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(56) References cited:
**CN-A- 107 792 310 DE-A1- 2 156 552
DE-B- 1 191 710 GB-A- 1 567 756
US-A- 2 091 264 US-A- 3 858 541
US-A1- 2007 199 498 US-A1- 2011 100 285
US-A1- 2018 154 986 US-B1- 6 598 552**

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Description

[0001] The invention relates to a vessel and a method for building a vessel.

[0002] DE 1191710 discloses a vessel comprising a floating body, wherein two propulsion units are attached to a hull. The vessel is a push boat and is designed for pushing barges. To this end a side of the vessel is provided with push supports for engaging push supports of a barge to the pushed.

[0003] One object of the invention is to enable a vessel to be built more cheaply, more simply, lighter, and/or faster compared with conventional building (in one piece). Another object of the invention is to provide freedom in underwater hydrodynamics, deck space, length, width, draught and exploitation possibilities. A further object of the invention is to provide an almost unsinkable vessel.

[0004] To that end, the invention provides a modularly built vessel according to claim 1.

[0005] The vessel comprises in particular two construction parts, at least, a main strength frame and a floating body.

[0006] The main strength frame can be manufactured of a first material which is resistant to forces of screw propellers and of the contact sides in one horizontal plane.

[0007] The vessel further comprises a floating body which has been built separately. The floating body may be manufactured of a second material, different from the first material. To the floating body, preferably, no propulsion units are attached.

[0008] The main strength frame and the floating body are preferably rigidly connected to create one vessel.

[0009] This modular vessel, of which the floating body and the main strength frame have been built separately, can be built more cheaply, more simply, lighter, and/or faster compared with a vessel in one piece. With such vessel, moreover, there is provided freedom in underwater hydrodynamics, deck space, length, width, draught and exploitation possibilities. Furthermore, the modular vessel is almost unsinkable.

[0010] The floating body serves substantially exclusively to create buoyancy. Because there are preferably no propulsion units attached to the floating body, and because there are no other spaces needed to accommodate tanks, etc., the floating body can have freedom in shape. In other words: the floating body is preferably not provided with such components (such as propulsion units and tanks).

[0011] The invention comprises various extra advantageous further elaborations.

[0012] The above-mentioned first material can be, for example, steel.

[0013] The main strength frame can contain one or more propulsion units.

[0014] The second material can be at least one of PE, polyester, carbon fibre, steel, aluminium, and any reusable material.

[0015] The floating body can contain a single-walled and/or double-walled construction. In advantageous embodiments, the floating body is built up from at least a series of floating elements. The floating body or the floating elements thereof may be wholly or partly manufactured by moulding, in particular rotational moulding (also: rotomoulding).

[0016] The floating body or the floating elements therefor can be substantially empty (hollow), in particular, can enclose a hollow interior (floating chamber).

[0017] The floating body may be filled with a floating material, for example, foam, empty PET bottles or lightweight balls. Alternatively, the floating bodies or the floating elements can be full, for example, foamed.

[0018] The main strength frame can contain a wheelhouse and/or accommodation and/or battery storage.

[0019] The invention further provides a main strength frame, a floating body, and a method for building a vessel. These provide the advantages mentioned above.

[0020] The invention is further elucidated below on the basis of exemplary embodiments and drawings. In the drawings:

Fig. 1 schematically shows a side view of a modularly built vessel according to an exemplary embodiment; Fig. 2 schematically shows a bottom view of a vessel of Fig. 1;

Figs. 3A and 3B schematically show in side view and top plan view an alternative embodiment of a vessel; Fig. 4 schematically shows in side view an embodiment of a vessel;

Fig. 5 schematically shows in side view a vessel as a push boat or push tug behind a flat-bottom craft to be pushed;

Fig. 6 schematically shows in perspective view a cut-away part of a vessel, in particular an embodiment of a part of a main strength frame thereof;

Figs. 7A and 7B schematically show a perspective view of an embodiment of a vessel;

Fig. 8 schematically shows a perspective view of a further embodiment of a vessel; and

Fig. 9 schematically shows a power box with a propulsion unit.

[0021] In this description, vessel should be understood to mean at least, though not limited to, a push tug, an aid boat, a ship maintenance boat or a boat with which maintenance on waterways, bridges and harbours can be carried out. Such vessels are usually also referred to as workboats. However, also other vessels can be implemented according to the invention.

[0022] The drawings show a modularly built vessel W according to an exemplary embodiment. In the exemplary embodiment shown, this is a push tug for push barges and like vessels to be pushed.

[0023] The vessel W comprises a main strength frame 1 made of a first material which is resistant to forces of screw propellers and of the contact sides in one horizon-

tal plane. The vessel W further comprises a floating body 2 which has been separately built of a second material, which may be different from the first material, while the floating body 2 has no propulsion units 3 attached in it or to it. The main strength frame 1 and the floating body 2, though, may also be built of the same material, or from combinations of materials. The main strength frame 1 and the floating body 2 have been rigidly connected to create one vessel W.

[0024] In this description, main strength frame 1 should be understood to mean at least a construction with which at least forces extending in a substantially horizontal plane can be transmitted, such as, for example, driving forces produced by screw propellers or like drives, and, for example, pushing forces which are transmitted by the vessel to, for example, a flat-bottom craft or like vessel to be pushed. The main strength frame can comprise, for example, as shown in Fig. 6, a substantially metal construction, including, for example, frame members 4 which support a deck 5, a covering 6 which forms a bow 7, stern 9 and flanks 10, and an underside 11 by which the main strength frame 1 can rest on the floating body 2. In the embodiment as shown in Fig. 6, the main strength frame 1 has openings 12 around which the frame members 4 and covering 6 have been arranged. In this way, the main strength frame can be implemented relatively still lighter and yet sufficiently strong. Moreover, the floating body 2 can be accessed through those openings 12, for example for inspection, and be anchored to the main strength frame 1. The frame members 4, of course, can also be manufactured from a different material, for example plastic or composite, while the covering can be made from any suitable material, for example metal and/or plastic.

[0025] In the embodiment shown, for example, in Fig. 6, two push supports 13 are provided on the side of the bow 7. These are firmly connected with the main strength frame 1 and, in embodiments, constitute a constructional component thereof. Via the push supports 13, pushing forces on, for example, a flat-bottom craft or barge 14 can be transmitted still better to the main strength frame 1 and vice versa.

[0026] This modular vessel W, of which the floating body 2 and the main strength frame 1 have been built separately, can be built more cheaply, more simply, lighter, and/or faster compared with a vessel in one piece. With this vessel, moreover, there is provided freedom in underwater hydrodynamics, deck space, length, width, draught and exploitation possibilities. Furthermore, the modular vessel W is almost unsinkable.

[0027] The floating body serves substantially exclusively to create buoyancy. Because there are no propulsion units 3 attached to the floating body 2, and because there are no other spaces needed to accommodate tanks, etc., the floating body 2 can have freedom in shape.

[0028] In a vessel W according to this disclosure, driving forces or thrust forces F generated by the propulsion

unit or propulsion units are preferably directly transmitted to the main strength frame 1, that is, without intervention of the floating body. If thereupon, for example, a flat-bottom craft or barge or the like is pushed with the vessel W, those thrust forces F are directly transmitted to the flat-bottom craft or barge 14 or the like. The floating body 2 preferably does not play a role here, other than keeping the vessel W floating.

[0029] The first material can be, for example, steel.

[0030] The main strength frame 1 can contain, for example, one or more propulsion units 3.

