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(54) **Title:** MOVABLE PLATFORM ASSEMBLY FOR A BOAT, PARTICULARLY FOR HAULING OR LAUNCHING TENDERS OR THE LIKE

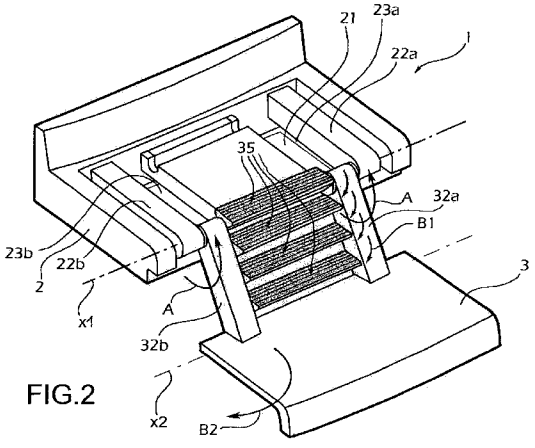


FIG.2

(57) **Abstract:** A movable platform assembly (1) comprises a base portion (2), able to be fixed to a support structure, and at least one pivotable arm (32a, 32b) hinged at one end with the base portion (2), about a first hinging axis (xl), and at the other end with a loading platform (3), about a second hinging axis (x2), the pivotable arm (32a, 32b) being able to be rotated by means of actuating devices (50, 60, Ul, U2, Sl, S2, S3), which are designed to allow the platform (3) to maintain a constant inclination with respect to the base portion (2) during rotation of the pivotable arm (32a, 32b). The actuating devices comprise a first and a second rotary actuator mounted on the first and second hinging axis, respectively. The first rotary actuator (50) comprises a first part (51) fastened to the base portion (2) and a second part (52) rotatable with respect to the first part (51) and fastened to the pivotable arm (32a, 32b), and the second rotary actuator (60) comprising a first part (61) fastened to the loading platform (3) and a second part (62) rotatable with respect to the first part (61) and fastened to the pivotable arm (32a, 32b), said actuating devices also comprising control devices (Ul, U2, Sl, S2, S3) able to control in a co-ordinated manner rotation of said first and second rotary actuators.

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MOVABLE PLATFORM ASSEMBLY FOR A BOAT, PARTICULARLY FOR HAULING OR LAUNCHING TENDERS OR THE LIKE

The present invention relates to a movable platform assembly, of the type comprising a base portion able to be fixed to a support structure and at least one pivotable arm hinged at one end with said base portion, about a first hinging axis, and at the other end, with a loading platform, about a second hinging axis, said at least one pivotable arm being able to be rotated via actuating means which are designed to allow said platform to maintain a constant inclination with respect to said base portion during rotation of said at least one pivotable arm.

A platform assembly of this type, which is specifically applied to a boat, is known from the international application WO 03/106254 A1 in the name of the same Applicant.

In this platform assembly, the movement of the pivotable arm(s) is obtained by means of chain-type transmission means, there being also envisaged additional chain-type transmission means which ensure the parallel alignment of the loading platform and the base portion.

Although this solution has proved to be particularly effective, the Applicant has investigated new solutions for moving the loading platform which are optimum also from the point of view of the compactness of the entire actuating system.

The invention therefore relates to a movable platform assembly of the type defined in the introduction, in which said actuating means comprise a first and a second rotary actuator mounted on said first and second hinging axes, respectively, in which the first rotary actuator comprises a first part fastened to the base portion and a second part rotatable with respect to the first part and fastened to the pivotable arm, and in which the second rotary actuator comprises a first part fastened to the loading platform and a second part rotatable with respect to the first part and fastened to the pivotable arm, said actuating means also comprising control means able to control in a co-ordinated manner rotation of said first and second rotary actuators.

Preferred embodiments are described in the dependent claims.

Further objects and advantages of the invention will become clearer from the following detailed description of a preferred, but non-limiting embodiment of the invention, provided with reference to the accompanying drawings in which:

- Figure 1 is a perspective view of a platform assembly according to the present invention, shown in a first operative position;
- Figure 2 is a perspective view of the platform assembly according to Fig. 1 in a second operative position;
- Figure 3 is a perspective view of a structure of the platform assembly of Fig. 1 in the second operative position;
- Figure 4 is a top plan view of the structure according to Fig. 3 in the first operative position;
- Figures 5 and 6 are a schematic side elevation view and schematic plan view, respectively, of the platform assembly according to the present invention; and
- Figure 7 is a schematic view of the platform assembly for illustrating operation thereof according to the present invention.

With reference to Figure 1 this shows a platform assembly 1 according to the invention, intended to be mounted on a support structure, for example, but not exclusively, on the stern portion of a boat. The platform assembly 1 comprises a base 2 with which a movable platform 3, shown in Fig. 1 in a closed position, is hinged. The base 2 may be provided with means (not shown) for allowing fixing of the assembly 1 to the support structure, or, in an alternative embodiment, may be incorporated in the support structure itself.

