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(54) **PLATFORM SYSTEM FOR A BOAT**

(57) A mobile platform system for boats (1) comprises a first support (2) and a second support (3) connectable to a boat, a first arm (5) hinged to the first support (2) and a second arm (7), hinged to the second support (3), in which the first arm (5) and the second arm (7) can be rotated around a first axis of rotation (9), a platform (10) hinged to the first arm (5) and to the second arm (7) around a second axis of rotation (11), drive members (14) for operating the first arm (5) and second arm (7) around the first rotation axis (9) and adjustable transmission members which operatively connect the platform (10) to the first support (2) and to the second support (3) in such a way as to cause a rotation of the same around the second rotation axis (11) following the rotation of the first arm (5) and of the second arm (7), wherein the adjustable transmission members are configured to selectively cause a further rotation of the platform (10) independently of the rotation of the first arm (5) and of the second arm (7).

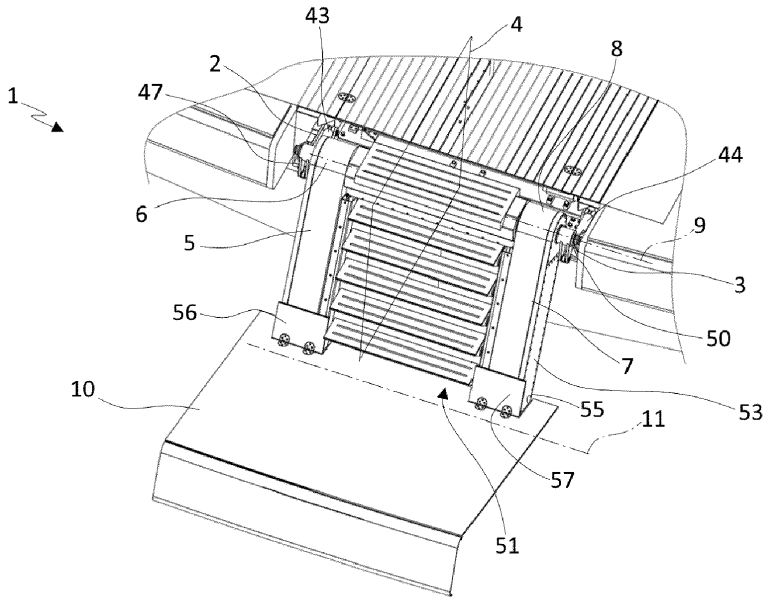

FIG.1

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Description

[0001] The present invention relates to a mobile platform system to be installed at the stern of a boat to allow objects and/or people to be lifted so as to promote their access on board the boat.

[0002] In the maritime field, the construction of a loading mobile platform system is known, connected to the stern of a boat by means of a pair of rotating arms, provided on the opposite sides of the platform itself.

[0003] The rotating arms are parallel to each other and move the platform selectively between a non-use position, wherein the platform is positioned at the deck of the boat, if desired inside a special compartment at the stern, and a position of use wherein the platform is positioned outside and at a lower level than the deck of the boat, if desired, until it is submerged in water.

[0004] In this regard, the arms are hinged at their first end to respective supports, in turn connected to the deck of the boat, and at their second end, opposite to the first, to the platform.

[0005] The mobile platform system comprises drive members, of the electric or hydraulic type, operatively connected to the arms and capable of rotating them around a first axis of rotation.

[0006] Furthermore, the mobile platform system comprises transmission members, configured for example as a chain, which mechanically connect the driving members to the platform so that following the rotation of the arms around the first axis of rotation, a reverse rotation of the platform around to a second axis of rotation, parallel to the first axis of rotation, is caused. In other words, the transmission members allow the loading platform to be kept aligned parallel with the deck of the boat during the rotation of the arms.

[0007] Therefore, following the rotation of the arms, the mobile platform translates between the retracted, non-use position and the extracted, use position.

[0008] EP1515885B1 discloses a mobile platform system which has drive members comprising a hydraulic system operatively connected to a pulley on which the drive chain is wound. The hydraulic system is connected to the pulley by a pair of belts.

[0009] Each belt is connected to a respective cylinder slidably housed inside a relative hydraulic cylinder in such a way that following the translation of the piston, traction is exerted on a respective belt, causing a consequent rotation of the pulley with a specific direction of rotation. The presence of two opposingly operated hydraulic cylinders is necessary to operate the pulley in both directions of rotation, making the structure of this mobile platform system complex.

[0010] EP2222543B1 discloses an alternative mobile platform system solution which comprises a pair of electric motors, each operatively connected to a respective axis between the first rotation axis and the second rotation axis, wherein the electric motors are operatively connected to each other via a drive system. This platform system, unlike what has been described in relation to the state of the art, does not include a mechanical system for the transmission of motion from the motor parts to the mobile platform, in fact providing for two electric motors - electric axles - distinct from each other.

[0011] The drawback of this solution is the difficulty of precisely and repetitively controlling the positioning of the platform during its movement. In particular, the feedback control of the motors is difficult to perform due to the inertia determined by the high masses to be moved, preventing precise movement of the platform.

[0012] Document US4068770A discloses a foldable platform on itself comprising a plurality of platforms hinged to each other, wherein the inclination of the final end platform can be adjusted.

[0013] More generally, a drawback that afflicts mobile platform systems of the known type concerns the inability to correct any misalignment of the platform with respect to the boat deck, as well as the possibility of selectively inclining the platform to promote hauling of a vessel or the ascent or descent of a person.

[0014] In fact, this misalignment can occur as a result of any play due to yielding or settling of the mechanical system or to mechanical tolerances of the platform movement transmission system.

[0015] The object of the present invention is to allow in a simple, efficient and economical way to adjust the positioning and inclination of a loading platform installed at the stern of a boat.

[0016] A further object of the present invention is to simplify the structure of a mobile platform system even within the context of a solution which has greater flexibility of the movement of the platform itself with respect to that which can be obtained in solutions of the traditional type.

[0017] Another object of the present invention is to ensure precise movement of the mobile platform system within an extremely reliable solution.

[0018] Yet another object of the present invention is to optimize the overall dimensions of a mobile platform system to promote its installation on board a boat.

[0019] The specific object of the invention is a mobile platform system for boats comprising:

- a first support and a second support configured to be connected to a boat;
- a first arm, hinged at a first end thereof to the first support and a second arm, hinged at a respective first end thereof to the second support, wherein the first arm and the second arm are rotatable around a first axis of rotation and are aligned and parallel to each other;
- a platform interposed between the first arm and the second arm and hinged, to a second end of the first arm and to a respective second end of the second arm, around a second axis of rotation, wherein the first axis of rotation and the second axis of rotation are parallel to each other;
- motor members operatively connected to the first

arm and to the second arm to operate them in rotation respectively with respect to the first support and the second support, around the first rotation axis;

- adjustable transmission members which operatively connect the platform to the first support and to the second support in such a way as to cause a rotation of the platform around the second axis of rotation as a consequence of the rotation of the first arm and second arm around the first rotation axis,

wherein the adjustable drive members are configured to selectively cause a controlled rotation of the platform around the second axis of rotation in an independent way with respect to the rotation of the first arm and second arm around the first axis of rotation to selectively vary the tilt of the platform.

[0020] According to another aspect of the invention, the mobile platform system for boat can comprise a central support, interposed between the first arm and the second arm, in which to support and house the motor unit.

[0021] According to a further aspect of the invention, the motor unit can comprise a first motor operatively connected to the first arm and a second motor operatively connected to the second arm, wherein the first motor and the second motor are synchronized with each other by being mutually connected and are operatively connected to a logic control unit.

[0022] According to an additional aspect of the invention, the adjustable transmission members can comprise a first rotatable joint for connecting and supporting the first arm relative to the first support and a second rotatable joint for connecting and supporting the second arm relative to the second support.