[0031] As a consequence, no propulsion units 3 need to be attached to the floating body 2.

[0032] The second material can be, for example, a plastic. The second material can be, for example, at least one of PE, polyester, carbon fibre, steel, aluminium, and any reusable material.

[0033] The floating body 2 can contain, for example, a single-walled and/or double-walled construction.

[0034] The floating body 2 can be, for example, empty. Thus, buoyancy can be created.

[0035] The floating body 2 may for example be filled with a floating material, for example foam, empty PET bottles or lightweight balls.

[0036] The main strength frame 1 can contain a wheel-house 15 and/or accommodation 16 and/or battery storage 17 and/or another power pack 18.

[0037] In an exemplary embodiment, a method for building a vessel W comprises: manufacturing a main strength frame 1 of a first material which is resistant to forces of screw propellers and of the contact sides in one horizontal plane; separately building a floating body 2 of a second material, preferably different from the first material, while no propulsion units 3 are attached to the floating body 2; and rigidly connecting the main strength frame 1 and the floating body 2 to create one vessel W.

[0038] As follows from the drawing, the propulsion units 3 are preferably at a distance from the floating body 2, for example near a rear side of the vessel W. In this example, the propulsion units 3 (e.g. thrusters) extend at an underside 11 of the main frame 1. As follows from the drawing, furthermore, the floating body 2 can comprise, for example, a floating body 2 extending convexly under the underside 11 of the main frame 1. The floating body has, for example, a curved underside 19. It will be clear that the floating body 2 may be shaped in different manners. Further, the main frame 1 in this example has a rectangular shape, but this is not requisite.

[0039] In embodiments, the floating body 2 can be built up, or provided, as a substantially hollow plastic and/or metal body. In an advantageous method, the floating body is formed hollow using plastic forming technique, in particular plastic moulding. In advantageous embodiments, a floating body 2 is formed with the aid of at least rotational moulding. With this technique, relatively simply, hollow bodies can be formed from plastic, whose shape can be substantially determined by the mould. In other embodiments, a floating body may be formed, for

example, by glass fibre technique, for example with the aid of polyester, metal sheet or combinations thereof. In embodiments, a floating body 2 of a vessel W can be manufactured as a one-piece entity.

[0040] Fig. 3A and Fig. 3B schematically show in side view and bottom view a hull of a vessel W in an alternative embodiment. Here, the floating body 2 is built up from a plurality of sub floating bodies 20, which have been separately manufactured and then connected with each other and with the main strength frame 1. The sub floating bodies 20 can be manufactured, for example, by rotational moulding from plastic, or in a different way and/or from different materials as mentioned earlier. By the use of sub floating bodies 20, the advantage is achieved that the sub floating bodies are simpler to manufacture than a single floating body having the size of the assembled sub floating bodies. Thus, for example, for rotation moulding a smaller mould and apparatus can be used, which has both production-technical and economic advantages. Moreover, use of sub floating bodies 20, in particular inherently closed, waterproof sub floating bodies, can provide the advantage that sufficient buoyancy for the vessel can be preserved if, for example, one of the sub floating bodies were to become leaky. Further, forming a floating body 2 from different sub floating bodies 20 can provide the advantage that a sub floating body 20 can be simply removed individually, for example for maintenance or to be replaced, in some embodiments even while the vessel keeps floating. A further advantage of the use of sub floating bodies 20 may be that the shape and dimensions of a floating body 2 can be relatively simply adapted, for example by adding or removing sub floating bodies 20.

[0041] In Fig. 3 the floating body 2 is built up from eight sub floating bodies 20 but it will be clear there may be more or fewer than eight involved. In alternative embodiments, a floating body 2 may also be formed differently, for example as a multi hull floating body, such as, for example, a catamaran or trimaran. In embodiments, one or more sub floating bodies may be omitted, or be replaced with parts of a different form, such as, for example, an open filling part in which, for example, ballast or load can be received.

[0042] In the figures, vessels such as workboats are shown in different implementations, where, as for example in Figs. 1-4, 7A and 7B, the main frame 1 to some extent overhangs the floating body 2 on all sides. The main frame 1 in these embodiments has a substantially rectangular outer shape. Naturally, that shape may also be chosen differently. The overhanging main frame can provide as an advantage that the floating body is thereby protected relatively well, for example from damage when the vessel is being used, for example, for pushing a barge or flat-bottom craft, or the like, or at quays and the like.

[0043] In, for example, Figures 1, 2, 4 and 7B it is shown that the propulsion units 3 are mounted on the main strength frame 1. In the embodiments shown, two propulsion units 3 are provided. However, one propulsion

unit 3 could also suffice, or, for example, three or more. In an embodiment with three propulsion units 3, for example, one could be provided at the bow 7, and two at the stern 9. Use of at least two propulsion units 3, for example next to each other, provides the possibility to use the propulsion units 3 for steering the vessel W, so that, for example, a separate rudder unit can be dispensed with.

[0044] In advantageous embodiments, as propulsion units 3, azimuth propellers are used. These can be, for example, well mounted thrusters, deck mounted thrusters, transom thrusters or tunnel thrusters. In advantageous embodiments, as propulsion units 3, electric screws or propellers are used. In advantageous embodiments, electric azimuth propellers or thrusters 3 are used, preferably well mounted electric azimuth thrusters. With these, a relatively low energy consumption can be obtained, with a relatively shallow draught and high manoeuvrability.

[0045] In embodiments, the propulsion units 3 are mounted on the underside 11 of the main frame 1, at the stern 9, adjacent two opposite corners of the main frame 1, in a part 21 thereof projecting beyond the floating body 2.

[0046] In the use of electrically powered propulsion units 3, as schematically shown in more detail in, for example, Fig. 9, there may be provided on the deck 5 of the main frame 1 one or more power boxes 18, in which or on which, for example, a battery/accumulator provision 17 may be included, and/or a generator 22 for generating electric energy. Such a generator 22 can be, for example, a generator driven by a fossil or non-fossil fuel, for example, though not limited to, petrol, gas oil, (bio) diesel, GTL, methanol, LNG, CNG, solar or fuel cell or the like. In embodiments, the power pack 18 is formed by batteries/accumulators, without generator. In the embodiment of Fig. 9 shown as an example, the generator 22 is coupled on one side via a transmission 23 with the propulsion unit 3 and on the other side with an accumulator/battery storage 17. The battery storage 17 can function as energy storage for later use by the propulsion unit and/or for other electric installations on board of the vessel W and/or externally of the vessel W. Naturally, the generator 22 may also be connected with the propulsion unit or units via the battery storage 17.

[0047] The or each power box 18 and/or battery storage 17 is preferably so configured that it can be simply uncoupled from the propulsion unit or units 3, so that the power box 18 and/or the battery storage can be simply exchanged for another power box 18 and/or battery storage 17. Thus, for example, at all times a power box can be chosen for which fuel is available or which is most suitable for particular circumstances or because of certain selection criteria, for example on the basis of emission, environmental pollution, energy consumption, legal regulations, preferences of the user or the like. To this end, a power box 18 and/or battery storage 17 may be implemented, for example, in or as a container, for ex-

ample a sea container. Also the cabins and like deck-superstructure 16 may be wholly or partly exchangeable. A wheelhouse 15 may be arranged in a fixed position or may for example be adjustable in height in a conventional manner.

