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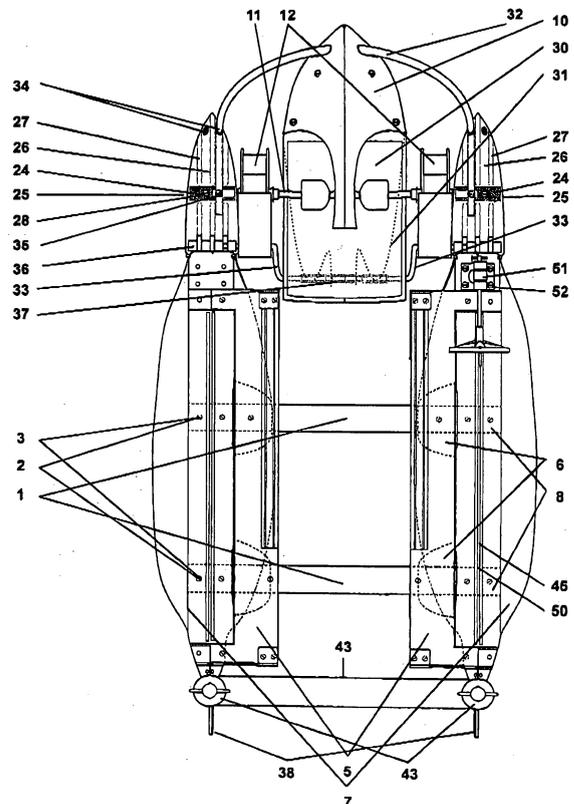
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(54) **ASSEMBLY AND COUPLING ELEMENTS FOR SINGLE- OR MULTIPLE-SEAT PEDAL-POWERED WATERCRAFT HAVING PADDLE WHEELS**

(57) Set of pieces in kit form for the quick assembly of boats, optionally propelled by pedals and paddle-wheels, configurable for one or some passengers, constituted by a basic structure with several crossbars placed transversely in relation to the direction of advance of the boat, that are secured to at least two main longitudinal floats whose number is equal to the number of passengers plus one. All the necessary elements for propulsion and control of the pedal boat and for passenger's accommodation are placed between each two adjacent floats. The basic structure previously cited gets rigidity with two longitudinal bars or plates that ends in two traverse segments each one. The longitudinal section of these longitudinal bars or plates is secured to the traverse crossbars of the boat and their respective traverse sections are fixed to one of the floats. The propulsion and control elements of the boat can be joined and assembled side by side serially in a number equal to the number of passengers of the boat.

Fig. 1



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Description

[0001] On at least two crossbars (1) of about 80 to 100 centimeters long and with a cross section rectangular or square, they are drilled several holes (2) to place fixing screws (3) for at least two longitudinal floats (7) and fixing screws (4) for two longitudinal bars or plates (5) that there are for each seat of the pedal boat to assemble. These longitudinal bars or plates (5) will support the seat and other elements for passenger's accommodation. The crossbars (1) join at least two longitudinal floats (7) passing through some holes, slots or grooves (8) of the same section that cross completely the longitudinal floats (7) transversely in relation to the direction of advance of the pedal boat, while the longitudinal bars or plates (5), parallel to the longitudinal floats (7), are fixed both to the crossbars (1) and to the longitudinal floats (7) by fixing screws (9), giving rigidity to this flotation structure and prevent its lateral deformation or folding in assembly or in navigation.

[0002] The longitudinal bars or plates (5) end in two short transverse sections or segments that contains the holes (2) for the fixing screws (3) to the longitudinal floats (7), giving to these longitudinal bars (5) a slightly shape of a letter U. These transverse sections can be inserted into grooves, slots or holes placed at the upper surface of the longitudinal floats (7) and crossing them transversely, so that once the longitudinal bars or plates (5) are placed and secured, the upper surface of the longitudinal floats (7) is all at the same level, without hollows. The transverse sections of the longitudinal bars or plates (5) are exactly long to fit exactly until the central vertical plane of symmetry of the longitudinal floats (7), so in case of the construction of a pedal boat of two or more seats the transverse sections can join together and share the longitudinal float (7) with the symmetric longitudinal bar or plate (5) of the adjacent seat.

[0003] The longitudinal floats (7) have a upper flat surface to facilitate the assembling, sliding and screwing of further pieces. They are going wider transversally toward its inferior part, finishing in a bottom surface relatively flat, that remembers a surfboard, that permits the pedal boat to slide above the water, minimizing the submerged surface of the longitudinal floats (7) and doing more easy its displacement by human power. The longitudinal floats (7) have a prow that gets narrow in relation to the main body of the float to cut better the water, to leave better enough space between them to place propulsion devices and a little front float (10), and also to compensate the additional flotation due to the cited front float (10). The longitudinal floats (7) have also a keel (49) disposed on its central vertical plane of symmetry to direct the water flow toward the rudders (38), increasing the maneuverability of the pedal boat.