With reference to Fig. 2, the platform assembly 1 is shown in the fully open position. The base 2 of this assembly has a recess 21 intended to receive the movable platform 3. The recess 21 is formed so that the platform 3 in the closed position fits completely inside the overall form of the base 2, as shown in Fig. 1, resulting in the upper surface of the loading platform 3 being flush with the upper surface of the base 2. The recess 21 also houses a pair of fixed arms 22a, 22b.

As can be seen more clearly from Fig. 3, the fixed arms 22a, 22b are provided with respective

fixing plates 23a, 23b which allow mounting thereof on the base 2 by means of conventional connection means, such as bolts for example. Respective swing arms 32a, 32b are hinged on the distal ends of the fixed arms 22a, 22b and are able to perform a rotation in a plane which is vertical (indicated by the arrow A in the figures), i.e. perpendicular to the general plane of the base 2 of the platform assembly 1. The axis for hinging of the swing arms 32a, 32b with respect to the fixed arms 22a, 22b is indicated by x1 in the figures. The swing arms 32a, 32b form with a plurality of surfaces 35 connected to them a ladder which can be oriented in a vertical plane. Each surface or step 35 is able to perform a relative rotation with respect to the swing arms 32a, 32b about its longitudinal axis (indicated by the arrows B1 in the figures). The step 35a closest to the base 2 of the platform assembly 1 is fastened to this base by means of a pair of brackets 36a, 36b which are fixed on one side to the ends of the step 35a and on the other side to the base 2 itself.

A pair of support feet 38a, 38b are hinged with the distal ends of the swing arms 32a, 32b. Their hinging axis is indicated by x2 in the figures. The support feet 38a, 38b are able to perform a relative rotation (namely that indicated by the arrows B2) with respect to the swing arms 32a, 32b in the vertical plane until they assume an arrangement folded back along these arms 32a, 32b in the closed position shown in Fig. 4. The support feet 38a, 38b allow mounting of the movable platform 3, as shown in Fig. 2.

The diagram shown in Figs. 5 and 6 illustrates more clearly operation of the platform assembly according to the invention. This diagram shows the platform assembly 1. A first rotary actuator 50 is mounted coaxially with the axis x1 of hinging between of the fixed arms 22a and 22b and the swing arms 32a, 32b, while a second rotary actuator 60 is mounted coaxially with the axis x2 of hinging between the swing arms 32a, 32b and the support feet 38a, 38b. In the example shown the rotary actuators 50, 60 are formed as dual actuators (only half of which can be seen in Figure 6) since they are envisaged for the movement of the two swing arms 32a, 32b and the two support feet 38a, 38b. These actuators are, for example, hydraulic actuators of the compact type, in particular of the type comprising a piston, the axial movement of which is converted into a rotary movement of a shaft.

The first dual rotary actuator 50 comprises a first part 51 fastened to the fixed arms 22a, 22b, and hence to the base 2, and a second part 52 which is rotatable with respect to the first part and fastened to the pivotable arms 32a, 32b. The first part 51 of the first rotary actuator 50 may consist of the two end shafts of the dual rotary actuator which are fixed respectively to the two fixed arms 22a, 22b. The second rotary actuator 60 comprises a first part 61 fastened to the support feet 38a, 38b, and hence to the loading platform 3, and a second part 62 which is rotatable with respect to the first part and fastened to the pivotable arms 32a, 32b. The first part 61 of the second rotary actuator 60 may consist of the two end shafts of the dual rotary actuator which are fixed to the two support feet 38a, 38b of the platform 3, respectively.

The movement of the two dual actuators 50 and 60 is performed by means of a hydraulic control unit, denoted by U1 in Figure 7, which supplies liquid, for example oil, to these actuators.

With reference to Figure 7, the actuating system also comprises an electronic control unit U2 which uses signals provided by sensors S1, S2, S3 to perform in a co-ordinated manner rotation of the first and second rotary actuators 50, 60. In particular, these sensors are absolute inclination sensors and comprise a reference sensor S1 fixed to the base 2 of the platform assembly and therefore to the support structure B, a movement sensor S3 fixed to the swing arm(s) 32a and 32b and an alignment sensor S3, fixed to the platform 3. The reference sensor S1 is able to provide the control unit U2 with a reference inclination signal indicating the inclination of the base 2 of the platform assembly. The movement sensor S2 is able to provide the control unit U2 with a movement inclination signal indicating the inclination of the swing arm(s) 32a, 32b. The reference sensor S3 is able to provide the control unit U2 with an alignment inclination signal indicating the inclination of the platform 3 of the platform assembly.

