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(54) **HOISTABLE CAR DECK PANEL**

HEBEBÜHNENPANEEL FÜR AUTOS

PANNEAU RELEVABLE DE PONT POUR VOITURE

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Description

TECHNICAL FIELD

[0001] The present invention relates generally to a displaceable deck panel arrangement for a ship, where the deck panel of the deck panel arrangement is displaceable between a lower and an upper position. The present invention further relates to a system of deck panel arrangements.

BACKGROUND

[0002] Displaceable deck panels for cargo on board ships, are used to support cargo on desired levels in cargo spaces on board the ship and are formed by a plurality of vertically displaceable deck panels for cargo. Displaceable deck panels are displaced to their desired position, where they can be positioned upon and supported by deck panel stops. There are two main types of displaceable deck panels for cargo on ships, hoistable and liftable deck panels.

[0003] The simplest displaceable deck panel is the liftable deck panel, which is displaced to desired height by means of devices for lifting deck panels, normally in the form of mobile scissor lifts. The devices for lifting deck panels are driven on the deck panel located below the displaceable deck panel. A liftable deck panel is a simple and cost-effective construction. Exemplary drawbacks of a liftable deck panel is that it is very time consuming to relocate a larger amount of deck panels, and that the deck panel lifts commonly is driven by combustion engines and thereby causing a loud and in general unhealthy working environment for the lift operator and other personnel working in the cargo space. An exemplary liftable deck panel is disclosed in JP 2005 067277A.

[0004] The alternative displaceable deck panel type, i.e. hoistable deck panel is normally provided with one centrally arranged actuator and hoisting wires arranged in a complex structure out to the four corners of the deck panel, to allow an even hoisting of the deck panel. Exemplary drawbacks of a hoistable deck panel is that it is a complex solution and high in price, additionally, the wires need to be greased, which requires additional maintenance and risk for grease spill on sensitive cargo, such as cars. An exemplary hoistable deck panel arrangement is disclosed in WO 2002 079025A1. US 2938638 discloses an apparatus for loading and unloading ship cargo. GB 1556150 discloses an adjustable access installation for roll-on roll-off ships.

[0005] Flexible solutions for ships are often based on several levels of displaceable deck panels in combination with stationary deck panels. A ship owner therefore has the choice of deck panels that are cost effective to produce and install, but are ineffective when the deck panels needs to be displaced, which is extra problematic if a large number of deck panels needs to be relocated, or choose deck panels that can relocate faster, but instead

are expensive, which high maintenance and risk of causing damages on the cargo.

SUMMARY

[0006] An object of this disclosure is to at least partially overcome the above problems, i.e. to suggest a displaceable deck panel that is more cost effective than existing hoistable deck panels and more efficient than a liftable deck panel. Another object of this disclosure is to suggest a cost-effective system of displaceable deck panel arrangements. A third object of this disclosure is to suggest a method for upgrading an existing liftable deck panel arrangement to a hoistable deck panel arrangement.

[0007] The first object is solved through a deck panel arrangement for a ship, wherein the deck panel arrangement comprises

- a deck panel provided to be displaced between a lower and an upper position,
- a winching arrangement,
- a plurality of deck panel attachment points provided at the deck panel
- a plurality of upper attachment points adapted to be provided at a fixed structure, wherein

the winching arrangement comprises a plurality of winching apparatuses, which each comprises a drive unit, a drum and a winching restraint, wherein

one deck panel attachment point and one upper attachment point is allocated to each winching apparatus and the winching arrangement is attached at one thereof, wherein

the drive unit is in drive arrangement with the drum and the winching restraint is arranged to the drum and between the deck panel attachment point and the upper attachment point such that the winching restraint can be wound about and unwound from the drum and thereby displace the deck panel between its lower and upper position. Further, the plurality of winching restraints are flat winching restraints.

[0008] With displaceable between a lower and an upper position is meant that the deck panel can be displaced by the winching arrangement to any position between the lower and the upper position. Additionally, the deck panels can have a lower and an upper resting position, whereby in order for the deck panel to be positioned upon e.g. deck panel stoppers at its upper resting position, the deck panel must be displaced higher than its upper resting position, in order to be lowered down to the stoppers at the resting position. Additional resting points can be provided in-between the deck panels upper and lower position. Hence, displaceable between a lower and upper position merely defines that the deck panel can be displaced in the vertical direction not limiting a specific

upper and lower position as the only possible positions to which the deck panel can be displaced.

[0009] The deck panel attachment points are attachment points at the deck panel where the winching restraints interact with the deck panel in order to induce a lifting force upon the deck panel during its displacement.

[0010] The upper attachment points are attachment points that are adapted to be provided at a fixed structure in order to act as a support for the lifting force that lifts the deck panel. The fixed structure is part of or fixedly connected to the ship structure or ship hull.

[0011] An exemplary effect of the disclosed deck panel arrangement is that it is flexible in where the winching apparatuses can be arranged, e.g. on the fixed structure, on the deck panel or even in or below the deck panel and keep a simple allocation of all winching restraint support points.

[0012] An exemplary simple allocation of the winching restraints is that respective winching restraint extends between the drum, the deck panel attachment point and the upper attachment point in one plane defined. Due to the plurality of attachment points, all the planes of the winching restraints are arranged parallel to each other, whereby a simple force distribution upon the deck panel is achieved. The winching apparatuses can also be arranged such that all the planes are parallel with the edges of the deck panel.

