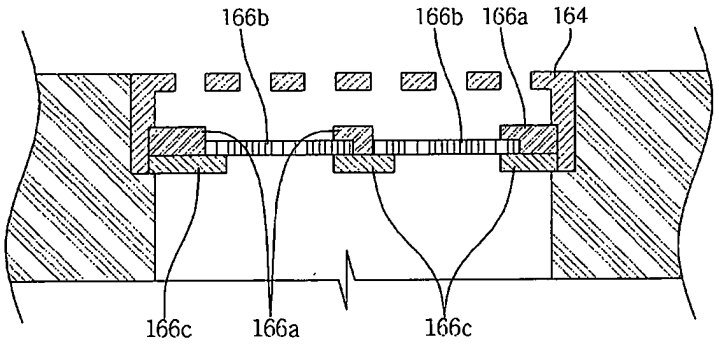


(b)

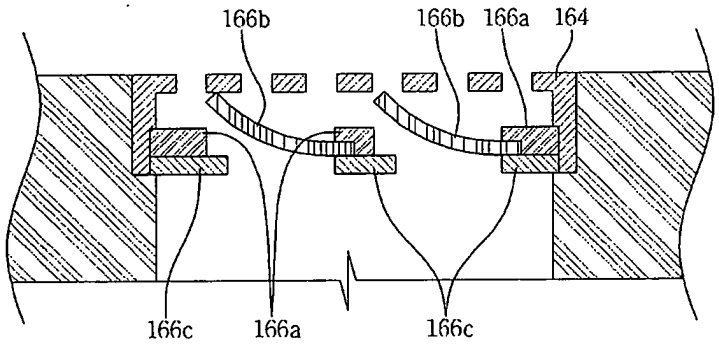
[Fig. 6]



[Fig. 7]

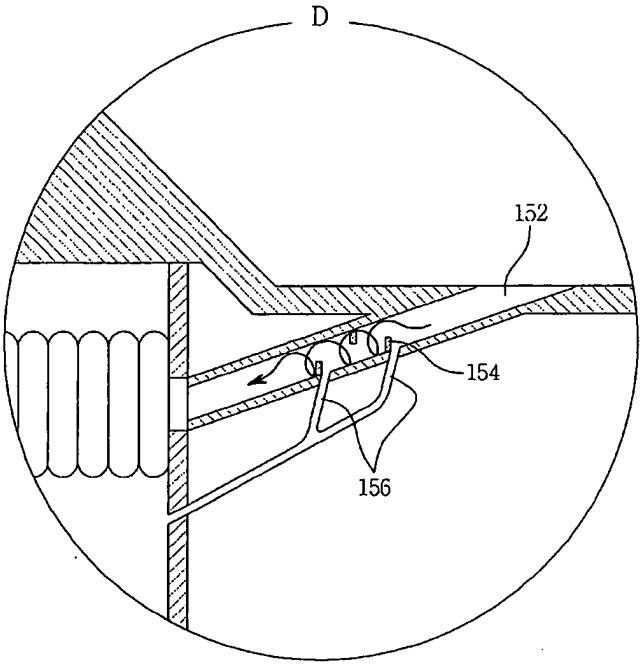

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166c
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(a)

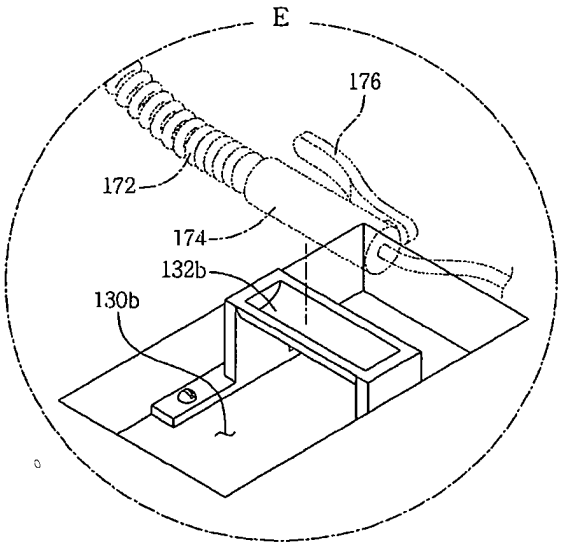

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166c
166a
166c

(b)

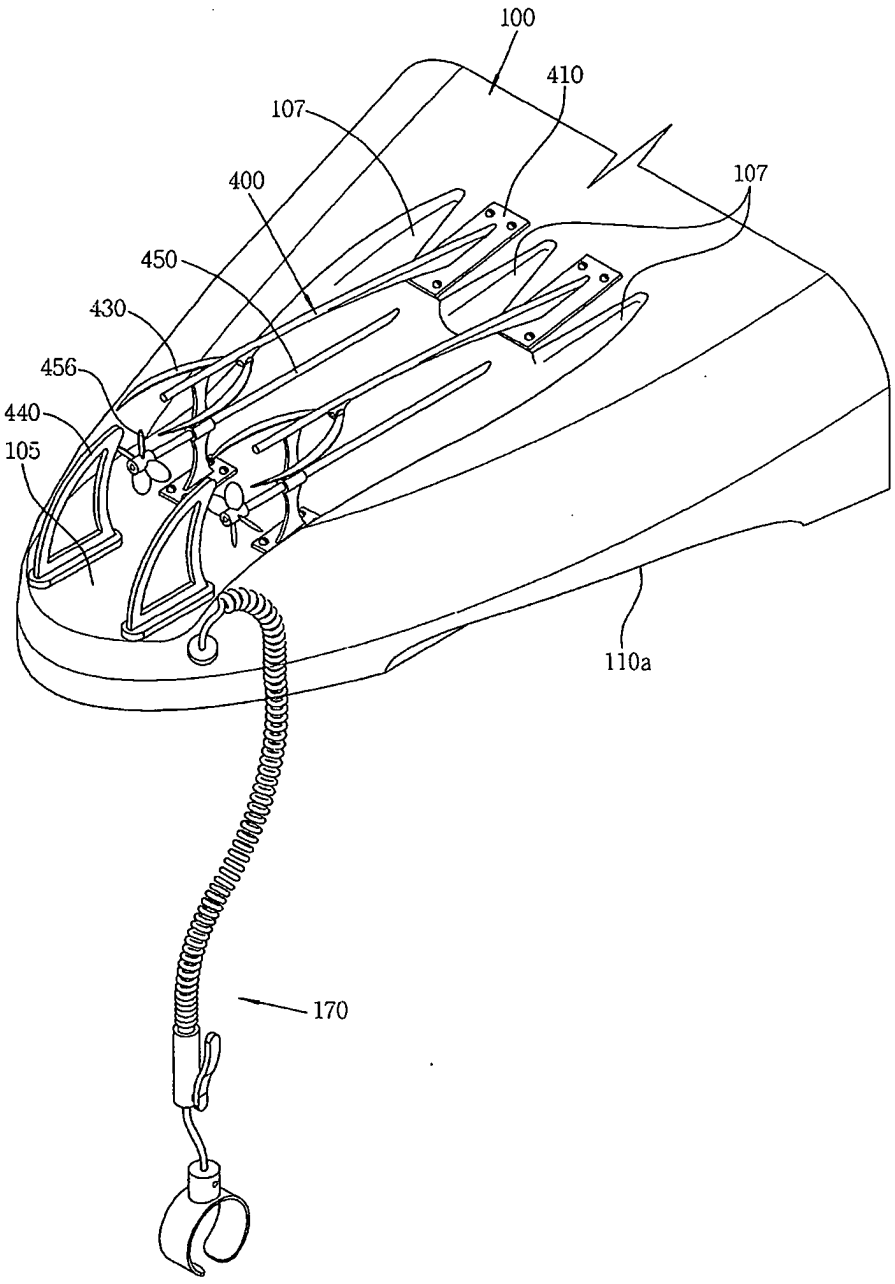
[Fig. 8]



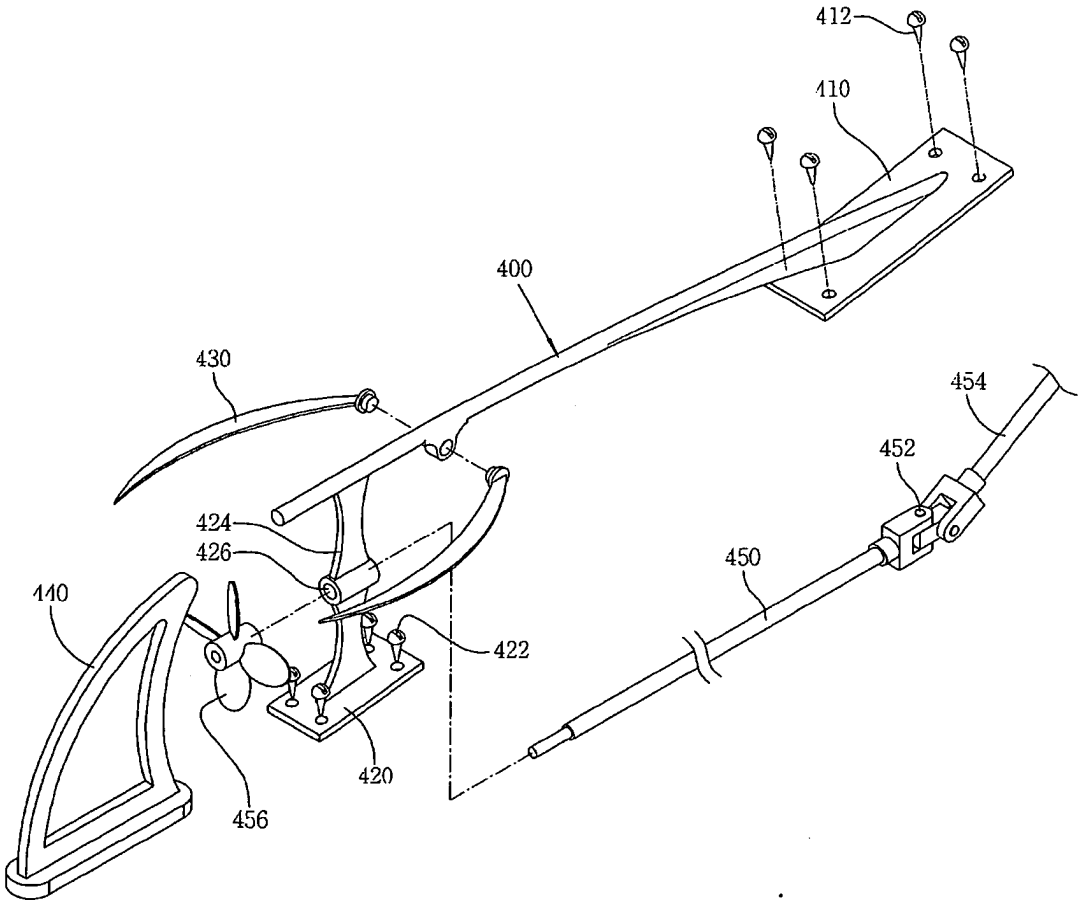
[Fig. 9]



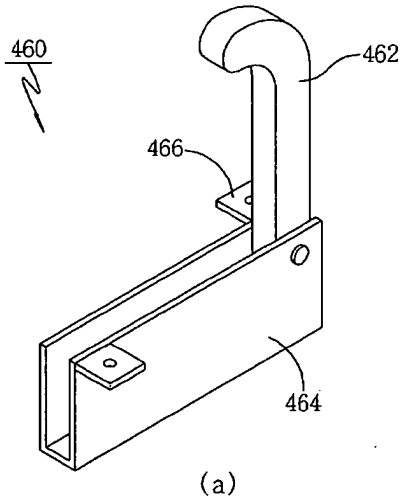
[Fig. 10]



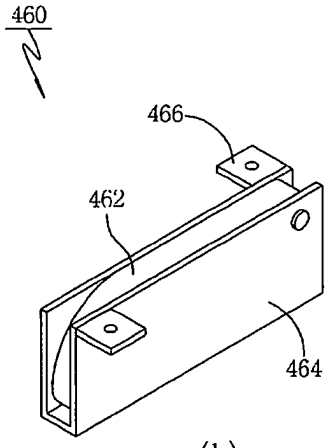
[Fig. 11]



[Fig. 12]

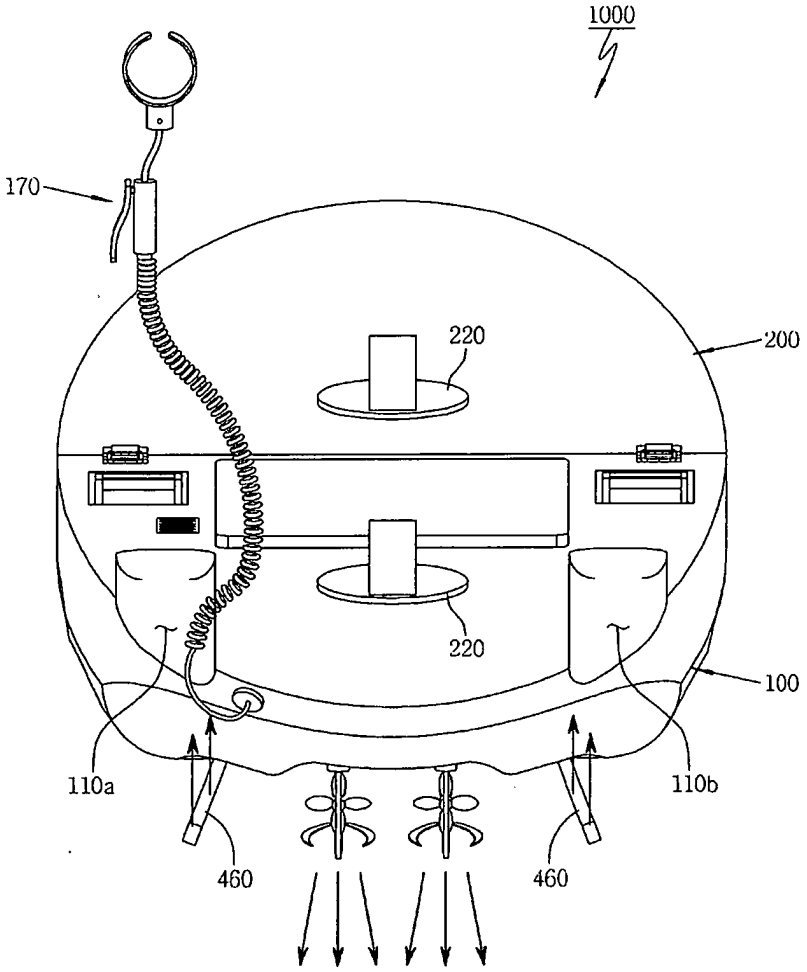


(a)

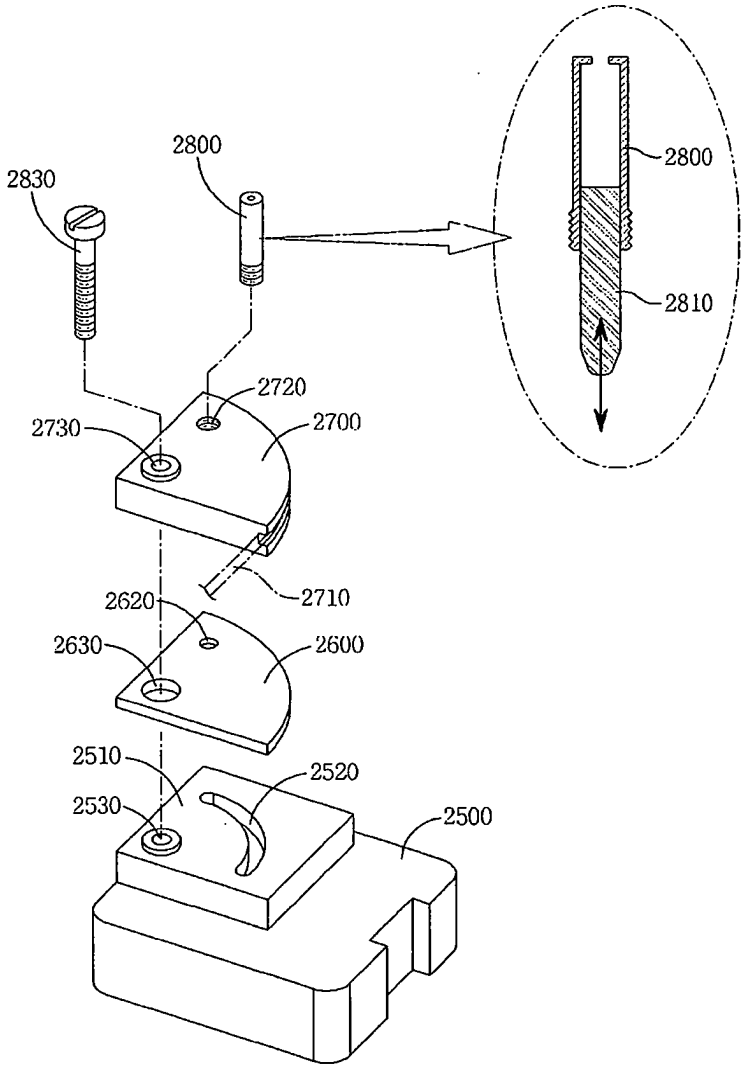


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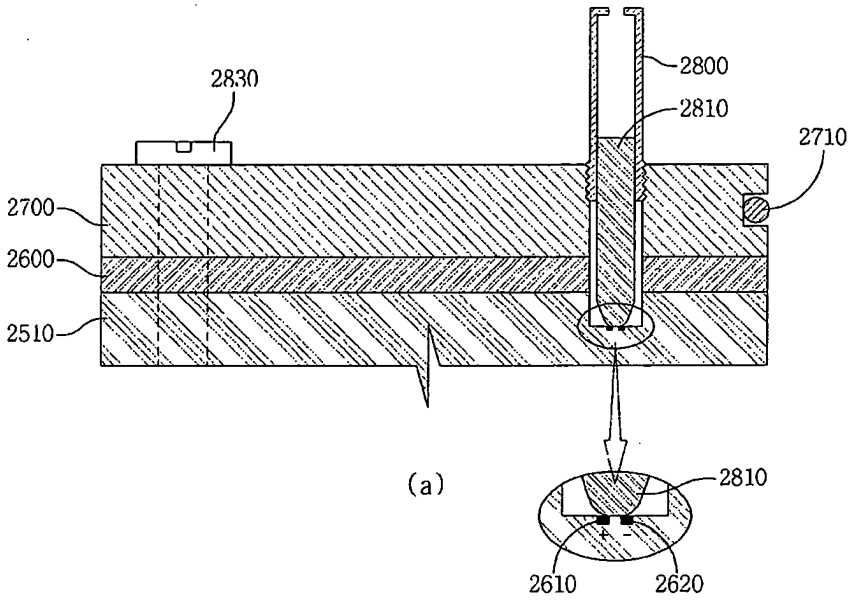
[Fig. 13]

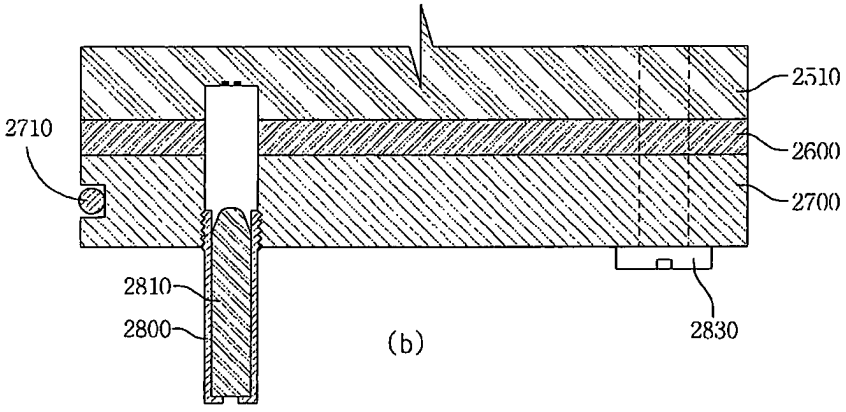


[Fig. 14]

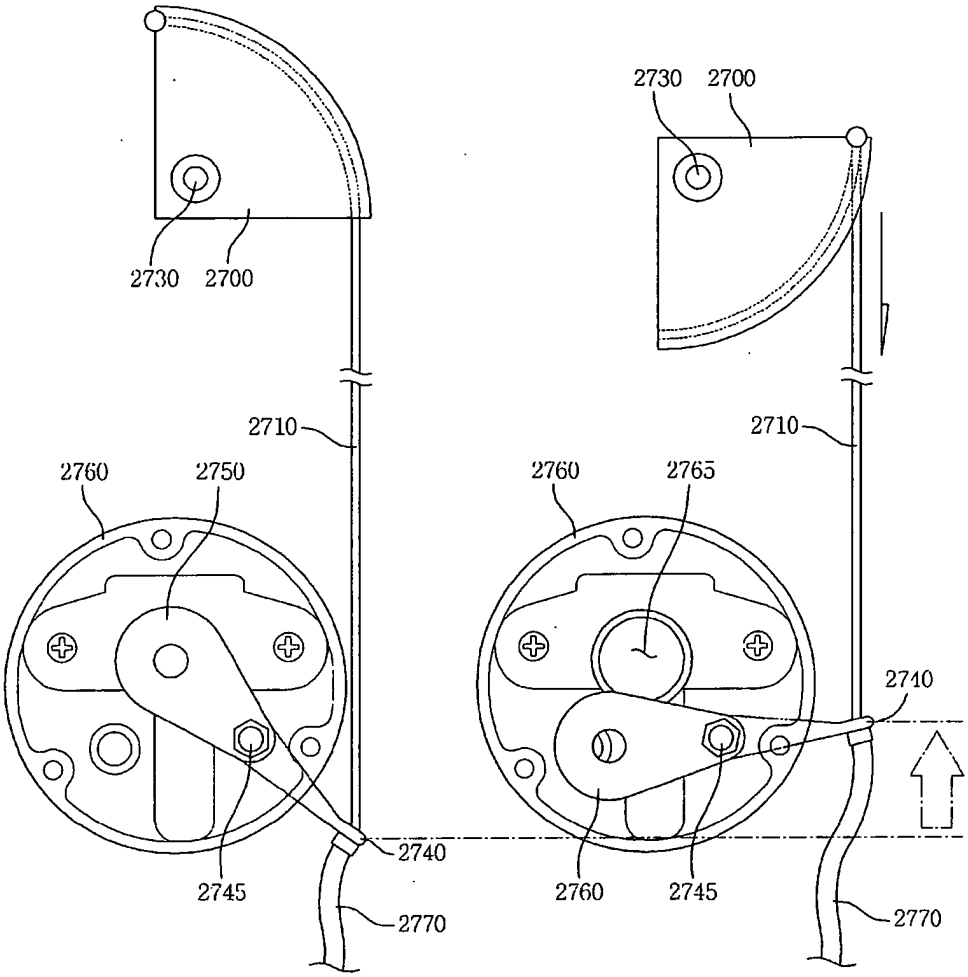

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[Fig. 15]

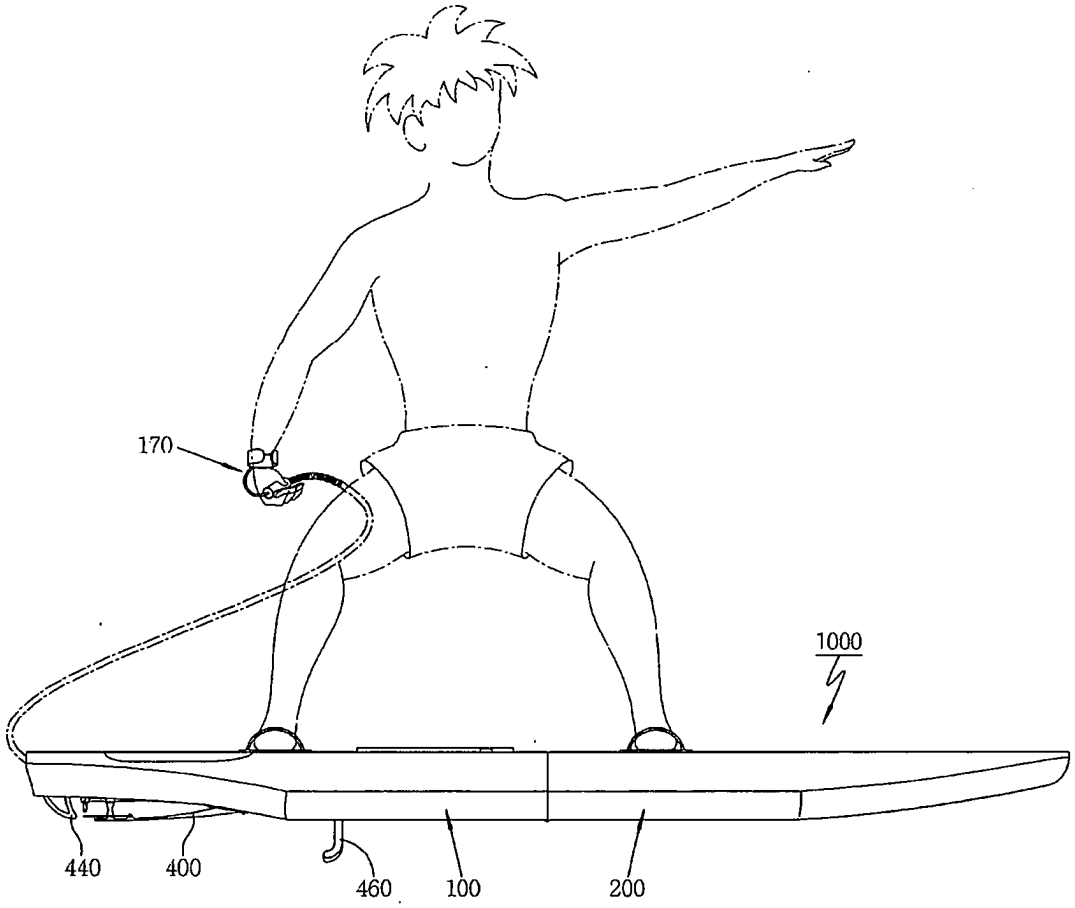

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(b)
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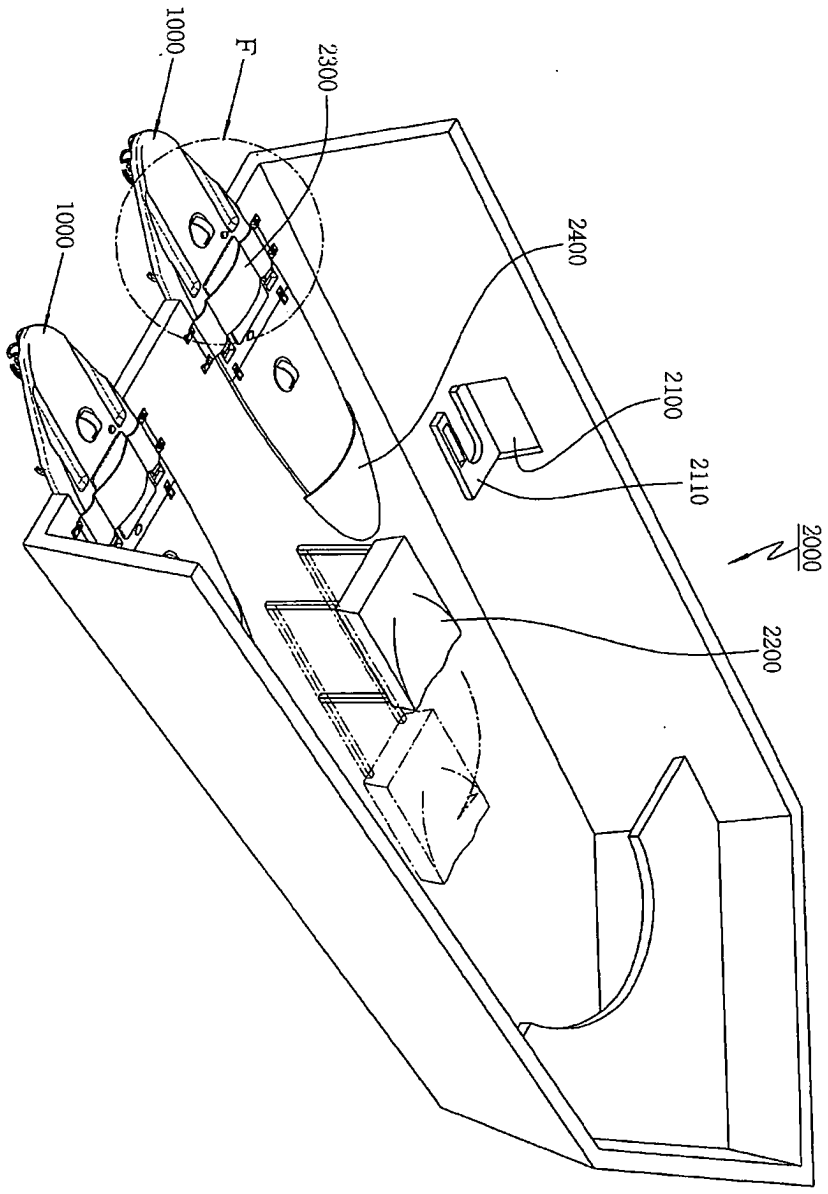
[Fig. 16]


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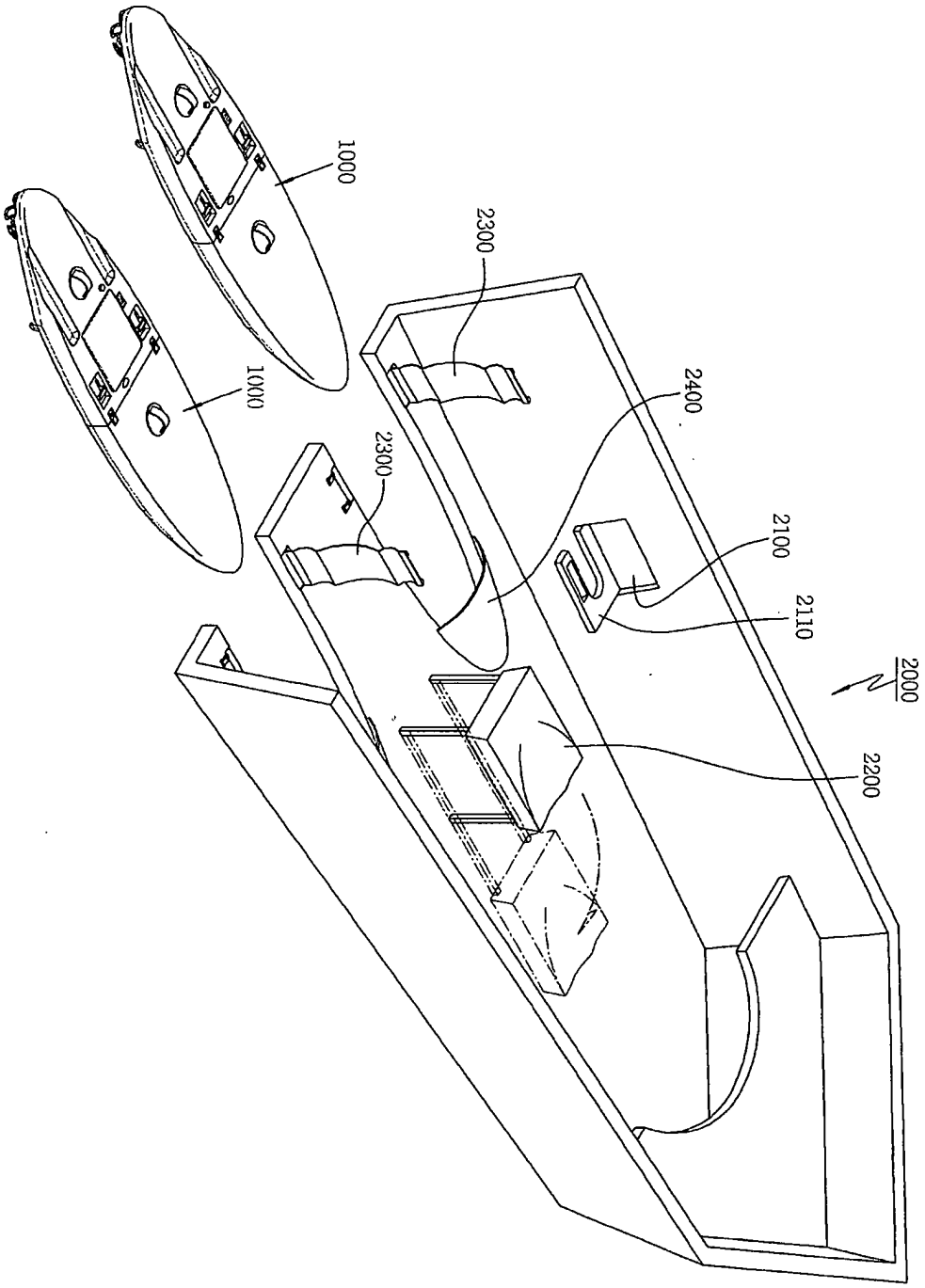
[Fig. 17]



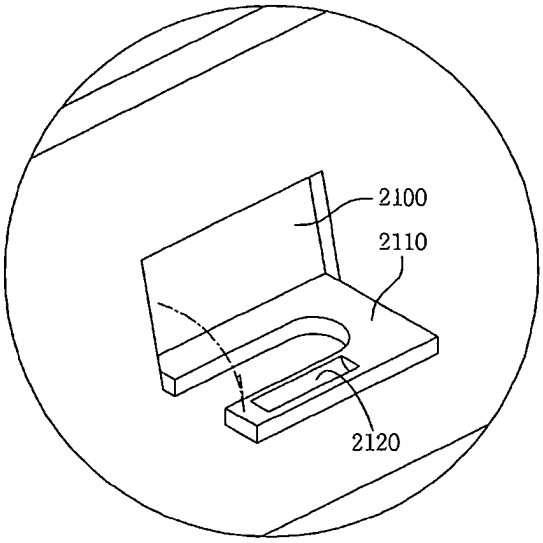
[Fig. 18]



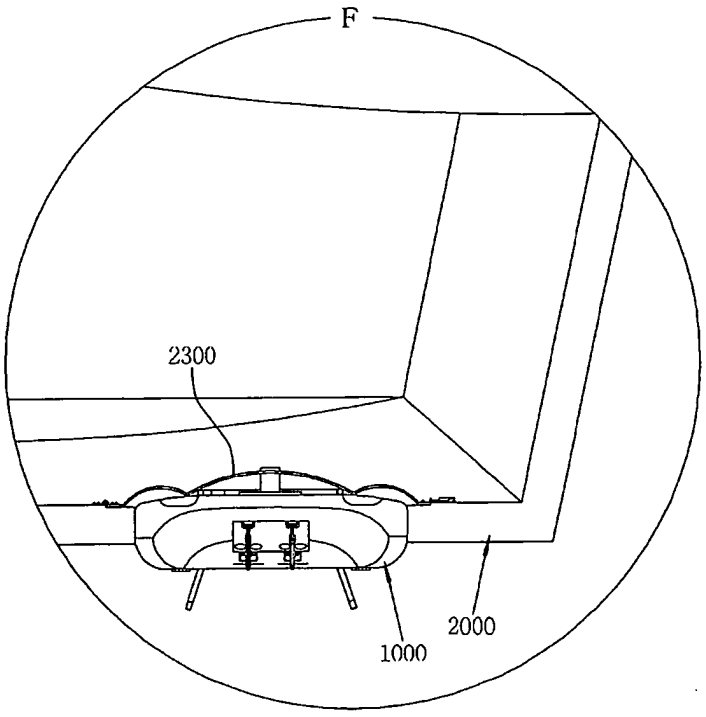
[Fig. 19]



[Fig. 20]



[Fig. 21]



PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference PP050702	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/KR2005/002543**	International filing date *(day/month/year)* **04 AUGUST 2005 (04.08.2005)**	(Earliest) Priority Date *(day/month/year)* 05 AUGUST 2004 (05.08.2004)

Applicant

SEO, Dae-su

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
      ☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
   b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.
2. ☐ Certain claims were found unsearchable (See Box No. II)
3. ☐ Unity of invention is lacking (See Box No. III)
4. With regard to the title,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the drawings to be published with the abstract is Figure No. 1
      ☒ as suggested by the applicant.
      ☐ because the applicant failed to suggest a figure.
      ☐ because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2005/002543

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 B63B 35/81

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Patents and applications for inventions since 1975
Korean Utility models and applictions for Utility models since 1975
Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
KIPO NPS System : "board", "surf", "boat", "engine", "air", "cool", "prop*", "screw", "skeg", "water pump", "weight", "pin" & "lever"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 02 - 0005335 A (HUH YOUP) 17 JANUARY 2002 See the whole document	1, 4, 5
A	KR 97 - 0069819 A (JANG KI NAM) 07 NOVEMBER 1997 See the whole document	1
A	JP 01 - 087995 U (UKAWASAKI HEAVY IND. COMP.) 09 JUNE 1989 See the whole document	1, 11
A	JP 57 -0185875 A (SUZUKI TADASHI) 16 NOVEMBER 1982 See the whole document	1, 11

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 NOVEMBER 2005 (15.11.2005)	**16 NOVEMBER 2005 (16.11.2005)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer PARK, SUNG WOO Telephone No. 82-42-481-8140

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 02 - 0005335 A	17.01.2002	None	
KR 97 - 0069819 A	07.11.1997	AU 2522697 A1 WO 9739941 A1	12.11.1997 30.10.1997
JP 01 - 087995 U	09.06.1989	None	
JP 57 -0185875 A	16.11.1982	None	

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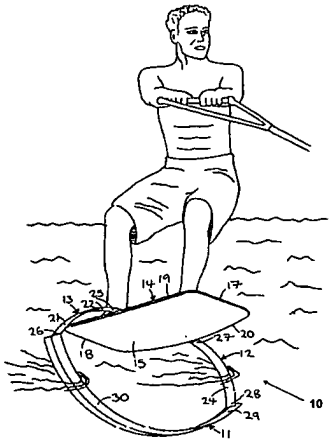
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(54) Title: WATER SPORTS EQUIPMENT



(57) Abstract: This invention relates to water sports equipment (10) for supporting a standing rider whilst the rider and the equipment are towed through the water, the equipment comprising: an elongate board (14) having an upper surface (16) carrying first (31, 33) and second (32, 34) foot securing means, said foot securing means being configured to be engaged by a respective foot of the rider so that the rider can stand on the board (14) with their body facing in a direction generally perpendicular to a direction in which the rider and equipment are towed through the water in use; a hydrofoil (11) having a longitudinal axis, said hydrofoil (11) being configured to impart lift to the board (14) when the rider and board are towed through the water; and means (12, 13) for affixing said hydrofoil (11) to said board (14) so that the hydrofoil is spaced from a lower surface (15) of the board and orientated such that said hydrofoil longitudinal axis is substantially transverse to the direction in which the rider and equipment are towed through the water in use.

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WATER SPORTS EQUIPMENT

This invention relates to water sports equipment.

A variety of different water sports and associated water sports equipment have previously been proposed, and in some instances these sports have evolved into new and exciting sports requiring their own type of equipment.

For example, in a similar fashion to the way that snowboarding grew out of skiing, the sport of wakeboarding has evolved from the sport of water skiing. In wakeboarding, an individual sits or stands on a wakeboard (akin to a shortened surfboard) that is towed behind a powered water craft at speed.

Kitesurfing has evolved from the sport of wakeboarding, and uses a board which is almost identical to a wakeboard. However, in this instance a kite is used to harness the energy of the wind and power the board instead of a powered water craft. Kitesurfing is officially recognised as one of the fastest growing "extreme sports" in the world, and has gained popularity due to the fact that controlling the kite requires an entirely different type of skills to those used for traditional wakeboarding, and because the kitesurf board can be used in wave conditions that would be unsuitable for a powered water craft.

As a modification of existing water sports equipment, it has also previously been proposed to mount a hydrofoil underneath the equipment so that the board lifts out of the water, thereby reducing drag and enabling the board to travel at much higher speeds.

An example of such a proposal is disclosed in US Patent No. 5,249,998. The equipment described in this patent has become known colloquially as the "flying Ski" or "Air Chair", and comprises a board that is towed by a powered watercraft and to which a chair has been fitted. A rider sits in the chair over the board, and the board itself has an arm which extends downward from the board into the water and to which a hydrofoil has been fitted. As the board is towed through the water, the lift imparted by the hydrofoil causes the board to lift so that the rider "flies" over the surface of the water.

This arrangement has several performance advantages including the ability to travel at higher speeds resulting from reduced friction, and a better ability to turn. However, whilst the Air Chair has these advantages there are a number of key drawbacks which have hitherto limited its appeal to the market.

The first of these is that the air chair needs to be towed by a powered water craft, and hence the equipment cannot be used when weather conditions are unsuitable for powered water craft. As such conditions are usually when the most fun can be had with such a device, this is a serious limitation of its appeal as compared, for example, to a kitesurf board.

Another problem associated with the Air Chair is that the hydrofoil mounted beneath the board is a directional hydrofoil that imparts lift only when the water is flowing in one direction over the hydrofoil. The effect of this is that the air chair could not easily be used with a kite to avoid its reliance on powered water craft (and hence broaden the scope for its use) as the equipment cannot be used in a reverse direction without physically turning the board through 180 degrees in order to ride in the opposite direction.

Yet another problem is that the positioning of the hydrofoil towards one end of the board and the length of the arm which extends from the board to the hydrofoil mean that the forces on the ankles of a rider are so large that snowboard boots must be worn to give the rider sufficient ankle support. These boots tend to become heavy when waterlogged, and also pose a significant danger as they cannot be released quickly if the rider should have an accident.

Yet another problem associated with the Air Chair is that the length of the arm supporting the hydrofoil is such that a significant depth of water is required before the equipment can be used. However, many beaches have relatively shallow water which extends a long way out to sea, thereby preventing an easy launch of the device from that beach.

It is apparent, therefore, that it would be beneficial if water sports equipment could be provided that avoided or at least mitigated some or all of the problems associated with the Air Chair.

To this end, a presently preferred embodiment of the present invention provides water sports equipment for supporting a standing rider whilst the rider and the equipment are towed through the water, the equipment comprising: an elongate board having an upper surface carrying first and second foot securing means, said foot securing means being configured to be engaged by a respective foot of the rider so that the rider can stand on the board with their body facing in a direction generally perpendicular to a direction in which the rider and equipment are towed through the water in use; a hydrofoil having a longitudinal axis, said hydrofoil being

configured to impart lift to the board when the rider and board are towed through the water; and means for affixing said hydrofoil to said board so that the hydrofoil is spaced from a lower surface of the board. In a particularly preferred arrangement, the means for affixing the hydrofoil to the board is configured so that said hydrofoil is orientated with said longitudinal axis substantially transverse to the direction in which the rider and equipment are towed through the water in use.

In a preferred embodiment, the hydrofoil comprises a bi-directional hydrofoil configured to impart lift to the board when the rider and board are towed, irrespective of the direction of water flow over the hydrofoil. This is advantageous as it allows the rider to avoid having to physically lift the board and turn it when they wish to change direction.

In a particularly preferred arrangement, the foot securing means are located on said upper surface in such a position relative to the hydrofoil that a rider can change the hydrofoil's angle of attack by moving their weight from one foot to the other. This provides for particularly easy and intuitive control of the board.

Preferably, the foot securing means are located to either side of and at least substantially equidistant from said hydrofoil.

In a preferred arrangement, said foot securing means are secured to said board in such a manner that the positions of said first and second foot securing means relative to said hydrofoil may be varied.

The hydrofoil may be detachable from said board. This allows for the equipment to be disassembled for storage and carriage. The hydrofoil may be affixed to said board by one or more frangible fasteners. The frangible fasteners may be configured to break and thereby release the hydrofoil from the board in the event of an impact between the hydrofoil and the sea bed or another submerged object.

The hydrofoil, board and said means for affixing the hydrofoil to the board are manufactured as a one-piece unit. This arrangement helps increase the strength of the equipment and hence reduces the likelihood of the equipment breaking.

In a preferred arrangement, the means for affixing the hydrofoil to the board comprises one or more struts.

The equipment may further comprise means operable when the equipment is ridden in an upwind direction to resist movement of the board in a downwind

direction. This is advantageous as it resists the tendency of the board to be blown downwind.

In a preferred embodiment, the board comprises a heelside edge proximate heel portions of said foot securing means and a toeside edge proximate toe portions of said foot securing means, and said means for resisting downwind movement of the board comprises one or more struts having a hydrofoil shaped cross-section, the hydrofoil cross-section being configured to impart lift in a direction generally perpendicular to a direction of motion when the board is ridden with said heelside edge closer to the water than said toeside edge.

In another embodiment said means for resisting downwind movement of the board may comprise one or more generally planar fins mounted so as to be submerged in the water in use and so as to be generally perpendicular to said longitudinal axis of said hydrofoil.

Preferably the hydrofoil is wider than said board so that the hydrofoil projects beyond the periphery of the board. Respective ends of said hydrofoil may be inclined towards the lower surface of said board. The hydrofoil may be curved, V-shaped or any other shape suitable for lifting the board above the water. In a particularly preferred arrangement, the hydrofoil comprises a central section that is generally co-planar with said board lower surface, and first and second outer sections extending from respective ends of said central section, said first and second outer sections being inclined towards said lower surface of said board.

In one arrangement, the means for affixing said hydrofoil to the lower surface of said board is configured to orientate said hydrofoil so that said hydrofoil longitudinal axis is substantially perpendicular to the direction in which the rider and equipment are towed through the water in use.

In a preferred embodiment, the board comprises a toeside edge and a heelside edge, a first board end extending between first ends of said toeside and heelside edges and a second board end extending between second ends of said toeside and heelside edges, said first and second board ends being inclined away from said board upper surface and said hydrofoil. This arrangement assists early planing of the board and helps avoid nose-diving.

Preferably, the toeside edge and said heelside edge curve towards one another in the vicinity of said first and/or second ends.

Preferably, different regions of the board have different resistances to flexion. For example, a region of the board between said first and second foot securing means may have a greater resistance to flexion than regions of the board in the vicinity of either end.

In a second embodiment of the invention, the equipment further comprises: a second hydrofoil having a longitudinal axis, said second hydrofoil being configured to impart lift to the board when the rider and board are towed through the water; and means for affixing said second hydrofoil to said board so that the second hydrofoil is spaced from a lower surface of the board and orientated such that said hydrofoil longitudinal axis is substantially transverse to the direction in which the rider and equipment are towed through the water in use.

The first and second hydrofoils may be differently orientated with respect to the direction in which the rider and equipment are towed through the water in use. Alternatively, the first and second hydrofoils may be similarly orientated with respect to the direction in which the rider and equipment are towed through the water in use.

In a preferred embodiment, the equipment further comprises a grab handle fixedly attached to said upper surface of the board.

Other features and advantages of embodiments of the present invention will be apparent from the following detailed description of the present invention.

Various preferred embodiments of the present invention will now be described, by way of illustrative example, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a rider standing on equipment according to a first embodiment of the invention, the equipment being towed behind a powered water craft (not shown);

Fig. 2 is a side elevation of the water sports equipment of Fig. 1;

Fig. 3 is a top plan view of the water sports equipment of Fig. 1;

Fig. 4 is an end elevation of the water sports equipment of Fig. 1;

Fig. 5 is an enlarged sectional view along the line 5-5 shown in Fig. 4;

Fig. 6 is an enlarged sectional view along the line 6-6 shown in Fig. 4;

Fig. 7 is a perspective view of equipment according to a second embodiment of the present invention;

Fig. 8 shows two different views of a another board design; and

Figs. 9a to 9d illustrate yet further board designs.

Referring now to the figures, various presently preferred embodiments of the present invention will now be described with reference to the use of the equipment with a kite or a powered water craft. It will be appreciated, and should be noted, that the equipment is suitable for use with either form of power and hence that the following description is merely illustrative of the teachings of the present invention and not a limitation thereof.

As aforementioned, Fig. 1 is a perspective view of a rider standing on equipment according to a first embodiment of the invention, the equipment being towed behind a powered water craft (not shown) such as a speed boat. The equipment 10 (hereafter referred to a "hydrofoil board") comprises an elongate board 14 having a lower face 15 and an upper face 16. The board 14 has a left foot end 17, a right foot end 18, a toeside edge 19 and a heelside edge 20.

An elongate toeside strut 13 extends from the toeside edge 19, and comprises an upper face 21, a lower face 22, an inner end 25 and an outer end 26. An elongate heelside strut 12 extends from the heelside edge 20, and likewise comprises an upper face 23, a lower face 24, an inner end 27 and an outer end 28.

A hydrofoil blade 11 is secured between the toeside strut 13 outer end 26 and the heelside strut 12 outer end 28, and comprises an upper face 29 and a lower face 30. In a particularly preferred embodiment of the present invention the hydrofoil blade is a so-called bidirectional blade that is capable of generating a lift force irrespective of the direction of water travel over the upper and lower faces 29, 30. It should be noted however, that significant improvements can be provided with a unidirectional blade (i.e. a blade that is capable of generating a lift force only when water is traveling in a particular direction over the upper and lower faces 29, 30) and hence that the scope of the present invention is not limited solely to the provision of a bi-directional blade.

In this preferred embodiment, a left footpad 31 and right footpad 32 are secured to the upper face 16 of the board 14. A left footstrap 33 extends in a loop over the left footpad 31, and a right footstrap 34 extends in a loop over the right footpad 32 to thereby enable a rider to secure themselves to the board. The footstraps may, in a preferred embodiment, be adjustable. It is also preferable for a grab handle 35 to be secured to the upper face 16 of the board 14.

In the preferred arrangement, the footpads 31, 32 and footstraps 33, 34 are

equidistant from and on either side of a toeside-heelside vertical axis of the equipment (line A—A in Fig. 2) that runs through the board 14, the struts 12, 13, and the hydrofoil 11. An advantage of this arrangement is that the rider can easily adjust the angle of attack of the hydrofoil blade 11 by shifting their weight, thereby controlling the lift generated by the hydrofoil 11. Whilst this arrangement is preferred, it should be noted that other arrangements are envisaged. For example, it may be desirable to have more weight on the rider's rear foot (for a given direction of travel) so that the board tends to leap more easily from the water thereby enabling the rider to put on a more spectacular display of his or her skills. For such an arrangement the rear footpad and footstrap would be further from the aforementioned axis than the other footpad and footstrap. In another envisaged arrangement, the position of the footpads and footstrap may be adjustable with respect to the aforementioned axis, and optionally with respect to their distance from the toeside or heelside edges of the board. This adjustment could be provided by providing the board with a series of mounting points for each footpad at differing positions on the board, or alternatively by mounting the footpads on runners secured to the upper face of the board.

As aforementioned, the hydrofoil board and rider can be towed by a powered water craft (such as a speed boat) using a standard wakeboard tow rope, the handle of which is held by the rider at arms length as illustrated in Fig. 1. Alternatively, the board and rider may be powered by a kite (typically known as a "power kite") of the type used for the sport of kitesurfing, the rider controlling the kite by means of a standard kite control system consisting of a bar and a waist harness which is worn by the rider.

Particular components of this embodiment of hydrofoil board 10 will now be described in greater detail. As is apparent from the top plan view of the board 10 shown in Fig. 3, in this embodiment the board 14 is symmetrical about both the aforementioned vertical central plane A—A (shown in Fig. 2) as well as an end to end vertical plane B—B (shown in Fig. 3).

In this preferred arrangement the toeside 19 and heelside 20 are each slightly curved so that they taper towards one another at both ends 17, 18 of the board. As aforementioned, in one preferred embodiment of the present invention the board is designed as a "twin-tip" board so that it is capable of being ridden in both directions. In such an arrangement the board has neither a front nor a back

end, but for simplicity the ends have been labeled and will be referenced herein as a left foot end 17 and a right foot end 18.

Depending on rider preference, weight, and skill level the board 14 may have a variety of different lengths and widths. For example, a less experienced rider might opt for a longer board (because longer boards are more buoyant and easier to cause to plane) having a length of between 140 and 150 centimetres, and a width of around 38 to 45 centimetres; whereas a more experienced rider might opt for a shorter board. The exact dimensions most suitable for a given rider will also vary with the weight of the rider, with heavier riders tending towards longer and wider boards. Irrespective of the size of the board, it is also highly preferred, as is clearly visible from the side view shown in Fig. 2 for the ends 17, 18 of the board to curve upwards, as such an arrangement tends to help the board to ride over the water despite waves or other turbulence.

The board 14 can be constructed from wood, fibreglass, carbon fibre, foams (such as Corecell™ foam available from Structural Polymer Systems Limited (a subsidiary of Gurit-Heberlein AG), St. Cross Business Park, Newport, Isle of Wight, UK PO30 5WU), combinations of these materials, as well as many other materials and combinations of materials that will be immediately apparent to those persons skilled in the art of board building. The board may have a solid construction of one material or mixture of materials, or in another arrangement the board may have a monocoque structure with a hollow core. In another particularly preferred arrangement the board may have a laminar structure consisting of a sandwich of layers of material chosen for their particular properties. A variety of different manufacturing methods are available for achieving such a structure, and particularly good results have been obtained by sandwiching layers together in a vacuum bagging process. One particular advantage of a layered construction is that different regions of the board may have different properties. For example, the board may be constructed so as to be more flexible at the tips than in between the rider's feet, thereby improving the rider's ability to control the board.

In a particularly preferred arrangement, the footpads 31, 32 are made from softer materials than those used for the board construction so that the feet of the rider are cushioned in use. This is particularly advantageous when the rider and board leaps from the water as a not insignificant force may be exerted on the rider when the board hits the water once again, and resilient footpads help lessen the

effect of this force on the rider.

The spacing between the footpads 31, 32 depends on rider preference and is usually set at around shoulder width, spaced symmetrically and equidistant from the toeside-heelside vertical central plane of the board 14. As aforementioned, however, other arrangements are envisaged within the scope of the teachings of the present invention.

The pads 31, 32 can either be formed as part of the upper face 16 of the board 14, or can be affixed to the upper face 16 after construction with a contact adhesive or similar. The footstraps 33, 34 may be made from a resilient relatively soft strap material and affixed to the board 14 by bolts which screw into threaded inserts in the upper face 16. Alternatively, the footstraps may be integrally formed with the footpads, and as aforementioned the footpads may be mounted on runners to the board to allow for the spacing of the pads with respect to the board to be adjusted.

In another preferred embodiment the footstraps and footpads may be replaced by resilient boots, for example of rubber, which are affixed (for example by bolts) to the upper face 16 of the board 14 or optionally to runners mounted to the board.

The struts 12, 13 extend from the edges 19, 20 of the board 14 in order to transmit the lift from the hydrofoil blade 11 to the board 14 and rider. They may be built into the body of the board 14, as an integral part of the structure in order to enhance the strength of the overall board. In another embodiment of the design they may be affixed at their inner ends 25, 27 to the board 14 with bolts or similar fastenings in a manner which allows them to be detached from the board 14, for example to facilitate transport of the device or to allow the board 14 to be ridden without the hydrofoil 11 and struts 12, 13 attached to it.

In a particularly preferred arrangement, the fixings used to mount the hydrofoil beneath the board may be configured to shear if a force (such as a force associated with a relatively high velocity impact of the hydrofoil with the sea bed or a submerged object) is applied to the hydrofoil in a direction generally perpendicular to one or other of the ends of the board. With such a configuration, in the event of an impact the fixings would shear and the hydrofoil and struts would separate from the board, thereby avoiding damage to the hydrofoil and reducing the chance of the rider being pitched forwards into the object that the board has

collided with. For safety reasons with such an arrangement it is preferred for the struts to be mounted to the underside of the board, rather than for the struts to extend over the upper surface of the board (as they do in the embodiment of Fig. 7).

As shown in Fig. 5 the struts 12, 13 of this embodiment have a cross-section that is symmetrical about a vertical axis C—C; in order to allow the device to be ridden in both directions. As shown these struts 12, 13 have a hydrofoil (lift generating) cross-section that provides lateral lift in an upwind direction for use in kitesurfing when the board is ridden at a sharp angle with one of the edges 19, 20 lower than the other, at least partially submerging the strut 12, 13 associated with the lowermost edge. In this configuration, the lift generated by the hydrofoil shaped strut helps resist the tendency for the rider to be blown downwind.

In an alternative configuration, particularly suitable where the hydrofoil is provided with fins (as in the embodiment described in connection with Fig. 7), the strut may simply comprise a flat plate as the fins resist any tendency for the rider to be blown downwind.

Fig. 6 illustrates the cross-sectional shape of the blade 11, and as shown the blade is preferably symmetrical about an axis D—D to thereby allow the hydrofoil to generate lift irrespective of the direction in which the board is ridden.

In the preferred arrangement, the hydrofoil blade 11 is permanently affixed at each end to the outer ends 26, 28 of the struts 12, 13 in order to increase the structural strength of the board. In an alternative arrangement, the blade 11 may be fixed (for example by bolts or other fixings) to the struts, thereby enabling the blade to be disassembled from the struts for easy transport of the equipment. As mentioned above, the fixings could be designed to shear and fracture in the event of an impact at speed that could otherwise damage the board.

The struts and hydrofoil may be of the same or similar construction to the board, or they may have a different construction to that used for the board. The struts and hydrofoil may be of any of a variety of different materials, for example they may be of carbon fibre or fibreglass. In another arrangement they may have a glass or foam core that is then covered with carbon fibre fibreglass. Other suitable materials will be immediately evident to persons of ordinary skill in the art.

Fig. 7 is a schematic perspective view of a hydrofoil board according to a second embodiment of the invention.

In this arrangement the board 14 has enlarged tips 17, 18 that are significantly upturned away from the hydrofoil from the surface of the board. These tips, termed "flip tips", help avoid nosediving and help early planing of the board. In this embodiment, the hydrofoil 11 consists of three straight sections 11a, 11b, and 11c joined to one another (in the preferred arrangement by virtue of having been formed integrally with one another). The outermost sections 11a and 11c are inclined toward the board 14, whereas the central section 11b is generally co-planar with the underside of the board to yet further improve rider balance as compared to that which would otherwise be achievable with a V-shaped two-section hydrofoil.

The hydrofoil 11 of this embodiment further comprises a plurality of fins 36 orientated so as to be generally perpendicular to the hydrofoil. As aforementioned, the fins 36 function to resist any tendency for the rider to be blown downwind when travelling in an upwind direction. As this resistance is provided, in this embodiment, by fins the struts supporting the hydrofoil may comprise simple flat plates.

Referring now to Figs. 8 and 9 (a) to (d) of the drawings, there are shown a variety of different board designs, each of which has the advantages described herein. As will be appreciated from the selection of board designs shown in these figures, a further advantage of the teachings of the present invention is that the board designer has considerable freedom to design boards of quite different shape that all function as described herein. Specifically, in Fig. 8 the board has been designed with two hydrofoils and has a serpentine shape. Similarly, in Fig. 9a, the board is even more serpentine than that shown in Fig. 8. In Fig. 9b, the hydrofoil has a centre section that is extended towards each end of the board. In Fig. 9c the hydrofoil has a "+" shape, and in Fig. 9d the board has two hydrofoils each of which is configured as an open-ended box.

The operation of the hydrofoil board 10 and the significance of the structural relationships of the components of the hydrofoil board 10 will now be described.

Two different operational scenarios will hereafter be described for this equipment. In a first arrangement, the equipment is towed behind a power kite that harnesses the power of the wind. The rider launches the kite from the beach in the usual manner for kitesurfing, as approved by the International Kiteboarding Organisation (IKO). The rider would then pick up the hydrofoil board 10 by the grab

handle 35 (or otherwise) and walk into the water to a depth greater than the maximum depth of the hydrofoil blade 11. The rider would then pilot the kite to a neutral position directly above them, then they must position their body on their back with the knees bent, and slide their feet into the foot straps 33, 34. The rider then swings the kite in the desired direction of travel, and allows the knees to flex further, putting more pressure on the front foot. The traction from the kite pulls the rider up onto the board and the board and rider will begin moving.

When moving at slow speeds with the board 14 generally horizontal the hydrofoil blade 11 will not be generating enough lift to raise the board 14 from the water, and the device can be ridden in the same manner as any normal kiteboard. An advantage over traditional kiteboards is that at this stage the submerged hydrofoil blade 11 and struts 12, 13 help to give the board directional stability, and to prevent it from being pulled off course downwind.

As aforementioned, in the preferred embodiment the central placement of the hydrofoil blade 11 and strut 12, 13 assembly in relation to the board easily allows the rider to change the angle of attack of the hydrofoil blade 11 by shifting their weight backwards or forwards relative to the blade 11. By increasing their speed, and inclining their weight backwards to increase the angle of attack of the hydrofoil blade 11, the rider is able to start using the hydrofoil blade 11 to generate lift which counteracts their own weight and lifts the board above the surface of the water so that the only portion of the hydrofoil board 10 in contact with the water is the hydrofoil blade 11 and the struts 12, 13. This ability of the rider to adjust the angle of attack of the hydrofoil is a significant advantage of the board disclosed herein.

The hydrofoil blade 11 illustrated in Fig. 1 is curved (when viewed from an end of the board), and this arrangement provides a surface piercing, self-stabilising hydrofoil which helps reduce the likelihood of the hydrofoil blade 11 jumping out of the water (known as "porpoising") when the speed is too great. This occurs because as the hydrofoil blade 11 generates lift and rises, so the outer edges are lifted above the surface of the water thereby reducing the total submerged lifting area of the blade. The lift generated is therefore reduced to a balance point at which the hydrofoil blade is no longer rising, and this becomes the cruising height.

Another key feature of the equipment described herein is that the geometry of the hydrofoil blade 11 and the struts 12, 13 (as illustrated in Fig. 1) aid the rider

in travelling in an upwind direction. Specifically, when travelling upwind the rider will tend to be leaning backwards into the wind so as to avoid getting blown downwind, and the board 14 will therefore be at an angle, with the heelside edge 20 lower than the toeside edge 19. When the board is in this position the cross sectional shape (illustrated in Fig. 5) and the positioning and angle of the struts 12, 13 combine to generate a lateral lift force in the upwind direction while the board is ridden at an angle, and this lateral lift force helps the rider to more easily travel upwind.

The hydrofoil board 10 can be jumped using the same technique as with a normal kiteboard. This is achieved by braking sharply (by turning into the wind), and pulling the kite upwards in the sky to give lift. The upwind lift effect described in the previous paragraph allows the hydrofoil board 10 of the preferred embodiment to brake more sharply than existing products, thereby increasing the efficiency of the transfer of lift from the kite to the rider and the hydrofoil board 10. The end result of this is that higher jumps are possible with the board of the preferred embodiment.

Landings for jumps are facilitated by the curvature of the lower face 15 of the board 14 (shown in Fig. 2 and known as the "rocker"). This allows for some correction is the landing angle of the board 14 if it is not fully aligned with the surface of the water.

The rider may also jump by shifting their weight backwards sharply to increase the angle of attack of the hydrofoil blade 11. This will lift it upwards sharply so that it will pop out of the water.

In order to turn and ride in the opposite direction across the wind, the rider performs the same manoeuvre as they would do with a standard twin-tip kiteboard. Firstly they must bring the kite above them to the neutral point, and turn the board 14 slightly towards the wind to act as a barrier to the direction of motion. They must then centralise their weight over the board to reduce the angle of attack of the hydrofoil blade 11 so that the board 14 sinks back to the water surface and begins to perform as a normal kiteboard. In doing this the rider will slow down and come to a stop. As soon as the rider feels the loss of speed, the rider pulls the kite downwards in the opposite direction to the previous one, and transfers their weight to the foot which was previously leading. The hydrofoil board 10 will then begin to move in the reverse direction without the need to be turned through 180 degrees.

As aforementioned, the equipment may also be towed behind a powered water craft. In such circumstances the equipment performs in exactly the same manner as previously described, and is ridden the same way. The difference is in the method of starting. Instead of operating a kite and harnessing the power from the wind, the rider is towed by a bar at the end of a rope from the watercraft. The starting body position in the water remains the same, with the bar held at arms length in the direction of the watercraft.

It will be apparent from the foregoing that the device described herein has significant performance improvements as compared to traditional boards.

It will also be apparent that whilst various embodiments of the present invention have been described herein, these embodiments are merely illustrative of the teachings of the invention and hence that modifications and alterations may be made thereto without departing from the scope of the invention. It should also be noted that the scope of the present invention extends to encompass any combination of features herein described irrespective of whether or not that particular combination has been claimed hereafter at this time.

As a modification of the particular arrangements described herein, the hydrofoil blade may instead be supported beneath the board by means of a single strut extending downwards from the board, preferably from the intersection of the aforementioned axes A—A and B—B. In other arrangements, the hydrofoil may be supported by more than two struts.

The equipment herein described may also be modified to include more than one hydrofoil blade. For example, two hydrofoil blades and associated strut assemblies may be affixed to the board 14, one blade being located roughly beneath each of the footpads 31, 32. Further blades could also be added.

Finally, whilst the board in Fig. 1 has a hydrofoil blade with a curved (generally circular) shape, this is not essential and the hydrofoil could instead have a V shape or comprise a blade that is mounted so as to be generally co-planar with the board. Many other shapes of hydrofoil that are suitable to impart lift to the board will be apparent to persons of ordinary skill in the art.

CLAIMS

1. Water sports equipment for supporting a standing rider whilst the rider and the equipment are towed through the water, the equipment comprising:

an elongate board having an upper surface carrying first and second foot securing means, said foot securing means being configured to be engaged by a respective foot of the rider so that the rider can stand on the board with their body facing in a direction generally perpendicular to a direction in which the rider and equipment are towed through the water in use;

a hydrofoil having a longitudinal axis, said hydrofoil being configured to impart lift to the board when the rider and board are towed through the water; and

means for affixing said hydrofoil to said board so that the hydrofoil is spaced from a lower surface of the board and orientated such that said hydrofoil longitudinal axis is substantially transverse to the direction in which the rider and equipment are towed through the water in use.

2. Equipment according to Claim 1, wherein said hydrofoil comprises a bi-directional hydrofoil configured to impart lift to the board when the rider and board are towed, irrespective of the direction of water flow over the hydrofoil.

3. Equipment according to any preceding claim, wherein said foot securing means are located on said upper surface in such a position relative to the hydrofoil that a rider can change the hydrofoil's angle of attack by moving their weight from one foot to the other.

4. Equipment according to Claim 3, wherein said foot securing means are located to either side of and at least substantially equidistant from said hydrofoil.

5. Equipment according to any preceding claim, wherein said foot securing means are secured to said board in such a manner that the positions of said first and second foot securing means relative to said hydrofoil may be varied.

6. Equipment according to any preceding claim, wherein said hydrofoil is detachable from said board.

7. Equipment according to Claim 6, wherein said hydrofoil is affixed to said board by one or more frangible fasteners.

8. Equipment according to Claim 7, wherein said frangible fasteners are configured to break and thereby release the hydrofoil from the board in the event of an impact between the hydrofoil and the sea bed or another submerged object.

9. Equipment according to any of claims 1 to 5, wherein said hydrofoil, board and said means for affixing the hydrofoil to the board are manufactured as a one-piece unit.

10. Equipment according to any preceding claim, wherein said means for affixing the hydrofoil to the board comprises one or more struts.

11. Equipment according to any preceding claim, comprising means operable when the equipment is ridden in an upwind direction to resist movement of the board in a downwind direction.

12. Equipment according to Claim 10 and 11, wherein said board comprises a heelside edge proximate heel portions of said foot securing means and a toeside edge proximate toe portions of said foot securing means, and said means for resisting downwind movement of the board comprises one or more struts having a hydrofoil shaped cross-section, the hydrofoil cross-section being configured to impart lift in a direction generally perpendicular to a direction of motion when the board is ridden with said heelside edge closer to the water than said toeside edge.

13. Equipment according to Claim 11, wherein said means for resisting downwind movement of the board comprises one or more generally planar fins mounted so as to be submerged in the water in use and so as to be generally perpendicular to said longitudinal axis of said hydrofoil.

14. Equipment according to any preceding claim, wherein said hydrofoil is wider than said board so that the hydrofoil projects beyond the periphery of the board.

15. Equipment according to any preceding claim, wherein respective ends of said hydrofoil are inclined towards the lower surface of said board.

16. Equipment according to Claim 15, wherein said hydrofoil is curved.

17. Equipment according to Claim 15, wherein said hydrofoil is V-shaped.

18. Equipment according to Claim 15, wherein said hydrofoil comprises a central section that is generally co-planar with said board lower surface, and first and second outer sections extending from respective ends of said central section, said first and second outer sections being inclined towards said lower surface of said board.

19. Equipment according to any preceding claim wherein said means for affixing said hydrofoil to the lower surface of said board is configured to orientate said hydrofoil so that said hydrofoil longitudinal axis is substantially perpendicular to the direction in which the rider and equipment are towed through the water in use.

20. Equipment according to any preceding claim wherein the board comprises a toeside edge and a heelside edge, a first board end extending between first ends of said toeside and heelside edges and a second board end extending between second ends of said toeside and heelside edges, said first and second board ends being inclined away from said board upper surface and said hydrofoil.

21. Equipment according to Claim 20, wherein said toeside edge and said heelside edge curve towards one another in the vicinity of said first and/or second ends.

22. Equipment according to any preceding claim, wherein different regions of the board have different resistances to flexion.

23. Equipment according to Claim 22, wherein a region of the board between said first and second foot securing means has a greater resistance to flexion than regions of the board in the vicinity of either end.

24. Equipment according to any preceding claim, further comprising:

a second hydrofoil having a longitudinal axis, said second hydrofoil being configured to impart lift to the board when the rider and board are towed through the water; and

means for affixing said second hydrofoil to said board so that the second hydrofoil is spaced from a lower surface of the board and orientated such that said hydrofoil longitudinal axis is substantially transverse to the direction in which the rider and equipment are towed through the water in use.

25. Equipment according to Claim 24, wherein said first and second hydrofoils are differently orientated with respect to the direction in which the rider and equipment are towed through the water in use.

26. Equipment according to Claim 24, wherein said first and second hydrofoils are similarly orientated with respect to the direction in which the rider and equipment are towed through the water in use.

27. Equipment according to any preceding claim, further comprising a grab handle fixedly attached to said upper surface of the board.

