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(54) **Modular multi-purpose watercraft with variable trim**

(57) There is describe a multi-purpose watercraft, comprising: a pair pair of tubular and/or board-shaped floats; a rigid platform that interconnects the two tubular floats; shock absorber means between the floats and the platform; a motor support frame, connected to the platform, suitable to allow vertical translation and horizontal translation of the position of the motor with respect to the platform.

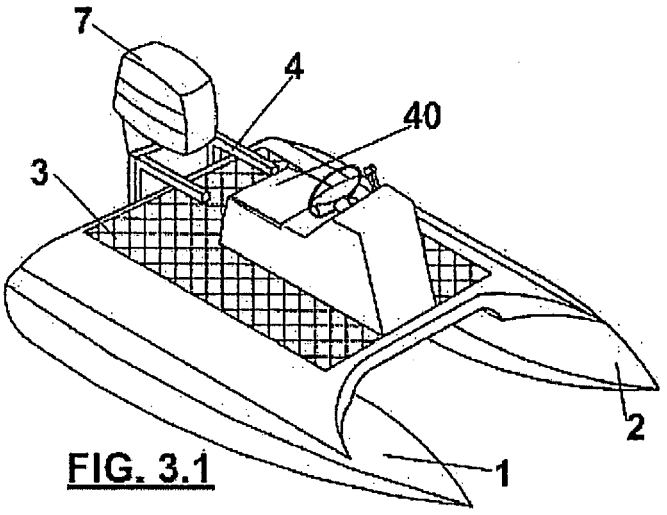

FIG. 3.1

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Description

Field of the invention

[0001] The present invention relates to a modular multi-purpose watercraft with variable trim.

State of the art

[0002] A previous embodiment of a modular multi-purpose watercraft is already known and described in the Italian patent TO2004A000506, filed on 21-7-2004. Said application is incorporated herein for reference, with regard to the parts of that watercraft which can be applied within the present invention.

[0003] The modular multi-purpose watercraft described in said previous application essentially comprises at least one pair of hulls consisting of surf, windsurf or kitesurf boards, and a topside that interconnects the two hulls and is configured for the selective application of:

- a windsurf mast-sail-boom assembly;
- an outboard motor and corresponding steering unit ;
- at least one seat for a rower,
- at least one seat for a handler of the kite.

[0004] Moreover, said topside can be configured for application of a tent structure for nautical camping. This watercraft has some limits in the applications and technical characteristics thereof, which limit flexibility of use and variation in size thereof, for example relative to the fact that the hulls are solely of the windsurf board type, and that the structure of the watercraft is not sufficiently flexible for the widest possible range of outboard applications, which cause problems of trim by stern and trim by head.

[0005] The low volumetric capacity of surf, windsurf or kitesurf boards limits the use of the watercraft provided with this type of floats to low powers and loads.

SUMMARY OF THE INVENTION

[0006] Therefore, the object of the present invention is to indicate a modular multi-purpose watercraft with variable trim suitable to overcome all the aforesaid drawbacks and limits, and also suitable to maximize the flexibility of use and the variation in the dimensions of the constituent elements.

[0007] The subject of the present invention is a multi-purpose watercraft, comprising: a pair of tubular or board-shaped floats; a rigid platform that interconnects said two tubular floats; shock absorber means between said floats and said platform; a m motor support frame, connected to said platform, suitable to allow vertical translation and horizontal translation of the position of the motor with respect to the platform.

[0008] The particular subject matter of the present invention is a modular multi-purpose watercraft with variable trim, as better described in the claims, which form an integral part of the present description.

Brief description of the figures

[0009] The invention will now be described in detail with reference to the accompanying drawings, provided purely by way of non-limiting example, wherein:

- Figures 1.1 and 1.2 show two front and rear perspective views of the multi-purpose watercraft according to the invention in a first possible configuration;
- Figures 2.1 and 2.2 show two front and rear perspective views of the multi-purpose watercraft according to the invention in a second possible configuration;
- Figures 3.1 and 3.2 show two front and rear perspective views of the multi-purpose watercraft according to the invention in a third possible configuration;
- Figure 4 shows a top view and respectively views according to side sections A-A, B-B, C-C of a first embodiment of the structural part of the multi-purpose watercraft according to the invention;
- Figure 5 shows a top view and respectively views according to side sections A-A, B-B, C-C of a second embodiment of the structural part of the multi-purpose watercraft according to the invention;
- Figure 6 shows an exploded perspective view of the main components that can be used to obtain the different configurations of the multi-purpose watercraft according to the invention.

[0010] The same reference numbers and letters in the figures identify the same element or components.

Detailed description of examples of embodiment

[0011] The multi-purpose watercraft according to the invention comprises, in different possible configurations shown in Figures 1.1 to 3.2, a structural part, in turn comprising a pair of hulls consisting of two tubular floats 1 and 2, and a rigid platform 3 that interconnects the two floats 1, 2, producing a catamaran type craft.

[0012] Figures 4 and 5 show two preferred variants of embodiment of the structural part of the watercraft.

[0013] In the variant of Figure 4, each float is connected rigidly to the platform, and comprises a rigid shell 9, and an inner cavity provided with an elastic membrane 10, preferably made of metal, to divide it in an intermediate position for the full length thereof. The membrane 10 defines a hollow bottom part 11 filled with gaseous fluid (e.g. air), and a hollow top part 12 filled with liquid fluid (e.g. oil). The two parts are not communicating.