[0013] One exemplary embodiment provides that one upper attachment point is adapted to be arranged essentially aligned with one respective deck panel attachment point in a direction perpendicular to the plane of the deck panel. An exemplary effect thereof is that winching restraints can be arranged such that during displacement of the deck panel arrangement essentially only vertical forces act on the attachment points, whereby less stress is induced in the whole arrangement.

[0014] One exemplary embodiment provides that a rotational axis of the drive unit and the drum is coaxial. One exemplary effect thereof is that an easy configuration and compact radial installation space is achieved.

[0015] According to an exemplary embodiment of the deck panel arrangement, the flat winching restraint is a strap. A strap can among others also be named sling, web strap, belt, band, in this disclosure will however strap be used and is defined as a winching restraint with a distinct extension in one plane, i.e. a flat winching restraint. Exemplary straps are made of a polymer textile, nature fiber textile and composite textile, i.e. from polymers, nature and/or metallic fibers. Exemplary effects of having a strap as a winching restraint is no grease is needed and thereby reduced risk of damaging cargo, a reduced drum diameter can be used, due to the flexibility of the straps flat side, whereby the whole installation can be made more compact.

[0016] According to one exemplary embodiment of the deck panel arrangement, the drive unit is an electric motor. In one exemplary embodiment, the drive unit is a synchronous reluctance motor. An exemplary effect of

having an electric motor as a drive unit, is that the electric motor can be made compact and an exact control can be easily facilitated.

[0017] An additional exemplary effect of having synchronous reluctance motors as drive units, is that the synchronous reluctance motors can be arranged to be controlled in a master/slave configuration, whereby a maintained exact control without any additional sensors is achieved. Such a configuration realizes an easy control of all the drive units, due to that only one motor needs to be controlled.

[0018] According to one exemplary embodiment of the deck panel arrangement, the winching arrangement comprises two winching apparatuses, each provided at opposite deck panel sides, whereby each winching apparatus is provided with two drums with respective winching restraints.

[0019] According to one exemplary embodiment of the deck panel arrangement, the winching arrangement comprises four winching apparatuses, each provided in a respective corner of the deck panel, e.g. at respective deck panel attachment point or in pairs of two, anywhere along opposite deck panel sides, e.g. such that the deck panel attachment point, the upper attachment points and the drive unit are arranged in one plane parallel with a side of the deck panel.

[0020] An exemplary effect of having four winching apparatuses is that more flexibility is achieved, due to that one winching apparatus can be allocated to each corner and that relatively small drive units can be used, whereby a high flexibility in where to allocate the winching arrangement is achieved.

[0021] One exemplary embodiment of the deck panel arrangement provides that more than four winching apparatuses are provided, whereby the flexibility and smallness of the winching apparatuses are maintained, simultaneously as the lifting capacity is increased. Exemplary non-limiting embodiments comprise six, eight or ten winching apparatuses.

[0022] According to one exemplary embodiment of the deck panel arrangement, one of the attachment points is a roll and the winching restraint extends between the other attachment point via the roll and back to the other attachment point. One exemplary effect thereof is that a higher lifting force is achieved.

[0023] According to one exemplary embodiment of the deck panel arrangement, the winching apparatuses are arranged at the deck panel attachment points or the upper attachment points. One exemplary effect thereof is a high flexibility of the deck panel arrangement.

[0024] One aspect of the disclosure concerns a system of deck panel arrangements, wherein the system of deck panel arrangements comprises a plurality of deck panel arrangements according to any of the exemplary embodiments disclosed herein.

[0025] According to one exemplary embodiment of the system of deck panel arrangements, the deck panel arrangements are adjacently arranged such that the deck

panels, when hoisted to the same level, form any one of a deck or part of a deck.

[0026] One exemplary system of deck panel arrangements comprises one control cabinet to control the displacement the plurality of deck panel arrangements, and the control cabinet comprises a deck panel selection control unit enabling to select which deck panel arrangement or deck panel arrangements to control.

[0027] One aspect of this disclosure concerns a method to convert a liftable deck panel of a ship to a hoistable deck panel of a ship, using a deck panel arrangement according to any of the embodiments disclosed herein, wherein the method comprises the steps of:

- providing the plurality of deck panel attachment points in the respective corner of the deck panel,
- providing the plurality of upper attachment points on a supporting construction of the ship,
- providing at least two of the plurality of winching apparatuses at two opposite sides of the deck panel allocated to either the deck panel or the supporting construction of the ship,
- arranging each of the plurality of winching restraints between a respective drum of the respective winching apparatus, one of the deck panel attachment points and one of the upper attachment points, such that the deck panel can be displaced between a lower position and an upper position by winding and unwinding the winching restraints about respectively from their respective drum.

[0028] One exemplary effect of the method is that a liftable deck panel of a ship can be converted to a more flexible hoistable deck panel fast, to a low cost and with the deck panel still at its position in the ship.

[0029] An exemplary embodiment of the method further comprises the steps of:

- providing a control cabinet upon a support structure of the ship, and
- connecting the winching apparatuses to the control cabinet such that the control cabinet can electronically control the winching apparatuses.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] The invention is now described, by way of example, with reference to the accompanying schematic drawings, in which:

Fig. 1 discloses a schematic drawing of ship.

Fig. 2 a-c discloses schematic drawings of displacement of a deck panel.