FIG. 1

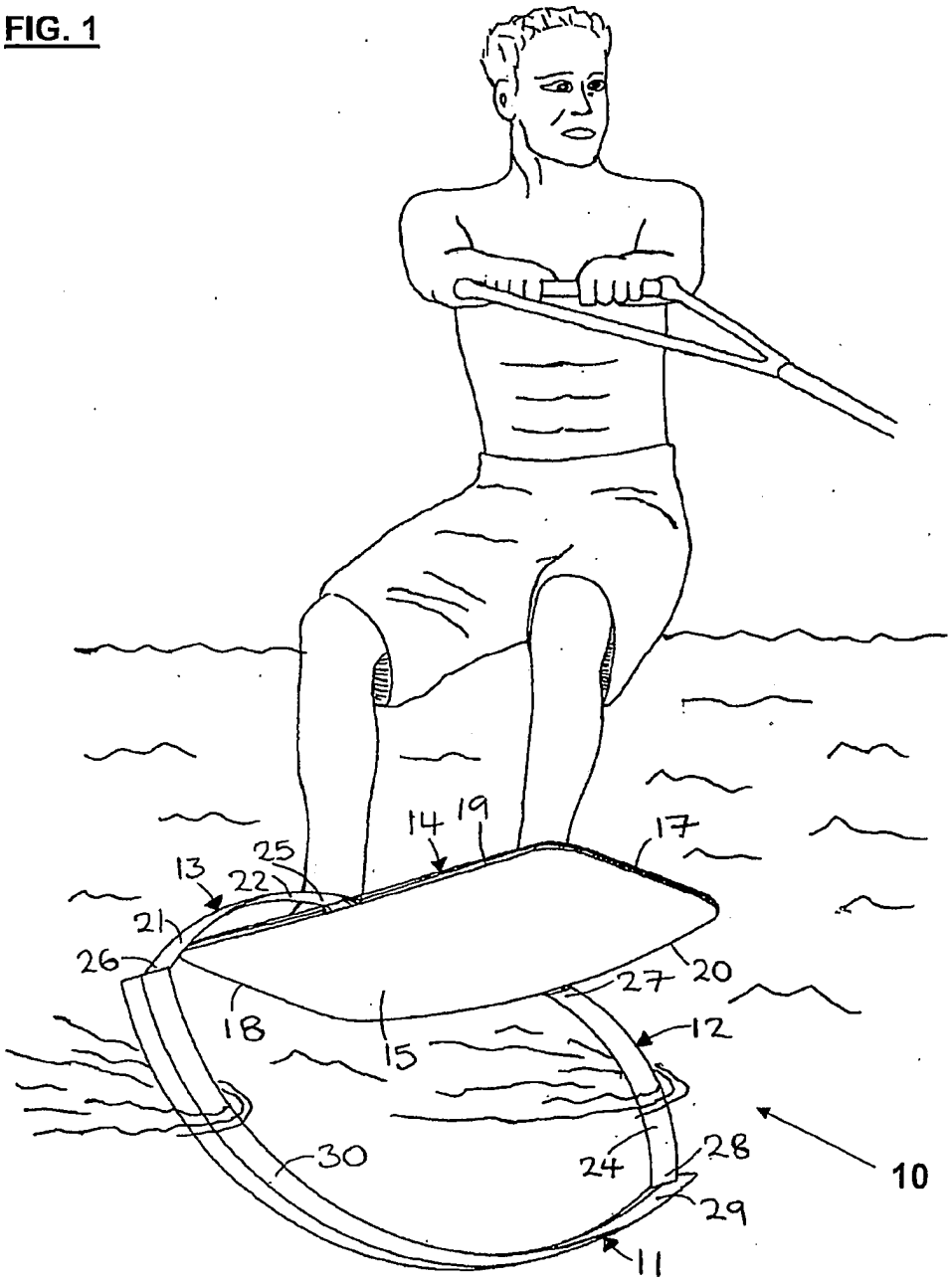


FIG. 2

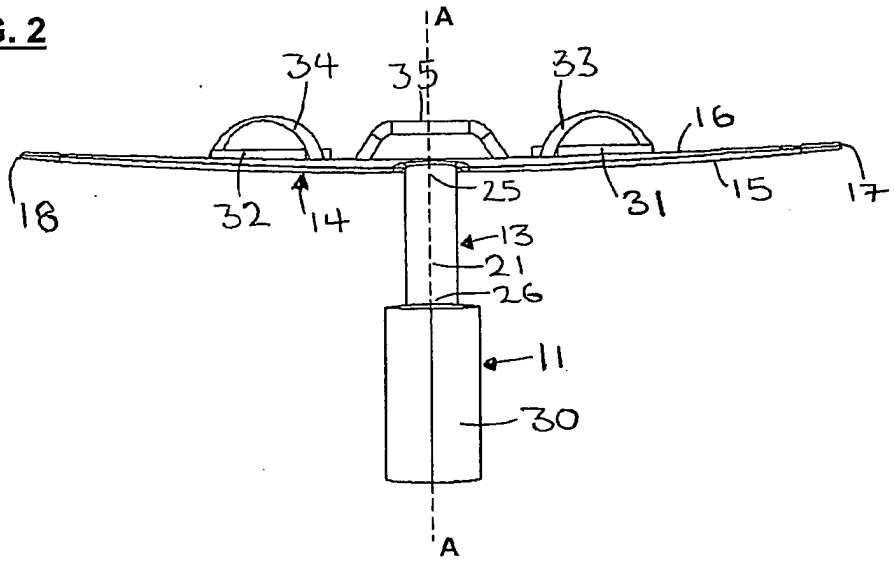

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A

FIG. 3

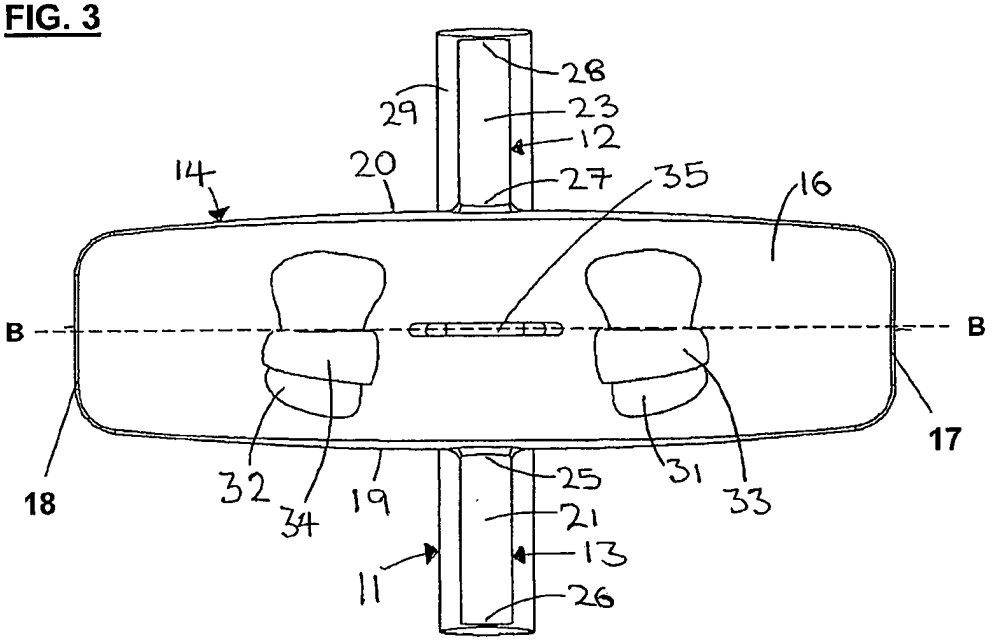

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FIG. 4

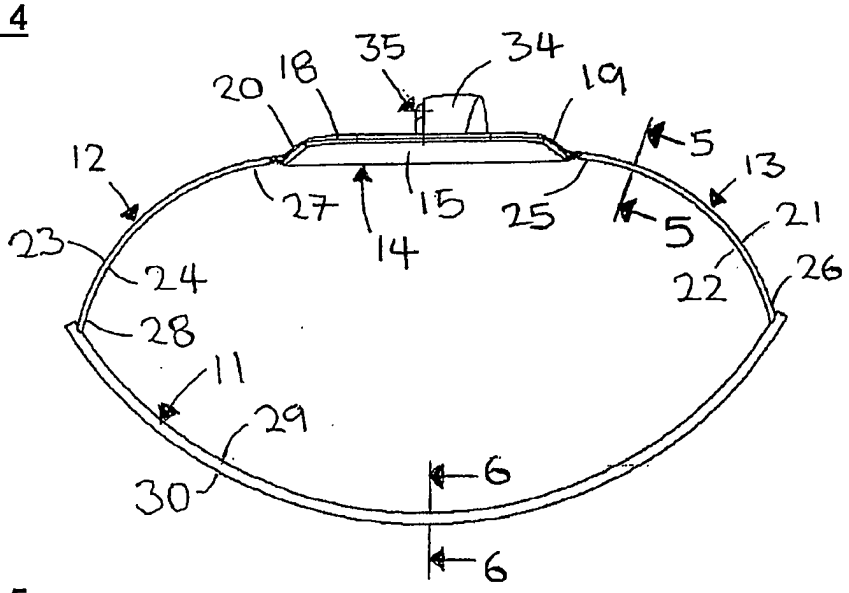


FIG. 5

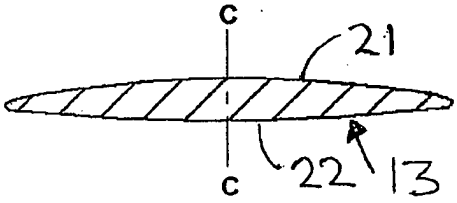
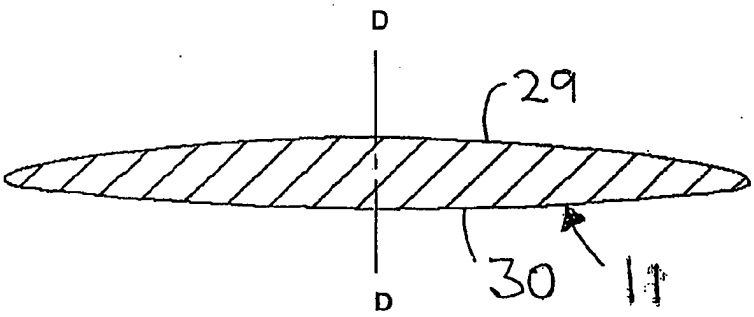


FIG. 6



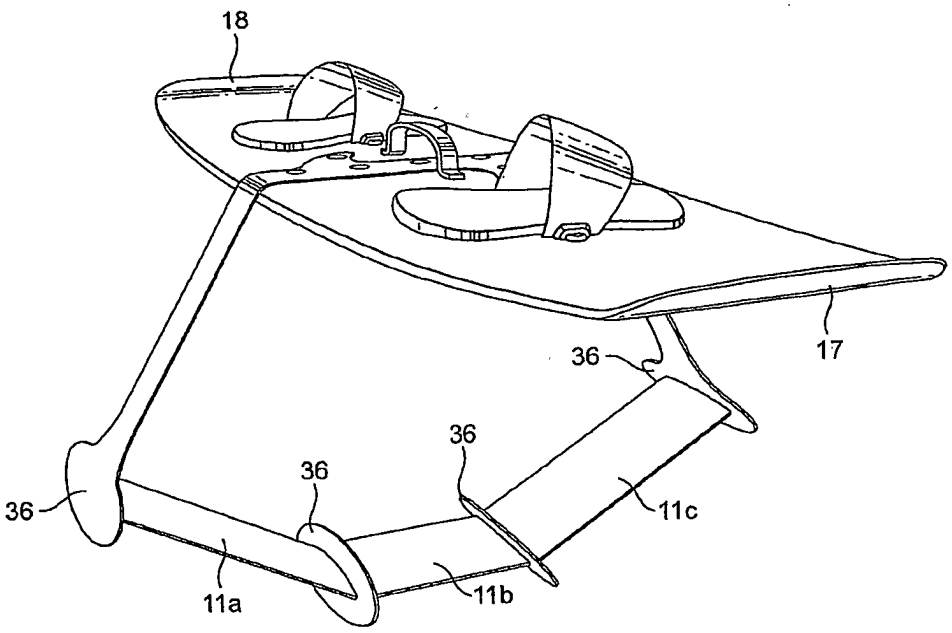


FIG. 7

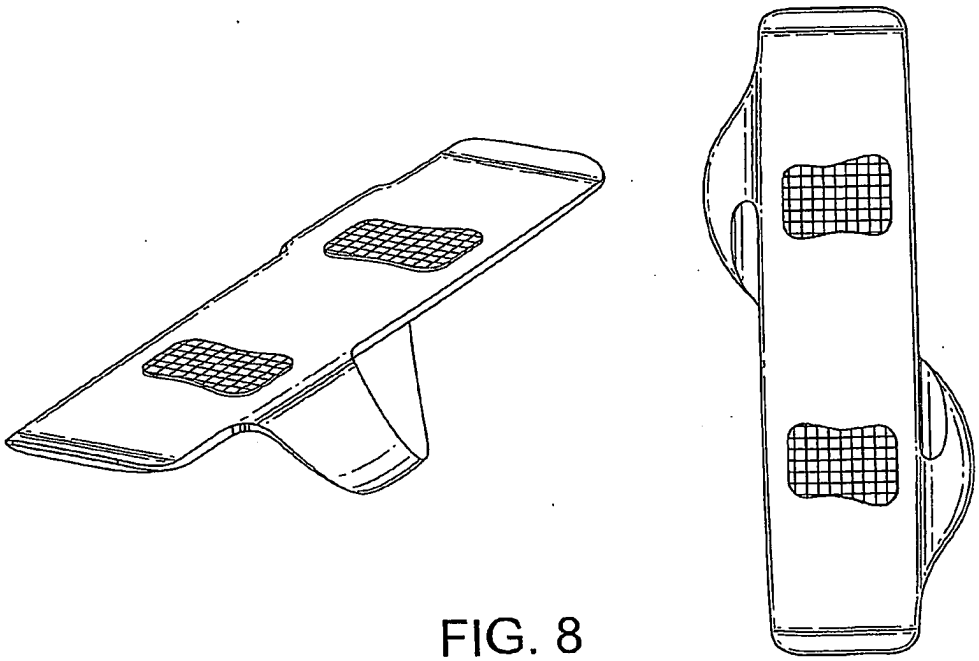


FIG. 8

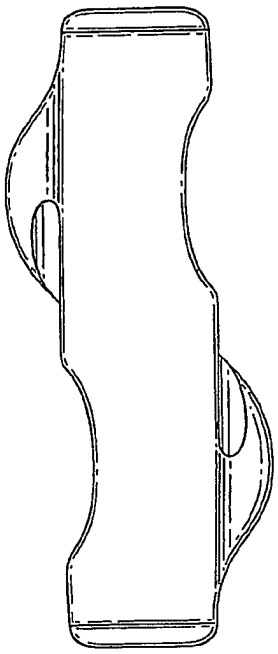


FIG. 9a

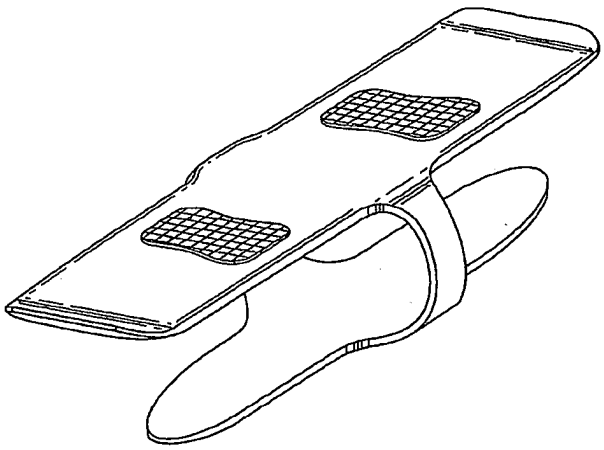


FIG. 9b

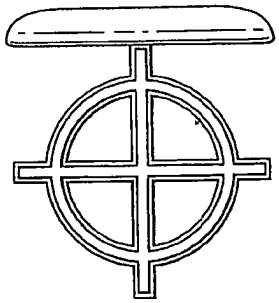


FIG. 9c

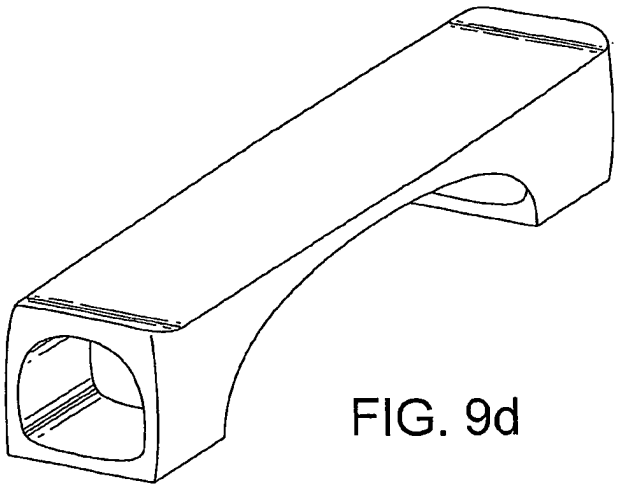


FIG. 9d

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2007/000320

A. CLASSIFICATION OF SUBJECT MATTER
INV. B63B35/79

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2 815 518 A (KUEHN OTTO L) 10 December 1957 (1957-12-10) the whole document	1
A	DE 78 32 654 U1 (KAYSER, HARALD, DR.-ING., 2822 SCHWANEWEDE) 10 April 1980 (1980-04-10) figures	1
A	FR 2 863 582 A (SALOMON SA [FR]) 17 June 2005 (2005-06-17) figures	1
A	US 5 249 998 A (WOOLLEY ROBERT C [US] ET AL) 5 October 1993 (1993-10-05) cited in the application abstract; figures	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 May 2007	21/05/2007

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Nicol, Yann

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2007/000320

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 2815518	A	10-12-1957	NONE		
DE 7832654	U1		NONE		
FR 2863582	A	17-06-2005	EP	1697104 A1	06-09-2006
			WO	2005065912 A1	21-07-2005
US 5249998	A	05-10-1993	NONE		

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(10) International Publication Number
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B63H 5/14 (2006.01) *B63H 21/30* (2006.01)

(21) International Application Number:
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(74) Agent: **EARLEY, Martin, G.**; Actuate IP, Level 9, 140 Queen Street, Melbourne, VIC 3000 (AU).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*
— *with amended claims (Art. 19(1))*

(54) Title: POWERED WATER SPORTS BOARD

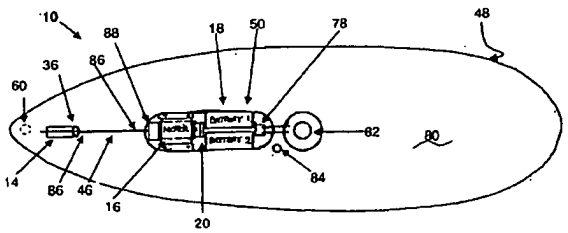


Fig 1

(57) Abstract: The invention provides a powered water sports board (10) which includes a motor (16) and a power supply (18), both of which are mounted inside a cavity (20) formed inside an elongate buoyant body (12) of the powered water sports board, and a propeller (36) which is capable of being driven by the motor (16) and which is housed inside a fin (14) of the elongate buoyant body (12) thereby to shield the propeller.

WO 2011/050410 A1

Powered water sports board

Field of the Invention

This invention relates to a powered water sports board and in particular to a powered water sports board which includes one or more fins.

Although the invention may be applied to any type of finned water sports board, for convenience sake it shall be described herein in terms of a powered surf board.

Background to the Invention

It is known to have powered water sports boards including powered surf boards. However, generally the approach to date is not suitable for users that wish to maintain the surfing capability of the board.

Serious and keen surfers and other users of water surf boards may wish to use a surf board in a hydrodynamic way to maximise the use of waves to provide a ride. The development of surfboards therefore has been to focus on design parameters of the board including the material and weight of the board, the length of the board, the shape of the board as well as developments on the shape, position and number of fins mounted on the board. For example, different length and weight boards change the stability and turnability of the board. Changing the shape can also provide a different wave cutting action. However, lately the focus of developments has been on fin designs which have lead to the greatest change or control of the hydrodynamic effect of the board.

For a more recreational user one of the approaches in board design is to provide a water sports board which is merely made suitable to be buoyant with the user on a water body. Such water sports boards may have a large motor attached thereto. The motor therefore provides a major component of the board and consequently could overshadow the board's hydrodynamic functions. This could result in a powered water sports board that has a reduced hydrodynamic capability.

However a concern for the serious surfer can be the amount of energy required to move to a position at which the serious surfer can catch a wave. One factor impacting on the amount of energy consumed is typically the distance which the surfer has to travel from the end of one surf manoeuvre to the start of the next. Another factor is the number of waves which the surfer has to cross in order to get to the wave catching position. One way of reducing the amount of energy consumed is to have a jet-ski rider or even small boat user drag the

surfer back through the surf out to the wave catching position. However this requires someone extra to be available for use by the serious surfer. This option can be generally available during competitions. However at recreational surf beaches for safety reasons such vehicles are banned from operating in surfing or swimming areas.

Another option to reduce the energy exerted by a surfer paddling to the wave catching position is to motorise the surf board. However, it will be generally of importance to the serious or keen surfer to not negatively affect the surfability of the board through the mechanisation thereof.

An example of motorised board can be found in US patent application number 2003/167991 which provides a kit for converting a conventional surf board into a motorised surf board. The kit includes an electric motor which is built directly into a rubber or fin. The fin is attachable to the surfboard so that no structural modifications to the board are required in order to incorporate the electric motor into the board. Another example of such a fitment is German patent number 3139816.

These designs suffer from a number of deficiencies including the increased likelihood of a surfer accidentally coming into contact with the rotating propeller. This will be most undesirable. Furthermore, the design could result in a weakening of the fin in order to allow the electric motor to be fitted thereto. The electric motor most likely will also have a short operating period due to the lack of battery storage capacity. An increase of the battery storage capacity could impact negatively on the hydrodynamics of the fin especially when considering how the electrical motor is secured to the fin in the US and German patent matters.

Summary of the Invention

Accordingly, it is an object of the present invention to at least partly overcome or ameliorate at least one of the disadvantages of the prior art or to provide a useful alternative.

The present invention generally provides a powered water sports board providing a propeller driven surfing device comprising of a buoyant body, a motor and a propeller driven by the motor.

In one embodiment of the invention there is provided for a powered water sports board which includes a motor, a source of power for the motor, an elongate buoyant body having at least one fin; and a propeller driven by the motor and which is capable of propelling the elongate buoyant body; and wherein the motor and the source of power are mounted to the body and

the propeller is mounted inside the at least one fin thereby allowing the at least one fin to shield the propeller.

The at least one fin may further be shaped to direct water flow from the propeller to a trailing end of the at least one fin.

The at least one fin may have a leading end and a trailing end; wherein the at least one fin includes a flow passage in which the propeller is mounted; and wherein the flow passage extends through the at least one fin from the leading end to the trailing end.

The flow passage may include an inlet, which faces the leading end, and an outlet which is directed towards the trailing end; and wherein a cross sectional diameter of the flow passage reduces from the inlet to the outlet.

The leading end of the at least one fin may extend across the inlet thereby to reduce a cross sectional diameter of the inlet.

The propeller may be mounted midway inside the flow passage.

The flow passage may be tubular in cross sectional diameter; wherein the fin may extend a portion into the flow passage from the leading end so that the fin divides a first section of the flow passage in half.

The at least one fin may include a portion which extends from the leading end into the flow passage; wherein the portion divides a first section of the flow passage, upstream from the propeller, into half; and wherein the portion has a maximum cross sectional diameter which is less than a maximum cross sectional diameter of a remainder of the fin thereby reducing a volume which is taken up by the portion inside the flow passage.

The flow passage may include an inlet cap on the inlet and an outlet cap on the outlet.

An inlet cap may be fitted to the inlet and an outlet cap may be fitted to the outlet; and wherein each of the inlet and outlet caps is grated to cover the inlet and outlet. At least the inlet cap may have fixed bars which prevent objects finding their way into the flow passage. Each of the inlet and outlet caps may be inserted at least partly into a respective inlet and outlet; and wherein a side wall of the flow passage and each of the inlet and outlet caps include complimentary, inter-engaging formations which allow the inlet and outlet caps to be secured the inlet and the outlet respectively with a tight frictional fit.

The motor may be secured with a mounting to the elongate buoyant body; and wherein the mounting allows water to flow around the motor to cool the motor during operation.

The mounting may include a tubular portion having a front end and a rear end; the front end may include a crosspiece which allows the motor to be secured to the mounting inside the tubular portion; wherein the tubular portion may have an outer sleeve and an inner sleeve which is positioned inside the outer sleeve; wherein the front and rear ends are sealed so that a sealed chamber is formed between the inner and outer sleeves; and wherein the motor is fitted inside the inner sleeve thereby allowing water flowing through the sealed chamber to cool the motor. The tubular portion may include a pair of diametrically opposed flanges which allow the tubular portion to be secured to the elongate buoyant body.

The elongate buoyant body may include a sealed cavity which houses the motor and the source of power.

The cavity may include piping which allows water from a water body on which the elongate buoyant body rests to be directed to the sealed chamber of the mounting to cool the motor.

The sealed chamber may include an entrance, which allows water to be introduced into the sealed chamber, and an exit which allows water to flow from the sealed chamber, and wherein the piping includes a feed portion which allows water to be drawn from the water body to flow into the sealed chamber, and a drain portion which allows water, having circulated around the inner sleeve, to flow from the sealed chamber and to exit the elongate buoyant body.

The elongate buoyant body may include at least one inlet port which allows water to come through an underside of the elongate buoyant body through the feed portion of the piping into the sealed chamber; and wherein the elongate body includes at least one output port which allows water to flow from the sealed chamber through the drain portion; and wherein the inlet and output ports are positioned relative to the motor thereby to allow water to flow into the sealed chamber through the inlet port at a position which is between the motor and a front end of the elongate buoyant body, and from the sealed chamber through the outlet port at a position which is between the motor and a rear end of the elongate buoyant body; whereby the positioning of the inlet and outlet ports allows water to flow through the cooling chamber as the elongate buoyant body moves across a water body.

The inlet may be positioned inside the flow passage downstream from the propeller thereby allowing operation of the propeller to force water into the inlet towards the sealed chamber along the feed portion to cool the motor.

The powered water sports board may include a plurality of motors, a plurality of propellers, and a plurality of fins; and wherein each of the plurality of propellers are mounted to one of the plurality of fins; and wherein the plurality of propellers are driven by the plurality of motors.

In one embodiment of the invention the powered water sports board may include a gearbox which is connected to each of the plurality of propellers; and wherein the plurality of motors are connected in series to drive the gearbox.

The powered water sports board may include an acceleration switch which is mounted midway to the elongate buoyant body for access from the upper side; and wherein activation of the acceleration switch causes operation of the motor thereby to cause rotational in the propeller.

Activation of the acceleration switch may cause the propeller to rotate at a maximum velocity.

In a further embodiment of the invention there is provided for a powered water sports board which includes a motor, a power supply, a propeller driven by the motor; and an elongate buoyant body having at least one fin; wherein the motor and the power supply are mounted to the body and the propeller is mounted to the at least one fin; and wherein the at least one fin includes a flow passage in which the propeller is housed.

The flow passage may be adapted to focus the flow of water from the propeller.

In one form of the invention there is provided a motorised surfboard having a hydrodynamically constructed board and fins suitable for allowing the user to surf unaided by the motor; one or more motors connected to a source of power and powering one or more propellers; wherein the one or more motors, propellers and source of power are sized and located on the board to provide little reduction in the unaided hydrodynamic surfability of the board.

The one or more motors and power supplies can be located within the hydrodynamic form of the surfboard. The surfboard can include cavities for receiving the one or more motors and power supplies and which allows accessibility.

The at least one fin has a hydrodynamic shape with a leading front edge and a rear edge and a flow passage housing includes a open shroud form enclosing the propeller and with an

front opening leading to a rear opening whereby water enters from the front opening and exits via a second smaller opening producing thrust.

The flow passage can be located at the base of the fin adjacent the underside of the board.

The invention also provides a lightweight motorised surfboard comprising:

a lightweight hydrodynamic body

at least one fin;

a battery operated motor;

a 2 blade to 8 blade propeller whereby the propeller is incorporated into the structure of at least one of the fins; and

a flow passage housing the fin structure incorporating the propeller and mounted under the body of the board, the flow passage housing having an encircling body able to substantially encircle the propeller and with a first front opening leading to a rear second smaller opening whereby in operation water enters from the front opening and exits via the second smaller opening producing thrust.

Brief Description of the Drawings

In order that the invention can be more readily understood the invention is further described by way of example with reference to the accompanying drawings.

Figure 1 is a schematic illustration of a powered water sports board according to the invention.

Figure 2 is a schematic illustration from a rear end of a fin used in the powered water sports board and to which a propeller is mounted.

Figure 3 is a schematic illustration in plan of the fin of Figure 2.

Figure 4 is a schematic illustration from one side of the fin of Figure 2.

Figure 5 is schematic illustrations showing in perspective a number of different powered water sports boards according to the invention wherein each board has a different fin configuration.

Figure 6 is schematic illustrations showing in plan a number of different powered water sports boards according to the invention wherein each board has a different sized cavity.

Figure 7 is a schematic illustration of a flow passage of a fin of the powered water sports board and to which inlet and outlet caps are fitted.

Figure 8 is a schematic illustration of the outlet cap.

Figure 9 is a schematic illustration of a powered water sports board according to a variation of the invention.

Figure 10 is a schematic illustration in perspective of a mounting used in the powered water sports board according to the invention.

Figure 11 is a schematic illustration from a front end of the mounting of Figure 10.

Figure 12 is a schematic illustration from a rear end of the mounting of Figure 10.

Figure 13 is a schematic illustration of a cavity of the powered water sports board according to the invention.

Figure 14 is a schematic illustration in cross-section of the cavity taken on a line 14–14 in Figure 13.

Figure 15 is a photographic representation of the powered water sports board illustrated in Figure 1.

Description of Illustrated Embodiments of the Invention

Figure 1 of the accompanying representations illustrates a powered water sports board 10 according to the invention. The powered water sports board includes an elongate buoyant body 12 carrying at least one fin 14 (illustrate in greater detail in Figures 2 to 4), a motor 16 and a source of power 18 for the motor both of which are mounted inside a cavity 20 and into the elongate buoyant body 12. In the illustrated embodiment the source of power 18 is shown as being a number of electrical batteries and the motor 16 is listed as being an electrical motor which is electrically connected to the batteries.

Referring in particular to Figures 2 to 4, the fin 14 contains a flow passage 24 which extends through the fin from a leading end 26 to a trailing end 28 of the fin. The flow passage has an inlet 30 and an outlet 32. Mounted inside the flow passage is a propeller 36 which is connected to the motor 16 the operation of which causes rotational movement in the propeller. As best can be seen in Figures 2 and 3, the flow passage has a tubular profile.

Referring back to Figure 4, the propeller 36 is mounted midway inside the flow passage 24. This allows a portion 38 of the fin 14 to extend from the leading edge into 26 into the flow passage. The portion 38 therefore divides a first section 40 of the flow passage in half. The portion 38 increases the strength of the fin by providing a direct connection between an upper portion 42 of the fin with a base portion 44 thereof. Furthermore, the portion increases the surface area of the fin and may reduce the turbulence with which water flows into the flow passage 24. Referring to Figure 2, the portion 38 has a reduced maximum cross sectional diameter when compared with a maximum cross sectional diameter of the

remaining portion of the fin. This increases the volume of water which can pass through the flow passage through the inlet 30.

Returning to Figure 1, the propeller 36 is connected to the motor 16 with a shaft 46 which extends from an underside 48 of the elongate buoyant body 12 into the cavity 20. The cavity is a dry chamber 50 and is sealed at an upper end 52, see Figure 14, with a lid 56 which is shown in Figure 15. The motor and batteries 18 are housed in the dry chamber 50 thereby reducing the likelihood of these components being damaged by water.

The cavity 20 is further illustrated in Figures 13 and 14. The cavity is associated with one or more inlet ports 58 and with one or more outlet ports 60. In Figure 20, one inlet port is positioned downstream from the propeller 36. Thus, operation of the propeller forces water into the inlet. The one inlet port is typically positioned in this manner when the powered water sports board 10 contains a motor 16 which has a relatively small power rating. In such a situation the powered water sports board 10 will not be able to move at great speed over a water body which is generally required to push water with sufficient pressure into the inlet.

In Figure 21 two inlet ports are shown to be positioned on an underside 48 of the elongate buoyant body 12. This configuration is typically adopted in powered water sports boards 10 which contain a high powered motor 16. Thus, the high powered motor 16 is capable of pushing the elongate buoyant body 12 over a body of water with sufficient speed to cause water to be pushed into the two inlet ports with sufficient pressure.

Figure 1 illustrates that one outlet port 60 is positioned on an underside 48 of the elongate buoyant body 12 in proximity to a rear end of the elongate buoyant body.

Referring in particular to Figures 1 and 10 to 12, the motor 16 is secured with a mounting 62 to the elongate buoyant body 12 inside the dry chamber 50. The mounting includes a tubular portion 64 which has a front end 66 (shown in Figure 11) and a rear end 68 shown in Figure 12. The tubular portion includes a pair of spaced apart, diametrically opposed flanges 70 with which the tubular portion is secured to the elongate buoyant body with a number of fasteners, not shown. The front end has a cross piece 72 which allows the motor 16 to be secured to the tubular section 64 using a number of fasteners, not shown, through a number of apertures 74. The cross piece further includes a central aperture 76 which allows an axle to extend through the cross piece. Wiring, extending from the power supply 18, is connected through the rear end to the motor 16.

The motor 16 is either a brushed or brushless which typically is designed to deliver a high torque. The power rating of the motor typically ranges between 100 to 8000 Watts. A motor

with a higher power rating is generally used for higher speed boards as typically such a motor can run at high speeds of around 20,000 RPM or higher. A motor with the lower power rating is generally used with boards which are not required to be propelled with high-speed through water. Typically such a lower power rating motor run at speeds of around 5000 RPM or lower.

As mentioned hereinabove, the power supply 18 is a form of one or more batteries which provide power to the motor 16. Typically these one or more batteries are housed inside the dry chamber 50 thereby reducing the likelihood of a short-circuit occurring. Also mounted inside the dry chamber are other control componentry 78 such as a switch with a relay which is used to operate the supply of electricity from the power supply 18 to the vehicle motor 16. The control componentry, for a brushless motor, also includes speed controllers and other required componentry in order to operate the brushless motor.

Referring back to Figure 1, accessible from an upper side and 80 of the elongate buoyant body 12 is a throttle or acceleration switch 82. A user of the powered water sports board 10, not shown, can use the acceleration switch to cause the motor to speed up to operate at maximum revolutions, for example 20,000 RPM. Also accessible from the other side 80 is a charge jack 84 which allows the power supply 18 to be charged from a suitable power source such as mains. The acceleration switch may be in the form of an open switch which is closed when operated by a user. The closing of the switch complete an electrical circuit thereby allowing electricity from the power supply 18 to flow to the motor 16.

The shaft 46 includes a number of universal joints 86 which allow the shaft to be connected at one end to the propeller 36 and at an opposed end to the motor 16. In such a configuration the universal joints connect a number of rigid shaft sections in order to form the shaft 46. However, one or more of the rigid shaft sections may be flexible so that the universal joints are no longer required. This will therefore allow a rigid shaft section, to which the propeller is secured, to be connected to the motor 16 with a flexible shaft. Thus, the flexible shaft is capable of bending through the elongate buoyant body 12 to connect the propeller to the motor 16.

Figures 9, 18 and 19 illustrate a variation 10A of the powered water sports board according to the invention. Like reference numerals are used to designate like components between the powered water sports boards 10 and 10A.

The powered water sports board 10A includes two motors 16 which are connected in series. This allows motor is having lower power ratings to be used in unison in order to achieve an

equal or an improved power rating when compared to a larger motor. Consequently, dimensions of the cavity 20A can be reduced as smaller motors are used as opposed to one or more large motors. Nonetheless, as is shown in Figure 6, the dimensional of the cavity are adjusted according to the number and sizes of the motors 16 used in the construction of the powered water sports board10. For example, when the powered water sports board includes five fins 14, more motors 16 may be required in order to drive the propellers. Accordingly, the dimensions of the cavity 20 are increased to accommodate the motors 16 and batteries 18 required to power the motors.

Figure 5 illustrates that the invention can be used on a surfboard having any number of fins. Depending on requirements such as availability of space in the elongate buoyant body 12 and power rating, one motor 16 can be used to drive a number of propellers 14 through a gearbox 88 (see Figure 1). Alternatively, each propeller can be connected to an individual motor which will typically increase the dimensions of the cavity 20.

The fin 14 of Figure 4 is shown having an attachment bracket 90 integrally formed with the fin thereby allowing the fin to be secured to a fin box 92 which is shown schematically in Figure 4. The attachment bracket is dimensioned to allow the position of the fin relative to the elongate buoyant body 12 to be slidingly adjusted along the fin box 92. A pin 94 is used to secure the fin to the elongate buoyant body once the correct position is selected. However, it should be noted that the fin can also be integrally formed with the elongate buoyant body thereby not needing the attachment bracket. The invention is therefore not limited in this regard.

Referring in particular to Figures 1, 4 and 10, the motor 16 is secured with the shaft 46 to the propeller 36. The flanges 70 are mounted to a rail 96, shown schematically in Figure 10, which in turn is mounted to the dry chamber 50. The rail allows the mounting 62 to slide inside the dry chamber thereby to accommodate the sliding movement of the fin 14 relative to the elongate buoyant body 12. However, the rail will be discarded when the fin is fixed to the elongate buoyant body. The invention is therefore not limited in this regard.

Figure 7 shows a variation 100 of the flow passage according to the invention. Like reference numerals are used to designate like components. An outlet 30 of the flow passage 100 extends past a leading end 26 of a fin 14. Due to the likelihood of unwanted objects moving into the flow passage 100, the inlet 30 is covered with an inlet cap 102 and the outlet 32 is covered with an outlet cap 104. As an example of the construction of the inlet and outlet caps, the construction of the outlet cap 104 is further described in Figure 8.

The outlet cap 104 includes a number of rods 106 which extends across a central aperture 108 of the outlet cap. A flange 110 of the outlet cap carries a number of spigots 112 which are registered with counterpart sockets 114 formed into an inner side or side wall 116. This allows the outlet cap to be fitted to the outlet 32 so that the flange 110 extends at least partly into the flow passage 100. It should be noted that where the outlet would 30 is positioned behind the leading end 26 (4 example is shown in Figure 4), that the portion 38 extending across the inlet will perform the same function as the rods 106. As such the inlet cap 102 is not needed.

The flow passage 100 may also be profiled to have a conical shape so that the inlet 30 has a maximum cross sectional diameter 118 which is greater than a maximum cross sectional diameter 120 of the outlet 32.

The housing of the propeller 14 inside flow passages 24 and 100 of the fin 14 has a number of advantages. The positioning of the propeller inside the fin allows the fin to shield the fin thereby reducing the likelihood of the propeller inadvertently coming into contact with objects such as a fish, sand, fingers or toes. The flow passage provides a mechanism for focusing water being accelerated through operation of the propeller. This focus increases the thrust capable of being generated through operation of the propeller. The profiling of the flow passage 100, which typically has a reduction in size in the order of 10% between the maximum cross sectional diameters 118 and 120 respectively of the inlet 30 and the outlet 32, is aimed to provide further focusing of the water flow from the propeller.

Furthermore, the positioning of the portion 38 of the fin 14 inside the first section 40 of the flow passages 24 and 100 allows the surface area of the fin to be increased. As described hereinabove, the upper portion or blade portion 42 extends from the base portion 44. Accordingly, the inclusion of the portion 38 inside the flow passage 24 effectively serves to extend the blade portion 42. As such the portion 38 increases the surface area to the blade portion 42 thereby to increase lateral stability capable of being provided by the fin when cutting through a body of water.

Additionally, the propeller 36 is positioned midway inside the flow passage 24 thereby reducing the likelihood of an object, for example a finger, coming into contact with the propeller. Also, the use of the inlet and outlet caps 102 and 104 further reduces the likelihood of such an object finding its way into the flow passage and coming into contact with the propeller.

Referring in particular to Figured 10 and 12, the tubular portion 64 includes an outer sleeve 124 and an inner sleeve 126 which is fitted to the outer sleeve. The front and rear ends 66 and 68 of the tubular portion 64 are sealed thereby creating a sealed chamber 128 between the inner and outer sleeves. The tubular portion further includes an entrance 130 and an exit 132. The entrance and the exit are spaced from one another thereby forcing water introduced into the sealed chamber through the entrance to flow over and along the inner sleeve 126 in order to reach the exit 132. The inner sleeve is dimensioned in order to allow the motor 16 to be inserted into the inner sleeve with a close fit. This close fit will promote the absorption of heat, generated through the operation of the motor, by water passing through the sealed chamber 82.

The one or more outlet ports 60 are also spaced from the one or more inlet ports 58. This requires water having entered the calling chamber through the inlet ports to flow through the cooling chamber before being able to exit the cooling chamber through the outlet ports 58. Furthermore, the inlet ports are designed to facilitate and promote the flow of water into the cooling chamber as the elongate buoyant body moves across a water body, for example the sea. Thus, movement of the elongate buoyant body through water body result in water being pushed into the cooling chamber. This water will be pushed from the cooling chamber through the outlet ports 60 by the continuous movement of more water, source from the water body, through the inlet ports.

Referring in particular to Figures 17 to 19, the powered water sports boards 10 and 10A include piping 134 which has a feed portion 136 and a drain portion 138. The feed portion is connected at one end to the one or more inlet ports 58 and at an opposed end to the inlet 84. Similarly, the drain portion is connected at one end to the one or more outlet ports 60 and at an opposed end to the exit 86. Thus, water enters the feed portion through the one or more inlet ports and is passed into the sealed chamber 128 through the inlet 84. After the water has passed through the sealed chamber over the inner sleeve 126, the water exits the elongate buoyant body 12 from the one or more outlet ports 60 through the drain piping.

Referring in particular to Figure 16, the shaft 46 extends from the gearbox 88 through the elongate buoyant body 12 in a sleeve 140. The sleeve is sealed using, for example, silicone, rubber o-rings, a water impervious bearing, or grease which is force-fed into the sleeve through a grease nipple.

The invention provides a water sports board which is capable of being propelled across a water body using a propeller, which is operated with a motor and power supply which is housed inside a cavity formed inside the elongate buoyant body, and which is shielded inside

a fin of the elongate buoyant body. The propeller is housed inside a flow passage extending through the fin which allows water exonerated through the operation of the propeller to be focused towards a trailing end of the fin. The focusing of the water is caused by the propeller pushing the accelerated water along the flow passage and exits from an outlet of the flow passage in proximity to the trailing end of the fin. Furthermore, thrust generated by the propeller can be used to force water through a sealed chamber thereby allowing the sealed chamber to be called by the water.

While we have described herein a particular embodiment of a powered water sports board, it is further envisaged that other embodiments of the invention could exhibit any number and combination of any one of the features previously described. However, it is to be understood that any variations and modifications which can be made without departing from the spirit and scope thereof are included within the scope of this invention.

Any reference to publications in this specification is not an admission that the disclosures constitute common general knowledge in Australia.

The claims defining the invention are as follows:

1. A powered water sports board which includes a motor, a source of power for the motor, an elongate buoyant body having at least one fin; and a propeller driven by the motor and which is capable of propelling the elongate buoyant body; and wherein the motor and the source of power are mounted to the body and the propeller is mounted inside the at least one fin thereby allowing the at least one fin to shield the propeller.

2. The powered water sports board according to claim 1 wherein the at least one fin is shaped to direct water flow from the propeller to a trailing end of the at least one fin.

3. The powered water sports board according to claim 1 or 2 wherein the at least one fin has a leading end and a trailing end; wherein the at least one fin includes a flow passage in which the propeller is housed; and wherein the flow passage extends through the at least one fin from the leading end to the trailing end.

4. The powered water sports board according to claim 3 wherein the flow passage includes an inlet, which faces the leading end, and an outlet which is directed towards the trailing end; and wherein a cross sectional diameter of the flow passage reduces from the inlet to the outlet.

5. The powered water sports board according to claim 4 wherein the inlet is displaced from the leading end; and wherein the leading end of the at least one fin extends across the inlet thereby to reduce a cross sectional diameter of the inlet.

6. The powered water sports board according to claim 3, 4 or 5 wherein the propeller is mounted midway inside the flow passage.

7. The powered water sports board according to any one of claims 3 to 6 wherein the flow passage is tubular in cross sectional diameter; and wherein the at least one fin extends a portion into the flow passage from the leading end so that the at least one fin divides a first section of the flow passage, between the propeller and the leading end, in half.

8. The powered water sports board according to any one of claims 3 to 7 wherein an inlet cap is fitted to the inlet and an outlet cap is fitted to the outlet; and wherein each of the inlet and outlet caps is grated to cover the inlet and outlet.

9. The powered water sports board according to claim 8 wherein each of the inlet and outlet caps is inserted at least partly into a respective inlet and outlet; and wherein a side wall of the flow passage and each of the inlet and outlet caps include complimentary, inter-engaging formations which allow the inlet and outlet caps to be secured the inlet and the outlet respectively with a tight frictional fit.

10. The powered water sports board according to any one of claims 1 to 9 wherein the motor is secured with a mounting to the elongate buoyant body; and wherein the mounting allows water to flow around the motor to cool the motor during operation.

11. The powered water sports board according to claim 10 wherein the mounting includes a tubular portion having a front end and a rear end; the front end includes a crosspiece which allows the motor to be secured to the mounting inside the tubular portion; wherein the tubular portion has an outer sleeve and an inner sleeve which is positioned inside the outer sleeve; wherein the front and rear ends are sealed so that a sealed chamber is formed between the inner outer sleeve; and wherein the motor is fitted inside the inner sleeve thereby allowing water flowing through the sealed chamber to cool the motor.

12. The powered water sports board according to claim 10 or 11 wherein the tubular portion includes a pair of diametrically opposed flanges which allow the tubular portion to be secured to the elongate buoyant body.

13. The powered water sports board according to claim 12 wherein the flanges are secured to railings thereby allowing longitudinal movement of the motor relative to the elongate buoyant body to accommodate pivotal movement of the at least one fin relative to the elongate buoyant body.

14. The powered water sports board according to claims 11, 12 or 13 wherein the elongate buoyant body includes a sealed cavity which houses the motor and the source of power.

15. The powered water sports board according to claim 14 wherein the cavity includes piping which allows water from a water body, on which the elongate buoyant body during use rests, to be directed to the sealed chamber of the mounting to cool the motor.

16. A powered water sports board according to claim 15 wherein the sealed chamber includes an entrance, which allows water to be introduced into the sealed chamber,

and an exit which allows water to flow from the sealed chamber, and wherein the piping includes a feed portion which allows water to be drawn from the water body into the sealed chamber, and a drain portion which allows water, having circulated around the inner sleeve, to flow from the sealed chamber and took exit the elongate buoyant body. .

17. The powered water sports board according to claim 16 wherein the elongate buoyant body includes at least one inlet port which allows water to come through an underside of the elongate buoyant body through the feed portion of the piping into the sealed chamber; and wherein the elongate body includes at least one output port which allows water to flow from the sealed chamber through the drain portion.

18. The powered water sports board according to claim 17 wherein the inlet and output ports are positioned relative to the motor thereby to allow water to flow into the sealed chamber through the inlet port at a position which is between the motor and a front end of the elongate buoyant body, and from the sealed chamber through the outlet port at a position which is between the motor and a rear end of the elongate buoyant body; whereby the positioning of the inlet and outlet ports allows water to flow through the sealed chamber as the elongate buoyant body moves across the water body.

19. A powered water sports board according to claim 17 wherein the inlet port is positioned inside the flow passage downstream from the propeller thereby allowing operation of the propeller to force water into the inlet port towards the sealed chamber along the feed portion to cool the motor.

20. The powered water sports board according to any one of claims 1 to 19 which includes a plurality of motors, a plurality of propellers, and a plurality of fins; and wherein each of the plurality of propellers are mounted to one of the plurality of fins; and wherein the plurality of propellers are driven by the plurality of motors.

21. The powered water sports board according to claim 20 which includes a gearbox which is connected to each of the plurality of propellers; and wherein the plurality of motors are connected in series to drive the gearbox.

22. The powered water sports board according to any one of claims 1 to 21 which includes an acceleration switch which is mounted midway to the elongate buoyant body for access from an upper side of the elongate buoyant body; and wherein

activation of the acceleration switch causes the propeller to rotate at a maximum velocity.

23. A powered water sports board which includes a motor, a power supply, a propeller driven by the motor; and an elongate buoyant body having at least one fin; wherein the motor and the power supply are mounted to the body and the propeller is mounted to the at least one fin; and wherein the at least one fin includes a flow passage in which the propeller is housed.

24. A powered water sports board according to claim 23 wherein the flow passage is adapted to focus the flow of water from the propeller.

25. A powered water sports board as substantially as hereinbefore described with reference to the accompanying representations.

AMENDED CLAIMS
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1. A powered water sports board which includes a motor, a source of power for the motor, an elongate buoyant body having at least one fin; and a propeller driven by the motor and which is capable of propelling the elongate buoyant body; the at least one fin has a leading end and a trailing end and includes a flow passage which extends through the at least one fin from the leading end to the trailing end; and wherein the motor and the source of power are mounted to the body and the propeller is mounted substantially inside the flow passage thereby allowing the at least one fin to shield the propeller.

2. The powered water sports board according to claim 1 wherein the flow passage includes an inlet, which faces the leading end, and an outlet which is directed towards the trailing end; and wherein a cross sectional diameter of the flow passage reduces from the inlet to the outlet thereby allowing the at least one fin to direct water flow from the propeller to a trailing end of the at least one fin.

3. The powered water sports board according to claim 2 wherein the inlet is displaced from the leading end; and wherein the leading end of the at least one fin extends across the inlet thereby to reduce a cross sectional diameter of the inlet.

4. The powered water sports board according to claim 1, 2 or 3 wherein the propeller is mounted midway inside the flow passage.

5. The powered water sports board according to any one of claims 1 to 4 wherein the flow passage is tubular in cross sectional diameter; and wherein the at least one fin includes a portion which extends at least partly into the flow passage from the leading end so that the at least one fin divides a first section of the flow passage, between the propeller and the leading end, in half.

6. The powered water sports board according to any one of claims 2 to 5 wherein an inlet cap is fitted to the inlet and an outlet cap is fitted to the outlet; and wherein each of the inlet and outlet caps is grated to cover the inlet and outlet.

7. The powered water sports board according to claim 6 wherein each of the inlet and outlet caps is inserted at least partly into a respective inlet and outlet; and wherein a side wall of the flow passage and each of the inlet and outlet caps include complimentary, inter-engaging formations which allow the inlet and outlet caps to be secured the inlet and the outlet respectively with a tight frictional fit.

8. The powered water sports board according to any one of claims 1 to 7 wherein the motor is secured with a mounting to the elongate buoyant body; and wherein the mounting allows water to flow around the motor to cool the motor during operation.

9. The powered water sports board according to claim 8 wherein the mounting includes a tubular portion having a front end and a rear end; the front end includes a crosspiece which allows the motor to be secured to the mounting inside the tubular portion; wherein the tubular portion has an outer sleeve and an inner sleeve which is positioned inside the outer sleeve; wherein the front and rear ends are sealed so that a sealed chamber is formed between the inner and outer sleeves; and wherein the motor is fitted inside the inner sleeve thereby allowing water flowing through the sealed chamber to cool the motor.

10. The powered water sports board according to claim 8 or 9 wherein the tubular portion includes a pair of diametrically opposed flanges which allow the tubular portion to be secured to the elongate buoyant body.

11. The powered water sports board according to claim 10 wherein the flanges are secured to railings thereby allowing longitudinal movement of the motor relative to the elongate buoyant body to accommodate pivotal movement of the at least one fin relative to the elongate buoyant body.

12. The powered water sports board according to claims 9, 10 or 11 wherein the elongate buoyant body includes a sealed cavity which houses the motor and the source of power.

13. The powered water sports board according to claim 12 wherein the cavity includes piping which allows water from a water body, on which the elongate buoyant body during use rests, to be directed to the sealed chamber of the mounting to cool the motor.

14. A powered water sports board according to claim 13 wherein the sealed chamber includes an entrance, which allows water to be introduced into the sealed chamber, and an exit which allows water to flow from the sealed chamber, and wherein the piping includes a feed portion which allows water to be drawn from the water body into the sealed chamber, and a drain portion which allows water, having circulated around the inner sleeve, to flow from the sealed chamber and to exit the elongate buoyant body.

15. The powered water sports board according to claim 14 wherein the elongate buoyant body includes at least one inlet port which allows water to come through an underside of the elongate buoyant body through the feed portion of the piping into the sealed chamber; and wherein the elongate body includes at least one output port which allows water to flow from the sealed chamber through the drain portion.

16. The powered water sports board according to claim 15 wherein the inlet and output ports are positioned relative to the motor thereby to allow water to flow into the sealed chamber through the inlet port at a position which is between the motor and a front end of the elongate buoyant body, and from the sealed chamber through the outlet port at a position which is between the motor and a rear end of the elongate buoyant body; whereby the positioning of the inlet and outlet ports allows water to flow through the sealed chamber as the elongate buoyant body moves across the water body.

17. A powered water sports board according to claim 15 wherein the inlet port is positioned inside the flow passage downstream from the propeller thereby allowing operation of the propeller to force water into the inlet port towards the sealed chamber along the feed portion to cool the motor.

18. The powered water sports board according to any one of claims 1 to 17 which includes a plurality of motors, a plurality of propellers, and a plurality of fins; and wherein each of the plurality of propellers are mounted to one of the plurality of fins; and wherein the plurality of propellers are driven by the plurality of motors.

19. The powered water sports board according to claim 18 which includes a gearbox which is connected to each of the plurality of propellers; and wherein the plurality of motors are connected in series to drive the gearbox.

20. The powered water sports board according to any one of claims 1 to 19 which includes an acceleration switch which is mounted midway to the elongate buoyant body for access from an upper side of the elongate buoyant body; and wherein activation of the acceleration switch causes the propeller to rotate at a maximum velocity.

21. A powered water sports board which includes a motor, a power supply, a propeller driven by the motor; and an elongate buoyant body having at least one fin; wherein the motor and the power supply are mounted to the body and the propeller is mounted to the at least one fin; and the at least one fin includes a tubular flow passage in which the propeller is housed; the tubular flow passage collects in use water adjacent a leading end of the at least one fin and focuses the collected water onto the propeller.

22. A powered water sports board according to claim 21 wherein the flow passage is adapted to focus the flow of water from the propeller.

23. A powered water sports board as substantially as hereinbefore described with reference to the accompanying representations.

5

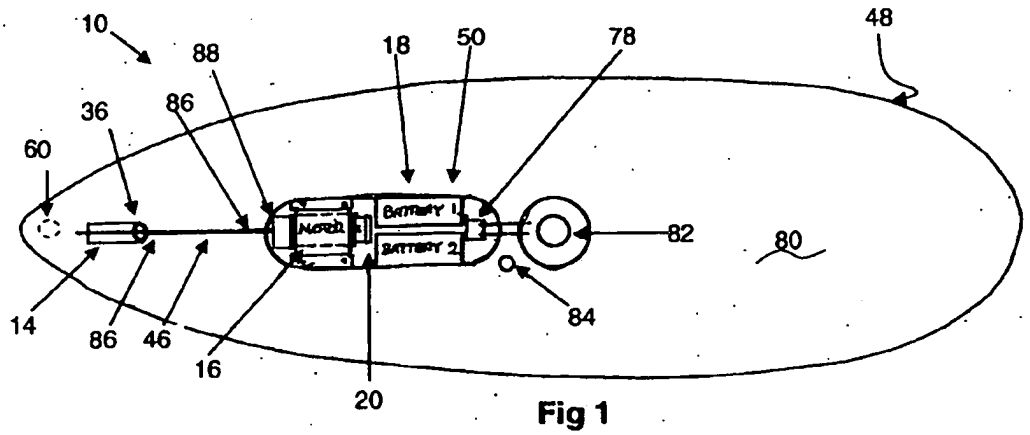


Fig 1

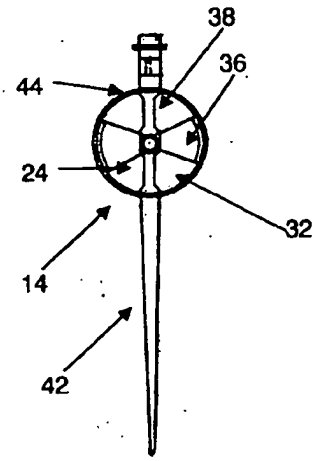


Fig 2

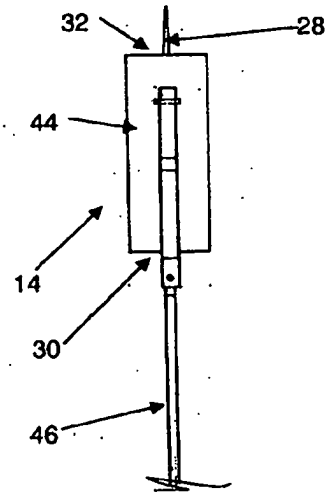


Fig 3

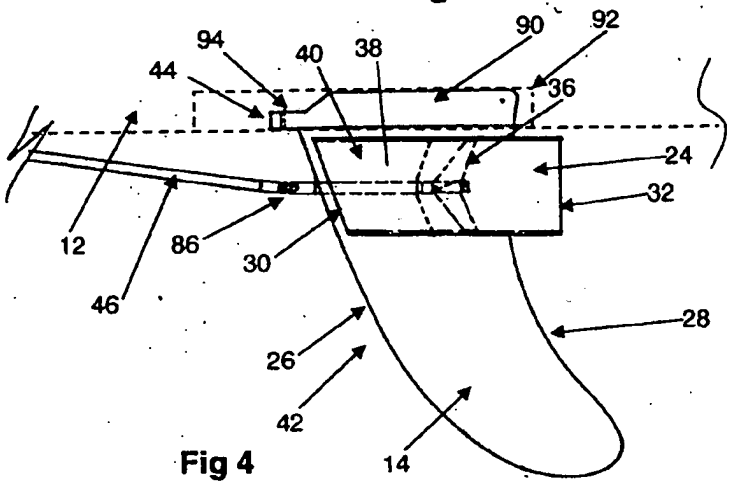


Fig 4

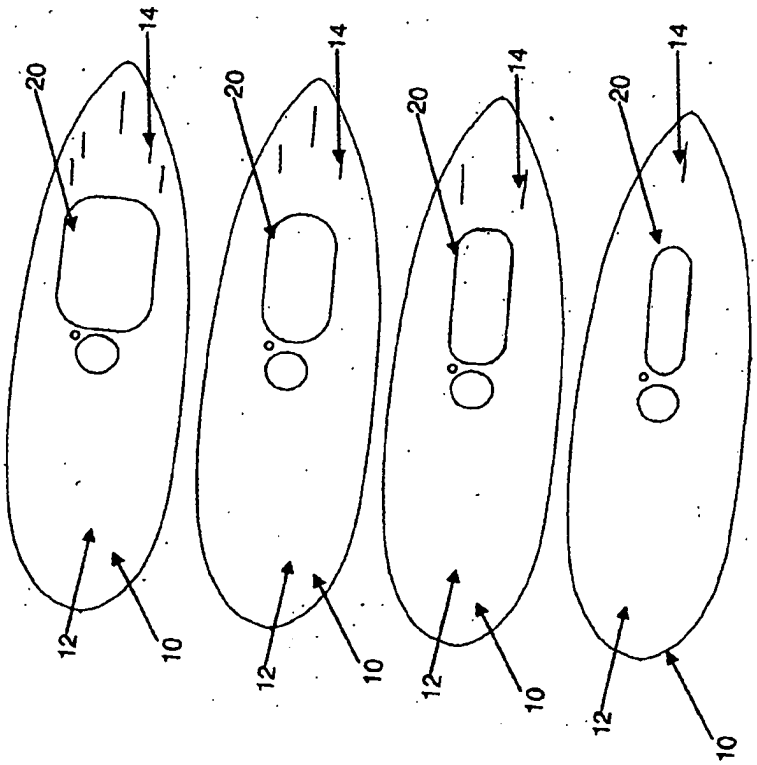


Fig 6

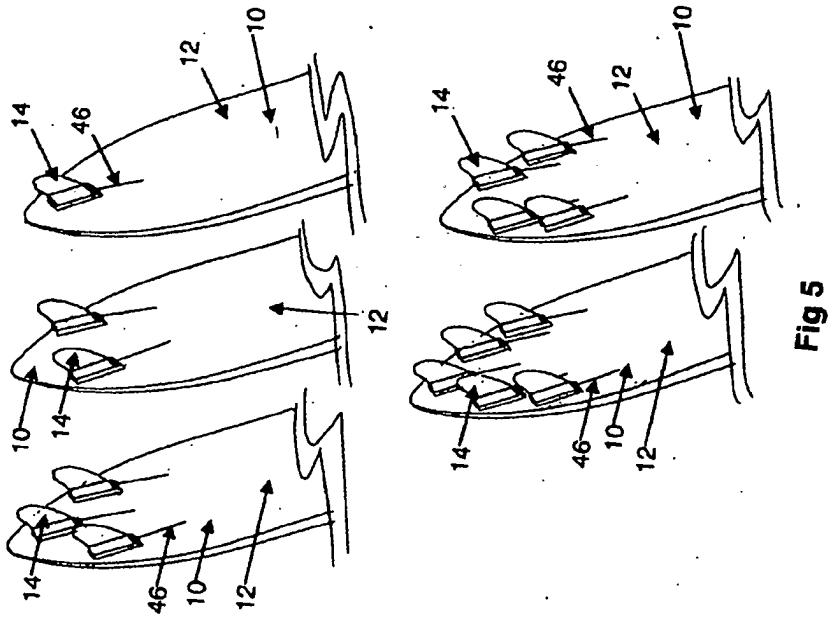


Fig 5

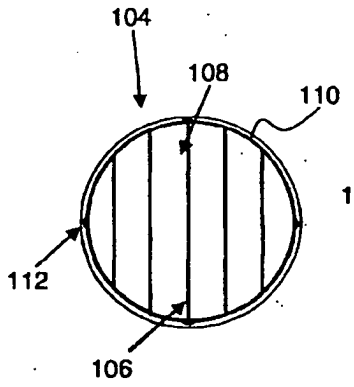


Fig 8

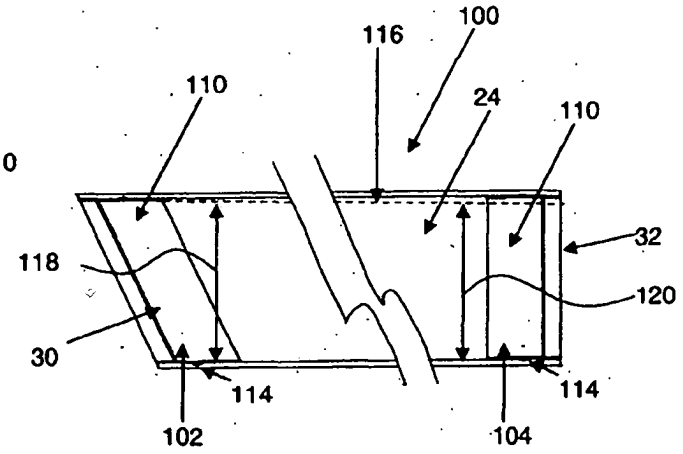


Fig 7

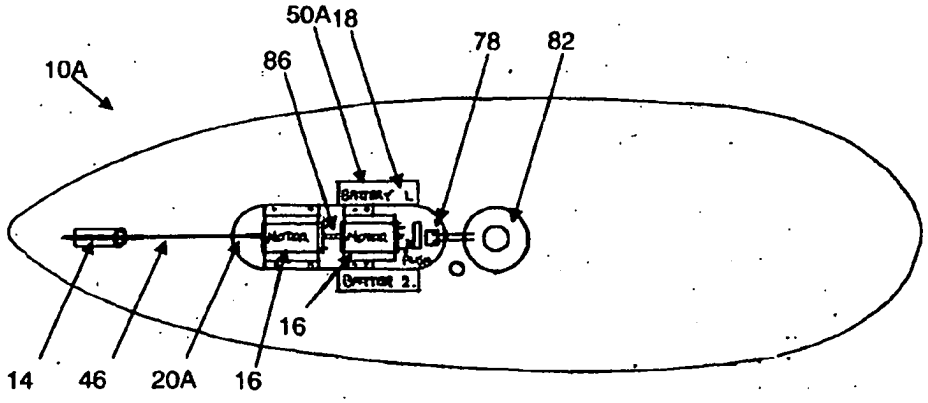


Fig 9

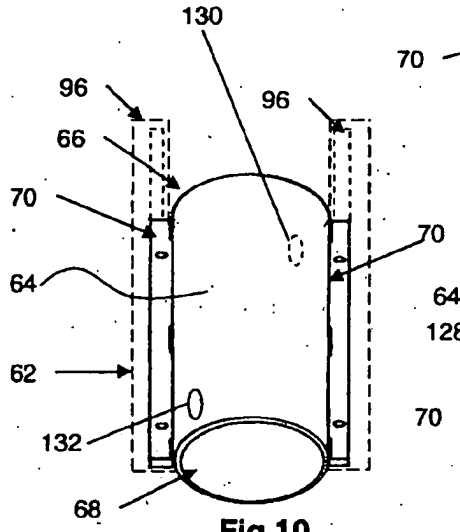


Fig 10

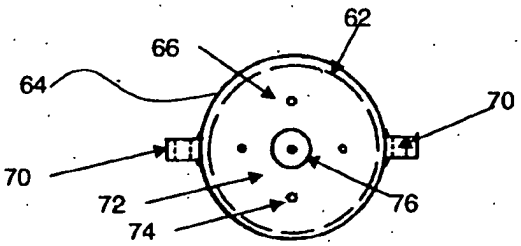


Fig 11

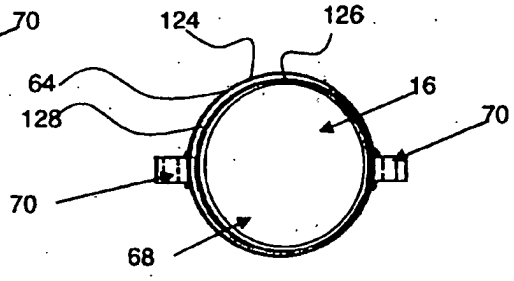


Fig 12

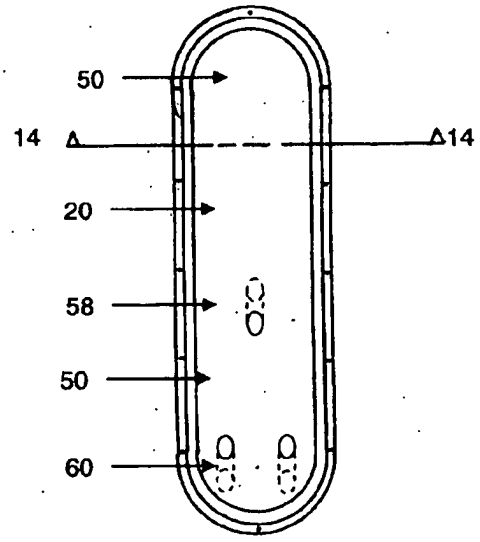


Fig 13

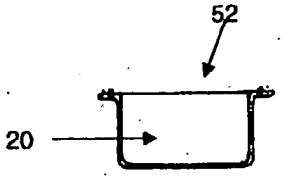


Fig 14

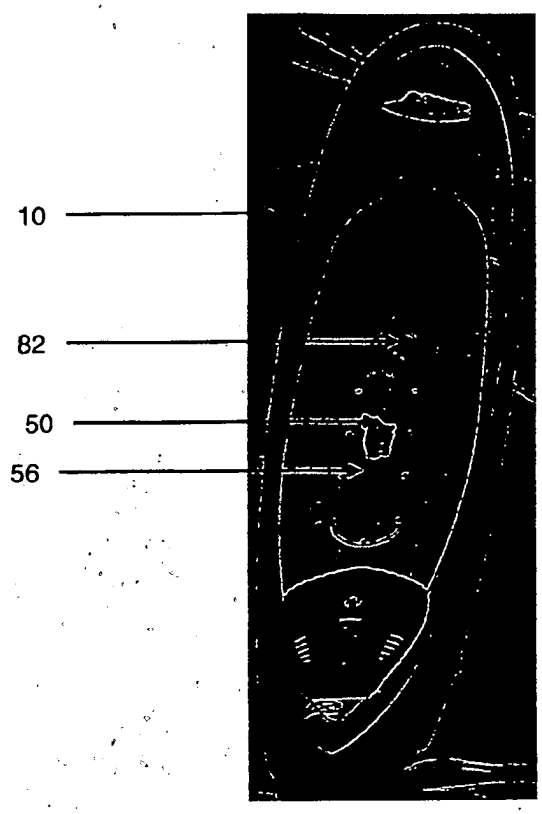


Fig 15

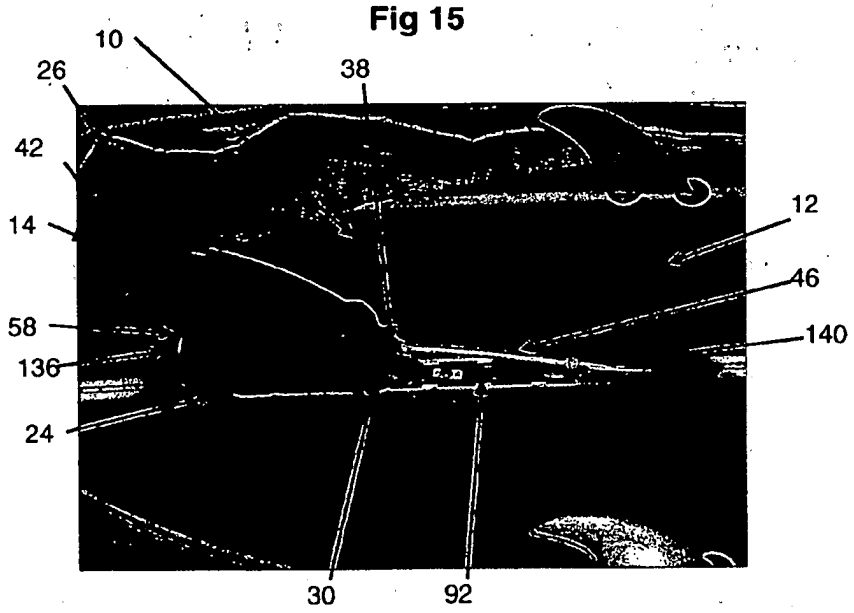


Fig 16

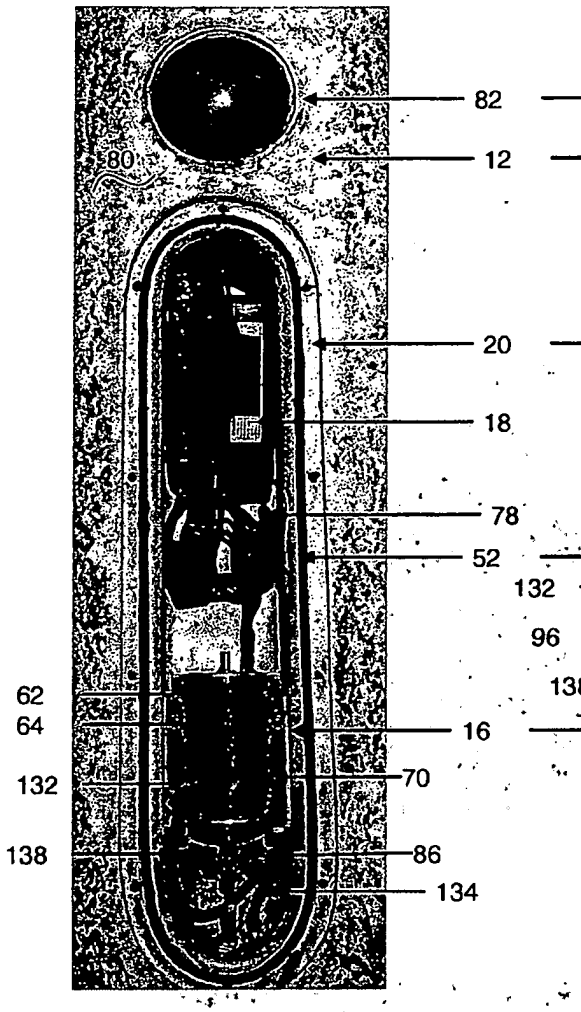


Fig 17

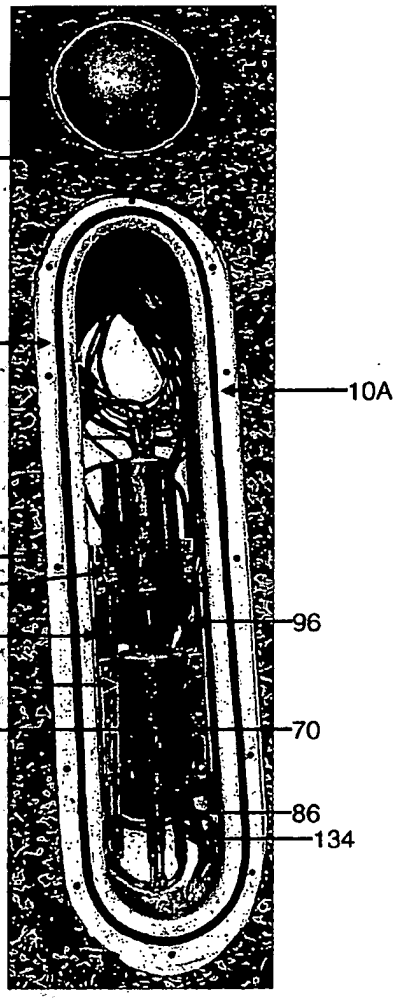


Fig 18

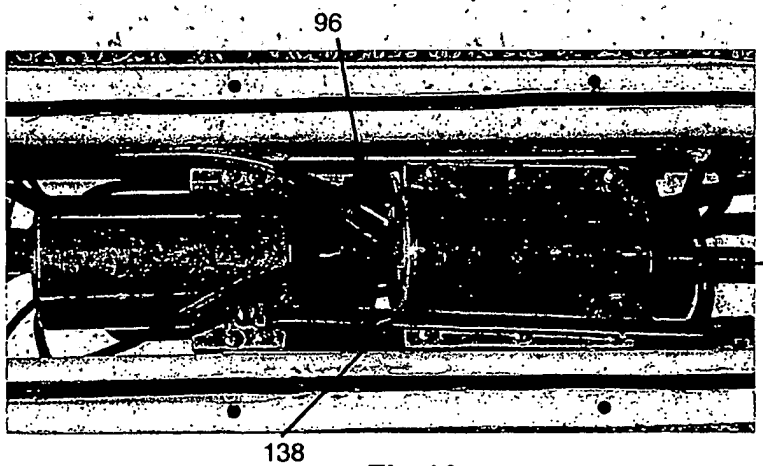


Fig 19

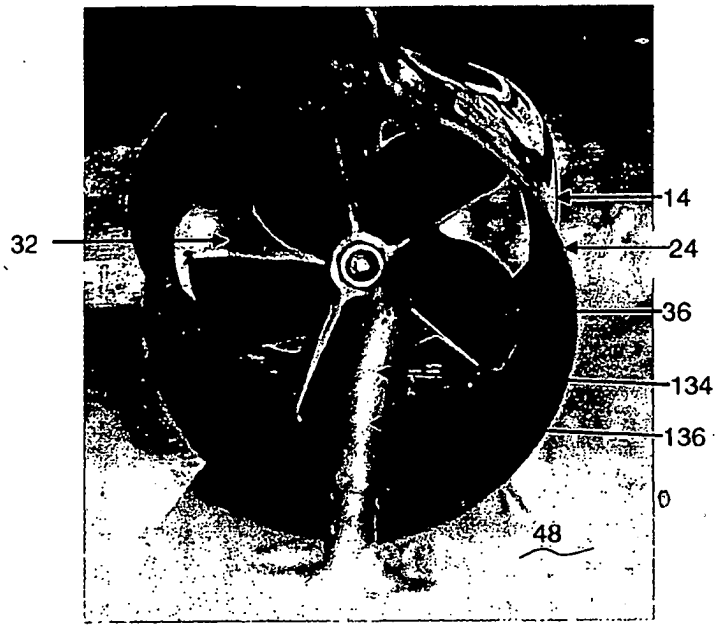


Fig 20

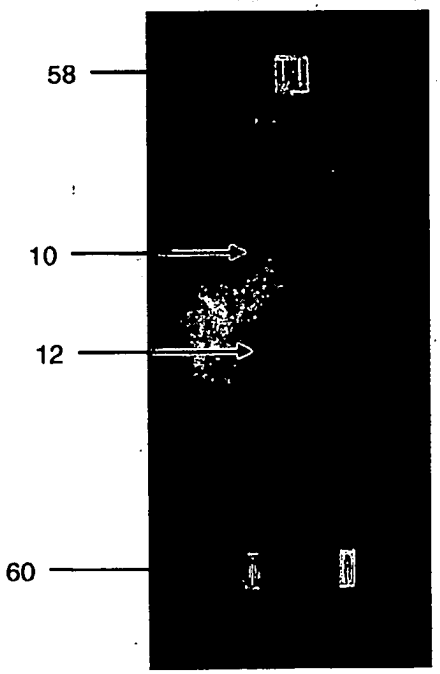


Fig 21

INTERNATIONAL SEARCH REPORT	International application No.
	PCT/AU2010/001437

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

B63B 35/79 (2006.01) *B63H 5/14* (2006.01)
A63B 35/12 (2006.01) *B63H 21/30* (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

1. WPI, EPODOC: IPC, ECLA B63B 35/73/LOW, B63H/-, A63B/- and keywords (board, propeller, fin, motor) and like terms.
2. EPODOC: ECLA B63B 35/79M and keywords (propeller, fin) and like terms.
3. USPTO @ ESP@CE: Keywords (surf, sports, board, powered, motor, propeller, fin) and like terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 3139816 A1 (STANDARD ELEKTRIK LORENZ AG) 11 May 1983 English abstract retrieved from EPODOC database Abstract, Figures 1-5, Machine Translation available from E-space (esp@cenet)	1, 2, 9, 20-24
X	FR 2580580 A1 (KESSLER JEAN LOUIS) 24 October 1986 English abstract retrieved from EPODOC database Abstract, Figure	1-3, 6-8
Y	US 3405677 A (SMITH) 15 October 1968 Figures 1-4	1, 2

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

*	Special categories of cited documents:		
"A"	document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
21 December 2010	05 JAN 2011
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. +61 2 6283 7999	Authorized officer **Dr ARUN SHARMA** AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No : +61 2 6222 3642

INTERNATIONAL SEARCH REPORT		International application No.
		PCT/AU2010/001437
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3144849 A (MASER) 18 August 1964 Figures 1-4	1, 2
A	US 2003/0167991 A1 (NAMANNY) 11 September 2003 Whole document	
A	FR 2728863 A1 (BOURGAULT YVES MARIE ROGER) 5 July 1996 Whole document	
A	WO 2005/058685 A1 (CONCEPT OF REALITY PTY LTD) 30 June 2005 Whole document	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2010/001437

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: **25**
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
The claim does not comply with Rule 6.2(a) because it relies on references to the description and/or drawings.

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU2010/001437

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
DE	3139816	NONE					
FR	2580580	NONE					
US	3405677	NONE					
US	3144849	NONE					
US	2003167991	NONE					
FR	2728863	NONE					
WO	2005058685	AU	2004299159	CN	1894129	EP	1704085
		MX	PA06006919				

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX

(12) PEDIDO INTERNACIONAL PUBLICADO SOB O TRATADO DE COOPERAÇÃO EM MATÉRIA DE PATENTES (PCT)

(19) Organização Mundial da Propriedade Intelectual
Secretaria Internacional

(43) Data de Publicação Internacional
30 de Junho de 2011 (30.06.2011)

PCT

(10) Número de Publicação Internacional
WO 2011/075808 A1

(51) Classificação Internacional de Patentes :
B63B 35/73 (2006.01) *B63B 35/85* (2006.01)
B63B 35/79 (2006.01)

(21) Número do Pedido Internacional :
PCT/BR2010/000444

(22) Data do Depósito Internacional :
21 de Dezembro de 2010 (21.12.2010)

(25) Língua de Depósito Internacional : Português

(26) Língua de Publicação : Português

(30) Dados Relativos à Prioridade :
PI 0905437-5
21 de Dezembro de 2009 (21.12.2009) BR

(71) Requerente *(para todos os Estados designados, exceto US)* : **WORK STATION COM. PEÇAS LTDA ME** [BR/BR]; Rua Paracambi, 201, Agua Rasa, 03333-020 São Paulo - SP (BR).

(72) Inventor; e
(75) Inventor/Requerente *(para US únicamente)* : **IMPARATO, Everson** [BR/BR]; Avenida Professor Ascendino Reis, 687, Vila Clementino, 04027-000 São Paulo - SP (BR).

(74) Mandatário : ADVOCACIA PIETRO ARIBONI S/C; Rua Guararapes, 1909, 7o Andar, Brooklin Novo, 04561-004 São Paulo - SP (BR).

(81) Estados Designados *(sem indicação contrária, para todos os tipos de proteção nacional existentes)* : AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Estados Designados *(sem indicação contrária, para todos os tipos de proteção regional existentes)* : ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasiático (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), Europeu (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(Continua na página seguinte)

(54) Title : BOARD WITH FASTENING FOR REMOVABLE HYDROFOIL

(54) Título : PRANCHA COM FIXAÇÃO PARA HIDROFÓLIO REMOVÍVEL

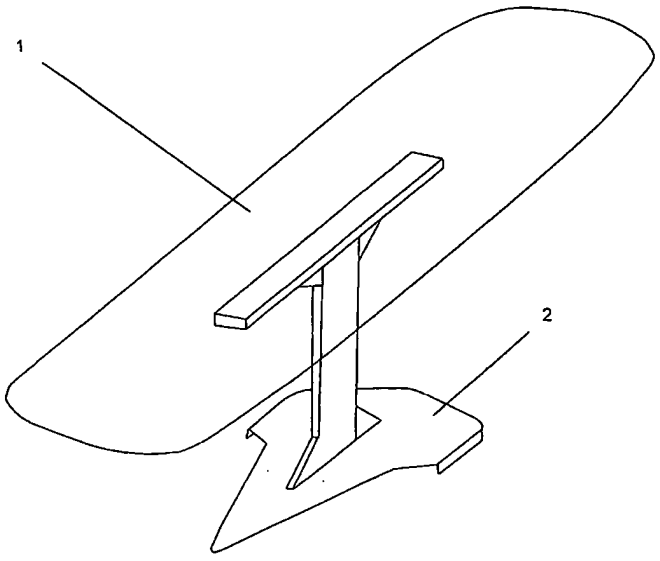


FIGURA 1

(57) Abstract : The subject matter of the present invention is a type of board used in the field of water sports, such as surfing. Said board (1) is provided with an upper surface (101) and a lower surface (102), the latter having keels, blades, cutouts (103) and, especially, a core (104) or inserts for fastening and adjusting the base (201) of a hydrofoil (2), the latter being connected to said base (201) by a column (203). Said base (201) may be fastened to the core (104) by means of threaded elements or engagement in rectilinear or circular guides with locking means. The blade (202) of the hydrofoil (2) may be constituted by an arrowhead element, with rectilinear or curved profile.

(57) Resumo : O objeto da presente invenção é um tipo de prancha utilizada na área de esportes náuticos como surfe. Dita prancha (1) é dotada de uma superfície superior (101) e de uma superfície inferior (102), sendo que esta última apresenta quilhas, lâminas, recortes (103) e, especialmente, uma alma (104) ou insertos para a fixação e regulagem da base (201) de um hidrofólio (2), sendo este último unido à dita base (201) através de uma coluna (203). A dita base (201) pode ser fixada à alma (104) através de elementos rosqueados ou encaixe em guias retas ou circulares com meios de travamento. A lâmina (202) do hidrofólio (2) pode ser constituída por um elemento em forma de seta, com perfil reto ou curvo.

WO 2011/075808 A1

Publicado:

— *com relatório de pesquisa internacional (Art. 21(3))*

Prancha com fixação para hidrofólio removível.

O objeto do presente pedido de patente é uma prancha do tipo wakeboard, kiteboard, kite surf, surf, windsurf, esquis para água, e outros similares, todas com fixação para hidrófio removível que permite a sua troca e regulagem de posicao pelo usuário.

ESTADO DA TÉCNICA

Os esportes aquáticos tiveram um aumento em sua variedade recentemente com o advento de novas modalidades esportivas tais como o wakeboard, kitesurf e outros, se juntando a outras modalidades já consagradas como surf, esqui, etc.

Varias destas modalidades fazem uso de um equipamento externo, tal como uma vela ou um veículo de reboque para dar velocidade à prancha, permitindo manobras por parte do usuário.

Tomando como exemplo entre as novas modalidades, o wakeboard, este é constituido por uma "prancha", e em seus primórdios possuía um formato parecido com as das pranchas de surf, mas de menor comprimento e maior largura, sendo rebocado por um veículo a motor, em geral uma lancha de pequeno porte e de alta velocidade.

Com o desenvolvimento do esporte se verificou a necessidade de se aumentar a largura da prancha e diminuir o seu cumprimento de forma a torná-la mais leve, manobrável e rápida. Esta prancha é o estado da técnica atual e permite uma grande variedade de manobras com uma velocidade razoável do veículo que a reboca.

O principal inconveniente deste tipo de prancha é a necessidade que seja utilizada basicamente em áreas de águas calmas, possuindo como ondas para manobra apenas o rastro formado pela lancha que a reboca, permitindo que o usuário faça as manobras usando apenas estas. No caso da área da prática do esporte possuir águas mais revoltas torna-se difícil o controle da prancha, gerando inclusive maiores dificuldades para a manutenção do usuário em cima desta e com grande possibilidade de acidente.