[0014] Corresponding cavities are produced inside the parts of the platform 3 on top of the two floats. An elastic membrane 13, preferably made of metal, is present in each cavity, to divide it in an intermediate position for the entire length thereof. Also in this case the membrane 13 defines a hollow bottom part 14 filled with liquid fluid, and

a hollow top part 15 filled with gaseous fluid.

[0015] The two parts 14 and 15 are not communicating, while the two corresponding cavities, the top one 12 of the float and the bottom one 14 of the platform are intercommunicating through appropriate channels 16, so that the liquid fluid can at least partly from pass one cavity to the other.

[0016] The two tubular floats 1 and 2 can be made of rigid or inflatable material. With the variant shown in Figure 4, the following results are obtained:

- through the use of floats of variable dimensions, the load carrying capacity of the watercraft no longer depends on the volume of the pair of hulls.
- a range of products can be provided on the basis of different requirements of load carrying capacity and motor power with consequent dimensioning of the floats and of the platform.
- the watercraft is rendered more comfortable to use, through the use of floats having two compartments, respectively containing air and liquid fluid, separated by the elastic membrane, the purpose of which is to compensate the variations in volume of the air contained in the compartment adjacent to the sea / lake surface; compensations to reduce the volume of the floating compartment containing the liquid fluid take place through the channels for connection with the compartment buried in the platform, intended to contain the fluid coming from that contained in the floats.
- the trim and comfort of the watercraft is optimized in various conditions of use and environmental conditions.

The channels 16 provided for connection of the compartments in the floats and in the platform, i.e. for transfer of the liquid fluid from one compartment to the other, have a section adjustable in diameter.

[0017] In the variant of Figure 5, each float comprises a rigid shell 20, and an inner cavity in which air can be present. Alternatively, the inner part of the float can be filled with floating material, such as expanded polyurethane.

[0018] The floats are connected elastically to the platform through hydropneumatic suspensions. More in particular, two suspensions are present, shown in greater detail in the two dashed line boxes in the figure. In appropriate hollows 21, 22, produced in the platform 3, there are housed appropriate hydropneumatic actuators 23, 24, with horizontal elastic arm which respectively control levers 25, 26, which in turn act through hinges on vertical pins 27, 28 connected to respective plates 29, 30 secured to the top part of the floats.

[0019] Moreover, a motor pump 31 is present, with a tank 32 for collection of the suspension fluid and relative hydraulic circuit 33 for hydraulic control of the suspensions.

[0020] With the variant shown in Figure 5 the same results as those of the variant in Figure 4 are obtained. The hydropneumatic suspensions form an elastic system, which changes the vertical motion of the pins (27, 28) connecting the floats to the platform into horizontal motion through the hinged linkage (25, 26) which insists on the hydropneumatic element, mounted horizontally inside the compartments in the platform.

[0021] With this elastic system, distribution of the percentage load can be varied according to requirements established, for example, by the force of the sea and of the load itself, i.e. the trim of the watercraft can be optimized when conditions of use vary.

[0022] In the variants shown in Figures 4 and 5, the floats can also be of the board type, for example consisting of surf, windsurf or kitesurf boards. It is also evident that shock absorber means are provided between the floats and the platform, to optimize the behaviour of the watercraft in relation to the conditions of the waters in which it is sailing, especially in the case of particularly rough waters.

[0023] The figures also show an auxiliary frame 4 to support the motor 7. The frame 4 comprises a support 5 and a plate 6 mutually connected in an adjustable manner. The support 5 engages in the stern part of the platform 3 with central projection, and is composed of horizontal extensions which are embedded in the platform. In a non limiting manner, the figures show four extensions. The plate 6 connects the motor 7 to the support 5. The position of the support 5 is horizontally adjustable, while the plate 6 is vertically adjustable.

[0024] In this manner, two types of additional trim adjustments of the watercraft are obtained:

- vertical translation of the motor support transom;
- horizontal translation of the auxiliary motor support frame.

[0025] In this manner, the multi-purpose watercraft is suitable for use with outboard motors having different shaft lengths (currently called "short shaft" and "long shaft") and for mounting tubular floats of variable dimensions, i.e. with different vertical heights.

[0026] Moreover, vertical translation of the plate 6 allows the prescribed height of the outboard motor installed to be maintained when the vertical height of the floats is varied.

[0027] The objective is to obtain a varied range of products on models having different dimensions of platform connecting the floats, according to the requirements for load carrying capacity and power requested.

[0028] The use of the auxiliary motor support frame allow problems related to trim by stern during the starting phase to be overcome, and therefore has the function of replacing the normal stern flaps, necessary to provide lift during starting and to prevent the trim by stern phenomenon. This phenomenon can therefore be eliminated through dimensioning of the auxiliary frame and relative positioning thereof with respect to the connecting platform.

[0029] The platform 3 can be made of appropriate materials, such as moulded plastic material, or wood such as teak, with non-slip surface. Photovoltaic panels, of the type that can be walked on, can also be fitted to the surface of the deck.

[0030] Elastic gaskets 39, for example made of neoprene, can advantageously be interposed between the platform 3 and each float 1, 2 to minimize localized shearing stresses.

[0031] The platform 3 defines the deck of the watercraft according to the invention, provided to allow easy and simple transformation from one to another of the various possible configurations the watercraft can assume, some of which are shown in Figures 1.1 to 3.2.