Fig. 3 a and b discloses schematic drawings of exemplary deck panel arrangements

Fig. 4 discloses a schematic drawing of an exemplary system of deck panel arrangements.

Fig. 5 and b disclose schematic drawings of exemplary arrangement of the winching apparatuses of the deck panel arrangements.

[0031] A person skilled in the art will readily appreciate that various features disclosed in the description may be modified, and that various embodiments disclosed and/or claimed may be combined without departing from the scope of the disclosure.

DETAILED DESCRIPTION

[0032] In the following, a detailed description of exemplary embodiments of the deck panel arrangement, winching apparatuses and system of deck panel arrangements will be disclosed. It should be emphasised that the embodiments shown are used as examples only and are in no way intended to limit the scope of the disclosure.

[0033] Fig. 1 discloses a schematic drawing of a ship 1 in which the deck panel arrangement 100 can be provided. Displaceable deck panel arrangements 100 are typically found on ro-ro-ships.

[0034] Fig. 2 a-c discloses a deck panel arrangement 100 with a displaceable deck panel 110 in its upper position (Fig. 2a), an in-between position (Fig. 2b) and a lower position (Fig. 2c). The displaceable deck panel 110 can be displaced between the lower and upper position by actuating a winching arrangement 120 arranged to actuate a lifting force between the deck panel 110 and the fixed structure 112 of the ship 1. The lifting force supports the deck panel 110 when it is between its resting positions, i.e. between stoppers 111. In its upper and lower position, the deck panel 110 is arranged upon the stoppers 111, such that the winching arrangement 120 is unloaded when the deck panel 100 is arranged at its upper and lower position. The winching arrangement 120 is provided with winching restraints 123, which transmit the lifting force between the fixed structure 112 of the ship 1 and the deck panel 110.

[0035] The deck panel arrangement 100 is controlled from a control cabinet 210, which at least is provided with a control for controlling the upwards and downwards displacement of the deck panel 110. The control cabinet 210 is therefore provided with electronic communication means 211 with the winching arrangements 120 of respective deck panel 110. The electronic communication means 211 can be wired or wireless.

[0036] The displacement of the deck panel 110 is done by a winching arrangement 120, which is disclosed in more detailed in conjunction with Fig. 3, 4 and 5.

[0037] Fig. 3 a and b disclose two exemplary embodiments of a deck panel arrangement 100. The deck panel

arrangement 100 in Fig. 3a is provided with a winching arrangement 120 with two drive units 121 and the deck panel arrangement 100 in Fig. 3b is provided with a winching arrangement 120 with four drive units 121. In both exemplary embodiments the deck panel arrangement 100 is provided with a deck panel 110, a winching arrangement 120, a plurality of deck panel attachment points provided at the deck panel 110 and a plurality of upper attachment points 131. The upper attachment points 131 are arranged at the fixed structure 112 of the ship 1.

[0038] The winching arrangement 120 comprises a plurality of winching apparatuses 129. Each winching apparatus 129 comprises at least one winching restraint and therefor allocated drum 122. In the exemplary embodiment disclosed in Fig. 3a each winching apparatus 129 is provided with one drive unit 121, which drives two drums 122, where respective drum is allocated to one winching restraint 123 each. The drive units are provided in the middle of opposite sides of the deck panel 110, whereby the winching restraints 123 extend along the deck panel sides towards the deck panel attachment points. It is preferred that the drive unit 121, the drums 122 and the extension of the winching restraints 123 between the drum 122 and the deck panel attachment point 130 are arranged below the deck panel surface.

[0039] In the exemplary embodiment disclosed in Fig. 3b, each winching apparatus 129 is provided with one drive unit 121, which drives one drum 122, and where respective drum 122 is allocated one winching restraint 123 each.

[0040] In both the exemplary embodiments disclosed in Fig. 3a and b, the drive units 121 are arranged upon the deck panel 120, however in an alternative arrangement the drive units 121 or some of the drive units can be arranged on the fixed structure 112 of the ship 1.

[0041] In both exemplary embodiments of the deck panel arrangement 100 disclosed in Fig. 3a and 3b, the winching restraints extend between the deck panel attachment points 130 and the upper attachment points 131. The winching restraints are further attached to a respective drum 122 provided in drive connection with the drive unit 121 of the winching apparatuses 129. The winching restraints 123 can be arranged to extend one or several times between the deck panel attachment point 130 and the upper attachment point 131 without departing from the scope of this disclosure.

[0042] In Fig. 4 an exemplary system 200 of deck panel arrangements 100 is disclosed. The system 200 comprises of four deck panels 110_1, 110_2, 110_3, 110_4, which can be individually controlled from the control cabinet 210. The control cabinet 210 is in electronic control connection with the winching arrangement 120 of the respective deck panel 110_1 - 110_4. The control cabinet 210 comprises a deck panel selection control unit 220, which can select which deck panel 110_1 - 110_4 that should be controlled. The control cabinet 210 further comprises at least an upwards and a downwards dis-

placement button 230, 240, which by actuation, controls the upwards and downwards movements of the deck panel 110_1 - 110_4 that is selected by the deck panel selection control unit 220. The control cabinet is preferably arranged upon the fixed structure 112 of the ship 1.