The control unit U2 is programmed to compare with each other the values of the reference signal and the alignment signal. If, during movement of the assembly, this control unit detects that these values differ by more than a certain tolerance, it intervenes, causing the hydraulic control unit U1 to vary distribution of the control liquid supplied to the two dual

actuators 50, 60. In this way, during the whole of the movement of the swing arms 32a, 32b, it is ensured that the loading platform 3 maintains a constant orientation with respect to the base 2. Preferably, the control unit U1 is also programmed to compare with each other the values of the reference signal and the movement signal, so as to be able to determine the angle of rotation of the swing arms with respect to the base 2. This feature may have several regulating and/or safety functions. For example, by equipping the control unit with an interface with allows a user to set the desired angle of rotation with respect to the closed position, it is possible to program the control unit so that it stops the supply of liquid to the actuators when this desired angle is reached. It is also possible to program the control unit to activate an alarm signal or, in case of a movable support structure such as a boat, to prevent starting of the movable structure if it detects that the angle of movement is changing while someone is attempting to start the movable structure.

With the platform assembly according to the invention it is possible to obtain a rotation of the swing arms 32a, 32b with a maximum angle of about 240° and more, from the closed position, where these arms 32a, 32b are completely extended on the base 2 of the platform assembly 1, into the maximum open position allowed by the particular arrangement of the hinging axis x1 of the swing arms 32a, 32b.

Inside the pivotable arms 32a, 32b, which are constructed with a box-like form, there is provided an alignment unit which is able to keep the orientation of the steps 35 unvaried with respect to the base 2 during rotation of the pivotable arms. For this purpose, each step 35 (as shown in Fig. 5) is fastened to a respective pair of end pulleys 65. The pulleys 65 and the associated steps 35 are pivotably mounted on the pivotable arms 32a, 32b so as to have an axis of rotation which is parallel to the axis x. The step 35a closest to the base 2 is fastened to the respective pulleys 65a which are keyed onto the first part 51 of the first dual rotary actuator 50 fastened to the fixed arms 22a, 22b. In this way the step 35a remains immobile when the pivotable arms 32a, 32b rotate. An alignment chain 68 is wound around the pulleys 65 and 65a so as to allow rotation of all the pulleys in the same sense.
Upper and lower tensioning devices 69a, 69b are also envisaged, these devices allowing the winding angle of the chain 68 on the pulleys 65, 65a to be increased and its tension to be kept

constant.

The system for achieving alignment of the steps 35, however, must not be regarded as being limited to the example described hitherto, it being possible to envisage for this purpose other means which may occur to a person skilled in the art, for example lever systems.

In case the invention is applied to a boat, by lowering the platform 3 so as to reach the fully open position of the swing arms 32a, 32b, it is possible to immerse this platform 3 underneath the surface of the water, allowing hauling out and launching of a tender or similar type of marine vehicle equipping the boat, while the steps 35 allow access for persons swimming in the water. It is also possible to vary the position of the platform 3 so as to reach decks of varying heights, while the fact that this platform 3 and the steps 35 remain in any case horizontal allows easy access from and onto the boat. Moreover, the fact that the platform 3 remains horizontal also during its entire movement allows easy access also for persons who have problems walking as well as the loading of bulky objects.

Anyway, the invention is not limited to such kind of application but, as can be easily understood, it may be used in any technical field, when the transport of loads between different height levels is required, while keeping constant the attitude of the transported load.

CLAIMS

1. Movable platform assembly (1), comprising a base portion (2), able to be fixed to a support structure, and at least one pivotable arm (32a, 32b) hinged at one end with said base portion (2), about a first hinging axis (x1), and at the other end with a loading platform (3), about a second hinging axis (x2), said at least one pivotable arm (32a, 32b) being able to be rotated by means of actuating means (50, 60, U1, U2, S1, S2, S3), which are designed to allow said platform (3) to maintain a constant inclination with respect to said base portion (2) during rotation of said at least one pivotable arm (32a, 32b), characterized in that said actuating means comprise a first and a second rotary actuator (50, 60) mounted on said first and second hinging axis, respectively, the first rotary actuator (50) comprising a first part (51) fastened to the base portion (2) and a second part (52) rotatable with respect to the first part and fastened to the pivotable arm (32a, 32b), and the second rotary actuator (60) comprising a first part (61) fastened to the loading platform (3) and a second part (62) rotatable with respect to the first part and fastened to the pivotable arm (32a, 32b), said actuating means also comprising control means (U2, S1, S3) able to control in a co-ordinated manner rotation of said first and second rotary actuators.

2. Platform assembly according to Claim 1, in which said control means comprise a reference inclination sensor (S1) fixed to the base portion (2) and able to provide a reference inclination signal indicating the inclination of the base portion (2), an alignment inclination sensor (S3) able to provide an alignment inclination signal indicating the inclination of the platform (3), and a control unit (U1, U2) programmed to compare with each other the values of the reference signal and the alignment signal and perform rotation of said first and second rotary actuators depending on said comparison.

3. Platform assembly according to Claim 2, in which said control means also comprise a movement inclination sensor (S3) fixed to the swing arm (32a, 32b) and able to provide the control unit (U2) with a movement inclination signal indicating the inclination of the swing arm (32a, 32b), said control unit being programmed to compare with each other the values of the reference signal and the movement signal, so as to be able to determine the angle of

rotation of the swing arm with respect to the base portion (2).