[0004] In order to increase the endurance of this structure against lateral compression movements of water, it is possible to insert several chocks or supplement pieces (6) between the crossbars (1) and the longitudinal

floats (7). They can be secured with pins or screws to the crossbars (1). Each crankshaft (11) of the pedal boat threads symmetrically by their both sides two identical paddlewheels (12) until a limit (13), placed in each lateral rod (14) of the crankshaft (11), in order to separate them from the pedals a certain distance. In each crankshaft (11) these lateral rods (14) are coincident with its rotation axis and can be modified to facilitate a quick assembly and linked rotation of both paddlewheels (12) and crankshaft (11). To do that, the external parts of these rods (14) are mechanized and finished in a cross section square or polygonal (15). The central hole (16) of the paddlewheels (12) have exactly the same shape and section, what allows that both parts can rotate as a whole without joining them with pins. If it is desirable a better resistance of the paddlewheels (12) against torsion, several pins (20) can be placed into holes (19) that cross both the axis of the paddlewheels (12) and the crankshafts (11) by their lateral rods (14) to secure them firmly.

[0005] The length of all identical crankshafts (11) between the ends of their two mechanized rods (16) is the same or a little less than the separation distance between the central vertical planes of symmetry of two adjacent longitudinal floats (7), so two adjacent crankshafts (11) can be placed side by side serially. As these mechanized rods segments (15) are not cylindrical and the crankshaft (11) can not roll over them, two identical rolling pieces of cylindrical symmetry (23) (usually cylindrical in shape) for each crankshaft (11) are added. They consist in a tube with an inner hole along its symmetry axis of the same cross section that the mechanized rod segments (15), so these tubes can be threaded laterally in the crankshafts (11) and used as lateral bearings or rolling surfaces. Each rolling piece of cylindrical symmetry (23) rolls fitting perfectly into a locking piece (24), usually with a box shape, that has a cylindrical hole along its bigger axis of the same inner diameter that the rolling piece (23). These rolling and locking pieces (23) and (24) can be manufactured in a plastic material of low friction and high resistance to the same, because they have two rolling surfaces in contact.

[0006] Each terminal locking piece (24) fits in an upper slot or groove (25) that cross from side to side transversely each longitudinal float (7) near its prow, so that both ends of each stacked propulsion device (composed by a crankshaft (11), two paddlewheels (12), and the two lateral rolling (23) and locking (24) pieces) can be secured transversely in relation to the direction of advance of the boat dropping it from above, with no possibility of lateral displacements. A front sliding cover (26) for each longitudinal float (7), that slides inside guides or flanges (27), lock and secure the propulsion parts to the longitudinal floats (7) with pins or screws (28). The rolling (23) and locking (24) pieces have the same length or near than the thickness of the prow of the longitudinal float (7), but the segments of the mechanized rods (16) of the crankshafts (11) that go into the longitudinal floats (7) only have the half. This fact allows to connect side by

side serially two or more crankshafts (11) with their respective paddlewheels (12), sharing each two adjacent crankshafts (11) a rolling piece (23) and a locking piece (24), to obtain a pedal boat of two or more seats. As the rolling piece (23) can be displaced transversely and be finally lost, it has a little enlargement that limits this movement. In a single-seat pedal boat, both rolling pieces (23) are mounted with their enlargements inside the boat, and in a pedal boat of more seats, they are mounted with both enlargements alternatively inside and outside in relation to each seat.

[0007] Between each two longitudinal floats (7) it is possible to couple a front float (10) with a little prow, that gives additional flotation and protects the passenger's feet from water, waves and splashes. This front float (10) has a little depth that allows it to slide above the water and do the displacement of the boat with human power easier. It can be mounted by horizontal sliding from the front of the pedal boat, passing exactly under the plane of the crankshafts (11) and pedals, without any touch or collision with the pedals or other parts. This front float (10) has on his rear a hollow or cavity that allows on its inner space the complete roll of the pedals, crankshafts and the passenger's feet. Another realization of this front float (11) is opened to water by its rear or their sides. Instead of the cavity, it has optionally one or two symmetrical horizontal surfaces or boards that slide above the water and allows the passenger to rest his or her feet.

[0008] The front float (10) is anchored to the flotation structure with a front horizontal curved bar (32) and two rear Z-shaped bended bars (33). The front horizontal curved bar (32) is firmly joined to the front float (10) by its middle part, and their two parallel arms are bended or curved an amount of 180°, giving it a C-shaped or an U-shaped aspect. Both arms can be introduced at time by horizontal displacement of the front float (10) into two horizontal and longitudinal holes of the same section practiced or drilled on the sliding covers (26) and / or in the longitudinal floats (7). They can be fixed to both pieces with fixing screws (35).

[0009] To allow the assembly of several front floats (10) in a pedal boat of two or more seats, the sliding covers (26) have a pair of horizontal holes, symmetric in relation of its vertical plane of symmetry. The front float (10) of a seat introduces each arm into the inner hole of the sliding covers at both sides (in relation of the considered seat), and the outer one remains free for coupling other adjacent front float (10).

[0010] Once placed the front float (10) on its position and anchored with the front horizontal curved bar (32) to the longitudinal floaters (7), it must be secured with two rear Z-shaped bended bars (33) whose profile is rounded.

[0011] For that, an arm of each one of them is introduced transversely, at the side where the front float (10) is, into a transversal symmetrical tube placed or drilled over the sliding covers (26) or the longitudinal floats (7), and crossing them completely. Then, both Z. shaped

bended bars (33) can pivot inside it to introduce from the bottom its other free arm into at least a locking device placed at the rear of the front float (10). The C-shaped (32) and the Z-shaped (33) bended bars anchor the front float (10) firmly and avoids that it can be released or loosened if the passenger puts his or her feet over it.

[0012] Each longitudinal float (7) have on its stern a vertical tube (41) that supports a rudder (38) by means several washers (40) and pins (42). Each rudder (38) has an optional upper piece with the shape of an horizontal double pulley (43) that can be locked or anchored with.