[0023] According to another aspect of the invention the first rotatable joint may comprise a first pin and a first sleeve rotatably engaged to the first pin around the first rotation axis, wherein the first pin is rotatably connected to an inner wall of the first arm and the sleeve is rotatably connected to an outer wall of the first arm and wherein the second rotatable joint comprises a second pin and a second sleeve rotatably engaged to the second pin about the first axis of rotation, wherein the first pin is rotatably connected to a respective inner wall of the second arm and the second sleeve is rotatably connected to a respective outer wall of the second arm.

[0024] According to a further aspect of the invention, the first pin and the first sleeve can each have a portion which extends outwardly from the first arm through the outer wall and wherein the second pin and the second sleeve each have a portion which extends outside the second arm, through the respective outer wall.

[0025] According to an additional aspect of the invention, the first pin can have a first end constrained to the first support and a second end, opposite the first end, which rotatably supports the inner wall of the first arm and wherein the second pin has a first end which is constrained to the second support and a second end, opposite the first end, which rotatably supports the respective inner wall of the second arm.

[0026] According to another aspect of the invention the adjustable transmission members can comprise a first transmission housed inside the first arm and a second transmission housed inside the second arm, wherein the first transmission comprises a first pulley, connected to the first sleeve, a second pulley operatively connected to the first arm and to the platform and operable in rotation around the second axis of rotation and transmission members which mechanically connect the first pulley and the second pulley to each other and wherein the second transmission comprises a respective first pulley, connected to the respective first sleeve, a respective second pulley operatively connected to the second arm, to the platform and operable in rotation around the second axis of rotation and respective transmission members which mechanically connect the respective first pulley and the respective second pulley to each other.

[0027] According to a further aspect of the invention, the adjustable transmission members can comprise a first actuator, operatively connected to the first pulley, to selectively rotate it around the first rotation axis and a second actuator, operatively connected to the respective first pulley, to selectively rotate it around to the first axis of rotation.

[0028] According to an additional aspect of the invention, the first actuator can be of the linear type and comprise a first mobile element, translatable with respect to a first fixed element, wherein the first mobile element is hinged to a first lever which, in turn, is pivoted along the first sleeve in an external position to the first arm and wherein the second actuator is of the linear type and comprises a second mobile element, translatable with respect to a second fixed element, wherein the second mobile element is hinged to a second lever which, in turn, it is pivoted along the second sleeve in an external position to the second arm.

[0029] According to another aspect of the invention, the first actuator can be interposed between the first arm and the first support and wherein the second actuator is interposed between the second arm and the second support.

[0030] The advantages offered by the mobile platform system for boats according to the invention are evident.

[0031] In particular, the mobile platform system for boats according to the invention allows the platform to be moved between a retracted position and an extracted position relative to an installation point at the stern of a boat and, moreover, to adjust the inclination of the platform itself with respect to a neutral position.

[0032] The adjustment of the inclination of the platform that can be obtained through the invention is easy to perform as well as being precise, promoting the hauling of a small vessel or the ascent or descent of one or more people relative to the platform itself, with respect to the solutions traditional type.

[0033] Furthermore, by adjusting the inclination of the platform it is possible to recover any mechanical play that

may occur in the mobile platform system during its use, thus ensuring a high and constant efficiency of the system itself.

[0034] The present invention will now be described, for illustrative but not limiting purposes, according to its preferred embodiments, with particular reference to the Figures of the attached drawings, wherein:

Figure 1 shows a schematic perspective view of the mobile platform system for a boat according to the invention, connected to the stern of a boat, in the extracted position;
Figure 2 shows a detailed perspective view of some components of the mobile platform system for boats according to the invention;
Figure 3 shows a front perspective and detail view of some components of the mobile platform system for boats according to the invention;
Figure 4 shows a rear perspective and sectional view of some components of the mobile platform system for boats according to the invention;
Figures 5 and 6 each show a detailed perspective and sectional view of some components of the mobile platform system for boats according to the invention;
Figures 7 and 8 show detail side views of the positioning of some components of the mobile platform system for boats in respective positions during use;
Figure 9 shows a schematic side view of the variable positioning of a platform included in the mobile platform system for boats according to the invention.

[0035] With reference to the attached Figures, a mobile platform system for boats according to the invention is indicated as a whole with 1.

[0036] The boat mobile platform system 1, hereinafter referred to as the platform system 1 for brevity, is configured to be connected to the stern of a boat and act as a loading element to promote the loading of small boats and/or people on board of the boat itself.

[0037] According to a preferred embodiment illustrated in the attached figures, the platform system 1 comprises a first support 2 and a second support 3, positioned symmetrically with respect to a median plane 4 of the platform system 1 and configured to connect opposite sides of the platform system 1 at the stern of a boat (see Figure 1).

[0038] The first support 2 and the second support 3 define an installation plane 4' (see for example Figure 4).

[0039] It is understood that according to an alternative embodiment, not shown, the first support 2 and the second support 3 can be an integral part of a single support structure or frame, however providing two connection points for the platform system 1 to a boat, similarly to the version in which they are made separately.

[0040] In the attached Figures, the boat is schematically and partially shown, for illustrative purposes only, to promote the understanding of the positioning of the platform system 1 on board the boat itself.

[0041] The platform system 1 comprises a first arm 5, hinged at its first end 6 to the first support 2 and a second arm 7 hinged at its respective first end 8 to the second support 3.

[0042] The first arm 5 and the second arm 7 are both rotatable around the same first rotation axis 9.

[0043] The first arm 5 and the second arm 7 are aligned parallel to each other and symmetrical with respect to the median plane 4. Both are hollow configured, preferably as box-like bodies for the purposes which will be described below.

[0044] The platform system 1 comprises a platform 10 hinged to the first arm 5 and to the second arm 7 around a second rotation axis 11, from opposite sides.

[0045] In more detail, the platform 10 is hinged to a second end 12 of the first arm 5 and to a respective second end 13 of the second arm 7 (see for example Figure 2 wherein some components have been intentionally omitted).

[0046] The first rotation axis 9 and the second rotation axis 11 are parallel to each other.

[0047] The platform system 1 comprises a motor unit, indicated as a whole with 14, operatively connected to the first arm 5 and to the second arm 7 to operate them in rotation, in a synchronized manner, around the first rotation axis 9 and to at least one control logic unit 15 configured to selectively command and control the actuation of the motor unit 14 itself (see Figure 3 wherein the control logic unit 15 is schematically illustrated).

[0048] According to the preferred embodiment illustrated in the attached figures, the motor unit 14 comprises a pair of cylindrical rotary motors, of the electric or hydraulic type, each comprising a cylindrical rotor inside it.

[0049] The two motors included in the motor unit 14 are positioned, in succession with each other, interposed between the first arm 5 and the second arm 7, aligned with each other and with the first rotation axis 9.

[0050] It should be noted that the platform system 1 comprises a central support 16 to support and house the motor unit 14 in an interposed position between the first arm 5 and the second arm 7.

[0051] According to the preferred embodiment illustrated in the accompanying Figures, see in particular Figures 3 and 4, the central support 16 is shaped like a hollow element which houses the motor unit 14 inside it.

[0052] The central support 16 has a connection portion 16' configured to be constrained to a boat, for example by means of a removable bolted connection, at the first support 2 and the second support 3.

[0053] Preferably, the central support 16 is shaped like a step to promote the access relative to the platform 10.

[0054] According to an alternative embodiment not shown in the attached figures, the central support 16 is an integral part or can be connected in a removable way to a support structure which also comprises the first support 2 and the second support 3.