4. Platform assembly according to one of Claims 1 to 3, in which said at least one pivotable arm (32a, 32b) is formed as a pair of parallel pivotable arms and said first and second rotary actuators are formed as dual rotary actuators, the respective first parts of which are formed as end shafts which are respectively fixed to the base portion and to the loading platform.

5. Platform assembly according to one of the preceding claims, in which said at least one pivotable arm (32a, 32b) is provided with a plurality of step elements (35, 35a) which are mounted along the length of the latter and are designed to allow easier access for persons to the platform (3).

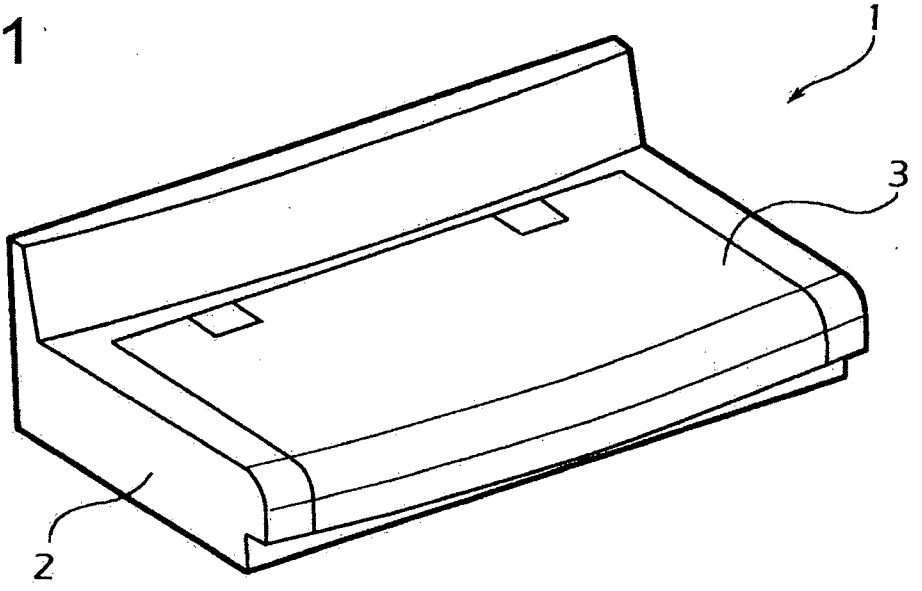
6. Platform assembly according to Claim 5, also comprising alignment means (68) which connect the first part (51) of the first rotary actuator (50) to a plurality of transmission members (65) which are respectively fastened to said step elements (35, 35a) and are rotatable about axes parallel to the first hinging axis (x1) so as to allow said plurality of step elements (35, 35a) to maintain in a constant manner substantially the same inclination of said platform (3) during rotation of said at least one pivotable arm (32a, 32b).

7. Platform assembly according to Claim 6, in which said transmission members (65) are respectively formed as pulley elements, each fastened to the respective step element (35), said alignment means being configured as a chain which connects the pulley elements (65) of the step elements (35) to the first part (51) of the first rotary actuator (50) so that these pulley elements are able to rotate in the same sense with respect to the pivotable arm (32a, 32b).

8. Platform assembly according to Claim 5, also comprising alignment means formed by a system of levers which connect together said step elements (35, 35a) so as to allow said plurality of step elements (35, 35a) to maintain in a substantially constant manner the same inclination of said platform (3) during rotation of said at least one pivotable arm (32a, 32b).