[0048] Fig. 8 schematically shows an alternative embodiment of a vessel. In this embodiment, the floating body 2 is substantially wholly in line with the outer contour of the main frame 1, so that there is no or substantially no overhang of the main frame 1 beyond the floating body 2. In this embodiment, the propulsion units 3 are attached against the rear side 9 of the main frame 1, for example as deck mounted or transom thrusters. In this embodiment, for example, a more (semi)permanent deck superstructure 16 may be provided. In this embodiment, a wheelhouse 15 is provided which with the aid of supporting arms 25 may be adjusted in height in a conventional manner.

[0049] The drawings are schematic and are intended only for illustration of the above-described exemplary embodiments.

[0050] To the skilled person, it will be clear that the invention is not limited to the preferred embodiments described. Thus, the floating body may comprise, for example, a single row of sub floating bodies 20 or more than two rows, or another arrangement of different sub floating bodies 20, for example staggered, for an augmented mutual connection. Other propulsion units may be used, such as, for example, an outboard motor type of drive unit. The main strength frame may be designed differently, for example as a full-foamed frame, and may have a different configuration. For example, a part thereof may be situated higher or lower, for example a stern may be configured such that it is situated partly next to and/or behind the floating body, for example partly under the waterline, while a propelling unit or propelling units may be provided therein under the waterline. The superstructure above the deck may naturally be implemented differently, for example with a fixed superstructure or a different wheelhouse and the like. These and various comparable modifications are within the scope of the invention as defined in the claims.

Claims

1. A modularly built vessel (W) comprising:

- a main strength frame (1) and a separately built floating body (2), wherein the main strength frame (1) and the floating body (2) are rigidly connected to create one vessel (W), wherein at least one, preferably at least two propulsion units (3) are attached to the main strength frame (1), wherein the main strength frame (1) is supported by the floating body (2) wherein the vessel is a workboat, especially a push tug, and is provided with push supports (13) mounted to the

main strength frame (1), and wherein driving force of the or each propulsion unit (3) during use is transmitted directly to the main strength frame (1), without intervention of the floating body, wherein the main strength frame (1) contains and/or supports at least one of a wheelhouse, an accommodation, a battery storage and a housing with another energy source, wherein the push supports (13) are for pushing a push barge or like vessel to be pushed by the push tug.

2. A vessel according to claim 1, wherein the main strength frame (1) overhangs the floating body at the bow of the vessel, wherein the main strength frame (1) preferably overhangs the floating body on all sides, wherein the push supports are provided at the bow of the vessel.

3. A vessel according to claim 1 or 2, wherein the main strength frame (1) is manufactured of a first material which is resistant to forces of screw propellers and of the contact sides in one horizontal plane and, wherein the floating body (2) is separately built of a second material or combination of materials, preferably a material or combination of materials other than of the main strength frame (1).

4. A vessel according to any one of the preceding claims, wherein:

- no propulsion units (3) are attached in or to the floating body (2) and/or - the propulsion units (3) extend at an underside (11) of the main strength frame (1) and/or
- the propelling units (3) are electric propelling units (3).

5. A vessel according to any one of the preceding claims, wherein the main strength frame is manufactured of steel and/or the main strength frame (1) contains two or more azimuthal thrusters (3).

6. A vessel according to any one of the preceding claims, wherein:

- the floating body (2) is manufactured of a second material which is or comprises at least one of PE, polyester, carbon fibre, steel, aluminium, and any reusable material and/or
- the floating body (2) contains a single-walled and/or double-walled construction and/or

the floating body (2) is empty, at least, hollow or the floating body (2) is filled with a floating material, for example foam, empty PET bottles or lightweight balls, in particular a material floating on water.

7. A vessel according to any one of the preceding claims, wherein propulsion units (3) are mounted on the underside (11) of the main strength frame (1), at the stern (9) of the vessel, adjacent two opposite corners of the main frame (1), in a part (21) thereof projecting beyond the floating body (2) and/or said at least one propulsion unit (3) is connected with the main strength frame (1), wherein the propulsion unit (3) is an electrically powered propulsion unit, wherein on and/or in the main strength frame (1) at least a power box (18) and/or a battery storage (17) is provided, being electrically connected with the at least one propulsion unit (3), wherein the power box preferably comprises at least a generator (22), wherein the power box (18) is detachably connected with the main strength frame (1) and with the at least one propulsion unit (3).
8. A vessel according to any one of the preceding claims, wherein the floating body is manufactured with the aid of at least moulding, in particular rotational moulding and/or wherein the floating body is built up from a series of sub floating bodies, wherein the sub floating bodies are preferably mutually connected for the formation of the floating body.
9. A vessel according to claim 8, wherein at least a number of sub floating bodies are manufactured using rotational moulding.
10. A vessel according to any one of the preceding claims, wherein the main strength frame (1) comprises a deck (5), wherein above the deck (5) at least a generator is provided for generating electric current, being coupled with at least one electrically powered propulsion unit, in particular a thruster (3).
11. A vessel according to claim 7, wherein the power box (18) and/or the battery storage (17) are implemented in or as a container, for example a sea container, preferably exchangeable for another such container comprising a power box (18) and/or battery storage (17).
12. A vessel according to any one of the preceding claims, wherein the vessel comprises cabins and line deck structures (16) which are wholly or partly exchangeable and/or comprises a wheelhouse which is height adjustable with the aid of supporting arms (25).
13. Method for building a vessel (W) according to any one of the preceding claims, wherein the method comprises:
- providing independently of each other a main strength frame (1) and a floating body (2); and
 - rigidly connecting the main strength frame (1)

and the floating body (2) to create the vessel (W),

wherein the main strength frame is provided with push supports (13) at a bow (7) of the vessel (1) and at least one, preferably at least two propulsion units (3) at a stern (9) of the vessel, extending from a bottom side and/or a stern side of the main strength frame (1), wherein the vessel (1) is manufactured as a work boat, especially a push tug, wherein the push supports (13) are made for pushing a push barge or the like vessel.

14. Method according to claim 13, wherein:

- the floating body (2) is substantially manufactured from plastic, in particular by moulding, more particularly rotational moulding and/or-

wherein the floating body (2) is built up from at least a series of sub floating bodies (20).

15. Method according to any one of claims 13 - 14, wherein the at least one propulsion unit (3) is attached to the main strength frame (1), at a distance from the floating body (2) and/or wherein as propulsion units (13) electrically powered propelling units (13) are mounted, extending at an underside of the main strength frame (1) at a distance behind the floating body (2), wherein at least one of a generator, a power box and a battery storage is provided on the main strength frame (1) in at least one container, connected to the at least one electrical propulsion unit (13), which at least one container is mounted to the main strength frame (1) such that it can be exchanged for another such container.