[0055] It should be noted that the platform system 1 according to the invention comprising a motor unit 14

positioned interposed between the first arm 5 and the second arm 7 and inside a central support 16 has a reduced size compared to that of prior art solutions, with particular reference to the transversal size, i.e. along the first rotation axis 9.

[0056] The platform system 1 comprises adjustable transmission members which operatively connect the platform 10 to the first support 2 and to the second support 3.

[0057] In particular, the adjustable transmission members are configured to rotate the platform 10 around the second rotation axis 11 as a consequence of the rotation of the first arm 5 and of the second arm 7 around the first rotation axis 9.

[0058] Furthermore, the adjustable transmission members are configured to selectively cause a further rotation of the platform 10 around the second rotation axis 11 independently of the rotation of the first arm 5 and of the second arm 7 around the first rotation axis 9, to selectively adjust the inclination of the platform 10.

[0059] In the following, the expression further rotation, with reference to the rotation of the platform 10, is intended to indicate a rotation of the platform 10 that takes place independently of the rotation caused to it as a result of the movement of the first arm 5 and of the second arm 7 around the first rotation axis 9.

[0060] Preferably, the adjustable transmission members are mirrored to the median plane 4, as better described below.

[0061] The adjustable transmission members comprise a first rotatable joint 17 for connecting and supporting the first arm 5 to the first support 2 (see Figure 5) and a second rotatable joint 18 for connecting and supporting the second arm 7 to the second support 3 (see Figure 6).

[0062] The first rotatable joint 17 comprises a first pin 19, a first sleeve 20 fitted along the first pin 19 and rotatable relative to it around the first rotation axis 9.

[0063] The first pin 19 and the first sleeve 20 are cylindrical.

[0064] In particular, the first rotatable joint 17 comprises first rotatable connection elements 21 for the reciprocal and rotatable connection between the first pin 19 and the sleeve 20.

[0065] According to a preferred embodiment, the first rotating connection elements 21 are sliding bearings such as bushings or similar elements interposed between the first sleeve 20 and the first pin 19, at opposite ends of the first sleeve 20 itself.

[0066] It should be noted that the first sleeve 20 has a shorter axial length than that of the first pin 19 and is fitted along the latter in such a way as to keep the opposite ends of the first pin 19 free, i.e. without overlapping, thus allowing a link in place of the first pin 19 itself.

[0067] In this regard, it should be noted that a first end of the first pin 19 is constrained to the first support 2, for example by means of an interference fit or a removable mechanical connection, while a second end of the first pin 19 is operatively connected to a side of the first arm 5, through a connection rotating around the first rotation axis 9.

[0068] The first arm 5 has an internal wall 22, which faces the motor unit 14, and an external wall 23 which faces the first support 2 (see Figure 5).

[0069] Preferably, the inner wall 22 and the outer wall 23 are parallel to each other.

[0070] The first pin 19 and the first sleeve 20 extend inside the first arm 5 and, moreover, each have a portion which extends outside the first arm 5 itself, through the external wall 23.

[0071] The inner wall 22 is rotatably connected to the first pin 19 while the outer wall 23 is rotatably connected to the first sleeve 20.

[0072] In more detail, the platform system 1 comprises a first flange 24 for the connection between the first arm 5, the first pin 19 and the motor unit 14.

[0073] Preferably, the first flange 24 is positioned inside the first arm 5, in abutment against an internal surface of the internal wall 22, and is connected to the first arm 5 and to the motor unit 14 via a bolted connection, indicated as a whole with 25.

[0074] In detail, the first flange 24 is connected to a rotor of a first of the two motors comprised in the motor unit 14 (see Figure 5) in such a way that the rotation of this first rotor, around the first rotation axis 9, activates the first arm 5 rotating around the first rotation axis 9.

[0075] A first bearing 26 is interposed between the first flange 24 and the first pin 19, connecting them to each other.

[0076] The first bearing 26 is configured to reduce the friction due to the relative rotation between the first flange 24 and the first pin 19.

[0077] The platform system 1 comprises a second bearing 27 which operatively connects the first arm 5 and the first sleeve 20 to each other.

[0078] In particular, the second bearing 27 is interposed between the outer wall 23 of the first arm 5 and the first sleeve 20, allowing relative rotation between the first arm 5 and the first sleeve 20, reducing the friction between them.

[0079] Preferably, the first bearing 26 and the second bearing 27 are of the sliding type, for example a bushing or a bushing, although it should be understood that it is possible to provide for the use of a rolling type bearing instead of a sliding type.

[0080] The platform system 1 comprises sealing elements interposed between the first sleeve 20 and the first bearing 26, as well as between the first sleeve 20 and the second bearing 27, to ensure a sealed connection between these components, during the relative rotation between the first sleeve 20, the first bearing 26 and the second bearing 27.

[0081] The shape of the second rotatable joint 18 and the connection between the second arm 7 and the second support 3 are similar to those disclosed in relation to the first rotatable joint 17 to which reference is made.

[0082] Below is a brief description of the second rotat-

able joint 18 with particular reference to what is illustrated in the attached Figure 6.

[0083] The second rotatable joint 18 comprises a second pin 28 and a second sleeve 29 fitted along the second pin 28 and rotatable relative to it around the first rotation axis 9.

[0084] The second pin 28 and the second sleeve 29 are rotatably connected to each other via second rotating connecting elements 30.

[0085] The second rotating connection elements 30 are sliding bearings such as bushings or similar elements, interposed between the second pin 28 and the second sleeve 29, at opposite ends of the second sleeve 29 itself.

[0086] It should be noted that the second sleeve 29 has a shorter axial length than that of the second pin 28 and is fitted along the latter in such a way as to keep the opposite ends of the second pin 28 free, i.e. without overlapping.

[0087] A first end of the second pin 28 is constrained to the second support 3, for example by means of an interference fit or a removable mechanical connection, while a second end of the second pin 28 is operatively connected to a side of the second arm 7, by means of a connection rotating around to the first rotation axis 9.

[0088] The second pin 28 and the second sleeve 29 extend inside the second arm 7 and each have a portion which extends outside the second arm 7 itself.

[0089] The second arm 7 has a respective internal wall 31, which faces the motor unit 14, and a respective external wall 32 which faces the second support 3.

[0090] The respective inner wall 31 is rotatably connected to the second pin 28 while the respective outer wall 32 is rotatably connected to the second sleeve 29.

[0091] In more detail, the platform system 1 comprises a second flange 33 for the connection between the second arm 7, the second pin 28 and the motor unit 14.

[0092] Preferably, the second flange 33 is positioned against an internal surface of the internal wall 31 of the second arm 7 and is connected to the second arm 7 and to the motor unit 14 via a respective bolted connection, indicated as a whole with 34.

[0093] In detail, the second flange 33 is connected to a rotor of a second of the two motors included in the motor unit 14 (see Figure 6) in such a way that the rotation of this second rotor, around the first rotation axis 9, causes the second arm 7 rotating around the first rotation axis 9.

[0094] A respective bearing 35 is interposed between the second flange 33 and the second pin 28.

[0095] The respective first bearing 35 is configured to reduce the friction due to the relative rotation between the second flange 33 and the second pin 28.

[0096] The platform system 1 comprises a respective second bearing 36 which operatively connects the second arm 7 and the second sleeve 29 to each other.

[0097] In particular, the respective second bearing 36 is interposed between the respective outer wall 32 of the second arm 7 and the second sleeve 29, allowing the relative rotation between them, reducing their friction.

[0098] Preferably, the respective first bearing 35 and the respective second bearing 36 are of the sliding type, for example a bushing or a bearing, although it should be understood that it is possible to provide for the use of a rolling type bearing instead of a sliding type.