9. Platform assembly according to one of the preceding claims, in which said support structure is a boat (B).

FIG.1



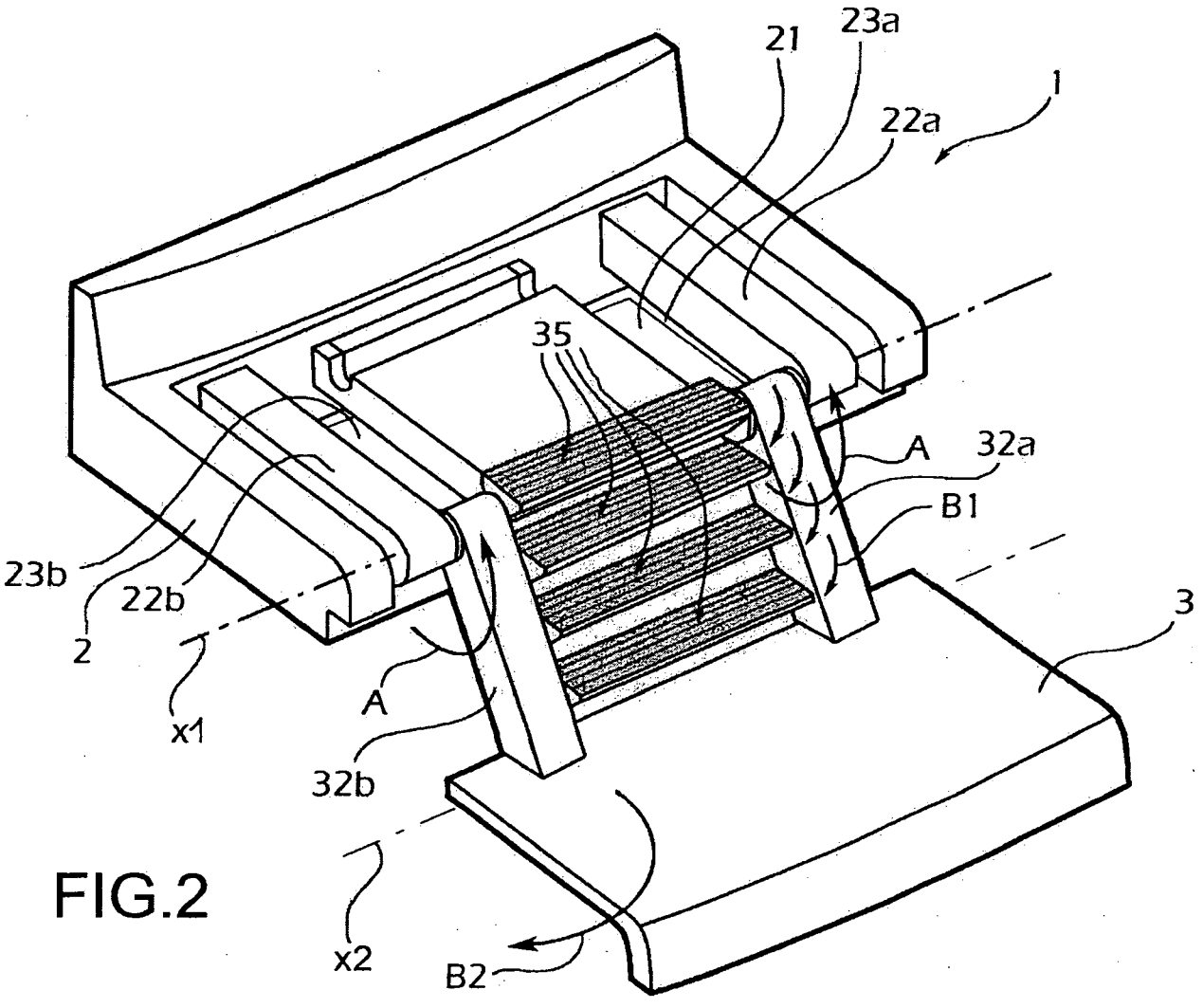
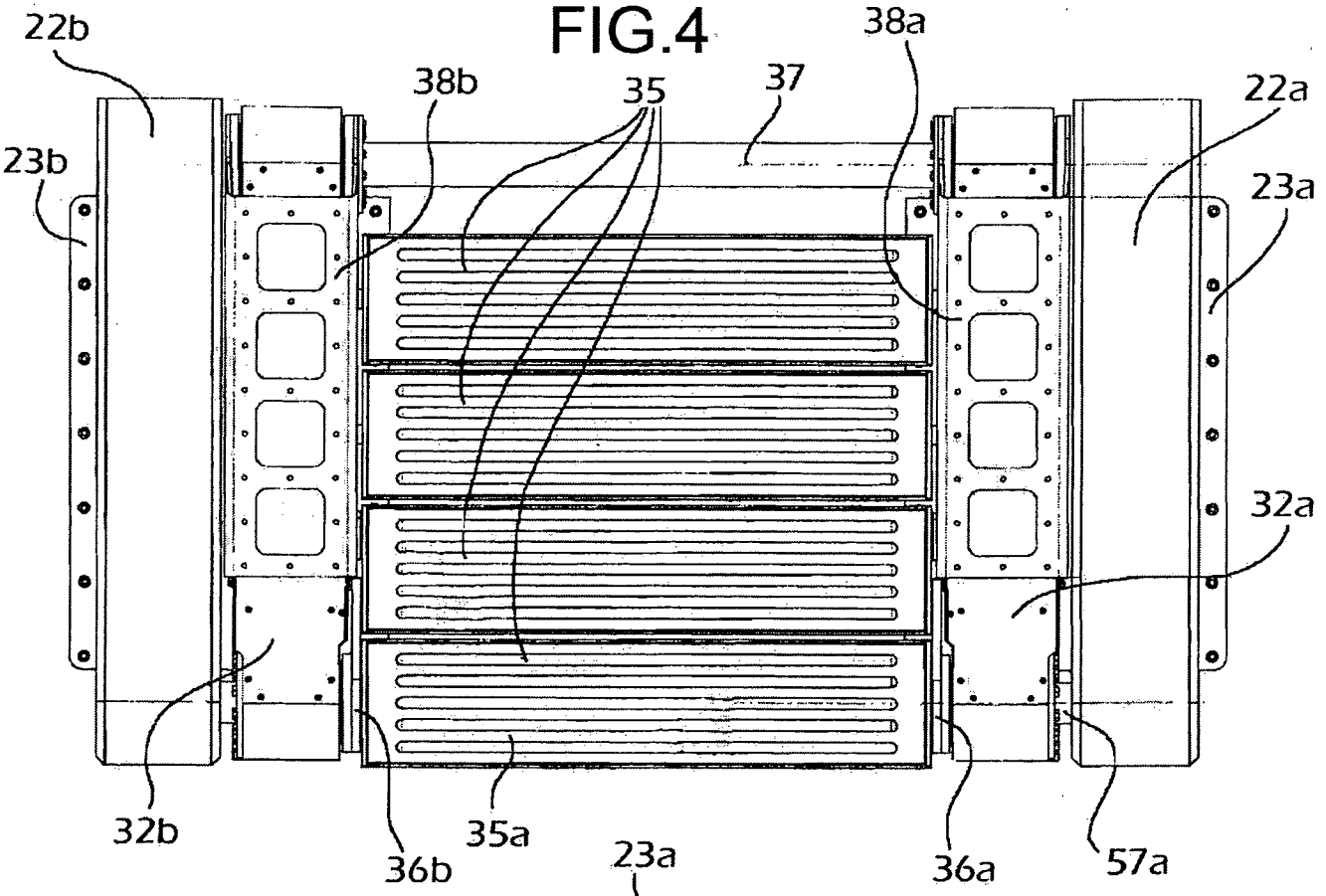