[0013] The piece with double pulley (43) that have all rudders (38) is manufactured in one piece and has several hooks or rings (47) symmetrically disposed around it to tie several ropes or strings, several upper stoppers symmetrically disposed that restrict the rotation angle of the rudders to less than 180° (38). As all rudders (38) and these pieces with two parallel pulleys (43) are disposed at the same level in the pedal boat, so all of them can be tied or hooked with an horizontal common string (43) that passes guided trough all the upper or lower pulleys to make possible that all rudders (38) have the same angle at any moment for control the boat efficiently.

[0014] The pedal boat has a single little column (51) screwed with several screws (52) in a chosen longitudinal float (7) to support a lever or steering wheel (56) for control of the boat. There are two strings (45), each one placed to drag the rudders (38) in one direction. They pass through a narrow slot or groove (50) practiced longitudinally in the middle of the upper surface of the longitudinal floats (7) that protects them, and climb inside the column (51) towards the steering wheel (56). Their ends at both sides are connected by hooks, knots or rings to the piece with a double pulley (43) and to the rod (65) of the steering wheel (56) with an adaptation piece (54). The vertical column (61) has two upper aligned tubes, placed longitudinally in relation to the boat. Inside of each one can be inserted a rolling cylindrical bearing or washer (53), with a centered inner hole whose cross section is square or polygonal (not circular). Both pieces can not be dropped or released from their tubes. The steering wheel (56) has a central rod mechanized (55) with the same cross section that the inner hole of both pieces (53), so it can be plugged passing through them. By this way, the steering wheel (56) can rotate freely into the two bearings (53) and displace longitudinally along its central rod (55) to be adjusted for the passenger, with pin placed at the end of the rod (55) that avoids it to be released and lost. Between the two rolling bearings or washers (53) another cylindrical piece with spool shape (54), with the same inner hole in order to be inserted with the steering wheel's rod (55), is intercalated. This piece (54) is confined, so it can not be lost but can rotate with the steering wheel (56). It has two hooks or rings, and each end of the two strings for control of the rudders is tied or hooked in one of them, with several turns of the strings rolled previously.

[0015] When the steering wheel (56) turns, the spool (54) make the same, rolling up a string and unrolling the other, dragging by this way the rudder (38) of the same longitudinal float (7) to one side, as the other rudders (38) connected to the first one.

BRIEF DESCRIPTION OF THE FIGURES.

[0016]

Figure 1 is a top view of the basic single-seat pedal boat assembled with the parts and pieces described in the present invention.

Figure 2 is a perspective view of the basic flotation structure (floats, crossbars and rudders) of the single-seat pedal boat described in the present invention, without and with the two U-shaped longitudinal bars or plates secured in their positions above the crossbars and the floats. In the figure these longitudinal bars have two guides for a seat.

Figure 3 shows the process of assembling the propulsion group for the basic single-seat pedal boat in three steps (dropping of the stacked propulsion group, sliding of the frontal sliding covers and fixing of them with screws). The figure shows a seat mounted and confined in the guides of the two U-shaped longitudinal bars.

Figure 4 shows the schematics and the stacking order of the different pieces and parts on each arm of the crankshafts to obtain a propulsion group for each seat.

Figure 6 is a section of the connection way side by side serially of two adjacent propulsion groups, where the adjacent ends of both crankshafts share a float and the two lateral pieces disposed for allow the rotation of the group when secured and fixed on the floats.

Figure 6 is a perspective view of the assembly of pedal boats of two or more seats by repeating laterally the same structure of the basic single-seat pedal boat.

Figure 7 is a perspective view that shows the process of coupling the front float of the pedal boat in two steps (sliding their arms into the holes of the sliding covers and locking it on its position with screws or pins).

Figure 8 is a section of the vertical column that supports the movable steering wheel, showing the way that its rotation strips a string and loosen the other to move the rudder.

Figure 9 is a perspective view of the float that have the column of the steering wheel, showing the connection of the two strings with the rudder and the rudder's upper piece with two linked horizontal parallel pulleys.

Claims

1. Parts and pieces for the construction and assembly of pedal boats, constituted by at least a pair of cross-bars (perpendicular in relation to the direction of advance of the boat), with adequate length to allow them to be fixed to a number of identical floats (all of them longitudinally placed in relation to the direction of advance of the boat and symmetrical in relation to their respective vertical longitudinal planes of symmetry), equal to the number of desired passengers plus one, so that the longitudinal floats are fixed at equal distances between them completing all the length of these crossbars, and there is enough width between each two adjacent longitudinal floats to place inside all the necessary pieces, accessories and elements for passenger's accommodation and for propulsion and control of the boat, repeated as many times as seats of the pedal boat assembled.
2. Parts and pieces for the construction and assembly of pedal boats as claimed in Claim 1, where this floating structure obtains rigidity with two equal U-shaped longitudinal bars or plates for each seat, placed between each two adjacent longitudinal floats and symmetrically in relation to the vertical central plane of symmetry of these combined two adjacent longitudinal floats. They are secured to the crossbars by means of screws or pins. Each one of these longitudinal bars or plates are also fixed to the longitudinal floats with screws or pins by means of two short transverse segments or sections at their ends. The length of these transverse sections is calculated to fit exactly to the vertical central plane of symmetry of the longitudinal float, so two symmetrical adjacent longitudinal bars or plates can share a longitudinal float fitting perfectly and symmetrically between them.
3. Parts and pieces for the construction and assembly of pedal boats as claimed in Claim 2, where the crossbars and / or the longitudinal bars are fixed on or near the top surface of the longitudinal floats, inserted into transverse holes, slots or grooves that cross these longitudinal floats completely from side to side.
4. Parts and pieces for the construction and assembly of pedal boats as claimed in Claim 3, where there are a number of identical crankshafts equal to the number of seats, each one with a pair of pedals and with the same length between the ends of their arms that the separation distance between the vertical central planes of symmetry of two adjacent longitudinal floats. Two identical paddlewheels are symmetrically inserted or threaded by their centres in the rods of the ends of each crankshaft and confined in the free spaces situated between the pedals and