[0099] The platform system 1 comprises sealing elements interposed between the second sleeve 29 and the respective first bearing 35, as well as between the second sleeve 20 and the respective second bearing 36 to ensure a sealed connection between these components, even following the relative rotation between the second sleeve 29, the respective first bearing 35 and the respective second bearing 36.

[0100] It should be noted that the first motor and the second motor comprised in the motor unit 14 have their respective rotors connected to each other and therefore able to rotate around the first rotation axis 9 in a synchronous manner.

[0101] The adjustable transmission members comprise a first transmission housed inside the first arm 5 and a second transmission housed inside the second arm 7.

[0102] The first transmission operatively connects the motor unit 14, the first arm 5, the first support 2 and the platform 10 while the second transmission operatively connects the motor unit 14, the second arm 7, the second support 3 and the platform 10.

[0103] The first transmission will be described in detail below, given that analogous considerations apply to the second transmission since they are equivalent to each other.

[0104] The first transmission comprises a first pulley 37, connected to the first sleeve 20, a second pulley 38 operatively connected to the first arm 5, to the platform 10 and operable in rotation around the second rotation axis 11, and transmission members which mechanically connect the first pulley 37 and the second pulley 38.

[0105] According to an embodiment illustrated in the attached Figure 2, the transmission members are configured as a belt 39 wound around the first pulley 37 and the second pulley 38. According to this embodiment, the first transmission comprises belt tensioners 40 arranged inside of the first arm 5 to keep the belt 39 in tension.

[0106] It is understood that alternative embodiments of the transmission members are possible, not shown in the attached Figures, comprising for example cascade gears for transmitting the motion between a first gear constrained to the first pulley 37 and a second gear constrained to the second pulley 38 or a chain in place of the set of gears or a pair of ropes which mutually connect the first pulley 37 and the second pulley 38, around which they can wrap.

[0107] The second pulley 38 is rotatably connected to the first arm 5 so as to be able to rotate around the second rotation axis 11 and is constrained to the platform 10 to define a mechanical axis, which can be selectively actuated in rotation around the second rotation axis 11.

[0108] The rotatable connection between the second pulley 38 and the first arm 5 is considered to be within the reach of a person skilled in the art and, therefore, will not be further described below.

[0109] The second transmission is configured similarly to the first transmission and comprises a respective first pulley 41, connected to the second sleeve 29, a respective second pulley 42 (illustrated schematically in Figure 2) rotatable connected to the second arm 7 and to the platform 10 and operable in rotation around to the second rotation axis 11 and respective transmission members which mechanically connect the respective first pulley 41 and the respective second pulley 42 to each other.

[0110] The respective transmission members of the second transmission correspond to the transmission members described in relation to the first transmission to which reference is made in its entirety.

[0111] As mentioned, the adjustable transmission members allow the platform 10 to be selectively rotated around the second rotation axis 11 independently of the rotation of the first arm 5 and of the second arm 7 around the first rotation axis 9.

[0112] In this regard, it should be noted that the adjustable transmission members comprise a first actuator 43, operatively connected to the first pulley 37, to selectively rotate it around the first rotation axis 9 and a second actuator 44, operatively connected to the respective first pulley 41, to rotate it selectively around the first rotation axis 9.

[0113] More in detail, the first actuator 43 is of the linear type and comprises a first mobile element 45, translatable with respect to a first fixed element 46, wherein the mobile element 45 is hinged to a first lever 47 which, in turn, is pivoted along the first sleeve 20, externally to the first arm 5.

[0114] The first lever 47 is interposed between the first arm 5 and the first support 2, making it easy to be reached and allowing a visual check of its positioning.

[0115] The first mobile element 45 can be operated selectively between an extracted position (see Figure 7) and a retracted position (see Figure 8) relative to the first fixed element 46, consequently varying the angular position of the first lever 47 around the first rotation axis 9.

[0116] According to a preferred embodiment, the first linear actuator 43 is a hydraulic actuator in which the first fixed element 46 is a cylinder and the first mobile element 45 is a piston slidingly connected to the cylinder and selectively actuatable in movement by means of the pressure of a fluid feedable inside the cylinder.

[0117] The rotation of the first lever 47, as mentioned, causes a corresponding rotation of the first sleeve 20 around the first rotation axis 9 which, in turn, causes a rotation of the first pulley 37 constrained to the first sleeve 20 and of the second pulley 38 mechanically connected to the first pulley 37.

[0118] The rotation of the second pulley 38 causes a rotation of the platform 10 around the second rotation axis 11.

[0119] The second actuator 44 is operatively connected to the respective first pulley 41 according to methods similar to those described in relation to the connection between the first actuator 43 and the first pulley 37.

[0120] According to a preferred embodiment of the invention, the second actuator 44 is a hydraulic actuator configured in a similar way to what is described in relation to the first actuator 43 to which reference is made in its entirety.

[0121] The second actuator 44, therefore, is preferably of the linear type and comprises a second mobile element 48, translatable relative to a second fixed element 49, wherein the second mobile element 48 is hinged to a second lever 50 which, in turn, is pivoted along the second sleeve 29, externally to the second arm 7.

[0122] In particular, the second lever 50 is provided in an interposed position between the second arm 7 and the second support 3.

[0123] The second mobile element 48 can be operated selectively between an extracted position and a retracted position relative to the second fixed element 49, by varying the angular position of the second lever 50 around the first rotation axis 9.

[0124] The rotation of the second lever 50 causes a corresponding rotation of the second sleeve 29 and, therefore, of the respective first pulley 41 around the first rotation axis 9, as well as a consequent rotation of the respective second pulley 42 around the second rotation axis 11, according to analogous modalities described in relation to the actuation in rotation of the first pulley 37 and of the second pulley 38 by means of the first lever 47, to which reference is made.

[0125] The rotation of the respective second pulley 42 causes a rotation of the platform 10 around the second rotation axis 11.

[0126] The first actuator 43 and the second actuator 44 are preferably synchronized with each other to cause an equal rotation, respectively, of the second pulley 38 and of the respective second pulley 42 and, therefore, causing a balanced rotational drive of the platform 10 around the second rotation axis 11.

[0127] The first actuator 43 and the second actuator 44 are operatively connected to the logic control unit 15 which controls their actuation and, therefore, the further rotation of the platform 10 around the second rotation axis 11, if desired according to the position assumed by the first arm 5 and by the second arm 7 and detected by suitable sensors not shown in the accompanying Figures.

[0128] By way of non-limiting example, the platform system 1 comprises sensors operatively connected to the control logic unit 15, to the first arm 5 and to the second arm 7 to detect their angular position with respect to the first rotation axis 9. Furthermore, the system platform 1 comprises sensors operatively connected to the adjustable transmission members, in more detail to the first actuator 43 and to the second actuator 44.

[0129] Again, the platform system 1 comprises sensors operatively connected to the platform 10 and to the

control logic unit 15 to check the inclination of the platform 10 with respect to a horizontal neutral position.

[0130] By way of non-limiting example, the adjustable transmission members are configured to cause a further rotation of the platform 10 around the second axis 11 with an angle equal to 30° in lifting or lowering with respect to a neutral position of the platform 10, wherein the neutral position corresponds to a horizontally aligned position or, in other words, parallel to an installation plane on which the first support 2 and the second support 3 lie, i. e. the plane 4'.

[0131] The attached Figure 9 shows some positions in which the inclination of the platform 10 is adjustable by means of the adjustable transmission members, wherein the platform 10 is illustrated with solid lines in a neutral horizontal position, parallel or substantially parallel to the installation plane 4' while shown with dotted lines in slanted, up or down positions.

[0132] The mobile platform system 1 comprises a plurality of intermediate elements indicated as a whole with 51, interposed between the first arm 5 and the second arm 7, configured to act as steps to promote the movement of a user relative to the platform 10 (descent towards the platform 10 or ascent from platform 10).