[0032] The platform can be produced in superimposed layers: expanded polyurethane, with appropriate shape that adapts to the bridge, can be used as core in the inner layers. In the stern area it is preferable to use plywood, such as Okoumè, and also in other areas in which bolts are present. A soft elastomeric foam gasket is used between surf boards and bridge, and finally mats and rush matting can be used in the leather parts of the platform.

[0033] A first configuration that the watercraft can assume is shown in Figures 1.1 and 1.2: the platform comprises at the stern the auxiliary frame 4 to support the motor 7, and centrally, one or more central mast steps 14. The mast steps 14 can be used selectively to position a mast foot 15 for articulated coupling of an assembly comprising a windsurf mast 16, sail 17 and boom 18.

[0034] Different positioning of the assembly on the steps depends on the sail surface, the intensity of the wind and the number of persons on board.

[0035] This configuration can be completed if necessary by rendering the mast 16 fixed, instead of articulated, at the base thereof, by providing an appropriate rigging, not shown.

[0036] Figures 3.1 and 3.2 represent another possible configuration of the multi-purpose watercraft according to the invention, with a motor instead of a sail. In this case the deck defined by the platform 3 houses a steering unit consisting of a seat 40 with a steering wheel 41 and hand levers 42 to control an outboard motor 7 installed through the auxiliary frame 4 on the platform.

[0037] The steering unit may in this case be located in the most suitable position, i.e., more towards the stern or more towards the bow, using the mast steps 14 and attachment devices similar to mast feet or of other type. Between the steering unit and the platform 3 an elastic gasket 43 can advantageously be interposed, for example made of neoprene, having the function of reducing stresses caused by contact of the watercraft with the water.

[0038] In the configuration represented in Figures 2.1, 2.2, the watercraft of Figures 3.1, 3.2 is also equipped with a removable tent 45 so that it can also be used for nautical camping.

[0039] The advantages deriving from application of the present invention are clear.

[0040] With regard to the watercraft intended as product advantages are obtained relative to:

- multi-purpose use;
- uniqueness, as no other finished products having similar characteristics exist;
- intrinsic capacity to form a range of finished products starting from the basic concept of multi-purpose use, each having its own specific market and using characteristics;
- minimization of dedicated components included in the bill of materials of the article;
- utilization of different spare parts, i.e. replaceability of the components included in the bill of materials with others having equivalent functions thereto;
- minimization of product engineering costs, given the limited number of components included in the bill of materials;
- design from a DfD (design for disassembly) viewpoint, and consequent minimization of the environmental impact of the product at the end of its lifespan;
- maximization of the possibility of reusing components in the bill of materials and of the relative possibility of recycling them for different uses at minimum cost at the end of the product's lifespan.

[0041] With regard to the production process of the watercraft, advantages are obtained relative to:

- production flexibility, intended as the possibility of producing highly customized articles dedicated to different uses;
- minimization of process engineering costs, and of quality assurance, given the limited number of dedicated components included in the bill of materials;
- possibility of developing materials used for the dedicated components included in the bill of materials, such as ACM (Advanced Composite Materials);
- possibility of adding the relative production process in pre-existing company organizations in the product sector of reference with minimization of cost centres and activation of profit centres relative to the product integration division.

[0042] It will be apparent from the foregoing description that the multi-purpose watercraft according to the invention is provided with extreme practicality and flexibility of use and, although using generally conventional components in part, it is able to easily and rapidly assume a plurality of different configurations for the maximum satisfaction of use at relatively limited costs.

[0043] Naturally, the constructional details and the embodiments may vary greatly with respect to what is described and illustrated herein, without however departing from the scope of the present invention as defined in the subsequent claims.

[0044] From the above description, a person skilled in the art is capable of implementing the object of the in-

vention without adding further structural details.

Claims

1. A multi-purpose watercraft, comprising:

   - a pair of tubular or board-shaped floats (1, 2);
   - a rigid platform (3) that interconnects said two tubular floats (1, 2);
   - shock absorber means between said floats and said platform;
   - a frame (4) to support the motor (7), connected to said platform, suitable to allow vertical translation and horizontal translation of the position of the motor with respect to the platform.

2. The multi-purpose watercraft according to claim 1, wherein:

   - each float is connected rigidly to the platform, and comprises an inner cavity provided with an elastic membrane (10), to divide it in an intermediate position for the full length thereof, said first membrane (10) defining a hollow bottom part (11) filled with gaseous fluid, and a hollow top part (12) filled with liquid fluid, said bottom and top parts being not communicating;
   - corresponding cavities are produced inside the parts of the platform (3) on top of said two floats, each cavity being provided with a second elastic membrane (13) to divide it in an intermediate position for the entire length thereof, said second membrane (13) defining a hollow bottom part (14) filled with liquid fluid, and a hollow top part (15) filled with gaseous fluid, said bottom and top parts not being communicating;
   - said hollow top parts (12) of each float and said corresponding bottom parts (14) of the platform being intercommunicating through channels (16), so that the liquid fluid can at least partly pass from one cavity to the other.

3. The multi-purpose watercraft according to claim 2, wherein said channels (16) have a section adjustable in diameter.

4. The multi-purpose watercraft according to claim 1, wherein said floats are connected elastically to the topside through hydropneumatic suspensions.

5. The multi-purpose watercraft according to claim 4, wherein said hydropneumatic suspensions comprise at least two hydropneumatic actuators (23, 24), in corresponding hollows (21, 22), produced in the platform (3), which act on pins (27, 28) secured to the top part of the floats.