[0043] The system of deck panel arrangements 200 could in different embodiments comprise any number of deck panel arrangements 100. In one embodiment the deck panels 110_1, 110_2, 110_3, 110_4 are arranged such that the deck panels 110_1, 110_2, 110_3, 110_4 when hoisted to the same level forms a deck. In another embodiment the deck panels are arranged such that the deck panels 110_1, 110_2, 110_3, 110_4 when hoisted to the same level forms part of a deck. In yet another embodiment a first set of deck panels are arranged side by side and any number of subsequent sets are arranged in the extension direction of the ship 1 forming a deck when hoisted to the same level.

[0044] Fig. 5a and b disclose partial views of a deck panel 110, where exemplary arrangements of the winching apparatus 129. The winching apparatus 129 comprises a drive unit 121 and the drum 122. The drive unit 121 drives the drum 122, which in the disclosed embodiments is coaxially arranged with the drive unit 121. The drum 122 is attached to the winching restraints 123 of the winching arrangement 120 such that the winching restraints 123 can be wound about and unwound from the drum 122 upon actuation of the drive unit 121. The winching arrangement 120 comprises a plurality of winching apparatuses 129 and a plurality of winching restraints 123, whereby only one winching apparatus 120 and winching restraint 123 is shown in respective Fig. 5a and b.

[0045] In Fig. 5a the drive unit 121 of the winching apparatus 129 is arranged upon the fixed structure 112 of the ship at the upper attachment point 131. The winching restraint 123 extends from the drum 122 down to the deck panel attachment point 130 and back up to the upper attachment point 131. At the deck panel attachment point 130 a roll 134 is arranged about which the winching restraint 123 is redirected back up to the upper attachment point 131. At the upper attachment point 131 the winching restraint is fixedly attached, such that when the winching restraint 123 is wound about the drum 122 the deck panel 110 is lifted by the winching restraint 123.

[0046] In the embodiment in Fig. 5b the winching apparatus 129 is instead arranged at the deck panel attachment point 130 and a roll is thereby placed at the upper attachment point about which the winching restraint 123 can be redirected.

[0047] The two exemplary embodiments disclosed in Fig. 5a and b show the flexibility of the disclosed deck panel arrangement 100. The location of the winching apparatus 129 can thereby be selected dependent on the general ship layout when retrofitting an existing liftable deck panel to a deck panel arrangement 100 according to this disclosure. In the same ship 1 or even at the same deck panel, the winching apparatuses 129 can

be arranged at either or both deck panel attachment points 130 and upper attachment points 131 depending on the space available at the respective pair of attachment points.

[0048] The winching apparatus 129 can be provided with a gearbox 124 between the drum 122 and the drive unit 121.

[0049] The high flexibility is realized through the unique combinations of features of the disclosed deck panel arrangements:

First the use of a plurality of winching apparatuses 129, which allows for smaller drive units 121, which can be arranged at different positions at the deck panel and/or the fixed structure 112 of the ship 1.

[0050] Additional flexibility and even smaller drive units is realized by having one drive unit in each corner.

[0051] Another flexibility and compactness enhancer is the exemplary embodiment where the winching restraints 123 are straps. A strap allows for a small diameter of the drum 122, due to the high flexibility of a strap in the direction perpendicular to the strap's extension plane. This in turn allows for a compact winching apparatus, which requires even less installation space.

Claims

1. A deck panel arrangement (100) for a ship (1), wherein the deck panel arrangement (100) comprising
 - a deck panel (110) provided to be displaced between a lower and an upper position,
 - a winching arrangement (120),
 - a plurality of deck panel attachment points (130) provided at the deck panel (110)
 - a plurality of upper attachment points (131) adapted to be provided at a fixed structure (112) of the ship (1), wherein the winching arrangement (120) comprises a plurality of winching restraints (123), which each is arranged to a respective drum (122) and between one allocated deck panel attachment point (130) and one allocated upper attachment point (131) such that the winching restraints (123) can be wound about and unwound from its respective drum (122) and thereby displace the deck panel (110) between its lower and upper position, wherein the winching arrangement (120) comprises a plurality of winching apparatuses (129), which each comprises a drive unit (121), a drum (122) and a winching restraint (123), and the drive unit (121) is in drive connection with its respective drum (122), **characterized in that** the plurality of winching restraints (123) are flat winching restraints.

2. The deck panel arrangement according to claim 1, wherein the winching restraint (123) is a strap.
3. The deck panel arrangement according to any of the preceding claims, wherein the drive units are electric motors and preferably synchronous reluctance motors.
4. The deck panel arrangement according to claim 3, wherein the electric motors (121) are arranged to be controlled in a master/slave configuration.
5. The deck panel arrangement according to any of the preceding claims, wherein the winching arrangement (120) comprises four winching apparatuses (129) each provided in a respective corner of the deck panel (110).
6. The deck panel arrangement according to any of the preceding claims, wherein one of the attachment points (130, 131) is a roll (133) and the winching restraint extends between the other attachment point (130/131) via the roll (133) and back to the other attachment point (130/131).
7. The deck panel arrangement according to any of the preceding claims, wherein the winching apparatuses (129) are arranged at the deck panel attachment points (130) or the upper attachment points (131).
8. A system (200) of deck panel arrangements comprising a plurality of deck panel arrangements (100) according to any of the preceding claims 1-7.
9. The system (200) of deck panel arrangements according to claim 8, wherein the deck panel arrangements (100) are adjacently arranged such that the deck panels (110_1 - 110_4) when hoisted to the same level forms any one of a deck or part of a deck.
10. The system (200) of deck panel arrangements according to any one of claims 8 or 9, wherein the system (200) comprises one control cabinet (210) to control the displacement of the plurality of deck panel arrangements (100), and that the control cabinet (210) comprises a deck panel selection control unit (220) enabling to select which deck panel arrangement (100) or deck panel arrangements (100_1 - 100_4) to control.
11. A method to convert a liftable deck panel of a ship (1) to a hoistable deck panel (100) of a ship (1), the method using a deck panel arrangement according to any of claims 1-7, wherein the method comprises the steps of:
 - providing the plurality of deck panel attachment points (130) in the respective corner of the deck