[0133] Each of the intermediate elements 51 has end portions hinged on one side to the first arm 5 and on the side opposite to the second arm 7 and operatively connected to them in such a way as to maintain an unchanged orientation with respect to the plane 4' during rotation of the first arm 5 and of the second arm 7 around the first rotation axis 9.

[0134] Each of the intermediate elements 51 is therefore rotatable around a respective axis of rotation which is parallel to the first rotation axis 9 and to the second rotation axis 11.

[0135] The rotational actuation mode of the intermediate elements 51 does not form a specific object of the invention and, therefore, will not be described in detail. Furthermore, it should be noted that in Figures 5 and 6 some internal components relating to the rotational actuation of the intermediate elements 51 have been intentionally omitted in order not to overcomplicate these Figures and not to limit the intelligibility of the first actuator 43 and of the second actuator 44.

[0136] The first arm 5 comprises a first door 52 which is removable connected along the outer wall 23, for example by means of a bolted connection (see Figures 3, 7 and 8). The first door 52 allows to selectively release a wide access opening inside the first arm 5 to access the first transmission.

[0137] The first door 52 is connected in a seal manner, for example through a gasket not shown in detail in the attached Figures, to the first arm 5 to prevent water from infiltrating inside the first arm 5.

[0138] Preferably, the first door 52 extends along the outer wall 23 for a distance equal to or substantially equal to or slightly less than the distance between the first rotation axis 9 and the second rotation axis 11.

[0139] Similarly, the second arm 7 comprises a second door 53 which is removably connected along the respective external wall 32, for example by means of a bolted connection (see Figures 1 and 9), which performs the same purposes described in relation to the first door 52.

[0140] The platform 10 has a first recess 54 and a second recess 55 along the side facing the first arm 5 and the second arm 7 respectively.

[0141] The first recess 54 is shaped to free a seat with respect to which the first arm 5 is movable, so as not to hinder the relative rotation between the first arm 5 itself and the platform 10.

[0142] Similarly, the second recess 55 allows to selectively house a portion of the second arm 7, passing through the platform 10, so as not to hinder the relative rotation between the second arm 7 and the platform 10.

[0143] The presence of the first recess 54 and of the second recess 55 makes it possible to optimize the overall dimensions of the platform system 10 and to promote a greater relative mobility between the platform 10 itself, the first arm 5 and the second arm 7.

[0144] The platform system 1 comprises a first door 56 for the selective closure of the first slot 54 and a second door 57 for the selective closure of the second slot 55 according to the position of the platform 10 with respect to the first arm 5 and the second arm 7.

[0145] The first door 56 is hinged to the platform 10 at a central side of the first recess 54 and has a free end which selectively abuts against the first arm 5 so that the relative movement of the first arm 5 with respect to the platform 10 causes the lifting or the automatic lowering of the flap 56.

[0146] Similarly, the second door 57 is hinged to the platform 10 at a central side of the second recess 55 and has a free end which selectively abuts against the second arm 7, according to the same methods discussed in relation to the abutment between the first door 56 and the first arm 5.

[0147] The first door 56 and the second door 57 allow the first recess 54 and the second recess 55 to be occluded selectively, preventing a user or an object from getting stuck between the platform 10, the first arm 5 and the second arm 7, thus avoiding the risk of crushing.

[0148] With reference to the above, it is evident that the mobile platform system 1 according to the invention is capable of achieving the intended purposed. The platform system 1 according to the invention, in fact, has a greater freedom of movement of the platform 10 with respect to solutions of the traditional type, as it allows a further rotation of the platform 10 itself around the second rotation axis 11, independently of the movement of the first rotating arm 5 and second rotating arm 7 around the first rotation axis 9.

[0149] This further rotation of the platform 10 makes it possible to tilt the platform 10 itself, once it has been moved in the extracted position, for example downwards, to promote the boarding of a small vessel or people on board the platform 10 itself or towards the high to prevent

any small vessel or persons on board platform 10 from slipping into the sea.

[0150] Furthermore, the mobile platform system for boats 1 makes it possible to recover any play that may occur during its use to the adjustable transmission members, thus ensuring that a predetermined positioning of the platform 10 is obtained even in the presence of play due to slight failures of the adjustable transmission members or mechanical tolerances.

[0151] If desired, the first actuator 43 and the second actuator 44 can be operated independently of each other to correct a misalignment of the free end of the platform 10 with respect to the second rotation axis 11.

[0152] The mobile platform system for boats 1 has a transversal size, i.e. along the direction identified by the first rotation axis 9, which is reduced or in any case comparable to if not even lower than that of loading platforms for boats of the traditional type, requiring thus less space for its installation.

[0153] In the foregoing the preferred embodiments have been described and variants of the present invention have been suggested, but it should be understood that those skilled in the art will be able to make modifications and changes without thereby departing from the relative scope of protection, as defined by the claims attached.

Claims

1. Platform system (1) for a boat comprising:

- a first support (2) and a second support (3) configured to be connected to a boat;
- a first arm (5), hinged at its first end (6) to said first support (2) and a second arm (7), hinged at its respective first end (8) to said second support (3), wherein said first arm (5) and said second arm (7) are rotatable about a first rotation axis (9) and are aligned and parallel to each other;
- a platform (10) interposed between said first arm (5) and said second arm (7) and hinged to a second end (12) of said first arm (5) and to a respective second end (13) of said second arm (7), around a second rotation axis (11), wherein said first rotation axis (9) and said second rotation axis (11) are parallel to each other;
- motor unit (14) operatively connected to said first arm (5) and to said second arm (7) to operate them in rotation respectively with respect to said first support (2) and to said second support (3), around said first rotation axis (9);
- adjustable transmission members which operatively connect said platform (10) to said first support (2) and to said second support (3) in such a way as to cause rotation of said platform (10) around said second rotation axis (11) simultaneously with the rotation of said first arm (5) and second arm (7) around said first axis of rotation (9),

wherein said adjustable transmission members are configured to selectively cause a controlled rotation of said platform (10) around said second axis rotation (11) independently of the rotation of said first arm (5) and second arm (7) around to said first axis rotation (9) to selectively vary the inclination of said platform (10).

2. Platform system (1) for a boat according to claim 1, wherein the rotation of said platform (10) around said second axis of rotation (11) is against the rotation of said first arm (5) and said second arm (7) around said first axis of rotation (9).

3. Platform system (1) for a boat according to claim 1, comprising a central support (16) interposed between said first arm (5) and said second arm (7) in which to support and house said motor unit (14).

4. Platform system (1) for a boat according to claim 1 or 2, wherein said motor unit (14) comprises a first motor operatively connected to said first arm (5) and a second motor operatively connected to said second arm (7), wherein said first motor and said second motor are mutually synchronized being mutually connected and are operatively connected to a logic control unit (15).

5. Platform system (1) for a boat according to claim 1, wherein said adjustable transmission members comprise a first rotatable joint (17) for connecting and supporting said first arm (5) relative to said first support (2) and a second rotatable joint (18) for connecting and supporting said second arm (7) relative to said second support (3).

6. Platform system (1) for a boat according to claim 1, wherein said first rotatable joint (17) comprises a first pin (19) and a first sleeve (20) engaged rotatable to said first pin (19) about said first axis of rotation (9), wherein said first pin (19) is rotatably connected to an internal wall (22) of said first arm (5) and said sleeve (20) is rotatably connected to an external wall (23) of said first arm (5) and wherein said second rotatable joint (18) comprises a second pin (28) and a second sleeve (29) engaged rotatable to said second pin (28) around said first axis of rotation (9), wherein said first pin (28) is rotatably connected to a respective inner wall (31) of said second arm (7) and said second sleeve (29) is rotatably connected to a respective outer wall (32) of said second arm (7).