No intuito de diminuir a necessidade de águas calmas foi desenvolvido por empresas americanas wakeboards dotados de hidrofólios. Estes hidrofólios são lâminas paralelas a extensão do wakeboard e que, em altas velocidades, pelas suas características hidrodinâmicas, fazem com que o wakeboard seja suspendido em relação ao plano das águas em que está navegando, permitindo uma melhor condução pelo usuário.

Um exemplo deste tipo de wakeboard é aquele apresentado no pedido WO/2007/088351 em nome de South Bank University Enterprises Limited que

mostra uma prancha de wakeboard dotada de hidrofólios de grandes dimensões, fixos na estrutura do wakeboard. Outro exemplo é a patente americana US 5,249,998 que mostra um conjunto composto por uma prancha, hidrofólio e assento.

O mesmo raciocínio relativo ao uso de hidrofólios em wakeboards pode ser aplicado às demais modalidades esportivas citadas, tais como **windsurf,** surf, kiteboard, kite surf, esqui, etc.

O grande problema das soluções acima apontadas é o fato de que o hidrofólio é fixado de forma definitiva na prancha gerando, entre outros problemas, o grande arrasto quando do uso em águas revoltas, e com isto, a possibilidade de quebra, sem substituição, da peça quebrada e a impossibilidade de variar a lâmina do hidrofólio, bem como a sua posição na prancha, em função das características dinâmicas desejadas, das condições climáticas presentes no local e das necessidades do usuário no momento do uso da prancha, bem como sua ergonometria individual.

OBJETIVO DA INVENÇÃO

O objetivo da presente invenção é o de obter uma prancha dotada de fixação para hidrofólios removíveis que permitam a sua substituição e regulagem, na prancha e nele mesmo, garantindo a troca da peça motivada por avaria ou necessidade, possibilitando a escolha do usuário da melhor configuração e posição do hidrofólio na prancha, possibilitando também a variação da altura da coluna, bem como, sua posição em relação à lâmina do hidrofólio, em função do local, estado das águas e/ou das manobras praticadas, além da própria ergonometria individual do usuário.

OBJETO DA INVENÇÃO

O objeto da presente invenção é uma prancha flutuante, tipo wakeboard, ou outra, dotada de encaixes para hidrofólios removíveis, que permitam a sua substituição e regulagem, de forma simples e prática por parte do usuário e com grande rigidez estrutural de forma a evitar possíveis quebras da prancha e dos hidrofólios. O objeto, ainda permite, a substituição da prancha ou do hidrofólio individualmente, no caso de avarias em um dos dois elementos, permitindo ainda encontrar a posição ideal de montagem para cada usuário, em cada situação de uso.

BREVE DESCRIÇÃO DOS DESENHOS

O objeto da presente invenção será melhor compreendido à luz das figuras anexas, dada a título de exemplo mas não limitando o escopo da presente invenção, nos quais:

- Figura 1 é uma vista em perspectiva de uma prancha com um hidrofólio;
- Figura 2 é uma vista em corte lateral esquemático uma prancha com um hidrofólio;
- Figura 3 é uma vista inferior de uma prancha, sem o hidrofólio;
- Figura 4 é uma vista superior de uma prancha de wakeboard; e
- Figura 5 a 8 são exemplos de hidrofólios para pranchas.

REALIZAÇÃO PREFERENCIAL

O objeto da presente invenção será descrito com base em uma configuração preferencial, dada a mero título de exemplo, mas não limitando o escopo da presente invenção, particularmente quanto às formas do hidrofólio ou da prancha e seu sistema de encaixe, tanto da prancha como do hidrofólio.

De conformidade com a figura 1 do presente relatório, o objeto da presente invenção é constituído por uma prancha (1) dotada de sistemas de fixação e regulagem para hidrofólios removíveis (2) fixados à prancha (1) por meio destes sistemas.

No presente exemplo será feito menção especifica a um sistema composto por orifícios rosqueados com fixação por parafusos, mas dito sistema também pode ser constituído por um sistema composto de trilhos de encaixe de correr, fixação por parafusos e/ou quaisquer elementos de encaixe e/ou rosqueados, fecho rápido, engate rápido, engate giratório com ou sem trava, etc. que permitam o encaixe e fixação do hidrofólio à prancha.

No presente exemplo a prancha (1) é dotada de uma superfície superior (101) e uma superfície inferior (102). Na superfície inferior, em suas extremidades, dita prancha (1) é dotada de um sistema de quilhas, lâminas e recortes (103) para permitir que, nas diversas velocidades e, sem o hidrofólio, o wakeboard possa ser facilmente manobrado pelo usuário. Em seu interior a prancha possui uma alma (104) e/ou incertos, feitos de material resistente, tal como aço inoxidável, dita alma (104) e/ou incertos, é dotada de furos (105), normalmente rosqueados, para fixação e regulagem do hidrofólio (2) à prancha (1).

O hidrofólio (2) por sua vez é composto por uma base de fixação (201), lâmina de hidrofólio (202), colunas (203) e, em certos casos, barras de reforço/fixação (204).

A base (201) e a lâmina (202) são unidas através de uma coluna (203) e, em alguns casos, reforçada por barras de fixação (204), quando necessário, ditas base (201), lâmina (202), coluna, são alinhadas no sentido longitudinal da base (201).

No presente exemplo a base (201) é dotada de furos passantes ou rosqueados (205) para permitir a passagem de parafusos (3) e/ou elementos rosqueados, para fixação da base (201) aos furos rosqueados (105) providos na alma (104) da prancha (1) ou incertos.

Os parafusos (3) devem ser dotados de cabeças hidrodinâmicas, preferencialmente arredondadas ou cônicas, que se acomodem em escareados.

Este método de fixação da base do hidrofólio (201) a alma

(104) da prancha (1) ou incertos, pode ser substituído por outros métodos tais como:

- a base (201) se encaixar em um recesso provido na superfície inferior (102) da prancha (1) e ser travada por um fecho rápido.

- a alma da prancha ser dotada de furos rosqueados e a base do hidrofólio de furos passantes ou rosqueados de tal sorte que a fixação se de por meio de parafusos e/ou elementos rosqueados.

- as guias (104) serem dotadas de pinos dotados de um furo passante e permitindo a fixação da base (201) a estes pinos por meio de prisioneiros;

- A alma (104) ser dotada de parafusos projetantes, permitindo a fixação da base (201) por meio de porcas de travamento;

- a base (201) pode ter formato circular e permitir o seu travamento em um "engate rápido" fixado a alma (104) da prancha (1) do tipo encaixa, gira e trava, e

-a base (201) se encaixar em guias externas (trilhos) a superfície inferior (102) e sendo fixada por meio de um travamento lateral, terminal, ou outro sistema.

No presente exemplo ainda a lâmina (202) é constituída por um elemento "enflechado" de baixo coeficiente hidrodinâmico, mais adequado para altas velocidades. Outras configurações tais como retas, curvas, etc. poderão ser adotadas em função da necessidade de empuxo e a velocidade desejada durante o trajeto conforme os exemplos das figuras 5 a 8.

Como pode ser verificado, o objeto da presente invenção permite a utilização das mais diversas pranchas sem o referido hidrofólio, variando assim o uso, desde o estilo primitivo deslizante sobre as águas apenas utilizando a prancha, até o sistema mais sofisticado da presente invenção, constituído por uma prancha com fixação e regulagem para hidrofólio removível, substituível por outros de modelos e formas variadas de acordo com a necessidade, gosto, velocidade, manobra, desafio, estado das águas, ergonometria individual do esportista, etc.

O invento ainda permite que se leve ao local da prática esportiva, apenas uma prancha que poderá ser utilizada sozinha, ou acompanhada de inúmeros modelos de hidrofólios, e com resultados distintos em cada combinação de prancha e hidrofólio.

Reivindicações

1. Prancha com fixação para hidrofólio removível, composto por uma prancha (1) e um hidrofólio (2), dita prancha (1) ser dotada de uma superfície superior (101) e uma superfície inferior (102), dita prancha (1) dotada de um sistema de quilhas, lâminas, e recortes (103) em dita superfície inferior (102 **caracterizado** pelo fato de dita prancha (1) possuir uma alma (104) ou incertos para fixação e regulagem da base (201) do hidrofólio (2) na superfície inferior (102) da prancha (1).

2. Prancha, conforme a reivindicação 1, **caracterizada** pelo fato da lâmina (202) do hidrofólio (2) ser unida à base (201) através da coluna (203), ditas base (201), lâmina (202) e coluna (203) alinhadas no sentido longitudinal da base (201).

3. Prancha, conforme qualquer uma das reivindicações 1 e 2, **caracterizada** pelo fato de dita alma da prancha (104) ou incertos, ser dotada de furos rosqueados (105) para fixação por parafusos ou prisioneiros (3) à base do hidrofólio (201).

4. Prancha, conforme qualquer uma das reivindicações 1 e 2, **caracterizada** pelo fato da base do hidrofólio se encaixar na alma da prancha ou incertos através de parafusos, prisioneiros, ou elementos rosqueados (3).

5. Prancha, conforme qualquer uma das reivindicações, **caracterizada** pelo fato de dita alma da prancha (104) ou incertos, ser dotada de parafusos projetantes, para fixação da base do hidrofólio (201) por porcas de travamento.

6. Prancha, conforme qualquer uma das reivindicações, **caracterizada** pelo fato de base do hidrofólio (104) ou incertos, se acoplar à alma da prancha por meio de porcas de travamento.

7. Prancha, conforme qualquer uma das reivindicações, **caracterizada** pelo fato de sua alma (104) ser constituída por guias externas ou trilhos aonde se encaixa a base do hidrofólio (201) em um movimento deslisante, fixada por meio de um travamento lateral, terminal e/ou longitudinal

8. Prancha, conforme qualquer uma das reivindicações 1 e 2, **caracterizada** pelo fato da base do hidrofólio (201) se encaixar em guias externas ou trilhos na superfície inferior da prancha (102) e fixada por meio de um travamento lateral, terminal e/ou longitudinal

9. Prancha, conforme qualquer uma das reivindicações, **caracterizada** pelo fato da alma (104) ter formato circular e permitir que a base do hidrofólio (201) a ela se encaixe através de um movimento giratório do tipo "encaixa gira e trava" .

10. Prancha, conforme qualquer uma das reivindicações, **caracterizada** pelo fato da base do hidrofólio (201) ter formato circular que permite se

encaixar à alma da prancha através de um movimento giratório do tipo "encaixa gira e trava" .

11. Prancha, conforme qualquer uma das reivindicações, **caracterizada** pelo fato de sua alma (104) ter um recesso provido na superfície inferior (102) da prancha (1).

12. Prancha, conforme qualquer uma das reivindicações 1 e 2, **caracterizada** pelo fato da base do hidrofólio (201) se encaixar em um recesso na superfície inferior da prancha (1).

13 Prancha, conforme qualquer uma das reivindicações 1 e 2, **caracterizada** pelo fato da lâmina (202) do hidrofólio ser constituída por um elemento "enflechado" de baixo coeficiente hidrodinâmico.

14. Prancha, conforme reivindicações 1 e 2, **caracterizada** pelo fato da lâmina (202) do hidrofólio ser constituída por um elemento reto de baixo coeficiente hidrodinâmico.

15. Prancha, conforme qualquer uma das reivindicações 1 e 2, **caracterizada** pelo fato da lâmina (202) do hidrofólio ser constituída por um elemento curvo de baixo coeficiente hidrodinâmico.

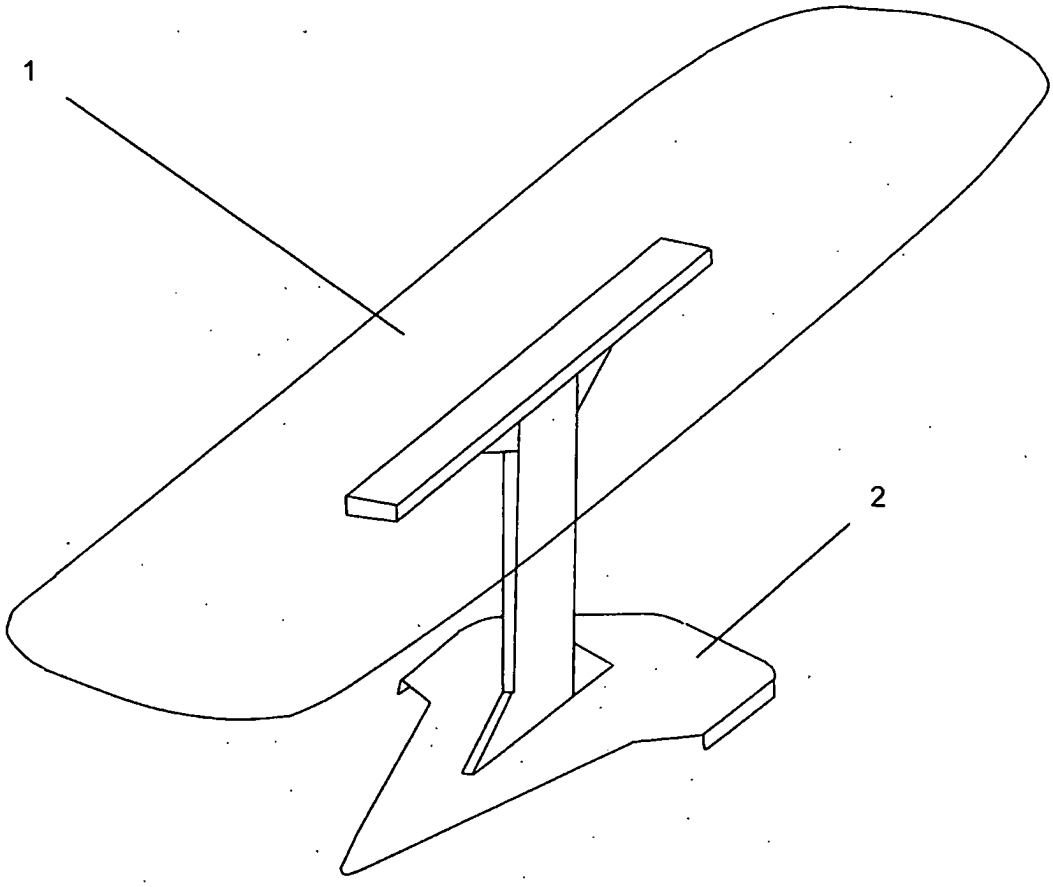


FIGURA 1

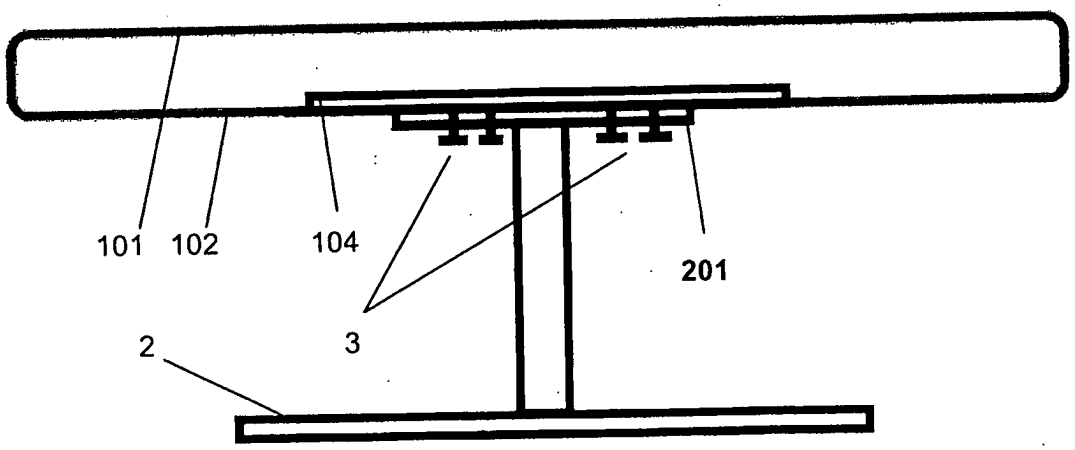


FIGURA 2

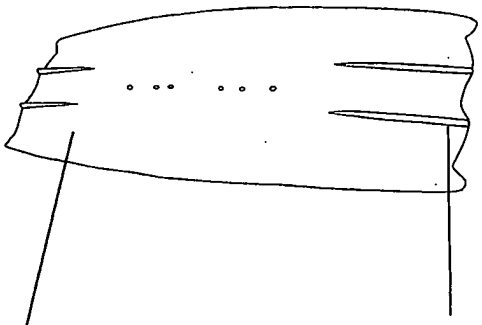


FIGURA 3

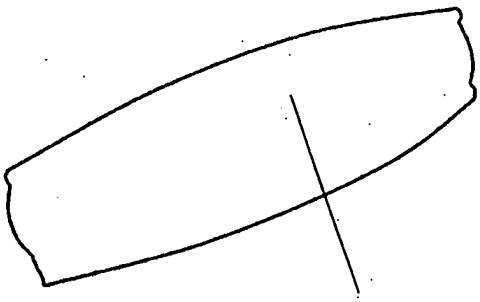


FIGURA 4

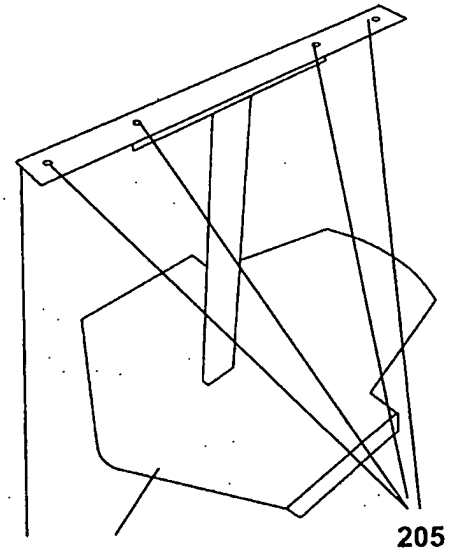


FIGURA 5

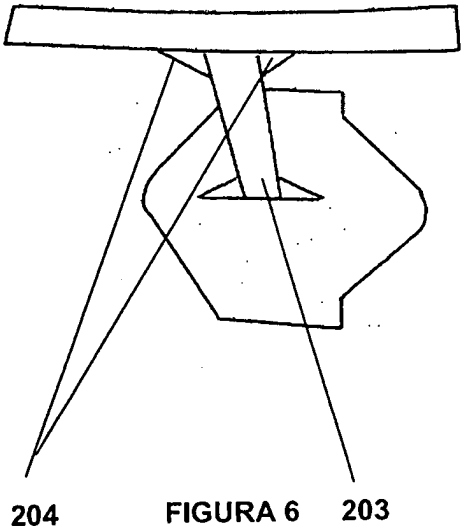


FIGURA 6

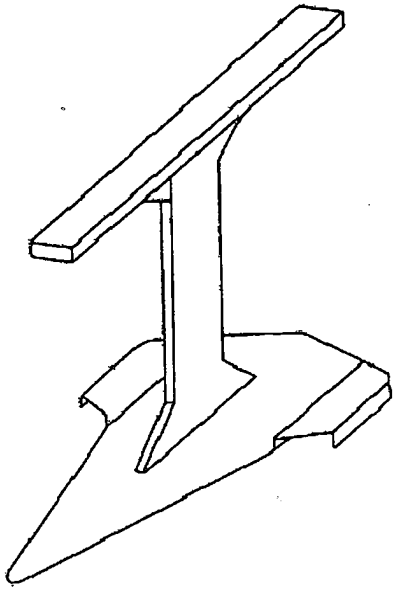


FIGURA 7

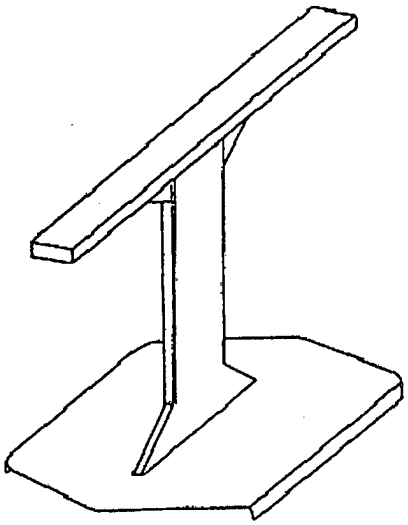


FIGURA 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/BR2010/000444

A. CLASSIFICATION OF SUBJECT MATTER

IPC (2011.01) B63B 35/73; B63B 35/79; B63B 35/85

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC (2011.01) B63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, USPTO, SINPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No:
X Y	US 3747138 A (MORGAN D) **24 July 1973 (24.07.73)** **The whole document**	1-4, 11-13 7,8
Y	US 4857026 A (HULL RONALD K [US]) **15 August 1989 (15.08.1989)** **column 2, lines 25-53** **all figures**	1-4, 14
Y	US 2005255764 A1 (WOOLLEY ROBERT C [US]) **17 November 2005 (17.11.2005)** **page 5, columns 1 and 2** **figures 1 and 2**	2, 14, 15
A	US 5211594 A (BARROWS MICHAEL L [US]) **18 May 1993 (18.05.1993)** **column 3** **figures 1 and 2**	2, 7, 8, 13, 15

[x] Further documents are listed in the continuation of Box C. [x] See patent family annex.

* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 February 2011 (11.02.2011)	250211

Name and mailing address of the ISA/	Authorized officer
INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL Rua Mayrink Veiga nº 9, 18º andar cep: 20090-050, Centro - Rio de Janeiro/RJ	**Rodrigo Danieli**
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Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/BR2010/000444

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to claim No.
A	FR 2814715 A1 (COMBEAU PHILIPPE ALBERT [FR]) **05 April 2002 (05.04.02)** **pages 1 and 2** **figures 2 and 5**	1, 3, 4, 7, 8, 11, 12, 15
A	US 5791957 A (HUNTER SAMUEL [ES]) **11 August 1998 (11.08.1998)** **column 3** **figure 1**	2, 14

US 3747138 A	1973-07-24	NONE	
US 4857026 A	1989-08-15	NONE	
US 2005255764 A1	2005-11-17	US 6234856 B1	2001-05-22
		US 2001010200 A1	2001-08-02
		US 6443786 B2	2002-09-03
		US 2001037758 A1	2001-11-08
		US 6443787 B2	2002-09-03
		US 2003079669 A1	2003-05-01
		US 6786785 B2	2004-09-07
		US 7097523 B2	2006-08-29
		US 2006094314 A1	2006-05-04
		US 7156713 B2	2007-01-02
		US 2005090166 A1	2005-04-28
		US 7232355 B2	2007-06-19
US 5211594 A	1993-05-18	NONE	
FR 2814715 A1	2002-04-05	FR 2814716 A1	2002-04-05
US 5791957 A	1998-08-11	NONE	

RELATÓRIO DE PESQUISA INTERNACIONAL

Depósito internacional Nº
PCT/BR2010/000444

A. CLASSIFICAÇÃO DO OBJETO

IPC (2011.01) B63B 35/73; B63B 35/79; B63B 35/85

De acordo com a Classificação Internacional de Patentes (IPC) ou conforme a classificação nacional e IPC

B. DOMÍNIOS ABRANGIDOS PELA PESQUISA

Documentação mínima pesquisada (sistema de classificação seguido pelo símbolo da classificação)

IPC (2011.01) B63B

Documentação adicional pesquisada, além da mínima, na medida em que tais documentos estão incluídos nos domínios pesquisados

Base de dados eletrônica consultada durante a pesquisa internacional (nome da base de dados e, se necessário, termos usados na pesquisa)

EPODOC, USPTO, SINPI

C. DOCUMENTOS CONSIDERADOS RELEVANTES

Categoria*	Documentos citados, com indicação de partes relevantes, se apropriado	Relevante para as reivindicações Nº
X Y	US 3747138 A (MORGAN D) 24 julho 1973 (1973-07-24) todo o documento	1-4, 11-13 7,8
Y	US 4857026 A (HULL RONALD K [US]) 15 agosto 1989 (1989-08-15) coluna 2, linhas 25-53 todas as figuras	1-4, 14
Y	US 2005255764 A1 (WOOLLEY ROBERT C [US]) 17 novembro 2005 (2005-11-17) página 5, colunas 1 e 2 figuras 1 e 2	2, 14, 15
A	US 5211594 A (BARROWS MICHAEL L [US]) 18 maio 1993 (1993-05-18) coluna 3 figuras 1 e 2	2, 7, 8, 13, 15

☒ Documentos adicionais estão listados na continuação do quadro C ☒ Ver o anexo de famílias das patentes

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Data da conclusão da pesquisa internacional	Data do envio do relatório de pesquisa internacional:
11 fevereiro 2011	250211

Nome e endereço postal da ISA/**BR**	Funcionário autorizado
INPI INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL Rua Mayrink Veiga nº 9, 18º andar cep: 20090-050, Centro - Rio de Janeiro/RJ 412	**Rodrigo Danieli**
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RELATÓRIO DE PESQUISA INTERNACIONAL

Depósito internacional Nº
PCT/BR2010/000444

C. DOCUMENTOS CONSIDERADOS RELEVANTES

Categoria*	Documentos citados, com indicação de partes relevantes, se apropriado	Relevante para as reivindicações Nº
A	FR 2814715 A1 (COMBEAU PHILIPPE ALBERT [FR]) 05 abril 2002 (2002-04-05) páginas 1 e 2 figuras 2 e 5	1, 3, 4, 7, 8, 11, 12, 15
A	US 5791957 A (HUNTER SAMUEL [ES]) 11 agosto 1998 (1998-08-11) coluna 3 figura 1	2, 14

RELATÓRIO DE PESQUISA INTERNACIONAL
Informação relativa a membros da família da patentes

Depósito internacional Nº
PCT/BR2010/000444

Documentos de patente citados no relatório de pesquisa	Data de publicação	Membro(s) da família de patentes	Data de publicação
US 3747138 A	1973-07-24	Nenhum	
US 4857026 A	1989-08-15	Nenhum	
US 2005255764 A1	2005-11-17	US 6234856 B1	2001-05-22
		US 2001010200 A1	2001-08-02
		US 6443786 B2	2002-09-03
		US 2001037758 A1	2001-11-08
		US 6443787 B2	2002-09-03
		US 2003079669 A1	2003-05-01
		US 6786785 B2	2004-09-07
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		US 2006094314 A1	2006-05-04
		US 7156713 B2	2007-01-02
		US 2005090166 A1	2005-04-28
		US 7232355 B2	2007-06-19
US 5211594 A	1993-05-18	Nenhum	
FR 2814715 A1	2002-04-05	FR 2814716 A1	2002-04-05
US 5791957 A	1998-08-11	Nenhum	

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(19) World Intellectual Property Organization
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B63H 21/17 (2006.01) *G06F 19/00* (2011.01)
B63H 21/22 (2006.01)

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14 February 2011 (14.02.2011)

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(26) Publication Language: English

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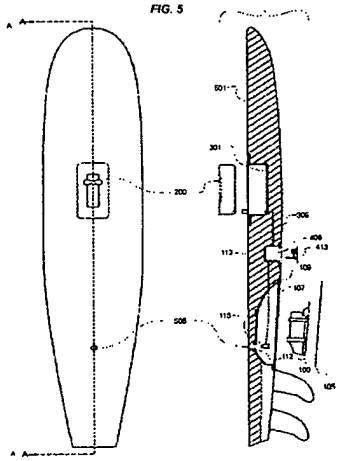
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(54) Title: ELECTRIC POWERED SURFBOARD PROPULSION AND CONTROL SYSTEMS



(57) Abstract: Practical electric -powered propulsion systems, associated operator-control systems, and modification methods enable conventional surfboards (and similar small watercraft) to be converted for water-jet propulsion. Wireless controls are integrated with wearable marine accessories such as modified neoprene or fabric gloves, armbands, wristbands, hand straps, or gauntlets. Safely immersible, wet-swappable high-power battery packs facilitate extended use of electric propulsion in surf. Compact integrated electronic control units incorporate motor controllers, wireless receivers, and control logic. On-board power, propulsion, and control components are positioned and installed to avoid disrupting the shape of the watercraft body so as to minimize added hydrodynamic drag and perceived differences from a traditional unpowered version of the watercraft in appearance, balance, or performance. Components are designed to facilitate efficient installation using construction techniques already in widespread use among manufacturers and customizers of the analogous unpowered watercraft.

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DESCRIPTION

TITLE: ELECTRIC POWERED SURFBOARD PROPULSION AND CONTROL SYSTEMS

RELATED APPLICATIONS: Priority benefit is claimed from U.S. Provisional Pat. App. No. 61/304,405, filed 13 February 2010. A substantially identical US application, serial no. 13/026317 filed 14 February 2011, is co-pending. Another related application is U.S. Provisional Pat. App. No. 61/147,733 filed 27 January, 2009.

TECHNICAL FIELD

Relevant fields include electric-powered surfboards and electric-powered versions of other watercraft for which light weight, balance, and hydrodynamic shape are critical factors in performance.

BACKGROUND ART

Internal-combustion-powered motorized surfboards have been built at least as far back as 1950, as a "self-propelled surfboard" appeared on the cover of the April 1950 issue of Mechanix Illustrated. This device used a 7.5 hp outboard engine in a large front-mounted engine housing and was not used for conventional wave surfing but rather for an alternative, high-speed jet-ski-like experience. Edward Dawson patented a powered board propelled by a rear-mounted gasoline engine in August 1969 (Pat. No. US3463116) which attempted to reduce the size and visual impact of the engine compartment. Another gasoline powered surfboard, with an engine mounted entirely inside the body of the surfboard, was produced during the late 1960s, with related Pat. No. US3262413 issuing to Douglas, Bloomingdale et al. in July 1966. This was an aluminum-hull surfboard containing a chainsaw-type engine entirely contained in an internal compartment, using water-jet propulsion and foot-operated controls. In appearance it was much closer to conventional surfboards and it could be ridden in a standing position.

All of these gasoline-powered boards shared similar drawbacks: noise, smoke, weight, expense, danger to operators and environment posed by potential fuel leaks, and appearance and performance characteristics unlike those which surfers expected from conventional boards. Since the 1960s combustion-driven powered boards have continued to evolve into high-power, high-speed devices more akin to jet skis than to conventional surfboards in usage and intent. Though some were originally intended to mitigate the need for strenuous paddling to reach surf and catch waves, they never enjoyed widespread popularity or notable commercial success.

In August 1968 a newspaper article in the Worthington Daily Globe briefly described a battery-powered surfboard designed by a Fleischer Manufacturing Company of Salt Lake City using an electric propulsion motor custom-designed by George Wasko. Assembly of these motors and boards was said

to be in progress at A.F. Scheppmann and Son Manufacturing Co. of Okabena, Minnesota and at Windom Manufacturing Co. The photograph published with the story appears to show an Okabena resident riding some sort of powered board on a lake, holding a wire presumably to control it. Other than this newspaper article, information about this product appears to be lacking in published sources. It was likely propeller-driven, rather than water-jet-driven, since the article refers to "tiny motors *and propellers*" (emphasis added). The absence of subsequent published information implies that this particular invention failed commercially, if indeed it ever came to market.

Further variants of electric-powered surfboards have also been conceived. Namanny (Pat. App. Pub. No. US20030167991, now abandoned) discloses a small electric-powered propeller unit mounted on a surfboard fin. Ruan et al. (Pat. App. Pub. No. US20080168937, now abandoned, and previously issued Pat. No. US7207282) disclose a "propeller-driven surfing device" with an electric motor and power supply. Railey (Pat. App. Pub. No. US20080045096, and previously issued Pat. No. US7226329) discloses a surfboard with dual internal electric motors and impellers. Chang (Pat. No. US5017166) describes a DC-motor-powered board with a large rear propeller and foot-operated control. Jung (Pat. No. US6702634) powers a board with an electric motor controlled by switches on a steering column, driving a helical propeller and including a retractable "brake." Efthymiou (Pat. No. US6142840) designed a board with a specialized shape and fin structure, dual water-jet pumps with angled intakes, and a wired handgrip control. Austin (Pat. No. US6409560) housed a motor in a box attached to the bottom of the board, with an external propeller and controls on a steering column.

As of this writing, none of these designs are in widespread use. Either the experience of riding them is not really "like" surfing, or the production cost renders them unaffordable for most surfers, or protruding parts create excessive drag, break easily, collect seaweed and other flotsam, or complicate transport. A motorized board that maneuvers like a traditional board, stands up to the physical punishment of heavy surf and frequent transport, takes advantage of the nuanced throttle control available with electric motors, is powerful enough to obviate (or operate as) a tow craft at "tow-in" locations, with a long-lasting battery that can be swapped out in wet conditions and easily recharged, could be welcomed by the sporting-goods industry, particularly if the production costs are reduced enough to facilitate widely affordable prices.

DISCLOSURE

An electric-powered water-jet propulsion system with wireless operator control facilitates safe, practical, effective, commercially viable motorization of surfboards and other small, balance-sensitive watercraft

Prior batteries typically encountered one or more obstacles to effective use in motorizing small balance-critical watercraft: They added excessive weight or drag-generating interruptions of hull surfaces, their capacity was insufficient for prolonged use, recharging was inconvenient, and replacement could not be done in the presence of water. The solution described here is a wet-

swappable, high-power-density, high capacity, conveniently rechargeable battery pack with acceptable weight for even the shorter variety of surfboard.

Prior electric propulsion systems were subject to insufficient power, inefficient use of stored power, excessive weight, overheating, and the starting difficulties caused by trapped air around the impeller. Here, a compact internal water jet pump unit of acceptable weight includes an integrated high-performance electric motor efficiently cooled by the surrounding water jet flow and prompt passive venting of any trapped air whenever the watercraft enters the water.

Prior propulsion-control systems were overly fragile (on wires or stalks) or they required the operator to look down or change position (e.g. bringing the hands together), potentially compromising the balance of the operator and watercraft. Here, a wearable wireless controller is operable by small movements of the fingers or thumb of one hand without looking, freeing the operator to take any necessary or desired bodily position. The controller drives a compact control unit integrated in the body of the watercraft, including a wireless receiver and programmable control logic circuitry to take full advantage of the nuanced throttle control made possible by an electric motor. For instance, a software-controlled "soft" motor power-down prevents sudden unbalancing stops.

High cost and a "look and feel" significantly different from the esteemed traditional unpowered versions of the watercraft have hindered commercialization of prior systems. Here, all on-board power supply, propulsion, and electronics control components are installed within the board or hull, under covers faired into the watercraft's normal contours. Cost is controlled by using installation methods already established for traditional versions of the watercraft. For example, a commercial surfing longboard, (either a hard-shelled board or a soft-surface "foamie") may be modified with electric water-jet propulsion using the same family of techniques already employed by surfers and board-builders to add fins in desired locations.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1A is a cross section of the assembled jet pump casing showing the motor and impeller installed inside the casing.

Fig. 1B is an exploded view showing the integrated jet pump assembly with its associated jet pump shroud and cover plate.

Fig. 2 is an exploded view of a preferred embodiment of the wet-swappable battery pack.

Fig. 3 is an exploded view of a preferred embodiment of the battery pack receptacle with the assembled battery pack positioned for insertion into the receptacle.

Fig. 4A shows the electronic control unit (ECU) cover plate and electronic components.

Fig. 4B is an exploded view of the ECU box.

Fig. 5 is a schematic exploded cross-section showing cavities and channels in the board body with installed fin-box-type liners and the corresponding power components ready for insertion.

Fig. 6 illustrates a preferred embodiment of a hand-operated wireless controller.

MODES FOR CARRYING OUT INVENTION

A surfboard is possibly the smallest, lightest, and most balance-critical of the group of similar watercraft (canoes, kayaks, pirogues, windsurfers, etc.) Surfing is also probably the most demanding of "start and stop" motorization and nuanced throttle control; a surfer may turn on the motor to get through the zone of breaking and cresting waves, use fine throttle control to catch a wave, then turn off the motor while riding the wave. Air can be trapped near the motor not only in the transition from beach to water, but also when the surfer "catches air" going over a swell. Surfboards are routinely flung onto sand or rocks, so durability is a must. A surfer's whole body is engaged in balancing and maneuvering the board; if control of the motor requires looking down, reaching for something, or even bringing a hand to the body or both hands together could destabilize the board and cause a "wipeout." The examples below are drawn to surfboards as a most-demanding-case, but minor modifications for other similar watercraft are within the scope of this invention.

The terms "fore" and "forward" are used to refer to positions relatively in the direction of the nose or bow (toward the direction of normal forward motion). The terms "rear" and "aft" are used to refer to positions relatively in the direction of the tail or stern (opposite to the direction of normal forward motion).

The components that combine to advance the art of motorized surfboards and similar watercraft include:

1. An integrated water jet pump assembly comprising a cylindrical electric motor, a rotor/impeller attached to the motor shaft, a stator with hydrodynamic flow-control vanes and integrated front motor mount, a motor tube with optimal clearance for the propulsion water jet to efficiently cool the motor, an exit cone section with streamlined radial vanes, integrated rear motor mount, and wiring conduits built into the vanes, and an outlet nozzle optimized to shape the water jet for efficient propulsion;

2. A jet-pump shroud containing the water jet pump assembly with a streamlined water-intake conduit forward of the impeller, a water outlet aft of the nozzle, a perimeter flange for fin-box-type installation, wiring ports, locating features for easy assembly, a vent hole on top to vent trapped air, and an interior shape that encourages bubbles toward the vent hole, and a cover plate contiguous with the bottom of the surfboard and perforated to allow adequate water intake while excluding seaweed and other debris;

3. A wet-swappable battery pack comprising a long-lasting, powerful battery cell or array of cells potted into a waterproof case, a pair of female power connectors recessed in the bottom of the case and sealed to prevent water from forming a conducting path between them, a sealed lid, integrated locking features that secure the pack in the board but are easily hand-released to swap batteries, and asymmetric features to prevent incorrect insertion;

4. A battery pack receptacle with latching features to securely hold the battery until an operator activates the hand-release apparatus, a pair of male power connectors that mate with the female connectors on the battery pack, and a perimeter flange for fin-box-type installation;

5. An electronic control unit (ECU) assembly comprising a wireless receiver, a motor controller, a microprocessor with programmable instruction storage, a mounting tray to anchor connectors, a tube to align and protect the receiver antenna, a waterproof ECU box with a perimeter flange for fin-box-type installation, and a sealed bottom cover designed to conduct waste heat away from the ECU and into the surrounding water;

6. A surfboard body of a conventional size and shape, modified with cavities on the fore-aft centerline for the battery pack (on top for easy swapping), the ECU box and the jet-pump shroud (on the bottom for conductive cooling and water intake, respectively) recessed so that, when the motorized board is fully assembled, the covers and the top surface of the battery are substantially flush with the surrounding board surface, placed to minimize the disturbance of the balance and center of gravity; further modified with wiring channels for the necessary connections and an air-vent tube leading from the air-vent hole in the pump shroud to the top surface of the board;

7. A wearable wireless controller with a trigger switch on the operator's hand operable by the thumb or fingers of the same hand without disturbing operator balance or concentration, an associated lightweight battery and wireless transmitter mounted nearby but out of the way (e.g., on the operator's forearm), configured for safety to run the motor only while the operator actively holds the switch in an "on" position;

In Fig. 1A, a waterproof electric motor 101 (in this embodiment, a brushless DC electric motor of "inrunner" design) is installed in a sectional jet-pump casing forming integrated jet-pump assembly 100. The rotating shaft of motor 101 passes through forward motor mount 126 and multi-bladed impeller 102 (in this embodiment, a modified commercially available marine impeller) is attached to the end of the shaft. The impeller is thus positioned within stator section 121 forward of stator vanes 125, which redirect the water flow from the impeller. Motor 101 is secured in forward motor mount 126 by a balanced circular array of mounting fasteners (not shown). The cylindrical body of motor 101 extends rearward axially inside motor tube 122, with sufficient clearance between the outer casing of motor 101 and the inner wall of motor tube 122 to facilitate efficient conductive cooling of motor 101 by the water jet passing around it. The rear end of motor 101 preferably fits snugly inside the open forward end of exit cone 127, obviating the need for more mounting fasteners. Motor power leads 113 conduct current from the electronic control unit (ECU, see Figs. 4A, 4B) to motor 101 via power lead passages 128 contained in exit cone vanes 134.

Fig. 1B is an exploded view showing the integrated jet pump assembly 100 with its associated jet pump shroud 107 and cover plate 105. Jet pump shroud 107 is an elongated, tapering, arched casing made of ABS (or some other suitable waterproof, substantially rigid material) to completely contain jet pump assembly 100. A streamlined forward portion forms an optimal water intake conduit just forward

of impeller 102 (hidden by the intake casing in Fig. 1B). Jet pump shroud 107 is permanently installed into a conforming cavity in the lower rear surface of a surfboard body so that the outer perimeter of the attached jet pump shroud flange 109 is flush with the outer skin of the surfboard. The inner perimeter of jet pump shroud flange 109 is slightly recessed just sufficiently to accommodate the thickness of jet pump cover plate 105, which when installed is also substantially flush with the outer surface of the surfboard, minimizing added drag and substantially maintaining the normal contours of the surfboard. In this embodiment, cover plate 105 is made of anodized aluminum, but it could also be made of other sturdy rigid plastic, metal or composite material.

Jet pump shroud 107 also incorporates at least one air vent hole 112 located near the apex of the arched portion of the shroud. Internal jet-pump conduits in water-jet propulsion systems tend to trap air inside when first submerged. This trapped air can fully or partially surround the jet-pump impeller. When the jet pump is activated with air around the impeller, the impeller cannot create enough suction force to draw enough water into the intake to "prime" the pump. Air vent hole 112 allows such trapped air to quickly escape when the surfboard is first placed in the water or returns to the water after "catching air." When the surfboard is in normal use, the apex of the shroud is its highest point Air bubbles in water naturally tend to rise. The smooth interior tapers and curves of the shroud guide rising bubbles toward the apex, expediting the venting of trapped air through air vent hole 112. From air vent hole 112, the air passes into an air vent tube (508 in Fig. 5) which leads upward through the body of the surfboard to an escape port in the board's top surface. Thus, any air bubbles in the jet-pump cavity escape harmlessly into the ambient air rather than remaining trapped in shroud 107 to interfere with the next attempt to start the motor.

Cover plate 105 incorporates an anti-fouling grate 114, comprising an array of water intake holes, slots or other openings in the forward portion of cover plate 105 of sufficient size to allow adequate intake of water through the openings into the forward intake portion of the enclosed integrated jet-pump assembly 100 when the motor is activated, but not large enough to admit substantial pieces of potentially pump-fouling material such as seaweed or other foreign material commonly found in surf zones.

To install the integrated jet-pump assembly 100 into the installed jet-pump shroud 107, motor power leads 113, which enter shroud 107 through motor power lead port 115, are inserted through power lead passages 128 in exit cone vanes 134, and mated to with motor power connectors in the rear motor end bell. Slack wire of motor power leads 113 is partially wrapped around the outer circumference of exit cone section 123 as necessary to avoid mechanical interference from leads 113 when integrated jet-pump assembly 100 is being installed into shroud 107. Next integrated jet-pump assembly 100 is placed into jet-pump shroud 107, where detents 108 or other locating features ensure correct and secure placement. Subsequently, cover plate 105 is secured to casing elements of integrated jet-pump assembly 100 with bolts or other suitable fasteners. Finally, the perimeter of cover

plate 105 is secured to shroud flange 109, for example with bolts through perimeter holes into threaded holes or inserts in shroud flange 109.

Fig. 2 is an exploded view of the wet-swappable battery pack that supplies power to the motor. A waterproof open-topped battery pack case 202, made of ABS plastic or other suitable rigid material, contains an array of parallel-connected groups of cells (not shown). Preferably, each group comprises several cells connected in series, and each parallel-connected group contains the same number and type of cells. Commercial lithium-ion nanoparticle-type cells have been shown to perform satisfactorily. The void space in the case is substantially filled with a suitable commercial waterproof potting compound (such as flexible urethane casting compound, or epoxy) encasing the cells and associated contacts and connections to protect them from moisture. Two electrical power terminals ("female bullet leads") 204 connected to the array of cells are integrally recessed into the outer rear bottom surface of the case 202. Each recessed female terminal 204 has a waterproof seal, such as an O-ring, within its recess to isolate the terminals and prevent inter-terminal electrolysis in wet environments.

The bottom surface structure of lid 207 encloses two protruding spring-loaded locking pins 208, one protruding at each end of lid 207. Spring-loading in this embodiment is accomplished by a suitable spring steel wire arc or bow in the structure of each locking pin 208. This steel bow seats against structure in the bottom surface of lid 207, resisting retraction of locking pins 208 and exerting force to keep locking pins 208 extended outside lid 207.

Strap 209 is a thin flexible flat band made preferably of a durable fabric that can tolerate extended salt water immersion and sun exposure. Each end of strap 209 is attached to one of the locking pins 208 so that the spring tension of locking pins 208 draws strap 209 substantially into a shallow recessed strap detent 210 in the upper surface of lid 207. Strap 209 normally lies in detent 210 substantially flush with the upper surface of lid 207, so it does not become snagged on passing objects or the operator's feet. However, when the operator grasps strap 209 and pulls firmly, the resulting tension retracts spring-loaded locking pins 208 to unlatch the battery pack from its receptacle (see Fig. 3).

Lid 207 also incorporates one or more small indicator holes 211 through its upper surface to allow for the visibility of one or more suitable visual indicators (such as LED indicators) to visually indicate battery charge level, temperature, trouble status or other information to the operator above. When the battery pack is assembled, lid 207 preferably forms a waterproof seal with battery pack case 202. In the illustrated embodiment, the seal is created by compressing elastomeric gasket 206 in the process of tightening down lid 207.

Fig. 3 is an exploded view of a preferred embodiment of the battery pack receptacle with battery pack 200 ready for insertion. A flanged open-top waterproof box 301, made of ABS plastic or other suitable material, of shape and internal dimensions to create a running slip-fit with the swappable battery pack, is permanently installed into a conforming cavity cut in the upper central surface of a commercial surfboard body, so that the outer perimeter of integrated flange 302 which surrounds the

top edges of box 301 is substantially flush with the outer skin of the surfboard. Positive and negative upwardly-protruding electrical power terminals ("male bullet leads") 303 are installed in the inner bottom surface of the box 301, for contact-connection to the female terminals 204 in the outer bottom surface of the battery pack case 202. Battery power leads 306 are connected to male terminals 303 where they penetrate the underside of the box 301, Power leads 306 then run through holes drilled (or channels cut and filled) in the surfboard body, to connect to the electronic control unit (ECU).

Integrated flange 302 incorporates locking pin receiver recesses 304 at forward and rear positions, capped by locking pin receiver plates 305 that are secured by receiver plate screws 307. Recesses 304 and receiver plates 305 form receivers for spring-loaded battery pack locking pins 208. When the assembled battery pack 200 is inserted into the assembled battery pack receptacle with corresponding male and female terminals 303 and 204 fully connected, spring-loaded locking pins 208, extend into the locking pin receiver recesses 304 and are retained therein by the locking pin receiver plates 305, securing the battery pack in place.

Preferably, the battery pack has one or more asymmetrical features, such as keyway 212, configured to mate with corresponding asymmetric features in the battery pack receptacle such as a protrusion slip-fitting into keyway 212 (not visible in this view). Because the other end 213 of battery pack 200 has no keyway, the protrusion in the receptacle hinders attempts to insert the battery backwards. Because keyway 212 does not extend all the way to the top of battery pack 200, the protrusion also hinders attempts to insert the battery upside-down. This asymmetry ensures that battery pack electrical power terminals 204 (see Fig. 2) will always properly engage battery pack receptacle electrical power terminals 303, rather than risk mechanical crushing or reversed electrical polarity. Any suitable known mechanical-asymmetry features may be used.

A battery pack may also incorporate one or more flotation chambers permanently enclosing air voids, foam material, or other buoyant matter sufficient to float the battery pack if it should fall overboard. Visibility aids such as fluorescent or phosphorescent exteriors could facilitate location and retrieval of floating batteries in rough or cloudy waters. In another embodiment, the battery pack may be cylindrical rather than prismatic in shape. In still another embodiment, the battery pack may advantageously incorporate one or more supercapacitors or inductors besides, or instead of, battery cells.

Other advantageous embodiments may include two or more battery packs and two or more battery pack receptacles, thereby supporting higher jet-pump propulsion power levels, longer time-of-use for the jet-pump propulsion system, or both. Alternatively, the extra receptacle(s) could be without electrical connections and used only to store extra batteries for mid-water swapping.

Fig. 4A illustrates the electronic control unit (ECU) electronics, comprising wireless receiver 401, antenna 402, programmable motor controller 403, and interface circuit 404 incorporating a microprocessor and a readable storage element (for instance, an EPROM) programmed with intelligent-motor-control firmware or software to exploit the nuanced control possibilities of electric

motors. For example, when interface circuit 404 receives an "off" input from wireless receiver 401, it signals the motor controller 403 for a rapid series of incrementally reduced motor power levels, ending with zero motor power. This ramping procedure results in a "soft" power-down, which avoids destabilizing the surfer on the board with the sudden change in equilibrium that would result from a "hard," instantaneous power shutoff. Other power level settings and power/time profiles may also be programmed in.

Another useful category of software or firmware for the ECU is by a data-recording function within the ECU; for example, wireless-communication data, motor performance data, or physical data from temperature, acceleration, pressure, speed, or electrical sensors mounted in the board. Analysis of the data could enable performance and quality analysis and engineering improvements. The recording function would provide experimental data for board designers and diagnostics for operators and repairers.

In alternate embodiments, the ECU is user-programmable via an interface port connected to, or a wireless transceiver communicating with, a computer or mobile device equipped with ECU-programming software. Such software may allow customized control of one or more motorized-surfboard propulsion or wireless-communication parameters (for example, time duration of "soft" motor power-down discussed above), access to recorded data, and adding recording functionality for later-installed sensors and other hardware.

All these components except the motor controller 403 are supported in ECU mounting tray 406 which incorporates locator holes or passages and connector plugs or terminals (e.g., bullet leads, not shown), for battery power leads 306 and motor power leads 113. Mounting tray 406 also incorporates an antenna receptacle 407 which maintains the antenna 402 in an optimal operating orientation (in this embodiment, pointing perpendicularly toward the top of the board). This antenna orientation optimizes reception of wireless signals from the operator's wireless controller. Motor controller 403 is mechanically secured in thermal contact to metal cover plate 413 (for example, by thermal epoxy). This arrangement allows heat from the motor controller 403 to be dissipated into the surrounding water when the surfboard is in use.

Fig. 4B is an exploded view of the waterproof electronic control unit (ECU) box, comprising an open-top waterproof case 408 made of ABS plastic or other suitable waterproof rigid material, an integrated flange 409 around the perimeter of the open top (which, when mounted in this embodiment of a surfboard, becomes an open bottom), and a perimeter seal 412 (e.g., an O-ring or other waterproof gasket) mounted on flange 409. Case 408 is permanently installed in a conforming cavity cut in the lower surface of a surfboard body so that the outer perimeter of flange 409 is substantially flush with the outer surface of the surfboard. Battery power leads 306 and motor power leads 113 (not visible in this view) penetrate case 408 to connect to the ECU electronics to be housed inside; these case penetrations are sealed and waterproofed. Motor power leads 113 extend from outside case 408 to jet-

pump shroud 107 through holes drilled, or channels cut and filled, in the surfboard body. Battery power leads 306 arrive from battery pack receptacle box 301 via similar holes or filled channels

Mounting tray 406 with the associated electronic components, and motor controller 403 attached to heat-dissipating cover plate 413, are inserted into installed case 408 so that cover plate 413 fits onto flange 409 contacting seal 412. When cover plate 413 is tightened onto perimeter flange 409 (for example, by tightening perimeter fasteners 411 through fastener holes 414), seal 412 is compressed to create a watertight join. When secured, cover plate 413 will lie substantially flush with the outer surface of the surfboard, minimizing drag and maintaining the normal contours of the surfboard.

In another embodiment, all ECU electronics (such as the antenna, wireless receiver and interface circuit) are encased in a cast block of waterproof potting compound or plastic that may be installed directly into the surfboard body, eliminating the need for a separate ECU casing.

Fig. 5 is an exploded cross-section on section line A-A of a motorized surfboard assembly, showing the cavities and channels created in the board body and the components that fit into them. Surfboard body 501 has been modified with cavities in its bottom surface fitted to jet pump shroud 107 and, ECU box 408, and a cavity in its top surface fitted to battery pack receptacle case 301 Shroud 107, box 408 and case 301 are shown here with a fin-box-type design and installation. Assembled battery pack 200 is shown positioned for insertion in battery pack receptacle 300. Battery power leads 306 extend from battery pack receptacle case 301 to ECU box case 408 through internal holes or channels in surfboard body 501. Motor power leads 113 extend from ECU box case 408 to jet pump shroud 107 through internal holes or channels in surfboard body 501 and pass through power lead port 115. Air vent tube(s) 508 are shown in the rear portion of the top surface of surfboard body 501. Air vent tube(s) 508 extend through the surfboard body 501 from jet pump shroud air vent hole(s) 112 to the pierced top of the board. Integrated jet-pump assembly 100 is shown positioned for insertion in jet-pump shroud 107. After integrated jet-pump assembly 100 is inserted in jet-pump shroud 107, cover plate 105 is poised to be fastened to integrated jet-pump assembly 100 and jet-pump shroud flange 109. ECU cover plate 413 (with attached electrical components previously discussed) is ready for attachment to ECU box flange 409. After assembly, all the covers will become substantially continuous extensions of the surrounding surfaces of board body 501, resulting in minimal departure from the appearance, hydrodynamics, and ergonomics of a conventional surfboard.

While the preferred embodiment of the electric-powered motorized surfboard is implemented with a "longboard" type of surfboard, other advantageous embodiments may be implemented using other sizes and types of surfboard (for example lighter, shorter, higher-performance "short boards", "knee boards", or heavier "stand up paddle" boards) incorporating identical propulsion, control, and power supply components as those described above, or similar alternate components adapted to fit the shape, size, and weight of the alternate type of board used.

Jet pump shroud 107, battery-pack receptacle 301, and ECU box 408 may be included as part of a purpose-built motorized surfboard, but alternatively may be installed in an existing unpowered

surfboard using "fin-box" modification techniques that are already standard among surfers and boardmakers. Fin boxes are after-market inserts, usually made of a hard plastic, with one or more slots to receive the stem of a fin and flanges around the perimeter of the slot(s). To install a fin box, a suitable fitted cavity is created in the board using a router or the like. The cavity includes a step to position the top surface of the fin-box flange either flush with the board surface or slightly recessed, depending on the next steps. The cavity may then be lined with adhesive, fiberglass sheets, or both as appropriate to the particular material(s) and structure of the board. The fin box is affixed into the cavity. The box may then be "glassed" into the cavity (fiberglass sheets are laminated to the flange and the surrounding board area), or some other reinforcement method may be used. In all cases the end result is a reinforced slot permanently and durably embedded in the board, without significant drag-generating interruption of its surface shape and often elegantly harmonizing with the board's visual appearance. A fin locked into the slot is attached ruggedly enough to survive the shocks and stresses typical of use in heavy surf.

The pump shroud, ECU box, and battery-pack receptacle of the preferred embodiment can be retrofitted into existing surfboards using these well-known fin-box techniques because of the perimeter flanges and simple silhouettes. Those skilled in the art might expect this approach to seriously compromise the strength and useful life of the board; the cavities required here are significantly larger than those typical of fin-boxes, and incidents of even structurally intact boards being snapped in two by heavy surf are fairly common. However, prototype tests uncovered no such structural fragility even in notoriously challenging surf locations.

Fig. 6 illustrates a preferred embodiment of a hand-operated wireless controller. Waterproof trigger switch unit 603, incorporating a depressible trigger button 605, is securely positioned on the edge of the operator's hand near the thumb 607 by a fully or partially flexible hand strap 601. Hand strap 601 may comprise, for example, an elastic band attached at both ends to a plastic mounting surface integrated with waterproof trigger switch unit 603, or an open-ended fabric band with patches of hook-and-loop fastening material (for example, Velcro™) positioned at each end allowing band length adjustment to various hand sizes. An armband or wristband 602 around part of the operator's forearm or wrist incorporates a pocket or attachment for waterproof case 604, which contains at least one battery and a wireless transmitter (not visible, inside case 604). Power leads 606 are attached to arm-or-wrist-band 602 and routed to connect with waterproof trigger switch unit 603.

When the operator depresses trigger button 605 of waterproof trigger switch unit 603 with a movement of thumb 607, the wireless transmitter inside case 604 signals wireless receiver 401 in the ECU to activate the jet-pump propulsion system. Propulsion will continue as long as the trigger switch remains depressed. When trigger button 605 is released, the wireless transmitter inside case 604 signals wireless receiver 401 in the ECU to perform a "soft" incremental power-down lasting approximately 1-2 seconds, as previously described above, in order to avoid destabilizing the surfer with a sudden power-off. Advantageously, this thumb-operated one-handed wireless controller allows the surfer to

control the jet-pump propulsion system without making any limb movements (e.g. reaching for controls with feet or hands) that would disrupt surfer's precise dynamic balance on the surfboard. This can be critically important for safety and the quality of the operator's experience.

In another embodiment of the wireless controller, a speed-selection control is included as well as the on-off trigger described above, to allow the operator to adjust motor power level to a preferred level. Such speed selection may be provided as a number of specific preset levels selectable by a switch, button array, or other suitable control attached to the surfer's body or clothing and connected to a wireless transmitter. For example, "3 km/h", "6 km/h" and "9 km/h" settings may be provided. Alternatively, a continuous range of motor power levels may be available and selectable by operating a slider control, dial, knob, keypad, or other suitable "throttle" control. In these embodiments the interface circuit in the ECU may contain additional software for a microcontroller to interpret and execute the speed-setting commands.

In another embodiment, the wireless controller is integrated with the handle and shaft of a "stand-up paddle" to enable paddleboard surfers to control motorized versions of their boards. In such an embodiment, a cylindrical portion of the shaft or handgrip of the oar may be rotatable around the long axis of the shaft in order to function as a speed-setting control (for example, by providing "click" switch positions which are distinctly perceptible by touch). Analogous designs could be applied to oars, paddles, poles, and similar manual devices customarily used to propel a small watercraft by leverage against the water or reachable solid ground. Even windsurfers wanting to motor past leeward sides of wind-blocking obstacles, such as cliffs, could control the motor from a switch mounted on the boom.

Another embodiment of the wireless controller is adapted for use by a surfing instructor, where the instructor's wireless controller contains additional controls and selectable pre-programmed motor-power profiles to allow the instructor to remotely control an electric-powered motorized surfboard's speed and acceleration on "flat" water in ways that may simulate board behavior in surf, thereby enhancing effectiveness of instruction and practice sessions for the student riding the motorized surfboard. This type of controller could also be used by a lifeguard, harbormaster, or other guardian to assist an operator in difficulty.

To use the motorized surfboard system, the operator will take the assembled motorized surfboard to a suitable body of water (such as a seashore), install a fully-charged battery pack in the battery pack receptacle as described above, attach the hand-operated wireless controller unit to his or her hand and arm as described above, and enter the body of water with the motorized surfboard. The operator mounts or holds onto the board as in unpowered surfing, but may then use the wireless controller to activate the jet-pump propulsion system to propel the motorized surfboard to a preferred location. Upon committing to catch a specific incoming wave, the operator may again use the wireless controller to activate the jet-pump propulsion system in order to attain optimal takeoff position relative to the incoming wave, and to attain sufficient forward speed to successfully catch or "drop in" onto the wave face. If the operator executes a successful "drop in" and attains desired dynamic equilibrium on

the moving wave face, he or she may then use the wireless controller to deactivate the jet-pump propulsion system (for example, by releasing the hand-operated wireless trigger switch described above in a preferred embodiment). In the course of normal surfing activity the operator may also find it desirable to activate the jet-pump propulsion system in other situations, such as escaping from hazardous or adverse locations in the surf zone, avoiding other surfers or watercraft, or returning to the shore. When the installed battery pack is nearing exhaustion, the operator may remove it as described above and install a fresh, fully-charged battery pack on shore (or in the water if associates or sponsors with watercraft are available to provide additional battery packs and retrieve used packs for recharging).

The motorized surfboard system with wearable wireless controller may also be used in "flat" water such as lakes, ponds, rivers, and swimming pools, where riders may use the system to learn basic surfing balance and weight-shifting skills or simply enjoy the experience of riding a water-jet propelled surfboard. Surfing instructors may also find the system useful as an aid to teaching fundamental surfing skills best practiced on a moving board in safe waters.

Many other embodiments, variations, and equivalents are implicit in, or may be extrapolated from, the foregoing description. These must be considered to be within the scope of the invention. Therefore, while the invention has been described in detail in its currently preferred embodiment, the foregoing disclosure does not limit the scope of the claims.

INDUSTRIAL APPLICABILITY

These improvements in compact marine electric motor technology are applicable to the sporting-equipment industry. They may be used in any type of small, lightweight, balance-critical watercraft that may be traditionally unpowered, but would benefit from a power boost under certain conditions. Besides surfboards, such watercraft include canoes, kayaks, paddleboards, windsurfers, pirogues, coracles, and other structures with similar characteristics.

CLAIMS

1. A powered small watercraft, comprising:

a battery pack with sealed terminals and casing preventing current leakage into ambient water;

a water-jet pump powered by the battery pack;

an electronic control unit powered by the battery pack and controlling the water-jet pump, comprising

a wireless receiver,

a programmable motor controller,

an information storage element with instructions for nuanced control of the water-jet pump,

a microprocessor interpreting signals received by the wireless receiver, reading the instructions on the information storage element, and issuing commands to the motor controller according to the instructions being read.

a body assembly comprising

a body of a size and shape similar to a conventional unpowered version of the watercraft, modified with cavities and channels fitting the battery pack, the water-jet pump, the electronic control unit, and associated electrical connections, and

a plurality of covers configured to confine and protect the battery pack, the water-jet pump, the electronic control unit, and the associated electrical connections inside the cavities and channels,

where

the cavities are configured to distribute the weight of intended contents so that the drag coefficient, balance, and center of gravity of the powered watercraft resembles those of a conventional unpowered version of the watercraft, and

when fully assembled, the shape of the powered watercraft substantially resembles that of a conventional unpowered version of the watercraft; and further comprising:

a wireless controller comprising

a switch,

a wireless transmitter controlled by the switch, and

a waterproof support structure supporting the switch and the wireless transmitter, where the wireless transmitter communicates with the wireless receiver in the electronic control unit, and

the support structure positions the switch to be operable without disrupting an operator's normal postures and gestures conventionally associated with piloting the watercraft.

2. The watercraft of claim 1, where the battery pack is rechargeable.
3. The watercraft of claim 1, further comprising flotation elements built into the battery pack so that the battery pack floats in water when disengaged from the watercraft.
4. The watercraft of claim 1, further comprising a retaining fastener that disengages by hand, releasing the battery for swapping.
5. The watercraft of claim 4, where the retaining fastener disengages as a result of a handle being pulled out of a non-protruding operating position.
6. The watercraft of claim 5, where the retaining fastener comprises a spring-loaded locking pin that retracts fully from a mating receptacle when the handle is pulled.
7. The watercraft of claim 5, where the retaining fastener is spring-loaded by a spring-steel wire arc seated in a surface of the battery-pack casing.
8. The watercraft of claim 1, where the battery pack cavity opens toward a top surface of the watercraft.
9. The watercraft of claim 1, where the cavities in the body enable the water-jet pump and the battery pack installed on a fore-to-aft center plane of the watercraft.
10. The watercraft of claim 9, where the cavities in the body are arranged so that the jet-pump and the electronics control unit is installed on a fore-to-aft center plane of the watercraft.
11. The watercraft of claim 1, further comprising an air-vent tube connecting an operating apex of the water-jet-pump cavity to the ambient air during operation.
12. The watercraft of claim 11, where the water-jet pump cavity is curved to follow the shape of the pump and tapered to guide water past the impeller and motor while guiding air bubbles toward the air-vent tube.
13. The watercraft of claim 1, where heat-generating and heat-sensitive elements of the electronic control unit are attached in thermal contact with a heat-dissipating cover on the bottom of the body assembly so that ambient water further dissipates heat from the cover.
14. The watercraft of claim 1, where at least one of the cavities in the body is lined by a solid box, receptacle, or shroud having a perimeter flange similar to the flange of a fin box.
15. The watercraft of claim 1, where the conventional unpowered version of the watercraft is a surfboard.
16. A wireless control system for an electric motor powering a small balance-sensitive watercraft, comprising:

an electronic control unit mounted to the watercraft, comprising

a wireless receiver,

an information-storage element with stored instructions for controlling the electric motor,

a microprocessor in communication with the wireless receiver and the information-storage element, and

a motor controller controlling the electric motor according to instructions from the microprocessor,

and further comprising a primary wireless transmitter communicating with the wireless receiver and responsive to an operator's manipulation of a switch,

where the stored instructions comprise an instruction to activate the motor and an instruction to gradually ramp down motor power to zero to prevent a sudden stop.

17. The control system of claim 16, further comprising a secondary wireless transmitter in communication with the wireless receiver, the second wireless transmitter used by a person located away from the watercraft to assist the watercraft operator.
18. The control system of claim 17, further comprising stored instructions for power/time sequences capable of initiation by the second wireless transmitter and optimized for at least one of instruction, demonstration, rescue, and hazard avoidance.
19. The control system of claim 16, where the motor controller automatically executes a power ramp-down if the operator ceases actively requesting continued motor power by holding the switch in an "on" position.
20. The control system of claim 16, where

the watercraft is a surfboard,

the switch is worn on the operator's hand, and

the switch is operable by the thumb or fingers of the same hand from a wide range of expected body positions.

21. The control system of claim 16, where

the watercraft is customarily propelled or steered by an implement held in the operator's hand, and

the switch is integrated in the implement near the normal operating position of at least one of the operator's hands.

22. The control system of claim 16, further comprising stored instructions for motor power variations other than full-power and ramp-down, where the switch is configured to issue corresponding distinguishable commands.
23. The control system of claim 16, further comprising a heat dissipater conducting heat away from the electronic control unit and into surrounding water.
24. The control system of claim 16, further comprising a data interface through which additional instructions can be downloaded into the storage element and additional functions can be programmed into the microprocessor from an external device.

25. The control system of claim 24, where the external device is selected from the following group: computers, portable phones, miniature digital storage-and-playback devices, and electronic organizers.
26. The control system of claim 24, further comprising:
    a data-logging function programmed into the microprocessor,
    associated sensors to collect data for logging. and
    instructions for uploading the data to an external device.
27. The control system of claim 26, further comprising a real-time indicator mounted on the watercraft in a location visible to the operator during operation, displaying a selected subset of the data as it is collected.
28. The control system of claim 27, where the location visible to the operator is on an exposed surface of a battery pack and the selected subset of data comprises an amount of charge presently remaining in the battery.

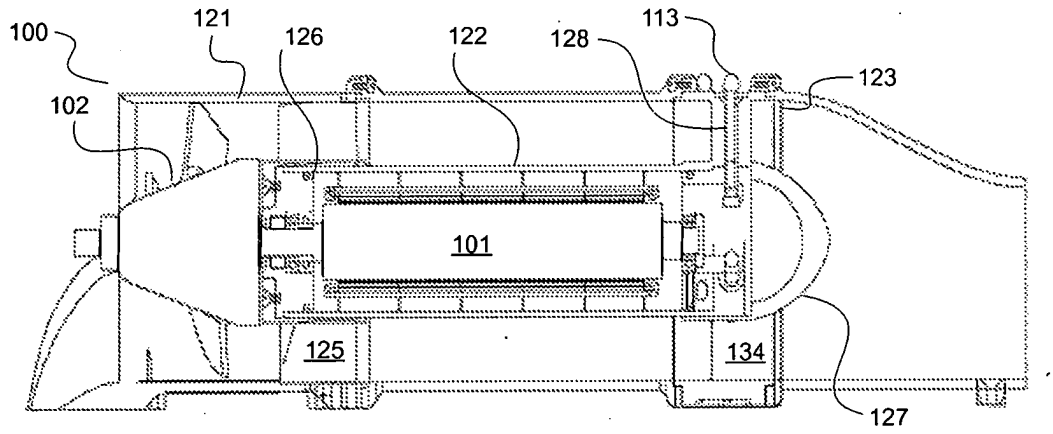

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FIG. 1A

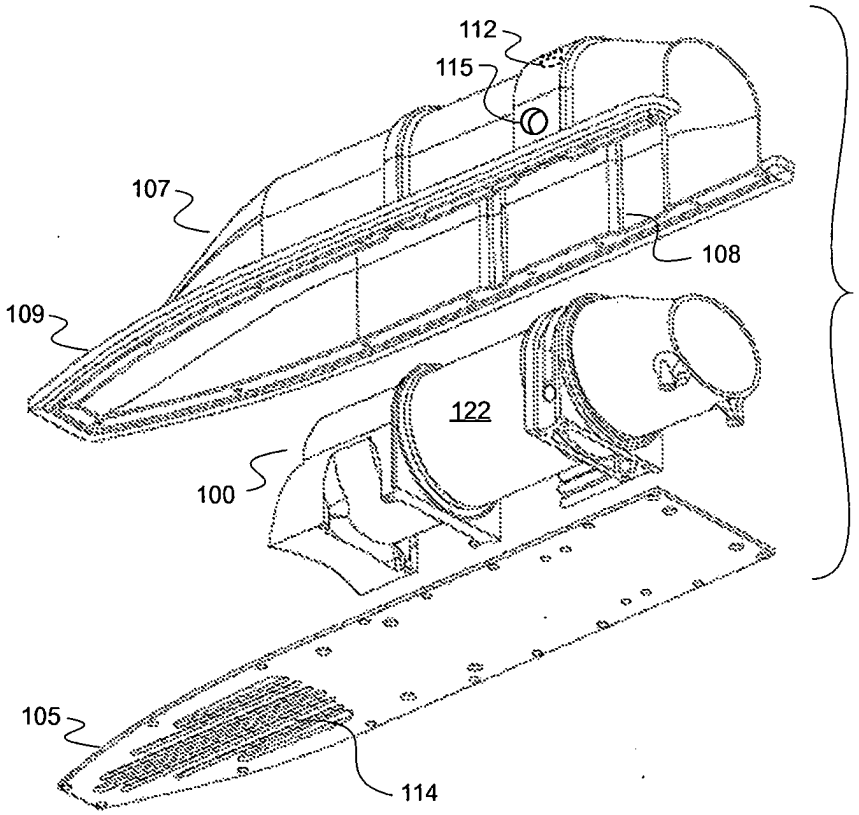

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FIG. 1B

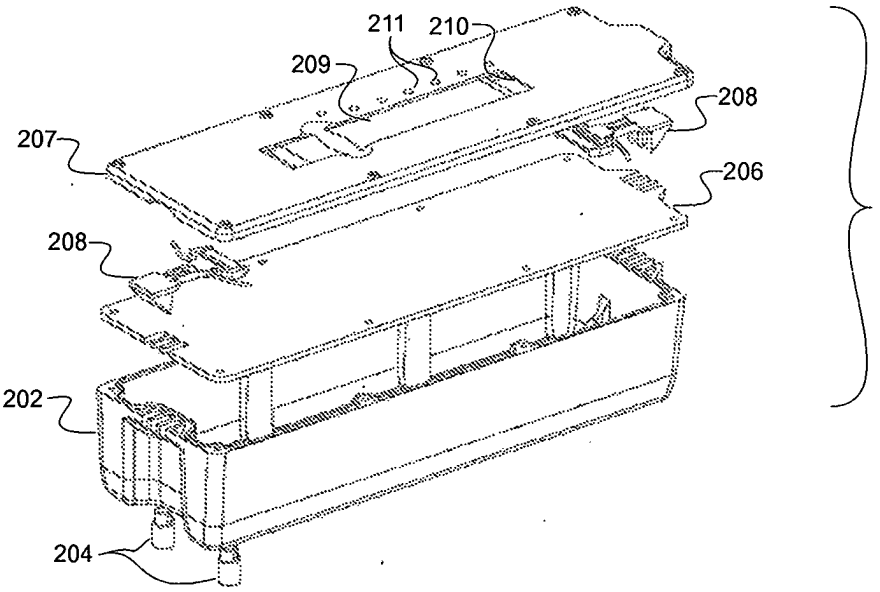

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FIG. 2

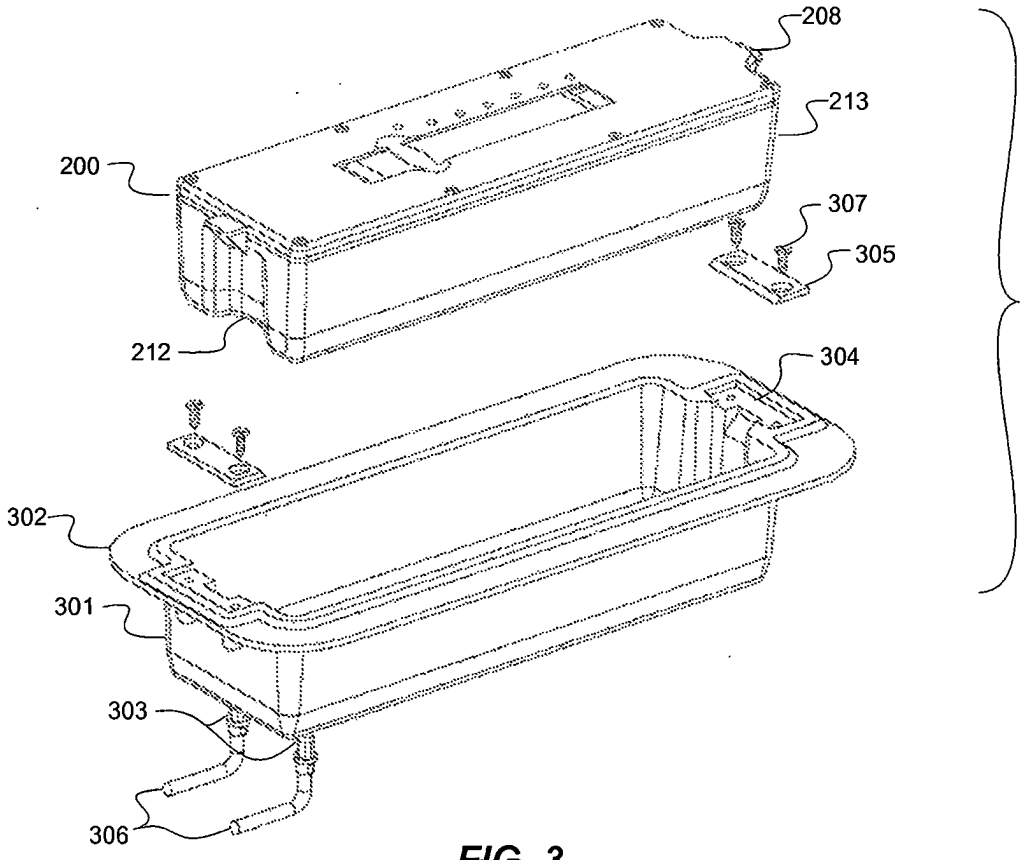

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FIG. 3

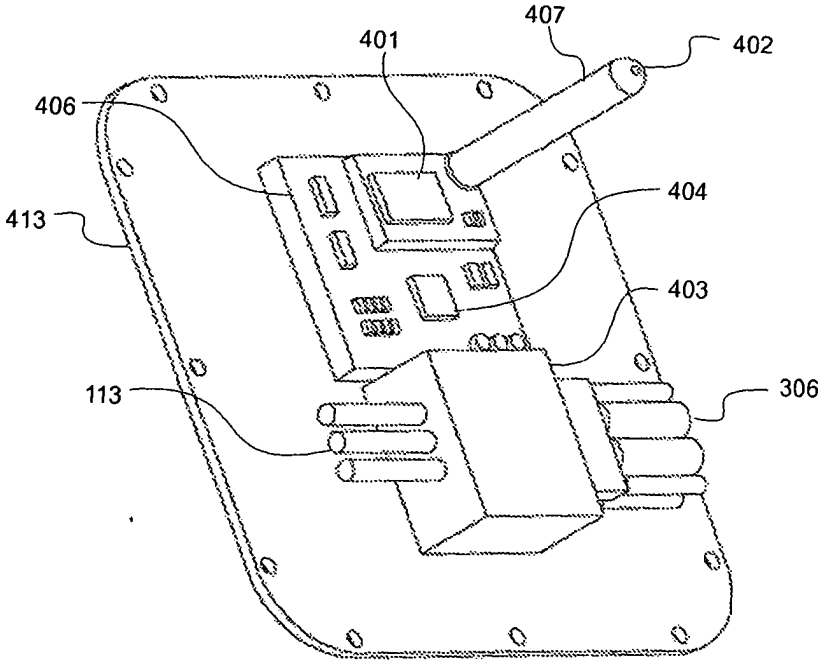

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FIG. 4A

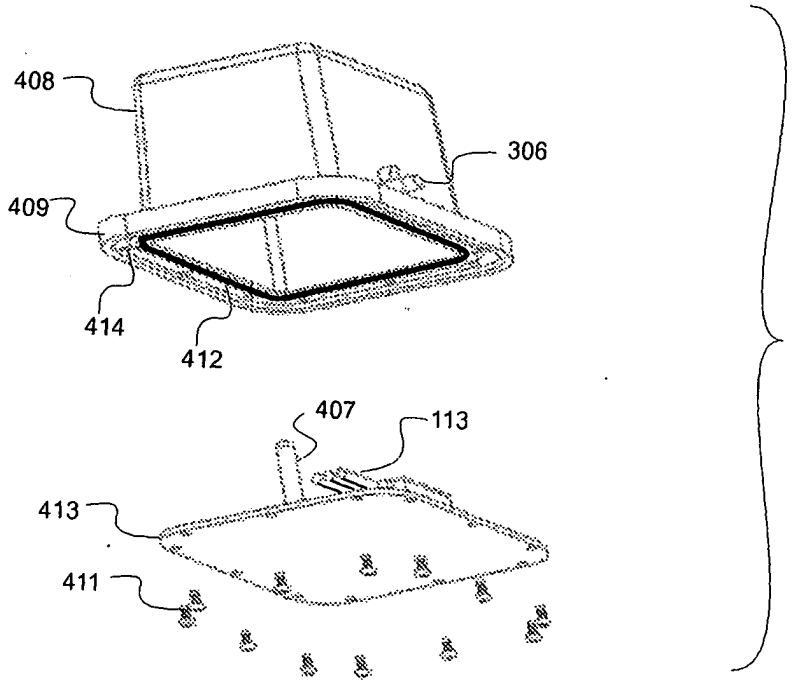

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FIG. 4B

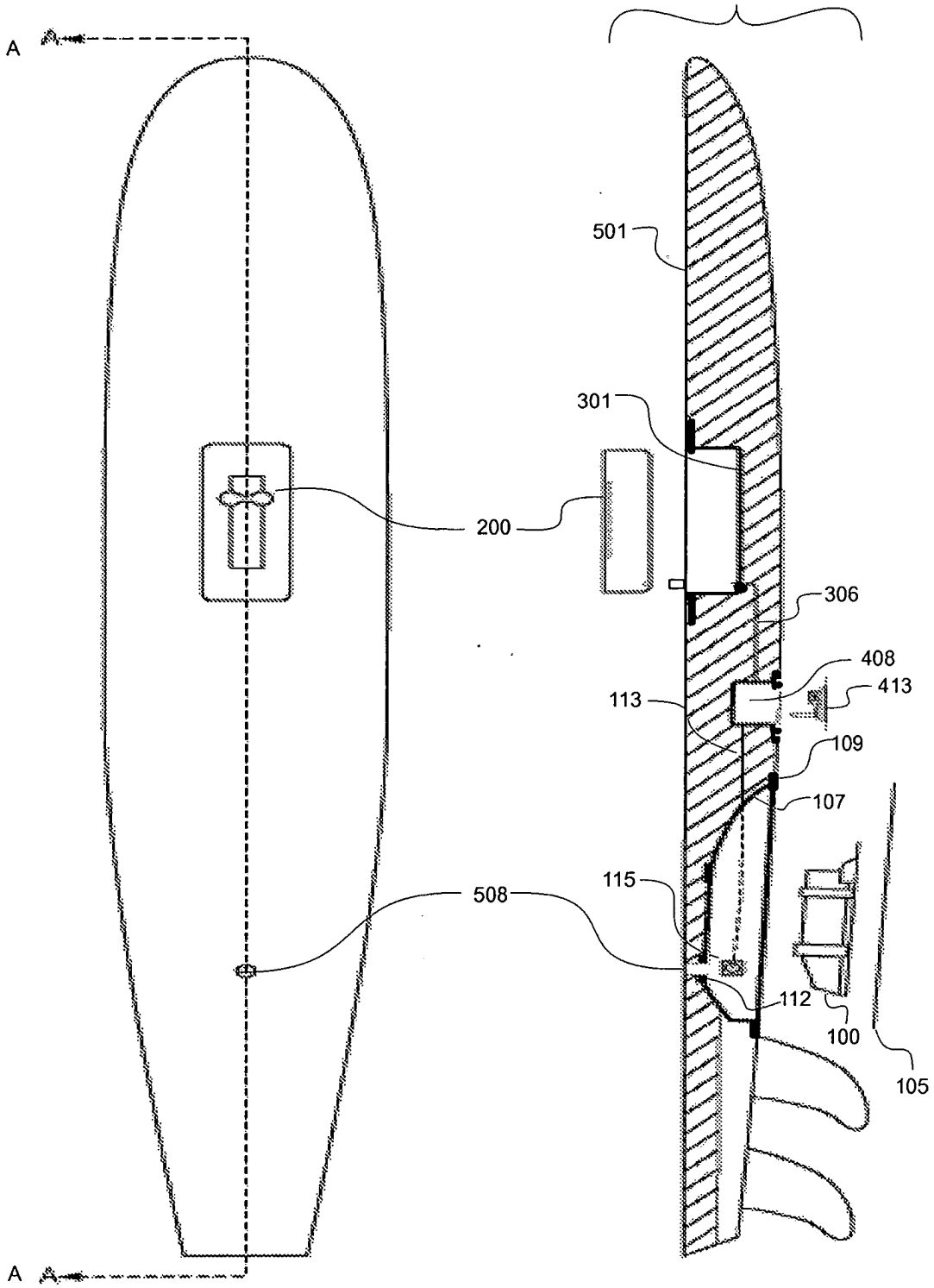


FIG. 5

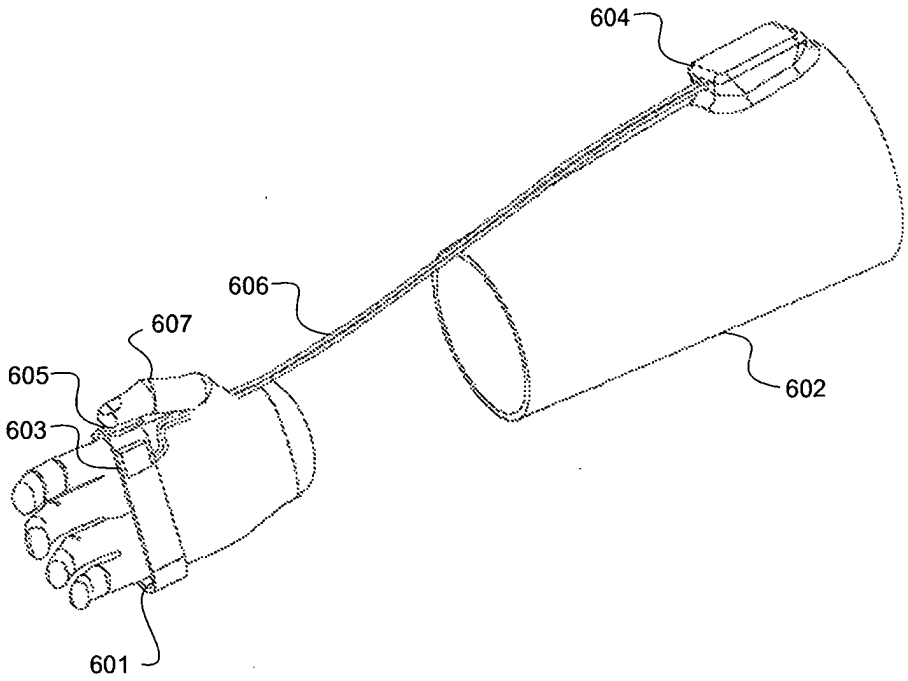


FIG. 6

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— *of inventorship (Rule 4.17(iv))*

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(54) Title: SURFING INSTRUCTION APPARATUS AND METHOD

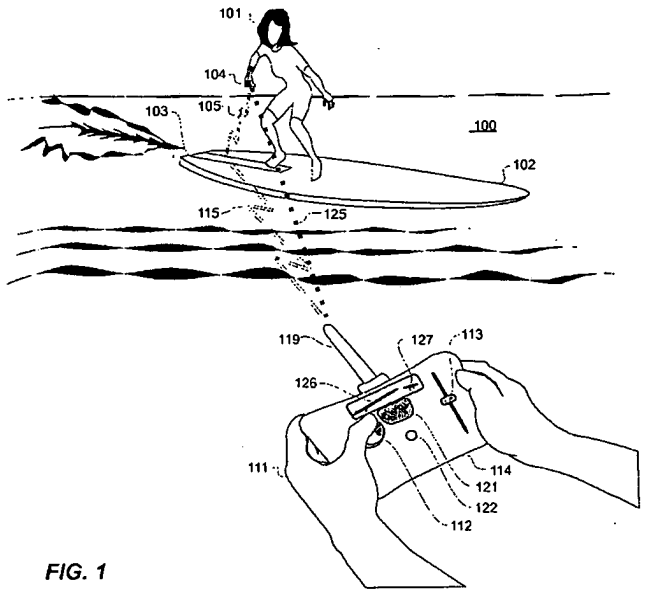


FIG. 1

(57) Abstract: Riding a surfboard on sizeable waves is generally very demanding and time-consuming to learn. Beginners tire quickly when paddling against incoming surf and repeatedly fall when first learning to catch and ride waves. A motorized surfboard wirelessly controllable by the instructor, the student, or both facilitates instruction and practice on a floating board moving at variable speeds in a relatively safe, controlled calm-water setting. This system provides an intermediate learning environment between dry land or still water and the vastly more challenging ocean surf. Later, in a surf zone, the board's motor propulsion assists with paddling so that the student can concentrate on wave-riding. Inland-dwelling students can use this system to learn to ride a board on an existing nearby lake, river, or large swimming pool before a holiday trip to the seashore or an artificial-surf pool.