FIG.2

FIG.4


22b
38b
35
37
38a
22a
23b
23a
32a
32b
36b
35a
36a
57a

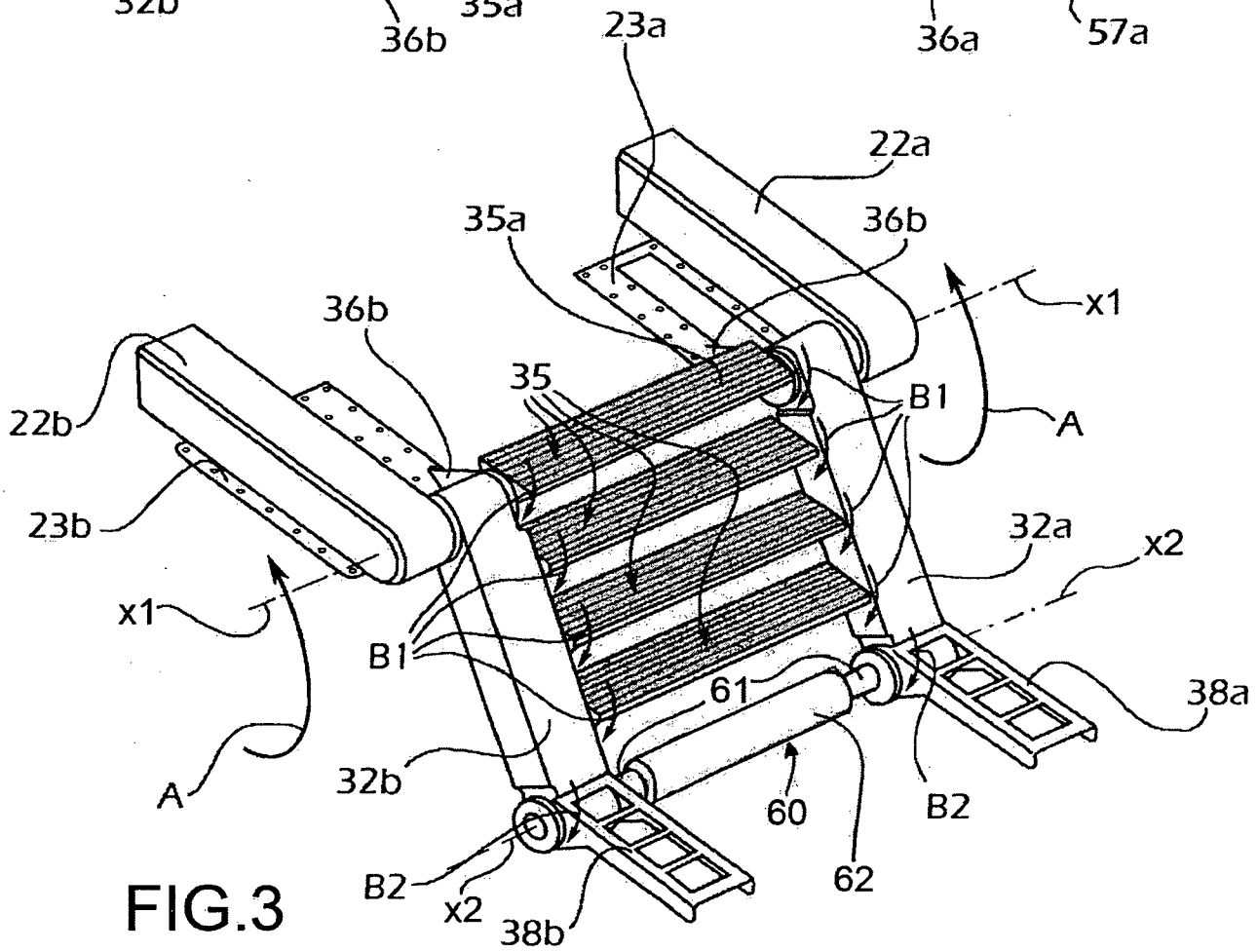

23a
22a
35a
36b
36b
x1
35
B1
22b
A
23b
32a
x2
x1
B1
61
38a
32b
A
60
B2
B2
62
x2
38b