Patentansprüche

1. Modular aufgebautes Schiff (W), umfassend:

- einen Hauptfestigkeitsrahmen (1) und einen separat gebauten Schwimmkörper (2), wobei der Hauptfestigkeitsrahmen (1) und der Schwimmkörper (2) starr miteinander verbunden sind, um ein Schiff (W) zu schaffen, wobei wenigstens eine, vorzugsweise wenigstens zwei Antriebseinheiten (3) am Hauptfestigkeitsrahmen (1) befestigt sind, wobei der Hauptfestigkeitsrahmen (1) von dem Schwimmkörper (2) gestützt wird, wobei das Schiff ein Arbeitsboot, insbesondere ein Schubschlepper, ist und mit am Hauptfestigkeitsrahmen (1) montierten Schubstützen (13) versehen ist, und wobei die Antriebskraft der oder jeder Antriebseinheit (3) während des Gebrauchs direkt auf den Hauptfestigkeitsrahmen (1) übertragen wird, ohne dass der Schwimmkörper eingreift, wobei der

- Hauptfestigkeitsrahmen (1) wenigstens eines von einem Radhaus, einer Aufnahme, einem Batteriespeicher und einem Gehäuse mit einer anderen Energiequelle enthält und/oder stützt, wobei die Schubstützen (13) zum Schieben eines Schubschiffs oder eines ähnlichen Schiffes sind, das durch den Schubschlepper geschoben werden soll.
2. Schiff nach Anspruch 1, wobei der Hauptfestigkeitsrahmen (1) den Schwimmkörper am Bug des Schiffes überragt, wobei der Hauptfestigkeitsrahmen (1) bevorzugt allseitig über den Schwimmkörper hinausragt, wobei die Schubstützen am Bug des Schiffes vorgesehen sind.
 3. Schiff nach Anspruch 1 oder 2, wobei der Hauptfestigkeitsrahmen (1) aus einem ersten Material hergestellt ist, das widerstandsfähig gegen Kräfte von Schraubenpropellern und der Kontaktseiten in einer horizontalen Ebene ist, und wobei der Schwimmkörper (2) separat aus einem zweiten Material oder einer Kombination von Materialien, bevorzugt einem anderen Material oder einer anderen Kombination von Materialien als das/der des Hauptfestigkeitsrahmens (1), hergestellt ist.
 4. Schiff nach einem der vorhergehenden Ansprüche, wobei:
 - keine Antriebseinheiten (3) im oder am Schwimmkörper (2) angebracht sind und/oder - die Antriebseinheiten (3) sich an einer Unterseite (11) des Hauptfestigkeitsrahmens (1) erstrecken und/oder
 - die Antriebseinheiten (3) elektrische Antriebe (3) sind.
 5. Schiff nach einem der vorhergehenden Ansprüche, wobei der Hauptfestigkeitsrahmen aus Stahl hergestellt ist und/oder der Hauptfestigkeitsrahmen (1) zwei oder mehr Azimutstrahlruder (3) enthält.
 6. Schiff nach einem der vorhergehenden Ansprüche, wobei:
 - der Schwimmkörper (2) aus einem zweiten Material hergestellt ist, das mindestens aus einem von PE, Polyester, Kohlefaser, Stahl, Aluminium und einem beliebigen wiederverwendbaren Material besteht oder dieses enthält und/oder
 - der Schwimmkörper (2) eine einwandige und/oder doppelwandige Konstruktion aufweist und/oder
 der Schwimmkörper (2) leer, zumindest hohl ist, oder der Schwimmkörper (2) mit einem Schwimmstoff, beispielsweise Schaum, leeren PET-Flaschen oder
 - Leichtballen, insbesondere einem auf Wasser schwimmenden Stoff, gefüllt ist.
 7. Schiff nach einem der vorhergehenden Ansprüche, wobei Antriebseinheiten (3) an der Unterseite (11) des Hauptfestigkeitsrahmens (1), am Heck (9) des Schiffes, neben zwei gegenüberliegenden Ecken des Hauptrahmens (1), in einem Teil (21) davon angebracht sind, der über den Schwimmkörper (2) hinausragt, und/oder die wenigstens eine Antriebseinheit (3) mit dem Hauptfestigkeitsrahmen (1) verbunden ist, wobei die Antriebseinheit (3) eine elektrisch angetriebene Antriebseinheit ist, wobei an und/oder in dem Hauptfestigkeitsrahmen (1) wenigstens ein Energiekasten (18) und/oder ein Batteriespeicher (17) vorgesehen ist, der elektrisch mit der wenigstens einen Antriebseinheit (3) verbunden ist, wobei der Energiekasten vorzugsweise wenigstens einen Generator (22) umfasst, wobei der Energiekasten (18) lösbar mit dem Hauptfestigkeitsrahmen (1) und mit der wenigstens einen Antriebseinheit (3) verbunden ist.
 8. Schiff nach einem der voranstehenden Ansprüche, wobei der Schwimmkörper mit Hilfe von wenigstens Formgebung, insbesondere Rotationsformgebung, hergestellt ist und/oder wobei der Schwimmkörper aus einer Reihe von Unterschwimmkörpern aufgebaut ist, wobei die Unterschwimmkörper bevorzugt zur Bildung des Schwimmkörpers miteinander verbunden sind.
 9. Schiff nach Anspruch 8, wobei mindestens eine Anzahl von Unterschwimmkörpern durch Rotationsformgebung hergestellt werden.
 10. Schiff nach einem der vorhergehenden Ansprüche, wobei der Hauptfestigkeitsrahmen (1) ein Deck (5) aufweist, wobei oberhalb des Decks (5) wenigstens ein Generator zur Erzeugung von elektrischem Strom vorgesehen ist, der mit wenigstens einer elektrisch angetriebenen Antriebseinheit, insbesondere einem Strahlruder (3), gekoppelt ist.
 11. Schiff nach Anspruch 7, wobei die Energiebox (18) und/oder der Batteriespeicher (17) in oder als ein Container, beispielsweise ein Seecontainer, implementiert sind, vorzugsweise austauschbar gegen einen anderen solchen Container, der eine Energiebox (18) und /oder einen Batteriespeicher (17) umfasst.
 12. Schiff nach einem der vorhergehenden Ansprüche, wobei das Schiff Kabinen und Liniendeckkonstruktionen (16) aufweist, die ganz oder teilweise austauschbar sind, und/oder ein Radhaus aufweist, das mit Hilfe von Stützarmen (25) höhenverstellbar ist.

13. Verfahren zur Herstellung eines Schiffes (W) nach einem der vorhergehenden Ansprüche, wobei das Verfahren umfasst:

- Zur Verfügung stellen, unabhängig voneinander, eines Hauptfestigkeitsrahmens (1) und eines Schwimmkörpers (2); und
- starres Verbinden des Hauptfestigkeitsrahmens (1) mit dem Schwimmkörper (2) zur Bildung des Schiffes (W),

wobei der Hauptfestigkeitsrahmen mit Schubstützen (13) an einem Bug (7) des Schiffes (1) und wenigstens einer, vorzugsweise wenigstens zwei Antriebseinheiten (3) an einem Heck (9) des Schiffes versehen ist, die sich von einer Unterseite und/oder einer Heckseite des Hauptfestigkeitsrahmens (1) erstrecken, wobei das Schiff (1) als Arbeitsboot, insbesondere Schubschlepper, hergestellt ist, wobei die Schubstützen (13) zum Schieben eines Schubschiffes oder eines ähnlichen Schiffes hergestellt sind.

14. Verfahren nach Anspruch 13, wobei:

- der Schwimmkörper (2) im Wesentlichen aus Kunststoff hergestellt ist, insbesondere durch Formgebung, insbesondere Rotationsformung, und/oder

wobei der Schwimmkörper (2) aus wenigstens einer Reihe von Unterschwimmkörpern (20) aufgebaut ist.