6. The multi-purpose watercraft according to claim 5, also comprising a motor pump (31) and a tank (32) for collection of the fluid from the hydropneumatic suspensions and a hydraulic circuit (33) for hydraulic control of the suspensions.

7. The multi-purpose watercraft according to claim 1, wherein said frame (4) to support the motor (7) comprises a support (5) and a plate (6) mutually connected in an adjustable manner, said support (5) engaging in the stern part of the platform (3) with central projection, and comprising horizontal extensions which are embedded in the platform, said plate (6) connecting the motor (7) to the support (5), the position of the support being adjustable horizontally, while the position of the plate (6) is adjustable vertically.

8. The multi-purpose watercraft according to claim 1, also comprising an assembly comprising a windsurf mast (16), sail (17) and boom (18), and a mast foot (15) for articulated coupling of said assembly to the top part of said platform (3).

9. The multi-purpose watercraft according to claim 1, also comprising a steering unit fitted to the platform (3), and comprising a seat (40) with steering wheel (41) and hand levers (42) to control said motor (7).

10. The multi-purpose watercraft according to any one of the preceding claims, also comprising a removable tent (45) on said platform.

11. The multi-purpose watercraft according to any one of the preceding claims, wherein said platform (3) is made of moulded plastic with non-slip surface, comprising photovoltaic panels, of the type that can be walked on, fitted to the surface of the deck.

12. The multi-purpose watercraft according to any one of the preceding claims, wherein said platform (3) is produced in superimposed layers: the inner layers comprise expanded polyurethane, plywood, such as Okoumé, being preferable in the stern area and also in other areas in which bolts are present.