WO 2011/130724 A2

DESCRIPTION

TITLE: SURFING INSTRUCTION APPARATUS AND METHOD

RELATED APPLICATIONS: This application claims priority to provisional US61/325,274, filed 16 April 2010. Another related application is US13/026317, "Electric Powered Surfboard Propulsion and Control Systems," filed 14 February 2011 and concurrently filed as PCT/US11/24700.

TECHNICAL FIELD: Related fields include specialized systems and devices for teaching athletic activities, education and demonstration of wave motion, and physical education for developing and testing coordination. The particular focus is instruction in surfing (balancing on a floating board while it moves across a water surface) using remote control of a self-contained propulsion system integrated in the board.

BACKGROUND ART

Many forms of surfing have developed since the mid-20th century. Body surfing, body board surfing, kayak surfing, standup paddle surfing, windsurfing, and kite-surfing are a few examples. The ancestor and best-known of all these surfing variations, and what is customarily meant by the unmodified term "surfing," is the riding, typically in a standing position, of a wave as it crests and breaks. This practice – variously viewed as a ritual, an art, a pastime, and a competitive sport - developed in Polynesia, and possibly independently on the western coast of South America, before European contact.

The traditional surfing "longboard" is 2.4m or longer, rounded at the nose, tapered or rounded at the tail, and may have one or more skegs (perpendicular fins) on the bottom. "Shortboards," developed in the 1960's are typically 1.5-2.1m, with pointed noses and 2-5 skegs. While shortboards can be highly maneuverable by a skilled surfer on the right kind of board, longboards are more stable in the water and thus typically preferred for teaching beginners.

Even on the more stable longboard, surfing is a very difficult skill to learn. The process of riding a wave involves:

1. Paddling out to the sloping swells. A surfer needs to catch a wave before its front face becomes vertical. This requires wading in from the shore, mounting the board in a prone, kneeling or sitting position, then paddling and "duck-diving" through approaching broken and cresting waves ("whitewater surf") until reaching the sloping-swell zone. Although moderate skill and

coordination is needed, this stage is very demanding of endurance and strength.

2. Catching a wave. The surfer chooses a promising swell and paddles the surfboard to reach the ever-steepening wave at a time, position, and angle for the wave face to properly accelerate the board. Typically the surfer lies prone and paddles with great intensity ("takes off") to meet the chosen wave. When the acceleration of the wave takes over, the surfer need paddle no longer: he has "dropped in" the wave. This stage requires a burst of strength and speed, combined with excellent timing and agile maneuvering.

3. Popping up to a standing position on the board. Once the surfer has dropped in, she immediately executes the "pop-up:" Maintaining her balance on the moving board, she quickly transitions from the prone position all the way to standing. This stage requires agility, flexibility, and dynamic balance as the slope and speed of the wave continue to develop.

4. Maneuver and trim. Once standing, the surfer must position the surfboard in the wave as it grows and crests. He may move his center of gravity to the left or to the right to execute turns, or back and forth to "trim" (flatten the plane of the board to gain speed) or to slow down by raising the nose. This stage requires coordination, timing, dynamic balance, and a keen awareness of changing peripheral conditions.

As can be imagined, putting all these skills together generally requires much practice, usually accompanied by guidance. Although some individual steps – the pop-up motion, for instance – may be practiced on land or in stationary water, almost all prior surfing instruction depended on access to waves of sufficient size and energy to catch and ride while standing. Because beginners will initially fall off the board ("wipe out") repeatedly, a sandy beach is much more appropriate than a rocky coastline or concrete seawall) is highly desirable. Even in such places, weather and tidal conditions vary the character of the waves by the day or by the hour so that they are frequently either too rough or too calm; Hawaiian kahuna priests even have traditional prayers to summon good surfing waves.

Comparison with another aquatic adventure activity is helpful here: SCUBA (Self-Contained Underwater Breathing Apparatus) diving students almost always initially learn in the safe and predictable environment of a swimming pool. Only after learning the moves and getting familiar with the equipment does the student venture into the uncontrolled setting of the ocean (or

other large body of water). With the exception of elaborate, high-maintenance "wave pools" at a handful of expensive parks and resorts, a similarly safe and predictable initial learning environment has not been available for the beginning surfing student. Anecdotal evidence from surf school owners is that approximately half of the beginning students give up after only a few lessons because of the difficulty of paddling very hard, feeling the surfboard drop-in to the wave, and then immediately executing a popup and maneuvering the board into trim.

Therefore, surf instructors and their students would benefit from a system that provides an intermediate learning and practice environment between dry land and uncontrolled natural waves. Preferably, such a system would be affordable and capable of sharing available resources rather than requiring extensive dedicated construction and constant skilled maintenance.

DISCLOSURE

An apparatus for surfing instruction includes a motorized surfboard (MSB) designed to look, feel, and behave like a conventional unmotorized surfboard such as a longboard. The board's motor responds to signals reaching an on-board wireless receiver (OBWR). A rider's wireless transmitter (RWT) is controlled by actuators that are easy to reach and identify without looking. The RWT assembly is lightweight and does not interfere with a wearer's balance, speed, or range of motion. An instructor's wireless transmitter (IWT) is also easy to operate without looking but may have a different configuration than the RWT. Both the RWT and the IWT are configured to communicate with the OBWR, and in some embodiments with each other.

Each wireless transmitter is a physically separate device, not mechanically coupled to the MSB. Operator control signals, such as "on/off" or "accelerate/decelerate," are received by the OBWR and translated to corresponding control signals for the propulsion motor. An RWT, an IWT, and one or more auxiliary transmitters may be used individually or together for various purposes in the teaching process.

In some embodiments, the IWT is identical to the RWT. In other embodiments, the IWT may include additional control features, longer signal range, or the capability to override the RWT (analogous to a driving or aviation teacher's set of controls). The IWT may differ from the RWT in size, shape, design or user interface. For example, the instructor's wireless transmitter could be a portable high-power "console" operated from a nearby pier where the instructor could observe and assist the student, perhaps also using a wireless voice link to the student on the board in the water. The student's corresponding voice link could be incorporated in the RWT, or in a separate waterproof wireless headset or bone-conduction earpiece, or even in a waterproof amplified speaker in the surfboard. Alternatively, an instructor's "console" interface could consist of software running on a computer with the IWT connected as a peripheral input/output device. Such a computer (portable in most embodiments) could also be configured to capture, store, and process data from, for example, a video camera recording the lesson, an audio feed from the voice link, or

MSB data from an on-board transmitter. Audio, video, mechanical, environmental, and propulsion-control data recorded by the software could be used later for post-lesson analysis and archival of examples for future classes.

The teaching method comprises a progressive set of practice activities using the apparatus described above. The student or the instructor uses a wireless transmitter to activate or deactivate or throttle the MSB motor to provide episodes of forward thrust and surfboard speed at specific points in the lesson. The motor's propulsion may simulate the physical dynamics of specific situations in wave surfing in a calm-water environment. When the student progresses to a site with surfable waves, the motor may help the student reach the swells without debilitating fatigue, then take off at the necessary speed for drop-in.

The MSB controlled by the rider, a nearby teacher, or both allows students to learn the essential moves of surfing not just only in ocean surf, but also in any quiet body of water including lakes, quiet rivers, and man made pools. They can also learn in the ocean at places or times too calm for normal surfing. The wirelessly controllable MSB not only decouples the wave-catching practice from the conditioning necessary to prolonged strenuous paddling; it is also fun to ride, even on flat water. After mastering basic balancing, position changes, and weight-shifting maneuvers while moving through water on the MSB, the student will have a much easier time catching and riding that first wave at the surfing destination.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 shows an example of a calm-water surfing lesson using an MSB, a wearable RWT, and a console-type IWT.

FIGs. 2A and 2B show an example of a motorized surfboard with integrated wireless receiver.

FIG. 3 shows an example of a wearable wireless transmitter assembly for controlling a motorized surfboard.

MODES FOR CARRYING OUT INVENTION

Teaching Apparatus

The teaching apparatus has the following properties: (1) The MSB has the shape and feel of a traditional unmotorized surfboard; for example, a longboard; (2) The MSB's integrated motor can propel the board with rider at approximately 6-10km/hr (this is not an absolute speed requirement, but an optimal speed for teaching purposes); (3) The motor can be controlled by a wireless receiver providing at least "on" and "off" commands. (4) The receiver communicates with a rider's wireless transmitter (RWT), an instructor's wireless transmitter (IWT), and any designated auxiliary

transmitter. (5) The RWT can be operated while lying, standing, kneeling, sitting or in any other position on the MSB in water, where the MSB is providing floatation for the student.

FIG. 1 illustrates the overall concepts involved. Student 101 practices on MSB 102, gaining experience in balancing and maneuvering a freely floating board that moves through water 100 of its own accord. Water 100 is relatively calm - much less dangerous for a beginning surfer than many surf locations. Nor is it crowded with impatient veteran surfers, as many popular surf spots tend to be. Student 101's experience is controllable to be relaxing or challenging according to her goals and skill level. The motor and wireless receiver for MSB 102 are inside the board under streamlined hatch 103, giving MSB 102 the same size and type of surface as an unmotorized board. MSB 102 has a wireless communication link 105 to RWT 104, illustrated here as a wearable controller on student 102's hand and forearm. Student 102 may use RWT 104 to control the activation, deactivation, and speed of the motor in MSB 102 while instructor 111 observes from nearby. Alternatively, instructor 111 may control the motor in MSB 102 from where he stands, using wireless communication link 115 from IWT 114. In some embodiments, RWT 104 also has a wireless communication link 125 to IWT 114.

Here, IWT 114 is shown as a ruggedized console embodiment with enhanced antenna 119, motor on-off button 112, and motor throttle fader 113. Instructor-to-student link 125 may include a voice link, usable on IWT 114 via microphone/speaker assembly 121. RWT 105 may have a panic button that uses RWT-IWT channel 125 to illuminate indicator 122 on IWT 114, or produce an audible alert.

If the communications links 105 and. 115 to MSB 102 are full-duplex, the MSB can be queried as well as commanded, or can issue alerts on its own. It can., for example, report its speed, temperature, and remaining fuel or electrical charge for Instructor 111 to monitor or record. Some enhanced embodiments may allow instructor 111 to monitor the pitch 126 and roll 127 of MSB 102 in the water, to more easily diagnose student 101's balance problems.

FIGs. 2A and 2B are two different conceptual views – a top view and an exploded cross-section along line A-A - of another MSB design suitable for this teaching system. Longboard-type MSB 200 with typical fins 201 has an integrated electric jet-pump propulsion unit 202 installed in its undersurface. Propulsion unit 202 is controlled by a motor controller, which in turn is controlled by a wireless receiver. These parts and their associated circuitry are incorporated in electronics control unit 203, shown here as also recessed in the undersurface of MSB 200. Power is supplied by a removable waterproof rechargeable electric power pack 204 in a receptacle in the top surface of MSB 200. In this example all components are contained inside, or faired into the contours of the MSB so as to substantially preserve the classic shape, feel and performance of a traditional unmotorized longboard. -

Those knowledgeable in the art are aware that a longboard can have a range of lengths (typically 2.4-3.4m) and a range of widths (typically 56-66cm) and can have a variety of fin

configurations (typically single, dual, tri fin and quad fin). Alternatively, the MSB could be a motorized "short board" (<2.4m length) for teaching advanced students who have already mastered the more stable, but less maneuverable, longboard. The MSB can be constructed from a variety of materials including, but not limited to: (1) Polyurethane foam and polyester resin with fiberglass; (2) extruded polystyrene and epoxy with fiberglass; or (3) polyethylene foam with LDPE (low density polyethylene) HDPE (high density polyethylene), or components and coatings comprising a combination of the two. This last construction method results in the "soft board" or "foamie." This board has a soft and forgiving surface, which is particularly amenable to beginners who are likely to fall frequently at first and may be reassured by the supportive feel of a yielding top layer. Serious injuries are less likely when falling on or from a foamie, compared to a waxed wooden or hard-shelled board, and the surface of a foamie need not be slippery under the rider's feet. If collisions happen, foamies are less likely to cause serious injuries than hard boards.

In various alternative embodiments of the MSB, the energy source for propulsion can be a battery, an array of batteries, a fuel cell, a capacitor or capacitor array, compressed gas in a tank, combustible liquid fuel, or any other device or means of storing energy. The propulsion source can be any means of propelling the MSB forward (for example, an enclosed water jet pump with electric motor power; one or more rear-mounted propellers driven by a small internal-combustion engine; a compressed-air-operated impeller). Circuitry and software associated with, or intermediary to, the wireless receiver and motor controller may implement additional features such as a "soft" automatic throttle-down providing a smooth (rather than abrupt) end to each episode of forward thrust (helping Student to preserve balance during the change-of-state associated with motor power-down).

Some embodiments of the IWT and RWT can receive and interpret information from a wireless board-data transmitter integrated in the MSB. Various versions output the interpreted information in real time (for instance, warning the rider or instructor when the battery charge or fuel level is low), store the information in a storage element for later review, or both. The output may be visual, audible, or tactile using suitable indicator lights, displays, speakers, or haptic interfaces. A microprocessor-and-display-equipped wireless phone or wireless-enabled tablet computer may be connected to the IWT to process, store, and display the information, or alternatively may be the IWT with appropriate application software and short-range wireless pairing to the board data transmitter and, optionally, the RWT.

FIG. 3 illustrates a wearable, hand-operated embodiment of a wireless transmitter assembly for remote control of the MSB propulsion system. Variants of this embodiment may be configured as RWTs or IWTs. Waterproof trigger switch unit 303 responds to one or more actuators, such as buttons 305 and 308. Buttons such as 305, very near user's thumb 307, may correspond to frequent activities such as throttle control or motor activation and deactivation. Buttons such as 308, reachable by thumb 307 by a larger, more necessarily intentional motion, may correspond to emergency functions such as a student panic button or wider-band distress signal. Switch unit 303

and its actuators are integrated in handstrap 301. Handstrap 301 securely, removably attaches to user's hand near the thumb 307. Alternate embodiments include, for example, an elastic band attached at both ends to a plastic mounting surface or an open-ended fabric band incorporating patches of commercially available hook-and-loop fastening material (for example, Velcro™) positioned to facilitate band-length adjustment for various hand sizes. Trigger switch unit 303 sends signals from actuators 305 and 308 through ruggedized waterproof power leads 306 to a wireless transmitter (or transceiver, for full-duplex communication) inside ruggedized waterproof transmitter case 302. Transmitter case 302, which may also house a compact lightweight power supply, is secured to a wearable armband 304. Armband 304 as shown here positions transmitter case 302 near the outer side of user's elbow, but alternate embodiments of armband 304 may be worn on the wrist, upper arm, or shoulder. Armband 304 may be made of elastic material (for example, neoprene wet-suit material) or any other suitably rugged, waterproof, adjustable or sized design. Along with a pocket or attachment for waterproof case 302, armband 304 preferably includes strain-relief for power leads 306.

When a user operates button 305 by moving thumb 307, the wireless transmitter inside case 302 signals the wireless receiver in the MSB: for example, to activate the propulsion system to move the MSB through the water. In one embodiment, propulsion continues as long as button 305 is held down. When button 305 is released, the wireless transmitter in transmitter case 302 sends a "deactivate" command to the MSB. Deactivation, in some embodiments, includes a "soft" incremental power-down lasting approximately 1-3 seconds, to avoid destabilizing the surfer with a sudden power-off. Advantageously, this convenient thumb-operated one-handed wireless transmitter allows the surfer to control the jet-pump propulsion system without making any limb movements (e.g. reaching for controls with feet or hands) that would inevitably disrupt surfer's precise dynamic balance on the surfboard. This can be critically important for safety and control.

The wireless transmitter may use technology similar to that used to lock and unlock cars (a wireless FOB and receiver unit operating at a frequency of approximately 300MHz). The actuators can be configured for either left-hand or right-hand operation.

In another embodiment, as previously discussed above, the instructor may operate an enhanced or fuller-featured wireless transmitter assembly or console, incorporating for example the ability to transmit override signals to override student's wireless propulsion control in an emergency situation.

In another embodiment, the wireless transmitter/receiver/motor-controller system may also incorporate "throttle control" functionality so that propulsion power level and/or surfboard speed may be selected and adjusted by the operator(s). Motor controller electronics and associated circuitry and software in the motorized surfboard may also incorporate automatic acceleration/deceleration control functionality to provide "smooth", rather than sudden, starts and stops when the propulsion is activated and deactivated.

Teaching Methodology

Conventional surfing instruction usually begins with introductory "dry land" practice of surfing movements and techniques. The system described here may be used either instead of or along with conventional dry-land exercises.

The MSB, incorporating a wireless receiver controlling the surfboard's propulsion motor in response to signals from a wireless transmitter operated by a student or an instructor facilitates a range of teaching methods, including:

1. Water entry and board mounting: Student enters the water with the MSB and practices climbing onto the upper surface of the floating MSB. When Student can easily climb onto the board from chest-deep calm water, Instructor may use the IWT to pulse the motor, simulating choppy or chaotic water moving the board around while Student climbs on.
2. Paddling practice: Instructor teaches Student to efficiently paddle while lying prone, kneeling, or sitting on the MSB. Student may then practice alone. Resistance may be supplied by mounting the board backwards (tail pointing forward) and activating the motor at a low power setting to work against the paddling, as practice for paddling against incoming waves to reach the zone of sloping swells.
3. Wave catching, takeoff, and pop-up practice in calm water with propulsion: In the water, Student can paddle and then "pop up", using propulsion to simulate the sensation of catching a wave and taking off. The propulsion can be controlled Student, riding the board and simulating the "wave size" and timing she feels ready for, or by Instructor who observes the student and controls the propulsion first to make it easy for Student to keep her balance, then to make it more challenging as Student's proficiency and confidence increase.
4. Maneuver and trim practice in calm water with propulsion: When Student has mastered standing on the MSB with propulsion activated to move the board through relatively calm water, Instructor can teach Student to maneuver by shifting his weight on the board. Shifting weight left or right causes the board to turn in the corresponding directions. Shifting weight forward and back adjusts the trim for faster or slower travel. Student can then practice alone, trying various ways of weight-shifting under power and becoming accustomed to the way the MSB responds. Student learns through

practice how far forward he may move on the board to increase speed before the nose digs down into the water and the board "pearls" (the nose digs down into the water, the board pitches sharply or may flip completely over, and the surfer often falls off the board. Optimal trim (minimizing drag for highest speed on a given wave) tends to have the nose of the board 5-8cm out of the water, but this is difficult to judge from above, and looking directly down detracts from balance in any case. A surfer typically learns to find the right trim by feel after pearling repeatedly, which is much more safely done in a lake or large swimming pool than in the ocean. Those skilled in the art will be aware that weight shifting on the board can be accomplished in a variety of ways including simple leaning, shuffling, or "walking the board" (moving the feet one over the other). These maneuvers are essentially the same for both "regular foot" (left foot forward) and "goofy foot" (right foot forward) surfers, the only difference being the direction the surfer faces while standing on the board.

5. Wave catching, takeoff, pop-up, maneuver and trim practice in surf with propulsion assist: When Student has mastered the moves in calm water with Instructor controlling propulsion via the IWT, the lessons can move into a surf zone and the use of the MSB, RWT and IWT can continue there. To reach the sloping-swell zone and drop in on a wave, Student may paddle, use MSB propulsion, or do some of each. The propulsion timing may be under Student's control, under Instructor's control, or some combination thereof. The voice-link and instructor-override embodiments are beneficial here for Student's safety and comfort. With the propulsion assist to repeatedly traverse the incoming breakers, Student can practice dropping in, maneuvering, and trimming for longer than she could if she were exhausted by prolonged paddling. One or more auxiliary wireless transmitters may be mounted on a buoy, boat, or pier near the sloping-swell zone to alert the student that he has gone out far enough, or is about to go out too far.

Learning how to ride a wave well enough for effective recreation can often be done over the course of a one- or two-week seaside vacation. Learning to paddle a surfboard efficiently through incoming breakers to the sloping-swell zone, then paddle rapidly to catch a wave – and conditioning the body to do so repeatedly without tiring – can take several weeks or months. Mastery of paddling

is reportedly a major deterrent for beginning students and a dominant cause of attrition from classes. Therefore, decoupling the mastery of wave-riding from that of paddling, as this system does, is likely to attract and retain a markedly increased number of surfing students.

Currently preferred embodiments of a surfing instruction system using wireless control of a motorized surfboard have been described in this written description and the accompanying drawings. This purely illustrative description is intended to enable those with skill in the art to practice representative embodiments without undue experimentation, either with the patent owner's permission or after the invention passes to the public domain. Only the appended claims and their unpatentable variations, however, delineate the boundaries of patent protection.

INDUSTRIAL APPLICABILITY

The recreational, tourism, and physical-education industries stand to benefit from a system that facilitates surfing instruction. More casual vacationers would be willing to pay for surfing lessons if the process could be almost immediately enjoyable. Once students master the moves in a safe and predictable environment, they will master the ocean wave riding environment with greater confidence and speed.

In addition, the surf instruction industry will be able to teach students in situations where there are no suitable ocean waves available suitable for teaching (for example, if the waves are too small or too large to be suitable for instruction.) In these cases the class can move to a quiet body of water. Students who live inland can be taught the basic surfing moves on local lakes, rivers, or even large swimming pools, to quickly become "ocean-ready" after arriving at an ocean-surf travel destination.

CLAIMS

What is claimed is:

1. Apparatus for surfing instruction, comprising:

   a motorized surfboard with a propulsion system and a wireless receiver configured to control the activation state of the propulsion system, and

   an instructor's wireless transmitter in communication with the wireless receiver to control the propulsion system,

   where the instructor's wireless transmitter is configured to control a motion of the motorized surfboard through water from a position off the motorized surfboard.

2. The apparatus of claim 1, further comprising a rider's wireless transmitter in communication with the wireless receiver to control the propulsion system from a position on the motorized surfboard.

3. The apparatus of claim 2, where the rider's wireless transmitter is wearable and comprises actuators positioned on a rider's transmitter-operating hand.

4. The apparatus of claim 2, where:

   the wireless receiver is configured to recognize an override signal taking precedence over any other wireless signal received, and

   the instructor's wireless transmitter is configured to transmit the override signal following an instructor's demand.

5. The apparatus of claim 2, further comprising a wireless communication link between the rider's wireless transmitter and the instructor's wireless transmitter.

6. The apparatus of claim 5, where the wireless communication link comprises a voice channel.

7. The apparatus of claim 1, further comprising:

   a board-data transmitter embedded in the motorized surfboard, configured to transmit information collected by integrated sensing elements, and

   a board-data receiver configured to receive the information from the board transmitter and accessible to at least one of the instructor and the rider,

   a processing element configured to interpret the information from the board-data receiver, and

   an output device to present the information interpreted by the processor in a human-comprehensible form.

8. The apparatus of claim 7, further comprising a storage element connected to the processor and configured to store the information interpreted by the processor.

9. The apparatus of claim 7, where

   the information comprises one of the group consisting of fuel level, battery charge level, motor power level, board speed, temperature, and board pitch or roll angle, and

the output device comprises one of the group consisting of a real-time display, a display associated with the storage element, an audio speaker, and a haptic transducer.

10. The apparatus of claim 1, further comprising an auxiliary wireless transmitter remote from, but communicating with, at least one of the group consisting of the motorized surfboard, the rider's wireless transmitter, and the instructor's wireless transmitter.

11. A method for surfing instruction using the apparatus of claim 1, comprising:

placing the motorized surfboard of claim 1 in a natural or human-made body of water;

arranging for a student to mount the motorized surfboard;

using the instructor's wireless transmitter of claim 1 to activate the propulsion system of claim 1 and cause the motorized surfboard, carrying the mounted student, to move across the surface of the water.

12. The method of claim 11, further comprising instructing or observing the student in the practice of at least one of surfing balance, paddling, wave-catching, takeoff, pop-up, weight-shifting, or maneuvering on the motorized surfboard as the propulsion system moves the motorized surfboard across the surface of the water.

13. The method of claim 11, where the water is too calm for unmotorized surfing.

14. The method of claim 13, further comprising at least one of:

operating the propulsion system at variable speeds according to the student's skill level,

operating the propulsion system in a pulsed or otherwise variable mode to simulate the changing forces of waves and currents, and

directing the propulsion system to work against the student's paddling to build strength for paddling against incoming waves.

15. The method of claim 11, further comprising recording at least one of

the instructions given to the student,

the student's comments, and

the student's performance.

16. The method of claim 11, further comprising at least one of

monitoring information from a board-data transmitter, and

recording information from the board-data transmitter to review with or without the student at a later time.

17. The method of claim 11, further comprising:

providing a rider's wireless transmitter to the student, and

teaching the student to control the propulsion system using the rider's wireless transmitter while riding the motorized surfboard.

18. The method of claim 17, further comprising communicating with the student over a wireless link between the instructor's wireless transmitter and the rider's wireless transmitter while the student is on or near the motorized surfboard.

19. The method of claim 17, further comprising taking control of the motorized surfboard from the student by activating an override switch on the instructor's wireless transmitter.
20. The method of claim 11, where the water has waves of a suitable size for unmotorized surfing, and further comprising at least one of:

    using the propulsion system to propel the motorized surfboard against breaking waves to reach a zone of sloping swells,

    using the propulsion system to reach a necessary speed for catching a wave, and

    controlling the propulsion system to help the student evade hazards in the water.

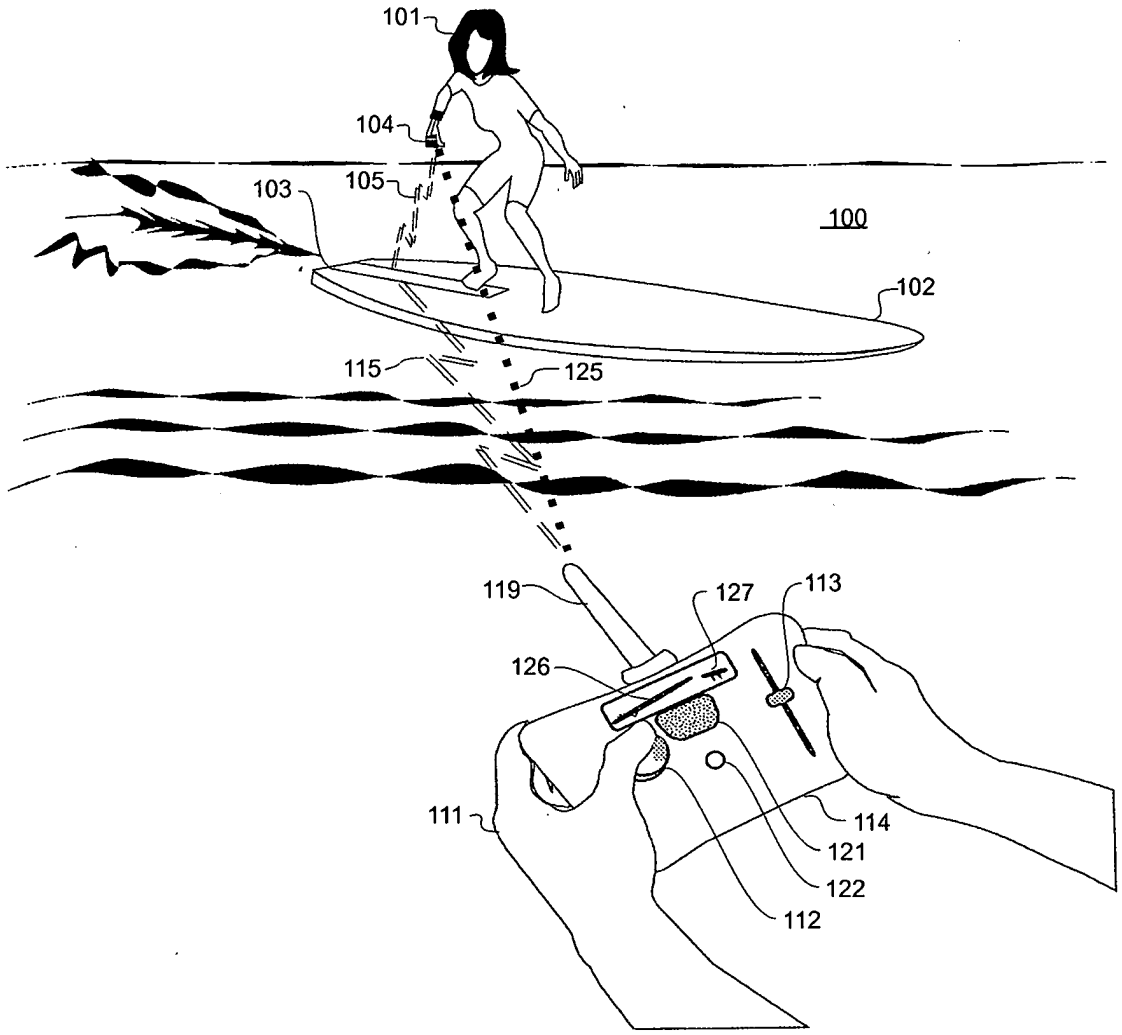

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FIG. 1

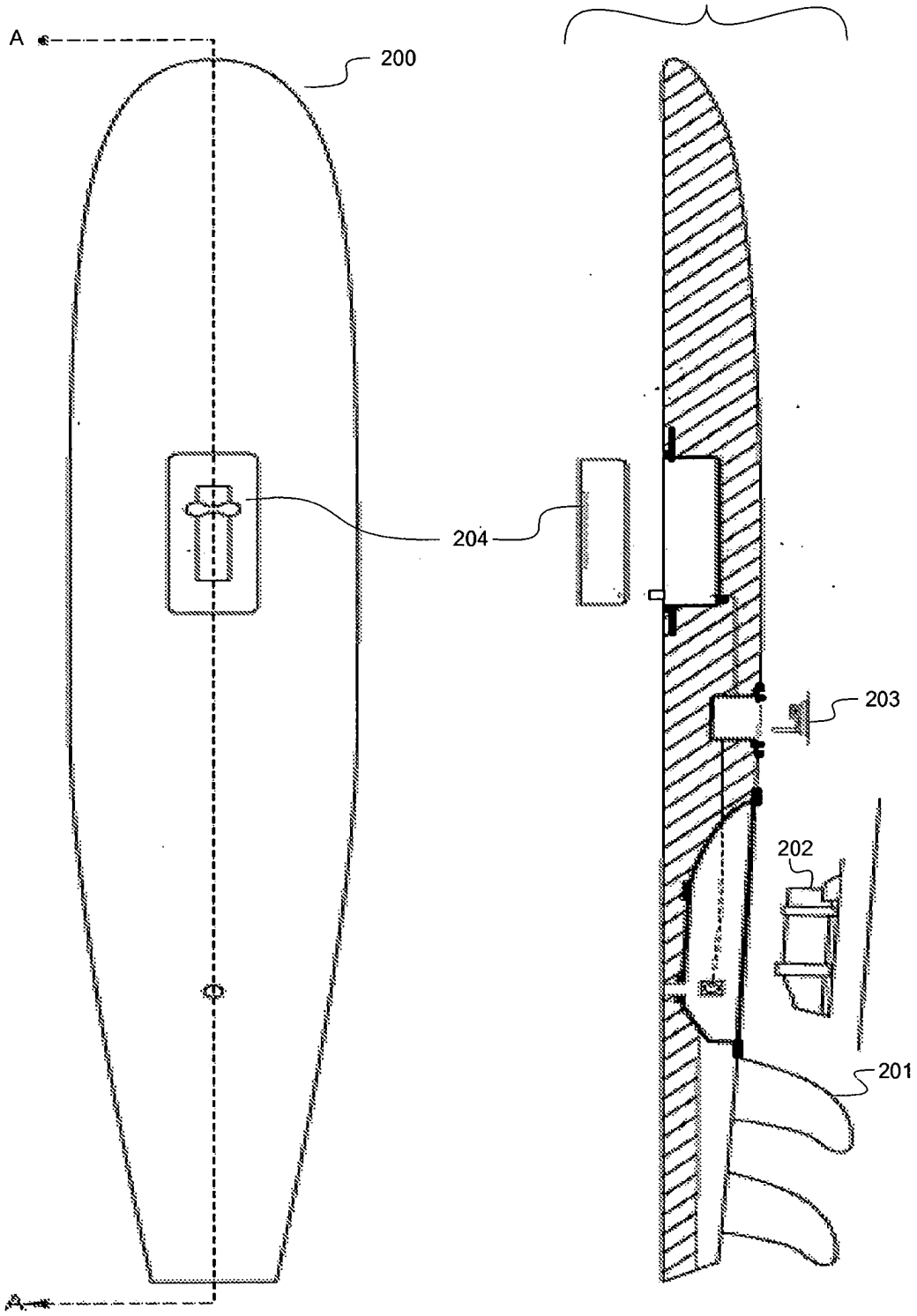


FIG. 2A FIG. 2B

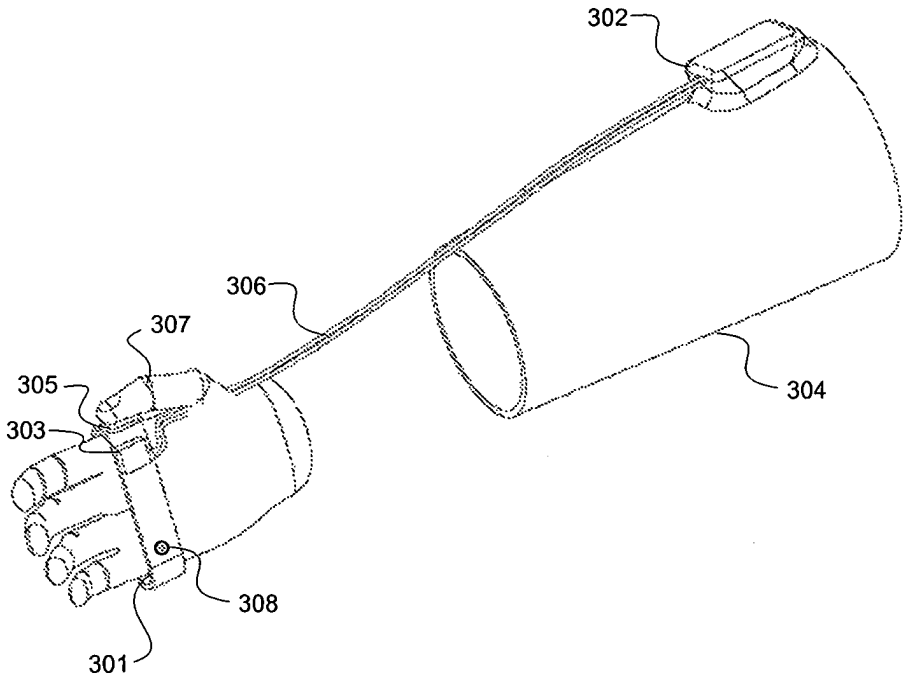


FIG. 3

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[Continued on next page]

(54) Title: MOTORIZED WATERCRAFT SYSTEM WITH INTERCHANGEABLE MOTOR MODULE

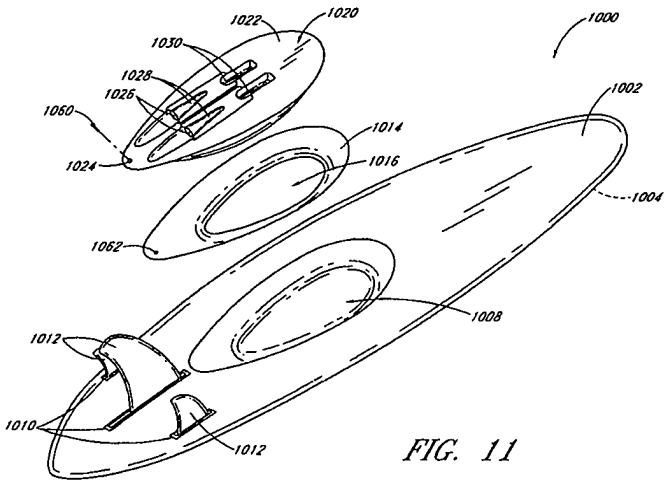


FIG. 11

(57) Abstract: A personal watercraft body (1000) comprises a recess (1008) configured to receive similarly shaped cassettes (1020). A first cassette may be motorized propel the body relative to a body of water. A second cassette may be non -motorized and may include a storage space therein for storing personal items. An insert (1014) may be disposed between the cassettes and the recess orient and fit the cassettes within the body.

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MOTORIZED WATERCRAFT SYSTEM WITH INTERCHANGEABLE MOTOR MODULE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 61/360,836 filed on July 1, 2010, entitled "MOTORIZED WATERCRAFT WITH INTERCHANGEABLE MOTOR MODULE," and U.S. Provisional Application No. 61/430,332 filed on January 6, 2011, entitled "MOTORIZED WATERCRAFT WITH INTERCHANGEABLE MOTOR MODULE," both of which are hereby incorporated by reference in their entireties.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to motor driven watercraft.

Description of the Related Art

[0003] Surfing is the sport of riding a surfboard on the face of an ocean wave towards the shoreline. Jet powered surfboards have been devised and utilized for the purpose of surfing without waves such as in lakes or other calm waters. Several types of motorized water boards in the prior art include U.S. Pat. No. 6,702,634 to Jung; U.S. Pat. No. 6,409, 560 to Austin; U.S. Pat. No. 6,142,840 to Efthymiou; U.S. Pat. No. 5,017,166 to Chang; and U.S. Pat. No. 4,020,782 to Gleason. Another powered surfboard design is described in U.S. Patent 7,226,329 to Railey. This device uses small electric motors to provide power while maintaining traditional surfboard performance.

SUMMARY OF THE INVENTION

[0004] In one embodiment, a personal watercraft comprises a top surface, a bottom surface, and a cassette. The bottom surface may comprise a first recess extending generally toward the top surface and the cassette may be at least partially disposed within the first recess. The cassette may comprise at least one motor and the motor may be configured to propel the personal watercraft in at least a first direction relative to a body of water. The cassette may also comprise an impeller and the impeller may be positioned

in a flow housing. The bottom surface may also comprise a second recess and a fin may be disposed at least partially within the second recess. The personal watercraft may also comprise an insert disposed at least partially between the cassette and the first recess. The insert may be coupled to the bottom surface and comprise a protrusion. The cassette may comprise an indentation that is configured to receive at least a portion of the protrusion. The cassette may be latched to the insert.

[0005] In another embodiment, a method of making a personal watercraft comprises forming a watercraft body with a recess in a bottom portion thereof, and placing a cassette at least partially within the recess. The cassette may be removably fastened or otherwise coupled to an insert.

[0006] In yet another embodiment, a method of making a personal watercraft comprises providing a cassette housing, placing a motor within the housing, placing an impeller within the housing, placing a battery within the housing, and enclosing the motor, impeller, and battery within the housing. The method may also comprise placing the cassette housing at least partially within a recess of a watercraft body.

[0007] In another embodiment, a personal watercraft kit comprises a personal watercraft, a motorized cassette, and a non-motorized cassette. The personal watercraft may comprise a top surface and a bottom surface. The bottom surface may comprise a recess that extends generally toward the top surface. The motorized cassette and the non-motorized cassette may each be configured to fit at least partially within the recess in the bottom surface.

[0008] In another embodiment, a system comprises an insert and a motorized cassette. The insert is configured to be secured relative to a watercraft, defines a receiving space, and comprises at least one protrusion extending into the receiving space. The motorized cassette is configured to be received at least partially within the receiving space and comprises at least one indentation configured to receive the at least one protrusion of the insert so as to inhibit movement of the cassette relative to the insert in at least one of a longitudinal direction, a transverse direction, and a lateral direction. The insert may comprise a latch configured to releasably secure the cassette relative to the insert when the cassette is at least partially received within the receiving space. The cassette may include an aperture, the insert may include a threaded bore, and the aperture and the threaded bore can be coaxially aligned when the cassette is at least partially receiving within the

receiving space. The insert may be ring shaped. The cassette and the receiving space may be complimentary shaped so as to inhibit movement of the cassette relative to the insert.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Fig. 1 is an exploded view of a top shell of a surfboard showing components placed in top shell recesses.

[0010] Fig. 2 is an exploded view of a bottom shell of a surfboard showing components placed in bottom shell recesses.

[0011] Fig. 3 is a cutaway view of a surfboard made from top and bottom shells with power components mounted therein in accordance with one embodiment of the invention.

[0012] Fig. 4 shows a detailed view of a passageway between a motor recess in a top shell and an impeller recess in a bottom shell.

[0013] Fig. 5 is a perspective view of a flow housing in which the impeller may be inserted.

[0014] Fig. 6 illustrates the bottom shell attached to the top shell in the region of the surfboard tail with one flow housing attached in one of the bottom shell recesses.

[0015] Fig. 7 is a block drawing showing one embodiment of a drive control system, which may be used in one embodiment of the motorized surfboard.

[0016] Fig. 8 is a flow chart illustrating a method for use with one embodiment of the motorized surfboard.

[0017] Fig. 9 is a flow a top view of one embodiment of a drive control system, which may be used in one embodiment of the motorized surfboard.

[0018] Fig. 10 is a perspective view of a personal watercraft including a first embodiment of a motorized cassette received in a bottom recess of the personal watercraft.

[0019] Fig. 11 is an exploded view of the surfboard of Fig. 10.

[0020] Fig. 12 is a perspective view of the personal watercraft of Figs. 10 and 11 including a non-motorized cassette received in a bottom recess of the personal watercraft.

[0021] Fig. 13 is an exploded view of the surfboard of Fig. 12.

[0022] Fig. 14 is a perspective view of a kayak including the first embodiment of a cassette received in a bottom recess of the kayak.

[0023] Fig. 15 is an exploded view of the kayak of Fig. 14.

[0024] Fig. 16 is a perspective view of a personal watercraft including a second embodiment of a motorized cassette received in a bottom recess of the personal watercraft.

[0025] Fig. 17 is an exploded view of the surfboard of Fig. 16.

[0026] Fig. 18 is an exploded view of the motorized cassette of Figs. 16 and 17.

[0027] Fig. 19 is a perspective cutaway view of the motorized cassette of Fig. 18.

[0028] Fig. 20 is a cross-sectional view of a personal watercraft including a curved body section adjacent to the exhaust port of the pump housing.

[0029] Fig. 21 is a bottom view of the personal watercraft of Fig. 20.

[0030] Fig. 22 is a perspective view of a pump housing including a flattened exhaust port.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0031] Traditionally, the sport of surfing comprises a rider ("surfer") "paddling out" by lying prone on the surfboard and paddling away from the shoreline towards a point at which waves are cresting; turning to face the shoreline; paddling quickly towards the shoreline when a wave begins to crest so as to "catch the wave"; and "riding the wave" on the surfboard propelled by the wave towards the shoreline in a prone, sitting, or standing position. When riding a wave, a surfer may turn the surfboard towards or away from different parts of the cresting wave depending on the preference and skill of the surfer. Subsequently, the surfer must paddle out and repeat the process of catching and riding waves. After catching and riding waves for a period of time, the surfer may ride a wave all the way to the shoreline, or may "paddle in" by lying prone on the surfboard and paddling towards the shoreline. Paddling out, turning, and paddling quickly to catch waves can be tiring and time consuming to the surfer and can thus limit the surfer's energy and time for riding waves. Advantageous embodiments of the present invention preserve a surfer's maximum energy for riding waves rather than exhausting the surfer's energy on paddling. Advantageous embodiments of the present invention also assist in catching waves by providing additional speed to the surfer when catching a wave.

[0032] The general purpose of many embodiments described herein is to provide a motorized surfboard which can be manufactured in a less labor intensive manner, has minimal problems with leakage, and has long term reliability. In some advantageous embodiments, a motorized drive system is provided as a separately housed cassette. The cassette may house batteries, motors, control electronics, impellers and associated drive hardware. This design has many significant advantages. It simplifies the construction of the surfboard in which the cassette is used. It may be made removable and/or exchangeable. Such a cassette may also be used in a variety of watercraft, not just in surfboards. These features are described further below with respect to the cassette embodiments illustrated in Figures 10-19 below.

[0033] Figures 1-6 illustrate suitable power and drive train components for a motorized watercraft such as a surfboard. In these Figures, the components are not placed in a cassette, but these Figures illustrate the components themselves and their relative placement and function. Referring now to Figures 1, 2, and 3, in some embodiments, a motorized surfboard comprises a top shell 102, and a bottom shell 202. This hollow shell construction has been recently utilized for surfboard manufacture, and represents a departure from traditional shaped foam boards. It is one aspect of the invention that this hollow shell design has been adapted to a motorized surfboard in a manner that minimizes manufacturing costs and provides structural integrity and long term reliability.

[0034] The top shell 102 is illustrated in Figure 1, and the bottom shell 202 is illustrated in Figure 2. In Figure 3, a conceptual cutaway view is provided showing how the shells mate with each other in one embodiment.

[0035] The top shell 102 has an outer surface 104, and an inner surface 106. Similarly, the bottom shell has an outer surface 204, and an inner surface 206. To produce the complete surfboard body, the two shells are sealed together along a seam 302 that extends around the periphery of the top and bottom shells. The "outer surface" of the top and bottom shells are the surfaces that are contiguous with the surfaces exposed to the water in use (although not all of the "outer surface" of the shells is actually exposed to water as will be seen further below). The "inner surface" of the top and bottom shells are the surfaces internal to the hollow board after sealing into a hollow surfboard body. The general methods of producing surfboards with this hollow shell technique are known in the art. Currently, Aviso Surfboards (www.avisosurf.com) manufactures surfboards in this manner from carbon fiber top and bottom shells forming a hollow surfboard body.

[0036] The outer surface 104 of the top shell 102 is formed with one or more recessed portions 112, where the recessed portions extend generally toward the inner surface 206 of the bottom shell 202 when the shells are sealed together into a hollow body. The recessed portions 112 form compartments for batteries 114, motor controller boards 116, and motors 118. The motors 118 are coupled to shafts 120 that extend out the rear of the motor compartment as will be explained further below.

[0037] After installation of these components, the recesses can be sealed with a cover 122 that can be secured in place with adhesive such as caulking or other water resistant sealant. If desired, an internally threaded access port 124 can be provided that receives an externally threaded cover 126. This can provide easier access than removing or cutting the adhesive on the larger cover 122. In some advantageous embodiments, one or both of the covers 122, 126 are clear so that the batteries, motors, and/or other electronics can be seen when they surfboard is sealed up and in use. Another threaded plug 130 can also be provided, which can be used to ensure equal air pressures on the inside and outside of the hollow body. This feature is well known and normally utilized for hollow shell surfboards.

[0038] Turning now to Figure 2, the outer surface 204 of the bottom shell 202 also includes one or more recessed portions 212, where the recessed portions extend generally toward the inner surface 106 of the top shell 102 when the shells are sealed together into a hollow surfboard body. The bottom shell 202 may also contain recesses 218 for fin boxes that accept fins 220 in a manner known in the art. The bottom shell recesses 212 are configured to accept pump housings 224. As shown in Figure 3, the pump housings 224 receive the motor shafts 120, onto which an impeller 226 is attached. At the rear of the pump housing 224, a flow straightener 228 may be attached.

[0039] As shown in Figure 3, the recessed portion 112 in the top shell and the recessed portion 212 in the bottom shell comprise walls 302 in the bottom shell and 304 in the top shell that are proximate to one another. In advantageous embodiments, these proximate walls extend approximately perpendicular to the overall top and bottom surfaces of the surfboard. In these proximate walls are substantially aligned openings, through which the motor shaft 120 extends. Thus, the motor(s) 118, which reside in a recessed portion of the top shell, are coupled to the impeller(s) that reside in the pump housing(s) that in turn reside in a recessed portion of the bottom shell.

[0040] Figure 4 illustrates in more detail the surfaces 302 and 304 through which the motor shaft 120 extends. Typically, the motor 118 includes an integral shaft 402 of fairly short extent. This short shaft may be coupled to a longer extended motor shaft 120 with a bellows coupler 404. These couplers 404 are commercially available, from for example, Ruland, as part number MBC-19-6-6-A. The bellows coupling 404 is advantageous because it allows for smooth shaft rotation even in the presence of vibrations and/or small deviations in linearity of the connection. The long shaft 120 then extends through a bearing 408 which has a threaded rear portion. The threaded rear portion of the bearing 408 is threaded into a threaded insert 410 that is positioned on the other side of the openings, in the recessed portion of the bottom shell. When the bearing is tightened into the insert, a water tight seal is created as the walls 302 and 304 are compressed together. It will be appreciated that the walls 302, 304 may directly touch, or they may remain separated, with or without additional material between. To further minimize any potential for leakage, it is possible to place washers of rubber, polymer, or the like between the insert 410 and the wall 320, and/or between the bearing 408 and the wall 304.

[0041] Figures 5 and 6 illustrate the positioning of the pump housing 224 in the recessed portion 212 of the bottom shell. Figure 5 illustrates the underside of the pump housing 224 and Figure 6 illustrates a pump housing installed in a recess of the bottom shell. The pump housing 224 is basically a hollow tube for directing water up to the impeller and out the rear of the surfboard. Thus, the pump housing comprises an inlet port 502 and an exhaust port 504. The pump housing 224 can be secured in the recess 212 in a variety of ways. The embodiment of Figures 5 and 6 includes shafts 508 that are secured to each side of the pump housing. The tip 510 of the shaft 508 extends through an opening 512 in the frontward of the pump housing 224. Referring now to Figure 6, these exposed tips 510 are placed in holes 602 in the recess to secure the pump housing into the frontward portion of the recess 212. The rear of the pump housing may comprise a wall with holes that mate with holes 616 in the bottom shell. The holes in the bottom shell may be provided with press fit threaded inserts. Screws 518 can then be used to secure the rear of the pump housing 224 to the rear of the recess 212.

[0042] It will be appreciated that the pump housing 224 can be secured in the recess 212 in a variety of ways. For example, instead of having holes in the bottom shell for screws and pins, slots and/or blind recesses can be formed in or adhesively attached to

the side surfaces of the recess that engage mating surfaces on the pump housing. Such structures can also be provided with threads for engaging screw connections. As another alternative, adhesive could be used to secure the pump housing in place.

[0043] Turning now to the power and control electronics and devices illustrated in Figures 1 and 3, a wide variety of power sources, motor controllers, and motors may be utilized. They can be secured in their respective recesses on metal frames and/or plates (not shown) that are secured in the recesses with adhesive and/or with fasteners such as screws to structures in the recesses integral to the side walls or adhesively secured thereto. Acceptable sources of power include a lithium battery or plurality of lithium batteries.

[0044] To avoid a hard wired connection to the motor controllers 116 from a throttle control input, the motor controller 116 advantageously include a wireless receiver. This receiver can communicate with a wireless transmitter that is controlled by the surfer in order to control the motor speed. Wireless throttle controls have been used extensively, but using a throttle while surfing poses unique issues in that paddling, standing, and riding waves will interfere with a surfer's ability to easily manipulate a control mechanism such as a trigger, a dial, or the like. In one embodiment, wireless transmission circuitry can be configured to transmit electromagnetic and/or magnetic signals underwater. Because one or both transmitter and receiver can be under the surface of the ocean during much of the duration of surfing, a transmission system and protocol that is especially reliable in these conditions may be used. For example, wireless circuitry can be implemented in accordance with the systems and methods disclosed in U.S. Patent No. 7,711,322, which is hereby incorporated by reference in its entirety. As explained in this patent, it can be useful to use a magnetically coupled antenna operating in a near field regime. A low frequency signal, e.g. less than 1 MHz, can further improve underwater transmission reliability. With this type of throttle system, an automatic shut off may be implemented, where if the signal strength between the transmitter and receiver drops below a certain threshold, indicating a certain distance between the two has been exceeded, the receiver shuts off the electric motor. This is useful as an automatic shut off if the surfer falls off the board.

[0045] Figure 7 illustrates an alternative control mechanism 680 for controlling a motorized surfboard. Control mechanism 680 has a processor 690 for coordinating the operation of the control mechanism 680. The processor 690 is coupled

to an accelerometer 700. The accelerometer 700 measures acceleration. These measurements are communicated to processor 690. Processor 690 may also communicate with accelerometer 700 for the purpose of initializing or calibrating accelerometer 700. In one embodiment, accelerometer 700 is a 3-axis accelerometer and can measure acceleration in any direction. Processor 690 is also coupled to memory 710. In one example, memory 710 is used to store patterns or profiles of accelerometer readings which have been associated with particular motor control commands. For example, memory 710 may store a pattern of accelerometer readings which has been previously associated with a command to cause the motor controller to activate the motors. The processor 690 can compare the current accelerometer 700 outputs to the previously stored profiles to determine whether the current outputs should be interpreted as a motor command. Control mechanism 680 also has a radio transmitter 720 coupled to the processor 690. In one embodiment, radio transmitter 720 transmits information received from processor 690, such as motor commands, to radio receiver 504.

[0046] Figure 8 illustrates a method 740 for using control mechanism 680, consistent with one embodiment of the invention. At step 745, output is received from the accelerometer. In one embodiment, the output from the accelerometer may be an analog signal representative of the acceleration measured along each axis measured by the accelerometer. In another embodiment, an analog to digital converter may be used to convert the output to a digital representation of the analog signal. Alternatively, the accelerometer may be configured to output digital signals. For example, the accelerometer itself may be configured to output a digital pulse when the acceleration detected on each axis exceeds some threshold amount.

[0047] After the output from the accelerometer is received, the control mechanism compares the output to pre-determined command profiles as show in step 750. These command profiles may also be referred to as accelerometer output patterns or simply as patterns. For example, the control mechanism may store a pattern corresponding to a repeated positive and negative acceleration substantially along a particular axis. Another pattern may correspond to an isolated positive acceleration along a particular axis. The patterns of accelerometer outputs may be associated with particular commands for the motor controllers. For example one pattern may correspond to a command to activate a subset of the available motors. Another pattern may correspond to

a command to activate one or more available motors with a particular duty cycle or at a particular percentage of maximum operation potential.

[0048] The comparison of the current accelerometer output to the command profile results in a determination of whether the output matches a particular command profile, as shown in step 755. In one embodiment, if the current output does not match a command profile, the output from the accelerometer is discarded and the method concludes, leaving the control mechanism to wait for more output from the accelerometer. However, if the current output does match a command profile, the control mechanism transmits the corresponding command to the motor controllers, as shown in step 760. After the transmission, the command mechanism may again wait for additional output from the accelerometer.

[0049] In alternative embodiments, the control mechanism may operate without the need for pattern comparison. For example, in one embodiment, the control mechanism may be configured to interpret accelerometer readings as a proxy for throttle control. In one embodiment, the magnitude and duration of the accelerometer output may be directly translated into magnitude and duration signals for the motor controllers. For example, an acceleration reading above a particular threshold may be interpreted as a command to activate the motors. The duration of the command may be a proportional to the duration for which the acceleration reading is received. Figure 9 illustrates one possible embodiment for the control mechanism 680. In this embodiment the control mechanism is encapsulated in a package 790 which is integrated into a glove 780. It will be appreciated by one of ordinary skill in the art that the term integrated into the glove may comprise being attached to the surface or within the structure of glove 780. In one embodiment the package 790 is a water tight package. In one embodiment, package 790 comprises a plastic box. In another embodiment, package 790 comprises layers of fabric or other materials. Advantageously this embodiment facilitates control of the motorized surfboard while maintaining the ability of the surfer to use his hands for normal surfing activity. For example, rather than positioning one hand on throttle 620 to control the motorized surfboard, the normal motion of the surfer's hand, while wearing the glove, may be used to control the motorized surfboard. For example, it may be desirable for the motor controller to activate the motors while the surfer would normally be paddling. This may be when the surfer is paddling out or when the surfer is attempting to position himself to catch a wave. Accordingly, when the control mechanism is embedded in a

glove 780, the control mechanism may be configured to recognize the acceleration experienced by a surfer's hand during the paddling motion as a command to engage the motors. Thus, the surfer is free to use his hands for normal surfing activity while the control mechanism activates the motors when the surfer's hand motions indicate that the surfer is performing an activity which would be aided by additional motor support. Alternatively, the control mechanism may be configured to activate the motors in response to patterns which, though not necessarily surfing related, require less effort or distraction than involved in manually manipulating a throttle. For example, while riding a wave, rather than adjusting a throttle, the surfer wearing glove 780 might simply shake his hand to engage or disengage the motor. Accordingly, the surfer is able to control the motors of the surfboard with less effort and coordination than would be required to manipulate the throttle embedded in body of the surfboard. In an alternative embodiment, the packaged control mechanism 790 may also be attached to or integrated into a wrist strap of other clothing or accessory. In another embodiment, a glove 780 or other accessory or clothing may be worn on each hand and each corresponding control mechanism may control a different subset of motors in the motorized surfboard.

[0050] Turning now to Figures 10 and 11, a personal watercraft comprising a first embodiment of a motorized cassette 1020 and a watercraft body 1000 is shown. The body 1000 comprises a top side 1004 and a bottom side 1002. In some embodiments, the body 1000 may comprise a surfboard and in other embodiments the body 1000 may comprise other traditionally non-powered watercrafts including, for example, inflatable watercrafts, dinghies, life rafts, tenders, sail boards, stand up paddle boards ("SUP boards"), kayaks, and canoes. The body 1000 may be constructed by affixing a top shell to a bottom shell as discussed above or may be constructed using other various methods known to those having ordinary skill in the art. The body 1000 may optionally comprise one or more fin boxes 1010 configured to receive one or more fins 1012.

[0051] Turning now also to Figure 11, the bottom side 1002 of the body 1000 may comprise a recess 1008 configured to receive a cassette 1020 therein. The recess 1008 may extend from the bottom surface 1002 toward the top surface 1004 and comprise a generally convex shaped depression in the bottom surface 1002 of the body 1000. In one embodiment, the recess 1008 forms a tear-drop shaped aperture in the bottom surface 1002. The tear-drop shaped aperture may be complimentary to the shapes of an insert 1014 and/or cassette 1020 such that the insert 1014 and/or cassette 1020 can be oriented

and/or positioned in a desired configuration within the recess 1008. As explained in further detail below, the insert can be useful because it can include desired features such as flanges, threaded holes for fastener engagement, and the like that can be used to, among other things, secure the cassette in the recess of the surfboard. This allows the shell of the surfboard itself to be entirely made with smooth and gently rounded surfaces in and around the recess 1008 and without sharp corners, holes, or other features that require difficult manufacturing processes. This makes the production of the surfboard 1000 itself very easy and requires minimal changes to the process of manufacturing a conventional surfboard.

[0052] With continued reference to Figure 11, the insert 1014 may comprise a solid or substantially ring-shaped sheet structure configured to cover at least a portion of the recess 1008. The insert 1014 may be coupled to the recess 1008 using various coupling means, for example, adhesives, bonding agents, and/or fasteners. In some embodiments, by virtue of the complimentary shapes of the insert 1014 and the recess 1008, the insert 1014 may be form fitted within the recess 1008 such that the engagement therebetween inhibits longitudinal, lateral, and/or transverse motion of the insert 1014 relative to the recess 1008. When disposed within the recess 1008, the insert 1014 can define a receiving space 1016 for receiving the cassette 1020. In some embodiments, the insert 1014 may comprise one or more relatively small flanges or protrusions (not shown) extending into the receiving space 1016. The one or more flanges can be configured to engage one or more mating grooves (not shown) disposed in the cassette 1020. In one embodiment, a flange extends from a forward most portion of the insert 1014 into the receiving space 1016 and the forward most portion of the cassette 1020 includes a corresponding groove. In this way, the cassette 1020 may releasably engage the insert 1014 to align and hold the front of the cassette 1020 relative to the insert 1014 and body 1000. As shown in Figure 10, the base surface 1022 of the cassette 1020 may be configured to substantially match the adjacent base surface 1002 of the body 1000 to achieve a desired hydrodynamic profile of the personal watercraft.

[0053] The cassette 1020 may be releasably coupled to the insert 1014 and recess 1008 by one or more fasteners 1060. In one embodiment, the insert 1014 includes an internally threaded bore 1062 configured to threadably engage a portion of a threaded fastener 1060, for example, a screw, that passes through a corresponding aperture 1024 formed in the cassette 1020. In another embodiment, a threaded bore is disposed in the

body 1000 and configured to engage a portion of threaded fastener 1060. In one embodiment, a groove on a first end of the cassette 1020 may releasably receive at least a portion of a corresponding flange extending from the insert 1014 and the second end of the cassette 1020 may be fastened to the insert/body by fastener 1060 to restrict longitudinal, lateral, and/or transverse motion of the cassette 1020 relative to the recess 1008. As discussed in more detail below, the receiving space 1016 may be configured to releasably receive various different cassettes that are similarly shaped to cassette 1020.

[0054] As shown in Figures 10 and 11, the removable cassette 1020 may comprise a drive system for the personal watercraft. In one embodiment, the drive system components disclosed with reference to Figures 1-6 may be housed within the cassette 1020. For example, cassette 1020 may comprise one or more exhaust ports 1026, one or more pump housings 1028, one or more motor shafts 1030, one or more motors (not shown), one or more batteries (not shown), and/or one or more impellers (not shown). The orientation and design of these components may be basically the same as described above but housed within cassette 1020. Thus, cassette 1020 may propel the body 1000 relative to a body of water, for example, to aid in paddling out a surfboard and catching waves.

[0055] Figures 12 and 13 show the personal watercraft comprising a second embodiment of a cassette 1040 received within body 1000. Cassette 1040 may be similarly shaped to cassette 1020 of Figures 10 and 11 such that both cassettes fit tightly within the receiving space 1016 formed by insert 1014. Cassette 1040 may be releasably coupled to the body 1000 by one or more threaded fasteners 1060 and/or the engagement between a flange extending from the insert and a groove in the cassette 1040. As shown, fastener 1060 may pass through an aperture 1034 in the cassette 1040 and be received within threaded bore 1062 in insert 1014.

[0056] In contrast to cassette 1020 of Figures 10 and 11, cassette 1040 may be un-powered or non-motorized. In some embodiments, the cassette 1040 may be hollow and may enclose a storage space configured to store personal items, for example, sun screen, watercraft hardware, keys, mobile phones, etc. In one embodiment, the storage space may be substantially water tight to protect items stored therein from the ingress of water from a body of water, for example, the ocean. In other embodiments, the cassette 1040 may be substantially solid such that the watercraft has generally uniform buoyancy and/or rigidity characteristics from the front end to the back end.

[0057] The cassette 1020 of Figures 10 and 11 and the cassette 1040 of Figures 12 and 13 may be interchanged to convert the body 1000 between a motorized configuration (Figures 10 and 11) and a non-motorized configuration (Figures 12 and 13). The body 1000 may come as a kit with one or both of the motorized cassette 1020 and the non-motorized cassette 1040. A user may switch between cassettes 1020 and 1040 depending on water conditions and/or desired performance characteristics of the personal watercraft. For example, a user may wish to lower the overall mass characteristic of the personal watercraft by opting to place the non-motorized cassette 1040 within the body 1000 or a user may wish to minimize human energy used in a surf session by opting to place the motorized cassette 1020 within the body 1000.

[0058] Figures 14 and 15 show a kayak including the cassette 1020 and insert 1014 of Figures 10 and 11 received within a recess 1408 of the kayak body 1400. As shown, a single cassette (e.g., cassette 1020 of Figures 10 and 11 or cassette 1040 of Figures 12 and 13) may be placed in different watercraft bodies that have recesses configured to receive the cassette. For example, a motorized cassette 1020 can be configured to fit within a recess in the body of a surfboard and a similarly shaped recess in the body of a kayak such that a user may use the same motorized cassette in multiple watercrafts. In this way, a user may purchase a single motorized cassette to propel different watercrafts. Further, in some implementations, a motorized cassette may be used as a stand alone device to propel a user without a watercraft. For example, a user may hold a motorized cassette 1020 and be propelled through a body of water without a more substantial watercraft (e.g., without a surf board or kayak).

[0059] Turning now to Figures 16 and 17, a personal watercraft comprising a motorized cassette 1620 and a watercraft body 1600 is shown. The body 1600 comprises a top side 1604 and a bottom side 1602. In some embodiments, the body 1600 may comprise a surfboard and in other embodiments the body 1600 may comprise other various watercrafts. Similar to the personal watercraft of Figures 10-13, the body 1600 may be constructed by affixing a top shell to a bottom shell as discussed above or may be constructed using other various methods known to those having ordinary skill in the art. The body 1600 may optionally comprise one or more fin boxes 1610 configured to receive one or more fins 1612.

[0060] Turning now to Figure 17, the bottom side 1602 of the body 1600 may comprise a recess 1608 configured to receive a cassette 1620 therein. The recess 1608

may extend from the bottom surface 1602 toward the top surface 1604 and comprise a generally convex shaped depression in the bottom surface 1602 of the body 1600. In one embodiment, the recess 1608 forms a tear-drop shaped aperture in the bottom surface 1602. The tear-drop shaped aperture may be complimentary to the shapes of the insert 1614 and/or cassette 1620 such that the insert 1614 and/or cassette 1620 can be oriented and/or positioned in a desired configuration within the recess 1608.

[0061] With continued reference to Figure 17, the insert 1614 may comprise a solid or substantially ring-shaped sheet structure configured to cover at least a portion of the recess 1608. The insert 1614 may be coupled to the recess 1608 using various coupling means, for example, adhesives, bonding agents, and/or fasteners. In some embodiments, by virtue of the complimentary shapes of the insert 1614 and the recess 1608, the insert 1614 may be form fitted within the recess 1608 such that the engagement therebetween inhibits longitudinal, lateral, and/or transverse motion of the insert 1614 relative to the recess 1608. When disposed within the recess 1608, the insert 1614 can define a receiving space 1616 for receiving the cassette 1620.

[0062] In some embodiments, the insert 1614 may include one or more protrusions 1651 configured to be inserted into one or more indentations 1659 (shown in Figure 18) on the cassette 1620. The protrusions 1651 and indentations 1659 on the cassette 1620 can have complimentary shapes such that the protrusions may be received by the indentations by sliding the cassette 1620 forward longitudinally relative to the insert 1614. The engagement of the protrusions 1651 and corresponding indentations can result in one or more abutments that act to arrest or inhibit longitudinal, lateral, and/or transverse movement of the cassette 1620 relative to the insert 1614 and body 1600.

[0063] The insert 1614 may also include a latch element 1653 that is cantilevered from a latch plate 1655. The latch element 1653 may catch one or more surfaces within a receptacle 1661 (shown in Figure 18) on the cassette 1620 when the cassette 1620 is received within the insert 1614 to secure the cassette 1620 in the longitudinal direction relative to the insert 1614. In this way, the cassette 1620 may be slid forward into the insert 1614 until the latch 1653 releasably engages a notch or other feature on the cassette such that the cassette 1620 is aligned and secured relative to the insert 1614. To remove the cassette 1620 from the insert 1614, the latch element 1653 may be depressed by applying a force to the cantilevered end of the latch element 1653 to disengage the latch element from the notch or other feature of the cassette. Disengaging

the latch element 1653 then will allow a user to slide the cassette 1620 backward longitudinally relative to the insert 1614 to release the protrusions 1651 from the indentations 1659 and to remove the cassette 1620 from the body 1600.

[0064] As shown in Figure 16, the base surface 1622 of the cassette 1620 may be configured to substantially match the adjacent base surface 1602 of the body 1600 to achieve a desired hydrodynamic profile of the personal watercraft. The base surface 1622 may also include a charging port 1631 and/or activation switch 1633. Thus, the cassette 1620 may be charged when the cassette is coupled to the watercraft body 1600 or when it is separate from the watercraft body. In embodiments when these are provided, the charger port 1631 can be disposed on an opposite side of the cassette 1620 and the activation switch 1633 can be disposed elsewhere as well if desired.

[0065] As shown in Figures 18 and 19, the removable cassette 1620 may comprise a drive system including one or more motors 1675. In one embodiment, the drive system can be at least partially housed between a cassette base 1671 and a cassette cover 1657. The one or more motors 1675 can be powered by one or more batteries 1665 and can be mounted to the cassette base 1671 by motor mounts 1677. In some embodiments, each motor 1675 can be coupled to a motor shaft 1690 by a shaft coupler 1679, shaft bearing 1681, bearing holder 1683, and spacer 1685. Each shaft 1690 can be coupled to an impeller 1699 that is disposed at least partially within a pump housing 1695 and a bearing 1697 can optionally be disposed between each shaft and the impeller 1699. In this way, the one or more motors 1675 can drive each impeller 1699 to draw water through the pump housing 1695 to propel the cassette relative to a body of water.

[0066] In some embodiments, each shaft 1690 can be disposed within a shaft housing 1694 that is configured to limit the exposure of the shaft 1690 to objects that are separate from the cassette 1620. Thus, the shaft housing 1694 can protect a user from inadvertently contacting the shaft 1690 during use and/or can protect the shaft 1690 from contacting other objects, for example, sea grass. Additionally, the shaft housing 1694 can improve performance of the cassette 1620 by isolating each shaft 1690 from the water that passes through the pump housing 1695. In some embodiments, each shaft 1690 can be protected from exposure to the water by one or more shaft seals 1692.

[0067] The cassette 1620 can also include one or more grates 1693 disposed over intake ports of the pump housing 1695. The grates 1693 can limit access to the impeller 1699 and shaft 1690 to protect these components and/or to prevent a user from

inadvertently contacting these components during use. In some embodiments, each pump housing 1695 and/or grate 1693 can be coupled to one or more magnetic switches (not shown) that can deactivate the motors 1675 when the pump housing 1695 and/or grate 1693 are separated from the cassette base 1671. Therefore, the one or more magnetic switches may prevent the cassette from operating without the optional grate 1693 and/or pump housing in place.

[0068] With continued reference to Figures 18 and 19, the drive system may also include one or more motor controllers 1673 for each motor 1675, one or more relays 1687 configured to connect the one or more batteries 1665 with the one or more motor controllers 1673, an antenna 1667, and a transceiver 1669. The one or more motor controllers 1673, one or more relays 1687, one or more batteries 1665, antenna 1667, and transceiver 1669, can be electrically connected to each another by one or more wiring harnesses 1663. As discussed above, the transceiver 1669 can include or be coupled to wireless transmission circuitry that is configured to transmit electromagnetic and/or magnetic signals underwater.