15. Verfahren nach einem der Ansprüche 13 bis 14, wobei die wenigstens eine Antriebseinheit (3) in einem Abstand vom Schwimmkörper (2) am Hauptfestigkeitsrahmen (1) angebracht ist und/oder wobei als Antriebseinheiten (13) elektrisch angetriebene Antriebseinheiten (13) angebracht sind, die sich an einer Unterseite des Hauptfestigkeitsrahmens (1) in einem Abstand hinter dem Schwimmkörper (2) erstrecken, wobei wenigstens eines von einem Generator, einer Energiebox und einem Batteriespeicher auf dem Hauptfestigkeitsrahmen (1) in wenigstens einem Container vorgesehen ist, verbunden mit der mindestens einen elektrischen Antriebseinheit (13), wobei der mindestens eine Behälter am Hauptfestigkeitsrahmen (1) so angebracht ist, dass er gegen einen anderen solchen Behälter ausgetauscht werden kann.

Revendications

1. Navire de construction modulaire (W) comprenant :
- un cadre de résistance principal (1) et un corps flottant construit séparément (2), dans lequel le

cadre de résistance principal (1) et le corps flottant (2) sont reliés de manière rigide pour créer un navire (W), dans lequel au moins un, de préférence au moins deux des unités de propulsion (3) sont fixées au cadre de résistance principal (1), dans lequel le cadre de résistance principal (1) est supporté par le corps flottant (2) dans lequel le navire est un bateau de travail, en particulier un remorqueur pousseur, et est pourvu de supports de poussée (13) montés sur le châssis principal (1), et dans lequel la force d'entraînement de l'unité de propulsion ou de chaque unité de propulsion (3) pendant l'utilisation est transmise directement au cadre de résistance principal (1), sans intervention du corps flottant, dans lequel le cadre de résistance principal (1) contient et/ou supporte au moins l'un d'une timonerie, d'un logement, d'un stockage de batterie et d'un logement avec une autre source d'énergie, dans lequel les supports de poussée (13) servent à pousser une barge pousseuse ou un navire similaire à pousser par le remorqueur pousseur.

2. Navire selon la revendication 1, dans lequel le cadre de résistance principal (1) surplombe le corps flottant à la proue du navire, dans lequel le cadre de résistance principal (1) surplombe de préférence le corps flottant de tous les côtés, dans lequel les supports de poussée sont prévu à la proue du navire.
3. Navire selon la revendication 1 ou 2, dans lequel le cadre de résistance principal (1) est fabriqué en un premier matériau résistant aux forces des hélices et des côtés de contact dans un plan horizontal et, dans lequel le corps flottant (2) est construit séparément en un second matériau ou une combinaison de matériaux, de préférence un matériau ou une combinaison de matériaux autres que le cadre de résistance principal (1).
4. Navire selon l'une quelconque des revendications précédentes, dans lequel :
- aucune unité de propulsion (3) n'est fixée dans ou sur le corps flottant (2) et/ou
 - les unités de propulsion (3) s'étendent sur une face inférieure (11) du cadre de résistance principal (1) et/ou
 - les unités de propulsion (3) sont des unités de propulsion électriques (3).
5. Navire selon l'une quelconque des revendications précédentes, dans lequel le cadre de résistance principal est fabriqué en acier et/ou le cadre de résistance principal (1) contient deux ou plusieurs propulseurs azimutaux (3).

6. Navire selon l'une quelconque des revendications précédentes, dans lequel :

- le corps flottant (2) est fabriqué à partir d'un deuxième matériau qui est ou comprend au moins l'un parmi le PE, le polyester, la fibre de carbone, l'acier, l'aluminium et tout matériau réutilisable et/ou
- le corps flottant (2) contient une construction à simple paroi et/ou à double paroi et/ou
- le corps flottant (2) est vide, au moins creux ou le corps flottant (2) est rempli d'un matériau flottant, par exemple mousse, des bouteilles en PET vides ou des balles légères, notamment un matériau flottant sur l'eau.

7. Navire selon l'une quelconque des revendications précédentes, dans lequel les unités de propulsion (3) sont montées sur la face inférieure (11) du cadre de résistance principal (1), à la poupe (9) du navire, à proximité de deux coins opposés du cadre principal (1), dans une partie (21) de celui-ci faisant saillie au-delà du corps flottant (2) et/ou ladite au moins une unité de propulsion (3) est reliée au cadre de résistance principal (1), dans lequel l'unité de propulsion (3) est une unité de propulsion électrique, dans lequel sur et/ou dans le cadre de résistance principal (1) au moins un boîtier d'alimentation (18) et/ou une batterie de stockage (17) est prévue, étant électriquement connectée à l'au moins une unité de propulsion (3), dans lequel le boîtier d'alimentation comprend de préférence au moins un générateur (22), dans lequel le boîtier d'alimentation (18) est relié de manière amovible au cadre de résistance principal (1) et à l'au moins une unité de propulsion (3).

8. Navire selon l'une quelconque des revendications précédentes, dans lequel le corps flottant est fabriqué à l'aide d'au moins un moulage, en particulier un moulage par rotation et/ou le corps flottant étant constitué d'une série de sous-corps flottants, les sous-corps flottants étant de préférence mutuellement reliés pour la formation du corps flottant.

9. Navire selon la revendication 8, dans lequel au moins un certain nombre de sous-corps flottants sont fabriqués par moulage par rotation.

10. Navire selon l'une quelconque des revendications précédentes, dans lequel le cadre de résistance principal (1) comprend un pont (5), dans lequel au-dessus du pont (5) au moins un générateur est prévu pour générer du courant électrique, étant couplé à au moins une unité de propulsion à propulsion électrique, en particulier un propulseur (3).

11. Navire selon la revendication 7, dans lequel le boîtier d'alimentation (18) et/ou la batterie de stockage (17)

sont mis en oeuvre dans ou sous la forme d'un conteneur, par exemple un conteneur maritime, de préférence échangeable contre un autre tel conteneur comprenant un boîtier d'alimentation (18) et/ou une batterie de stockage (17).

12. Navire selon l'une quelconque des revendications précédentes, dans lequel le navire comprend des cabines et des structures de pont en ligne (16) qui sont totalement ou partiellement échangeables et/ou comprend une timonerie qui est réglable en hauteur à l'aide de bras de support (25).

13. Procédé de construction d'un navire (W) selon l'une quelconque des revendications précédentes, dans lequel le procédé comprend les étapes consistant à :

fournir indépendamment l'un de l'autre un cadre de résistance principal (1) et un corps flottant (2) ; et
relier rigidement le cadre de résistance principal (1) et le corps flottant (2) pour créer le navire (W), dans lequel le cadre de résistance principal est pourvu de supports de poussée (13) au niveau d'une proue (7) du navire (1) et au moins une, de préférence au moins deux unités de propulsion (3) au niveau d'une poupe (9) du navire, s'étendant depuis un côté inférieur et/ou un côté arrière du cadre de résistance principal (1), dans lequel le navire (W) est fabriqué comme un bateau de travail, en particulier un remorqueur pousseur, dans lequel les supports de poussée (13) sont conçus pour pousser une barge poussée ou un navire similaire.

14. Procédé selon la revendication 13, dans lequel :

- le corps flottant (2) est essentiellement fabriqué en matière plastique, notamment par moulage, plus particulièrement moulage par rotation et/ou
- dans lequel le corps flottant (2) est constitué d'au moins une série de sous-corps flottants (20).

15. Procédé selon l'une quelconque des revendications 13 - 14, dans lequel l'au moins une unité de propulsion (3) est fixée au cadre de résistance principal (1), à distance du corps flottant (2) et/ou dans lequel, en tant qu'unités de propulsion (3), des unités de propulsion électriques (3) sont montées, s'étendant sur une face inférieure du cadre de résistance principal (1) à une certaine distance derrière le corps flottant (2), dans lequel au moins l'un parmi un générateur, un boîtier d'alimentation et une batterie de stockage est prévu sur le cadre de résistance principal (1) dans au moins un conteneur, connecté à l'au moins une unité de propulsion électrique (3), lequel au moins un conteneur est monté sur le cadre de résistance

principal (1) de sorte qu'il puisse être remplacé par un autre conteneur de ce type.