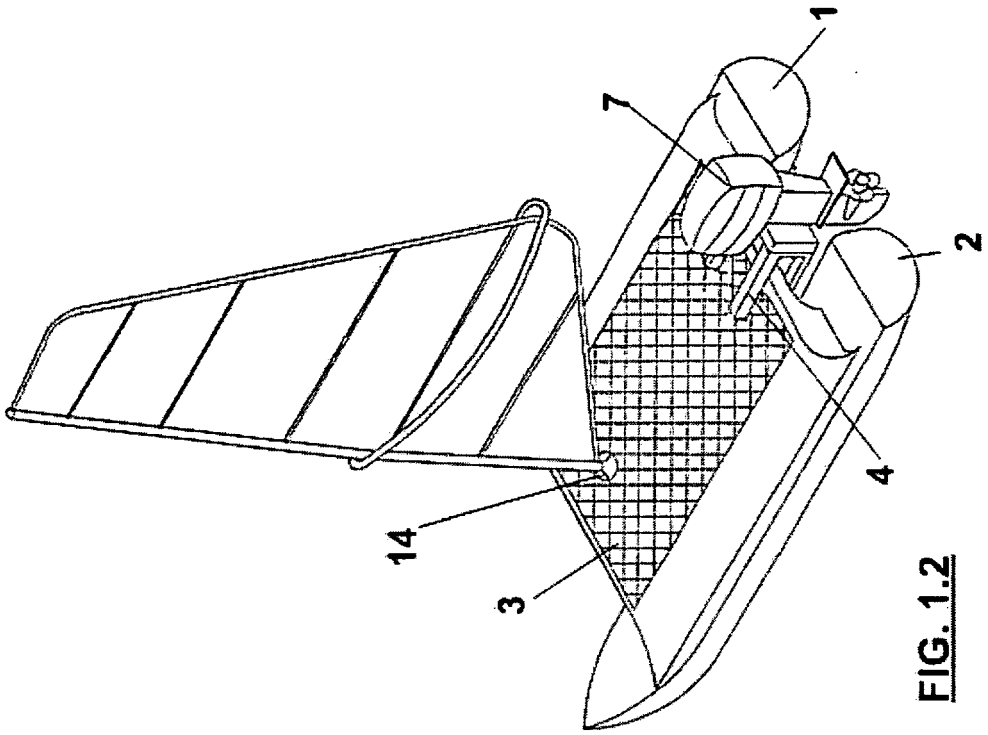

FIG. 1.2

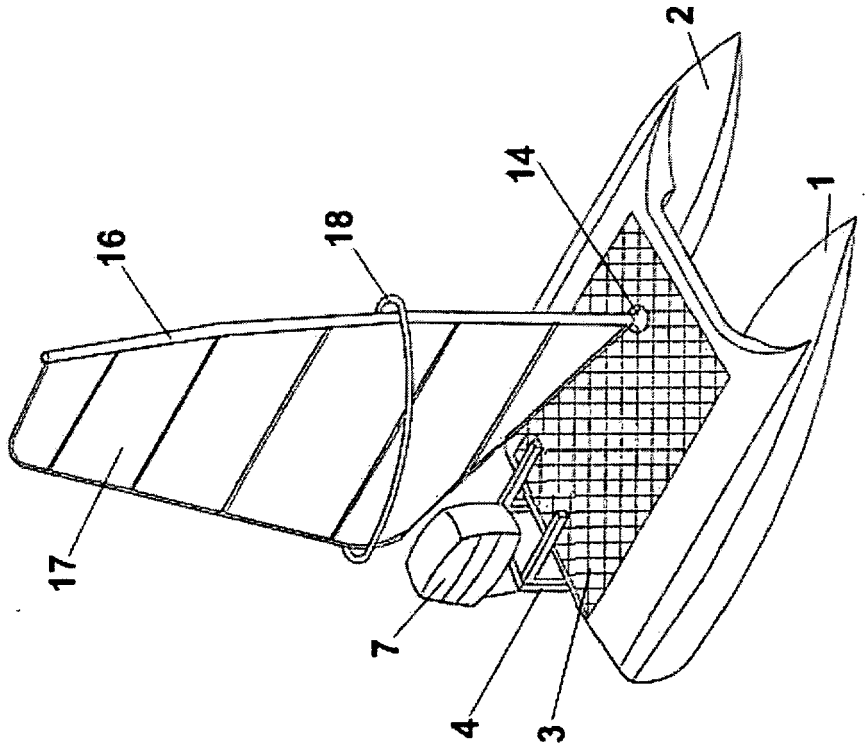

FIG. 1.1

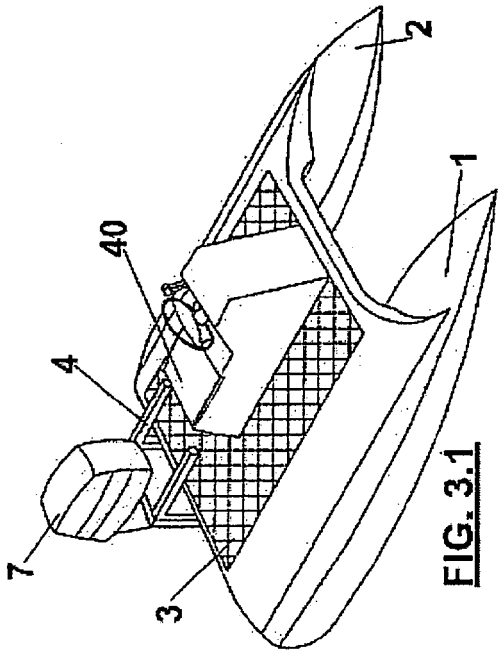

FIG. 3.1

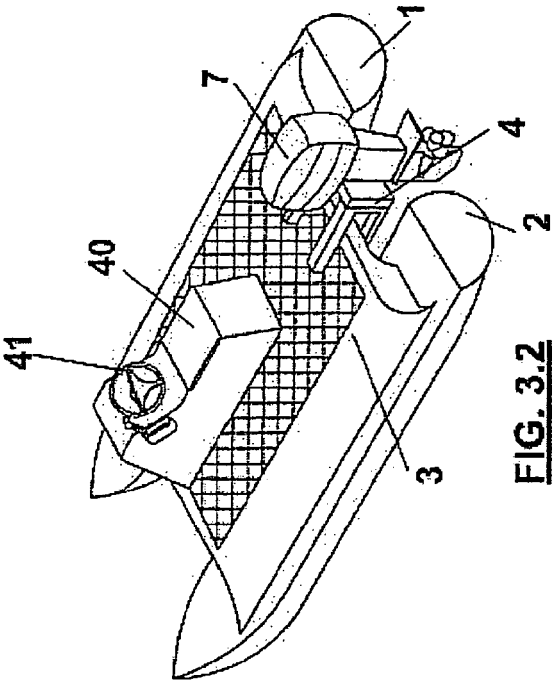

FIG. 3.2

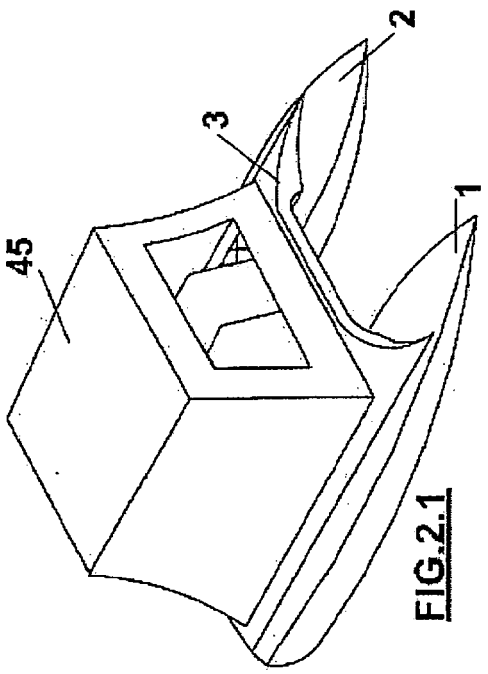

FIG.2.1

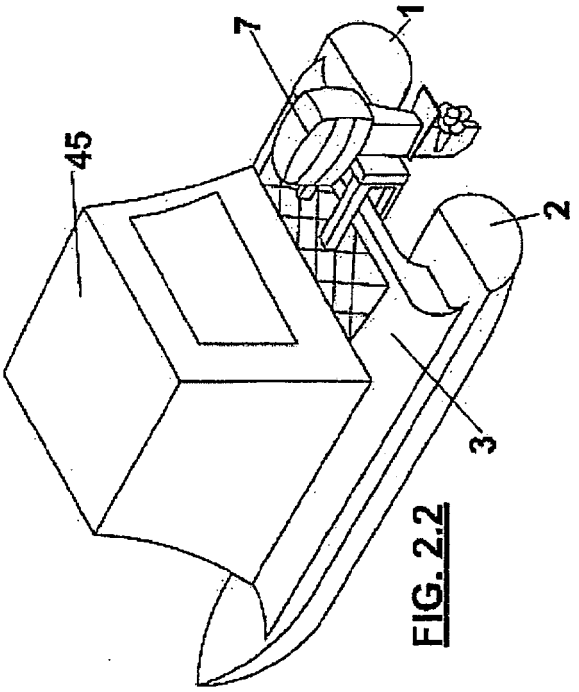