[0069] Figures 20 and 21 show a personal watercraft 2000 comprising a body 2031 having a curved section 2033 disposed adjacent to and rearward of a pump housing 2020 and pump housing exhaust port 2025. The curved section 2033 may be shaped to create a Coanda Effect to direct flow from the exhaust port 2025 to follow the curve of the curved section 2033. The Coanda Effect on the flow that exits the exhaust port 2025 can result in an effective thrust of the expelled fluid in a thrust area 2050 as the expelled fluid enters the surrounding water 2060. As used herein, the term "Coanda Effect" refers to the tendency of a fluid jet to be attracted to a nearby surface, for example, the curved section 2033 of personal watercraft 2000 body 2031. The curved section 2033 and the relative positioning of the curved section 2033 and the pump housing 2020 can be incorporated in any of the personal watercraft described herein to create a thrust area between the exhaust port 2025 and the curved section 2033.

[0070] Figure 22 shows an embodiment of a pump housing 2220 having a generally curvilinear cross-sectional shape that tapers to a flattened and oblong exhaust port 2225. The exhaust port 2225 includes a first flattened side 2221 and a second flattened side 2223 disposed opposite to the first side. The first and second sides 2221, 2223 of exhaust port 2225 stabilize the rotational flow of water passing therethrough to create a more uniform flow of expelled water in the thrust area 2250 adjacent to and

rearward of the exhaust port 2225. Pump housing 2220 can optionally include one or more flow straighteners, for example, flow straighteners 228 previously discussed with reference to Figures 2 and 3. The optional flow straighteners can be configured to stabilize the flow of water passing through the pump housing 2220 and the exhaust port 2225 can be configured to further stabilize the flow of water passing therethrough. The shape of the pump housing 2220 and the exhaust port 2225 can be incorporated in any of the personal watercraft described herein to create a more uniform flow in the thrust area adjacent to the exhaust port 2225.

WHAT IS CLAIMED IS:

1. A personal watercraft comprising:

a top surface;

a bottom surface comprising a first recess, wherein the first recess extends generally toward the top surface; and

a cassette disposed at least partially within the first recess.

2. The personal watercraft of Claim 1, wherein the cassette comprises at least one motor

3. The personal watercraft of Claim 2, wherein the at least one motor is configured to propel the personal watercraft in at least a first direction relative to a body of water.

4. The personal watercraft of Claim 2, wherein the cassette comprises an impeller.

5. The personal watercraft of Claim 4, wherein the impeller is positioned in a flow housing.

6. The personal watercraft of Claim 5, wherein the impeller is coupled to one portion of a shaft, wherein another portion of the shaft is coupled to the motor.

7. The personal watercraft of Claim 6, wherein the shaft is coupled to the motor through a bellows coupler.

8. The personal watercraft of Claim 7, wherein the cassette comprises at least one battery.

9. The personal watercraft of Claim 8, wherein the cassette comprises at least one motor controller.

10. The personal watercraft of Claim 1, wherein the personal watercraft is a surfboard.

11. The personal watercraft of Claim 1, wherein the bottom surface further comprises a second recess.

12. The personal watercraft of Claim 11, wherein the second recess comprises a fin box.

13. The personal watercraft of Claim 12, further comprising a fin disposed at least partially within the fin box.

14. The personal watercraft of Claim 1, further comprising an insert disposed at least partially between the cassette and the first recess.

15. The personal watercraft of Claim 14, wherein the insert is coupled to the bottom surface.

16. The personal watercraft of Claim 15, wherein the insert is bonded to the bottom surface.

17. The personal watercraft of Claim 15, wherein the insert is fastened to the bottom surface.

18. The personal watercraft of Claim 14, wherein the insert comprises a protrusion.

19. The personal watercraft of Claim 18, wherein at least a portion of the cassette comprises an indentation.

20. The personal watercraft of Claim 19, wherein at least a portion of the protrusion is at least partially received within the indentation.

21. The personal watercraft of Claim 14, wherein the cassette is removably coupled to the insert.

22. The personal watercraft of Claim 21, wherein the cassette is fastened to the insert.

23. The personal watercraft of Claim 21, wherein the cassette is latched to the insert.

24. The personal watercraft of Claim 1, wherein the cassette comprises a storage space.

25. A method of making a personal watercraft, the method comprising:

forming a watercraft body with a recess in a bottom portion thereof; and

placing a cassette at least partially within the recess.

26. The method of Claim 25, further comprising fastening the cassette to the insert.

27. The method of Claim 25, comprising placing an insert at least partially within the recess.

28. A method of making a personal watercraft, the method comprising:

providing a cassette housing;

placing a motor within the housing;

placing an impeller within the housing;

placing a battery within the housing; and

enclosing the motor, impeller, and battery within the housing.

29. The method of Claim 28 further comprising placing the cassette housing at least partially within a recess of a watercraft body.

30. A personal watercraft kit comprising:

a personal watercraft comprising and a bottom surface, wherein the bottom surface comprises a recess that extends generally toward the top surface;

a motorized cassette configured to fit at least partially within the recess; and

a non-motorized cassette configured to fit at least partially within the recess.

31. A system comprising:

an insert configured to be secured relative to a watercraft, the insert defining a receiving space and comprising at least one protrusion extending into the receiving space; and

a motorized cassette configured to be received at least partially within the receiving space, the cassette comprising at least one indentation configured to receive the at least one protrusion so as to inhibit movement of the cassette relative to the insert in at least one of a longitudinal direction, a transverse direction, and a lateral direction.

32. The system of Claim 31, wherein the insert comprises a latch configured to releasably secure the cassette relative to the insert when the cassette is at least partially received within the receiving space.

33. The system of Claim 31, wherein the cassette comprises an aperture, wherein the insert comprises a threaded bore, and wherein the aperture and the threaded bore are coaxially aligned when the cassette is at least partially received within the receiving space.

34. The system of Claim 31, wherein the insert is ring-shaped.

35. The system of Claim 31, wherein the cassette and the receiving space are complimentary shaped so as to inhibit movement of the cassette relative to the insert in at least one of a longitudinal direction, a transverse direction, and a lateral direction.

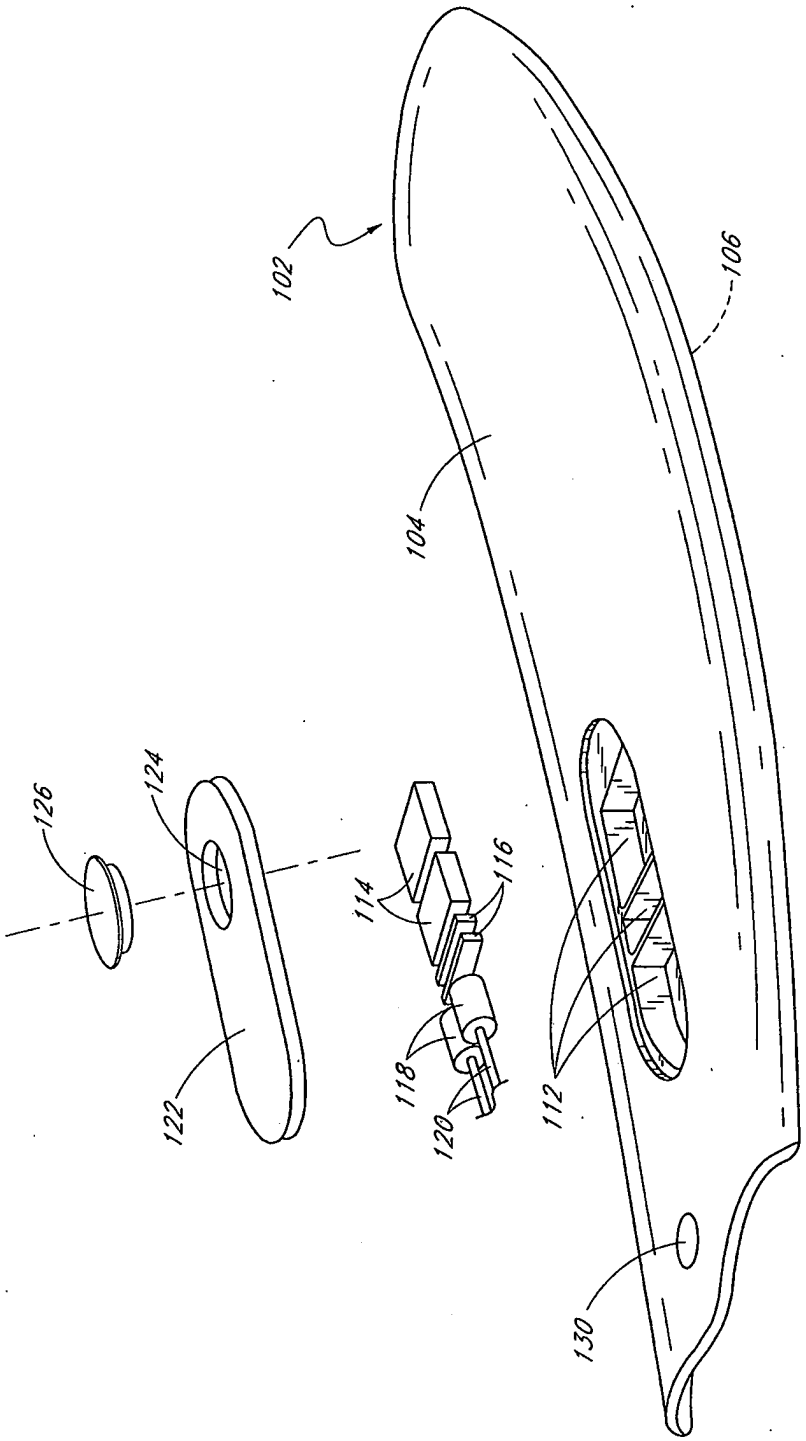


FIG. 1

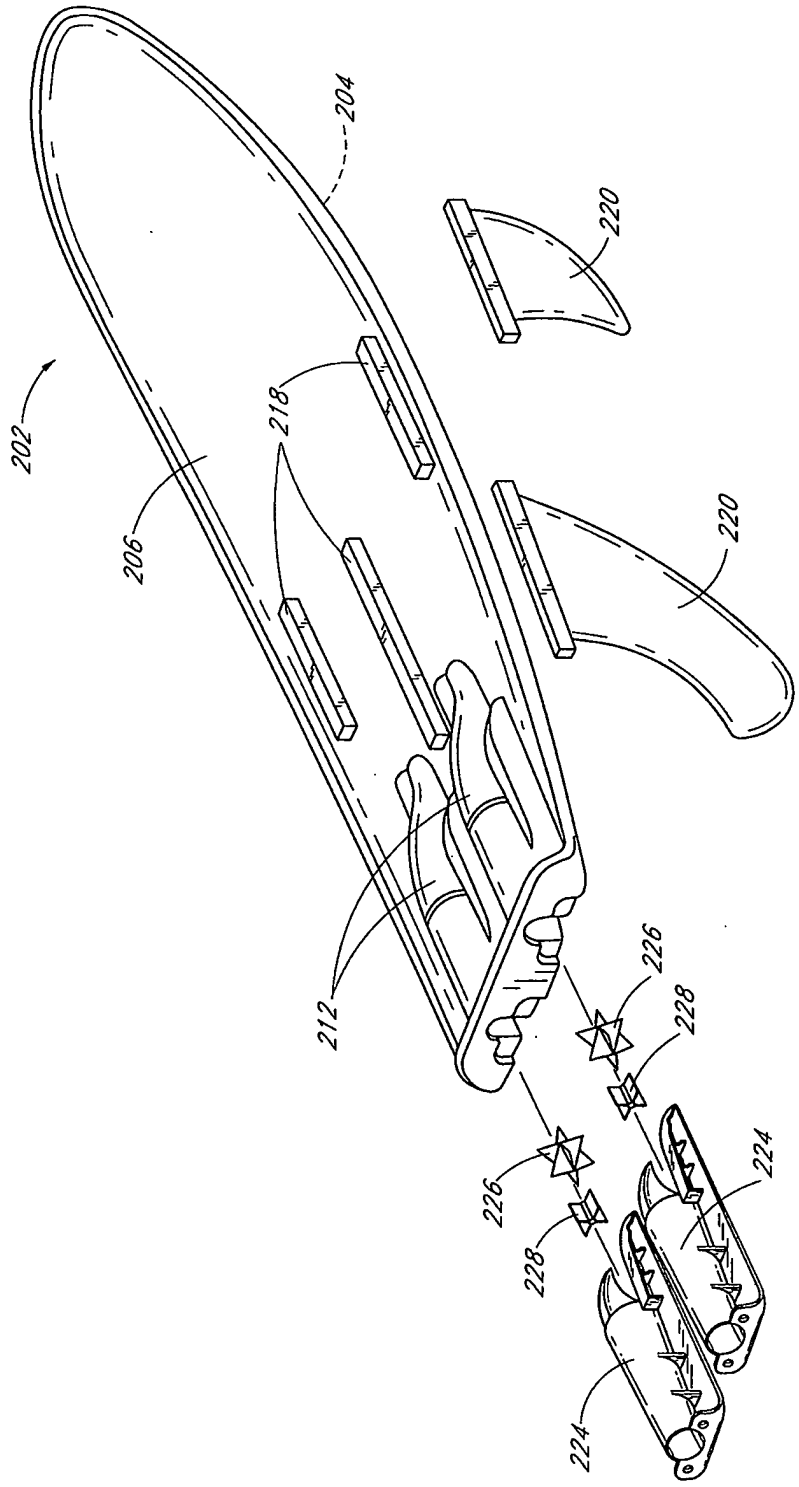


FIG. 2

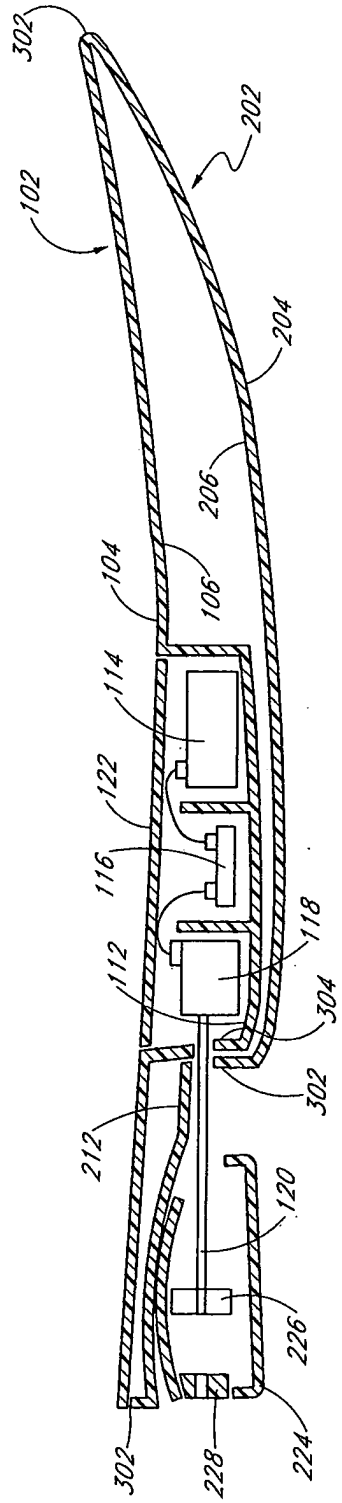

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FIG. 3

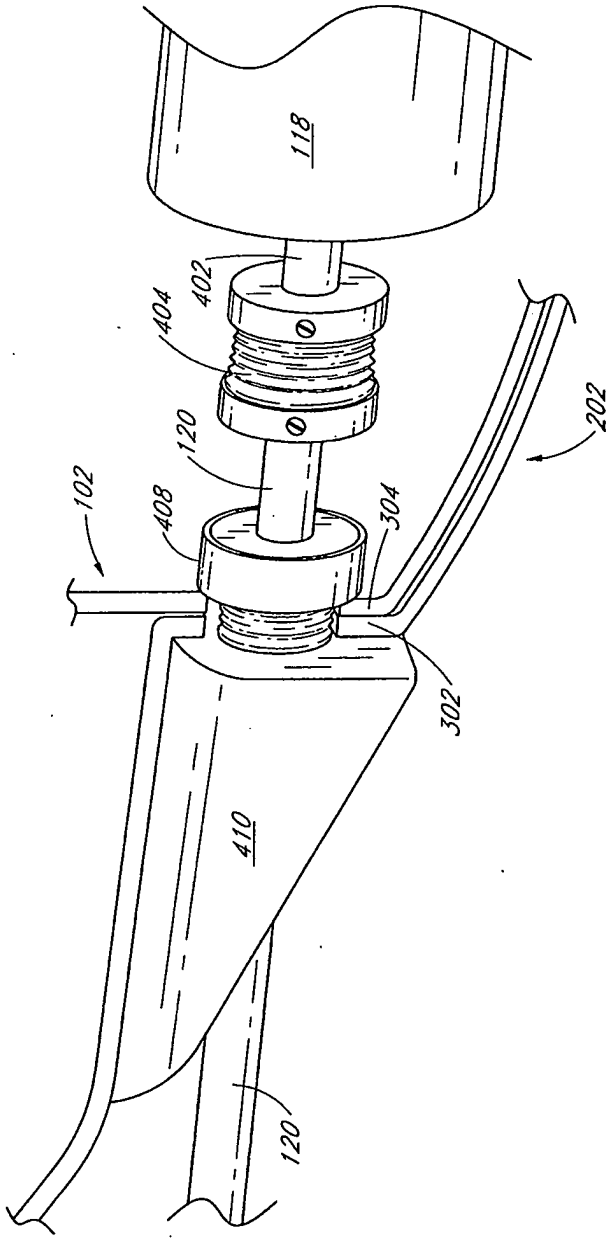


FIG. 4

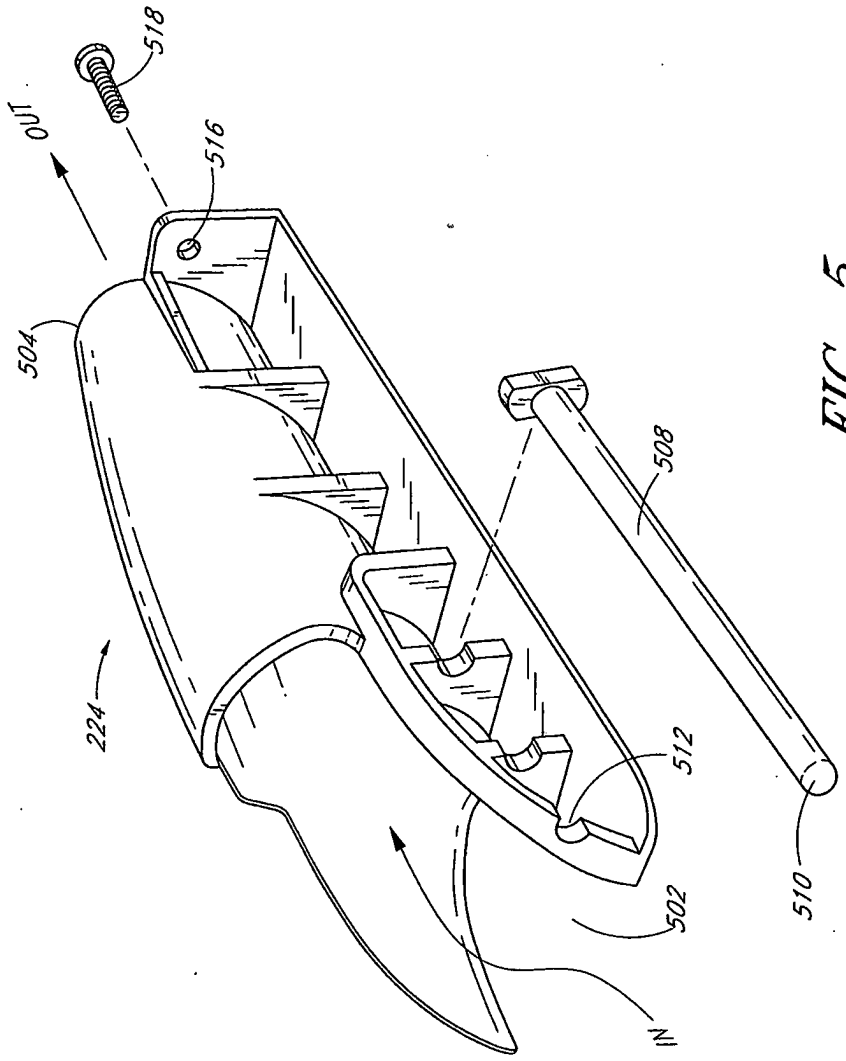


FIG. 5

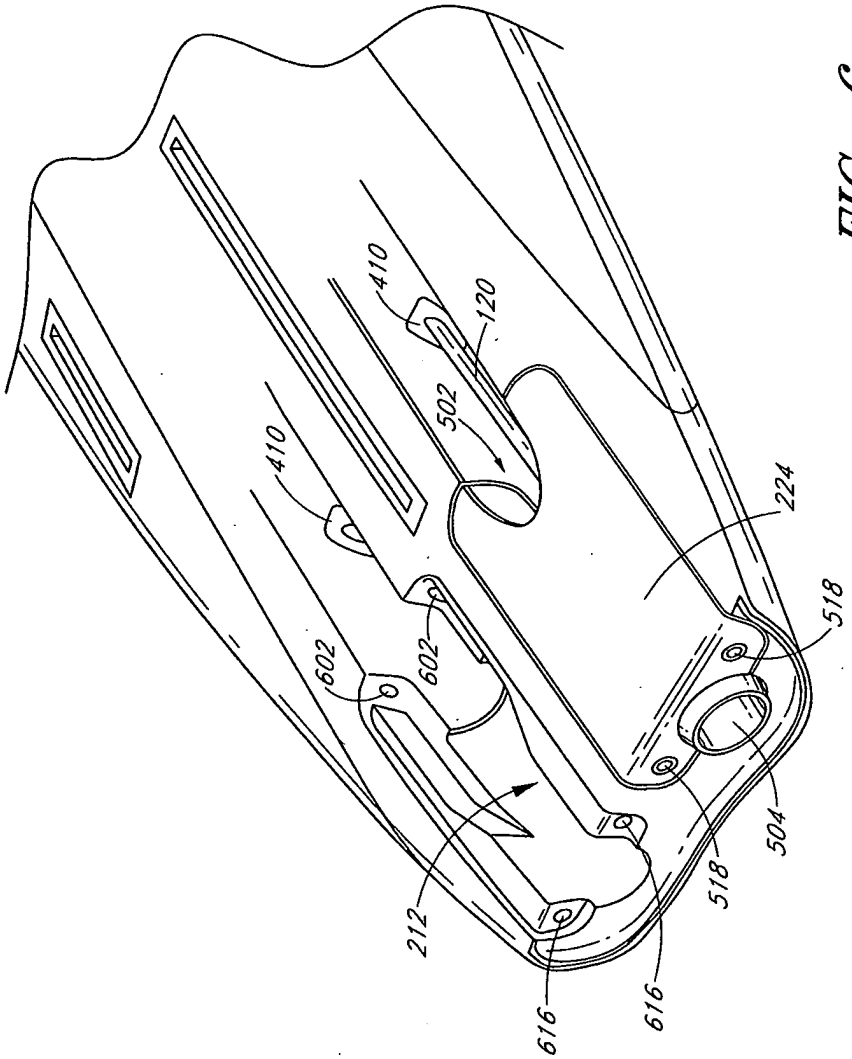


FIG. 6

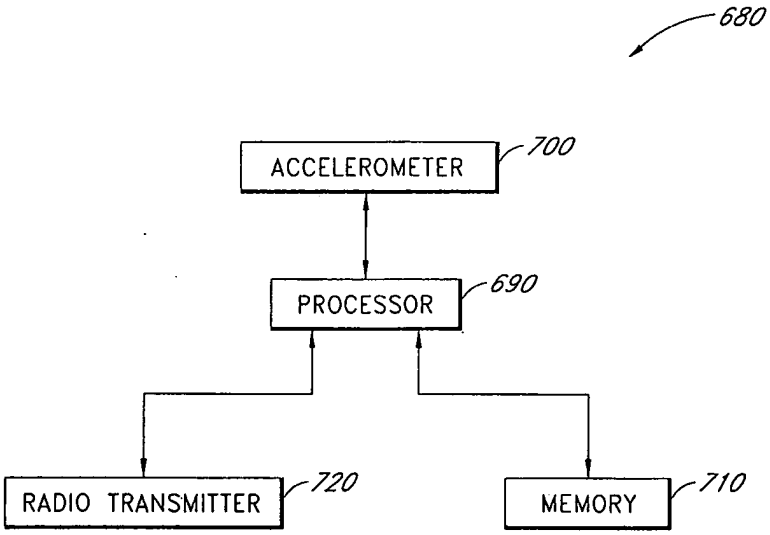

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PROCESSOR
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RADIO TRANSMITTER
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MEMORY
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FIG. 7

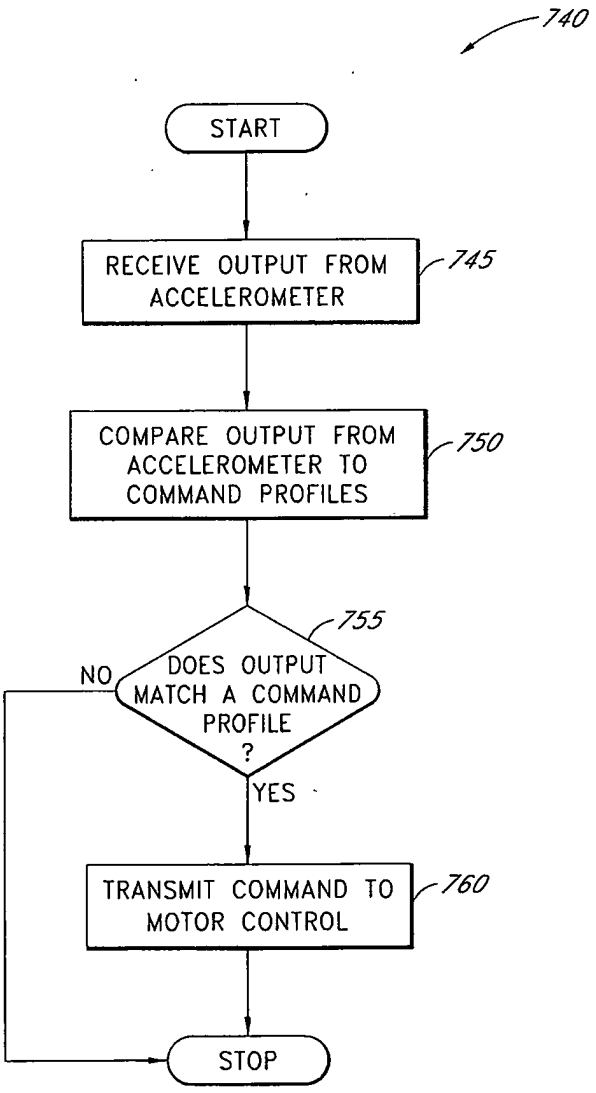

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START
RECEIVE OUTPUT FROM ACCELEROMETER
745
COMPARE OUTPUT FROM ACCELEROMETER TO COMMAND PROFILES
750
755
DOES OUTPUT MATCH A COMMAND PROFILE ?
NO
YES
TRANSMIT COMMAND TO MOTOR CONTROL
760
STOP

FIG. 8

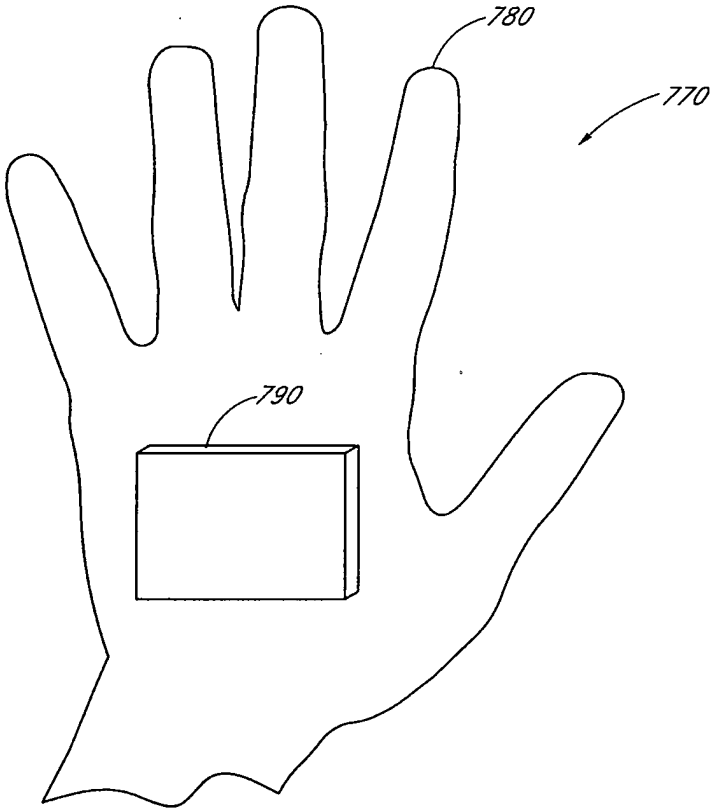


FIG. 9

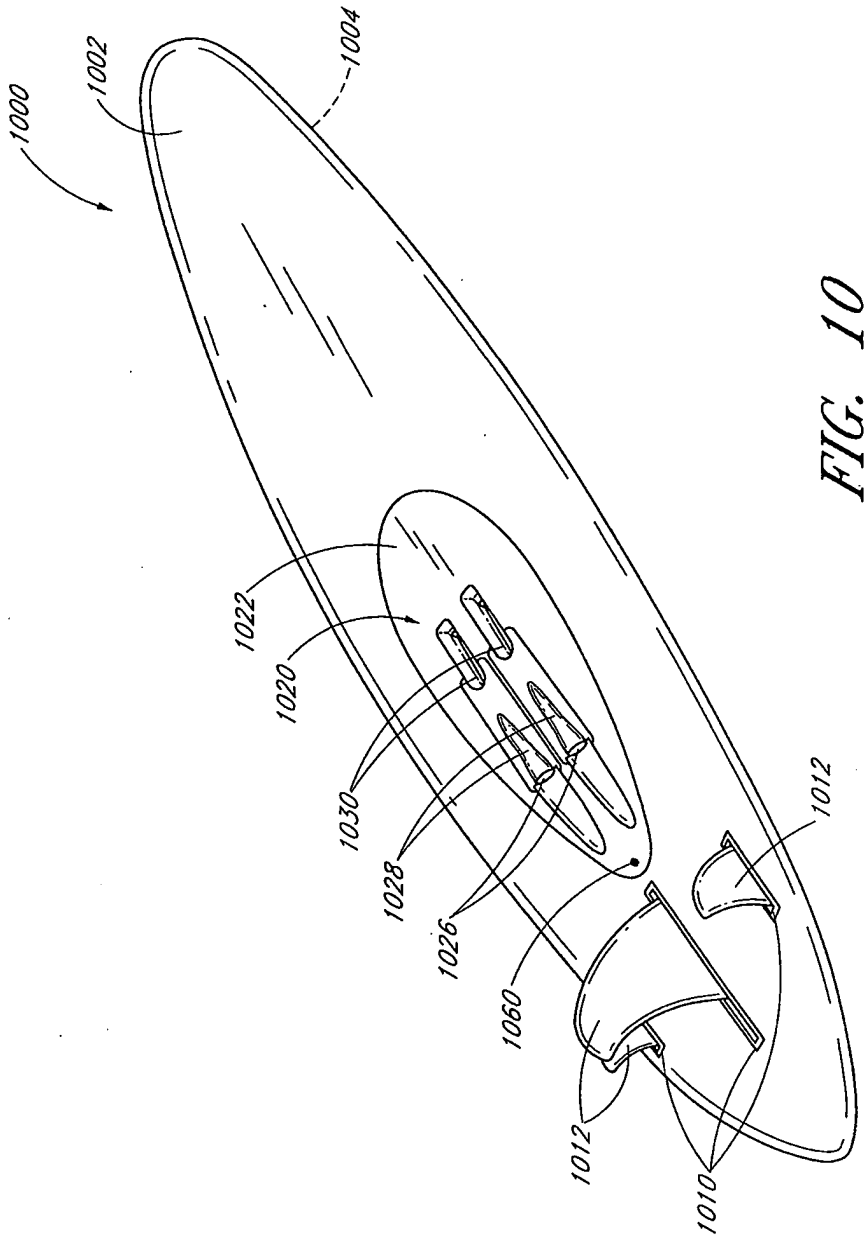


FIG. 10

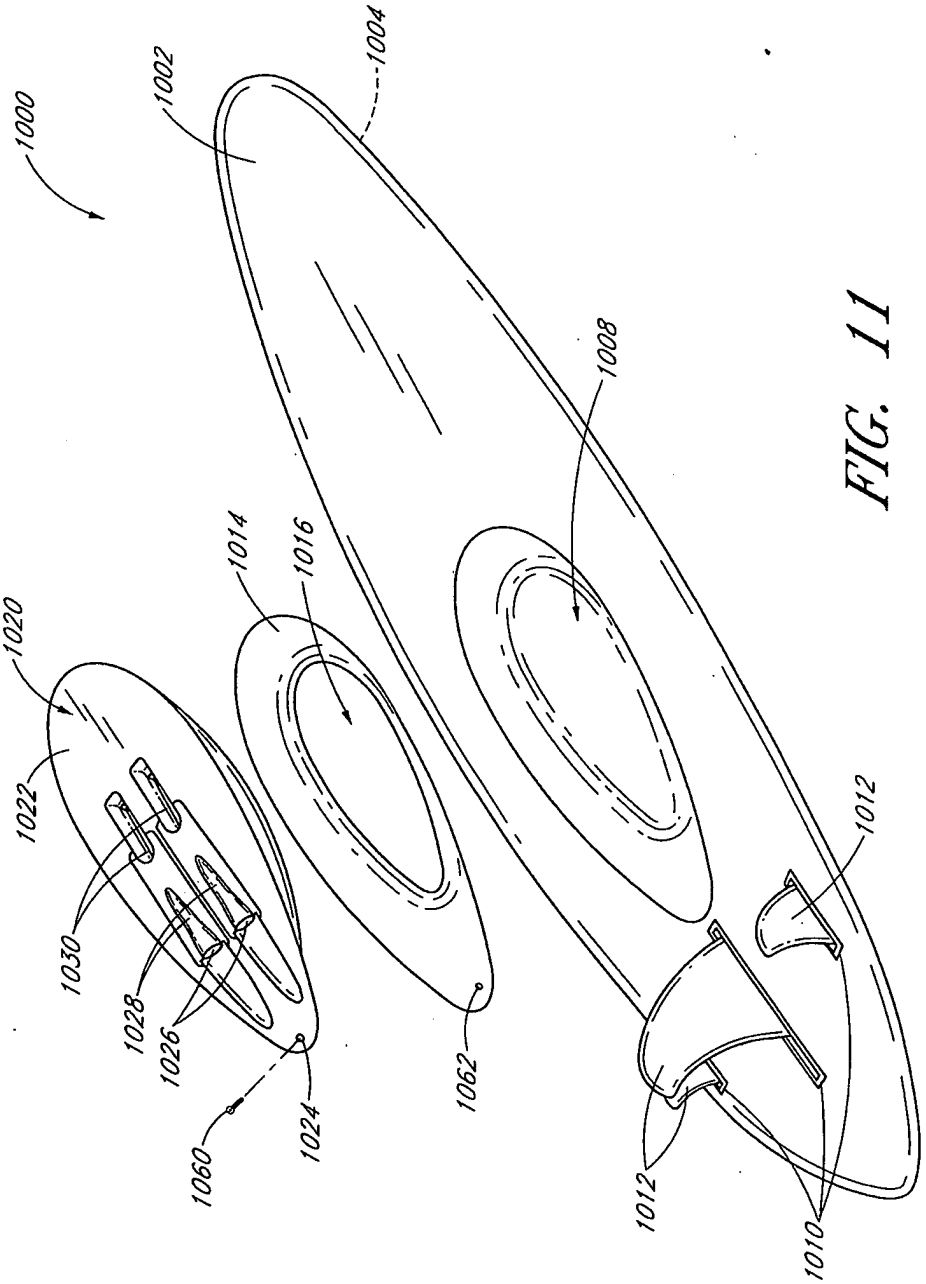

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FIG. 11

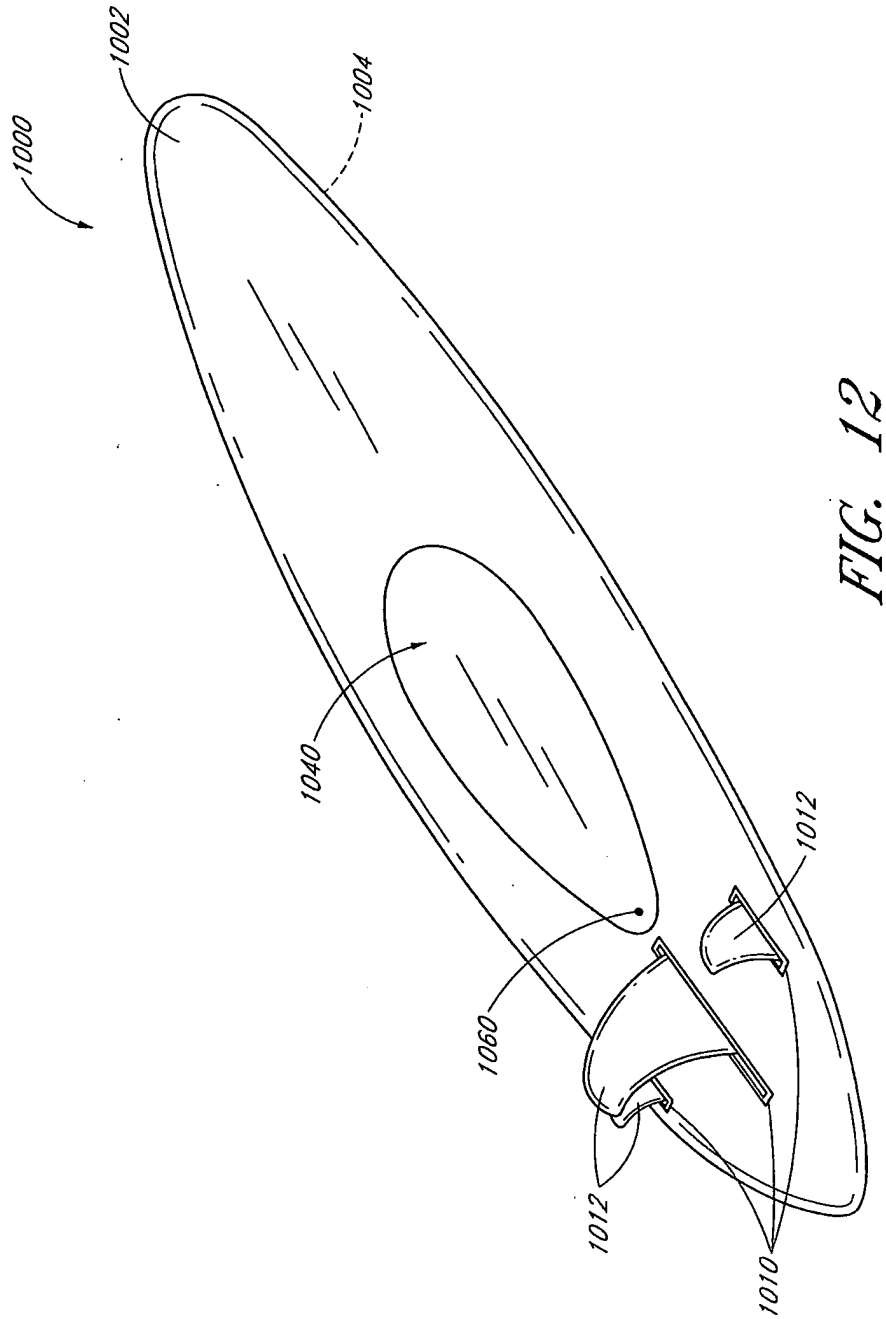


FIG. 12

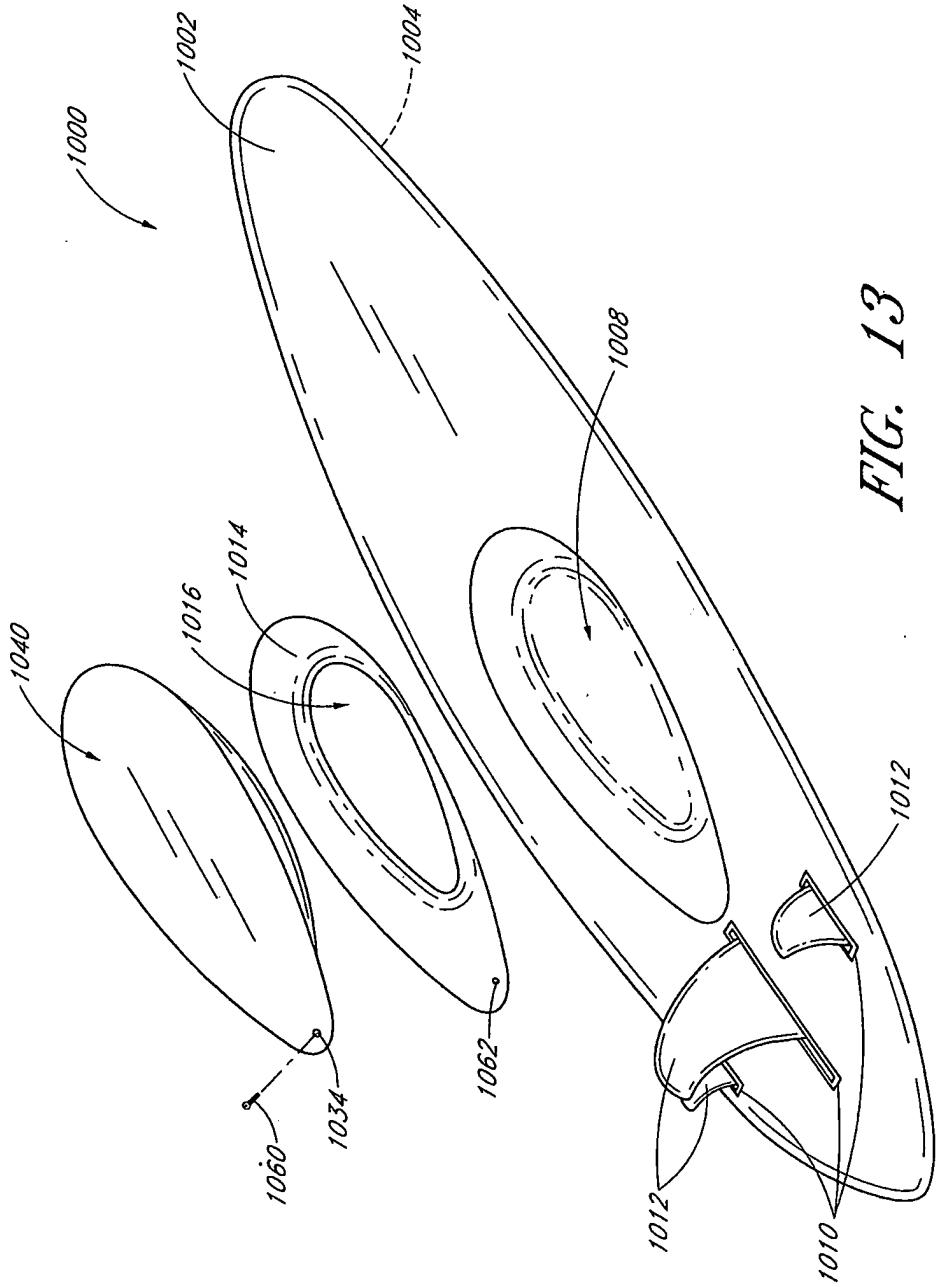


FIG. 13

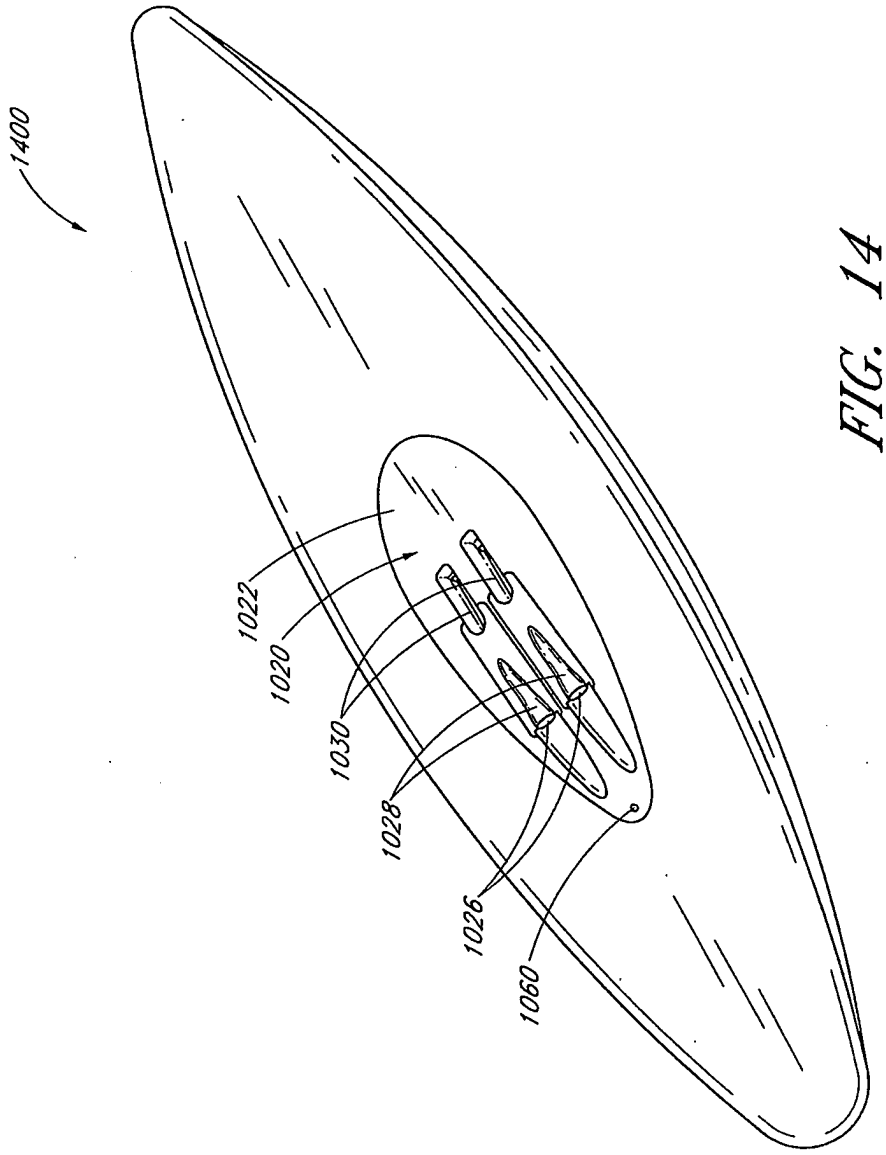


FIG. 14

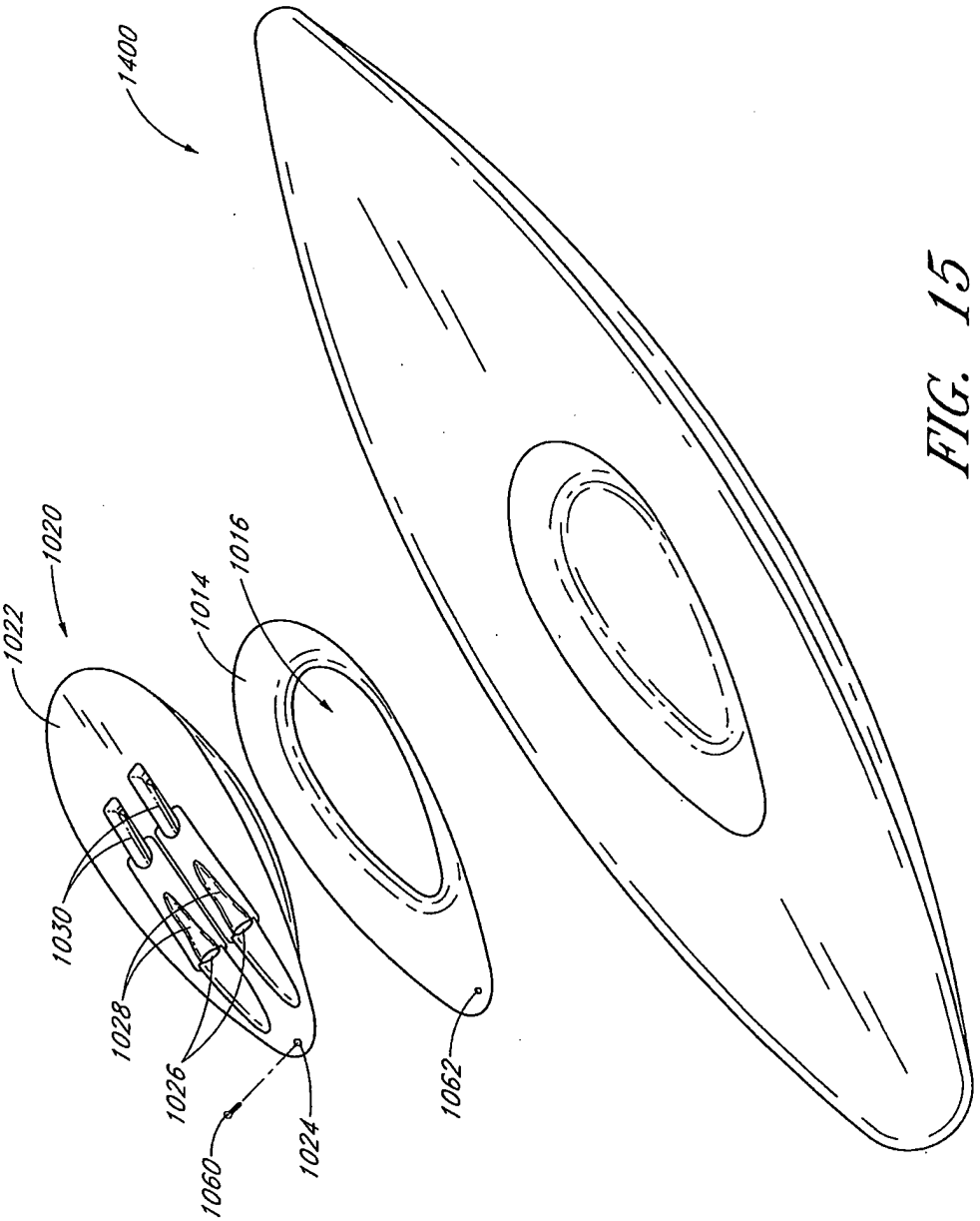


FIG. 15

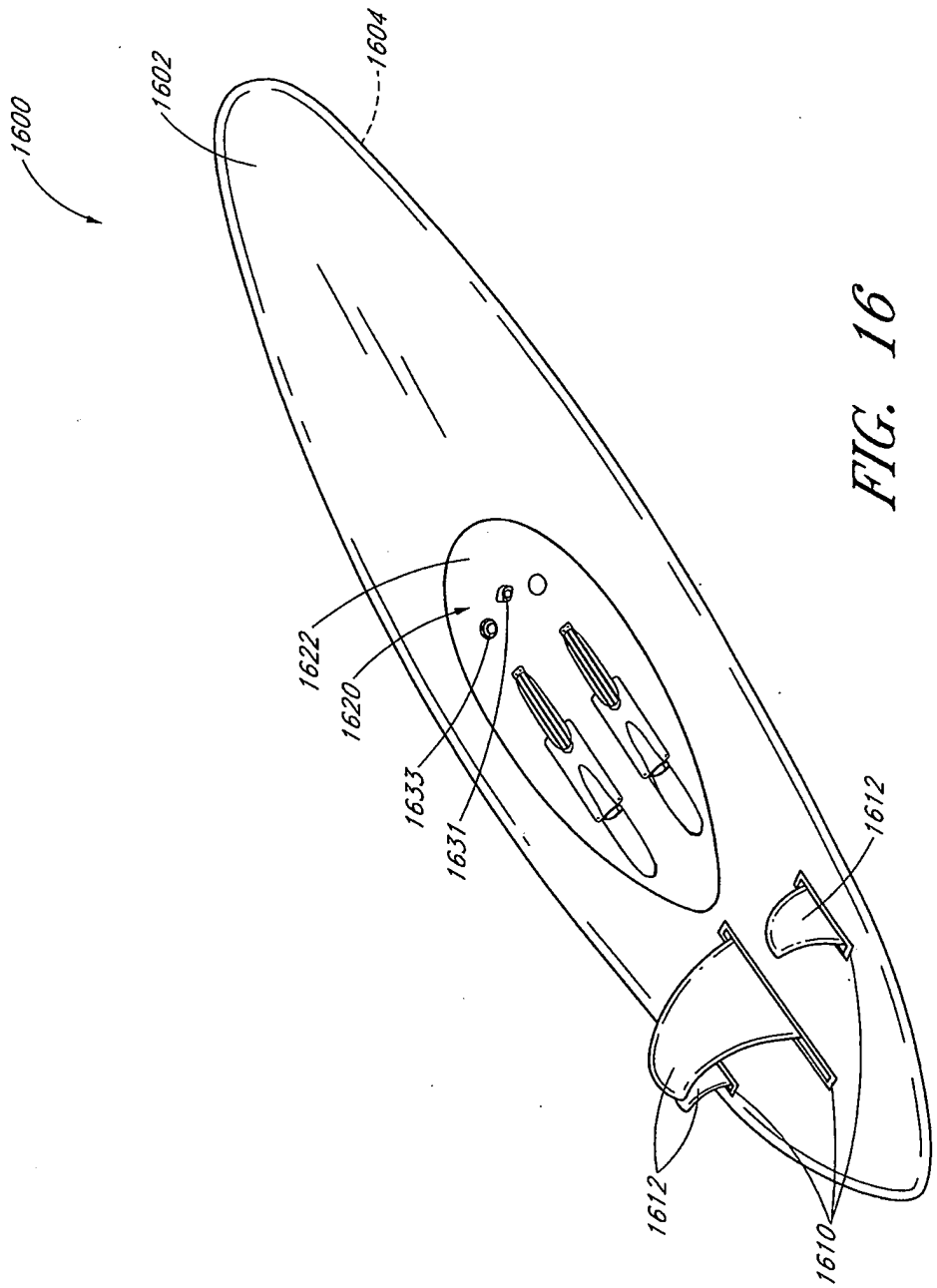


FIG. 16

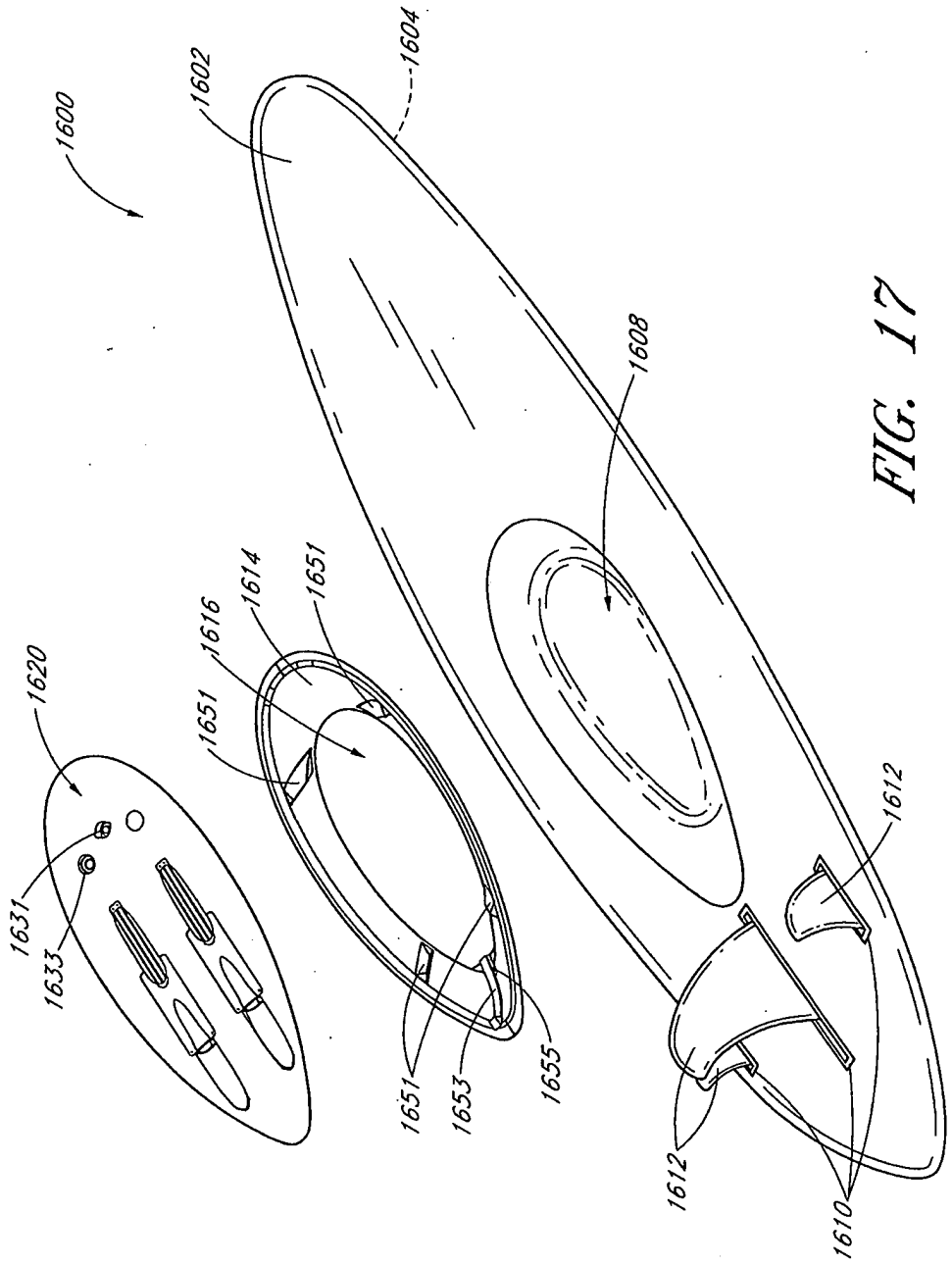

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FIG. 17

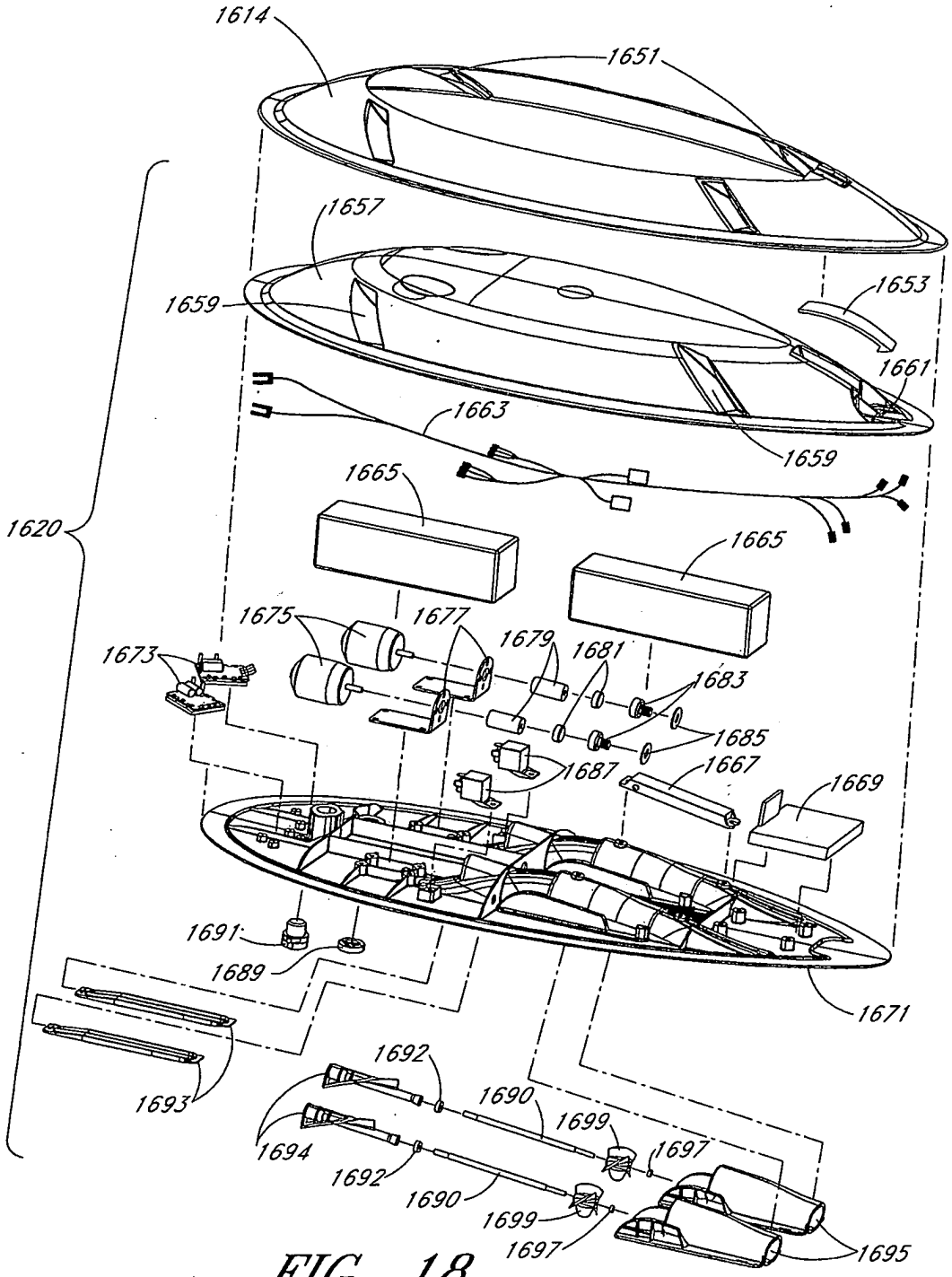

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FIG. 18

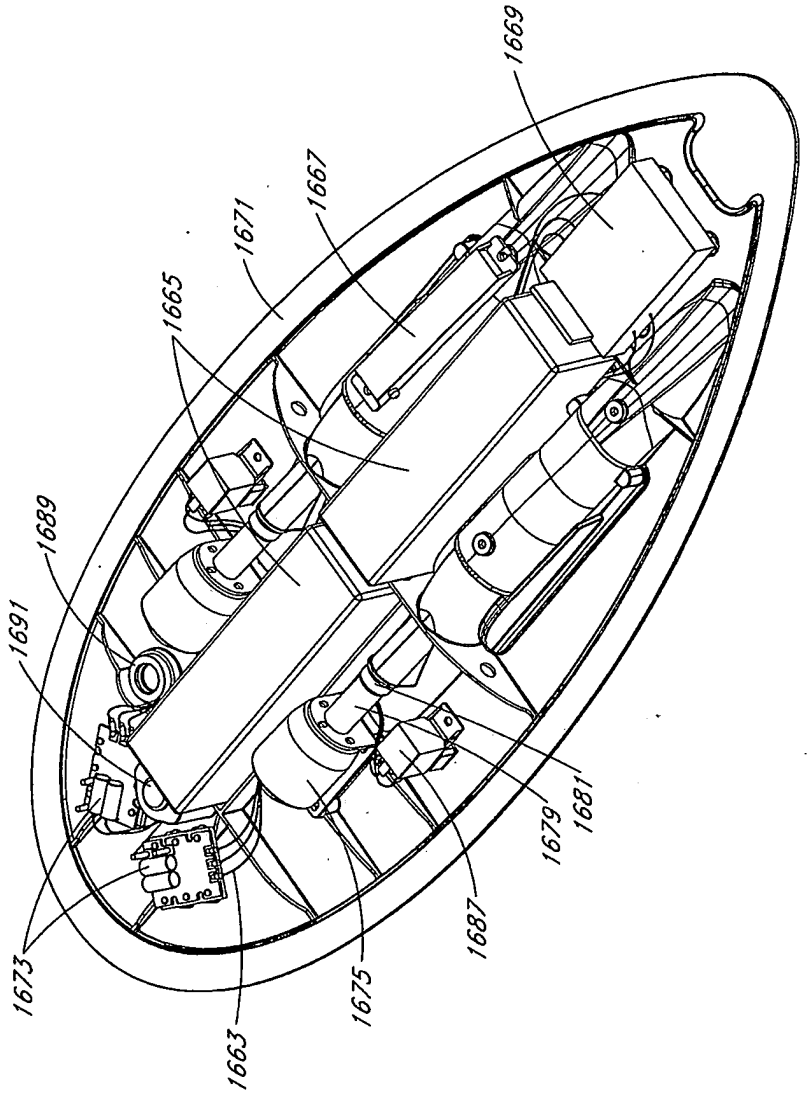


FIG. 19

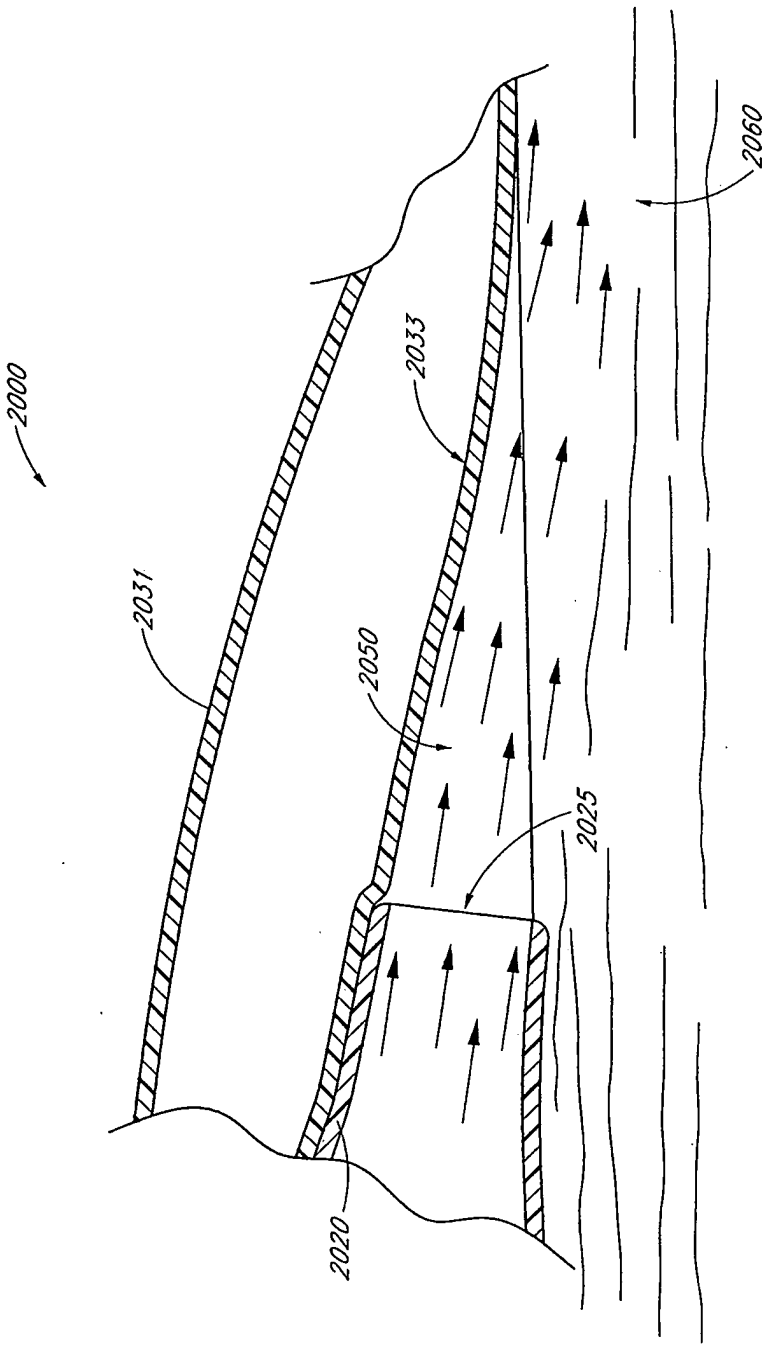


FIG. 20

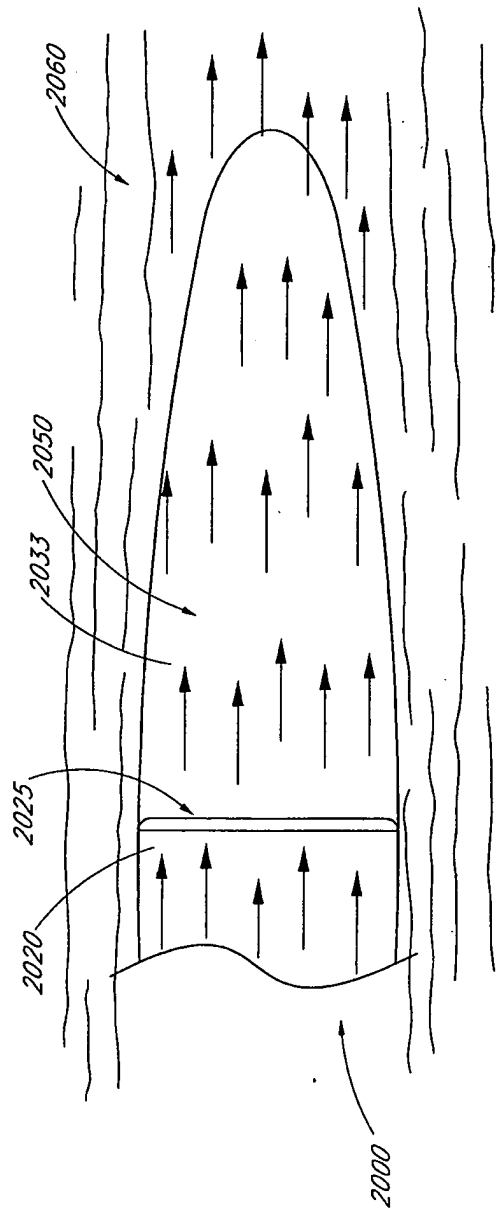


FIG. 21

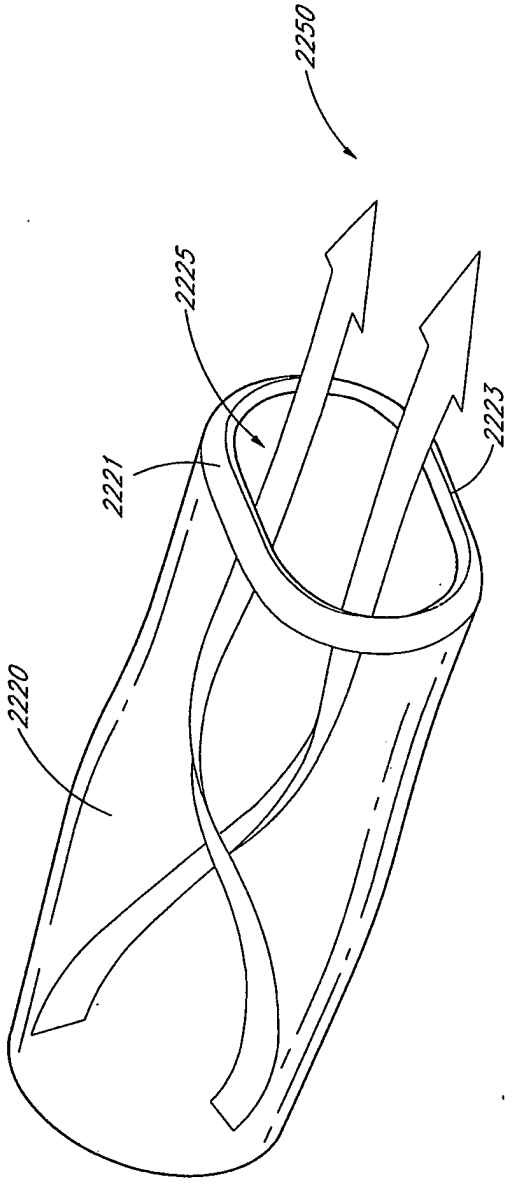


FIG. 22

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/042617

A. CLASSIFICATION OF SUBJECT MATTER
INV. B63B35/79
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2003 026085 A (YAMAHA MOTOR CO LTD) 29 January 2003 (2003-01-29) abstract; figure 6 -----	1-29
X	JP 2002 193185 A (YAMAHA MOTOR CO LTD) 10 July 2002 (2002-07-10) abstract; figures 1-5 -----	1-7, 10-27, 30-35
A	DE 20 2006 000210 U1 (MOLITOR JEAN [DE]) 16 March 2006 (2006-03-16) page 3, column 1, lines 29-38; figures 1-9 ----- -/--	1-6, 10-13,25

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 October 2011	26/10/2011

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Vermeulen, Tom

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/042617

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3 536 025 A (TIERNEY BERNARD C) 27 October 1970 (1970-10-27) the whole document	1,8, 14-18, 21,22, 24-27, 31,35
A	US 5 582 529 A (MONTGOMERY ROBERT E [US]) 10 December 1996 (1996-12-10) column 8, line 46 - column 11, line 60; figures 2-13	1-3,7, 10,14, 15, 17-22, 25-27, 31,33,35
A	US 2009/165690 A1 (WALWORTH CHRISTOPHER J [US] ET AL) 2 July 2009 (2009-07-02) paragraphs [0029], [0035] - [0037]; figures	1-6, 8-10,24, 25,28-30
A	DE 10 2004 049615 A1 (ROTINOR GMBH [DE]) 13 April 2006 (2006-04-13) paragraph [0037]; figures	1,8,25, 30

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/042617

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
21 November 2013 (21.11.2013)

WIPO | PCT

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WO 2013/173182 A1

(51) International Patent Classification:
A63H 33/00 (2006.01) *A63H 13/00* (2006.01)
A63H 3/26 (2006.01) *A63H 33/42* (2006.01)

(21) International Application Number:
PCT/US2013/040510

(22) International Filing Date:
10 May 2013 (10.05.2013)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

61/647,910	16 May 2012 (16.05.2012)	US
29/447,627	5 March 2013 (05.03.2013)	US
13/788,355	7 March 2013 (07.03.2013)	US

(72) Inventor; and
(71) Applicant : **THOMPSON, Joe, Lee** [US/US]; 3300 Horse Trail Court, Merritt Island, FL 32953 (US).

(74) Agent: **STEINBERGER, Brian, S.**; 101 Brevard Avenue, Cocoa, FL 32922 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*
— *with amended claims (Art. 19(1))*

(54) Title: TOY SURFBOARD

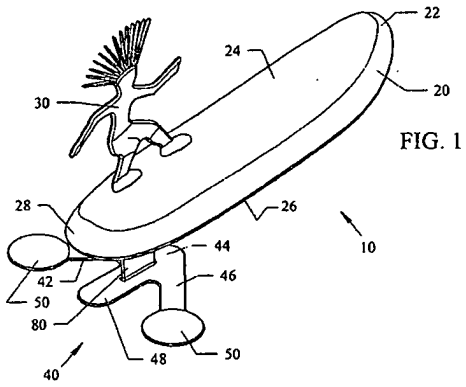


FIG. 1

(57) Abstract: Toy surfboard toys and methods of a figurine mounted on a surfboard with hydrofoil allowing the surfboard to ride incoming waves back to a shore. The hydrofoil can have a V or boomerang shape with side wings having ends extending rearward and out from the surfboard. Wing ends can be curved discs for stability. Optional stabilizing tail/fin/rudder can extend rearward from the hydrofoil. Games can include racing toys by tossing them simultaneously from the shore to see which one reaches the shore first.

WO 2013/173182 A1

TOY SURFBOARD

CROSS REFERENCE TO RELATED APPLICATIONS

This invention claims the benefit of priority to U.S. Patent Application Serial No. 13/788,355 filed March 7, 2013, and U.S. Provisional Patent Application Serial No. 61/647,910 filed May 16, 2012 and U.S. Design Patent Application Serial No. 29/447,627 filed March 5, 2013. The entire disclosure of each of the applications listed in this paragraph are incorporated herein by specific reference thereto.

FIELD OF INVENTION

This invention relates to toys, and in particular to a toy surfboard devices, apparatus and methods of playing a game with a figurine mounted on a surfboard and a hydrofoil rudder underneath the board for allowing the surfboard to ride incoming waves back to a shoreline.

BACKGROUND AND PRIOR ART

Popular marketed water toys over the years have generally included balls and blow up toys which may be fun to some but would have limited fun to surfers. Traditional many toys such as dolls and the like, may also sink in the water or float out to sea, both of which would not be

desirable. The inventor is not aware of any marketed surfboard toys that would be popular with surfers and beachgoers that is able to take advantage of the direction and power of incoming waves found along ocean and large lake shorelines.

A check of the U.S. Patent Office database has shown that some patents on toy type surfboards have been proposed in years past. See for example, U.S. Patents: Des. 312,491 to Roland; Des. 324,706 to Gibson, and 4,923,427 to Roland.

Although both Roland patents reference having heavy keels/fins, these toys are primarily for show. The downwardly protruding keels/fins would have difficulty in balancing the toy surfboard and keeping the surfboard in an upright position in the water.

Gibson '706 shows a surfer doll on top of a toy surfboard. The large mass of the doll compared to the thin toy board and single fin would not be able to balance in the water and would top be able to ride waves coming to shore at a beach. The top heavy doll would undoubtably cause the toy capsize if used in the water without someone's hand holding the toy upright.

Furthermore, there is a good chance that Gibson '706 and possibly the Roland products would end up floating away and not being able to return to the shoreline which could result in the loss of these toys.

Thus, the need exists for solutions to the above problems with the prior art.

SUMMARY OF THE INVENTION

A primary objective of the present invention is to provide toy surfboard devices, apparatus and methods of playing a game with a figurine mounted on a surfboard and a hydrofoil rudder underneath the board for allowing the surfboard to ride incoming waves back to a shoreline.

A secondary objective of the present invention is to provide toy surfboard devices, apparatus and methods of playing a game, having a buoyant surfboard with a weighted hydrofoil which offsets the weight of a figurine mounted on the board which is able to continuously float on water in an upright position.

A third objective of the present invention is to provide toy surfboard devices, apparatus and methods of playing a game, having figurines that can interchangeably be mounted to the top of the surfboard.

A fourth toy surfboard devices, apparatus and methods of playing a game with a figurine mounted on a surfboard and a hydrofoil rudder underneath the board, where players can simultaneously toss or throw respective surfboard toy devices, and determine a winner of the first surfboard toy to reach the shoreline.