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Fig. 1

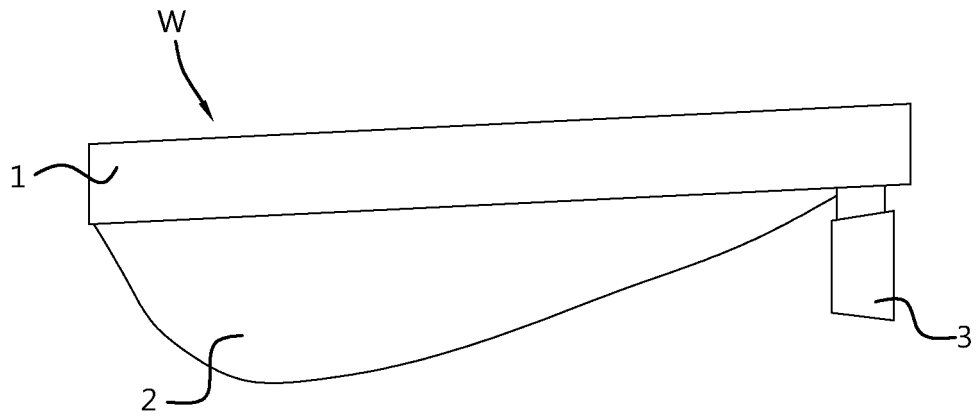


Fig. 2

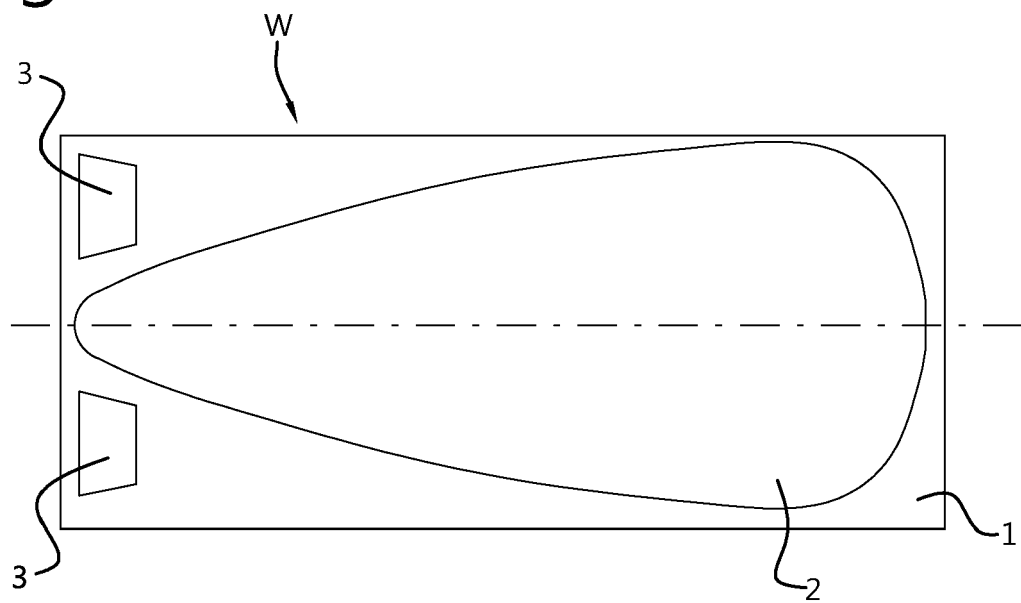


Fig. 3A

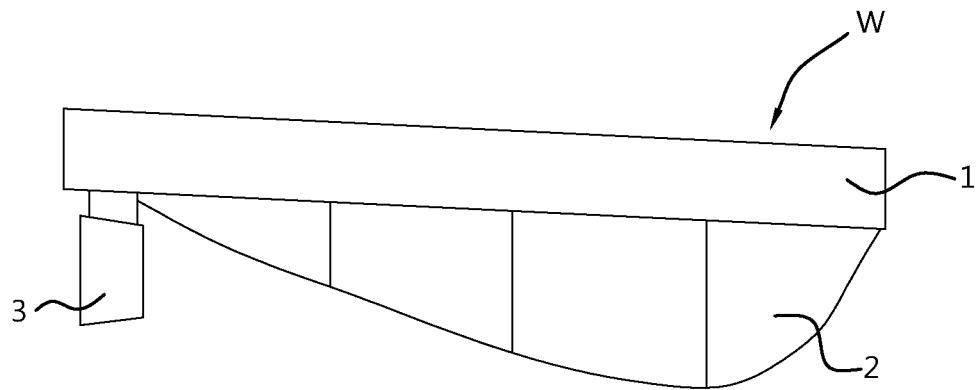


Fig. 3B