each longitudinal float of the pedal boat. These paddlewheels can be fixed to the crankshafts with some pins or screws that cross both of them by their rotation axis and hold them together.

5. Parts and pieces for the construction and assembly of pedal boats as claimed in Claim 4, where the crankshafts have the rod of their ends mechanized and finished in segments whose cross section is square or polygonal (not circular) and the lateral paddlewheels have a central hole with the same cross section, so that both crankshaft and paddlewheels can rotate linked with an easy assembly even if they are not secured with pins or screws.
6. Parts and pieces for the construction and assembly of pedal boats as claimed in Claim 5, where the two lateral rods of cross section square or polygonal of each crankshaft are inserted into two respective pieces of cylindrical symmetry (manufactured with a plastic material of high hardness, low friction and high resistance to friction), through a central hole that cross each one completely. This hole has the same cross section that the lateral rods of the crankshafts, and is coincident with the axis of cylindrical symmetry of the piece, so pieces and crankshaft can adjust and fit perfectly but their relative rotation is impeded. The length of such pieces of cylindrical symmetry is the same or a little less than the transverse thickness of the longitudinal float in the position of the crankshafts. The pieces of cylindrical symmetry also incorporate in one side a little enlargement of cylindrical symmetry too that avoid their lateral displacement and possible loss when the crankshaft turns.
7. Parts and pieces for the construction and assembly of pedal boats as claimed in Claim 6, where each one of the pieces of cylindrical symmetry is introduced through a cylindrical hole (of the same inner diameter than the external diameter of the piece of cylindrical symmetry cited), practiced or drilled in another piece of square or rectangular cross section (not cylindrical), crossing it completely according to its principal axis, being the length of this piece the same or a little smaller than the transverse thickness of the longitudinal floats in the fixing position of the crankshafts. By that, such pieces can fit into holes, slots or grooves, practiced in the front superior part of the floats, that fix them and impede their displacement or possible loss in longitudinal and traverse directions but allow their introduction from above. As the pieces of cylindrical symmetry roll inside the other ones, both of them can be manufactured with a plastic material of high hardness that provides a low friction and a high resistance to the friction.
8. Parts and pieces for the construction and assembly

of pedal boats as claimed in Claim 7, where each propulsion group (composed by a crankshaft, two paddlewheels, and two pieces of both cross sections cylindrical and square or rectangular) is mounted and their ends are introduced in respective holes, slots or grooves practiced in the front superior part of each longitudinal float, and locked with two sliding covers that hold them and impede their extraction or loss from the top. These sliding covers slide into lashes or guides practiced in the longitudinal floats and can be secured with almost a pin or screw each one.

9. Parts and pieces for the construction and assembly of pedal boats as claimed in Claim 8, where all propulsion groups of the pedal boat cited in the previous claim are connected side by side serially, allowing their rotation as a whole. To do that each pair of adjacent propulsion groups share one of the rolling pieces of cylindrical symmetry and one of the pieces of square or rectangular section with the exception of the ends of the series, that obviously do not share them with another adjacent crankshaft. So that it is possible to mount the crankshafts and their pedals all in the same plane or alternating with a 90° separation.
10. Parts and pieces for the construction and assembly of pedal boats as claimed in Claim 9, where each longitudinal float has a rudder on its stern, fixed on a vertical rotation axis with a tube and a pin or screw, so that rudder has an upper piece (optionally with the shape of two horizontal parallel pulleys with several hooks or rings), whose function is to connect all the rudders of the pedal boat with strings or ropes and synchronize them in direction and rotation.
11. Parts and pieces for the construction and assembly of pedal boats as claimed in Claim 10, where each longitudinal float has a few holes practiced on its upper surface, between the crossbars and the front sliding covers, so that allows to fix with screws a single vertical column on the top of a chosen longitudinal float of the pedal boat to support and to allow to rotate, inside two upper tubes placed in the direction of advance of the boat), a lever or a steering wheel for the control of the boat.
12. Parts and pieces for the construction and assembly of pedal boats as claimed in Claim 11, where there are a lever or steering wheel linked to a rod whose cross section is square or polygonal, that can turn and displace longitudinally in relation to the boat inside the two consecutive and aligned tubes disposed at the top of the vertical column, passing through and dragging on its turn two cylindrical bearings with an inner hole whose cross section is the same than the steering wheel's rod one. Between these two bearings, that can roll inserted into the upper tubes of the

column freely, there is a spool of cylindrical symmetry, with an inner hole of the same cross section than the one of the bearings, and two rings or hooks to tie strings. When the steering wheel is plugged into the bearings and the central spool, its turn drags the spool to the same side, so it tightens up the string tied to one of the rings or hooks and loosens the other.