A fifth objective of the present invention is to provide toy surfboard devices, apparatus and methods, which turns right-side up, points toward the shore after being put into a incoming shore wave, and returns to the shore each time it is used where the toy surfs the wave to the shore.

A sixth objective of the present invention is to provide toy surfboard devices, apparatus and methods, which takes advantage of the waves at a beach, instead of being overwhelmed, where a figurine on the toy stays upright and surfs the waves all the wave to the shore.

Further objects and advantages of this invention will be apparent from the following detailed description of the presently preferred embodiments which are illustrated schematically in the accompanying drawings.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a top right perspective view of surfboard toy with mounted figurine and hydrofoil.

FIG. 2 is a top left perspective view of the surfboard toy of FIG. 1.

FIG. 3 is a bottom left perspective view of the surfboard toy of FIG. 1.

FIG. 4 is a bottom right perspective view of the surfboard toy of FIG. 1.

FIG. 5 is a side view of the surfboard toy of FIG. 1.

FIG. 6 is a top view of the surfboard toy of FIG. 1.

FIG. 7 is a bottom view of the surfboard toy of FIG. 1.

FIG. 8 is a view of the surfboard toy of FIG. 1.

FIG. 9 is a front view of the surfboard toy of FIG. 1.

FIG. 10 is a top exploded perspective view of the surfboard toy of FIG. 1.

FIG. 11 is a bottom exploded perspective view of the surfboard toy of FIG. 1.

FIG. 12 shows a user on the back-swing of throwing a surfboard toy of FIG. 1 into the breaking surf from a shoreline.

FIG. 13 shows the person in FIG. 12 throwing a toy into the breaking surf.

FIG. 14 shows the toy of FIG. 13 just after landing upside-down in the breaking surf.

FIG. 15 shows the beginning the self righting ability of the toy in FIG. 14.

FIG. 16 shows the toy of FIG. 15 fully upright. Floatation zone in noted.

FIG. 17 shows the toy of FIG. 16 floating in the breaking surf with its side to the oncoming waves.

FIG. 18 shows the toy of FIG. 17 just being caught by a breaking wave. The front three quarters of the board float free of the water allowing the assembly to rotate about the floatation zone as the wave exerts its influence. This

naturally points the nose of the floatation board in the direction of wave travel.

FIG. 19 shows the toy of FIG. 18 continuing to rotate influenced by the breaking wave.

FIG. 20 shows the toy of FIG. 19 has full oriented itself with its nose in the direction of wave travel and is "surfing "on the breaking wave.

FIG. 21 is an enlarged view of an alternative figurine that can be mounted on the surfboard toy of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Before explaining the disclosed embodiments of the present invention in detail it is to be understood that the invention is not limited in its applications to the details of the particular arrangements shown since the invention is capable of other embodiments. Also, the terminology used herein is for the purpose of description and not of limitation.

A list of the components referenced in the figures will now be described.

10 Surfboard toy.

20 Floatation board.

22 front upwardly curving end(nose)

24 top surface

26 bottom surface

28 rear end

30 Surfer figurine.

40 Hydrofoil-generally V or boomerang shape(weighted)

42 left wing/vane

44 apex

46 right wing/vane

48 stabilizing tail/rudder

50 wing end stabilizers/weights(curved portions or disc shapes).

60 figurine mounting pegs.

70 figurine mounting holes in floatation board.

80 Keel/strut member

82. mount tenon(male member).

90 Keel mount mortise in bottom of surfboard.

100 Shore surf.

110 Small breaking shore wave.

120 Person.

130 Water line.

140 Floatation zone of surfboard toy.

150 Pivot point around which Surfer Dude assembly rotates when acted upon by a breaking wave

FIG. 1 is a top right perspective view of surfboard toy 10 having floatation board 20 with mounted figurine 30 and hydrofoil 40. FIG. 2 is a top left perspective view of the

surfboard toy 10 of FIG. 1. FIG. 3 is a bottom left perspective view of the surfboard toy 10 of FIG. 1. FIG. 4 is a bottom right perspective view of the surfboard toy 10 of FIG. 1.

FIG. 5 is a side view of the surfboard toy 10 of FIG. 1 with dimensions of a preferred embodiment. FIG. 6 is a top view of the surfboard toy 10 of FIG. 1. FIG. 7 is a bottom view of the surfboard toy 10 of FIG. 1 with dimensions of a preferred embodiment. FIG. 8 is a view of the surfboard toy 10 of FIG. 1. FIG. 9 is a front view of the surfboard toy 10 of FIG. 1. FIG. 10 is a top exploded perspective view of the surfboard toy 10 of FIG. 1. FIG. 11 is a bottom exploded perspective view of the surfboard toy 10 of FIG. 1.

SURFBOARD 20

Referring to FIGURES 1-11, the novel surfboard toy 10 can include a floatation board 20 having a front upwardly curving end 22 with rounded tip and a rear end 28 with rounded edge with a top side 24 and bottom side 26. The floatation board 20 can be formed from injection molded foam, or foam rubber cut into a selected shape, or other lightweight material impervious to water. Alternatively, the board 20 can be formed from in injection molded plastic hollow housing with rubber placed inside the plastic shell..

Referring to Figures 5-7, the surfboard 20 can have dimensions of approximately 10.23 inches in length from the front end 22 to the rear end 28, and have a width of approximately 3.01 inches that tapers down at both the front end 22 and the rear end 29 to rounded tips. The thickness of the surfboard 20 can have a thickness of approximately 1.28 inches with the rear end 29 curving downward to an outer edge. The surfboard 20 has a generally flat bottom surface 26 that curves upward near the front end 22 in order to aid in lift of the surfboard when riding incoming waves.

FIGURINE 30

Referring to FIGURES 1-11 and mounted to the top surface 24 of the surfboard 20 adjacent to the rear end 28 can be surfer figurine 30 mounted thereon. The figurine 30 can have downwardly extending male members 60, such as pegs, that are insertable into figurine mounting holes(female receptacles) 70 on the top surface 24 of the surfboard 20 adjacent to the rear end 28 of the surfboard 20 as shown in FIGURES 10-11. The pegs 60 can be locked into the mounting holes 70 with waterproof glue or cement and the like.

Referring to FIG. 5, the figurine 30 can be formed from injection molded plastic and the like, and have a height from a foot portion mounted to the top surface 24 of the surfboard 20 to the top of the head portion to be

approximately 4.62 inches and a width of approximately 3.72 inches between ends of the outstretched hands. Additionally, the figurine 30 can be formed from a lightweight foam so that it will stay upright easily while being pummeled by waves as the toy 10 is being used in the surf of incoming waves. The figurine can be narrow thin stick figure turned sideways so the plane of the planar shaped body is in the same plane as the keel/strut member 80 mounted underneath the board 20. The figurine 30 can be mounted almost directly above the keel/strut member 80.

HYDROFOIL 40 and KEEL/STRUT MEMBER 80

Referring to FIGURES 1-11, and mounted underneath the surfboard 20 adjacent to the rear end 28 can be a hydrofoil 40. A generally rectangular and narrow diameter keel type strut member 80 can be turned so that one side edge faces forward and the opposite side edge faces rearward. The keel/strut member can have a upper male member (tenon) that fits into a mateable slit 90 on the bottom surface 26 of the surfboard 20 adjacent to the rear end 28 of the surfboard 20 can be locked with waterproof glue or cement and the like.

Referring to FIG. 5, the keel/strut member 80 can have a height of approximately 1.59 inches between the bottom surface 26 of the surfboard and the top of the generally

flat left wing/vane (not shown) and right wing/vane 47 of the hydrofoil 40.

Referring to FIGURES 1-11, the hydrofoil 40 can have a generally V or boomerang shape with a generally flat thin left wing/vane 42 connected to a generally flat thin right wing/vane 46 by a rounded/curved tip apex portion 44. The outer free ends of the left wing/vane 42 and right wing/vane 46 extend rearward from the apex portion and outward from the sides of the surfboard 20, and end in additional stabilizer/weighted curved portions 50. The wing end stabilizer/weighted portions 50 can be curve shaped and can include disc shapes and the like. The wing end stabilizer/weighted portions 50 can be slightly thicker with a slightly rounded top surface to add additional stabilizing weight to the hydrofoil 40. Extending rearward from the apex portion 44 can be an optional generally flat stabilizing tail rudder 46 located between the left wing/vane 42 and the right wing/vane 46.

Referring to FIGURES 5 and 7, the hydrofoil 40 can have an overall length between outer ends of the of outer stabilizing weights to be approximately 6.03 inches, and a length from the apex portion outer edge 44 to the outer end of the tail/rudder member 48 to be approximately 3.25 inches. Each of the wings/vanes 42, 46 can have a width of approximately 0.61 inches, with a width of the tail/rudder

member 48 being approximately 0.93 inches. Each of the wing end stabilizers/weights 50 can have a radius of approximately R.74, and the distance between center points of each wing end stabilizers/weights 50 from one another can be approximately 4.55 inches.

The angle between the wings/vanes 42, 46 of the generally V shape or generally boomerang shaped hydrofoil 40 can range between approximately 10 to approximately 120 degrees. A narrower range can be between approximately 22 to approximately 60 degrees, and a narrower range of a preferred embodiment can range between approximately 35 to approximately 5 degrees.

Both the keel/strut member 80 and the hydrofoil 40 can be formed from hardened plastic, that was injection molded, and can include metal layer imbedded within the plastic. The weight of the keel/strut 80 and hydrofoil 40 can be approximately 1.3 ounces, while the entire weight of the figurine 30, surfboard 20 and keel/strut member 80 with hydrofoil 40 can be approximately 2.2 ounces. As such, the weight of keel/strut member 80 and the hydrofoil 40 can easily counter-balance the lighter weight of the figurine 30 to counter balance the figurine 30 in order to keep the surfboard toy 10 in an upright floating position.

The plane of the wings 42, 46 of the hydrofoil to the generally flat bottom surface 26 of the surfboard can be

slightly angled so that the bottom surface 26 of the surfboard 20 angles upward toward the front end 22 approximately 6 degrees.

The figurine 30 can be mounted to be approximately perpendicular to the top surface 24 of the surfboard 20. The generally flat top surface 24 of the surfboard 20 can have an angle of approximately 95 degrees relative to the flat wings 42, 46 of the hydrofoil 40.

The dimensions referenced in a preferred embodiment shown and described in relation to FIGURES 5,7, 21 and 22 are approximate. The term "approximately" can be +/- 10% of the dimension numbers referenced for the preferred embodiment. The dimensions come from a preferred embodiment that has been tested in the ocean by the inventor to an effective working embodiment.

While FIGURES 5, 7, 21 and 22 show a preferred embodiment dimensions, the invention can use alternative dimensions when the toy is scaled up or scaled down to different sizes such as small as approximately 3 inches long as desired by the user.

METHOD OF PLAYING WITH THE SURFBOARD TOY

FIG. 12 shows a user 120 standing adjacent to a shoreline near the shore surf 100 and on the back-swing of

throwing a surfboard toy 10 of FIG. 1 into the breaking surf 110. FIG. 13 shows the user 120 in FIG. 12 throwing the toy surfboard 10 into the breaking surf 110 .

FIG. 14 shows the toy 10 of FIG. 13 just after landing upside-down in the breaking surf and resting on the water line 130. FIG. 15 shows the beginning the self righting ability of the toy 10 in FIG. 14. The weighted keel 80 and hydrofoil 40 will always insure that the surfboard toy 10 stays upright. FIG. 16 shows the toy 10 of FIG. 15 fully upright. Floatation zone in noted where a rear portion of the bottom surface 26 of the surfboard 20 can float on the water line 130 with the weighted hydrofoil 40 below the waterline 130.

FIG. 17 shows the toy 10 of FIG. 16 floating in the breaking surf 100 with its side to the oncoming waves.110.

FIG. 18 shows the toy 10 of FIG. 17 just being caught by a breaking wave 110. The front three quarters of the board 20 float free of the water allowing the toy 10 to rotate about the floatation zone 140 as the wave exerts its influence. This naturally points the nose (front end) 22 of the floatation board 20 in the direction of wave travel and pivots at a pivot point 15. FIG. 19 shows the toy 10 of FIG. 18 continuing to rotate influenced by the breaking wave 110.

FIG. 20 shows the toy 10 of FIG. 19 has full oriented itself with its nose 22 in the direction of wave travel and is "surfing "on the breaking wave 110.

FIG. 21 is an enlarged view of an alternative figurine 30F that can be mounted on the surfboard toy 10 of FIG. 1. The figurine 30F can have similar dimensions to the previously described figurine 30.

Additional games that can take place with the novel surfboard toys 10 can include two or more players tossing or throwing generally identical surfboard toys 10 into the surf and determining a winner when the first surfboard toy 10 reaches the shoreline.

While the invention has been described, disclosed, illustrated and shown in various terms of certain embodiments or modifications which it has presumed in practice, the scope of the invention is not intended to be, nor should it be deemed to be, limited thereby and such other modifications or embodiments as may be suggested by the teachings herein are particularly reserved especially as they fall within the breadth and scope of the claims here appended.

I claim:

1. A surfboard toy, comprising:

an elongated surfboard with front and rear ends, and top and bottom surfaces;

a figurine mounted to the top surface adjacent to the rear end of the surfboard, the figurine having a figurine weight; and

a hydrofoil mounted attached to the bottom surface of the surfboard by a vertical strut member, the hydrofoil having a left leg member and a right leg member attached to one another to form a generally V shape or boomerang shape with an apex portion attached to a bottom end of the strut member, the left leg member extending rearwardly to the left from the front end of the surfboard, the right leg member extending rearwardly to the right from the front end of the surfboard, the hydrofoil having a hydrofoil weight, wherein the hydrofoil weight is greater than the figurine weight.

2. The surfboard toy of claim 1, wherein the left leg member includes a left planar wing extending rearwardly to the left from the front end of the surfboard attached to a bottom end of the strut member, and the right leg member includes a right planar wing extending rearwardly to the right from the bottom end of the strut member.

3. The surfboard toy of claim 2, wherein the left planar wing and the right planar wing have a planar sheet configuration are in a horizontal plane so that the bottom surface of the surfboard is generally tilted upward.

4. The surfboard toy of claim 1, wherein the left leg member and the right leg member each includes a free end that extends sideways away from respective sides of the surfboard.

5. The surfboard toy of claim 4, wherein the free ends of both the left leg member and the right leg member includes a curve portion being wider than a width of the free ends of both the left leg member and the right leg member.

6. The surfboard toy of claim 5, wherein the curve portion includes a cylindrical disc shape.

7. The surfboard toy of claim 1, wherein the hydrofoil includes:

a tail member extending rearwardly from the apex portion of the hydrofoil between the left leg member and the right leg member.

8. The surfboard toy of claim 7, wherein the left leg member includes a left planar wing extending rearwardly to the left from the front end of the surfboard attached to a bottom end of the strut member, and the right leg member includes a right planar wing extending rearwardly to the right from the bottom end of the strut member, and the tail member includes a planar horizontal fin.

9. The surfboard toy of claim 8, wherein the left planar wing and the right planar wing and the tail planar fin are in a horizontal plane, and the bottom surface of the surfboard is slightly tilted upward relative to horizontal plane of the hydrofoil.

10. The surfboard toy of claim 9, wherein the free ends of both the left leg member and the right leg member includes a curve portion being wider than a width of the free ends of both the left leg member and the right leg member.

11. The surfboard toy of claim 10, wherein the curve portion includes a cylindrical disc shape.

12. The surfboard toy of claim 1, wherein the surfboard is formed from foam material.

13. The surfboard of claim 12, wherein the hydrofoil is formed from injection molded plastic with a metal insert therein and the figurine is formed from injection molded plastic.

14. A method of playing a game with a surfboard toy, comprising the steps of:

providing a an elongated surfboard with front and rear ends, and top and bottom surfaces;

mounting a figurine to the top surface adjacent to the rear end of the surfboard, the figurine having a figurine weight;

mounting a V or boomerang shaped hydrofoil to the bottom surface of the surfboard by a strut member extending downward from the bottom surface of the surfboard, the hydrofoil having a plane generally parallel to the bottom surface of the surfboard, the hydrofoil having a hydrofoil weight greater than the figurine weight;

tossing the surfboard toy from a shoreline toward incoming waves;

causing the surfboard to turn upright with the figurine standing upward; and

turning the surfboard to head back to the shoreline by the surfboard riding an incoming wave with the front end of the surfboard pointed in the direction of the shoreline.

15. The method of claim 14, wherein the step of providing the V or boomerang shaped hydrofoil includes the step of:

providing the hydrofoil with a left leg member and a right leg member attached to one another to form the V or boomerang shaped hydrofoil with an apex portion attached to a bottom end of the strut member, the left leg member extending rearwardly to the left out from the front end of the surfboard, and the right leg member extending rearwardly to the right out from the front end of the surfboard.

16. The method of claim 15, wherein the step of providing the V or boomerang shaped hydrofoil includes the step of:

providing a tail member extending rearwardly from the apex portion of the hydrofoil between the left leg member and the right leg member.

17. The method of claim 16, wherein the step of providing the V or boomerang shaped hydrofoil includes the steps of:

providing the left leg member with a left planar wing extending rearwardly to the left from the front end of the surfboard attached to a bottom end of the strut member, and

providing the right leg member with a right planar wing extending rearwardly to the right from the bottom end of the strut member, and the tail member includes a planar horizontal fin.

18. The method of claim 16, wherein the step of providing the V or boomerang shaped hydrofoil includes the step of:

providing the left planar wing and the right planar wing and the tail planar fin to be in a horizontal plane, and the bottom surface of the surfboard is generally tilted upward relative to the horizontal plane of the hydrofoil.

19. The method of claim 18, wherein the step of providing the V or boomerang shaped hydrofoil includes the step of:

providing the free ends of both the left leg member and the right leg member with a curve portion being wider than a width of the free ends of both the left leg member and the right leg member.

20. The method of claim 14, further comprising the steps of:

providing a second toy surfboard generally identical to the first toy surfboard; and

racing the second toy surfboard against the first toy surfboard by having both the first and second toy surfboards being tossed out simultaneously to incoming waves from a shoreline; and

determining a winner when one of the first and the second toy surfboards reaches the shoreline first.

21. The surfboard toy of claim 1, wherein the figurine is mounted to the top surface adjacent to the rear end of the surfboard by a male prong member inserted into a female socket opening.

22. The surfboard toy of claim 21, wherein the male prong member includes a pair of male prong members, each prong member extending down from a foot portion of the figurine and being mateable into respective socket openings in the top surface of the surfboard.

23. The surfboard toy of claim 1, wherein the hydrofoil is mounted to the bottom surface of the surfboard by an upper end of the vertical strut member being mateably received into an opening underneath the surfboard.

24. The surfboard toy of claim 23, wherein the upper end of the vertical strut member is a rectangular planar shape that mateably fits into a slit size opening underneath the surfboard.

AMENDED CLAIMS
received by the International Bureau on 11 October 2013.

1. A surfboard toy, comprising:

an elongated surfboard with front and rear ends, and top and bottom surfaces and left side edges and right side edges;

a figurine mounted to the top surface adjacent to the rear end of the surfboard, the figurine having a figurine weight; and

a hydrofoil mounted attached to the bottom surface of the surfboard by a vertical strut member, the hydrofoil having a left leg member with a front portion and a free end, and a right leg member with a front portion and a free end, the front portion of the left leg member attached to the front portion of the right leg member to form a generally V shape or boomerang shape with an apex portion attached to a bottom end of the strut member, the free end of the left leg member extending rearwardly to the left from the front end of the surfboard, the free end of the right leg member extending rearwardly to the right from the front end of the surfboard, the free end of the left leg member having additional weight located away from and outside of the left side edges of the surfboard, the free end of the right leg member having additional weight located away from and outside of the right side edges of the surfboard, the hydrofoil having an overall hydrofoil weight, wherein the hydrofoil weight is greater than the figurine weight, wherein a majority of weight of the left leg member and a majority of weight of the right leg member are located away from and outside the left side edges and the right side edges of the surfboard.

2. The surfboard toy of claim 1, wherein the left leg member includes a left planar wing extending rearwardly to the left from the front end of the surfboard attached to a bottom end of the strut member, and the right leg member includes a right planar wing extending rearwardly to the right from the bottom end of the strut member.

3. The surfboard toy of claim 2, wherein the left planar wing and the right planar wing have a planar sheet configuration are in a horizontal plane so that the bottom surface of the surfboard is generally tilted upward.

4 (Canceled).

5. The surfboard toy of claim 1, wherein the free ends of both the left leg member and the right leg member includes a curve portion being wider than a width of the free ends of both the left leg member and the right leg member.

6. The surfboard toy of claim 5, wherein the curve portion includes a cylindrical disc shape.

7. The surfboard toy of claim 1, wherein the hydrofoil includes:

a tail member extending rearwardly from the apex portion of the hydrofoil approximately midway between the left leg member and the right leg member.

8. The surfboard toy of claim 7, wherein the left leg member includes a left planar wing extending rearwardly to the left from the front end of the surfboard attached to a bottom end of the strut member, and the right leg member includes a right planar wing extending rearwardly to the right from the bottom end of the strut member, and the tail member includes a planar horizontal fin.

9. The surfboard toy of claim 8, wherein the left planar wing and the right planar wing and the tail planar fin are in a horizontal plane, and the bottom surface of the surfboard is slightly tilted upward relative to horizontal plane of the hydrofoil.

10. The surfboard toy of claim 9, wherein the free ends of both the left leg member and the right leg member includes a curve portion being wider than a width of the free ends of both the left leg member and the right leg member.

11. The surfboard toy of claim 10, wherein the curve portion includes a cylindrical disc shape.

12. The surfboard toy of claim 1, wherein the surfboard is formed from foam material.

13. The surfboard of claim 12, wherein the hydrofoil is formed from injection molded plastic with a metal insert therein and the figurine is formed from injection molded plastic.

14. A method of playing a game with a surfboard toy, comprising the steps of:

providing an elongated surfboard with front and rear ends, and top and bottom surfaces, and left side edges and right side edges;

mounting a figurine to the top surface adjacent to the rear end of the surfboard, the figurine having a figurine weight;

mounting a V or boomerang shaped hydrofoil to the bottom surface of the surfboard by a strut member extending downward from the bottom surface of the surfboard, the hydrofoil having a plane generally parallel to the bottom surface of the surfboard, the hydrofoil having a left leg with a front portion and a free end, and a right leg with a front portion and a free end, the front portion of the left leg being attached to the front

portion of the right leg, with the free end of the left leg extending rearwardly from the front end of the surfboard, and the free end of the right leg extending rearwardly from the front end of the surfboard, the free end of the left leg member having additional weight located away from and outside of the left side edges of the surfboard, the free end of the right leg member having additional weight located away from and outside of the right side edges of the surfboard, the hydrofoil having an overall hydrofoil weight greater than the figurine weight, wherein a majority of weight of the left leg member and a majority of weight of the right leg member are located away from and outside the left side edges and the right side edges of the surfboard;

tossing the surfboard toy from a shoreline toward incoming waves;

causing the surfboard to turn upright with the figurine standing upward; and

turning the surfboard to head back to the shoreline by the surfboard riding an incoming wave with the front end of the surfboard pointed in the direction of the shoreline.

AMENDED SHEET (ARTICLE 19)

15. The method of claim 14, wherein the step of providing the V or boomerang shaped hydrofoil includes the step of: providing the hydrofoil with a left leg member and a right leg member attached to one another to form the V or boomerang shaped hydrofoil with an apex portion attached to a bottom end of the strut member, the left leg member extending rearwardly to the left out from the front end of the surfboard, and the right leg member extending rearwardly to the right out from the front end of the surfboard.

16. The method of claim 15, wherein the step of providing the V or boomerang shaped hydrofoil includes the step of: providing a tail member extending rearwardly from the apex portion approximately midway between the left and the right leg members.

17. The method of claim 16, wherein the step of providing the V or boomerang shaped hydrofoil includes the steps of:

providing the left leg member with a left planar wing extending rearwardly to the left from the front end of the surfboard attached to a bottom end of the strut member, and

providing the right leg member with a right planar wing extending rearwardly to the right from the bottom end of the strut member, and the tail member includes a planar horizontal fin.

AMENDED SHEET (ARTICLE 19)

18. The method of claim 16, wherein the step of providing the V or boomerang shaped hydrofoil includes the step of:

providing the left planar wing and the right planar wing and the tail planar fin to be in a horizontal plane, and the bottom surface of the surfboard is generally tilted upward relative to the horizontal plane of the hydrofoil.

19. The method of claim 18, wherein the step of providing the V or boomerang shaped hydrofoil includes the step of:

providing the free ends of both the left leg member and the right leg member with a curve portion being wider than a width of the free ends of both the left leg member and the right leg member.

20. The method of claim 14, further comprising the steps of:

providing a second toy surfboard generally identical to the first toy surfboard; and

racing the second toy surfboard against the first toy surfboard by having both the first and second toy surfboards being tossed out simultaneously to incoming waves from a shoreline; and

determining a winner when one of the first and the second toy surfboards reaches the shoreline first.

AMENDED SHEET (ARTICLE 19)

21. The surfboard toy of claim 1, wherein the figurine is mounted to the top surface adjacent to the rear end of the surfboard by a male prong member inserted into a female socket opening.

22. The surfboard toy of claim 21, wherein the male prong member includes a pair of male prong members, each prong member extending down from a foot portion of the figurine and being mateable into respective socket openings in the top surface of the surfboard.

23. The surfboard toy of claim 1, wherein the hydrofoil is mounted to the bottom surface of the surfboard by an upper end of the vertical strut member being mateably received into an opening underneath the surfboard.

24. The surfboard toy of claim 23, wherein the upper end of the vertical strut member is a rectangular planar shape that mateably fits into a slit size opening underneath the surfboard.

AMENDED SHEET (ARTICLE 19)

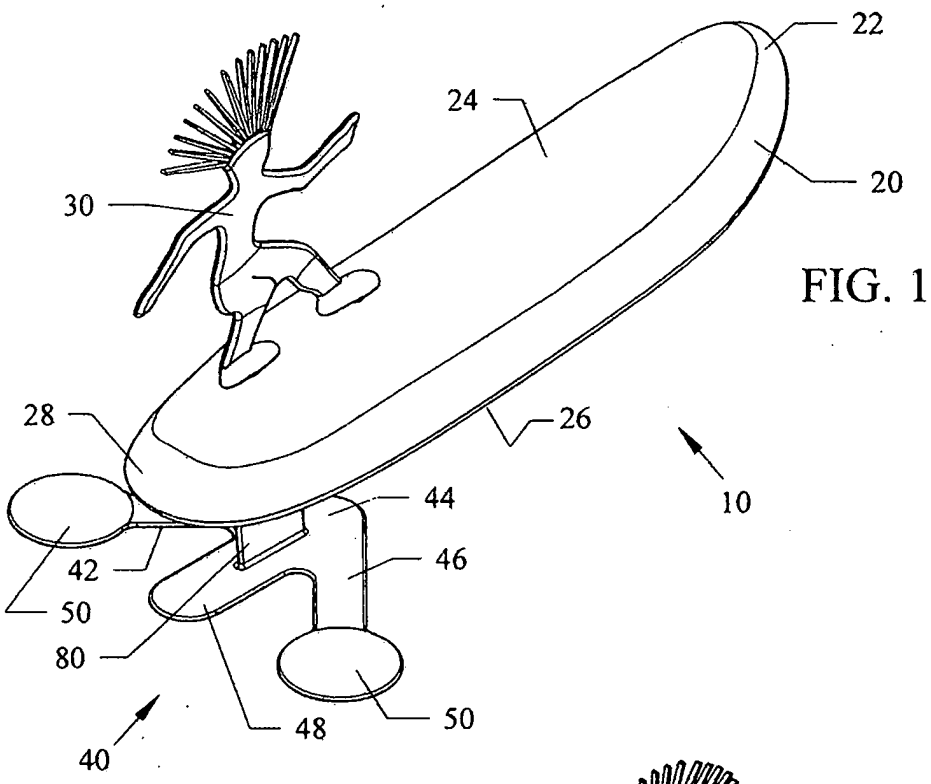

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FIG. 1

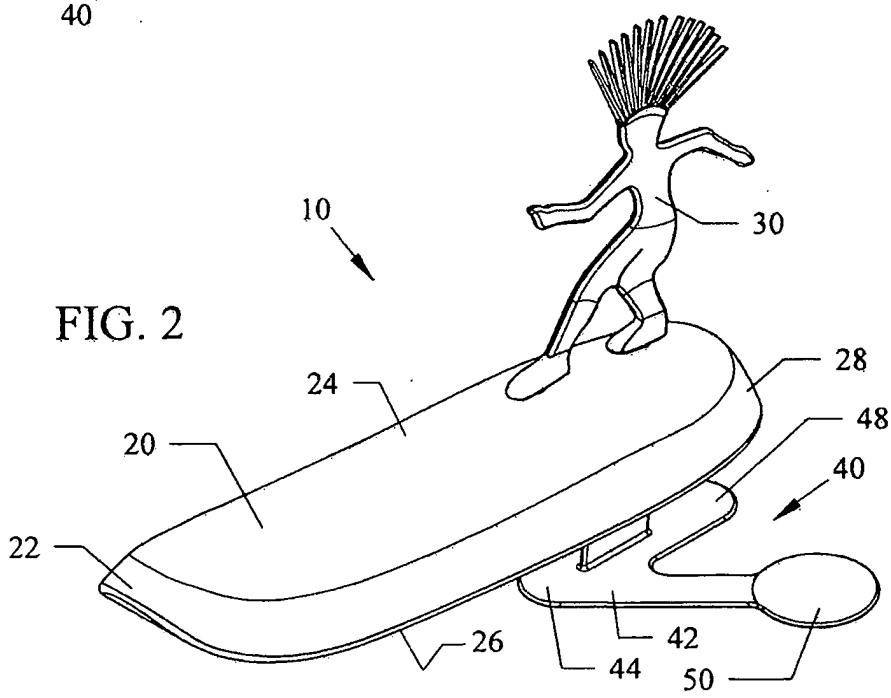

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FIG. 2

FIG. 3

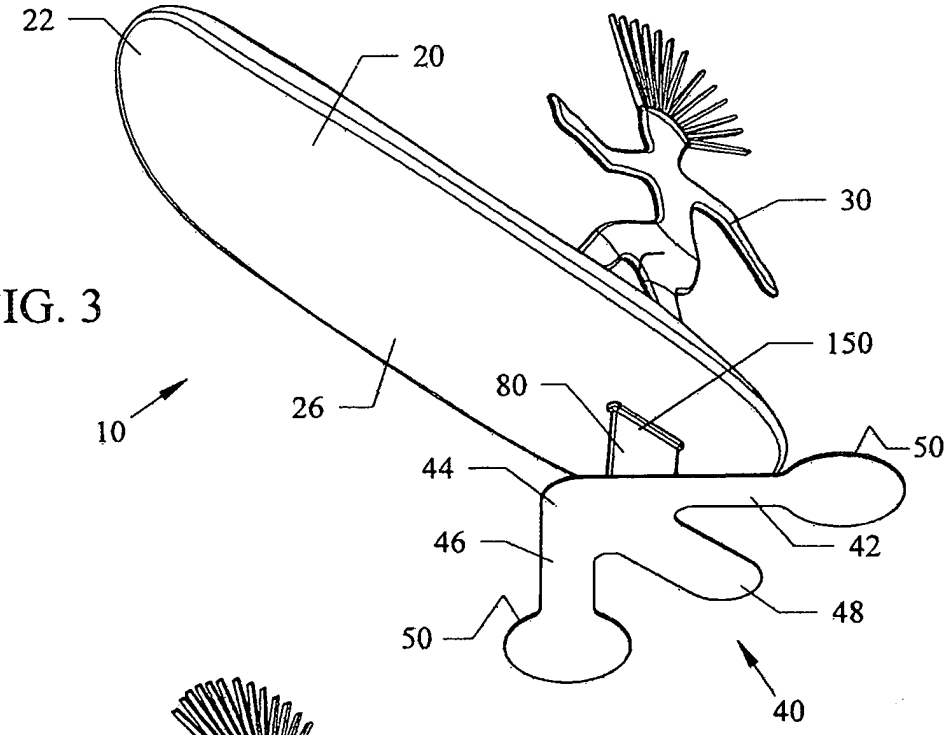

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FIG. 4

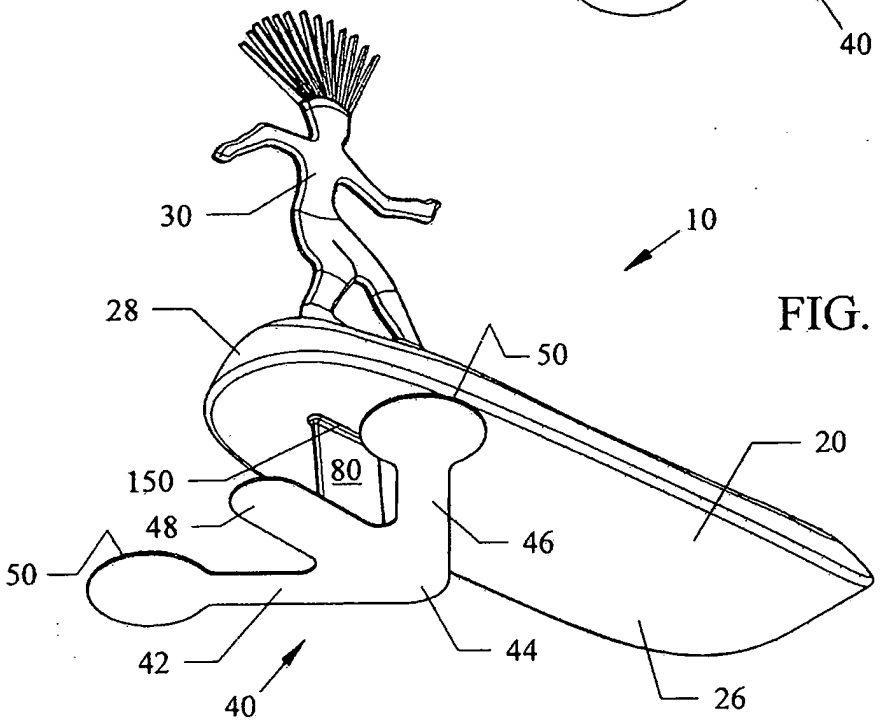
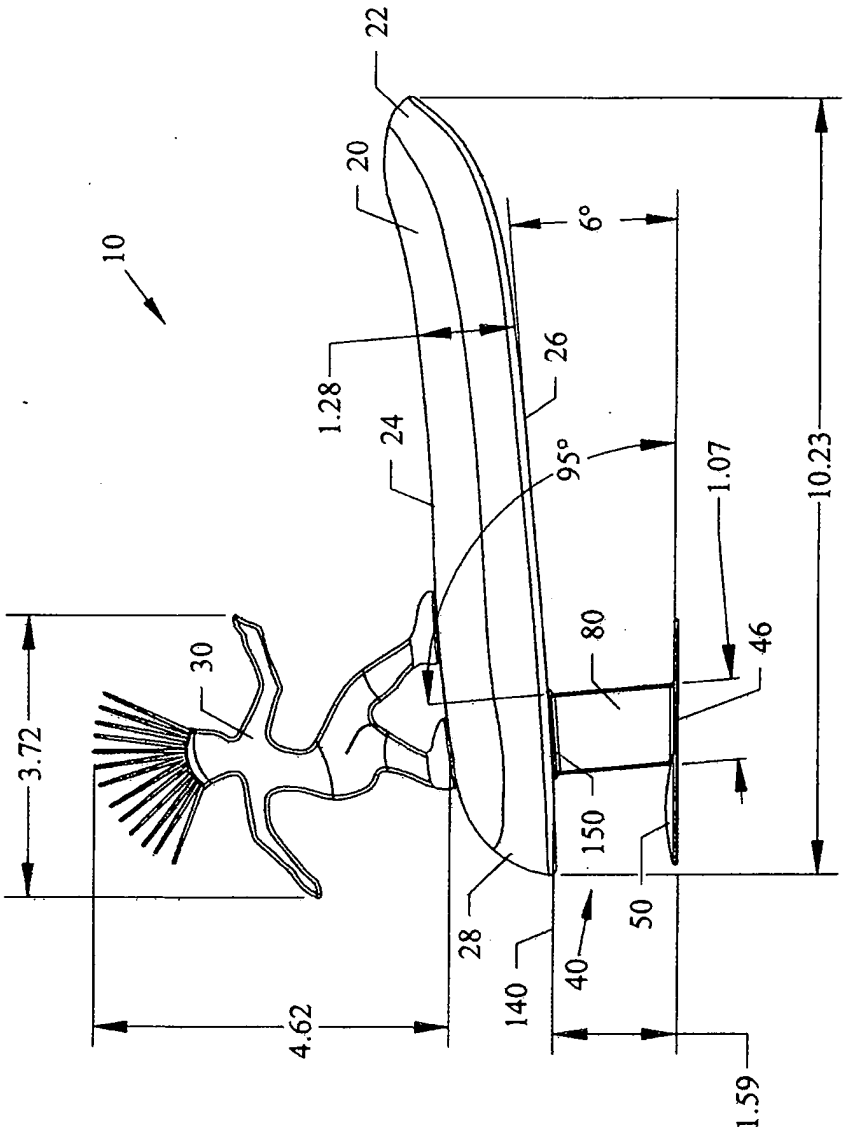

30
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42
44
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26

FIG. 5


10
22
20
6°
26
1.28
24
95°
1.07
10.23
80
46
30
3.72
150
50
28
40
140
4.62
1.59

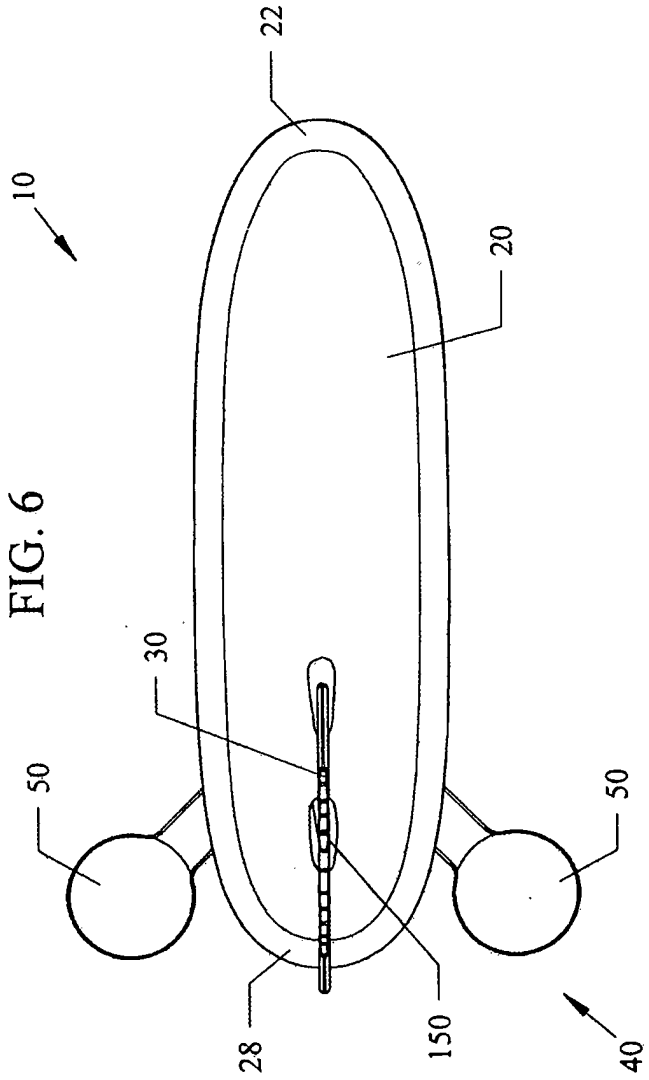


FIG. 6

FIG. 7

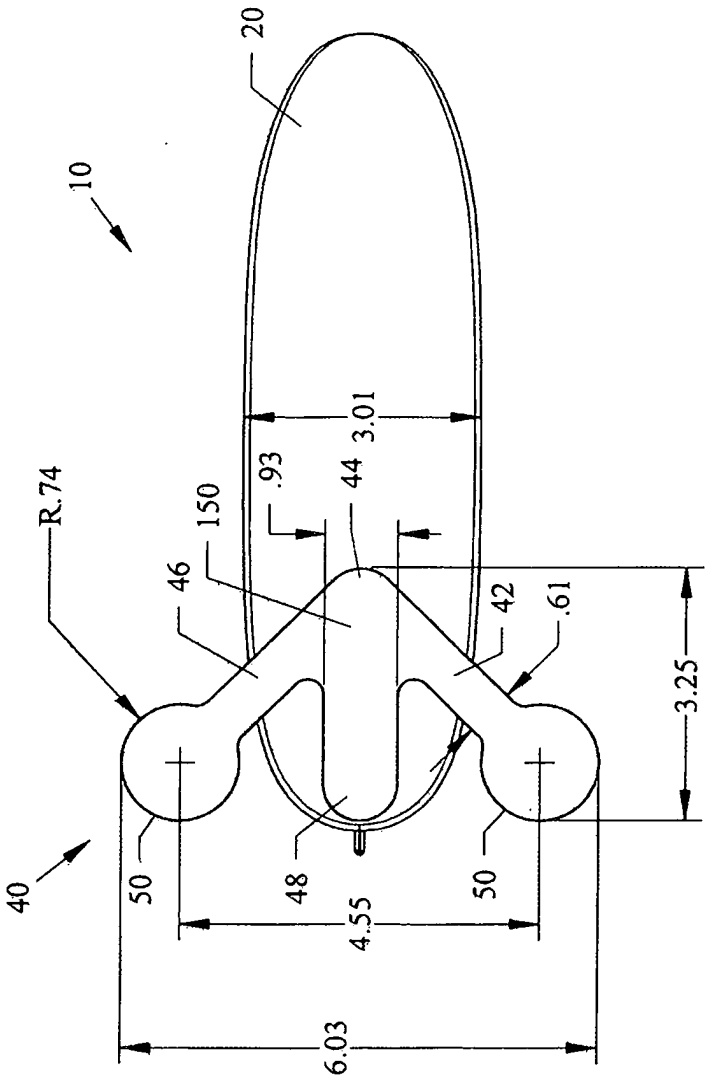


FIG. 9

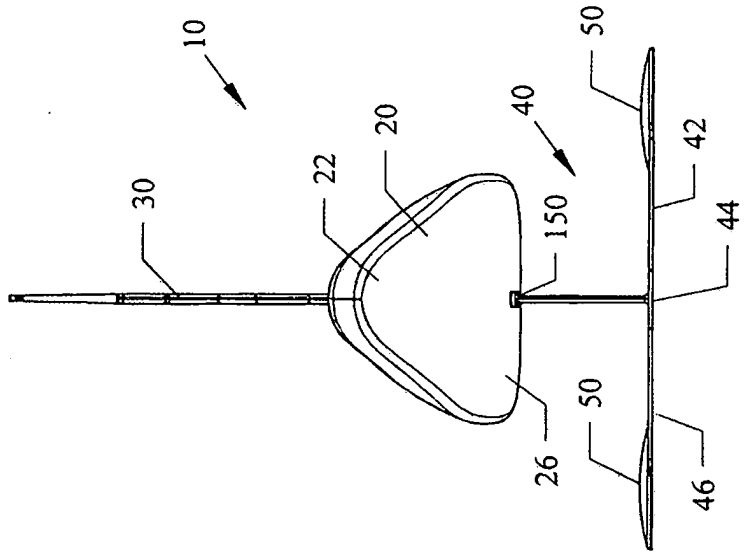

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FIG. 8

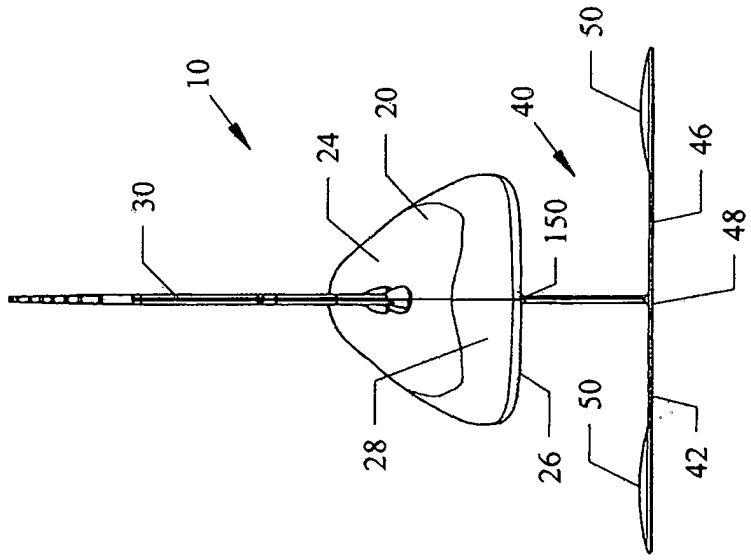

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FIG. 10

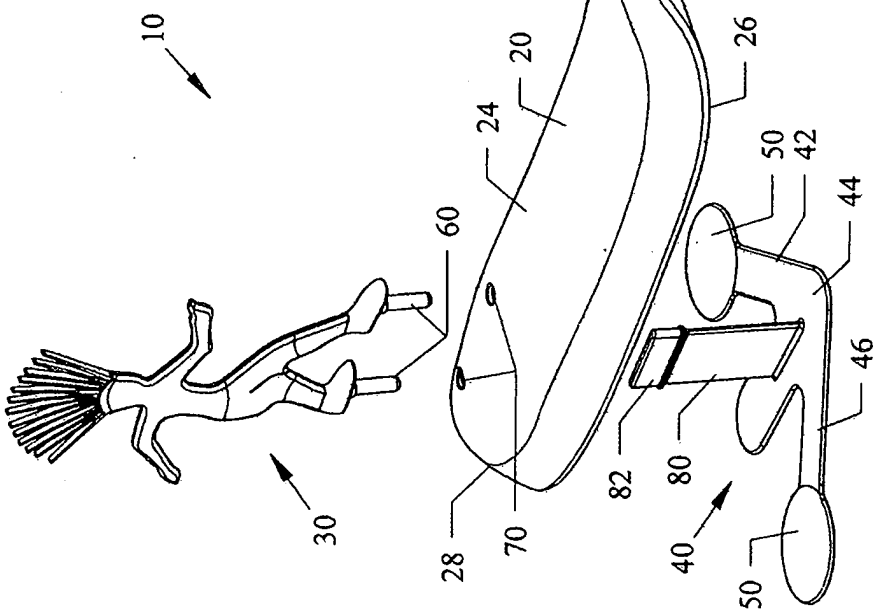

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FIG. 11

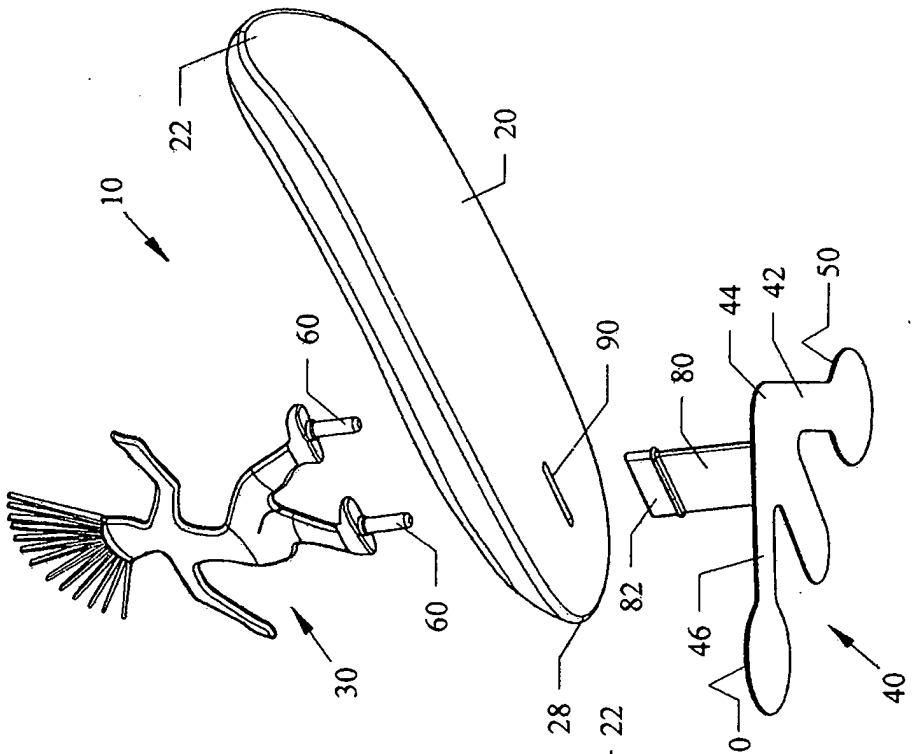

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FIG. 12

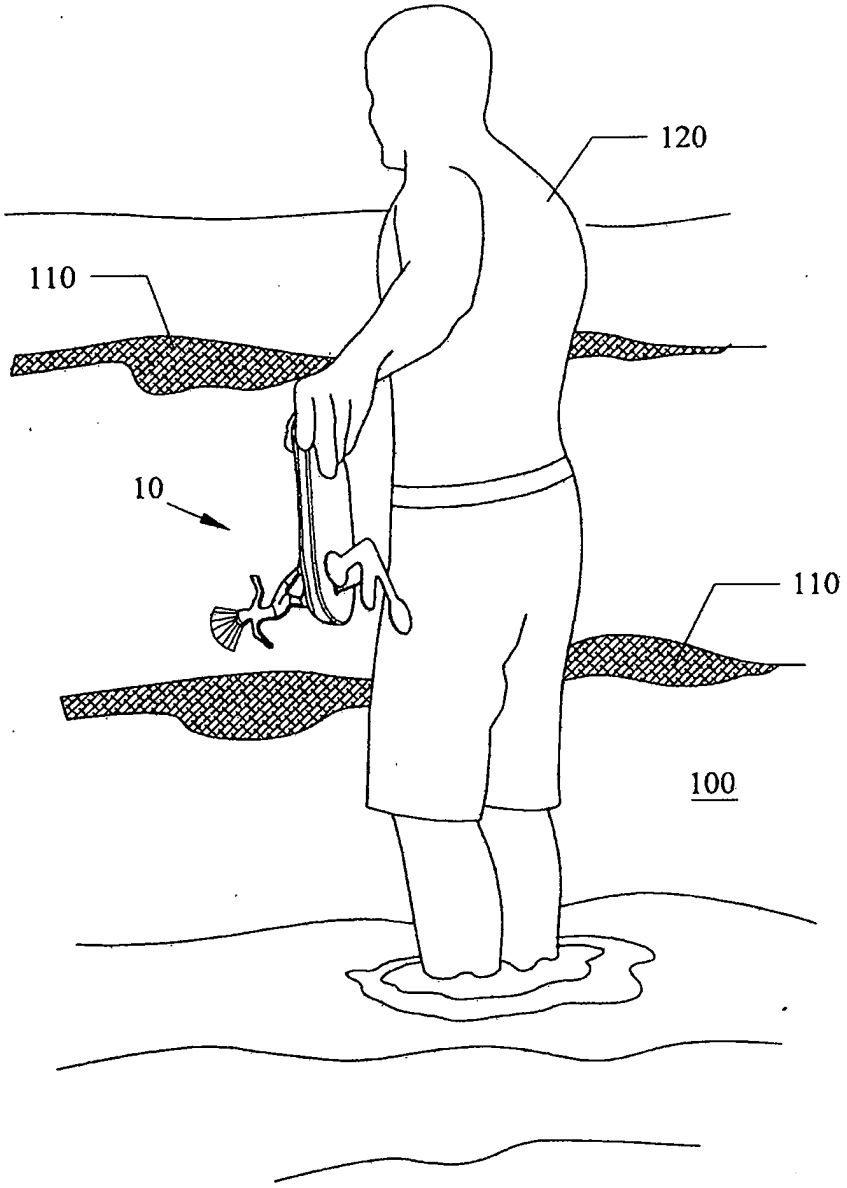
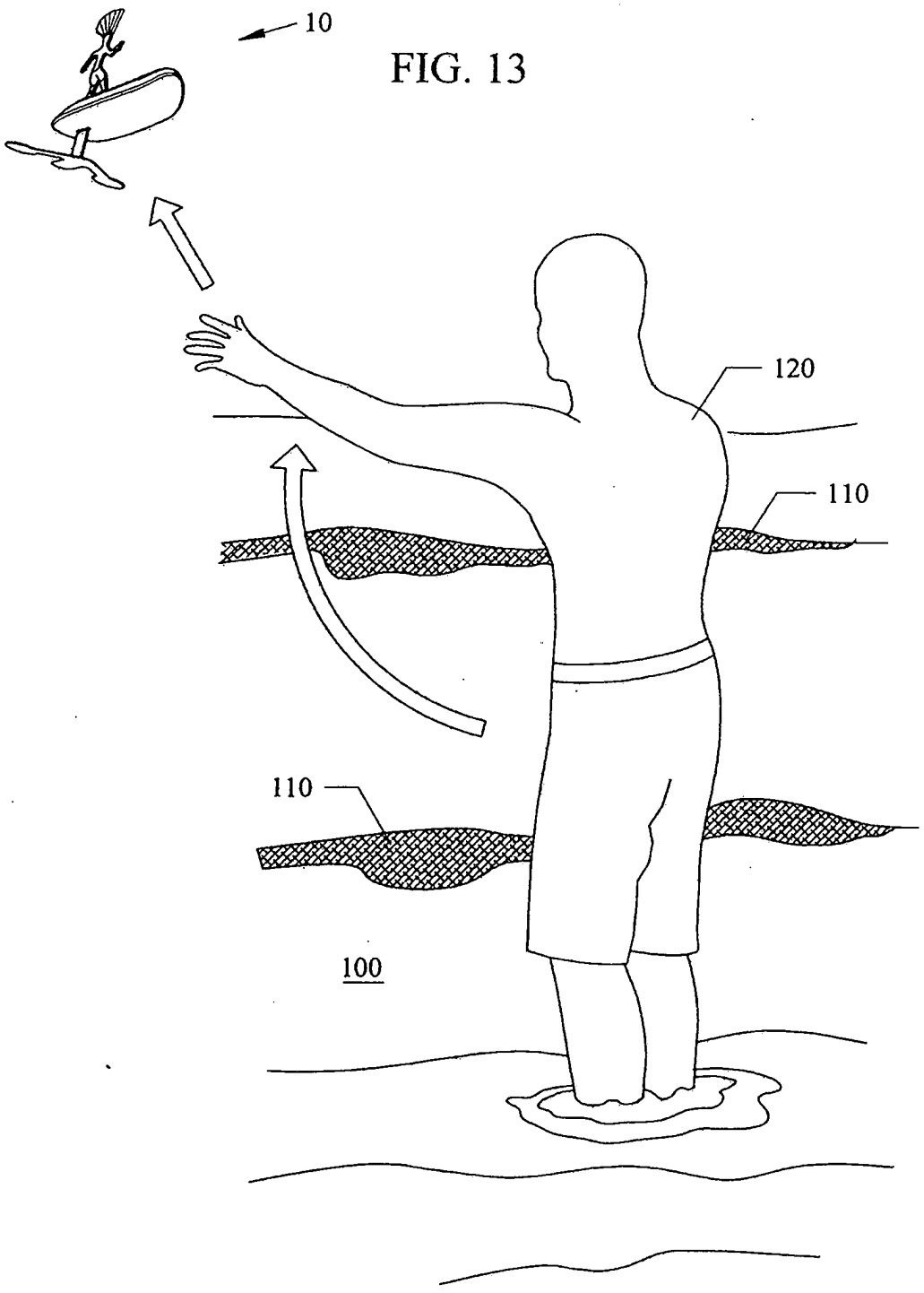


FIG. 13



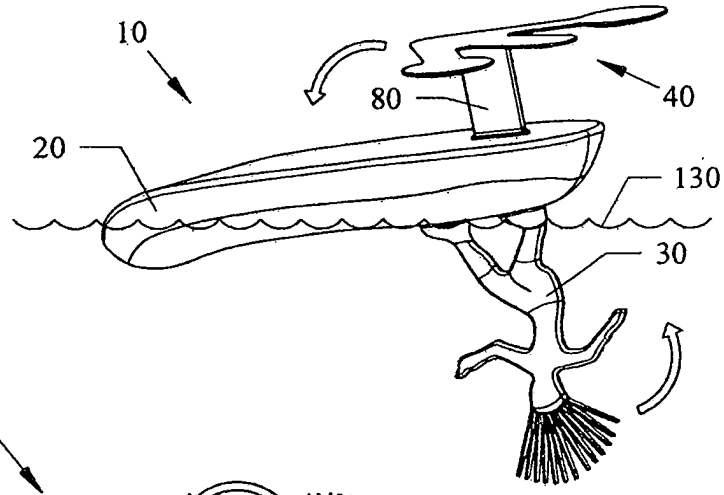


FIG. 14

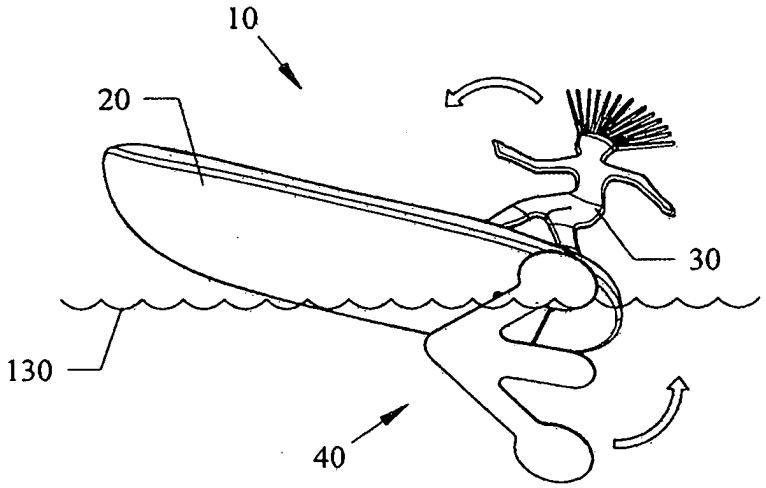


FIG. 15

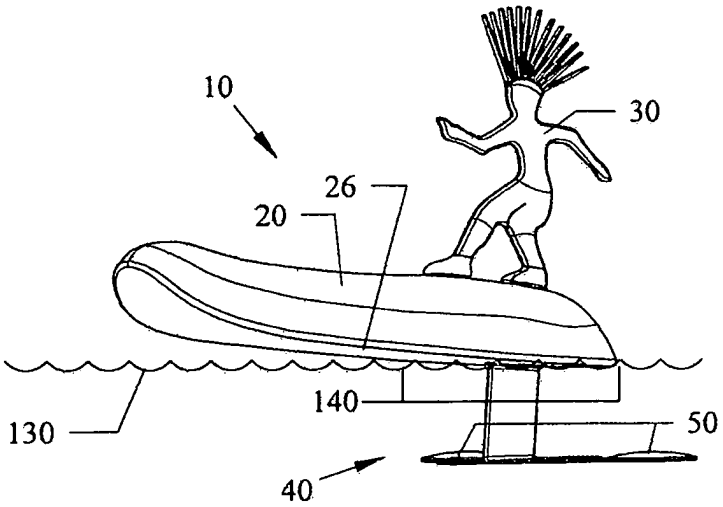


FIG. 16

FIG. 17

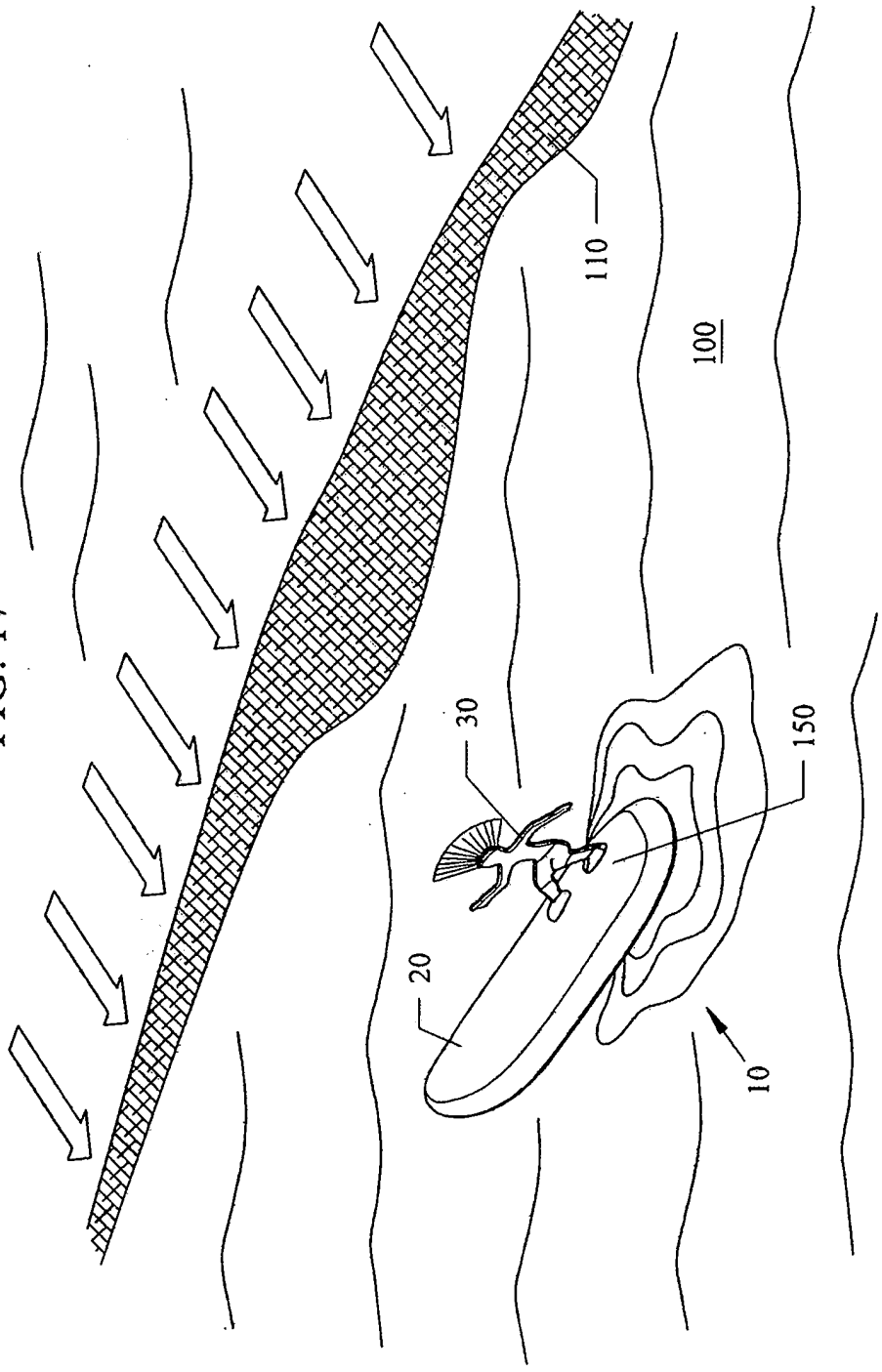


FIG. 18

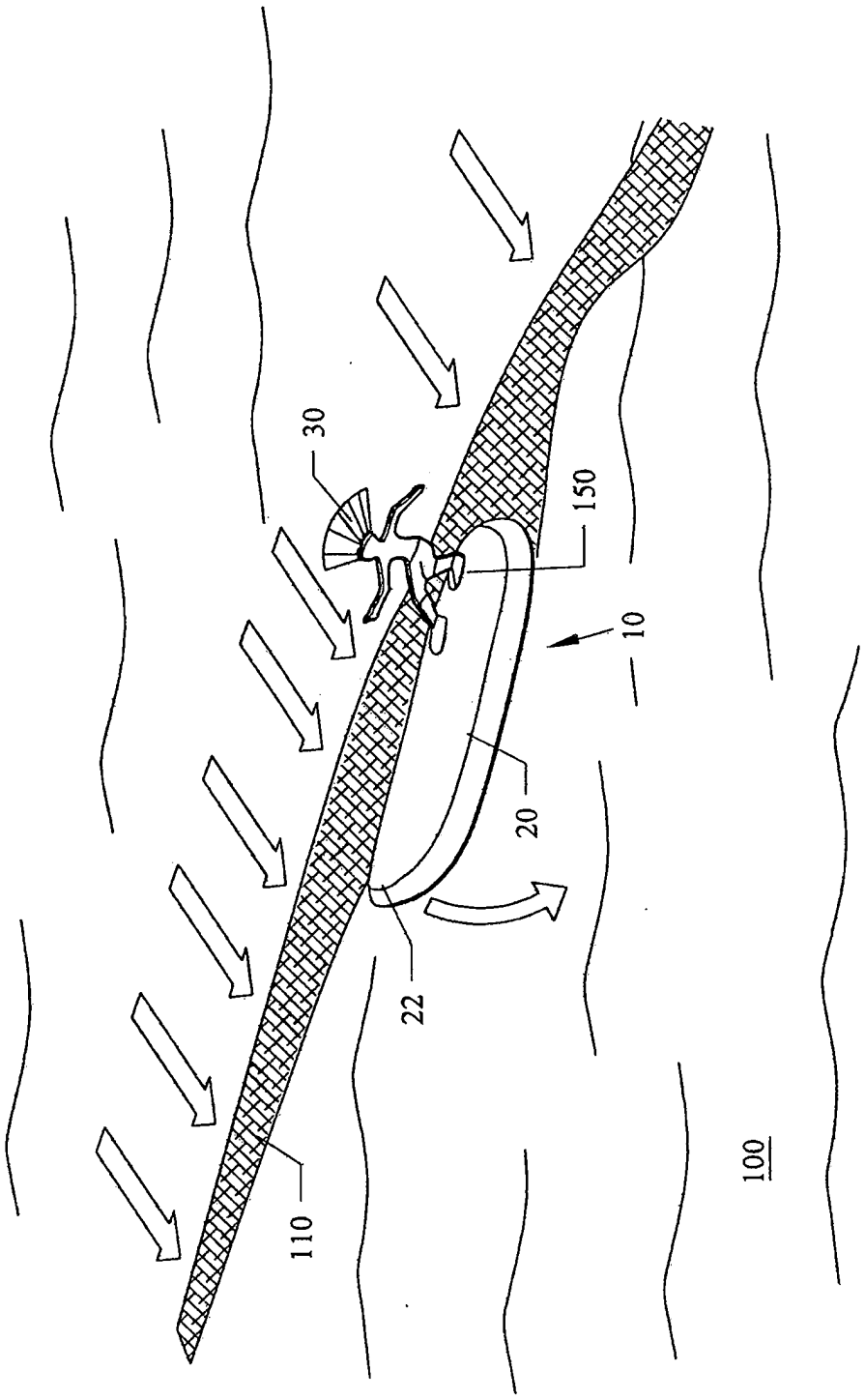


FIG. 19

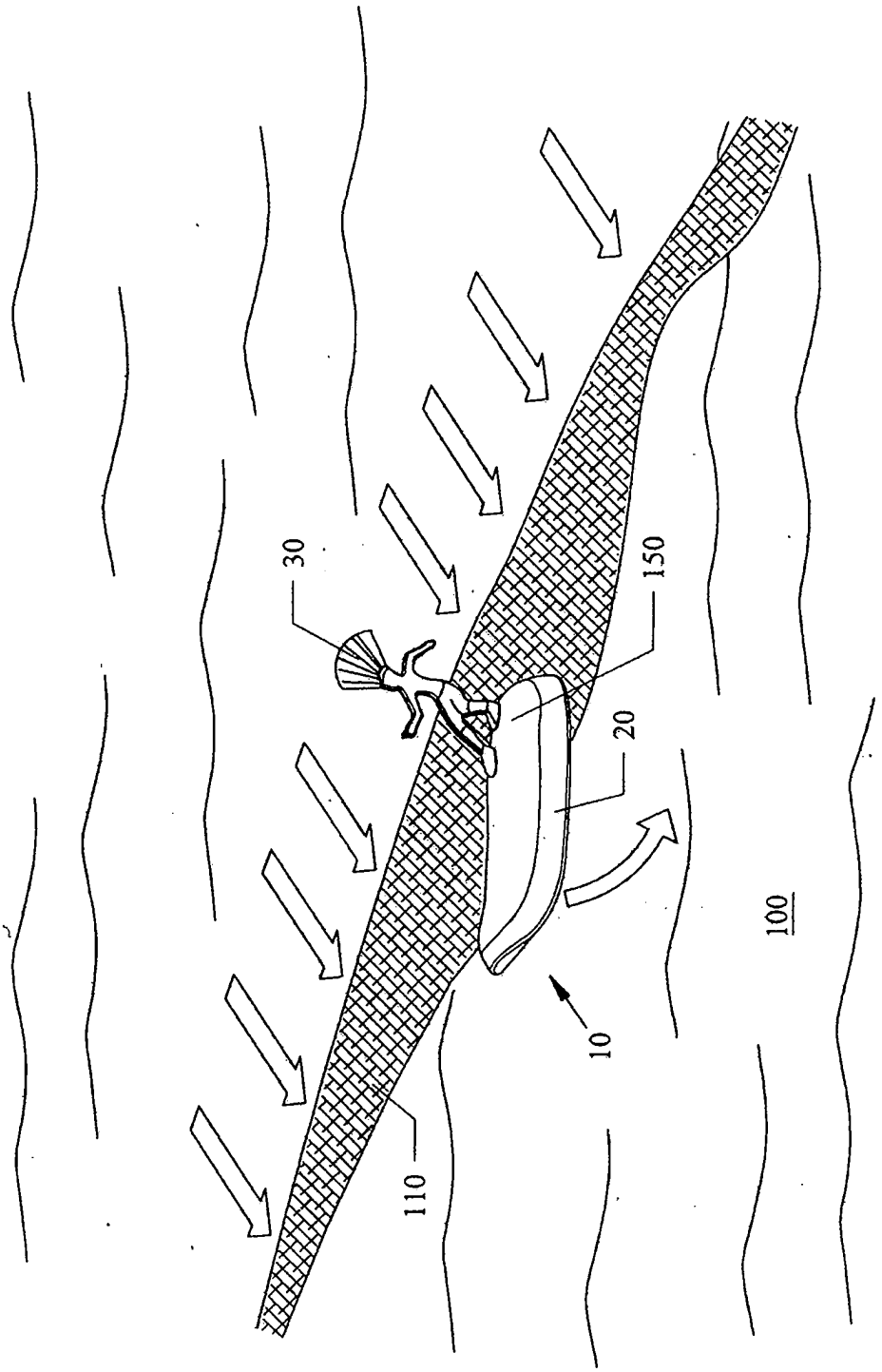


FIG. 20

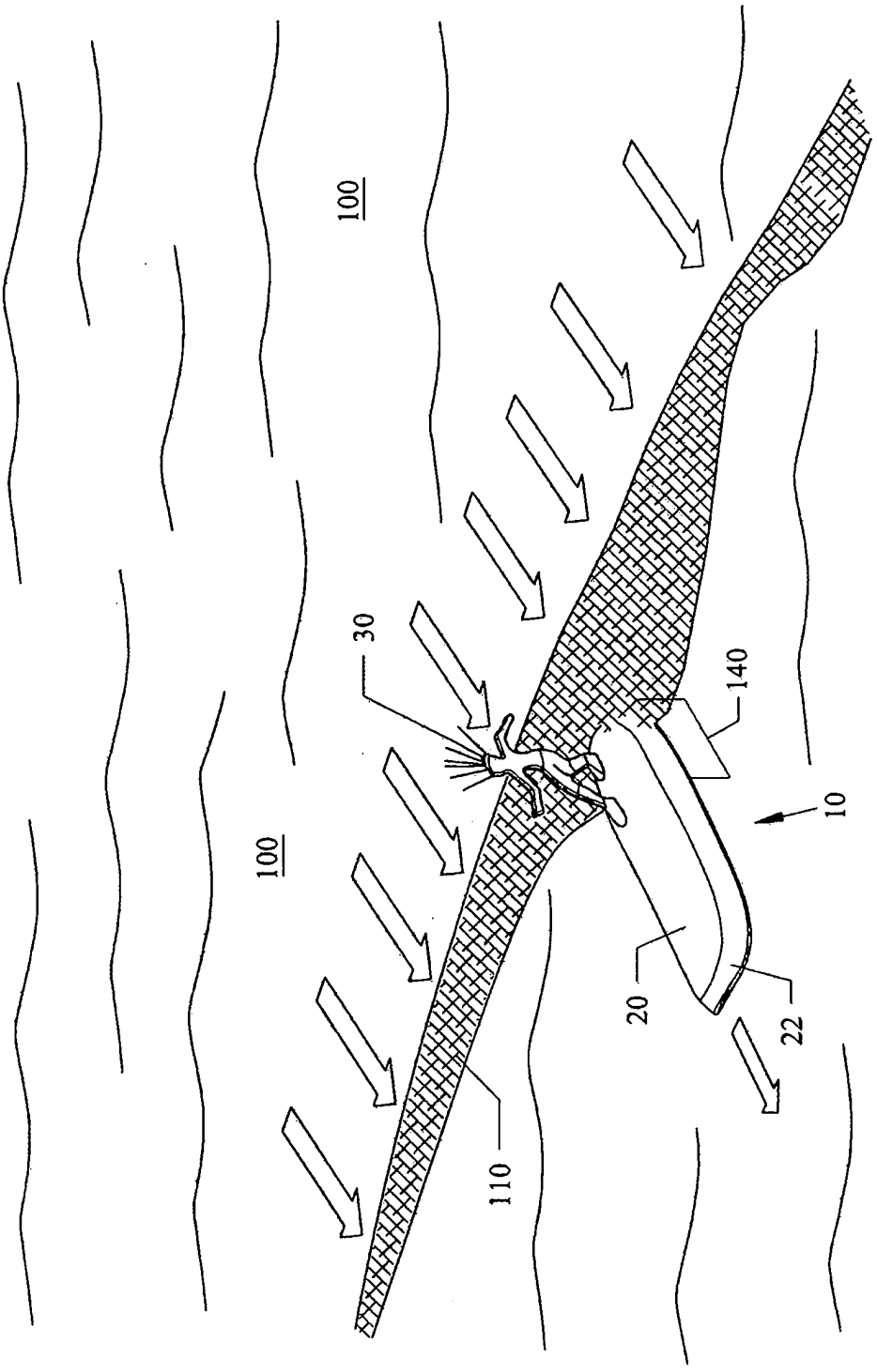
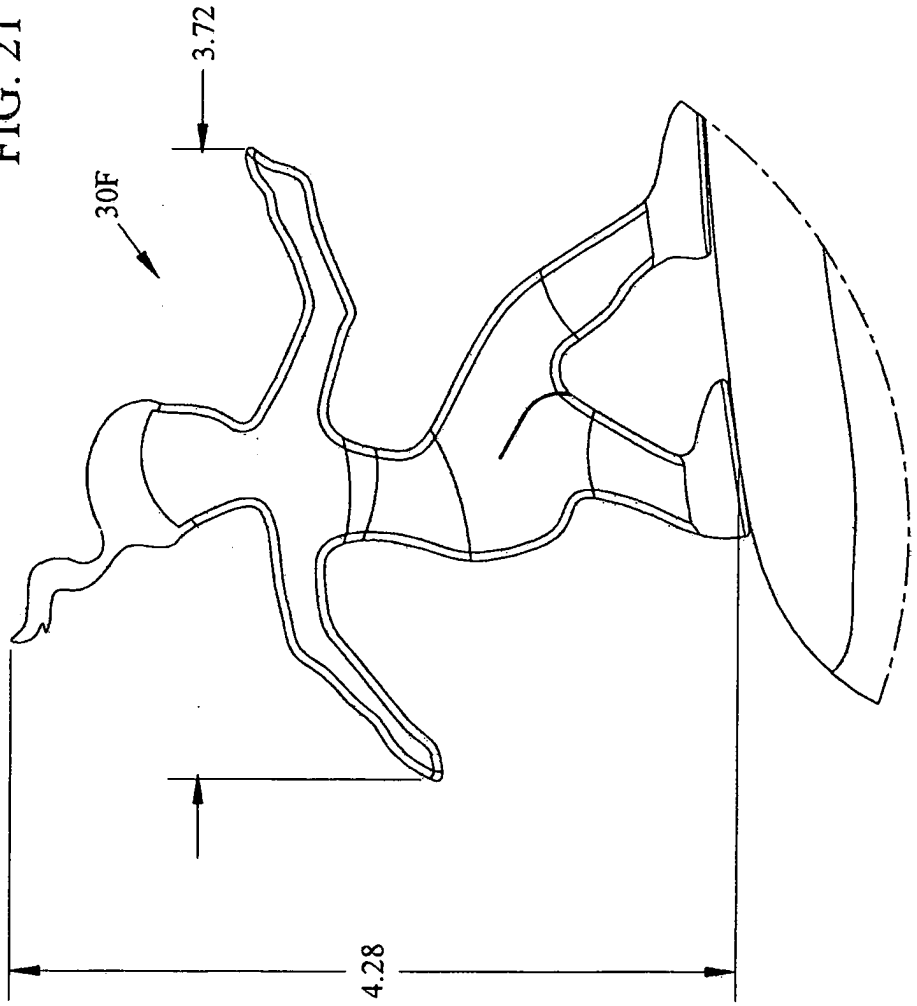


FIG. 21



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/040510

A. CLASSIFICATION OF SUBJECT MATTER

A63H 33/00(2006.01)i, A63H 3/26(2006.01)i, A63H 13/00(2006.01)i, A63H 33/42(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A63H 33/00; B63B 1/22; A63H 13/18; A63H 23/02; B63B 1/24; A63H 13/04; A63H 23/04; A63C 15/00; A63H 23/10; A63H 3/26; A63H 13/00; A63H 33/42

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords:surfboard, toy, figurine, hydrofoil and V shape

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,923,427 A (ROLAND, VINCENT) 5 May 1990 See column 2, line 33 - column 3, line 24, column 3, lines 56-62; claims 1,2,5,16 and figures 1,3,7,9.	1-24
Y	US 2005-0109257 A1 (LANG et al.) 26 May 2005 See paragraph [0028]; claim 1 and figures 2,5.	1-24
A	WO 99-48581 A1 (KLIPPO PTY. LTD.) 30 September 1999 See page 3, lines 7-13; claim 1 and figures 1,3,7.	1-24
A	US 5,063,869 A (BIELEFELDT, ERNST-AUGUST) 12 November 1991 See column 2, lines 31-50, column 4, lines 30-41; claim 1 and figures 1,2,5.	1-24
A	US 6,183,333 B1 (HALL, JASON GRANT VENABLES) 6 February 2001 See column 3, lines 21-31, column 3, lines 58-64; claim 1 and figures 1,4.	1-24

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 August 2013 (09.08.2013)	**12 August 2013 (12.08.2013)**

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea
Facsimile No. +82-42-472-7140

Authorized officer
HAN Joong Sub
Telephone No. +82-42-481-5606

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2013/040510

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4923427 A	08/05/1990	AU 1990-90389 A	28/06/1990
		AU 615980 B2	17/10/1991
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		US 6167829 B1	02/01/2001
		US 6439148 B1	27/08/2002
		US 6901873 B1	07/06/2005
		WO 02-092420 A1	21/11/2002
WO 99-48581 A1	30/09/1999	AU 1999-29159 A1	18/10/1999
US 5063869 A	12/11/1991	JP 02-109791 A	23/04/1990
US 6183333 B1	06/02/2001	AU 1998-50427 B2	06/09/2001
		JP 03775606 B2	17/05/2006
		JP 2001-504375 A	03/04/2001
		WO 98-23345 A1	04/06/1998

(12) 특허협력조약에 의하여 공개된 국제출원

(19) 세계지식재산권기구
국제사무국

(43) 국제공개일
2013 년 12 월 27 일 (27.12.2013)

WIPO | PCT

(10) 국제공개번호
WO 2013/191501 A1

(51) 국제특허분류:
B63B 35/79 (2006.01) *B63H 25/20* (2006.01)
B63H 21/17 (2006.01)

(21) 국제출원번호: PCT/KR2013/005488

(22) 국제출원일: 2013 년 6 월 21 일 (21.06.2013)

(25) 출원언어: 한국어

(26) 공개언어: 한국어

(30) 우선권정보:
10-2012-0066531 2012 년 6 월 21 일 (21.06.2012) KR

(72) 발명자; 겸
(71) 출원인 : 구권회 (KU, Kwon Hoi) [KR/KR]; 570-956 전라북도 익산시 동서로 206-7 (남중동), Jeollabuk-do (KR).