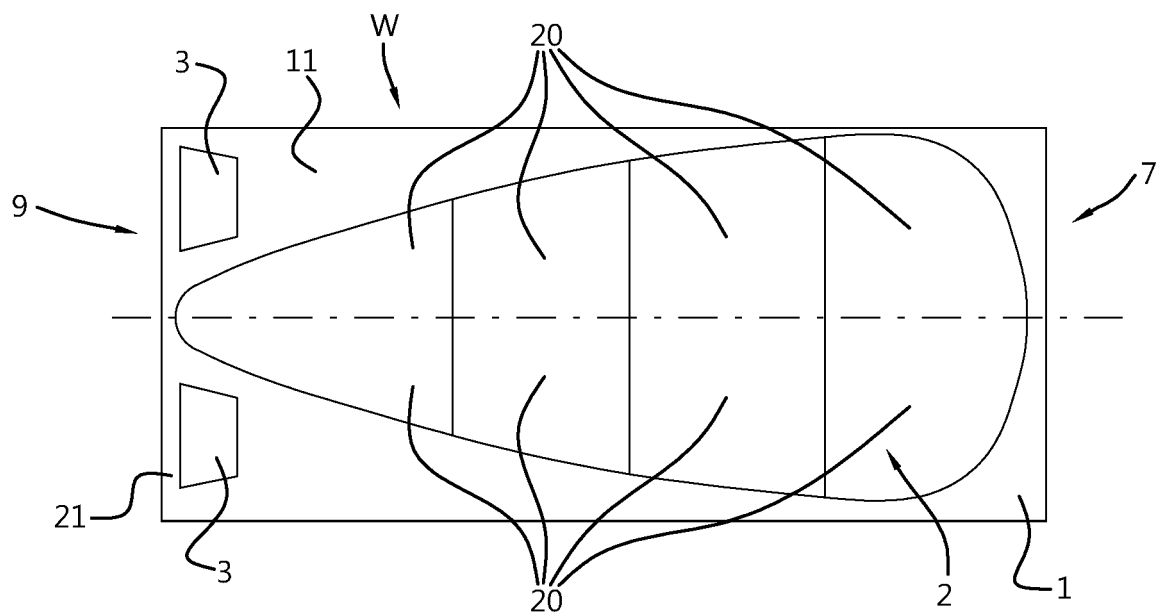


Fig. 4

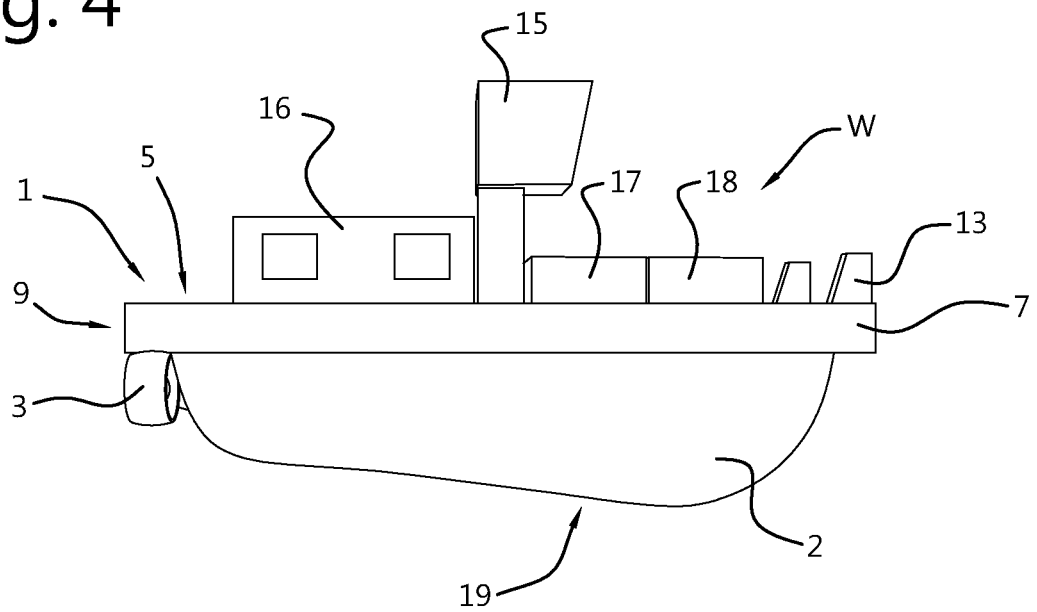


Fig. 5

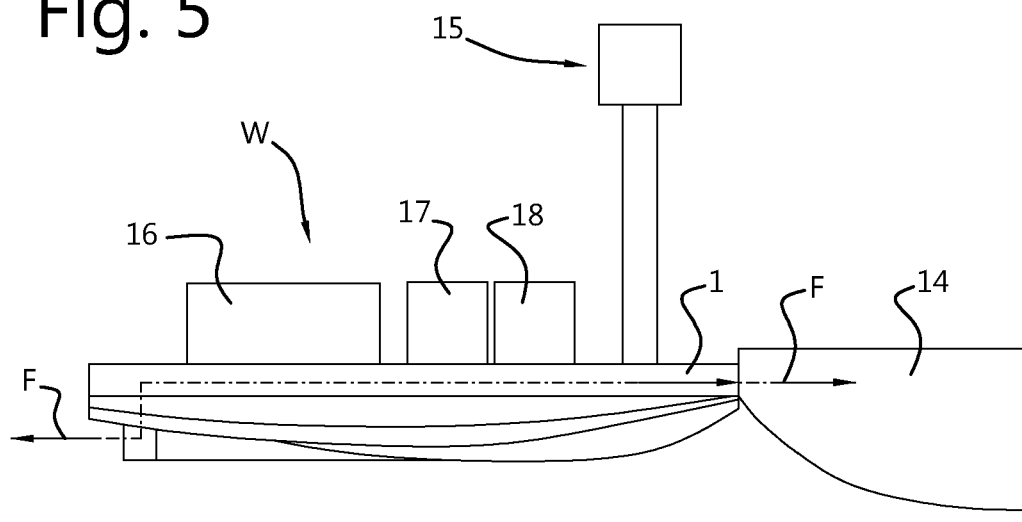


Fig. 6

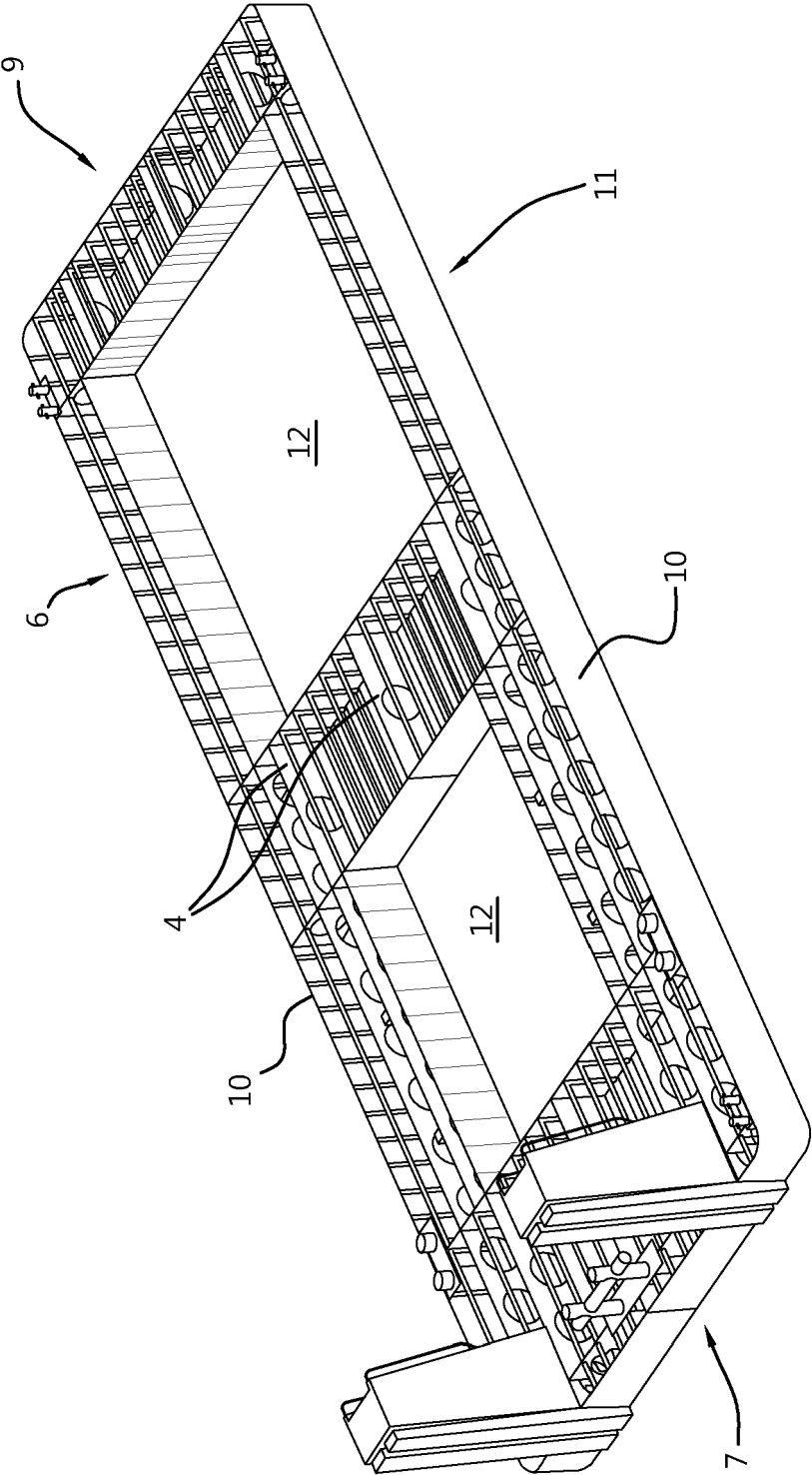


Fig. 7A

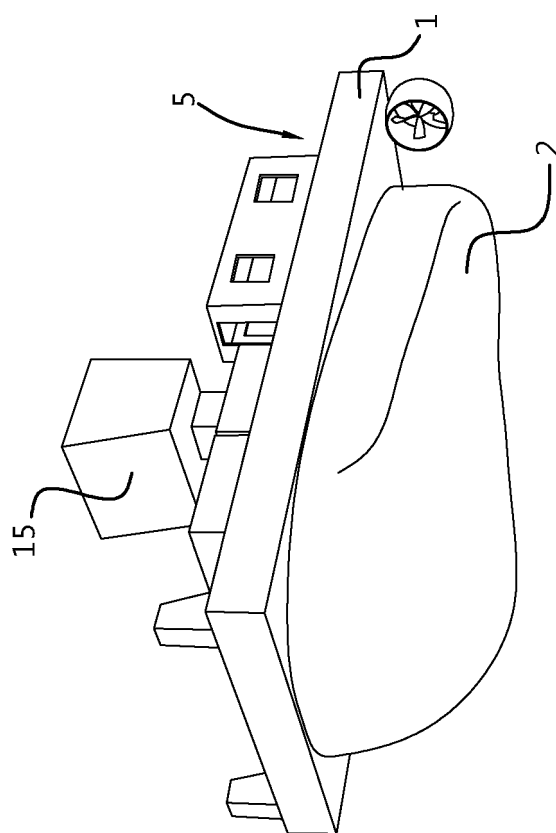