13. Parts and pieces for the construction and assembly of a pedal boat as is claimed in Claim 12, where the strings for the control of the rudder pass protected inside of the vertical column that supports the lever or steering wheel, as well as through guides, tubes and flanges practiced in the longitudinal floats, and they end beside or near the piece of the rudder with a double pulley placed at the stern of the same float. These strings are tied to this piece or to the rudder by using knots, rings or hooks.
14. Parts and pieces for the construction and assembly of a pedal boat as is claimed in Claim 13, where it is possible to couple, between each pair of adjacent longitudinal floats and in the space between the pedals and the paddlewheels coupled to the crankshaft, a little front float of little depth with a prow, that slides above the surface of water, gives additional flotation, and protects the passenger against waves and splashes. This front float can be mounted by horizontal displacement from the front of the pedal boat, sliding it exactly under the axis of the crankshaft without trip or collision.
15. Parts and pieces for the construction and assembly of a pedal boat as is claimed in Claim 14, where each front float is fixed between each pair of adjacent longitudinal floats with a long curved bar whose arms are curved an amount of 180°, (C-shaped, U-shaped or similar), so each one of these arms can be introduced, slide into and stop in a hole of the same cross-section practiced or drilled, in the direction of advance of the boat, in the sliding covers placed on top of both two adjacent longitudinal floats placed at both sides of the front float considered and / or in these same longitudinal floats.
16. Parts and pieces for the construction and assembly of a pedal boat as is claimed in Claim 15, where where the rear of the front float is fixed with two Z-shaped bended bars of cylindrical cross section, placed at both sides and symmetrically in relation to the longitudinal vertical plane of symmetry of each pair of adjacent longitudinal floats. One of the arms or extremities of each Z-shaped bar is introduced into a tubular receptacle practiced or drilled (transversally in relation to the direction of advance of the boat) in each sliding cover, inside of which this Z-shaped bar can turn to introduce and secure the other free arm into one or many slots, grooves or other

locking devices practiced in the rear of the front float to anchor it to the flotation structure of the pedal boat.

17. Parts and pieces for the construction and assembly of a pedal boat as is claimed in Claim 16, where the front float has on its rear an inner hollow or cavity of approximately cylindrical symmetry, placed horizontally perpendicularly in relation to the direction of advance of the boat and opened for the top, that allows the free rotation of the crankshaft, pedals and the passenger's feet inside it without any trip or collision.
18. Parts and pieces for the construction and assembly of a pedal boat as is claimed in Claim 16, where at least one of the front floats is opened for their sides so the passenger's feet gets inside water, and optionally has one or two symmetrical horizontal flat surfaces that slip or skate above the water so that the passenger can support the feet on it or them to rest.