(74) 대리인: 성낙훈 (SEONG, Nak Hoon); 135-910 서울시 강남구 역삼 1 동 642-9 송촌빌딩 16 층, Seoul (KR).

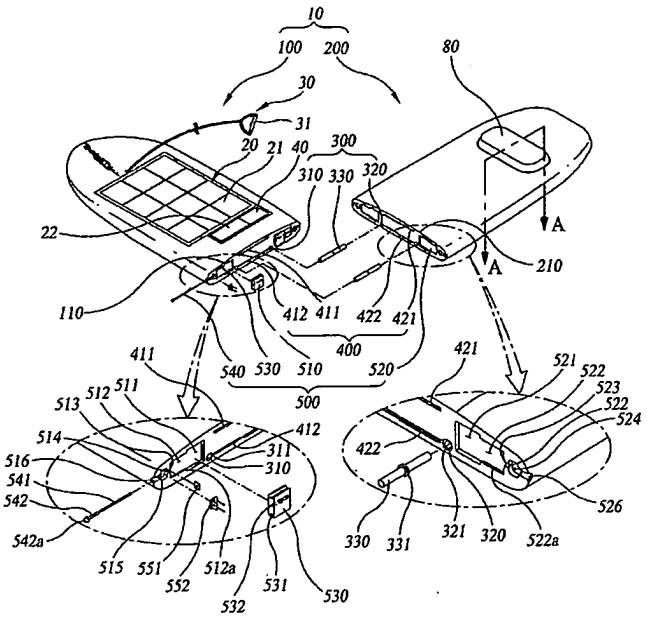
(81) 지정국 (별도의 표시가 없는 한, 가능한 모든 종류의 국내 권리의 보호를 위하여): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) 지정국 (별도의 표시가 없는 한, 가능한 모든 종류의 역내 권리의 보호를 위하여): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), 유라시아 (AM, AZ, BY, KG, KZ, RU, TJ, TM), 유럽 (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

공개:
— 국제조사보고서와 함께 (조약 제 21 조(3))

(54) Title: SURFING BOARD

(54) 발명의 명칭 : 서핑보드



(57) Abstract: Disclosed is a surfing board with a body capable of being separated into a front and a rear part, which includes: the body floating on the surface of water; a grip provided in the body; the body including a front and a rear plate lengthwise of the body; and a connecting unit arranged between the front and the rear part for connecting or separating the front and the rear part, wherein the connecting unit includes a support part used in connecting the front and the rear plate to resist against bending of the connecting unit, a guide part for guiding the connecting position of the front and the rear part, and a fastening part for interlocking firmly the front and the rear plate.

(57) 요약서: 서핑보드의 몸체를 전방과 후방으로 분리 및 결합할 수 있는 분리가능한 서핑보드에 관한 것으로, 수면에 부유하는 몸체와, 몸체에 구비되는 손잡이부를 포함하고, 몸체는, 몸체의 길이방향에 대해, 전방에 위치하는 전방판과, 후방에 위치하는 후방판을 포함하며, 전방판과 후방판 사이에는, 전방판과 후방판을 서로 분리 및 결합하는 연결부가 배치되고, 연결부는, 전방판과 후방판을 연결하고, 연결부의 휨에 대하여 대향력을 가지게 하는 지지부와, 전방판과 후방판의 결합 위치를 가이드하는 가이드부와, 전방판과 후방판의 결합 고정을 단속하는 결합부를 포함할 수 있다.

WO 2013/191501 A1

명세서

발명의 명칭: 서핑보드

기술분야

[1] 본 발명은 서핑보드에 관한 것으로, 더욱 상세하게는 서핑보드의 몸체를 전방과 후방으로 분리 및 결합할 수 있는 서핑보드에 관한 것이다.

배경기술

[2] 최근, 생활수준이 높아짐에 따라 레저활동 인구가 증가하고 있는 실정이며, 이러한 레저활동 또한 수상에서 할 수 있는 서핑이나 수상스키 등의 수상 레저와 산에서 할 수 있는 등반이나 오프 로드 등의 산악 레저와 도로에서 할 수 있는 하이킹 등의 도로 레저 등 다양해지고 있는 실정이다.

[3] 이중 수상에서 할 수 있는 대표적인 레저로는 서핑보드를 이용하여 즐길 수 있는 서핑을 들 수 있는데, 이러한 서핑을 즐기기 위해서는 적절한 수위와 파도 등 자연조건이 요구된다.

[4] 그러나, 우리나라에서는 상기와 같은 자연조건이 제공되는 장소가 극히 제한되어 있어 국내에서 서핑보드를 즐긴다는 것이 매우 까다로웠다.

[5] 이에, 우리나라에서는 이러한 서핑을 즐기고자 하는 사람들은 수위와 파도의 조건에 크게 제한받지 않는 바람을 이용한 윈드서핑이 주류를 이루고 있는 실정이다.

[6] 하지만, 이러한 윈드서핑 또한 자연조건을 최소화한다 하더라도 최소한의 바람이 제공되어야 하는 것인바, 바람이 약하거나 없는 날에는 이마저 즐길 수가 없으며, 바람의 방향을 이용하여야 함으로 바람에 따라 돛을 이용하는 기술을 습득하여야 하는 등 일반인들이 서핑을 즐기기 위해 많은 시간과 노력을 필요로 하는 문제점이 있었다.

[7] 또한, 서핑보드는 그 크기가 일반인의 키보다 큰 약 2m 정도의 길이를 가지고 있는 것인바, 일반적인 승용 차량에는 그 수용 및 운반이 불가하였으며, 이에 서핑보드를 수용할 수 있는 차량용 루프박스 등의 수납장비를 구비하여야 하는 번거로움과 비용부담이 가중되는 문제점이 있었다.

[8] 그리고, 가정 등에서 보관시에는 서핑보드를 수용할 만한 장소가 마땅치 않을 시에는 아무렇게나 방치되는 등 미관상으로도 매우 좋지 못하는 등 보관상의 문제점이 있는 등 이러한 제반 문제점으로 하여 서핑보드 활동을 기피하는 문제점이 있었다.

발명의 상세한 설명

기술적 과제

[9] 본 발명이 이루고자 하는 기술적 과제는, 서핑보드의 몸체를 전방판과 후방판으로 분리 가능하게 함으로써, 보관상의 용이함과 휴대상의 편리함을 줄 수 있는 서핑보드를 제공하는데 있다.

[10] 또한, 본 발명이 이루고자 하는 다른 기술적 과제는, 서핑보드의 몸체에 구동부에 의해 회전하는 프로펠러를 배치함으로써, 수면을 용이하게 주행할 수 있는 서핑보드를 제공하는데 있다.

[11] 또한, 본 발명이 이루고자 하는 다른 기술적 과제는, 서핑보드의 몸체에 방향전환부를 배치함으로써, 서핑보드의 주행방향을 용이하게 조절할 수 있는 서핑보드를 제공하는데 있다.

과제 해결 수단

[12] 상기의 기술적 과제를 달성하기 위한, 본 발명에 따른 서핑보드는, 수면에 부유하는 몸체와, 몸체에 구비되는 손잡이부를 포함하고, 몸체는, 몸체의 길이방향에 대해, 전방에 위치하는 전방판과, 후방에 위치하는 후방판을 포함하며, 전방판과 후방판 사이에는, 전방판과 후방판을 서로 분리 및 결합하는 연결부가 배치되고, 연결부는, 전방판과 후방판을 연결하고, 연결부의 휨에 대하여 대항력을 가지게 하는 지지부와, 전방판과 후방판의 결합 위치를 가이드하는 가이드부와, 전방판과 후방판의 결합 고정을 단속하는 결합부를 포함할 수 있다.

[13] 여기서, 지지부는, 전방판의 단부면에 단턱홈을 갖는 하나 이상의 전방 지지홈과, 후방판의 단부면에 단턱홈를 가지며 전방 지지홈과 대응되는 후방 지지홈과, 전방판과 후방판이 전,후방 지지홈에 삽입되고, 지지부의 중앙에 단턱홈에 걸림되는 확장편을 갖는 지지봉을 포함할 수 있다.

[14] 그리고, 가이드부는, 전방판의 단부면에 배치되는 하나 이상의 돌출형 전방 결합돌기와, 전방판의 단부면에 배치되는 하나 이상의 함몰형 전방 결합홈과, 후방판의 단부면에 배치되어, 전방 결합돌기와 대응되는 함몰형 후방 결합홈과, 후방판의 단부면에 배치되어, 전방 결합홈과 대응되는 돌출형 후방 결합돌기와, 전방 결합돌기와 후방 결합홈을 결합시키고, 전방 결합홈과 후방 결합돌기를 결합시키는 끼움 가이드를 포함할 수 있다.

[15] 이어, 결합부는, 전방판의 단부면 양측과 후방판의 단부면 양측에 서로 대응되는 형태의 홈을 이루는 전,후방 결합부와, 전,후방 결합부 중, 어느 한측에 수용되고, 슬라이딩 이동에 따라, 대응되는 전,후방 결합부를 서로 결속 결합시키는 결속부재와, 결속부재와 나사 결합되어 그 결속부재의 슬라이딩을 단속하는 나사축을 포함할 수 있다.

[16] 경우에 따라, 본 발명은 몸체의 하부에 구비되는 구동부와, 구동부와 축결합되고, 구동부의 구동에 의해 회전하여 몸체를 주행시키는 프로펠러와, 프로펠러와 일정간격을 유지한 상태로, 몸체의 하부에 회전가능하게 수직으로 축결합되어, 프로펠러에 의해 주행하는 몸체의 주행방향을 전환시키는 방향전환부와, 몸체의 상부에 구비되어 방향전환부를 회전시키는 방향전환발판부를 더 포함할 수도 있다.

[17] 여기서, 방향전환발판부는, 몸체의 후측 상부에 수직구비되는 축부재와,

축부재의 상측이 하부면 중심부에 축결합되는 발판과, 발판의 일측 하부에 구비되어 발판의 일측을 탄성지지하는 일측 탄성부재와, 발판의 타측 하부에 구비되어 발판의 타측을 탄성지지하는 타측 탄성부재를 포함하는 탄성부재와, 일측 탄성부재와 축부재 사이에 위치하는 다수의 일측접철링크들과, 타측 탄성부재와 축부재 사이에 위치하는 다수의 타측접철링크들을 포함하는 접철링크와, 일측접철링크들을 축결합하는 일측 연결링크와, 일측 연결 링크에 축결합되고 타측연결링크들을 축결합하는 타측 연결링크를 포함하는 연결링크와, 일측 연결링크의 타측 및 타측 연결링크의 일측에 전측이 축결합되고, 후측이 방향전환부의 상측에 고정되는 보조연결링크를 포함할 수 있다.

[18] 또한, 방향전환발판부는, 몸체의 후측 상부에 구비되는 발판과, 발판의 내부에 구비되고, 발판의 일측 및 발판의 타측으로 가해지는 하중을 감지하는 무게감지센서와, 방향전환부의 상측과 축결합된 상태로 몸체의 후측 상부에 구비되고, 무게감지센서의 감지신호를 근거로 방향전환부를 회전시키는 구동부재를 포함할 수 있다.

[19] 한편, 본 발명에 따른 서핑보드는, 길이방향에 대해, 전방에 위치하는 전방판, 후방에 위치하는 후방판, 및 전방판과 후방판 사이에 위치하여 전방판과 후방판을 서로 분리 및 결합하는 연결부를 포함하는 몸체와, 몸체의 상부에 구비되는 손잡이부와, 몸체의 하부에 구비되는 구동부와, 구동부와 축결합되고, 구동부의 구동에 의해 회전하여 몸체를 주행시키는 프로펠러와, 프로펠러와 일정간격을 유지한 상태로, 몸체의 하부에 회전가능하게 수직으로 축결합되어, 프로펠러에 의해 주행하는 몸체의 주행방향을 전환시키는 방향전환부와, 몸체의 상부에 구비되어 방향전환부를 회전시키는 방향전환발판부를 포함할 수 있다.

[20] 여기서, 본 발명은, 몸체의 상부에 배치되는 태양전지판과, 몸체의 상부에 배치되고, 태양전지판이 발생시킨 전기가 축전되는 축전지와, 손잡이부에 배치되고, 축전지에 축전된 전기를 구동부로 공급 및 차단하는 전원스위치부와, 몸체의 속도를 조절하는 속도조절스위치부를 더 포함할 수 있다.

발명의 효과

[21] 본 발명은, 서핑보드의 몸체를 전방판과 후방판으로 분리 가능하게 함으로써, 보관상의 용이함과 휴대상의 편리함을 줄 수 있고, 별도의 보관 및 휴대 장비 등을 구비할 필요가 없어, 취급상의 비용부담을 절감할 수 있다.

[22] 또한, 본 발명은, 서핑보드의 몸체에 구동부에 의해 회전하는 프로펠러를 배치함으로써, 수면을 용이하게 주행할 수 있어, 효과적으로 서핑을 즐길 수 있다.

[23] 또한, 본 발명은, 서핑보드의 몸체에 방향전환부를 배치함으로써, 서핑보드의 주행방향을 용이하게 조절할 수 있다.

도면의 간단한 설명

[24] 도 1은 본 발명에 따른 서핑보드를 보여주는 분해 사시도

[25] 도 2는 본 발명에 따른 서핑보드를 보여주는 결합 사시도

[26] 도 3은 본 발명에 따른 서핑보드를 보여주는 결합 단면도

[27] 도 4는 도 1의 지지부의 결합상태를 보여주는 단면도

[28] 도 5는 도 1의 가이드부의 결합상태를 보여주는 단면도

[29] 도 6은 도 1의 결합부의 결속부재 작동 상태도

[30] 도 7은 도 1의 결합부에 의해 전방판과 후방판이 결속된 상태를 보여주는 단면도

[31] 도 8은 도 1의 손잡이부를 보여주는 평면도

[32] 도 9는 도 1의 A - A 선상에 따른 방향전환발판부를 보여주는 단면도

[33] 도 10은 발판의 일측에 하중이 가해진 상태를 보여주는 단면도

[34] 도 11은 도 10의 B - B 선상에 따른 단면도

[35] 도 12는 발판의 타측에 하중이 가해진 상태를 보여주는 단면도

[36] 도 13은 도 12의 C - C 선상에 따른 단면도

[37] 도 14는 방향전환발판부의 다른예를 보여주는 일부확대측면도

[38] 도 15는 도 14의 D - D 선상에 따른 단면도

발명의 실시를 위한 최선의 형태

[39] 본 명세서 및 청구범위에 사용된 용어나 단어는 통상적이거나 사전적인 의미로 한정해서 해석되어서는 아니 되며, 발명자는 그 자신의 발명을 가장 최선의 방법으로 설명하기 위해 용어의 개념을 적절하게 정의할 수 있다는 원칙에 입각하여 본 발명의 기술적 사상에 부합하는 의미와 개념으로 해석되어야만 한다.

[40] 따라서, 본 명세서에 기재된 실시예와 도면에 도시된 구성은 본 발명의 가장 바람직한 일 실시예에 불과할 뿐이고, 본 발명의 기술적 사상을 모두 대변하는 것은 아니므로, 본 출원시점에 있어서 이들을 대체할 수 있는 다양한 균등물과 변형예들이 있을 수 있음을 이해하여야 한다.

[41] 이하, 본 발명의 바람직한 실시예를 첨부된 도면을 참고하여 상세히 설명한다.

[42] 도 1은 본 발명에 따른 서핑보드를 보여주는 분해 사시도이고, 도 2는 본 발명에 따른 서핑보드를 보여주는 결합 사시도이며, 도 3은 본 발명에 따른 서핑보드를 보여주는 결합 단면도이다.

[43] 도 1 내지 도 3에 도시된 바와 같이, 본 발명에 따른 서핑보드(1)는, 몸체(10)와 손잡이부(30)를 포함할 수 있다.

[44] 여기서, 몸체(10)는, 몸체(10)의 길이방향에 대해, 전방에 위치하는 전방판(100)과, 후방에 위치하는 후방판(200)을 포함할 수 있다.

[45] 그리고, 몸체(10)는, 전방판(100)과 후방판(200) 사이에 연결부가 배치되어, 전방판(100)과 후방판(200)을 서로 분리 및 결합할 수 있다.

[46] 이때, 연결부는, 지지부(300), 가이드부(400), 결합부(500)를 포함할 수 있다.

[47] 또한, 서핑보드(1)는, 구동부(50), 프로펠러(60), 방향전환부(70), 방향전환발판부(80)을 더 포함할 수 있다.

[48] 추가적으로, 서핑보드(1)는, 전원공급부(20), 제어부(40), 몸체 안정키(90)를 더 포함할 수도 있다.

[49] 이와 같이, 구성되는 본 발명의 서핑보드(1)를 좀 더 상세히 설명하면 다음과 같다.

[50] 먼저, 몸체(10)는, 수면에 부유하는 것으로서, 몸체(10)가 보다 용이하게 수면에 부유할 수 있도록 하기 위해, 몸체(10)의 내부에는 스티로폼 등을 포함한 부력충진제가 충진될 수 있다.

[51] 그리고, 몸체(10)는, 길이방향으로 2개로 분리할 수 있다.

[52] 즉, 몸체(10)는, 몸체(10)의 길이방향에 대해, 전방에 위치하는 전방판(100)과, 후방에 위치하는 후방판(200)으로 분리될 수 있다

[53] 그리고, 몸체(10)는, 전방판(100)의 단부면(110)과 후방판(200)의 단부면(210)을 서로 면접 결합함으로써, 일체화된 몸체(10)를 이룰 수 있다.

[54] 여기서, 전방판(100)과 후방판(200) 사이에는, 연결부가 배치되어, 전방판(100)과 후방판(200)을 서로 분리 및 결합할 수 있다.

[55] 이때, 연결부는, 지지부(300), 가이드부(400), 결합부(500)를 포함할 수 있다.

[56] 연결부의 지지부(300)는, 전방판(100)과 후방판(200)의 결합 영역이, 상부에서 하중이 가해질 때, 휘어지는 것을 방지하는 역할을 수행할 수 있다.

[57] 그리고, 전방판(100)의 단부면(110)에는 하나 이상의 전방 지지홈(310)을 형성하고, 후방판(200)의 단면부(210)에도 전방판(100)의 전방 지지홈(310)과 대응되는 위치에 후방 지지홈(320)을 형성할 수 있다.

[58] 이때, 각각의 전,후방 지지홈(310)(320)은, 원형홈이나 각홈 등 다양한 형태로 구성할 수 있으며, 단면부(110)(210)의 하부 양측에서 각각 한 쌍을 이루게 형성할 수 있다.

[59] 그리고, 전,후방 지지홈(310)(320)에 삽입되는 지지봉(330)이 구비되는 것인데, 지지봉(330)은 전,후방 지지홈(310)(320)과 동일한 형상을 이루는 강질의 합성수지 또는 금속재 봉 형태로 구성할 수 있다.

[60] 한편, 전,후방 지지홈(310)(320)의 마주보는 단부에 확장된 직경을 갖는 단턱홈(311)(321)을 각각 더 형성하고, 지지봉(330)의 중간부 둘레에는 단턱홈(311)(321)에 삽입되는 확장편(331)을 더 형성할 수 있다.

[61] 여기서, 지지봉(330)의 양측이, 전,후방 지지홈(310)(320)에 각각 삽입될 때, 지지봉(330)의 중심 확장편(331)이 각각의 단턱홈(311)(321)에 삽입 걸림되어, 전,후방 지지홈(310)(320)에 동일한 깊이로 삽입될 수 있다.

[62] 그리고, 가이드부(400)는, 전방판(100)과 후방판(200)이 결합할 때, 그들이 면접되는 단부면(110)(210)의 정확한 위치를 잡아주기 위한 것으로, 각각의 단부면(110)(210)에는 하나 이상의 전,후방 결합돌기(411)(422)와 전,후방

결합홈(412)(421)이 대응되는 형태로 형성되어 서로간에 끼움 결합이 가능하게 구성될 수 있다.

[63] 상세히 설명하면, 전방판(100)의 단부면(110)에는 그 양측으로 전방 결합돌기(411) 및 전방 결합홈(412)이 형성된 것으로, 그 일측 상,하부에는 전방 결합돌기(411) 및 전방 결합홈(412)이 각각 형성되고, 그 타측 상,하부에는 전방 결합홈(412)과 전방 결합돌기(411)가 형성되어 양측이 서로 교차되는 형태를 이루게 구성할 수 있다.

[64] 또한, 전방판(100)의 단부면(110)과 대응되는 후방판(200)의 단부면(210)에는 그 양측으로 후방 결합돌기(422) 및 후방 결합홈(421)이 형성된 것으로, 그 일측 상,하부에는 후방 결합홈(421) 및 후방 결합돌기(422)가 각각 형성되고, 그 타측 상,하부에는 후방 결합돌기(422) 및 후방 결합홈(421)이 형성되어 양측이 서로 교차되는 형태를 이루게 구성할 수 있다.

[65] 이어, 결합부(500)는, 전방판(100)과 후방판(200)의 결합 고정을 단속하기 위한 것으로, 전방판(100)과 후방판(200) 단부면(110)(210) 각각의 양측에 형성되는 전,후방 결합부(510)(520)와, 결속부재(530)와, 나사축(540)으로 구성될 수 있다.

[66] 여기서, 전,후방 결합부(510)(520)는, 각각의 단부면(110)(210) 중심부 측으로부터 외측을 향하게 결속부재(530)가 수용될 수 있도록, 사각 형태의 결속부재 수용홈(511)(521)이 마련될 수 있다.

[67] 또한, 결속부재 수용홈(511)(521)의 일측에는 그 결속부재 수용홈(511)(521)과 연장되도록 사각 형태의 결속홈(512)(522)이 마련될 수 있다.

[68] 이때, 결속홈(512)(522)의 내측 상단 및 하단에는 하방 및 상방으로 돌출되는 결속돌기(512a)(522a)가 각각 형성되는 것인데, 그 결속돌기(512a)(522a)는 단부면(110)(210)과 동일면을 이루게 구성할 수 있다.

[69] 그리고, 결속홈(512)(522)의 내부 일측에는 그 결속홈(512)(522)과 연장되도록 단턱 형태로 링고정홈(513)(523)이 마련될 수 있다.

[70] 이어, 링고정홈(513)(523)의 일측에는 그 링고정홈(513)(523)과 연장되도록, 나사축(540)이 내입되는 하프관 형태의 축내입홈(514)(524)이 마련될 수 있다.

[71] 또한, 축내입홈(514)(524)의 일측에는 그 축내입홈(514)(524)과 연장되도록 나사축(540)을 고정 설치할 수 있도록 축고정홈(515)(525)이 마련될 수 있다.

[72] 그리고, 축고정홈(515)(525)의 일측에는 그 축고정홈(515)(525)과 연장되도록 나사축(540)의 회전력을 부여하기 위한 공구가 삽입되는 공구진입공(516)(526)이 외부와 연통되게 마련될 수 있다.

[73] 이상과 같이, 전,후방 결합부(510)(520)는, 단부면(110)(210)의 중심으로부터 결속부재 수용홈(511)(521)과 결속홈(512)(522)과 링고정홈(513)(523)와 축내입홈(514)(524)과 축고정홈(515)(525)과 공구진입공(516)(526)이 단부면(110)(210)의 전면으로 개방되는 형태로 연속하여 연결 형성되며, 전방판(100)의 단부면(110)과 후방판(200)의 단부면(210)을 면접시 하나의 공간을 이루게 구성될 수 있다.

[74] 다음, 결속부재(530)는, 전,후방 결합부(510)(520) 중 어느 한 측의 결속부재 수용홈(511)에 수용되고, 슬라이딩 이동에 따라 전방판(100)과 후방판(200)을 서로 연결 결합하게 되는 것으로, 결속부재 수용홈(511)에 수용시 전면으로 돌출될 수 있도록 소정 두께를 갖는 판형 블록 형태로 구성될 수 있다.

[75] 여기서 결속부재(530)의 상단 및 하단에는 서로 대칭되는 형태로 돌기 내합홈(531)이 각각 형성되는 단면상 "H" 형태를 이루고, 그 중앙에는 나사축(540)이 나삽될 수 있도록 암나사부(532)가 형성될 수 있다.

[76] 나사축(540)은, 전,후방 결합부(510)(520) 중 결속부재(530)가 수용되는 측에 설치되는 것으로, 설치시 결속부재(530)와 나사결합되며, 그 나사축(540)의 회전력에 의해 결속부재(530)의 좌우 슬라이딩이 단속하게 구성될 수 있다.

[77] 여기서, 나사축(540)은, 그 일측에 결속부재(530)의 암나사부(532)에 나삽될 수 있도록 수나사부(541)가 형성되고, 타측에는 단부면에 육각 렌치 등의 공구가 결합될 수 있도록, 홈 형태의 공구결합부(542a)가 형성된 축설부(542)로 구성될 수 있다.

[78] 이때, 나사축(540)은, 그 중간부가 축내입홈(514)에 수용된 상태에서 그 수나사부(541)가 결속부재(530)의 암나사부(532)에 나사체결되는 것인데, 이와 같이 설치되는 나사축(540)은, 가이드링(551) 및 고정브라켓(552)에 의해 가이드 및 고정될 수 있다.

[79] 상세히 설명하면, 먼저, 링고정홈(513)에는 가이드링(551)이 끼움 결합되고, 축고정홈(515)에는 고정브라켓(552)이 볼트 등을 이용하여 결합되는 것인데, 이때, 그 가이드링(551)에는 나사축(540)의 수나사부(541)가 관통되어 결속부재(530)에 나삽되는 것이고, 나사축(540)의 축설부(542)는 상기 고정브라켓(552)에 공회전 가능하게 설치될 수 있다.

[80] 이때, 상기 고정브라켓(552)에 공회전 가능하게 설치되는 나사축(540)의 축설부(542)는, 통상의 베어링 등의 공회전 수단을 이용하여 설치할 수 있다.

[81] 한편, 상기와 같이 구성되는 전,후방 결합부(510)(520)의 결속부재 수용홈(511)(521)과 결속홈(512)(522)의 깊이는, 결속부재(530)의 1/2에 해당하는 깊이를 가지게 구성할 수 있고, 결속돌기(512a)(522a)의 두께는 결속부재(530)의 돌기 내합홈(531) 폭의 1/2에 해당하게 구성할 수 있다.

[82] 이와 같이, 본 발명의 서핑보드는, 몸체(10)의 전방판(100)과 후방판(200) 사이에 연결부가 배치되어, 전방판(100)과 후방판(200)을 서로 분리 및 결합할 수 있으므로, 서핑보드의 휴대 및 보관 등 취급의 용이함과 사용상의 편리함을 확보할 수 있다.

[83] 먼저, 서핑보드(1)를 휴대 및 보관하고자 할 시에는, 몸체(10)의 전방판(100)과 후방판(200)이 분리된 상태로의 휴대 및 보관이 가능한 것인바, 그 부피가 축소되어 가능한 것이다.

[84] 또한, 전방판(100)과 후방판(200)이 분리된 서핑보드(1)를 사용하고자 할 시에는, 분리된 전방판(100)과 후방판(200)을 서로 연결 결합함으로써, 간편하게,

일체화된 몸체(10)를 이루어 사용하면 되는 것이다.

[85] 한편, 전원공급부(20)는 전원을 공급하기 위한 것으로, 태양에너지를 전기에너지로 변환시켜주는 태양전지판(21) 및 그 전기 에너지를 저장하기 위한 축전지(22)가 구비될 수 있다.

[86] 여기서, 태양전지판(21)은 몸체(10)의 전방판(100)에 수평구비될 수 있고, 축전지(22)는 태양전지판(21)의 후방에 위치하도록 몸체(10)의 전방판(100)에 구비될 수 있다.

[87] 그리고, 손잡이부(30)는 몸체(10)에 구비되어 작동을 단속하는 것으로, 스위치의 작동에 의해, 서핑보드(1)의 전원 ON/OFF 및 전진속도 및 후진속도 조절 등 서핑보드(1)의 주행을 단속하는 스위치(31)가 형성될 수 있다.

[88] 이어, 제어부(40)는 작동을 제어하는 것으로, 서핑보드(1)의 전체적인 작동 신호를 제어하기 위한 것으로, PCB(Printed Circuit Board)로 구성될 수 있다.

[89] 경우에 따라, 몸체(10)의 전방판(100)에는 몸체(10)의 상부에서 몸체(10)의 하부방향으로 일정깊이로 함몰되는 상측이 개방된 수납공간이 형성될 수도 있다.

[90] 여기서, 수납공간의 전측에는 구동부(50)를 제어하는 인쇄회로기판(PCB) 등을 포함한 제어부(40)가 구비될 수도 있다.

[91] 또한, 제어부(40)의 후방방향에 위치하도록 수납공간내에 복수의 축전지(22)가 일정간격으로 수납될 수도 있다.

[92] 그리고, 수납공간의 상측방향에 위치하도록 몸체(10)의 전방판(100)에는 수납공간을 개폐하기 위한 커버가 분리가능하게 수평안착될 수도 있다.

[93] 다음, 구동부(50)는 몸체(10)의 구동력을 부여하기 위한 것으로, 회전 동력을 발생시키는 모터(51) 등으로 구성될 수 있다.

[94] 여기서, 구동부(50)는 DC모터를 포함한 구동모터일 수 있으며, 몸체(10)의 후측 하부에 수평구비될 수도 있다.

[95] 그리고, 프로펠러(60)는, 구동부(50)와 연결되어 몸체(10)를 주행시키기 위한 것으로, 구동부(50)의 작동에 의해 회전력이 부여되어 서핑보드(1)를 주행시킬 수 있는 통상적으로 소형 보트 등에 사용되는 프로펠러로 구성될 수 있다.

[96] 여기서, 프로펠러(60)는, 구동부(50)의 구동축과 축결합되어 수중에 위치하게 된다.

[97] 또한, 프로펠러(60)는 구동부(50)의 구동에 의해 정역회전하여 수면에 부유하는 몸체(10)를 주행시키게 된다.

[98] 이어, 방향전환부(70)는 주행방향을 단속하는 것으로, 프로펠러(60)와 일정간격을 유지한 상태로 몸체(10)의 후측 하부에 회전가능하게 축결합되어 프로펠러(60)에 의해 주행하는 몸체(10)의 주행방향을 전환시키게 된다.

[99] 또한, 방향전환부(70)는 방향전환축(71)과 방향전환날개(72)로 구성될 수 있다.

[100] 여기서, 방향전환축(71)은 프로펠러(60)와 일정간격을 유지한 상태로, 프로펠러(60)의 후방에 위치하도록, 몸체(10)의 후측 하부에 수직으로

정역회전가능하게 축결합될 수 있다.

[101] 또한, 방향전환날개(72)는 방향전환축(71)의 하측에 일체형으로 수직형성되어 수중에 위치한 상태에서 방향전환축(71)을 따라 정역회전될 수 있다.

[102] 다음, 방향전환 발판부(80)는 방향전환부(70)를 조작하기 위한 것으로, 몸체(10)의 후방 상부에서 방향전환부(70)와 다수의 링크로 연결되어 방향전환부(70)를 조절할 수 있다.

[103] 여기서, 방향전환 발판부(80)는 몸체(10)의 후측 상부에 구비되어 방향전환부(70)를 정역회전시키게 된다.

[104] 그리고, 몸체 안정키(90)은 몸체(10)의 후방 저면에 형성되어 몸체(10)를 수면에 부유시 그 몸체(10)의 중심을 유지할 수 있는 날개 형태로 구성될 수 있다.

[105] 이와 같이, 본 발명은, 부유하는 몸체가 구동부에 의해 회전하는 프로펠러에 의해 수면을 주행할 수 있기 때문에 일반인들이 보다 용이하게 서핑을 즐길 수 있음은 물론 특히, 방향전환발판부를 통해 방향전환부를 정역회전시켜 몸체의 주행방향을 보다 용이하게 조절할 수 있다.

[106] 도 4는 도 1의 지지부의 결합상태를 보여주는 단면도이다.

[107] 도 4에 도시된 바와 같이, 지지부(300)는, 전방판(100)의 단부면에 배치되어 단턱홈을 갖는 하나 이상의 전방 지지홈(310)과, 후방판(200)의 단부면에 단턱홈를 가지며 전방 지지홈(310)과 대응되는 후방 지지홈(320)과, 전방판(100)과 후방판(200)이 전,후방 지지홈(310, 320)에 삽입되고, 지지부(300)의 중앙에 단턱홈에 걸림되는 확장편(331)을 갖는 지지봉(330)을 포함할 수 있다.

[108] 전방판(100)과 후방판(200)은, 지지부(300)에 의해 결합될 수 있는데, 전방판(100)과 후방판(200)은 지지봉(330)으로 연결될 수 있다.

[109] 여기서, 전방 지지홈(310)과, 후방 지지홈(320)은, 전방판(100) 및 후방판(200)의 단부면(110)(210)에 대응되게 형성는데, 지지봉(330)의 양측은, 전방 지지홈(310)과, 후방 지지홈(320)에 동일한 비율로 삽입될 수 있다.

[110] 그리고, 삽입된 지지봉(330)은 전방판(100)과 후방판(200)의 연결을 포함하여 상부에서 하중이 작용시 그 연결부에 대하여 벌어짐과 휨에 대한 대항력을 가질 수 있는 것이다.

[111] 여기서, 지지봉(330)이 동일한 비율로 삽입되게 하기 위해, 지지봉(330)의 중간영역에 확장편(331)이 형성될 수 있다.

[112] 즉, 전방판(100)과 후방판(200) 각각의 단부면(110)(210)을 면접할 때, 그 확장편(331)이 각각의 전,후방 지지홈(310)(320)에 형성된 단턱홈(311)(321)에 삽입 및 걸림 지지될 수 있다.

[113] 이와 같이, 전방판(100)과 후방판(200)은, 지지부(300)에 의해 결합됨과 동시에, 가이드부에 의해 전방판(100)과 후방판(200)의 단부면이 긴밀하게 결합될 수 있다.

[114] 도 5는 도 1의 가이드부의 결합상태를 보여주는 단면도이다.

[115] 도 5에 도시된 바와 같이, 가이드부(400)는, 전방판(100)의 단부면(110)에 배치되는 하나 이상의 돌출형 전방 결합돌기(411)와, 전방판(100)의 단부면(110)에 배치되는 하나 이상의 함몰형 전방 결합홈(422)과, 후방판(200)의 단부면(210)에 배치되어, 전방 결합돌기(411)와 대응되는 함몰형 후방 결합홈(421)과, 후방판(200)의 단부면(210)에 배치되어, 전방 결합홈(412)과 대응되는 돌출형 후방 결합돌기(422)와, 전방 결합돌기(411)와 후방 결합홈(421)을 결합시키고, 전방 결합홈(412)과 후방 결합돌기(422)를 결합시키는 끼움 가이드를 포함할 수 있다.

[116] 즉, 전방판(100)과 후방판(200)에 각각 서로 대응되도록, 전방 결합돌기(411)와 후방 결합홈(421) 및 전방 결합홈(412)과 후방 결합홈(421)이 마련될 수 있다.

[117] 그리고, 전방판(100)과 후방판(200)의 단부면(110)(210)을 면접할 때, 전방 결합돌기(411)와 후방 결합홈(421)이 끼움 가이드 되고, 전방 결합홈(412)과 후방 결합돌기(422)가 끼움 가이드되어, 전방판(100)과 후방판(200)이 긴밀하게 결합될 수 있다.

[118] 이에, 전방판(100) 및 후방판(200)의 단면부(110)(210)이 면접되게 되면, 그 단부면(110)(210)에 형성된 전,후방 결합부(510)(520)은 서로 결합되어 하나의 공간을 이루게 되는 것이다.

[119] 이와 같이, 전방판(100)과 후방판(200)은, 가이드부(400)에 의해 결합 위치가 설정된 상태에서, 결합부(500)에 의해 전방판(100)과 후방판(200)의 결속 결합될 수 있다.

[120] 도 6은 도 1의 결합부의 결속부재 작동 상태도이고, 도 7은 도 1의 결합부에 의해 전방판과 후방판이 결속된 상태를 보여주는 단면도이다.

[121] 도 6 및 도 7에 도시된 바와 같이, 결합부(500)는, 전방판(100)의 단부면(110) 양측과 후방판(200)의 단부면(210) 양측에 서로 대응되는 형태의 홈을 이루는 전,후방 결합부(510, 520)와, 전,후방 결합부(510, 520) 중, 어느 한측에 수용되고, 슬라이딩 이동에 따라, 대응되는 전,후방 결합부(510, 520)를 서로 결속 결합시키는 결속부재(530)와, 결속부재(530)와 나사 결합되어 그 결속부재(530)의 슬라이딩을 단속하는 나사축(540)을 포함할 수 있다.

[122] 여기서, 결속부재(530)는, 나사축(540)의 회전에 의해, 슬라이딩 이동되어, 전,후방 결합부(510, 520)를 결속할 수 있다.

[123] 그리고, 전,후방 결합부(510, 520)는, 전방판(100) 및 후방판(200)의 단부면(110, 210) 중심으로부터 외측을 향해 결속부재(530)가 수용되는 결속부재 수용홈(511, 521)과, 전,후방 결합부(510, 520)의 내측 상단 및 하단에 결속돌기(512a, 522a)가 각각 돌출 형성된 결속홈(512, 522)과, 결속홈(512, 522) 일측에 배치되는 링고정홈(513, 523)과, 나사축(540)이 내입되는 축내입홈(514, 524)과, 나사축(540)을 고정하기 위한 축고정홈(515, 525)과, 외부와 연통되는 공구진입공(516, 526)을 포함할 수 있다.

[124] 이어, 결속부재(530)는, 결속부재(530)의 일측이 결속부재 수용홈(511)에

수용되고, 결속부재(530)의 상단 및 하단에 돌기 내합홈(531)이 각각 형성되며, 결속부재(530)의 중앙에는 수평 방향으로 암나사부(532)가 형성될 수 있다.

[125] 다음, 나사축(540)은, 나사축(540)의 일측에 형성되는 수나사부(541)와, 나사축(540)의 타측에 형성되어, 공구결합부(542a)를 갖는 축설부(542)를 포함하는 봉 형태를 이루고, 링고정홈(513)에 결합되는 가이드링(551) 및 축고정홈(515)에 결합되는 고정브라켓(552)을 포함하며, 나사축(540)의 중간부가, 어느 한 측의 축내입홈(514)에 내입되는 상태에서, 수나사부(541)가 가이드링(551)을 관통하여, 결속부재(530)의 암나사부(532)에 결합되고, 축설부(542)가 고정브라켓(552)에 의해 공회전 가능하게 결합될 수 있다.

[126] 즉, 전방 결합부(510)의 결속부재 수용홈(511)에 수용된 결속부재(530)는 나사축(540)의 회전에 의해 결속부재 수용홈(511)으로부터 결속홈(512)(522) 측으로 슬라이딩 이동되는 것이다.

[127] 이때, 나사축(540)을 회전시키기 위해서는 별도의 회전용 공구가 필요한 것인데, 이는 공구진입공(516)(526)을 통해 렌치 등의 공구를 삽입 및 나사축(540)의 공구결합부(542a)에 결합한 상태에서 어느 한 방향으로 회전시키면 되는 것이다.

[128] 즉, 상기와 같이 나사축(540)이 회전하게 되면, 그 나사축(540)의 수나사부(541)에 나사 결합된 결속부재(530)는 수나사부(541)를 따라 결속부재 수용홈(511)(521)으로부터 결속홈(512)(522)으로 슬라이딩 이동함과 동시에 도 7에 도시와 같이 전,후방 결합부(510)(520) 각각의 결속홈(512)(522)에 형성된 결속돌기(512a)(522a)를 결속부재(530)의 돌기 내합홈(531)내에 구속시키게 되는 것이며, 이에, 전방판(100)과 후방판(200)의 긴밀한 결합이 이루어지는 것이다.

[129] 이와 같이, 구성되는 본 발명은, 서핑보드의 몸체를 전방판과 후방판으로 분리 가능하게 함으로써, 보관상의 용이함과 휴대상의 편리함을 줄 수 있고, 별도의 보관 및 휴대 장비 등을 구비할 필요가 없어, 취급상의 비용부담을 절감할 수 있다.

[130] 도 8은 도 1의 손잡이부를 보여주는 평면도이다.

[131] 도 8에 도시된 바와 같이, 손잡이부(30)는 연결줄(3210)과 손잡이(3220)로 구성될 수 있다.

[132] 여기서, 연결줄(3210)은 일반 와이어 등으로 이루어질 수 있고, 와이어 등으로 이루어질 수 있는 연결줄(3210)의 전측은 몸체(10)의 전측 상부에 일체형으로 연결 고정될 수 있다.

[133] 또는, 연결줄(3210)은 전선 등으로 이루어질 수 있고, 전선 등으로 이루어질 수 있는 연결줄(3210)의 전측이 제어부와 연결된 상태로 몸체(10)의 상부 중간부에 연결줄(3210)이 구비될 수도 있다.

[134] 손잡이(3220)는 서핑하고자 하는 일반인이 손으로 파지하기 위한 것으로서, 손잡이(3220)의 전측 중심부에 연결줄(3210)의 후측이 일체 연결 고정될 수 있다.

[135] 그리고, 손잡이(3220)는 손잡이바(3221)와 연결대(3222)로 구성될 수 있다.

[136] 여기서, 손잡이바(221)는 연결줄(3210)과 직교를 이룬 상태로 연결줄(3210)의 후측 후방에 구비될 수 있다.

[137] 연결대(3222)는 연결줄(3210)의 후측과 손잡이바(3221) 사이에 일체형성될 수 있다.

[138] 연결대(3222)는 손잡이바(3221)에서 연결줄(3210)방향으로 볼록한 'C'형상 등으로 형성될 수 있다.

[139] 그리고, 연결대(222)의 전측 중심부에는 연결줄(3210)의 후측이 일체 연결 고정될 수 있다.

[140] 또한, 손잡이부(30)에는 전원스위치부(390)와 속도조절스위치부(3100)가 구비될 수 있다.

[141] 전원스위치부(390)는 축전지에 축전된 전기를 구동부로 공급 및 차단할 수 있다.

[142] 이어, 전원스위치부(390)는 손잡이부(30)의 손잡이바(3221)의 전측 외주면 중간부에 누름식 버튼 등 다양한 방식으로 구비될 수 있다.

[143] 손잡이바(3221)를 파지한 상태인 일반인이 전원스위치부(390)를 ON상태로 조작한 경우, 축전지에 축전된 전기는 구동부로 공급될 수 있다.

[144] 그리고, 손잡이바(3221)를 파지한 상태인 일반인이 전원스위치부(390)를 OFF상태로 조작한 경우, 축전지에서 구동부로의 전기공급이 차단될 수 있다.

[145] 이어, 속도조절스위치부(3100)는 전진속도감소스위치(3101), 전진속도증가스위치(3102), 후진속도감소스위치(3103) 및 후진속도증가스위치(3104)로 구성될 수 있다.

[146] 여기서, 전진속도감소스위치(3101)와 전진속도증가스위치(3102)는 손잡이부(30)의 손잡이바(3221)의 후측 외주면 타측에 누름식 버튼 등 다양한 방식으로 일정간격으로 각각 구비될 수 있다.

[147] 또한, 후진속도감소스위치(3103)와 후진속도증가스위치(3104)는 손잡이부(30)의 손잡이바(3221)의 후측 외주면 일측에 누름식 버튼 등 다양한 방식으로 일정간격으로 각각 구비될 수 있다.

[148] 전진속도감소스위치(3101)의 조작에 따른 축전지에서 구동부로의 전기공급량(Q_1)은 전진속도증가스위치(3102)의 조작에 따른 축전지에서 구동부로의 전기공급량(Q_2)보다 적을 수 있다.($Q_1 < Q_2$)

[149] 후진속도감소스위치(3103)의 조작에 따른 축전지에서 구동부로의 전기공급량(Q_3)은 후진속도증가스위치(3104)의 조작에 따른 축전지에서 구동부로의 전기공급량(Q_4)보다 적을 수 있다.($Q_3 < Q_4$)

[150] 손잡이바(3221)를 파지한 상태인 일반인이 전진속도감소스위치(3101), 전진속도증가스위치(3102), 후진속도감소스위치(3103) 및 후진속도증가스위치(3104)를 OFF상태로 조작한 경우, 제어부의 제어에 의해 축전지에서 구동부로의 전기 공급이 차단될 수 있다.

[151] 손잡이바(3221)를 파지한 상태인 일반인이 전진속도감소스위치(3101)를 ON

상태로 조작한 경우, 제어부의 제어에 의해 축전지에서 구동부로 적은 양의 전기가 공급됨과 더불어 제어부의 제어에 의해 구동부가 저속으로 프로펠러를 정방향으로 회전시키게 되고, 이로 인해 몸체(10)가 저속으로 전진하게 된다.

[152] 손잡이바(3221)를 파지한 상태인 일반인이 전진속도증가스위치(3102)를 ON상태로 조작한 경우, 제어부의 제어에 의해 축전지에서 구동부로 많은 양의 전기가 공급됨과 더불이 제이부의 제이에 의해 구동부가 고속으로 프로펠러를 정방향으로 회전시키게 되고, 이로 인해 몸체(10)가 고속으로 전진하게 된다.

[153] 손잡이바(3221)를 파지한 상태인 일반인이 후진속도감소스위치(3103)를 ON상태로 조작한 경우, 제어부의 제어에 의해 축전지에서 구동부로 적은 양의 전기가 공급됨과 더불어 제어부의 제어에 의해 구동부가 저속으로 프로펠러를 역방향으로 회전시키게 되고, 이로 인해 몸체(10)가 저속으로 후진하게 된다.

[154] 손잡이바(3221)를 파지한 상태인 일반인이 후진속도증가스위치(3104)를 ON상태로 조작한 경우, 제어부의 제어에 의해 축전지에서 구동부로 많은 양의 전기가 공급됨과 더불어 제어부의 제어에 의해 구동부가 고속으로 프로펠러를 역방향으로 회전시키게 되고, 이로 인해 몸체(10)가 고속으로 후진하게 된다.

[155] 도 9는 도 1의 A - A 선상에 따른 방향전환발판부를 보여주는 단면도이다.

[156] 도 9에 도시된 바와 같이, 방향전환발판부(80)는, 축부재(8610), 발판(8620), 탄성부재(8630), 접철링크(8640), 연결링크(8650) 및 보조연결링크(8660)로 이루어질 수 있다.

[157] 먼저, 몸체(10)의 후측 상부에는 몸체(10)의 상부에서 몸체(10)의 하부방향으로 일정깊이로 함몰되는 상측이 개방된 홈(113)이 형성될 수 있다.

[158] 축부재(8610)는 몸체(10)의 후측 상부에 형성된 홈(113)의 중간부에 일체형으로 수직구비될 수 있다.

[159] 발판(8620)의 하부면 중심부에는 축부재(8610)의 상측이 축결합될 수 있다.

[160] 스프링 등을 포함하여 이루어질 수 있는 탄성부재(8630)는 일측 탄성부재(8631)와 타측 탄성부재(8632)로 구성될 수 있다.

[161] 일측 탄성부재(8631)는 발판(8620)의 일측 하부에 구비되어 발판(8620)의 일측을 탄성지지할 수 있다.

[162] 일측 탄성부재(8631)의 상측은 발판(8620)의 일측 하부에 일체연결될 수 있고, 일측 탄성부재(8631)의 하측은 몸체(10)의 후측 상부에 형성된 홈(113)의 일측 바닥에 일체연결될 수 있다.

[163] 타측 탄성부재(8632)는 발판(8620)의 타측 하부에 구비되어 발판(8620)의 타측을 탄성지지할 수 있다.

[164] 타측 탄성부재(8632)의 상측은 발판(8620)의 타측 하부에 일체연결될 수 있고, 타측 탄성부재(8632)의 하측은 몸체(10)의 후측 상부에 형성된 홈(113)의 타측 바닥에 일체연결될 수 있다.

[165] 접철링크(8640)는 일측 탄성부재(8631)와 축부재(8610) 사이에 위치하는 일측접철링크(8641)와, 타측 탄성부재(8632)와 축부재(8610) 사이에 위치하는

타측접철링크(8642)로 이루어질 수 있다.

[166] 일측접철링크(8641)는 일측 상부접철링크(8641a)와 일측 하부접철링크(8641b)로 구성될 수 있다.

[167] 일측 상부접철링크(8641a)의 상측은 발판(8620)의 일측 하부에 축결합될 수 있다.

[168] 일측 하부접철링크(8641b)의 상측은 일측 상부접철링크(8641a)의 하측에 축결합될 수 있다.

[169] 일측 하부접철링크(8641b)의 하측은 몸체(10)의 후측 상부에 형성된 홈(113)의 일측 바닥에 축결합될 수 있다.

[170] 타측접철링크(8642)는 타측 상부접철링크(8642a)와 타측 하부접철링크(8642b)로 구성될 수 있다.

[171] 타측 상부접철링크(8642a)의 상측은 발판(8620)의 타측 하부에 축결합될 수 있다.

[172] 타측 하부접철링크(8642b)의 상측은 타측 상부접철링크(8642a)의 하측에 축결합될 수 있다.

[173] 타측 하부접철링크(8642b)의 하측은 몸체(10)의 후측 상부에 형성된 홈(113)의 타측 바닥에 축결합될 수 있다.

[174] 연결링크(8650)는 일측 연결링크(8651)와 타측 연결링크(8652)로 구성될 수 있다.

[175] 일측 연결링크(8651)의 일측은 일측 상부접철링크(8641a)의 하측 및 일측 하부접철링크(8641b)의 상측에 축결합될 수 있다.

[176] 타측 연결링크(8652)의 일측은 일측 연결링크(8651)의 타측에 축결합될 수 있다.

[177] 타측 연결링크(8652)의 타측은 타측 상부접철링크(8642a)의 하측 및 타측 하부접철링크(8642b)의 상측에 축결합될 수 있다.

[178] 일측 연결링크(8651)의 타측과 타측 연결링크(8652)의 일측에 각각 형성된 관통공(8653)내에 수직으로 삽입되는 축부재(8654)를 기준으로 일측 연결링크(8651)의 일측과 타측 연결링크(8652)의 타측이 각각 상하방향으로 보다 용이하게 회전이동될 수 있도록 하기 위해, 관통공(8653)의 일측 내주면 관통공(8653)의 타측 내주면은 축부재(8654) 방향으로 각각 볼록하게 호형상으로 돌출될 수 있다.

[179] 일측 연결링크(8651)의 일측을 기준으로 일측 연결링크(8651)의 타측이 전후방향으로 보다 용이하게 회전이동 및 타측 연결링크(8652)의 타측을 기준으로 타측 연결링크(8652)의 일측이 전후방향으로 보다 용이하게 회전이동될 수 있도록 하기 위해, 일측 연결링크(8651)의 일측 및 타측 연결링크(8652)의 타측에 각각 형성된 관통공(도 13의 8655)의 일측 내주면 및 타측 내주면은 후술할 축부재(8656) 방향으로 각각 볼록하게 호형상으로 돌출될 수 있다.

[180] 축부재(8656)는 일측 연결링크(8651)의 일측에 형성된 관통공(8655)과 일측 상부접철링크(8641a)의 하측 및 일측 하부접철링크(8641b)의 상측을 관통할 수 있다.

[181] 또한, 축부재(8656)는 타측 연결링크(8652)의 타측에 형성된 관통공(8655)과 타측 상부접철링크(8642a)의 하측 및 타측 하부접철링크(8642b)의 상측을 관통할 수 있다.

[182] 보조연결링크(8660)의 전측은 일측 연결링크(8651)의 타측과 타측 연결링크(8652)의 일측을 축결합시키는 축부재(8654)의 하측에 축결합될 수 있다.

[183] 보조연결링크(8660)의 후측은 방향전환부(70)의 방향전환축(71)의 상측에 고정될 수 있다.

[184] 도 10은 발판의 일측에 하중이 가해진 상태를 보여주는 단면도이고, 도 11은 도 10의 B - B 선상에 따른 단면도이다.

[185] 도 10 및 도 11에 도시된 바와 같이, 서핑하고자 하는 몸체(10)에 올라선 일반인이 발바닥부위로 발판(8620)의 일측을, 발판(8620)의 일측 하부방향으로 가압하게 되면, 발판(8620)의 일측은 발판(8620)의 일측 하부방향으로 하강함과 더불어 발판(8620)의 타측은 발판(8620)의 타측 상부방향으로 상승하게 된다.

[186] 이때, 일측 탄성부재(8631)는 수축됨과 더불어 타측 탄성부재(8632)는 팽창된다.

[187] 또한, 일측 상부접철링크(8641a)의 상측이 일측 하부접철링크(8641b)의 하측방향으로 회선이동하면서 하강하여 일측 접철링크(8641)는 접혀진다.

[188] 또한, 타측 상부접철링크(8642a)의 상측이 타측 상부접철링크(8642a)의 상부방향으로 회전이동하면서 상승하여 타측 접철링크(8642)는 펼쳐진다.

[189] 또한, 일측 연결링크(8651)와 타측 연결링크(8652)는 일측 접철링크(8641)에서 타측 접철링크(8642) 방향으로 이동하면서, 보조연결링크(8660)의 전측을 보조연결링크(8660)의 타측방향으로 회전이동시키게 되고, 이때, 보조연결링크(8660)의 후측에 상측이 고정된 방향전환축(71)은 보조연결링크(8660)의 타측방향으로 회전하면서 방향전환날개(72)를 보조연결링크(8660)의 일측방향으로 회전시키게 된다.

[190] 도 12는 발판의 타측에 하중이 가해진 상태를 보여주는 단면도이고, 도 13은 도 12의 C - C 선상에 따른 단면도이다.

[191] 도 12 및 도 13에 도시된 바와 같이, 서핑하고자 하는 몸체(10)에 올라선 일반인이 발바닥부위로 발판(8620)의 타측을, 발판(8620)의 타측 하부방향으로 가압하게 되면, 발판(8620)의 타측은 발판(8620)의 타측 하부방향으로 하강함과 더불어 발판(8620)의 일측은 발판(8620)의 일측 상부방향으로 상승하게 된다.

[192] 이때, 일측 탄성부재(8631)는 팽창됨과 더불어 타측 탄성부재(8632)는 수축된다.

[193] 또한, 일측 상부접철링크(8641a)의 상측이 일측 상부접철링크(8641a)의

상부방향으로 회전이동하면서 상승하여 일측 접철링크(8641)는 펼쳐진다.

[194] 또한, 타측 상부접철링크(8642a)의 상측이 타측 하부접철링크(8642b)의 하측방향으로 회전이동하면서 하강하여 타측 접철링크(8642)는 접혀진다.

[195] 또한, 일측 연결링크(8651)와 타측 연결링크(8652)는 타측 접철링크(8642)에서 일측 접철링크(8641) 방향으로 이동하면서, 보조연결링크(8660)의 전측을 보조연결링크(8660)의 일측방향으로 회전이동시키게 되고, 이때, 보조연결링크(8660)의 후측에 상측이 고정된 방향전환축(71)은 보조연결링크(8660)의 일측방향으로 회전하면서 방향전환날개(72)를 보조연결링크(8660)의 타측방향으로 회전시키게 된다.

[196] 방향전환날개(72)가 보조연결링크(8660)의 일측방향으로 회전 및 보조연결링크(8660)의 타측방향으로 각각 회전하게 됨에 따라, 몸체(10)가 전진주행 또는 후진주행하는 과정 중에 좌회전 또는 우회전을 보다 용이하게 행할 수 있게 된다.

[197] 도 14는 방향전환발판부의 다른예를 보여주는 일부확대측면도이고, 도 15는 도 14의 D - D 선상에 따른 단면도이다.

[198] 도 14 및 도 15에 도시된 바와 같이, 방향전환부(70)는, 발판(8620), 무게감지센서(8670) 및 구동부재(8680)로 이루어질 수 있다.

[199] 발판(8620)은 몸체(10)의 후측 상부에 구비될 수 있다.

[200] 무게감지센서(8670)는 일측 무게감지센서(8671) 및 타측 무게감지센서(8672)로 구성될 수 있다.

[201] 일측 무게감지센서(8671)는 일반인이 발바닥부위로 발판(8620)의 일측을 발판(8620)의 일측 하부방향으로 가압할 시, 발판(8620)의 일측에 가해지는 하중을 감지할 수 있다.

[202] 타측 무게감지센서(8672)는 일반인이 발바닥부위로 발판(8620)의 타측을 발판(8620)의 타측 하부방향으로 가압할 시, 발판(8620)의 타측에 가해지는 하중을 감지할 수 있다.

[203] 구동모터로 이루어질 수 있는 구동부재(8680)는 방향전환부(70)의 방향전환축(71)의 상측과 축결합된 상태로 발판(8620)의 후방에 위치하도록 몸체(10)의 후측 상부에 수직고정될 수 있다.

[204] 구동부재(8680)는 무게감지센서(8670)의 감지신호를 근거로 상기 제어부의 제어에 의해 방향전환부(70)의 방향전환축(71)을 정역회전시킬 수 있다.

[205] 일측 무게감지센서(8671)가 발판(8620)의 일측에 가해지는 하중을 감지하게 되면 구동부재(8680)는 제어부의 제어에 의해 방향전환부(70)의 방향전환축(71)을 정방향으로 회전시키게 되고, 이때 방향전환부(70)의 방향전환날개(72) 또한 방향전환축(71)을 따라 정방향으로 회전하게 된다.

[206] 타측 무게감지센서(8672)가 발판(8620)의 타측에 가해지는 하중을 감지하게 되면 구동부재(8680)는 제어부의 제어에 의해 방향전환부(70)의 방향전환축(71)을 역방향으로 회전시키게 되고, 이때 방향전환부(70)의

방향전환날개(72) 또한 방향전환축(71)을 따라 역방향으로 회전하게 된다.

[207] 이와 같이, 구성되는 본 발명은, 서핑보드의 몸체에 구동부에 의해 회전하는 프로펠러를 배치함으로써, 수면을 용이하게 주행할 수 있어, 효과적으로 서핑을 즐길 수 있다.

[208] 또한, 본 발명은, 서핑보드의 몸체에 방향전환부를 배치함으로써, 서핑보드의 주행방향을 용이하게 조절할 수 있다.

청구범위

[청구항 1] 수면에 부유하는 몸체; 그리고,
상기 몸체에 구비되는 손잡이부를 포함하고,
상기 몸체는,
상기 몸체의 길이방향에 대해, 전방에 위치하는 전방판과, 후방에 위치하는 후방판을 포함하며,
상기 전방판과 후방판 사이에는, 상기 전방판과 후방판을 서로 분리 및 결합하는 연결부가 배치되고,
상기 연결부는,
상기 전방판과 후방판을 연결하고, 상기 연결부의 휨에 대하여 대항력을 가지게 하는 지지부와,
상기 전방판과 후방판의 결합 위치를 가이드하는 가이드부와,
그리고
상기 전방판과 후방판의 결합 고정을 단속하는 결합부를 포함하는 것을 특징으로 하는 서핑보드.

[청구항 2] 제 1 항에 있어서,
상기 지지부는,
상기 전방판의 단부면에 단턱홈을 갖는 하나 이상의 전방 지지홈;
상기 후방판의 단부면에 단턱홈를 가지며 상기 전방 지지홈과 대응되는 후방 지지홈;
상기 전방판과 후방판이 상기 전,후방 지지홈에 삽입되고, 상기 지지부의 중앙에 상기 단턱홈에 걸림되는 확장편을 갖는 지지봉을 포함하는 것을 특징으로 하는 서핑보드.

[청구항 3] 제 2 항에 있어서,
상기 지지봉의 양측은,
상기 전방 지지홈과, 상기 후방 지지홈에 동일한 비율로 삽입되는 것을 특징으로 하는 서핑보드.

[청구항 4] 제 1 항에 있어서,
상기 가이드부는,
상기 전방판의 단부면에 배치되는 하나 이상의 돌출형 전방 결합돌기;
상기 전방판의 단부면에 배치되는 하나 이상의 함몰형 전방 결합홈;
상기 후방판의 단부면에 배치되어, 상기 전방 결합돌기와 대응되는 함몰형 후방 결합홈;
상기 후방판의 단부면에 배치되어, 상기 전방 결합홈과 대응되는 돌출형 후방 결합돌기; 그리고,

상기 전방 결합돌기와 후방 결합홈을 결합시키고, 상기 전방 결합홈과 후방 결합돌기를 결합시키는 끼움 가이드를 포함하는 것을 특징으로 하는 서핑보드.

[청구항 5] 제 1 항에 있어서,
상기 결합부는,
상기 전방판의 단부면 양측과 상기 후방판의 단부면 양측에 서로 대응되는 형태의 홈을 이루는 전,후방 결합부;
상기 전,후방 결합부 중, 어느 한측에 수용되고, 슬라이딩 이동에 따라, 대응되는 전,후방 결합부를 서로 결속 결합시키는 결속부재;
그리고,
상기 결속부재와 나사 결합되어 그 결속부재의 슬라이딩을 단속하는 나사축을 포함하는 것을 특징으로 하는 서핑보드.

[청구항 6] 제 5 항에 있어서,
상기 결속부재는,
상기 나사축의 회전에 의해, 슬라이딩 이동되어, 상기 전,후방 결합부를 결속하는 것을 특징으로 하는 서핑보드.

[청구항 7] 제 5 항에 있어서, 상기 전,후방 결합부는,
상기 전방판 및 후방판의 단부면 중심으로부터 외측을 향해 상기 결속부재가 수용되는 결속부재 수용홈;
상기 전,후방 결합부의 내측 상단 및 하단에 결속돌기가 각각 돌출 형성된 결속홈;
상기 결속홈 일측에 배치되는 링고정홈;
상기 나사축이 내입되는 축내입홈;
상기 나사축을 고정하기 위한 축고정홈; 그리고,
외부와 연통되는 공구진입공을 포함하는 것을 특징으로 하는 서핑보드.

[청구항 8] 제 7 항에 있어서,
상기 결속부재는,
상기 결속부재의 일측이 상기 결속부재 수용홈에 수용되고,
상기 결속부재의 상단 및 하단에 돌기 내합홈이 각각 형성되며,
상기 결속부재의 중앙에는 수평 방향으로 암나사부가 형성되는 것을 특징으로 하는 서핑보드.

[청구항 9] 제 8 항에 있어서,
상기 나사축은,
상기 나사축의 일측에 형성되는 수나사부와,
상기 나사축의 타측에 형성되어, 공구결합부를 갖는 축설부를 포함하는 봉 형태를 이루고,
상기 링고정홈에 결합되는 가이드링 및 상기 축고정홈에 결합되는

고정브라켓을 포함하며,
상기 나사축의 중간부가, 상기 어느 한 측의 축내입홈에 내입되는 상태에서, 상기 수나사부가 상기 가이드링을 관통하여, 상기 결속부재의 암나사부에 결합되고, 상기 축설부가 상기 고정브라켓에 의해 공회전 가능하게 결합되는 것을 특징으로 하는 서핑보드.

[청구항 10] 제 1 항에 있어서,
상기 몸체의 하부에 구비되는 구동부;
상기 구동부와 축결합되고, 상기 구동부의 구동에 의해 회전하여 상기 몸체를 주행시키는 프로펠러;
상기 프로펠러와 일정간격을 유지한 상태로, 상기 몸체의 하부에 회전가능하게 수직으로 축결합되어, 상기 프로펠러에 의해 주행하는 상기 몸체의 주행방향을 전환시키는 방향전환부;
상기 몸체의 상부에 구비되어 상기 방향전환부를 회전시키는 방향전환발판부를 더 포함하는 것을 특징으로 하는 서핑보드.

[청구항 11] 제 10 항에 있어서,
상기 방향전환발판부는,
상기 몸체의 후측 상부에 수직구비되는 축부재;
상기 축부재의 상측이 하부면 중심부에 축결합되는 발판;
상기 발판의 일측 하부에 구비되어 상기 발판의 일측을 탄성지지하는 일측 탄성부재와, 상기 발판의 타측 하부에 구비되어 상기 발판의 타측을 탄성지지하는 타측 탄성부재를 포함하는 탄성부재;
상기 일측 탄성부재와 상기 축부재 사이에 위치하는 다수의 일측접철링크들과, 상기 타측 탄성부재와 상기 축부재 사이에 위치하는 다수의 타측접철링크들을 포함하는 접철링크;
상기 일측접철링크들을 축결합하는 일측 연결링크와, 상기 일측 연결 링크에 축결합되고 상기 타측연결링크들을 축결합하는 타측 연결링크를 포함하는 연결링크; 그리고,
상기 일측 연결링크의 타측 및 상기 타측 연결링크의 일측에 전측이 축결합되고, 후측이 상기 방향전환부의 상측에 고정되는 보조연결링크를 포함하는 것을 특징으로 하는 서핑보드.

[청구항 12] 제 11 항에 있어서,
상기 접철링크의 일측접철링크는,
상기 발판의 일측 하부에 상측이 축결합되는 일측 상부접철링크와, 상기 일측 상부접철링크의 하측에 상측이 축결합되고 하측이 상기 몸체의 후측 상부 일측에 축결합되는 일측 하부접철링크를 포함하고,

상기 접철링크의 타측접철링크는,
상기 발판의 타측 하부에 상측이 축결합되는 타측 상부접철링크와, 상기 타측 상부접철링크의 하측에 상측이 축결합되고 하측이 상기 몸체의 후측 상부 타측에 축결합되는 타측 하부접철링크를 포함하는 것을 특징으로 하는 서핑보드.

[청구항 13] 제 12 항에 있어서,
상기 연결링크의 일측 연결링크는,
상기 일측 상부접철링크의 하측 및 상기 일측 하부접철링크의 상측에 일측이 축결합되고,
상기 연결링크의 타측 연결링크는,
상기 일측 연결링크의 타측에 일측이 축결합되고 타측이 상기 타측 상부접철링크의 하측 및 상기 타측 하부접철링크의 상측에 축결합되는 것을 특징으로 하는 서핑보드.

[청구항 14] 제 10 항에 있어서,
상기 방향전환발판부는,
상기 몸체의 후측 상부에 구비되는 발판;
상기 발판의 내부에 구비되고, 상기 발판의 일측 및 상기 발판의 타측으로 가해지는 하중을 감지하는 무게감지센서;
상기 방향전환부의 상측과 축결합된 상태로 상기 몸체의 후측 상부에 구비되고, 상기 무게감지센서의 감지신호를 근거로 상기 방향전환부를 회전시키는 구동부재를 포함하는 것을 특징으로 하는 서핑보드.

[청구항 15] 제 10 항에 있어서,
상기 몸체의 상부에 배치되는 태양전지판;
상기 몸체의 상부에 배치되고, 상기 태양전지판이 발생시킨 전기가 축전되는 축전지;
상기 손잡이부에 배치되고, 상기 축전지에 축전된 전기를 상기 구동부로 공급 및 차단하는 전원스위치부;
상기 몸체의 속도를 조절하는 속도조절스위치부를 더 포함하는 것을 특징으로 하는 서핑보드.

[청구항 16] 제 15 항에 있어서,
상기 속도조절스위치부는,
상기 몸체의 전진속도를 감소시키는 전진속도감소스위치;
상기 몸체의 전진속도를 증가시키는 전진속도증가스위치;
상기 몸체의 후진속도를 감소시키는 후진속도감소스위치;
상기 몸체의 후진속도를 증가시키는 후진속도증가스위치를 포함하는 것을 특징으로 하는 서핑보드.

[청구항 17] 길이방향에 대해, 전방에 위치하는 전방판, 후방에 위치하는

후방판, 및 상기 전방판과 후방판 사이에 위치하여 상기 전방판과 후방판을 서로 분리 및 결합하는 연결부를 포함하는 몸체;
상기 몸체의 상부에 구비되는 손잡이부;
상기 몸체의 하부에 구비되는 구동부;
상기 구동부와 축결합되고, 상기 구동부의 구동에 의해 회전하여 상기 몸체를 주행시키는 프로펠러;
상기 프로펠러와 일정간격을 유지한 상태로, 상기 몸체의 하부에 회전가능하게 수직으로 축결합되어, 상기 프로펠러에 의해 주행하는 상기 몸체의 주행방향을 전환시키는 방향전환부;
그리고,
상기 몸체의 상부에 구비되어 상기 방향전환부를 회전시키는 방향전환발판부를 포함하는 것을 특징으로 하는 서핑보드.

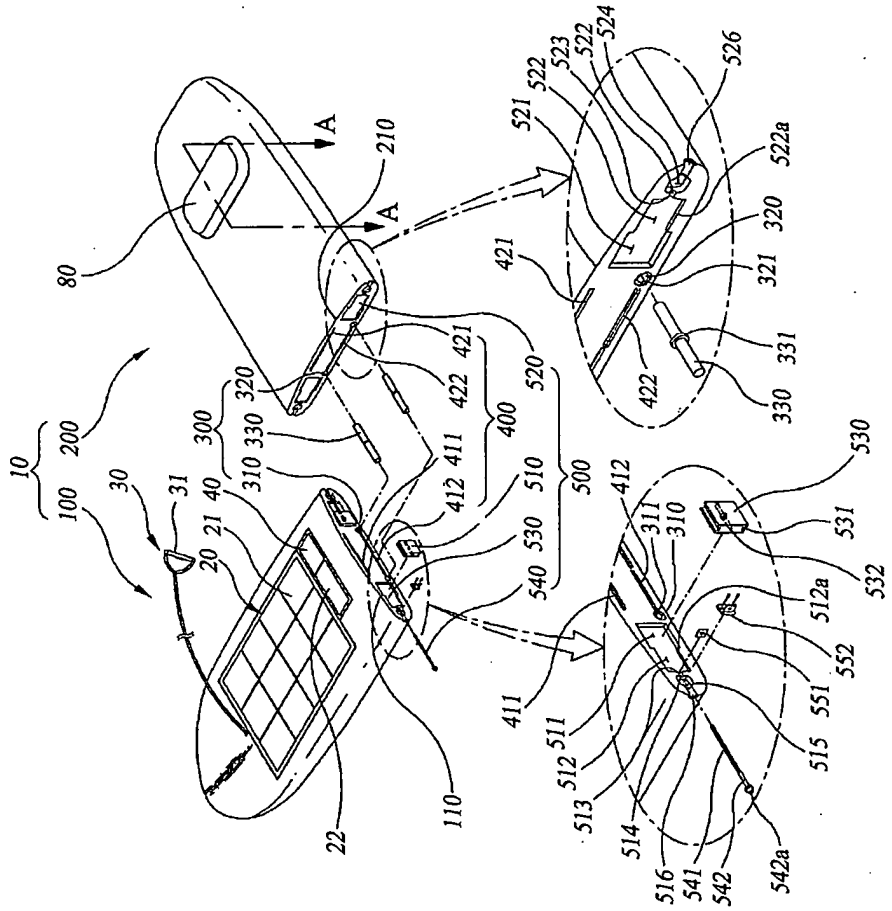
[청구항 18] 제 17 항에 있어서,
상기 몸체의 상부에 배치되는 태양전지판;
상기 몸체의 상부에 배치되고, 상기 태양전지판이 발생시킨 전기가 축전되는 축전지;
상기 손잡이부에 배치되고, 상기 축전지에 축전된 전기를 상기 구동부로 공급 및 차단하는 전원스위치부;
상기 몸체의 속도를 조절하는 속도조절스위치부를 더 포함하는 것을 특징으로 하는 서핑보드.

[청구항 19] 제 17 항에 있어서,
상기 방향전환발판부는,
상기 몸체의 후측 상부에 수직구비되는 축부재;
상기 축부재의 상측이 하부면 중심부에 축결합되는 발판;
상기 발판의 일측 하부에 구비되어 상기 발판의 일측을 탄성지지하는 일측 탄성부재와, 상기 발판의 타측 하부에 구비되어 상기 발판의 타측을 탄성지지하는 타측 탄성부재를 포함하는 탄성부재;
상기 일측 탄성부재와 상기 축부재 사이에 위치하는 다수의 일측접철링크들과, 상기 타측 탄성부재와 상기 축부재 사이에 위치하는 다수의 타측접철링크들을 포함하는 접철링크;
상기 일측접철링크들을 축결합하는 일측 연결링크와, 상기 일측 연결 링크에 축결합되고 상기 타측연결링크들을 축결합하는 타측 연결링크를 포함하는 연결링크; 그리고,
상기 일측 연결링크의 타측 및 상기 타측 연결링크의 일측에 전측이 축결합되고, 후측이 상기 방향전환부의 상측에 고정되는 보조연결링크를 포함하는 것을 특징으로 하는 서핑보드.

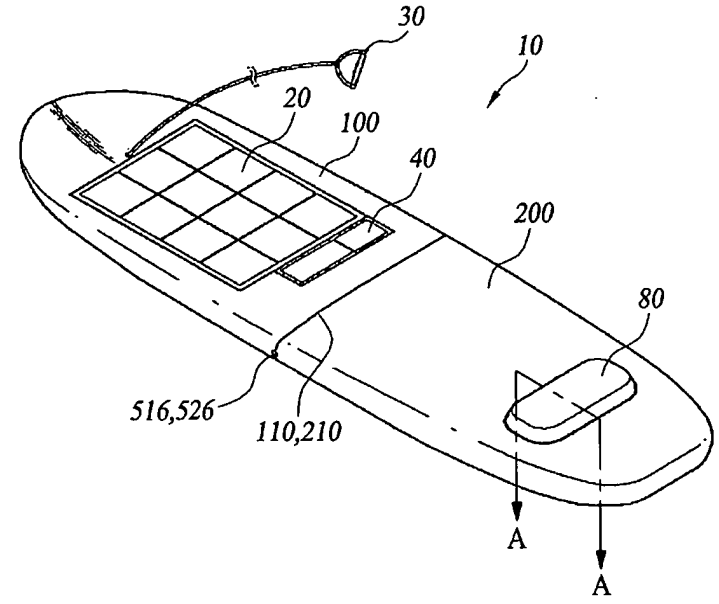
[청구항 20] 제 17 항에 있어서,

상기 방향전환발판부는,
상기 몸체의 후측 상부에 구비되는 발판;
상기 발판의 내부에 구비되고, 상기 발판의 일측 및 상기 발판의 타측으로 가해지는 하중을 감지하는 무게감지센서;
상기 방향전환부의 상측과 축결합된 상태로 상기 몸체의 후측 상부에 구비되고, 상기 무게감지센서의 감지신호를 근거로 상기 방향전환부를 회전시키는 구동부재를 포함하는 것을 특징으로 하는 서핑보드.