7. Platform system (1) for a boat according to claim 6, wherein said first pin (19) and said first sleeve (20) each have a portion which extends outside said first

arm (5) through said wall outside (23) and wherein said second pin (28) and said second sleeve (29) each have a portion which extends outside said second arm (7), through said respective outer wall (32).

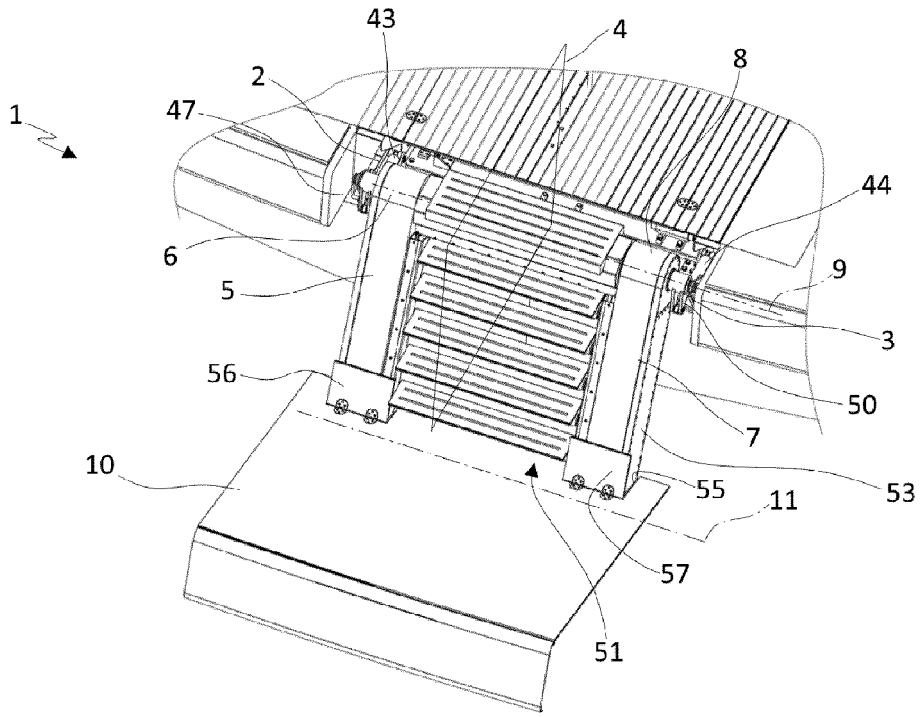
8. Platform system (1) for a boat according to claim 6 or 7, wherein said first pin (19) has a first end constrained to said first support (2) and a second end, opposite to said first end, which supports rotatable said inner wall (22) of said first arm (5) and wherein said second pin (28) has a first end constrained to said second support (3) and a second end, opposite to said first end, which rotatably supports said respective inner wall (31) of said second arm (7).

9. Platform system (1) for a boat according to any one of claims from 6 to 8, wherein said adjustable transmission members comprise a first transmission housed inside said first arm (5) and a second transmission housed inside of said second arm (7), wherein said first transmission comprises a first pulley (37), connected to said first sleeve (20), a second pulley (38) operatively connected to said first arm (5) and to said platform (10) and operable in rotation around said second rotation axis (11) and transmission members which mechanically connect said first pulley (37) and said second pulley (38) to each other and wherein said second transmission comprises a respective first pulley (41), connected to said respective first sleeve (29), a respective second pulley (42) operatively connected to said second arm (7), to said platform (10) and operable in rotation around said second rotation axis (11) and respective transmission members which mechanically connect said respective first pulley (41) and said respective second pulley (42) to each other.

10. Platform system (1) for a boat according to claim 9, wherein said adjustable transmission members comprise a first actuator (43), operatively connected to said first pulley (37), to selectively rotate it around said first rotation axis (9) and a second actuator (44), operatively connected to said respective first pulley (41), to selectively rotate it around said first rotation (9).

11. Platform system (1) for a boat according to claim 10, wherein said first actuator (43) is of the linear type and comprises a first mobile element (45), translatable with respect to a first fixed element (46), wherein said first mobile element (45) is hinged to a first lever (47) which, in turn, is pivoted along said first sleeve (20) in an external position to said first arm (5) and wherein said second actuator (44) is of the linear type and comprises a second mobile element (48), translatable with respect to a second fixed element (49), wherein said second mobile element (48) is hinged to a second lever (50) which, in turn, is pivoted along said second sleeve (29) in an external position to said second arm (7).

12. Platform system (1) for a boat according to claim 10 or 11, wherein said first actuator (43) is interposed between said first arm (5) and said first support (2) and wherein said second actuator (44) is interposed between said second arm (7) and said second support (3).


43
4
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44
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9
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3
56
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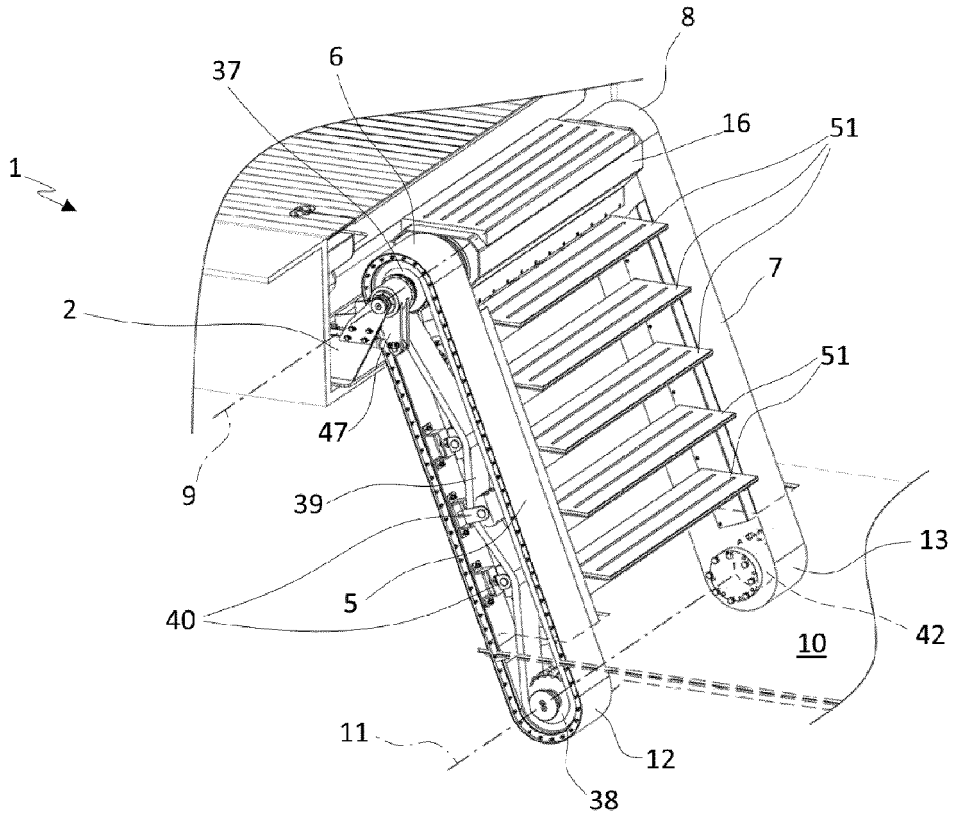
10
55
53
11
57
51