FIG. 2.2

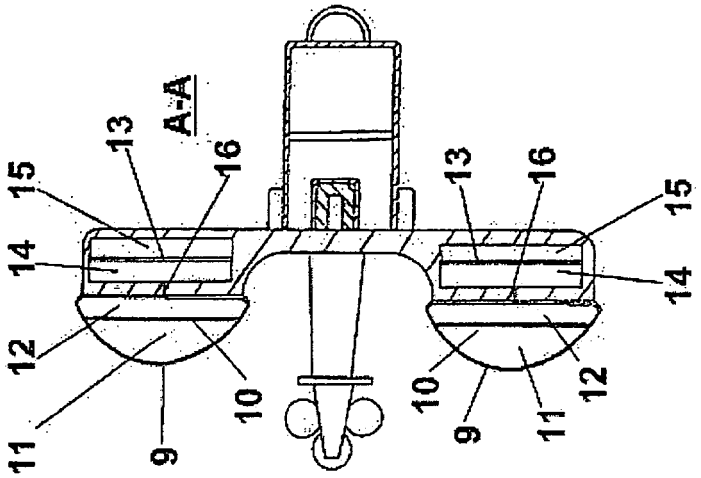
A-A
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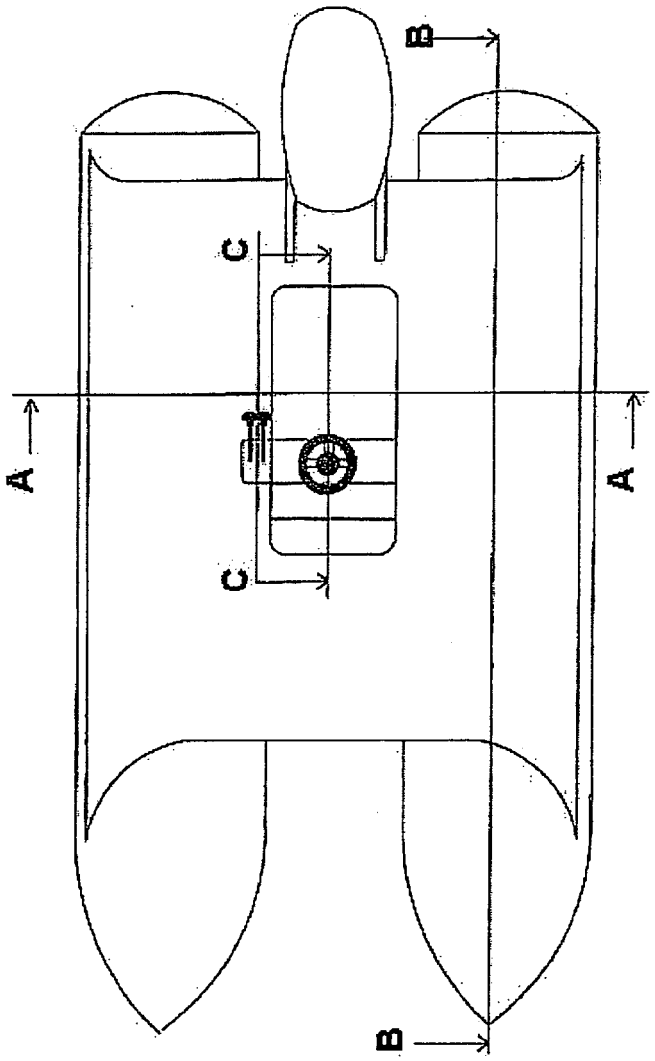
FIG.4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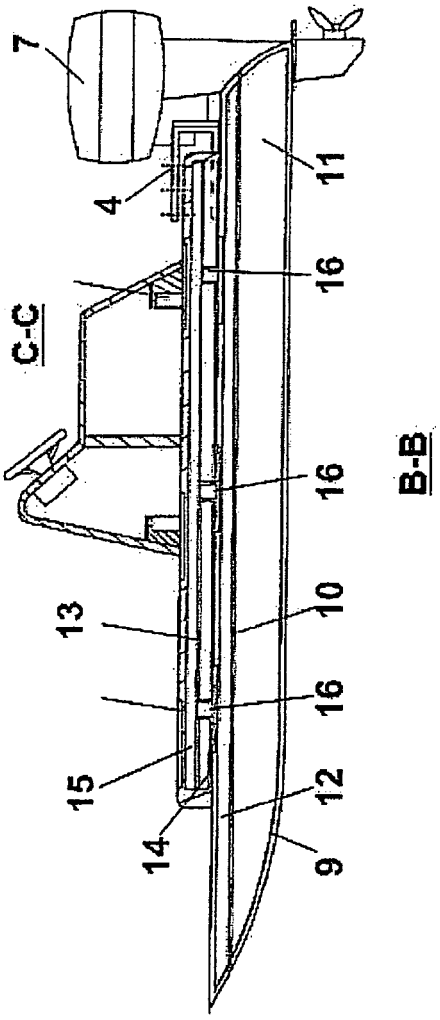
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B-B