panel (110),

- providing the plurality of upper attachment points (131) on a supporting construction of the ship (1),
- providing at least two of the plurality of winching apparatuses (129) at two opposite sides of the deck panel (100) allocated to either the deck panel (110) or the supporting construction of the ship (1),
- arranging each of the plurality of winching restraints (123) between a respective drum (122) of the respective winching apparatus (129), one of the deck panel attachment points (130) and one of the upper attachment points (131), such that the deck panel (110) can be displaced between a lower position and an upper position by winding and unwinding the winching restraints (123) about respectively from their respective drum (122).

12. The method according to claim 11, wherein the method further comprises the steps of:

- providing a control cabinet (210) upon a support structure of the ship (1), and
- connecting the winching apparatuses (129) to the control cabinet (210) such that the control cabinet (210) can electronically control the winching apparatuses (129).

Patentansprüche

1. Decksplattenanordnung (100) für ein Schiff (1), wobei die Decksplattenanordnung (100) Folgendes umfasst:

- eine Decksplatte (110), die bereitgestellt wird, um zwischen einer unteren und einer oberen Position verschoben zu werden,
- eine Windenanordnung (120),
- eine Vielzahl von Decksplatten-Befestigungspunkten (130), die an der Decksplatte (110) bereitgestellt werden,
- eine Vielzahl von oberen Befestigungspunkten (131), die angepasst sind, um einer festen Struktur (112) des Schiffes (1) bereitgestellt zu werden, wobei

die Windenanordnung (120) Folgendes umfasst: eine Vielzahl von Windenhalterungen (123), die jeweils derart an einer jeweiligen Trommel (122) und zwischen einem zugeordneten Decksplatten-Befestigungspunkt (130) und einem zugeordneten oberen Befestigungspunkt (131) angeordnet sind, dass die Windenhalterungen (123) um ihre jeweilige Trommel (122) auf- und abgewickelt werden können und dadurch die Decksplatte (110) zwischen ihrer unteren

und oberen Position verschoben werden kann, wobei die Windenanordnung (120) Folgendes umfasst: eine Vielzahl von Windeneinrichtungen (129), die jeweils eine Antriebseinheit (121), eine Trommel (122) und eine Windenhalterung (123) umfassen, und wobei die Antriebseinheit (121) mit ihrer jeweiligen Trommel (122) in Antriebs Verbindung steht, **dadurch gekennzeichnet, dass** die Windenhalterungen (123) flache Windenhalterungen sind.

2. Decksplattenanordnung nach Anspruch 1, wobei die Windenhalterung (123) ein Gurt ist.

3. Decksplattenanordnung nach einem der vorstehenden Ansprüche, wobei die Antriebseinheiten Elektromotoren und vorzugsweise Synchronreluktanzmotoren sind.

4. Decksplattenanordnung nach Anspruch 3, wobei die Elektromotoren (121) so angeordnet sind, dass sie in einer Master-/Slave-Konfiguration gesteuert werden.

5. Decksplattenanordnung nach einem der vorstehenden Ansprüche, wobei die Windenanordnung (120) vier Windeneinrichtungen (129) umfasst, die jeweils in einer Ecke der Decksplatte (110) bereitgestellt werden.

6. Decksplattenanordnung nach einem der vorstehenden Ansprüche, wobei einer der Befestigungspunkte (130, 131) eine Rolle (133) ist und die Windenhalterung sich zwischen dem anderen Befestigungspunkt (130/131) über die Rolle (133) und zurück zum anderen Befestigungspunkt (130/131) erstreckt.

7. Decksplattenanordnung nach einem der vorstehenden Ansprüche, wobei die Windeneinrichtungen (129) an den Decksplatten-Befestigungspunkten (130) oder den oberen Befestigungspunkten (131) angeordnet sind.

8. System (200) von Decksplattenanordnungen, umfassend eine Vielzahl von Decksplattenanordnungen (100) nach einem der vorstehenden Ansprüche 1-7.

9. System (200) von Decksplattenanordnungen nach Anspruch 8, wobei die Decksplattenanordnungen (100) derart nebeneinander angeordnet sind, dass die Decksplatten (110_1 - 110_4), wenn sie auf die gleiche Höhe hochgehoben werden, entweder ein Deck oder einen Teil eines Decks bilden.

10. System (200) von Decksplattenanordnungen nach einem der Ansprüche 8 oder 9, wobei das System (200) einen Steuerschrank (210) zum Steuern der Verschiebung der Vielzahl von Decksplattenanord-

nungen (100) umfasst und dass der Steuerschrank (210) eine Decksplattenauswahl-Steuereinheit (220) umfasst, die es ermöglicht, auszuwählen, welche Decksplattenanordnung (100) oder Decksplattenanordnungen (100_1 - 100_4) gesteuert werden sollen.