FIG.1


8
37
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7
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9
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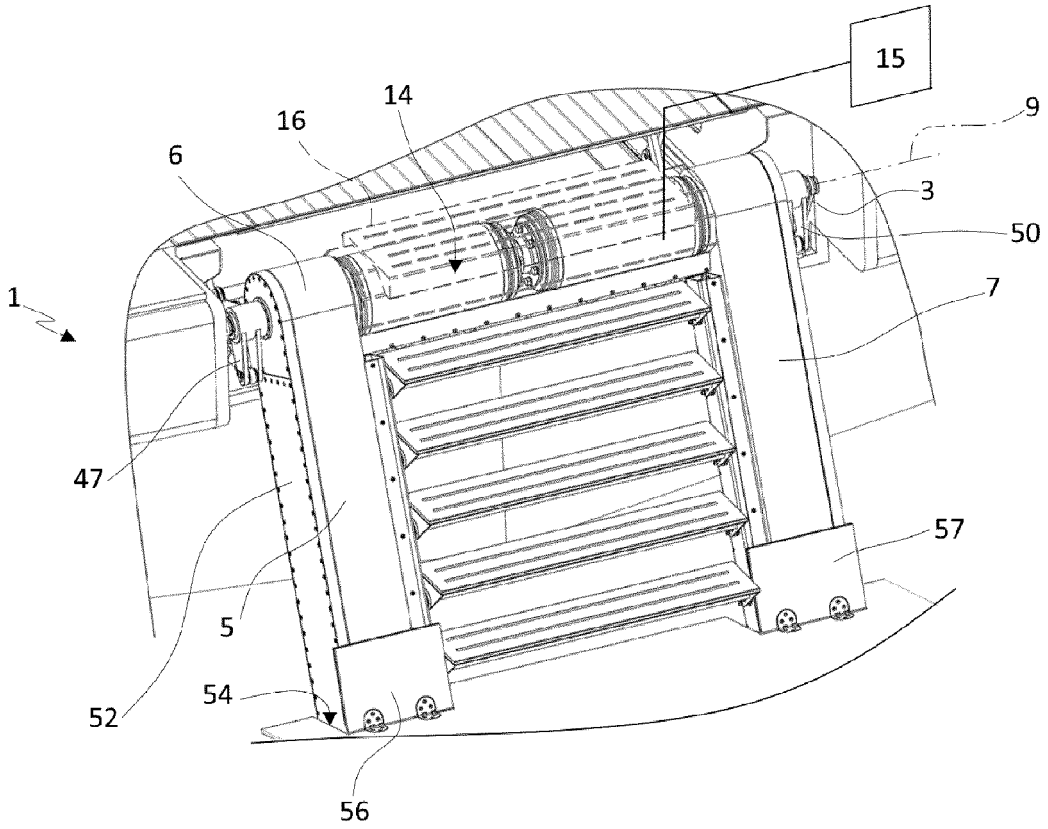
12
38

FIG.2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14
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9
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52
54
56

FIG.3

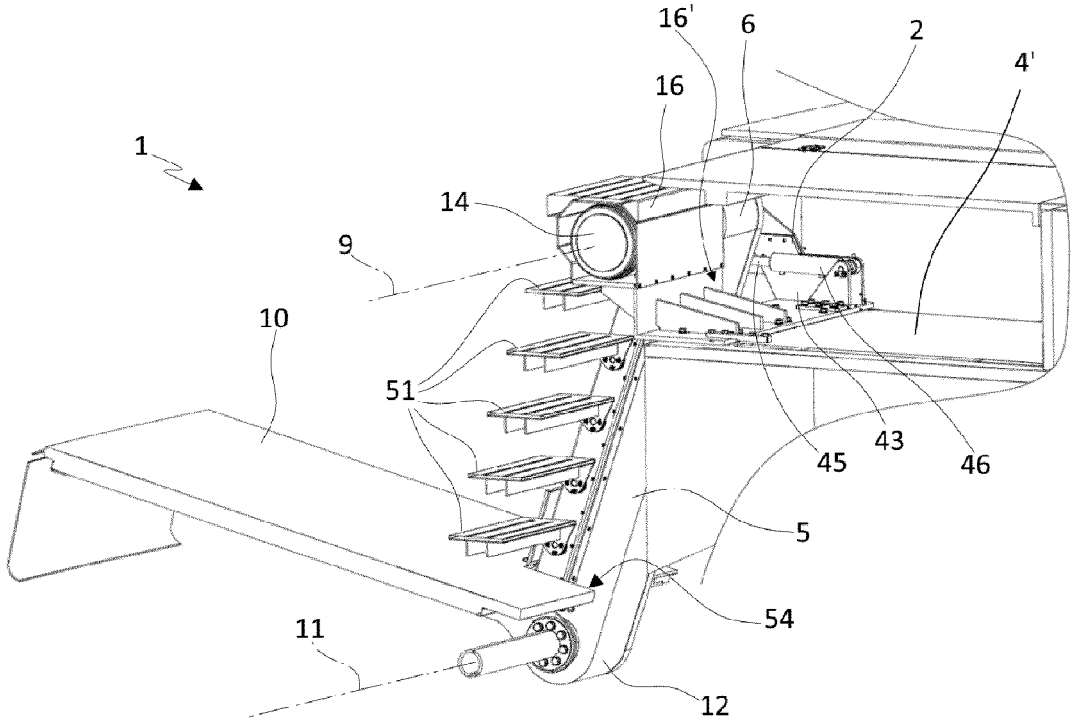
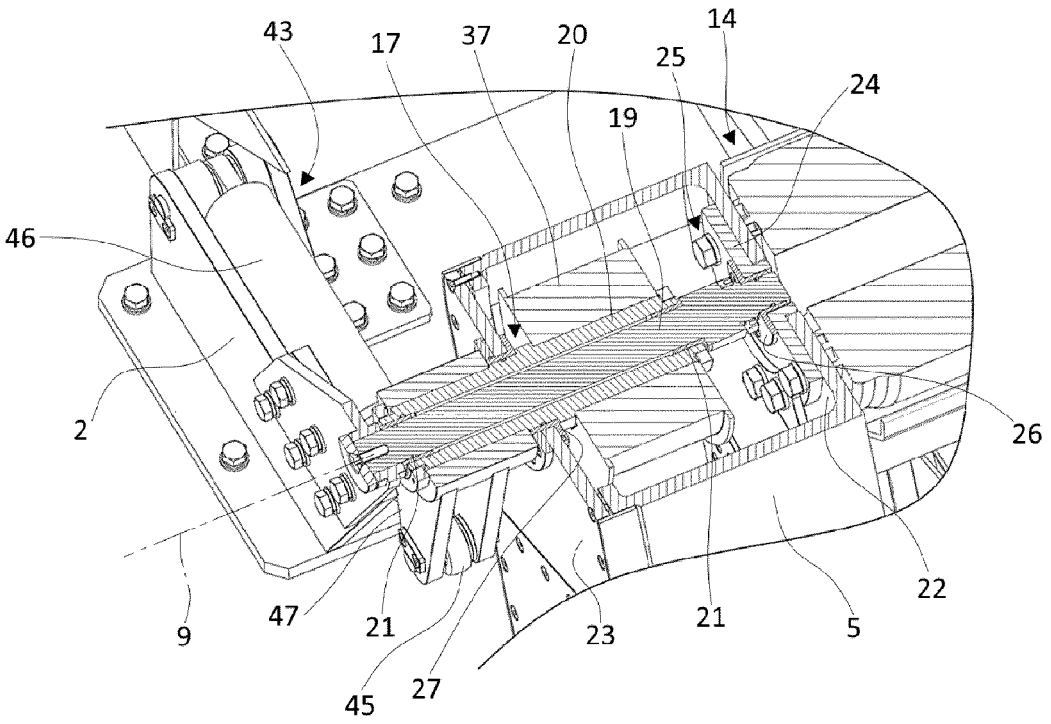