Fig. 7B

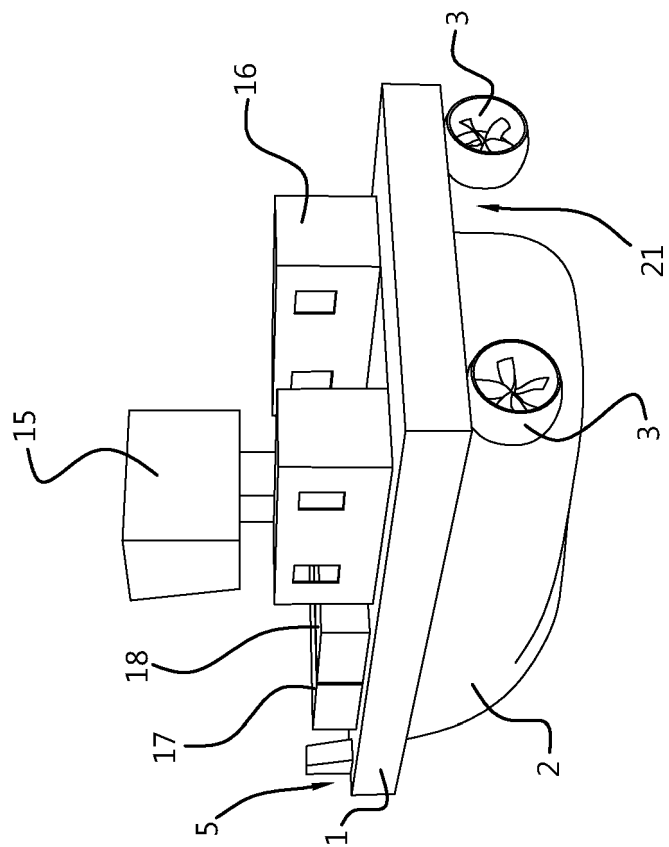


Fig. 8

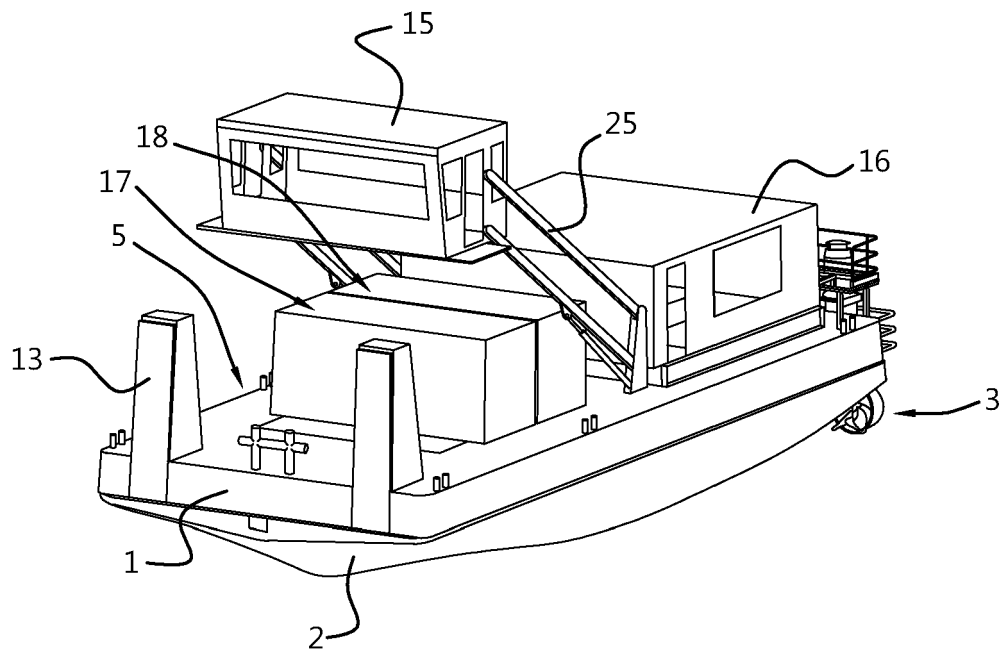
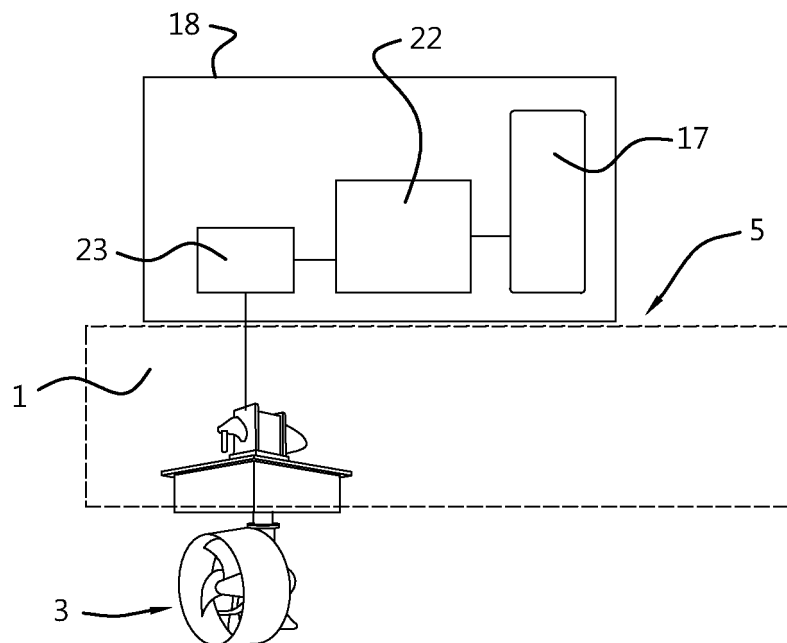


Fig. 9



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 1191710 [0002]