Fig. 1

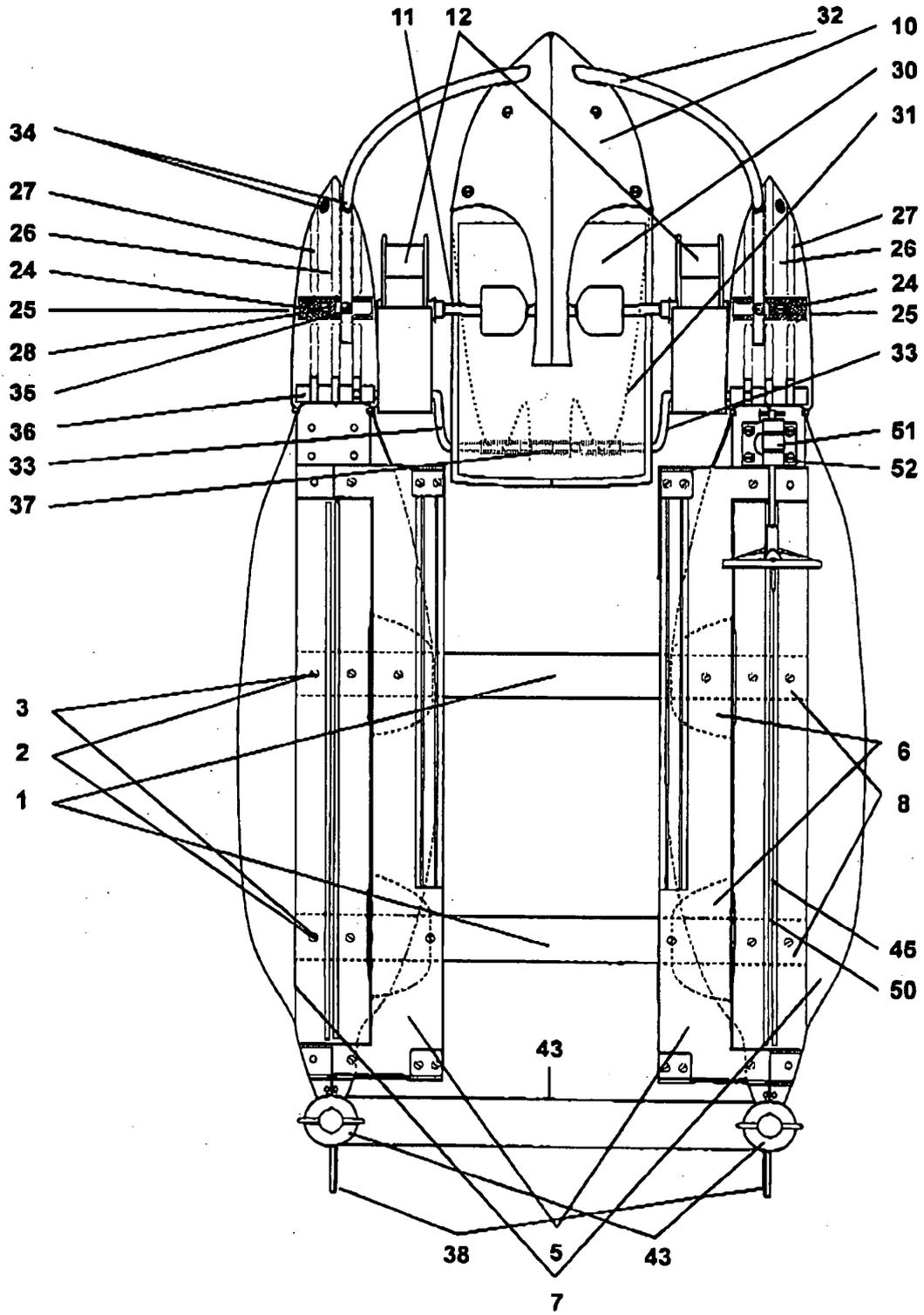


Fig. 2

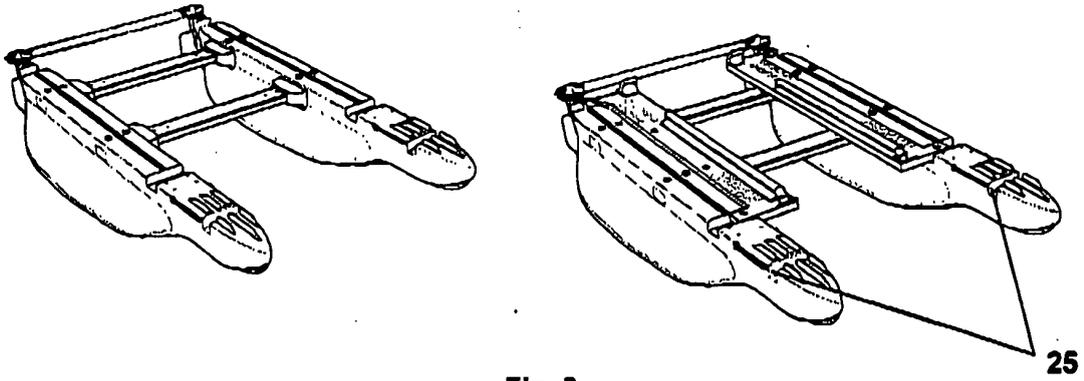


Fig. 3

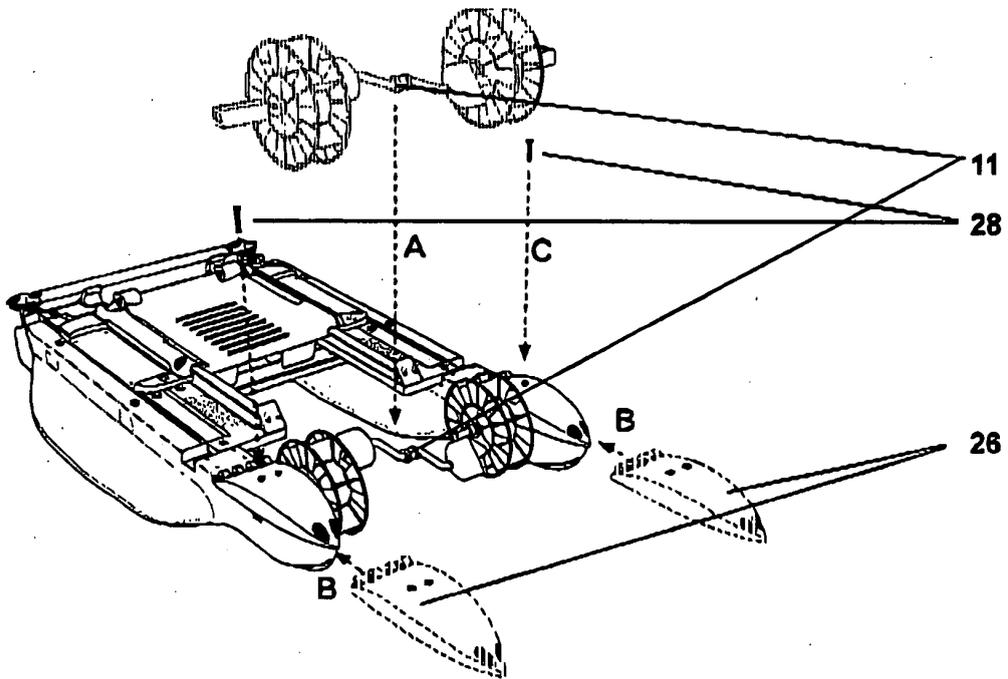


Fig. 4

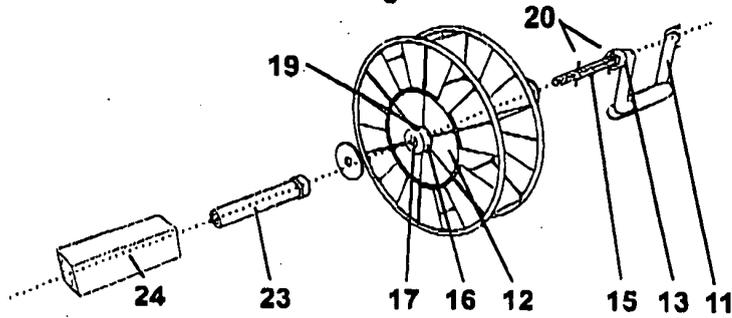


Fig. 5

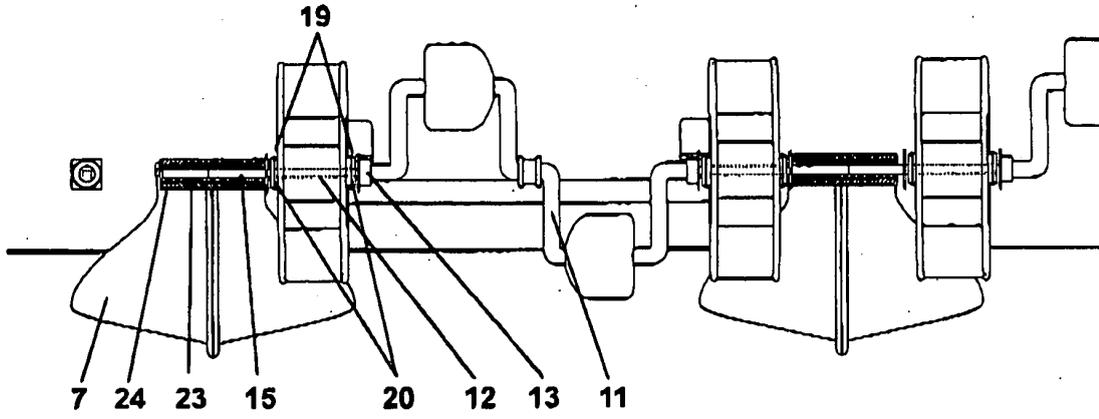


Fig. 6

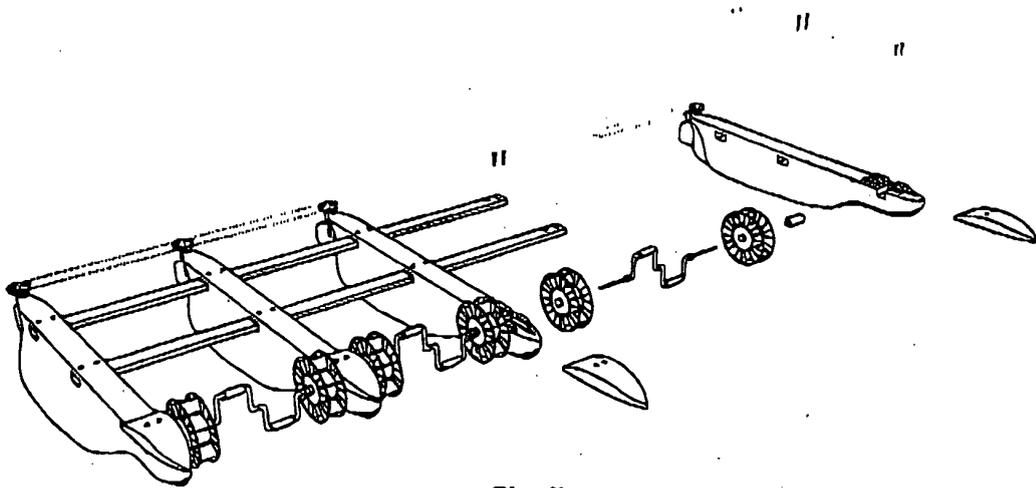


Fig. 7

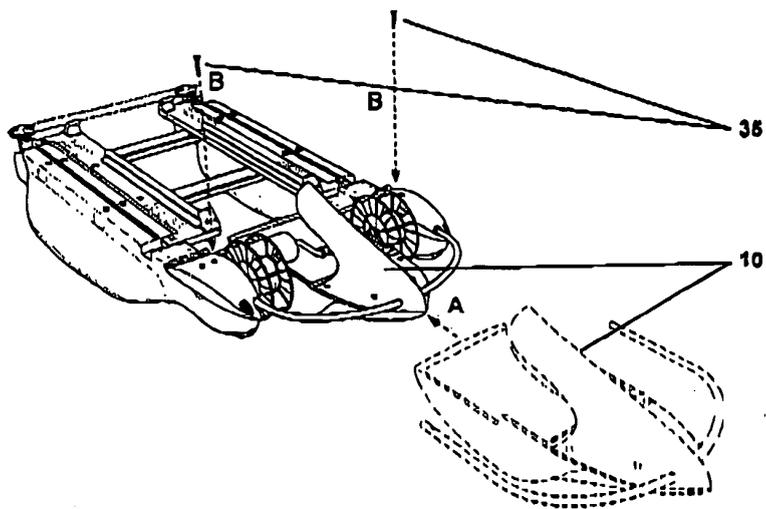


Fig. 8

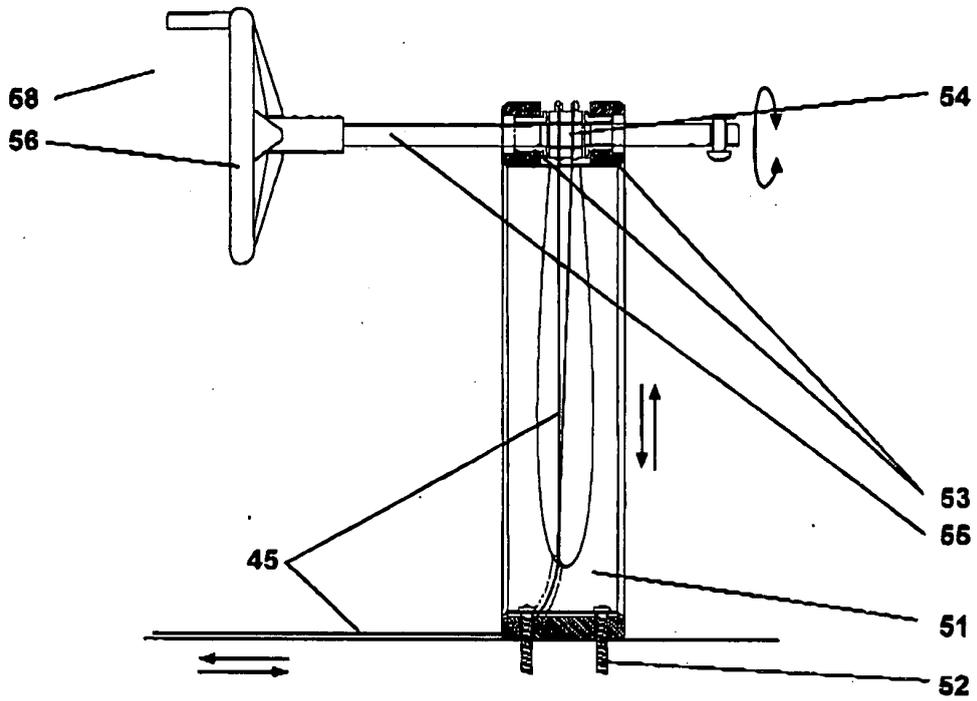
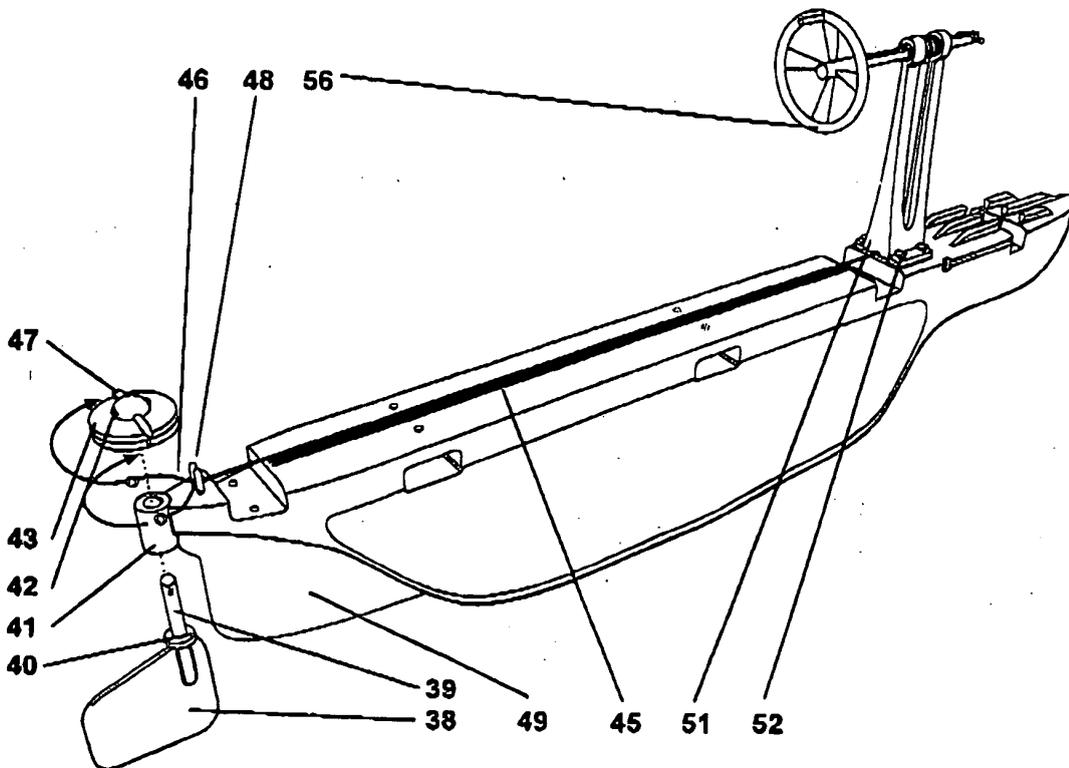


Fig. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES 2007/000471

A. CLASSIFICATION OF SUBJECT MATTER

see extra sheet

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+, B63H+

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)

CIBEPAT, EPODOC, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2287706 A (PERRY et al.) 23.06.1942, column 1, line 24 - column 2, line 18; figures.	1
X	FR 1544093 A (OMNIUM COMMERCIAL ET IND MEDIT) 23.09.1968, page 2, lines 19-29; figure 1.	1
X	GB 1441399 A (COX H C) 30.06.1976, page 1, lines 49-54; figure 2.	1
X	US 2004035344 A1 (METZGER et al.) 26.02.2004, paragraph [20]; figure 7.	1

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:	"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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"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)	"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
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Date of the actual completion of the international search

03.December.2007 (03.12.2007)

Date of mailing of the international search report

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EP 2 070 814 A1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/ES 2007/000471

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
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