11. Verfahren zum Umbau einer anhebbaren Decksplatte eines Schiffes (1) zu einer hochhebbaren Decksplatte (100) eines Schiffes (1), wobei das Verfahren das Verwenden einer Decksplattenanordnung nach einem der Ansprüche 1-7 umfasst, wobei das Verfahren die folgenden Schritte umfasst:

- Bereitstellen der Vielzahl von Decksplatten-Befestigungspunkten (130) in der jeweiligen Ecke der Decksplatte (110),
- Bereitstellen der Vielzahl von oberen Befestigungspunkten (131) an einer Tragstruktur des Schiffes (1),
- Bereitstellen von mindestens zwei von der Vielzahl von Windeneinrichtungen (129) an zwei gegenüberliegenden Seiten der Decksplatte (100), die entweder der Decksplatte (110) oder der Tragkonstruktion des Schiffes (1) zugeordnet sind,

Anordnen jeder von der Vielzahl von Windenhalterungen (123) zwischen einer jeweiligen Trommel (122) der jeweiligen Windeneinrichtung (129), einem der Decksplatten-Befestigungspunkte (130) und einem der oberen Befestigungspunkte (131) derart, dass die Decksplatte (110) durch Auf- und Abwickeln der Windenhalterungen (123) von ihrer jeweiligen Trommel (122) zwischen einer unteren Position und einer oberen Position verschoben werden kann.

12. Verfahren nach Anspruch 11, wobei das Verfahren weiter die folgenden Schritte umfasst:

- Bereitstellen eines Steuerschranks (210) auf einer Tragstruktur des Schiffes (1) und
- Verbinden der Windeneinrichtungen (129) mit dem Steuerschrank (210) derart, dass der Steuerschrank (210) die Windeneinrichtungen (129) elektronisch steuern kann.

Revendications

1. Agencement de panneau de pont (100) pour un navire (1), dans lequel l'agencement de panneau de pont (100) comprend

- un panneau de pont (110) fourni pour être déplacé entre une position inférieure et supérieure,
- un agencement de treuillage (120),

- une pluralité de points de fixation de panneau de pont (130) fournis au niveau du panneau de pont (110),
- une pluralité de points de fixation supérieurs (131) adaptés pour être fournis au niveau d'une structure fixe (112) du navire (1), dans lequel

l'agencement de treuillage (120) comprend

une pluralité de dispositifs de retenue de treuillage (123), chacun étant agencé au niveau d'un tambour respectif (122) et entre un point de fixation de panneau de pont attribué (130) et un point de fixation supérieur attribué (131) de sorte que les dispositifs de retenue de treuillage (123) puissent être enroulés autour et déroulés de leur tambour respectif (122) et ainsi déplacer le panneau de pont (110) entre sa position inférieure et supérieure, dans lequel l'agencement de treuillage (120) comprend une pluralité d'appareils de treuillage (129), chacun comprenant une unité d'entraînement (121), un tambour (122) et un dispositif de retenue de treuillage (123), et l'unité d'entraînement (121) est en liaison d'entraînement avec son tambour respectif (122), **caractérisé en ce que** la pluralité de dispositifs de retenue de treuillage (123) sont des dispositifs de retenue de treuillage plats.

2. Agencement de panneau de pont selon la revendication 1, dans lequel le dispositif de retenue de treuillage (123) est une sangle.

3. Agencement de panneau de pont selon l'une quelconque des revendications précédentes, dans lequel les unités d'entraînement sont des moteurs électriques et de préférence des moteurs synchrones à réluctance.

4. Agencement de panneau de pont selon la revendication 3, dans lequel les moteurs électriques (121) sont agencés pour être commandés dans une configuration maître/esclave.

5. Agencement de panneau de pont selon l'une quelconque des revendications précédentes, dans lequel l'agencement de treuillage (120) comprend quatre appareils de treuillage (129), chacun fourni dans un coin respectif du panneau de pont (110).

6. Agencement de panneau de pont selon l'une quelconque des revendications précédentes, dans lequel l'un des points de fixation (130, 131) est un rouleau (133) et le dispositif de retenue de treuillage s'étend entre l'autre point de fixation (130/131) via le rouleau (133) et retour à l'autre point de fixation (130/131).