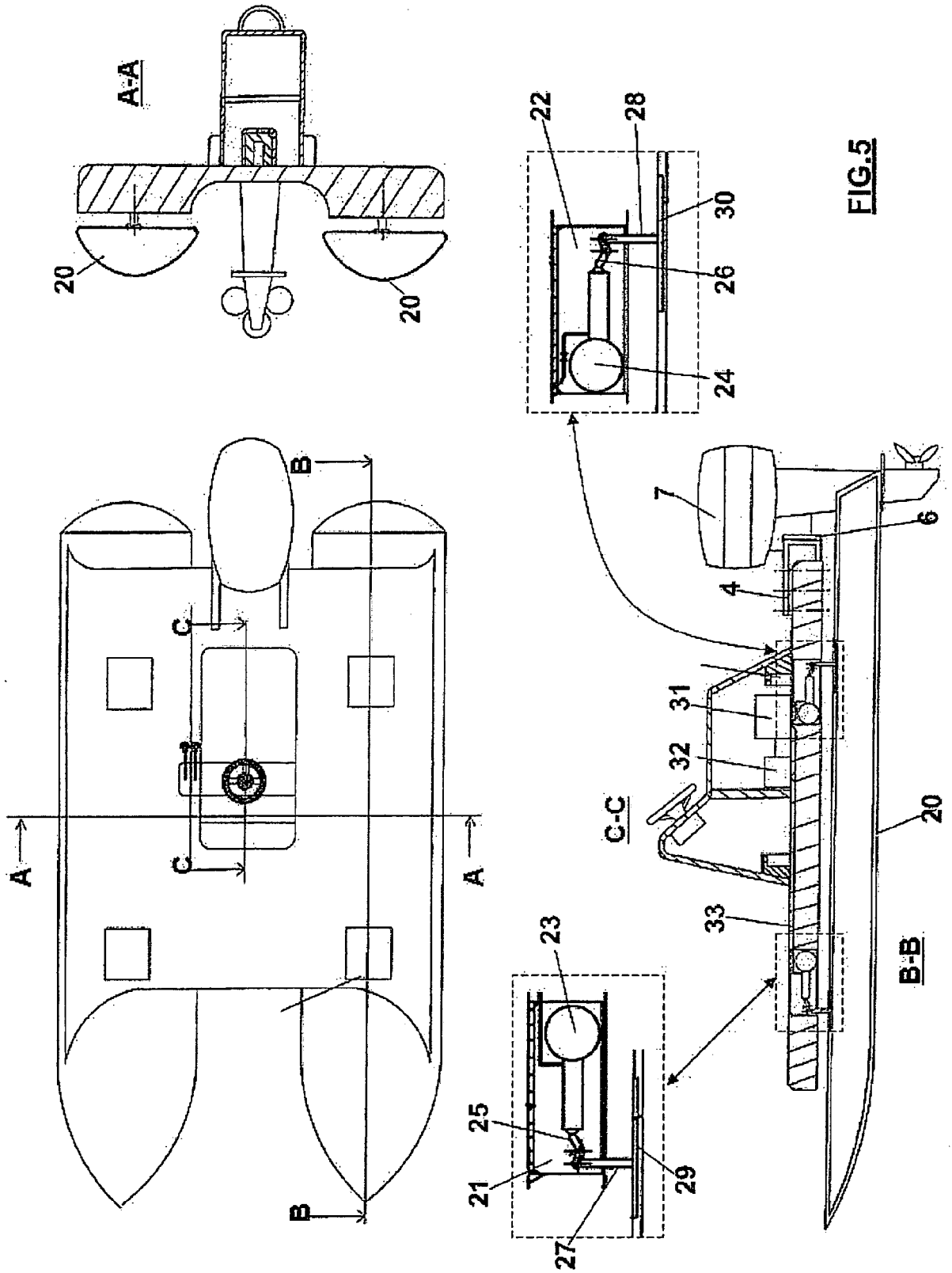

FIG.5

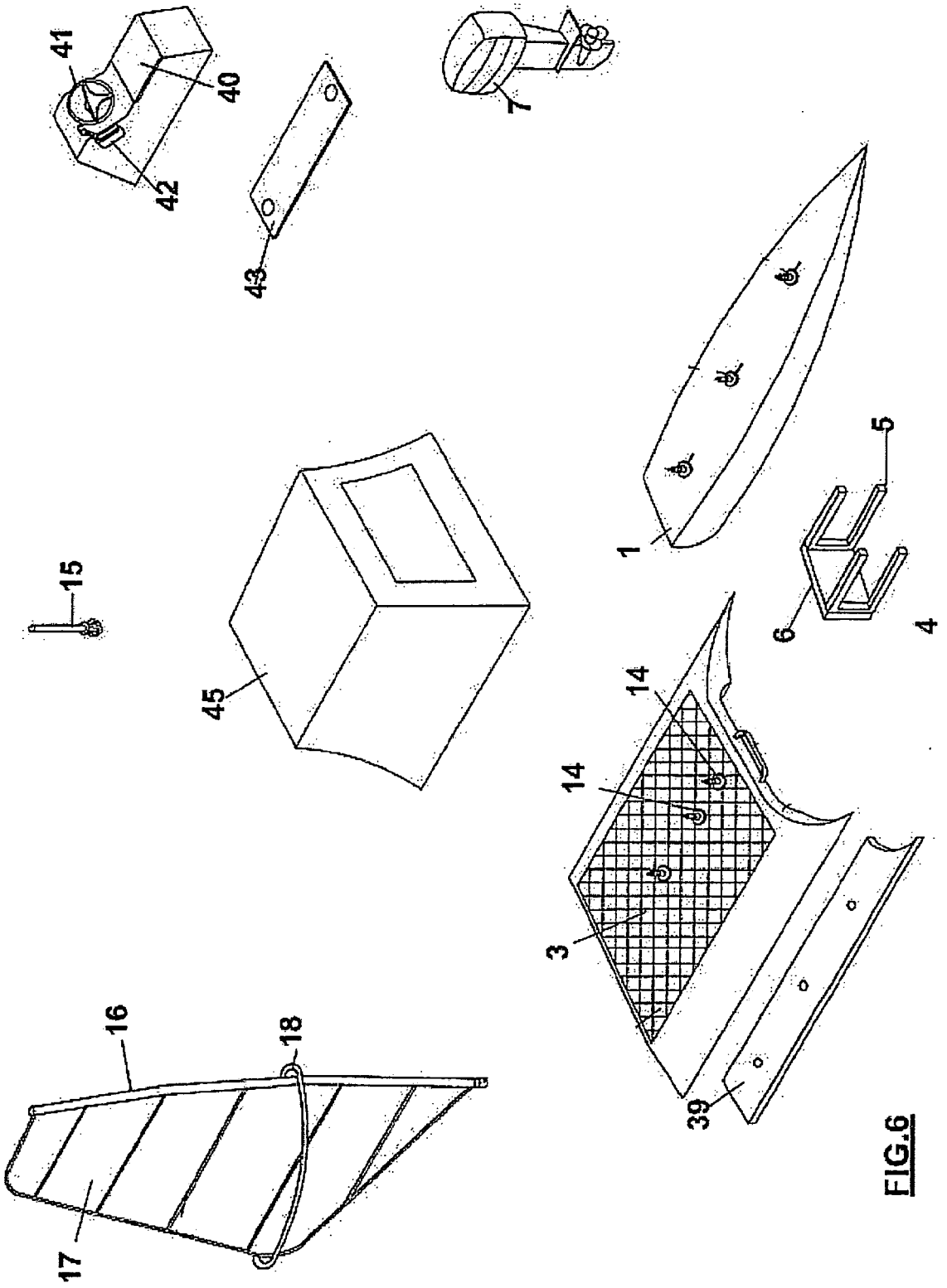

FIG.6

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EUROPEAN SEARCH REPORT

Application Number
EP 09 42 5214

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 228 404 A (GIBBS LOUIS L [US]) 20 July 1993 (1993-07-20) * column 2, line 28 - column 3, line 16; figures 1,2 *	1,4-7,9	INV. B63B1/10
X	US 6 176 190 B1 (OZGA JOHN [US]) 23 January 2001 (2001-01-23) * column 2, line 38 - column 3, line 58; claim 4; figures 1,2,4-7 *	1,4-6	
X	US 3 860 982 A (RUMSEY ROLLIN DOUGLAS) 21 January 1975 (1975-01-21) * column 2, line 31 - column 5, line 55; figures 1-13 *	1,7-10	
X	US 3 326 166 A (YOST JOHN V) 20 June 1967 (1967-06-20) * column 2, line 16 - column 3, line 15; figures 1,2 *	1,7,9	
X	DE 33 18 638 C2 (HEINZE GUENTER ING GRAD) 17 December 1987 (1987-12-17) * column 5, line 31 - column 7, line 54; figures 1-10 *	1,8, 11-12	TECHNICAL FIELDS SEARCHED (IPC) B63B
X	US 4 716 847 A (WILSON JR EARL B [US]) 5 January 1988 (1988-01-05) * column 3, line 17 - line 66; figures 1-3 * * column 4, line 49 - column 5, line 2; figure 5 *	1,9, 11-12	

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
Munich	4 January 2010	Brumer, Alexandre

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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Application Number
EP 09 42 5214

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1, 4-6, 8-10, 12(completely); 11(partially)

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 09 42 5214

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1, 4-6, 8-10, 12(completely); 11(partially)

Catamaran type watercraft with two floats and a rigid platform, having shock absorbers between the floats and the platform.

1.1. claim: 8

Catamaran type watercraft with two floats and a rigid platform, having shock absorbers between the floats and the platform; whereby a mast, sail and boom are also provided.

1.2. claim: 9

Catamaran type watercraft with two floats and a rigid platform, having shock absorbers between the floats and the platform, whereby a steering unit, a seat and hand levers are provided on the platform.

1.3. claim: 10

Catamaran type watercraft with two floats and a rigid platform, having shock absorbers between the floats and the platform, whereby a removable tent is provided on the platform.

1.4. claim: 12

Catamaran type watercraft with two floats and a rigid platform, having shock absorbers between the floats and the platform, the platform being made of one of a selection of materials.

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2. claims: 2-3

Catamaran type watercraft with two floats and a rigid platform, having shock absorbers between the floats and the platform and a rigid connection between the platform and the flaots, as well as a specific design of the floats.

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3. claim: 7

Catamaran type watercraft with two floats and a rigid platform, having shock absorbers between the floats and the platform; being provided with a support frame for a motor, said frame being adjustable in the horizontal and in the vertical directions.

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 09 42 5214

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

4. claim: 11(partially)

Catamaran type watercraft with two floats and a rigid platform, having shock absorbers between the floats and the platform, the platform being provoded with photovoltaic panels, of the type that can be walked on, fitted on the surface of the deck.

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 42 5214

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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04-01-2010

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REFERENCES CITED IN THE DESCRIPTION

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