FIG.3

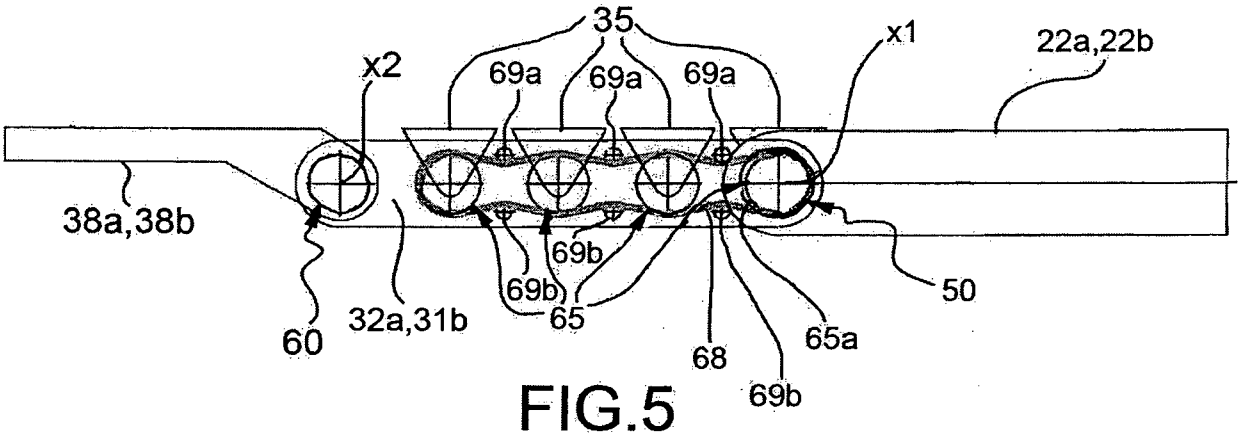

35
x1
22a,22b
x2
69a
69a
69a
38a,38b
69b
69b
50
60
32a,31b
65
65a
68
69b

FIG.5

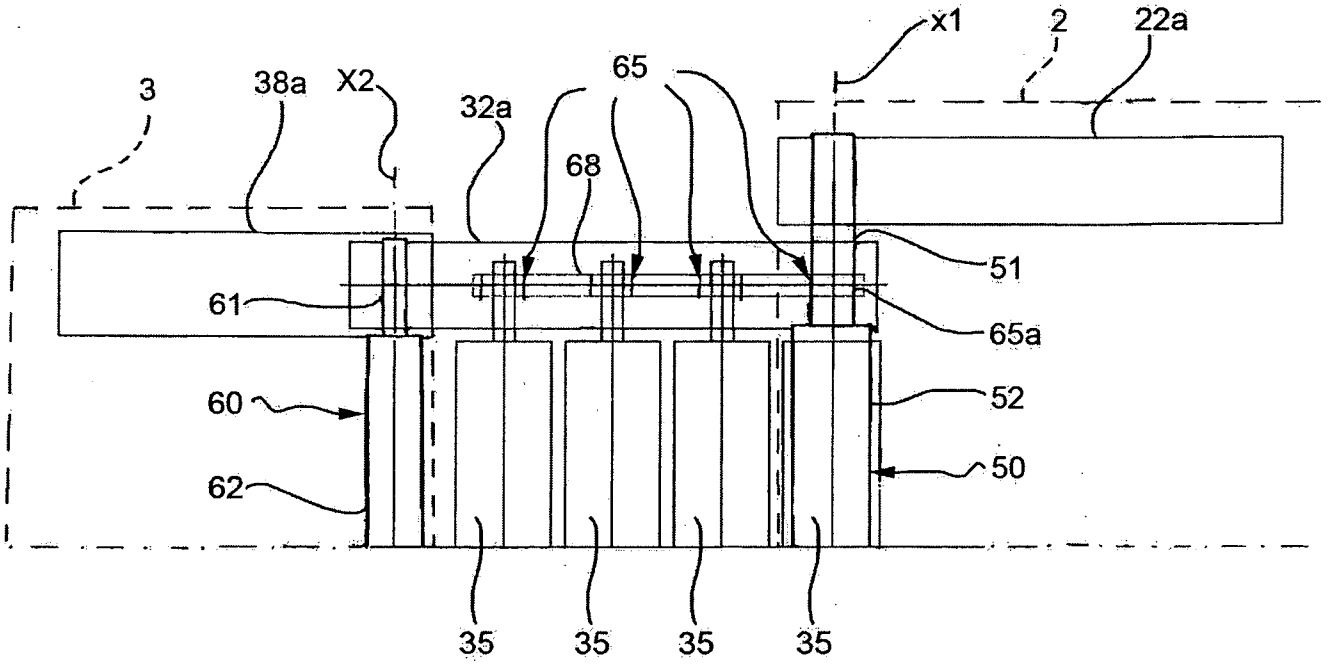

x1
2
22a
3
38a
X2
65
32a
68
51
61
65a
60
52
62
50
35
35
35
35

FIG.6

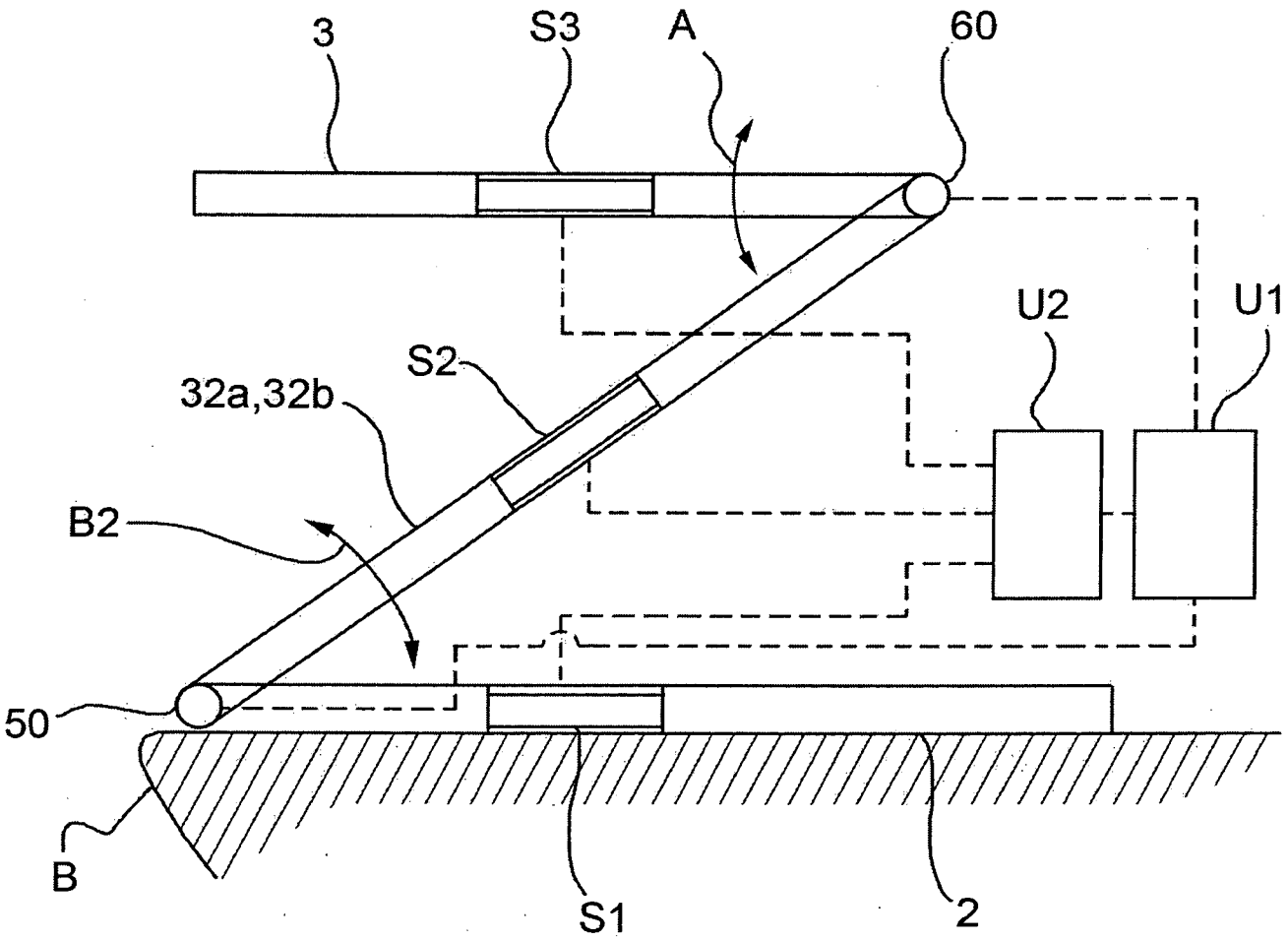


FIG.7

INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2008/000110

A. CLASSIFICATION OF SUBJECT MATTER
INV. B63B23/32 B63B27/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	WO 03/106254 A (OPACMARE S R L [IT]; GRIMALDI MICHELE [IT]) 24 December 2003 (2003-12-24) page 3, line 24 - page 7, line 5; figures 3-8	1,5-8
X	EP 1 382 523 A (HAESE FRANK [DE]) 21 January 2004 (2004-01-21) paragraphs [0028] - [0030]; figures 13a,14,15,17-22	1,5,9

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
5 September 2008	17/09/2008

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2008/000110

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	DE 199 63 057 C1 (BCM YACHTSERVICE GMBH & CO KG [DE]) 14 December 2000 (2000-12-14) the whole document	1,9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IT2008/000110

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