7. Agencement de panneau de pont selon l'une quelconque des revendications précédentes, dans lequel les appareils de treuillage (129) sont agencés au niveau des points de fixation de panneau de pont (130) ou des points de fixation supérieurs (131). 5
8. Système (200) d'agencements de panneau de pont comprenant une pluralité d'agencements de panneau de pont (100) selon l'une quelconque des revendications précédentes 1-7. 10
9. Système (200) d'agencements de panneau de pont selon la revendication 8, dans lequel les agencements de panneau de pont (100) sont agencés de manière adjacente de sorte que les panneaux de pont (110_1 - 110_4), lorsqu'ils sont hissés au même niveau, forment l'un quelconque parmi un pont ou une partie d'un pont. 15
10. Système (200) d'agencements de panneau de pont selon l'une quelconque des revendications 8 ou 9, dans lequel le système (200) comprend une armoire de commande (210) pour commander le déplacement de la pluralité d'agencements de panneau de pont (100), et l'armoire de commande (210) comprend une unité de commande de sélection de panneau de pont (220) permettant de sélectionner l'agencement de panneau de pont (100) ou les agencements de panneau de pont (100_1 - 100_4) à commander. 20 25 30
11. Procédé de conversion d'un panneau de pont relevable d'un navire (1) en panneau de pont hissable (100) d'un navire (1), le procédé utilisant un agencement de panneau de pont selon l'une quelconque des revendications 1-7, dans lequel le procédé comprend les étapes de : 35
- fourniture de la pluralité de points de fixation de panneau de pont (130) dans le coin respectif du panneau de pont (110), 40
 - fourniture de la pluralité de points de fixation supérieurs (131) sur une construction de support du navire (1),
 - fourniture d'au moins deux de la pluralité d'appareils de treuillage (129) au niveau de deux côtés opposés du panneau de pont (100) attribués soit au panneau de pont (110) soit à la construction de support du navire (1), 45 50
- agencement de chacun de la pluralité de dispositifs de retenue de treuillage (123) entre un tambour respectif (122) de l'appareil de treuillage respectif (129), l'un des points de fixation de panneau de pont (130) et l'un des points de fixation supérieurs (131), de sorte que le panneau de pont (110) puisse être déplacé entre une position inférieure et une position supérieure en enroulant et en déroulant les disposi- 55
- tifs de retenue de treuillage (123) respectivement autour de leur tambour respectif (122).
12. Procédé selon la revendication 11, dans lequel le procédé comprend en outre les étapes de :
- fourniture d'une armoire de commande (210) sur une structure de support du navire (1), et
 - liaison des appareils de treuillage (129) à l'armoire de commande (210) de sorte que l'armoire de commande (210) puisse commander électroniquement les appareils de treuillage (129).