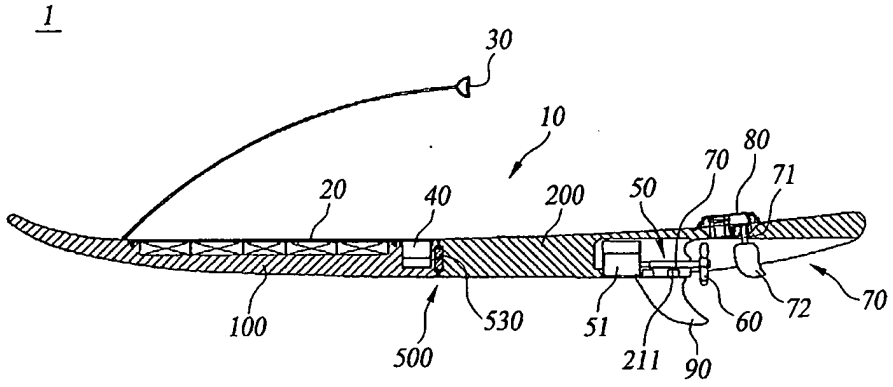
[Fig. 1]


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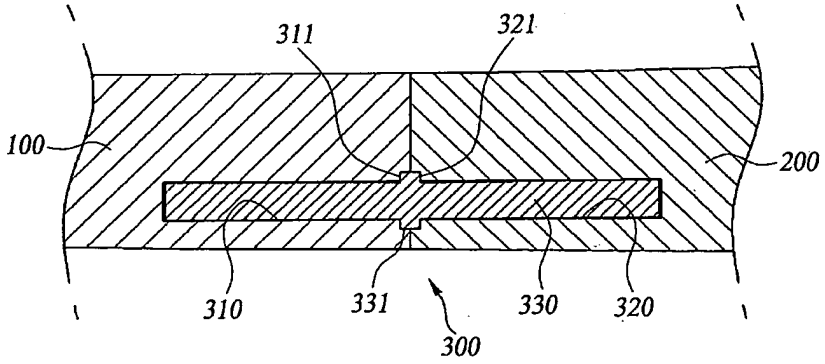
[Fig. 2]


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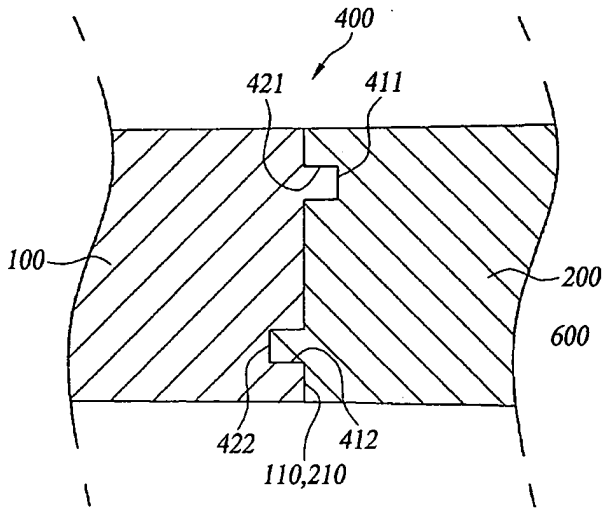
[Fig. 3]



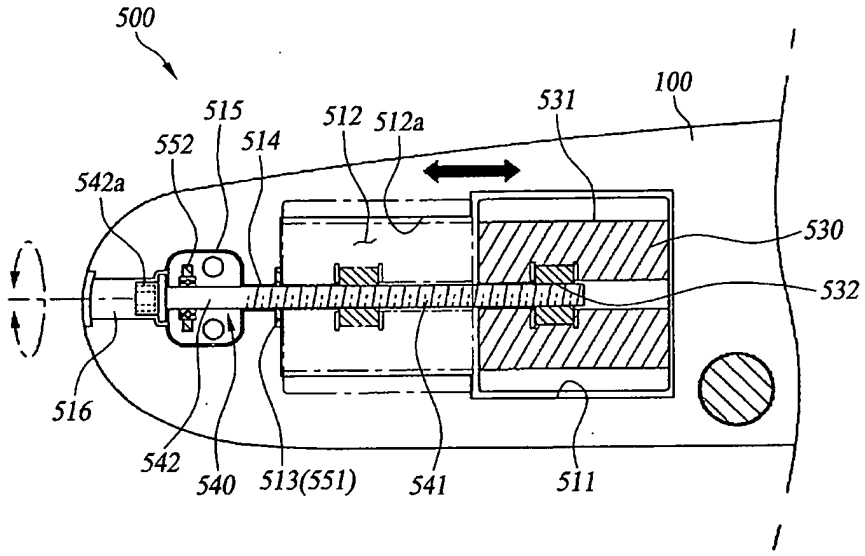
[Fig. 4]



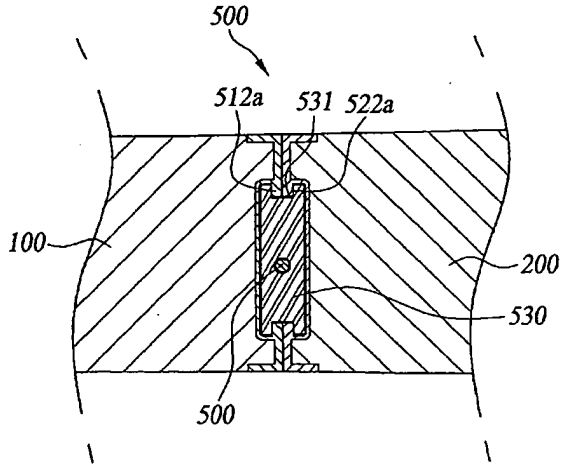
[Fig. 5]



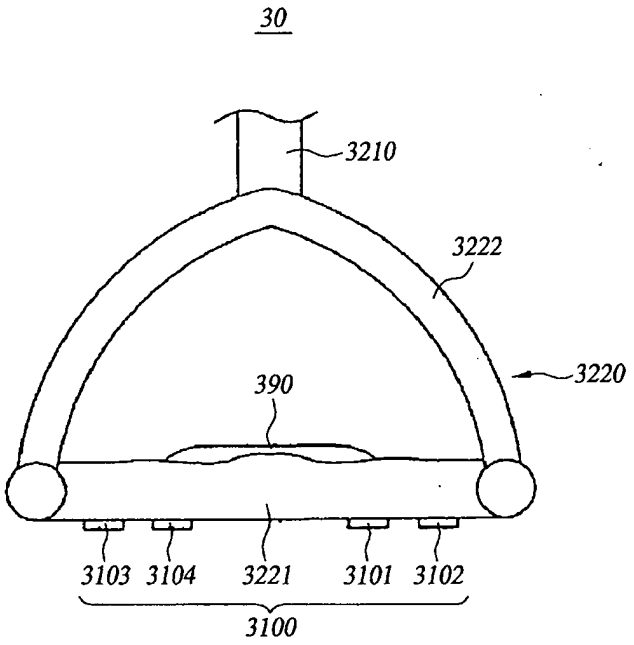
[Fig. 6]


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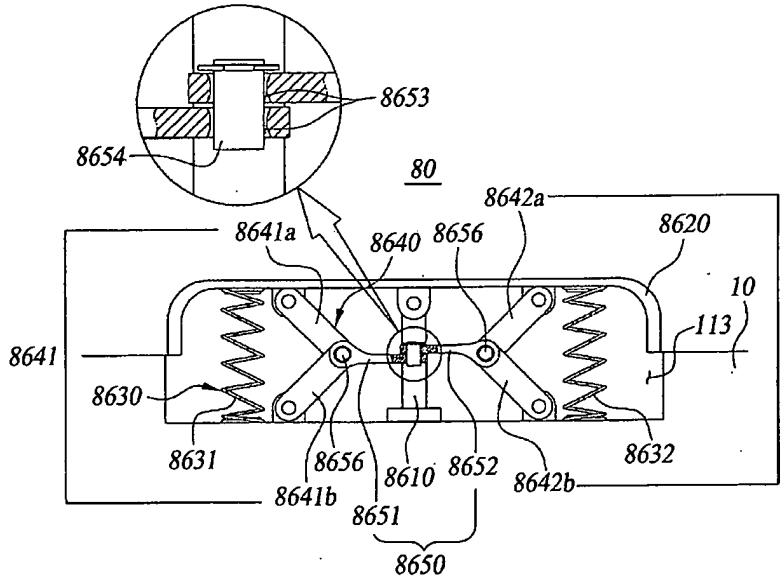
[Fig. 7]


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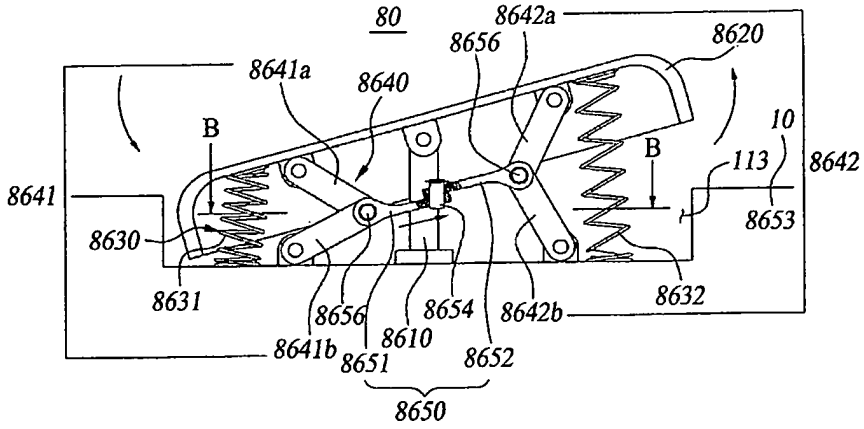
[Fig. 8]


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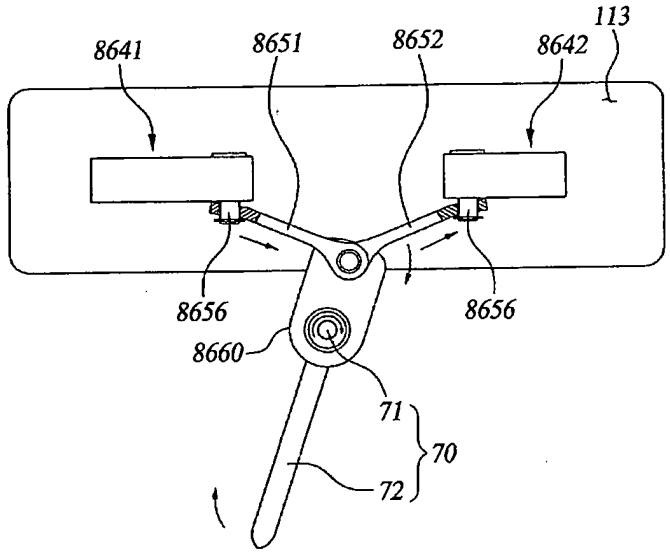
[Fig. 9]


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8642b
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8641b
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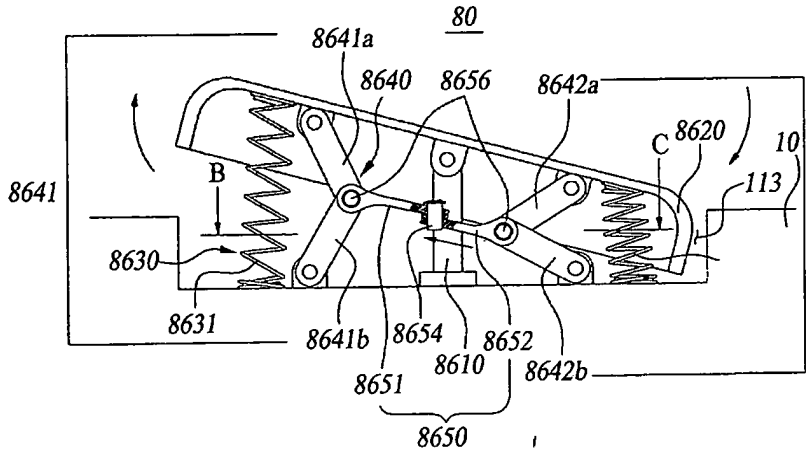
[Fig. 10]



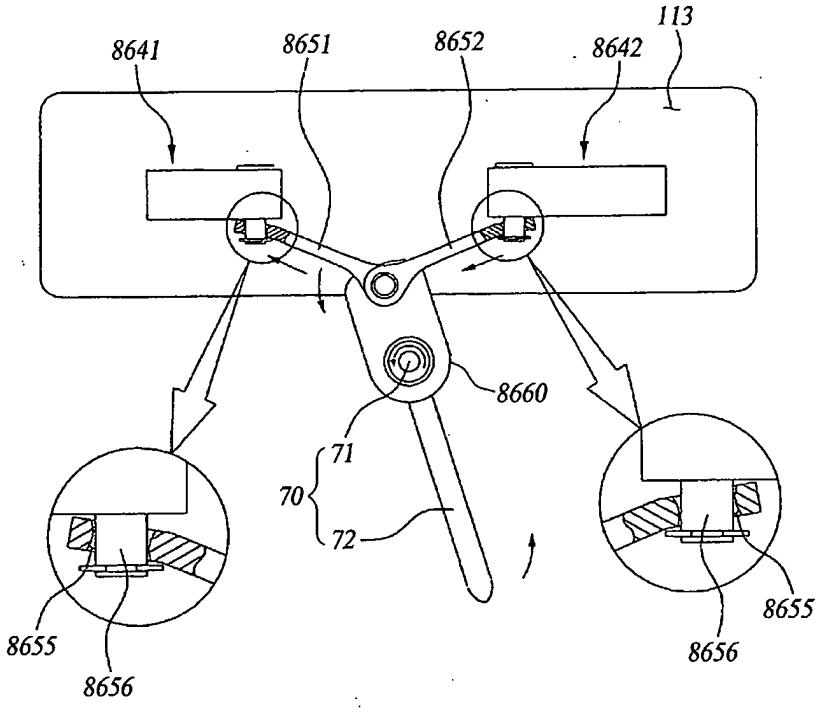
[Fig. 11]



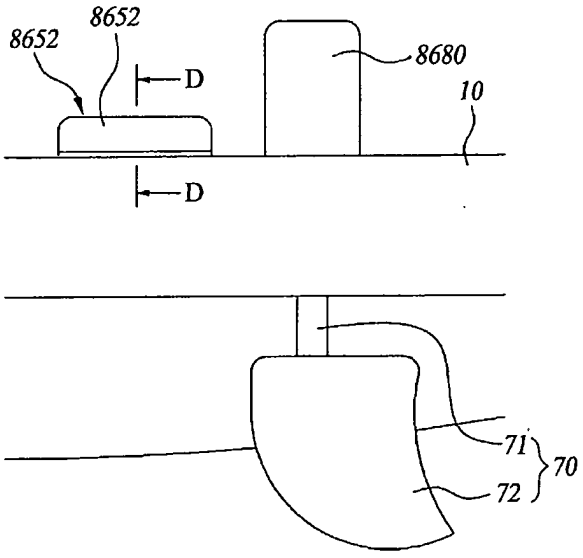
[Fig. 12]



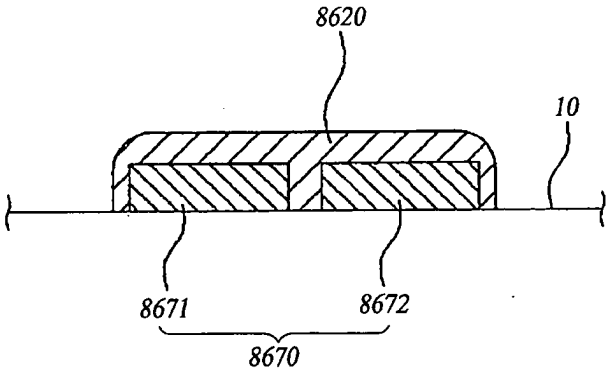
[Fig. 13]


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[Fig. 14]


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[Fig. 15]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2013/005488

A. CLASSIFICATION OF SUBJECT MATTER

B63B 35/79(2006.01)i, B63H 21/17(2006.01)i, B63H 25/20(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B63B 35/79; B63B 35/81; B63H 21/17; B63B 35/73; B63H 11/00; B63H 25/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models: IPC as above
Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: surfing, board, sun, battery, direction, springboard

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-1998-0063072 A (LEE, Sang Seog) 07 October 1998 See claim 1; and figures 1, 2.	1-16
X	KR 10-2005-0012293 A (PARK, Yi Hwan) 02 February 2005 See Technical Objectives that the Invention Intends to Achieve of page 2; and figure 2.	17
Y	See Constitution and Operation of the Invention of page 2; and figures 2, 3.	18
Y	US 05582529 A (MONTGOMERY, Robert E.) 10 December 1996 See lines 42-46 of column 13; and figure 2.	18
A	See lines 4-10 of column 13; figures 11, 14.	19-20
Y	US 2011-0003521 A1 (ROMAN, Kendyl A.) 06 January 2011 See paragraph 87 of page 4; and figure 3B.	18

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 SEPTEMBER 2013 (26.09.2013)	**27 SEPTEMBER 2013 (27.09.2013)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Seonsa-ro, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2013/005488

Patent document cited in search report	Publication date	Patent family member	Publication date
KR 10-1998-0063072 A	07/10/1998	NONE	
KR 10-2005-0012293 A	02/02/2005	NONE	
US 05582529 A	10/12/1996	CA 2161670 C	17/05/2005
		EP 0696981 A1	21/02/1996
		EP 0696981 A4	26/06/1996
		EP 0696981 B1	28/06/2000
		JP 03-176632B2	18/06/2001
		JP 08-510425A	05/11/1996
		KR 10-0293301 B1	22/11/2001
		US 05582529 A	10/12/1996
		WO 95-23731 A1	08/09/1995
US 2011-0003521 A1	06/01/2011	US 8070544 B2	06/12/2011

국 제 조 사 보 고 서

국제출원번호
PCT/KR2013/005488

A. 발명이 속하는 기술분류(국제특허분류(IPC))

B63B 35/79(2006.01)i, B63H 21/17(2006.01)i, B63H 25/20(2006.01)i

B. 조사된 분야

조사된 최소문헌(국제특허분류를 기재)

B63B 35/79; B63B 35/81; B63H 21/17; B63B 35/73; B63H 11/00; B63H 25/20

조사된 기술분야에 속하는 최소문헌 이외의 문헌

한국등록실용신안공보 및 한국공개실용신안공보: 조사된 최소문헌란에 기재된 IPC

일본등록실용신안공보 및 일본공개실용신안공보: 조사된 최소문헌란에 기재된 IPC

국제조사에 이용된 전산 데이터베이스(데이터베이스의 명칭 및 검색어(해당하는 경우))

eKOMPASS(특허청 내부 검색시스템) & 키워드: 서핑, 보드, 태양, 전지, 방향, 발판

C. 관련 문헌

카테고리*	인용문헌명 및 관련 구절(해당하는 경우)의 기재	관련 청구항
A	KR 10-1998-0063072 A (이상석) 1998.10.07 청구항 1; 및 도면1,2 참조.	1-16
X	KR 10-2005-0012293 A (박이환) 2005.02.02 페이지 2의 발명이 이루고자 하는 기술적 과제; 및 도면 2 참조.	17
Y	페이지 2의 발명의 구성 및 작용; 및 도면 2,3 참조.	18
Y	US 05582529 A (MONTGOMERY; ROBERT E.) 1996.12.10 컬럼 13의 라인 42-46; 및 도면 2 참조.	18
A	컬럼 13의 라인 4-10; 도면 11,14 참조.	19-20
Y	US 2011-0003521 A1 (ROMAN KENDYL A.) 2011.01.06 페이지 4의 식별번호 87; 및 도면 3B 참조.	18

☐ 추가 문헌이 C(계속)에 기재되어 있습니다.

☒ 대응특허에 관한 별지를 참조하십시오.

* 인용된 문헌의 특별 카테고리:

"A" 특별히 관련이 없는 것으로 보이는 일반적인 기술수준을 정의한 문헌

"E" 국제출원일보다 빠른 출원일 또는 우선일을 가지나 국제출원일 이후에 공개된 선출원 또는 특허 문헌

"L" 우선권 주장에 의문을 제기하는 문헌 또는 다른 인용문헌의 공개일 또는 다른 특별한 이유(이유를 명시)를 밝히기 위하여 인용된 문헌

"O" 구두 개시, 사용, 전시 또는 기타 수단을 언급하고 있는 문헌

"P" 우선일 이후에 공개되었으나 국제출원일 이전에 공개된 문헌

"T" 국제출원일 또는 우선일 후에 공개된 문헌으로, 출원과 상충하지 않으며 발명의 기초가 되는 원리나 이론을 이해하기 위해 인용된 문헌

"X" 특별한 관련이 있는 문헌. 해당 문헌 하나만으로 청구된 발명의 신규성 또는 진보성이 없는 것으로 본다.

"Y" 특별한 관련이 있는 문헌. 해당 문헌이 하나 이상의 다른 문헌과 조합하는 경우로 그 조합이 당업자에게 자명한 경우 청구된 발명은 진보성이 없는 것으로 본다.

"&" 동일한 대응특허문헌에 속하는 문헌

국제조사의 실제 완료일	국제조사보고서 발송일
2013년 09월 26일 (26.09.2013)	2013년 09월 27일 (27.09.2013)

ISA/KR의 명칭 및 우편주소
대한민국 특허청
(302-701) 대전광역시 서구 청사로 189,
4동 (둔산동, 정부대전청사)
팩스 번호 +82-42-472-7140

심사관
한주철
584
전화번호 +5728

국제조사보고서
대응특허에 관한 정보

국제출원번호
PCT/KR2013/005488

국제조사보고서에서 인용된 특허문헌	공개일	대응특허문헌	공개일
KR 10-1998-0063072 A	1998/10/07	없음	
KR 10-2005-0012293 A	2005/02/02	없음	
US 05582529 A	1996/12/10	CA 2161670 C	2005/05/17
		EP 0696981 A1	1996/02/21
		EP 0696981 A4	1996/06/26
		EP 0696981 B1	2000/06/28
		JP 03-176632B2	2001/06/18
		JP 08-510425A	1996/11/05
		KR 10-0293301 B1	2001/11/22
		US 05582529 A	1996/12/10
		WO 95-23731 A1	1995/09/08
US 2011-0003521 A1	2011/01/06	US 8070544 B2	2011/12/06

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Date : March 7, 2016

TO : Director, Office of Data Management

FROM : Office of Petitions

SUBJECT : Withdrawal from Issue of **Application No.**

Applicant(s) : Jacob Willem Langelaan
Application No. : 14/509,289
Filed : October 8, 2014

The above-identified application has been assigned Patent No. 9,278,729 and an issue date of March 8, 2016.

It is hereby directed that this application be withdrawn from issue at the request of the applicant. Do not refund the issue fee.

The following erratum should be published in the Official Gazette if the above-identified application is published in the OG of March 8, 2016:

> **"All reference to Patent No. 9,278,729 to Jacob Willem Langelaan of Pennsylvania for WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT appearing in the Official Gazette of March 8, 2016 should be deleted since no patent was granted."**

/Liana Walsh/
Liana Walsh
Petitions Lead Paralegal Specialist
Office of Petitions

cc: Paul Harrison
Niomi Farmer
Mary E. Johnson (Cookie)
Brad Harris
Kim Terrell
Lamont Fletcher
PDCS Weekly Process
DeShawn Durham
Frederick Briscoe

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

MAILED
MAR 07 2016
OFFICE OF PETITIONS

DINSMORE & SHOHL LLP
PO BOX 7021
TROY MI 48007-7021

In re Application of :
Langelaan, Jacob Willem :
Application No. 14/509,289 : DECISION ON PETITION
Filed: October 8, 2014 : UNDER 37 CFR 1.313(c)
Attorney Docket No. JWL-10002/36 :

This is a decision on the petition under 37 CFR 1.313(c), filed March 4, 2016, to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED**.

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). *See* 37 CFR 1.313(c)(2).

Petitioner is advised that the issue fee paid on January 27, 2016, cannot be refunded. If, however, this application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.[1]

Telephone inquiries should be directed to the undersigned at (571) 272-3206.

This application is being referred to Technology Center AU 3617 for processing of the request for continued examination under 37 CFR 1.114 and for consideration of the concurrently filed IDS.

/Liana Walsh/
Liana Walsh
Petition Lead Paralegal Specialist
Office of Petitions

[1] *The request to apply the issue fee to the new Notice may be satisfied by completing and returning the new Part B – Fee(s) Transmittal Form (along with any balance due at the time of submission). Petitioner is advised that the Issue Fee Transmittal Form must be completed and timely submitted to avoid abandonment of the application.*

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

PATENT WITHDRAWAL NOTICE

DATE WITHDRAWN	WITHDRAWAL NUMBER
3/7/2016	32317

The following application has been **WITHDRAWN** from the

3/8/2016 issue.

SERIAL NO.	PATENT NUMBER
14509289	9278729

TITLE

WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

NAME AND ADDRESS

LANGELAAN, JACOB WILLEM
STATE COLLEGE, PENNSYLVANIA

REASON FOR WITHDRAWAL

Applicant's petition to withdraw - Granted

-

APPROVED

/Kimberly Terrell/, Manager

Patent Publication Branch
Office of Data Management

FORM PTO-302 -- (REV. 05-2009)

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: April 12, 2016
Electronic Signature for Brent L. Farese: /Brent L. Farese/

Docket No. MHLCUS 3.0F-002
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Langelaan

Application No.: 14/509,289 Confirmation No.: 2924

Filed: October 8, 2014 Art Unit: 2617

For: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT Examiner: J. E. Hayes

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Dear Sir:

Prior to initiation of the prosecution of the above-identified pending U.S. patent application, the following amendments and remarks are respectfully submitted.

IN THE CLAIMS

1. (currently amended) A passively stable, weight-shift controlled personal hydrofoil watercraft, comprising:

a flotation device that has a fore-aft length greater than a lateral width, the flotation device having a top surface and a bottom surface, wherein a user can be disposed on the top surface of the flotation device in a prone, kneeling, or standing position, the ~~floatation~~ flotation device having a forward section, a middle section, and a rear section, and the flotation device being controlled via weight shift of the user;

a strut having an upper end and a lower end, the upper end fixedly interconnected with the flotation device between the middle section and the rear section of the flotation device;

a hydrofoil fixedly interconnected with the lower end of the strut, the hydrofoil having no movable surface and designed to provide passive static stability controlled solely by weight shift of the user;

a propulsion system for propelling the watercraft in a body of water, wherein the propulsion system is connected to the hydrofoil; and

the watercraft having no movable steering system.

2. (original) A watercraft in accordance with claim 1, wherein the propulsion system comprises a battery, an electric motor, a motor speed controller, and a propulsor, the propulsor selected from a propeller, a ducted propeller, or a pump-jet.

3. (original) A watercraft in accordance with claim 2, wherein the propulsor is disposed below the hydrofoil.

4. (currently amended) A watercraft in accordance with claim 1, wherein the propulsion system is integrated in a first hydrofoil wing of the hydrofoil and has an inlet near a leading end of the first hydrofoil wing and an outlet near a trailing edge of the first hydrofoil wing.

Claims 5-12 (canceled).

13. (previously presented) A watercraft in accordance with claim 1, wherein the design for providing the passive static stability is achieved through a combination of airfoil design, planform design and tailoring of span-wise twist distribution.

14. (previously presented) A watercraft in accordance with claim 1, wherein the hydrofoil is wing shaped with a front edge and a rear edge that both curve rearwardly.

15. (new) A watercraft in accordance with claim 1, wherein the hydrofoil is indirectly connected to the strut.

16. (new) A watercraft in accordance with claim 15, wherein the strut is directly connected to the propulsion system.

17. (new) A watercraft in accordance with claim 16, wherein a first hydrofoil wing of the hydrofoil is indirectly connected to the strut through the propulsion system.

18. (new) A watercraft in accordance with claim 15, wherein the hydrofoil comprises a plurality of wings that are interconnected by way of a strut.

19. (new) A watercraft in accordance with claim 2, wherein the battery and motor speed controller are contained in a waterproof compartment integrated into the flotation device.

20. (new) A watercraft in accordance with claim 2, wherein the electric motor is integrated into a waterproof, streamlined pod and the watercraft comprises a cooling system.

21. (new) A watercraft in accordance with claim 2, wherein the electric motor is removably interconnected with the hydrofoil through a fitting.

22. (new) A watercraft in accordance with claim 18, wherein the first hydrofoil wing includes winglets extending at an angle to a main body of the first hydrofoil wing.

23. (new) A watercraft in accordance with claim 19, further comprising a wireless handheld controller having a transmitter, and a throttle interface having a receiver, wherein the transmitter is adapted to send wireless signals to the receiver that cause an output of the propulsion system to change.

24. (new) A watercraft in accordance with claim 1, wherein a first hydrofoil wing of the hydrofoil is directly connected to the strut.

25. (new) A watercraft in accordance with claim 1, wherein the hydrofoil is spaced a fixed distance apart from the flotation device.

26. (new) A watercraft in accordance with claim 23, wherein the strut has an internal passage and electrical wires extend from the electric motor to the waterproof compartment inside the strut through the internal passage for controlling the electric motor.

27. (new) A watercraft in accordance with claim 2, wherein the flotation device has a detector adapted to detect a user's presence on the flotation device and cease operation of the electric motor if the detector detects that the user is not on the flotation device.

28. (new) A watercraft in accordance with claim 19, wherein the electric motor is a brushless motor.

29. (new) A watercraft in accordance with claim 1, wherein the propulsion system is directly or indirectly connected to the hydrofoil.

30. (new) A watercraft in accordance with claim 29, wherein the hydrofoil is directly connected to the strut, and the strut is directly connected to the propulsion system.

REMARKS

The above-noted cancellation of claims 5-12, amendments to claims 1 and 4, and addition of new dependent claims 15-30 are respectfully submitted prior to initiation of the prosecution of this application in the U.S. Patent and Trademark Office. Independent claim 1 has only been slightly amended herein to resolve a formality error.

The above-noted amended and new claims are respectfully submitted in order to more clearly and appropriately claim at least one aspect of the subject matter that Applicant considers to constitute the inventive contribution. No new matter is included in these amendments. In addition, Applicant respectfully notes the following recent prosecution history for context. After a Notice of Allowance was mailed for the present application on December 4, 2015, and Applicant paid the issue fee on January 27, 2016, Applicant filed a Petition to Withdraw from Issue on March 4, 2016 ("the Petition") along with an Information Disclosure Statement and a Request for Continued Examination. The Petition was filed to satisfy Applicant's duty of candor before the Office, and it was granted on March 7, 2016 – prior to issuance of the present application on March 8, 2016. As the Petition was timely filed and granted prior to issuance of the present application (*see* MPEP § 1308 *et seq.*), Applicant respectfully requests that the Examiner consider the RCE and IDS filed March 4, 2016.

Applicant also respectfully notes that independent claim 1 has only been slightly amended herein to resolve a formality issue, and that none of the art cited in the recent IDS impacts the allowability of claim 1 in any respect. Thus, it is respectfully submitted that independent claim 1 is allowable for the same reasons addressed by Applicant previously during prosecution, and Applicant respectfully requests that the Examiner reissue the Notice of Allowance mailed December 4, 2015. Applicant has merely canceled certain claims herein and provided additional dependent claims that further clarify the subject matter, which Applicant considers to constitute the inventive contribution. As an example, new dependent claim 15 recites that the hydrofoil is indirectly connected to the strut (*see e.g.*, Figs. 6-7), and new dependent claim 16 recites that the strut is directly connected to the propulsion system (*see e.g.*, Figs. 6-7). The new dependent claims also clarify that the hydrofoil may include connected hydrofoil wings (*see e.g.*, claim 18 and Fig. 8). Thus, the new dependent claims, *inter alia*, serve to clarify the constitution of different embodiments of the hydrofoil disclosed in Applicant's application (*c.f.*, Figs. 1, 6, and 8), and the myriad ways in which the hydrofoil can

be incorporated into claimed watercraft.[1] Although only some new claims are addressed above, all of the new dependent claims are respectfully supported by the application, as filed, and contain no new matter. Thus, Applicant respectfully requests that the Examiner issue a subsequent Notice of Allowance allowing the application.

In view of the above, it is respectfully requested that these amendments now be entered and the application allowed accordingly. If, however, for any reason the Examiner does not believe such action can be taken, it is respectfully requested that the Examiner telephone Applicant's attorney at (908) 654-5000 in order to overcome any objections that the Examiner may have.

All required fees are being paid via credit card. However, please charge any additional fees not already paid via credit card, and credit any overpayments to our Deposit Account No. 12-1095.

Dated: April 12, 2016

Respectfully submitted,
Electronic signature:
/Brent L. Farese/
Brent L. Farese
Registration No.: 63,617
LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK, LLP
600 South Avenue West
Westfield, New Jersey 07090
(908) 654-5000
Attorney for Applicant

LD-553
4470228_1.docx

[1] Applicant's characterization of the hydrofoil of U.S. Patent No. 7,232,355 to Wooley in its amendment dated November 16, 2016 are thus inapposite and have been implicitly clarified via the amended and/or new claims.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

[X] I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 00530

OR

[ ] I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

[X] The address associated with the above-mentioned Customer Number

OR

[ ] The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

[X] Inventor or Joint Inventor (title not required below)

[ ] Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

[ ] Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

[ ] Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	MARCH 4 2016
Name	Jacob Willem Langelaan		
Title			

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

[ ] Total of 1 forms are submitted.

4431784

AMENDMENT TRANSMITTAL LETTER			Docket No. MHLCUS 3.0F-002
Application No. 14/509,289-Conf. #2924	Filing Date October 8, 2014	Examiner Not Yet Assigned	Art Unit 3617

Applicant(s): Jacob Willem Langelaan

Invention: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

TO THE COMMISSIONER FOR PATENTS

Transmitted herewith is an amendment in the above-identified application.

The fee has been calculated and is transmitted as shown below.

CLAIMS AS AMENDED						
	Claims Remaining After Amendment	Highest Number Previously Paid		Number Extra Claims Present	Rate	
Total Claims	22	- 20	=	2	x 40.00	80.00
Independent Claims	1	- 3	=	0	x	
Multiple Dependent Claims (check if applicable) ☐						
Other fee (please specify):						
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT:						80.00

☐ Large Entity ☒ Small Entity

☐ No additional fee is required for this amendment.

☐ Please charge Deposit Account No. 12-1095 in the amount of $ _____ .

☐ A check in the amount of $ _____ to cover the filing fee is enclosed.

☒ Payment by credit card. Form PTO-2038 is attached.

☒ The Director is hereby authorized to charge and credit Deposit Account No. 12-1095 as described below. A duplicate copy of this sheet is enclosed.

☒ Credit any overpayment.

☒ Charge any additional filing or application processing fees required under 37 C.F.R. § 1.16 and 1.17.

/Brent L. Farese/ Dated: April 12, 2016

Brent L. Farese
Attorney/Agent Reg. No.: 63,617

LERNER, DAVID, LITTENBERG, KRUMHOLZ & MENTLIK, LLP
600 South Avenue West
Westfield, New Jersey 07090
(908) 518-6328

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: April 12, 2016 Electronic Signature for Brent L. Farese: /Brent L. Farese/

4493894

Electronic Patent Application Fee Transmittal

Application Number:	14509289
Filing Date:	08-Oct-2014
Title of Invention:	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
First Named Inventor/Applicant Name:	Jacob Willem Langelaan
Filer:	Arnold H. Krumholz/Sophia Buchan
Attorney Docket Number:	JWL-10002/36

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Claims in excess of 20	2202	2	40	80
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**80**

Electronic Acknowledgement Receipt

EFS ID:	25466063
Application Number:	14509289
International Application Number:	
Confirmation Number:	2924
Title of Invention:	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
First Named Inventor/Applicant Name:	Jacob Willem Langelaan
Customer Number:	25006
Filer:	Arnold H. Krumholz/Sophia Buchan
Filer Authorized By:	Arnold H. Krumholz
Attorney Docket Number:	JWL-10002/36
Receipt Date:	12-APR-2016
Filing Date:	08-OCT-2014
Time Stamp:	14:10:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$80
RAM confirmation Number	323
Deposit Account	121095
Authorized User	AUGUSTIN, RAYMOND W.

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	Preliminary_Amendment.pdf	36280 d56ea1b18d78c66839c313829f89dab8fd482e23	no	6
Warnings:					
Information:					
2	Power of Attorney	POA_or_Authorization_of_Agent.pdf	16333 7d3636d396499fdf263dfc8747a074dff1380919	no	1
Warnings:					
Information:					
3	Power of Attorney	MHLCUS_9_POA.pdf	206659 57c25194cb6175c5619b417e7d12533c458adb7a	no	1
Warnings:					
Information:					
4	Miscellaneous Incoming Letter	Amendment_Transmittal.pdf	21869 3e3fe1e1004f88d1e61e9c36f3e40b94edce2502	no	1
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	30951 82713edc2f3fa5914c239f86175204484c42c778	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	312092		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
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TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	14/509,289
Filing Date	October 8, 2014
First Named Inventor	Jacob Willem Langelaan
Title	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
Art Unit	3617
Examiner Name	Not Yet Assigned
Attorney Docket Number	MHLCUS 3.0F-002

SIGNATURE of Applicant or Patent Practitioner

Signature	/Brent L. Farese/	Date (Optional)	April 12, 2016
Name	Brent L. Farese	Registration Number	63,617
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

[X] *Total of 1 forms are submitted.

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: April 12, 2016 Electronic Signature for Brent L. Farese: /Brent L. Farese/

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
14/509,289	10/08/2014	

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **04/12/2016**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 21	Minus	** 20	= 1	X $40 =	40
Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $210 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	**40**

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LDRC
/CHERRI FITZGERALD/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/509,289	10/08/2014	Jacob Willem Langelaan	MHLCUS 3.OF-002

CONFIRMATION NO. 2924

530
LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK
600 SOUTH AVENUE WEST
WESTFIELD, NJ 07090

POA ACCEPTANCE LETTER

OC000000082329907

Date Mailed: 04/21/2016

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/12/2016.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/tpetros/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/509,289	10/08/2014	Jacob Willem Langelaan	JWL-10002/36

CONFIRMATION NO. 2924

POWER OF ATTORNEY NOTICE

25006
DINSMORE & SHOHL LLP
PO BOX 7021
TROY, MI 48007-7021

OC000000082329841

Date Mailed: 04/21/2016

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/12/2016.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/tpetros/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

530 7590 04/26/2016

LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK
600 SOUTH AVENUE WEST
WESTFIELD, NJ 07090

EXAMINER
HAYES, JOVON E

ART UNIT	PAPER NUMBER
3617	

DATE MAILED: 04/26/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	10/08/2014	Jacob Willem Langelaan	MHLCUS 3.OF-002	2924

TITLE OF INVENTION: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$480	$480	07/26/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

530 7590 04/26/2016
LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK
600 SOUTH AVENUE WEST
WESTFIELD, NJ 07090

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	10/08/2014	Jacob Willem Langelaan	MHLCUS 3.OF-002	2924

TITLE OF INVENTION: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$480	$480	07/26/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
HAYES, JOVON E	3617	440-006000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ 607 Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	10/08/2014	Jacob Willem Langelaan	MHLCUS 3.OF-002	2924

530 7590 04/26/2016

LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK
600 SOUTH AVENUE WEST
WESTFIELD, NJ 07090

EXAMINER	
HAYES, JOVON E	

ART UNIT	PAPER NUMBER
3617	

DATE MAILED: 04/26/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

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OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/509,289	Applicant(s) LANGELAAN, JACOB WILLEM	
	Examiner JOVON HAYES	Art Unit 3617	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *a RCE received 4/12/2016*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-4 and 13-30*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☒ All b) ☐ Some *c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 10/8/14 3/4/16
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

DETAILED ACTION

1. This is an allowance of RCE application 14/509,289.

2. Claims 5-12 are canceled.

3. Claims 1-4 and 13-30 are allowed.

REASONS FOR ALLOWANCE

4. The following is an examiner's statement of reasons for allowance: prior art search did not reveal the limitations of the claim, while applicant only canceled and added new dependent claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOVON HAYES whose telephone number is (571)272-3115. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samuel (Joe) Morano can be reached on 5712726684. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOVON HAYES/
Examiner, Art Unit 3617

/Lars A. Olson/
Primary Examiner, Art Unit 3617

Notice of References Cited	Application/Control No. 14/509,289	Applicant(s)/Patent Under Reexamination LANGELAAN, JACOB WILLEM	
	Examiner JOVON HAYES	Art Unit 3617	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-3,265,027 A	08-1966	BROWN ARTHUR E	B63H11/12	114/278
*	B	US-3,405,677 A	10-1968	SMITH ROBERT C	B63B35/7943	114/55.53
*	C	US-5,809,926 A	09-1998	Kelsey; Kevin	B63B1/286	114/274
*	D	US-6,019,059 A	02-2000	Kelsey; Kevin R	B63B1/28	114/274
*	E	US-6,178,905 B1	01-2001	Dynes; Richard	B63B35/731	114/55.54
*	F	US-6,409,560 B1	06-2002	Austin; Shawn M.	B63B35/7943	440/6
*	G	US-2002/0124783 A1	09-2002	Dynes, Richard	B63B1/285	114/55.54
*	H	US-2005/0109258 A1	05-2005	Smith, Timothy D.	B63B1/24	114/274
*	I	US-7,047,901 B2	05-2006	Chen; Shane	B63B1/246	114/274
*	J	US-7,232,355 B2	06-2007	Woolley; Robert C.	B63B1/248	114/253
*	K	US-2007/0245943 A1	10-2007	Rice; Mark Shipley	B60V1/08	114/272
*	L	US-7,731,555 B2	06-2010	Railey; Mike R.	B63B35/7943	440/6
*	M	US-2010/0167605 A1	07-2010	Schultz; Wilderich C.	B63H5/14	440/67

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 14/509,289	Applicant(s)/Patent Under Reexamination LANGELAAN, JACOB WILLEM	
	Examiner JOVON HAYES	Art Unit 3617	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-7,832,349 B2	11-2010	Dansie; Stephen W.	B63B1/24	114/274
*	B	US-2010/0323568 A1	12-2010	CHAMBERS; Tucker C.	B63B35/793	441/79
*	C	US-7,854,637 B2	12-2010	Schultz; Wilderich C.	B63H5/14	440/67
*	D	US-2015/0104985 A1	04-2015	Langelaan; Jacob Willem	B63H21/17	440/6
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Docket No.: JWL-10002/36
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Utility Application of:
Jacob Willem Langelaan

RECEIVED
MAR 04 2016
OFFICE OF PETITIONS

Application No.: 14/509,289

Filed: October 8, 2014

For: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

Allowed: December 4, 2015

Confirmation No.: 2924

Art Unit: 3617

Examiner: J. E. Hayes

INFORMATION DISCLOSURE STATEMENT (IDS)

MS RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Pursuant to 37 C.F.R. § 1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement, pursuant to 37 C.F.R. § 1.114(c), accompanies the Request for Continued Examination (37 C.F.R. § 1.114) submitted herewith.

A summary/abstract translation of the non-English language references is enclosed.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H./

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

In accordance with 37 C.F.R. § 1.97(g), the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made or that no other material information as defined in 37 C.F.R. § 1.56(a) exists. In accordance with 37 C.F.R. § 1.97(h), the filing of this Information Disclosure Statement shall not be construed to be an admission that any patent, publication or other information referred to therein is "prior art" for this invention unless specifically designated as such.

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 04-1133, under Order No. JWL-10002/36.

Dated: March 3, 2016

Respectfully submitted,

By _____

Douglas L. Wathen
Registration No.: 41,369
DINSMORE & SHOHL LLP
2701 Troy Center Drive, Suite 330
Post Office Box 7021
Troy, Michigan 48007-7021
(734) 913-9300
(734) 913-6007 (Fax)
Attorney for Applicant

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H./

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14509289
Filing Date	2014-10-08
First Named Inventor	Jacob Willem Langelaar
Art Unit	3617
Examiner Name	J. E. Hayes
Attorney Docket Number	JWL-10002/36

RECEIVED
MAR 04 2016
OFFICE OF PETITIONS

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	3405677		1968-10-15	Smith	
	2	6178905		2001-01-30	Dynes et al.	
	3	293133		1884-02-05	Applegate	
	4	322712		1885-07-21	Harris	
	5	326241		1885-09-15	Preston	
	6	374713		1887-12-13	Smith	
	7	427435		1890-05-06	Manville	
	8	497158		1893-05-09	Allen	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14509289
Filing Date	2014-10-08
First Named Inventor	Jacob Willem Langelaan
Art Unit	3617
Examiner Name	J. E. Hayes
Attorney Docket Number	JWL-10002/36

RECEIVED
MAR 04 2016
OFFICE OF PETITIONS

	9	506237		1893-10-10	Kinsman	
	10	619281		1899-02-14	Cornish	
	11	670263		1901-03-19	Whiton	
	12	704790		1902-07-15	Gillinder	
	13	714428		1902-11-25	Wirth	
	14	723235		1903-03-24	Brachhausen	
	15	773155		1904-10-25	O'Neill	
	16	2110812		1938-03-08	Negri	
	17	2451781		1948-10-19	Steele	
	18	2748400		1956-06-05	James	
	19	2812736		1957-11-12	Fry	

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14509289
Filing Date	2014-10-08
First Named Inventor	Jacob Willem Langelaan
Art Unit	3617
Examiner Name	J. E. Hayes
Attorney Docket Number	JWL-10002/36

RECEIVED
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	20	2815518		1957-12-10	Kuehn	
	21	2840832		1958-07-01	Conger	
	22	2891259		1959-06-23	Perry	
	23	3019760		1962-02-06	Berliner	
	24	3105249		1963-10-01	Palmore	
	25	3150632		1964-09-29	Evans	
	26	3164119		1965-01-05	Emmanuel et al.	
	27	3213822		1965-10-26	Sawchuck	
	28	3254622		1966-06-07	Bramson	
	29	3294055		1966-12-27	Mcguire	
	30	3324822		1967-06-13	Carter	

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MAR 04 2016
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	31	3340845		1967-09-12	Tyrack	
	32	3371646		1968-03-05	Mela	
	33	3380421		1968-04-30	Lstiburek	
	34	3456613		1969-07-22	Smith	
	35	3536025		1970-10-27	Tierney	
	36	3548778		1970-12-22	Von Smagala-Romanoff	
	37	3882815		1975-05-13	Bennett	
	38	3964417		1976-06-22	Williams et al.	
	39	4020782		1977-05-03	Gleason	
	40	5017166		1991-05-21	Chang	
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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
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First Named Inventor	Jacob Willem Langelaan
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	42	5947788		1999-09-07	Derrah	
	43	6142840		2000-11-07	Efthymiou	
	44	6183333		2001-02-06	Hall	
	45	6311631		2001-11-06	Beecher	
	46	6568340		2003-05-27	Dec et al.	
	47	6901872		2005-06-07	Battle et al.	
	48	7089875		2006-08-15	Kurze	
	49	7207282		2007-04-24	Ruan et al.	
	50	7232350		2007-06-19	Krah	
	51	7298056		2007-11-20	Gizara	
	52	7930985		2011-04-26	Walworth et al.	

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	First Named Inventor	Jacob Willem Langelaan
	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

	53	7963814		2011-06-21	Grimmeisen	
	54	8636552		2014-01-28	Braden et al.	
	55	8702458		2014-04-22	Preston	
	56	9060385		2015-06-16	Manning	
	57	8870614		2014-10-28	Railey	
	58	RE28955	E	1976-09-07	Stanberry, Sr. et al.	

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U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020124783	A1	2002-09-12	Dynes	
	2	20150104985	A1	2015-04-16	Langelaan	
	3	20010007235	A1	2001-07-12	Dynes et al.	

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H./

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	4	20010042498	A1	2001-11-22	Burnham	
	5	20020056408	A1	2002-05-16	Dec et al.	
	6	20020072285	A1	2002-06-13	Jung	
	7	20030167991	A1	2003-09-11	Namanny	
	8	20040139905	A1	2004-07-22	Chen	
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	10	20070046028	A1	2007-03-01	Gizara	
	11	20070089657	A1	2007-04-26	Ruan et al.	
	12	20070283865	A1	2007-12-13	Railey	
	13	20080078316	A1	2008-04-03	Gizara	
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	15	20080173225	A1	2008-07-24	Proto	
	16	20090165690	A1	2009-07-02	Walworth et al.	
	17	20090221198	A1	2009-09-03	Townsend	
	18	20100233920	A1	2010-09-16	Railey	
	19	20110003521	A1	2011-01-06	Roman	
	20	20110056423	A1	2011-03-10	Railey	
	21	20120000409	A1	2012-01-05	Railey	
	22	20120073486	A1	2012-03-29	Railey	
	23	20120225598	A1	2012-09-06	Railey et al.	
	24	20130059489	A1	2013-03-07	Vlock et al.	
	25	20130104787	A1	2013-05-02	Roman	

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	26	20130239861	A1	2013-09-19	Gizara	
	27	20140007802	A1	2014-01-09	Railey	
	28	20140134900	A1	2014-05-15	Derrah	
	29	20140349531	A1	2014-11-27	MCLELAN	
	30	20150011133	A1	2015-01-08	Vlock et al.	
	31	20150064995	A1	2015-03-05	WOODS et al.	
	32	20150083034	A1	2015-03-26	Howes	
	33	20150251734	A1	2015-09-10	Roman	
	34	20110201238	A1	2011-08-18	Rott et al.	
	35	20110212691	A1	2011-09-01	Rott et al.	
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FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	591358	CH	A5	1977-09-15	Henking, Roberto		☒
	2	202264871	CN	U	2012-06-06	Zhenning, Guo		☒
	3	3070662	DE		1985-06-20	Dawson		☒
	4	4100890	DE	A1	1992-07-16	Meier, Andreas		☒
	5	102004049615	DE	A1	2006-04-13	Rotinor Gmbh		☒
	6	102013218735	DE	A1	2015-03-19	Schilcher, Markus		☒
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	8	2700571	EP	A2	2014-02-26	Joy Ride Technology Co., Ltd		☒
	9	2728863	FR	A1	1996-07-05	Bourgault, Yves Marie Roger		☒

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Examiner Name	J. E. Hayes
Attorney Docket Number	JWL-10002/36

	10	2755090	FR	A1	1998-04-30	Magnani, Ivan Joseph		☒
	11	2766154	FR	A1	1999-01-22	Verel, Francois		☒
	12	2012025293	JP	A	2012-02-09	Kawanishi, Eiji		☒
	13	20140024816	KR	A	2014-03-03	Joy Ride Technology Co., Ltd		☒
	14	2006014085	WO	A1	2006-02-09	Seo, Dae-su		☒
	15	2007088351	WO	A1	2007-08-09	South Bank Univ Entpr Ltd		☒
	16	2011050410	WO	A1	2011-05-05	Preston, Christopher		☒
	17	2011075808	WO	A1	2011-06-30	Work Station Com Pecas Ltda Me		☒
	18	2011100654	WO	A2	2011-08-18	Rott, Dainuri		☒
	19	2011130724	WO	A2	2011-10-20	Rott, Dainuri		☒
	20	2012003333	WO	A1	2012-01-05	Boomerboard Llc		☒

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

	21	2013173182	WO	A1	2013-11-21	Thompson, Joe		☒
	22	2013191501	WO	A1	2013-12-27	Ku, Kwon Hoi		☒

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

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EXAMINER SIGNATURE

Examiner Signature	/Jovon Hayes/	Date Considered	04/16/2016

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)	Application Number	14509289
	Filing Date	2014-10-08
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	3617
	Examiner Name	J. E. Hayes
	Attorney Docket Number	JWL-10002/36

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature		Date (YYYY-MM-DD)	2016-03-03
Name/Print	Douglas L. Wathen	Registration Number	41369

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14509289	LANGELAAN, JACOB WILLEM
	Examiner	**Art Unit**
	JOVON HAYES	3617

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/10/2015	11/19/2015	04/16/2016						
1	1	✓	=	=						
2	2	✓	=	=						
3	3	✓	=	=						
4	4	✓	=	=						
	5	✓	=	-						
	6	✓	=	-						
	7	✓	=	-						
	8	✓	=	-						
	9	✓	=	-						
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17	25			=						
18	26			=						
19	27			=						
20	28			=						
21	29			=						
22	30			=						

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	36	surfboard and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/16 22:29
L3	84	surfboard and (hydrofoil foil) and (strut fin) and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/16 22:32
L4	362362	441/ andsurfboard and (hydrofoil foil) and (strut fin) and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/16 22:32
L5	26	441/ and surfboard and (hydrofoil foil) and (strut fin) and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/16 22:32
L6	59	114/ and surfboard and (hydrofoil foil) and (strut fin) and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/04/16 22:34
S1	1	"14509289"	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 14:47
S2	0	b63b5/15.cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 14:48
S3	174	b63b1/248.cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 14:48
S4	18	("2747138" | "2931332" | "3227123" | "3262413" | "4274357" | "4508046" | "4971586" | "5062378" | "6192817" | "6702634" | "7047901" | "7144285" | "7232355" | "7731555").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 14:49
S5	26	(surfboard waterboard powerboard	US-PGPUB;	OR	ON	2015/08/08

		watercraft) and hydrofoil and strut and propulsion and (jet adj drive propulsor kort adj nozzle thruster)	USPAT; USOCR			15:03
S6	0	114/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and propulsion and (jet adj drive propulsor kort adj nozzle thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:07
S7	0	114/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and propulsion and (jet adj drive propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:07
S8	0	114/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and propulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:08
S9	0	114/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:08
S10	0	114/79 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:09
S11	14	"114"/ and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:09
S12	4	441/74 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:09
S13	0	441/77 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:10
S14	2	441/79 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:10
S15	1	440/6 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:11
S16	3	"440"/ and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:11
S17	14	"114"/ and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:12
S18	19	(surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:13
S19	6	114/274 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:15
S20	3	114/278 and (surfboard waterboard powerboard watercraft) and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:16
S21	0	board and hydrofoil and strut and proulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:17
S22	15	board and hydrofoil and strut and propulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:17

S23	3	surfboard and hydrofoil and strut and propulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:20
S24	15	watercraft and hydrofoil and strut and propulsion and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:20
S25	15	watercraft and hydrofoil and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:20
S26	24	watercraft and (hydrofoil foil) and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:20
S27	10	surfboard and (hydrofoil foil) and strut and (propulsor thruster)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:21
S28	35	surfboard and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:22
S29	35	(surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:25
S30	29	"114"/ and (surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:27
S31	14	"441"/ and (surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/08 15:27
S32	26	("0857951" | "2593806" | "2931332" | "3456613" | "3465704" | "3650234" | "3722450" | "4349340" | "4711195" | "4972792" | "5083948" | "5117776" | "5136961" | "5362264" | "5413066" | "5448963" | "5471942" | "6178905" | "6409560" | "6468118").PN. OR ("7047901").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/10 08:38
S33	0	("2007/0245943").URPN.	USPAT	OR	OFF	2015/08/10 08:42
S34	5	"440"/ and (surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:44
S35	0	441/65 and (surfboard waterboard powerboard sportsboard boogieboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:46
S36	0	441/65 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:46
S37	35	441/and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:46
S38	14	"441"/ and (surfboard waterboard powerboard sportsboard paddleboard)	US-PGPUB; USPAT;	OR	ON	2015/08/10 08:46

		and (hydrofoil foil) and strut and (propulsor thruster propeller)	USOCR			
S39	3	"441"/74 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:47
S40	7	"441"/79 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:47
S41	3	"441"/74 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:48
S42	18	"441"/74 and (surfboard waterboard powerboard sportsboard paddleboard) and (hydrofoil foil) and (propulsor thruster propeller)	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 08:49
S43	26	("0857951" | "2593806" | "2931332" | "3456613" | "3465704" | "3650234" | "3722450" | "4349340" | "4711195" | "4972792" | "5083948" | "5117776" | "5136961" | "5362264" | "5413066" | "5448963" | "5471942" | "6178905" | "6409560" | "6468118").PN. OR ("7047901").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/10 08:50
S44	27	("3405677" | "3456613" | "3536025" | "4020782" | "4274357" | "5516126" | "D260797").PN. OR ("6409560").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/10 08:57
S45	4	(surfboard paddleboard waterboard) and hydrofoil with tail	USPAT	OR	OFF	2015/08/10 10:10
S46	19	(surfboard paddleboard waterboard) and hydrofoil with tail	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/10 10:11
S47	1	("2015/0017850").URPN.	USPAT	OR	OFF	2015/08/10 10:12
S48	7	("20050266746" | "20080305698" | "20150017850" | "2815518" | "7832349" | "7926437").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/08/10 10:13

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	34	surfboard and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT	OR	ON	2016/04/16 22:17
S49	759	114/274	USPAT	OR	OFF	2015/11/19 18:31
S50	825	114/274	US-PGPUB; USPAT	OR	OFF	2015/11/19 18:31
S51	33	surfboard and (hydrofoil foil) and strut and (propulsor thruster propeller)	US-PGPUB; USPAT	OR	ON	2015/11/19 18:32
S52	163	b63b1/248.cpc.	US-PGPUB; USPAT	OR	ON	2015/11/19 18:32
S53	5	S50 and S51 635	US-PGPUB; USPAT	OR	ON	2015/11/19 18:33

S54	17	S52 and S51	US-PGPUB; USPAT	OR	ON	2015/11/19 18:33
S55	1445	441/74	US-PGPUB; USPAT	OR	ON	2015/11/19 18:48
S56	5	S52 and S55	US-PGPUB; USPAT	OR	ON	2015/11/19 18:48

4/ 16/ 2016 11:09:49 PM
C:\ Users\ jhayes\ Documents\ EAST\ Workspaces\ 14509289.wsp

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14509289	LANGELAAN, JACOB WILLEM
	Examiner	**Art Unit**
	JOVON HAYES	3617

CPC								
Symbol							**Type**	**Version**
B63B		1	/	248			F	2013-01-01
B63H		11	/	04			A	2013-01-01
B63H		1	/	16			A	2013-01-01
B63B		35	/	7926			I	2013-01-01
B63B		35	/	7943			I	2013-01-01
B63H		21	/	17			I	2013-01-01
B63H		21	/	21			I	2013-01-01
B63H		5	/	14			I	2013-01-01
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CPC Combination Sets								
Symbol							**Type**	**Set**	**Ranking**	**Version**
			/							
			/							

/JOVON HAYES/ Examiner.Art Unit 3617	04/16/2016	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	22	
/LARS A OLSON/ Primary Examiner.Art Unit 3617	04/18/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner) 637	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14509289	LANGELAAN, JACOB WILLEM
	Examiner	**Art Unit**
	JOVON HAYES	3617

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION	
CLASS	SUBCLASS	CLAIMED	NON-CLAIMED
441	75	B 6 3 B 1 / 248	

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
114	274				

/JOVON HAYES/ Examiner.Art Unit 3617	04/16/2016	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	22	
/LARS A OLSON/ Primary Examiner.Art Unit 3617	04/18/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner) 638	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14509289	LANGELAAN, JACOB WILLEM
	Examiner	**Art Unit**
	JOVON HAYES	3617

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	9	17												
2	2	10	18												
3	3	11	19												
4	4	12	20												
	5	13	21												
	6	14	22												
	7	15	23												
	8	16	24												
	9	17	25												
	10	18	26												
	11	19	27												
	12	20	28												
5	13	21	29												
6	14	22	30												
7	15														
8	16														

/JOVON HAYES/ Examiner.Art Unit 3617 (Assistant Examiner)	04/16/2016 (Date)	**Total Claims Allowed:** 22	
/LARS A OLSON/ Primary Examiner.Art Unit 3617 (Primary Examiner)	04/18/2016 639 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14509289	LANGELAAN, JACOB WILLEM
	Examiner	Art Unit
	JOVON HAYES	3617

CPC- SEARCHED		
Symbol	Date	Examiner
b63b1/248	8/10/2015	jh
b63b1/248	11/19/2015	jh
b63b1/248	4/16/2016	jh

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
441	74, 79	8/10/2015	jh
441	74, 79	11/19/2015	jh
441	74	4/16/2016	jh

SEARCH NOTES		
Search Notes	Date	Examiner
conducted class and text search.	8/10/2015	jh
conducted class and text search.	11/19/2015	jh
conducted class and text search.	4/16/2016	jh

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
b63b1/248		11/19/2015	jh
441	74	11/19/2015	jh
b63b1/248		4/16/2016	jh

/JOVON HAYES/
Examiner.Art Unit 3617

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Jacob Willem Langelaan
Art Unit	N/A
Examiner Name	Not Yet Assigned
Attorney Docket Number	JWL-10002/36

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5062378		1991-11-05	Bateman	
	2	3747138		1973-07-24	Morgan	
	3	7144285		2006-12-05	Hendricks	
	4	4508046		1985-04-02	Coulter et al.	
	5	7232355		2007-06-19	Woolley	
	6	7731555		2010-06-08	Railey	
	7	6702634		2004-03-09	Jung	
	8	3262413		1966-07-26	Bloomingdale et al.	

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	JWL-10002/36

	9	6192817		2001-02-27	Dec et al.	
	10	4971586		1990-11-20	Walsh	
	11	4274357		1981-06-23	Dawson	
	12	3227123		1966-01-04	Voigt	
	13	2931332		1960-04-05	Hebrank	
	14	7047901		2006-05-23	Chen	

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	JWL-10002/36

	1							☐

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

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EXAMINER SIGNATURE

Examiner Signature	/Jovon Hayes/	Date Considered	04/16/2016

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)	Application Number	
	Filing Date	
	First Named Inventor	Jacob Willem Langelaan
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	JWL-10002/36

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☒ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☒ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Douglas L. Wathen/	Date (YYYY-MM-DD)	2014-10-08
Name/Print	Douglas L. Wathen	Registration Number	41369

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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BIB DATA SHEET

CONFIRMATION NO. 2924

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/509,289	10/08/2014	440	3617	JWL-10002/36

APPLICANTS

INVENTORS

Jacob Willem Langelaan, State College, PA;

**** CONTINUING DATA ***************************

This appln claims benefit of 61/889,071 10/10/2013

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **

10/14/2014

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /JOVON E HAYES/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		PA	4	12	1

ADDRESS

DINSMORE & SHOHL LLP
PO BOX 7021
TROY, MI 48007-7021
UNITED STATES

TITLE

WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

FILING FEE RECEIVED		
810	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	10/08/2014	Jacob Willem Langelaan	MHLCUS 3.0-002	2924

TITLE OF INVENTION: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480.00		$480.00	$0.00	07/26/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
Hayes, Jovon E.	3617	440-006000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
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2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Lerner, David, Littenberg, Krumholz & Mentlik, LLP
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- [X] Issue Fee (Previously Paid January 27, 2016)
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- [X] The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 12-1095 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ☐ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ☐ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Brent L. Farese/ Date April 29, 2016

Typed or printed name Brent L. Farese Registration No. 63,617

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

4517301

Application No. (if known): 14/509,289 Attorney Docket No.: MHLCUS 3.0-002

Certificate of Electronic Filing Under 37 C.F.R. § 1.8

I hereby certify that this correspondence is being transmitted via the Office electronic filing system in accordance with 37 C.F.R. § 1.6(a)(4):

MS Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

on April 29, 2016 .
Date

/Brent L. Farese/
Signature

Brent L. Farese
Typed or printed name of person signing Certificate

63,617
Registration Number, if applicable

(908) 518-6328
Telephone Number

Note: Each paper must have its own certificate of mailing, or this certificate must identify each submitted paper.

Issue Fee Transmittal (1 page)

Electronic Acknowledgement Receipt

EFS ID:	25639147
Application Number:	14509289
International Application Number:	
Confirmation Number:	2924
Title of Invention:	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
First Named Inventor/Applicant Name:	Jacob Willem Langelaan
Customer Number:	530
Filer:	April M. Capati
Filer Authorized By:	
Attorney Docket Number:	MHLCUS 3.OF-002
Receipt Date:	29-APR-2016
Filing Date:	08-OCT-2014
Time Stamp:	14:39:58
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Issue_Fee_Transmittal.pdf	41198 47bb9d45a22f5eb396f016e85afee1db5cef4ee9	no	2

649

Warnings:	
Information:	

Total Files Size (in bytes):	41198

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

OPAP
APR 29 2016
PATENT & TRADEMARK OFFICE

IFW

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

LERNER, DAVID, LITTENBERG, KRUMHOLZ & MENTLIK, LLP
600 South Avenue West
Westfield, New Jersey 07090

05/02/2016 CCHAU2 00000018 14509289

01 FC:2581 480.00 OP

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	10/08/2014	Jacob Willem Langelaan	MHLCUS 3.0-002	2924

TITLE OF INVENTION: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480.00		$480.00	$0.00	07/26/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
Hayes, Jovon E.	3617	440-006000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Lerner, David, Littenberg, Krumholz & Mentlik, LLP

2

3

Adjustment date: 05/02/2016 CCHAU2
01/29/2015 INTEFSW 00000529 14509289
01 FC:2581 -480.00 OP

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee (Previously Paid January 27, 2016)
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 12-1095 (enclose an extra copy of this form).

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- ☐ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ☐ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Brent L. Farese/ Date April 29, 2016

Typed or printed name Brent L. Farese Registration No. 63,617

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/509,289	06/07/2016	9359044	MHLCUS 3.OF-002	2924

530 7590 05/18/2016

LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK
600 SOUTH AVENUE WEST
WESTFIELD, NJ 07090

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Jacob Willem Langelaan, State College, PA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

Amended PTO/AIA/82B(07-13)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

☒ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. 21186

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter to:

☒ The address associated with the above mentioned Customer Number.

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

☒ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☐ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (*e.g.*, a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Jacob Willem Langelaan, Ph.D.		
Title			

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☒ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	27003022
Application Number:	14509289
International Application Number:	
Confirmation Number:	2924
Title of Invention:	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
First Named Inventor/Applicant Name:	Jacob Willem Langelaan
Customer Number:	530
Filer:	James R. Gould/Alexis Dagostino
Filer Authorized By:	James R. Gould
Attorney Docket Number:	MHLCUS 3.OF-002
Receipt Date:	22-SEP-2016
Filing Date:	08-OCT-2014
Time Stamp:	13:07:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		4664_001US1-RPOA.pdf 654	345960 84b74baeae089ab077ef7543d86586e7e6bf0618	yes	2

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	1
	Power of Attorney	2	2
Warnings:			
Information:			
	Total Files Size (in bytes):	345960	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Jacob Willem Langelaan
Title: WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT

Docket No.:	4664.001US1	Serial No.:	14/509,289
Filed:	October 8, 2014	Due Date:	N/A
Examiner:	Jovon Hayes	Group Art Unit:	3617
Customer No.:	21186	Confirmation No.:	2924

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

X Power of Attorney to Prosecute Applications before the USPTO (PTO/AIA/82B) (1 pg.)

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
Customer No.: 21186

By: Brent Farese
Brent L. Farese
Reg. No. 63,617

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/509,289	10/08/2014	Jacob Willem Langelaan	MHLCUS 3.OF-002

CONFIRMATION NO. 2924

POWER OF ATTORNEY NOTICE

530
LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK
600 SOUTH AVENUE WEST
WESTFIELD, NJ 07090

OC000000086127750

Date Mailed: 09/30/2016

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/22/2016.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/vnguyen/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/509,289	10/08/2014	Jacob Willem Langelaan	MHLCUS 3.OF-002

CONFIRMATION NO. 2924

POA ACCEPTANCE LETTER

21186
SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

OC000000086127777

Date Mailed: 09/30/2016

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/22/2016.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/vnguyen/

To:	Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313–1450	**REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK**

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Southern District of California on the following: **_X_** Patents or ___ Trademarks:

DOCKET NO. 3:20–cv–01648–LAB–WVG	**DATE FILED** 8/24/20	**US District Court** Southern District of California San Diego, CA
PLAINTIFF MHL Custom, Inc.		DEFENDANT Avante Innovations, LLC
PATENT OR TRADEMARK NO.	**PATENT OR TRADEMARK NO.**	**PATENT OR TRADEMARK NO.**
1. 9,359,044	**6.**	**11.**
2. 9,586,659	**7.**	**12.**
3.	**8.**	**13.**
4.	**9.**	**14.**
5.	**10.**	**15.**

In the above–entitled case, the following patents(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY __ Amendment __ Answer __ Cross Bill __ Other Pleading	
PATENT OR TRADEMARK NO.	**PATENT OR TRADEMARK NO.**	**PATENT OR TRADEMARK NO.**
1.	**6.**	**11.**
2.	**7.**	**12.**
3.	**8.**	**13.**
4.	**9.**	**14.**
5.	**10.**	**15.**

In the above–entitled case, the following decision has been rendered or judgment issued:

DECISION/JUDGMENT

CLERK John Morrill	(BY) DEPUTY CLERK	DATE

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 **Director of the U.S. Patent and Trademark Office** **P.O. Box 1450** **Alexandria, VA 22313-1450**	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court District of Delaware on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT District of Delaware
PLAINTIFF MHL CUSTOM, INC.		DEFENDANT WAYDOO USA, INC., SHENZHEN WAYDOO INTELLIGENCE TECHNOLOGY CO., LTD.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	9,359,044	6/17/2016	MHL CUSTOM, INC.
2	9,586,659	3/7/2017	MHL CUSTOM, INC.
3			
4			
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

660

Copy 1—Upon initiation of action, mail this copy to Director **Copy 3—Upon termination of action, mail this copy to Director**
Copy 2—Upon filing document adding patent(s), mail this copy to Director **Copy 4—Case file copy**

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

[X] I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 00530

OR

[ ] I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

[X] The address associated with the above-mentioned Customer Number

OR

[ ] The address associated with Customer Number:

OR

[ ] Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

MHL Custom, Inc.

[ ] Inventor or Joint Inventor (title not required below)

[ ] Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

[X] Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

[ ] Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	May 7th, 2020
Name	Nicholas Leason		
Title	President		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

[ ] Total of 1 forms are submitted.

6323529

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
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TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	14/509,289
Filing Date	10/08/2014
First Named Inventor	Nicholas Leason
Title	Weight-Shift Controlled Personal Hydrofoil Watercraft
Art Unit	3617
Examiner Name	Jovon E. Hayes
Attorney Docket Number	MHLCUS 3.0-002

SIGNATURE of Applicant or Patent Practitioner

Signature	/Michael C. Bossner/	Date (Optional)	December 7, 2021
Name	Michael C. Bossner	Registration Number	79,441
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of 1 forms are submitted.

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 C.F.R. § 1.6(a)(4).

Dated: December 7, 2021 Electronic Signature for Michael C. Bossner: /Michael C. Bossner /

Electronic Acknowledgement Receipt

EFS ID:	44454463
Application Number:	14509289
International Application Number:	
Confirmation Number:	2924
Title of Invention:	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
First Named Inventor/Applicant Name:	Jacob Willem Langelaan
Customer Number:	21186
Filer:	Keith McWha/Melinda Cormier
Filer Authorized By:	Keith McWha
Attorney Docket Number:	MHLCUS 3.OF-002
Receipt Date:	07-DEC-2021
Filing Date:	08-OCT-2014
Time Stamp:	15:07:24
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	executed_general_POA.PDF 663	90616 c9bea827cf216921184d07d2a3ac360a27bf8169	no	1

Warnings:

Information:					
2	Miscellaneous Incoming Letter	Power_of_Attorney_by_Applicant_PTO_AIA-82.pdf	19535 ba8421465f65d618cb4530c9d78dde88dd5877ee	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	110151	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/509,289	10/08/2014	Jacob Willem Langelaan	MHLCUS 3.OF-002

CONFIRMATION NO. 2924

IMPROPER CPOA LETTER

21186
SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

OC000000130386495

Date Mailed: 12/13/2021

NOTICE REGARDING POWER OF ATTORNEY

This is in response to the power of attorney filed 12/07/2021. The power of attorney in this application is not accepted for the reason(s) listed below:

- The power of attorney is from an assignee and the statement required by 37 CFR 3.73(c) has not been received.

/sleutchit/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

00530
LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK
20 COMMERCE DRIVE
CRANFORD, NJ 07016
UNITED STATES

665

Electronic Acknowledgement Receipt

EFS ID:	44623903
Application Number:	14509289
International Application Number:	
Confirmation Number:	2924
Title of Invention:	WEIGHT-SHIFT CONTROLLED PERSONAL HYDROFOIL WATERCRAFT
First Named Inventor/Applicant Name:	Jacob Willem Langelaan
Customer Number:	21186
Filer:	James A. Vezeris/Traci Krauss
Filer Authorized By:	James A. Vezeris
Attorney Docket Number:	MHLCUS 3.OF-002
Receipt Date:	28-DEC-2021
Filing Date:	08-OCT-2014
Time Stamp:	15:42:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73	Statement_By_Assignee_to_Establish_Ownership_37_CFR_3736c.pdf	25802 e6a2a1dd4488a3fef7476790e2c7917105da7d6e	no	2

Warnings:

Information:					
2	Miscellaneous Incoming Letter	Request_for_Applicant-Related_Correction.pdf	65865 44502ce6567669cb7d4a59926691076213dff05a	no	1
Warnings:					
Information:					
3	Application Data Sheet	Application_Data_Sheet_ADS_-_PTO_AIA-14.pdf	48779 0f0cd09fbb1cde37fd95157aa57f6fb83fe1ad91	no	1
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
4	Miscellaneous Incoming Letter	Power_of_Attorney_by_Applicant_PTO_AIA-82.pdf	15959 e09c156e78154a5fa7072f06c99434c7eefa1c49	no	1
Warnings:					
Information:					
5	Power of Attorney	executed_general_POA.PDF	90616 c9bea827cf21692118 4d07d2a3ac360a27bf8169	no	1
Warnings:					
Information:					
		Total Files Size (in bytes):	247021		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/96 (08-12)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: MHL Custom, Inc.

Application No./Patent No.: 9,359,044 Filed/Issue Date: June 7, 2016

Titled: Weight-Shift Controlled Personal Hydrofoil Watercraft

MHL Custom, Inc. , a Corporation
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. [x] The assignee of the entire right, title, and interest.

2. [ ] An assignee of less than the entire right, title, and interest (check applicable box):

   [ ] The extent (by percentage) of its ownership interest is _____ %. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   [ ] There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. [ ] The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. [ ] The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. [ ] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____ , Frame _____ , or for which a copy thereof is attached.

B. [x] A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Jacob Willem Langelaan To: MHL Custom, Inc.
   The document was recorded in the United States Patent and Trademark Office at
   Reel 056684 , Frame 0625 , or for which a copy thereof is attached.

2. From: _____ To: _____
   The document was recorded in the United States Patent and Trademark Office at
   Reel _____ , Frame _____ , or for which a copy thereof is attached.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____ , Frame _____ , or for which a copy thereof is attached.

4. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____ , Frame _____ , or for which a copy thereof is attached.

5. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____ , Frame _____ , or for which a copy thereof is attached.

6. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____ , Frame _____ , or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Michael C. Bossner/	December 28, 2021
Signature	Date
Michael C. Bossner	79,441
Printed or Typed Name	Title or Registration Number

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 C.F.R. § 1.6(a)(4).

Dated: December 28, 2021 Electronic Signature for Michael C. Bossner: /Michael C. Bossner/

Doc Code: R46C.REQ
Document Description: Request under 37 CFR 1.46(c) to correct, update or change the applicant.

PTO/AIA/41 (04-15)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST TO CORRECT OR UPDATE THE NAME OF THE APPLICANT UNDER 37 CFR 1.46(c)(1), OR CHANGE THE APPLICANT UNDER 37 CFR 1.46(c)(2) **(FOR USE ONLY IN APPLICATIONS FILED ON OR AFTER SEPTEMBER 16, 2012)**		
	Application Number	14/509,289-Conf. #2924
	Filing Date	October 8, 2014
	First Named Inventor	Jacob W. Langelaan
	Art Unit	3617
	Examiner Name	Not Yet Assigned
	Practitioner Docket Number	MHLCUS 3.0-002

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Applicant hereby **requests that the name of the applicant be corrected or updated under 37 CFR 1.46(c)(1), or that the applicant be changed under 37 CFR 1.46(c)(2),** in the above-identified application. **Requests under 37 CFR 1.46(c)(1) or (c)(2) cannot be submitted after payment of the issue fee or if the application has been patented.**

Please check the applicable box(es) below.

☐ 1.This request is to **correct or update the name of the applicant** (**under 37 CFR 1.46(c)(1)**) and includes:

☐ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) with the corrected or updated information shown with markings (*e.g.*, underlining for insertions, strikethrough for deletions). A Corrected Web-based ADS may be used.

Note: Requests under 37 CFR 1.46(c)(1) may be filed to correct typographical errors in the name of the § 1.46 applicant, or for updating the name of the § 1.46 applicant (*i.e.,* where there is no change in the applicant itself but just in the applicant's name). See the Manual of Patent Examining Procedure (MPEP) section 605.01.

☒ 2. This request is to **change the applicant** (**under 37 CFR 1.46(c)(2)**) and includes:

☒ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) that identifies the changes with proper markings (underlining for insertions and strikethrough for deletions). A Corrected Web-based ADS may be used.

☒ A Statement Under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent). See MPEP 325.

I am the

☐ applicant* ☒ attorney or agent of record Registration number 79,441 ☐ attorney or agent acting under 37 CFR 1.34 Registration number _____

Signature /Michael C. Bossner/

Typed or printed name Michael C. Bossner

Date December 28, 2021

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. *Juristic entities must be represented by a patent practitioner (See 37 CFR 1.31, applicable to any paper filed on or after September 16, 2012 that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below**.

☐ ** Total of 1 forms are submitted.

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 C.F.R. § 1.6(a)(4).

Dated: December 28, 2021 Electronic Signature for Michael C. Bossner: /Michael C. Bossner/

Corrected Application Data Sheet

Application Number::	14/509,289
Filing Date::	10/08/14
Title::	Weight-Shift Controlled Personal Hydrofoil Watercraft

Please correct Applicant Information

Applicant Number:	1
Applicant Type:	Assignee
Organization Name::	~~Jacob W. Langelaan~~ MHL Custom, Inc.
Street of mailing address::	~~606 Devonshire Drive~~ 500 Barrio Bajuras
City of mailing address::	~~State College~~ Isabela
Country of mailing address::	~~Pennsylvania~~ Puerto Rico
Postal or Zip Code of mailing address::	~~16803~~ 00662

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Michael C. Bossner/	Date (YYYY-MM-DD)	2021-12-28
Name	Michael C. Bossner	Registration Number	79,441

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	14/509,289
Filing Date	October 8, 2014
First Named Inventor	Jacob W. Langelaan
Title	Weight-Shift Controlled Personal Hydrofoil Watercraft
Art Unit	3617
Examiner Name	Not Yet Assigned
Attorney Docket Number	MHLCUS 3.0-002

SIGNATURE of Applicant or Patent Practitioner

Signature	/Michael C. Bossner/	Date (Optional)	December 28, 2021
Name	Michael C. Bossner	Registration Number	79,441
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of 1 forms are submitted.

7111909

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

[X] I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 00530

OR

[ ] I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

[X] The address associated with the above-mentioned Customer Number

OR

[ ] The address associated with Customer Number:

OR

[ ] Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

MHL Custom, Inc.

[ ] Inventor or Joint Inventor (title not required below)

[ ] Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

[X] Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

[ ] Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	May 7th, 2020
Name	Nicholas Leason		
Title	President		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

[ ] Total of 1 forms are submitted.

6323529

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/509,289	10/08/2014	Jacob Willem Langelaan	MHLCUS 3.0-002

CONFIRMATION NO. 2924

POA ACCEPTANCE LETTER

530
LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK
20 COMMERCE DRIVE
CRANFORD, NJ 07016

OC00000130882169

Date Mailed: 01/06/2022

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/28/2021.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/lqchau/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/509,289	10/08/2014	Jacob Willem Langelaan	MHLCUS 3.OF-002

CONFIRMATION NO. 2924

POWER OF ATTORNEY NOTICE

21186
SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

OC000000130882150

Date Mailed: 01/06/2022

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/28/2021.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/lqchau/