16'
6
2
4'
16
1
14
9
10
51
43
45
46
5
54
11
12

FIG.4


43
17
37
20
14
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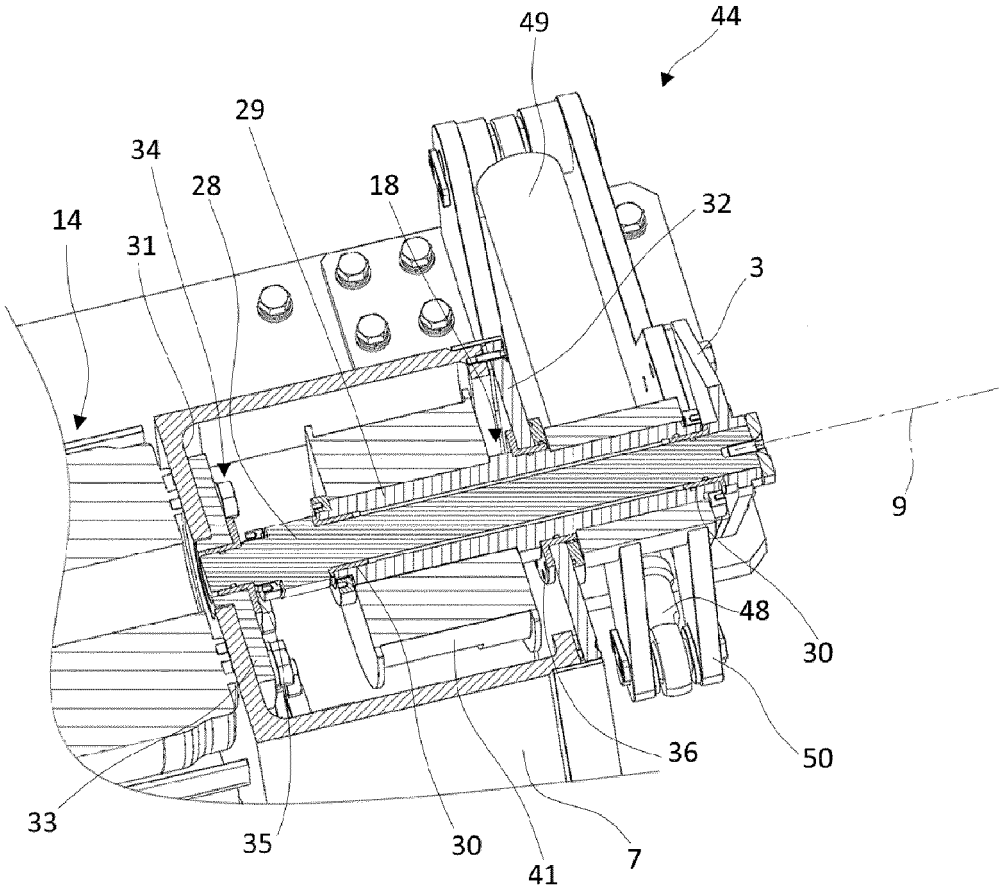
24
19
46
2
26
22
9
47
21
23
21
5
45
27

FIG.5


49
44
29
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18
32
14
31
3
9
48
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36
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33
35
30
41
7

FIG.6

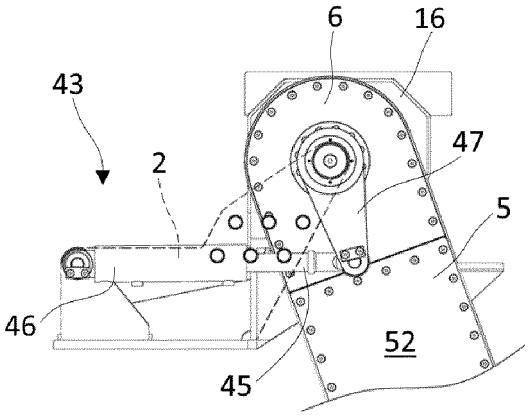

FIG.7

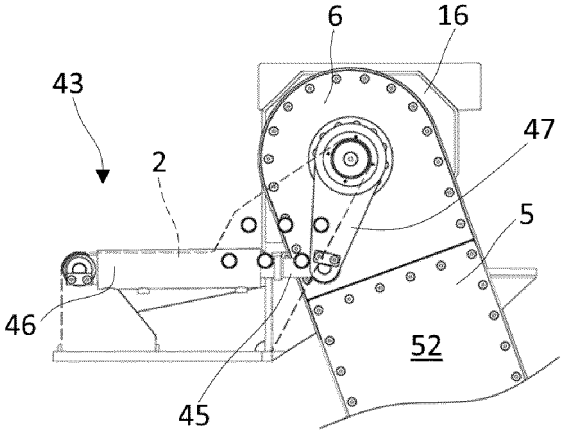

FIG.8

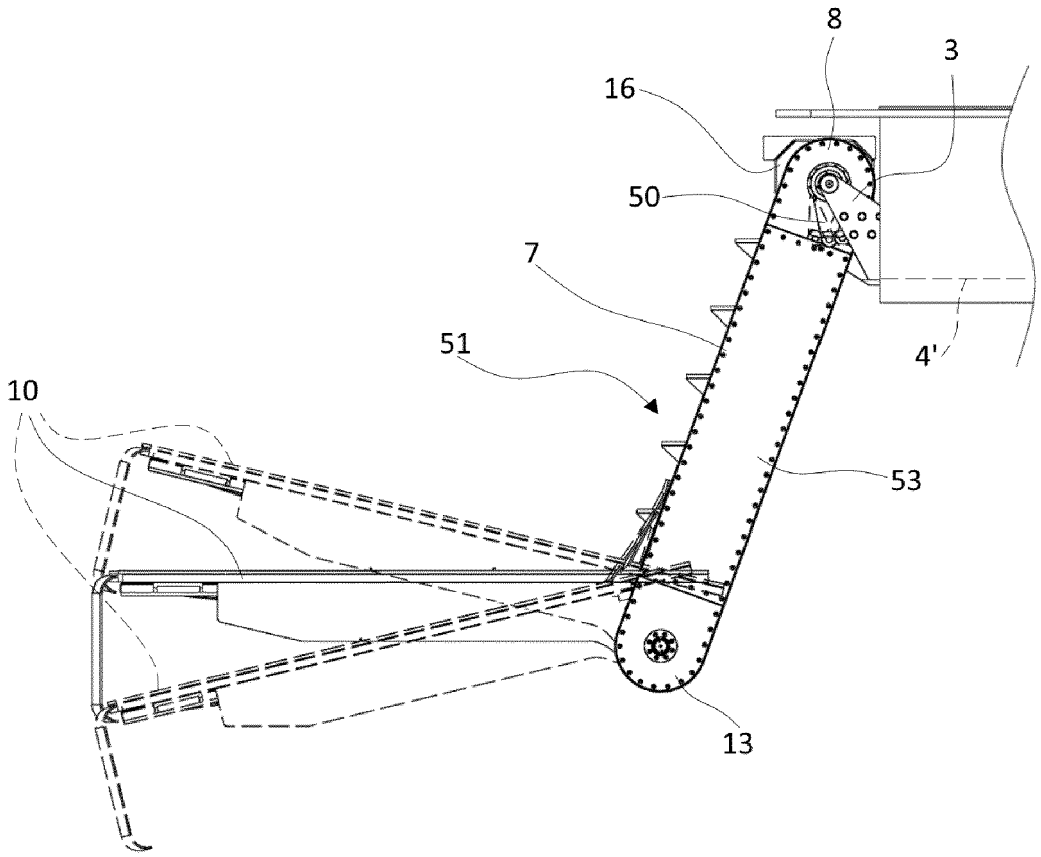

FIG.9

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EUROPEAN SEARCH REPORT

Application Number
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Place of search	Date of completion of the search	Examiner
The Hague	30 June 2023	Cavallo, Frédéric

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