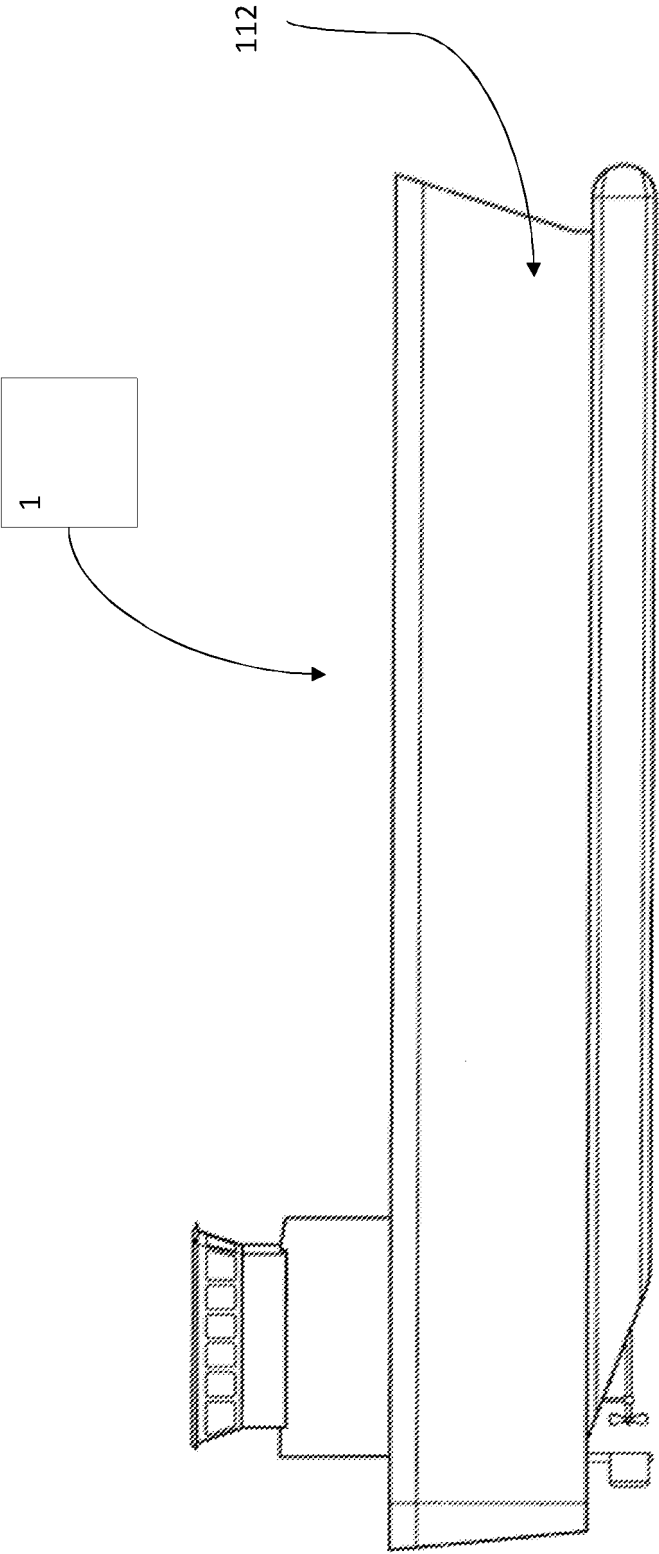


FIG. 1

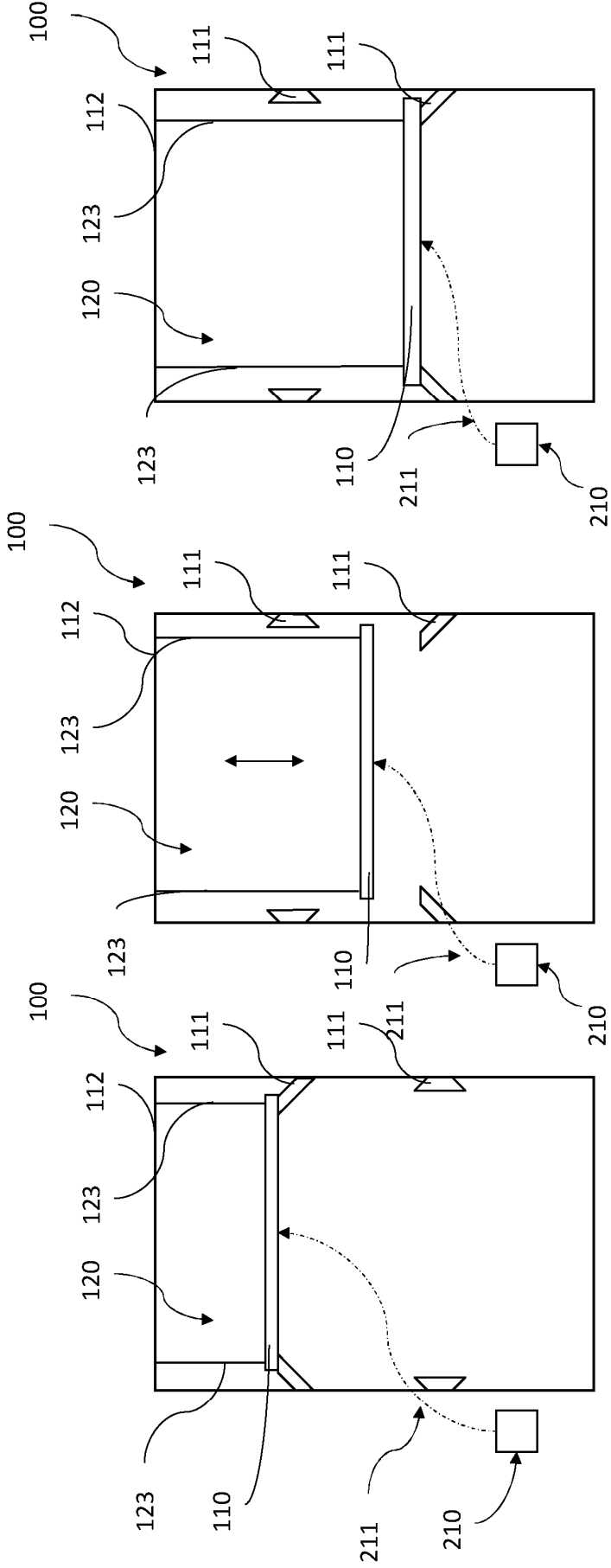


FIG. 2c

FIG. 2b

FIG. 2a

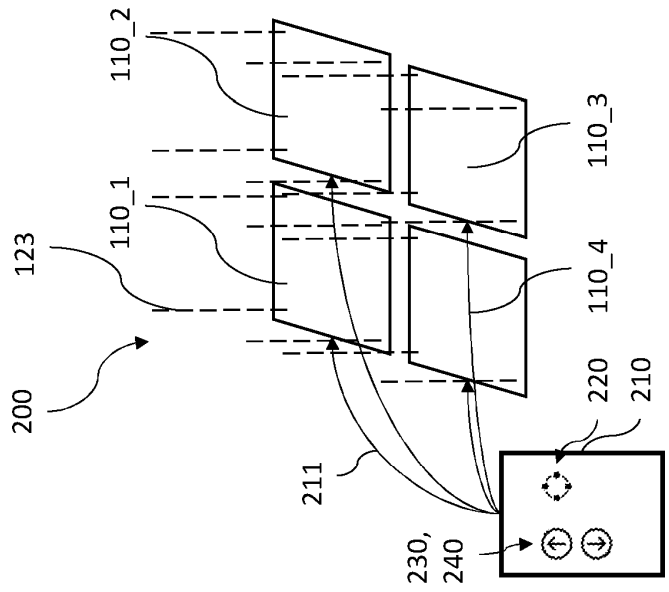


FIG. 4

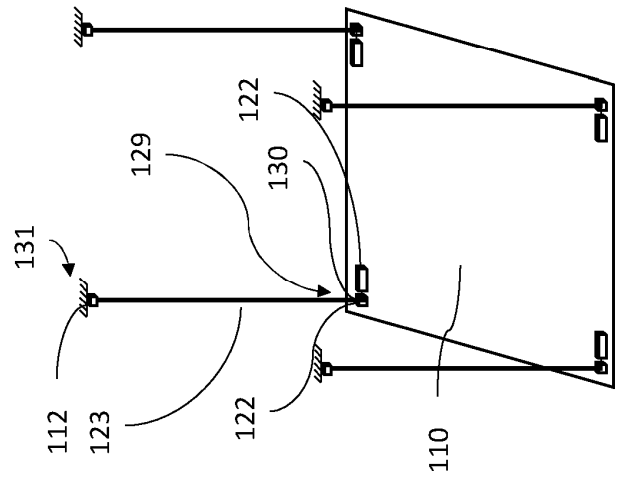


FIG. 3b

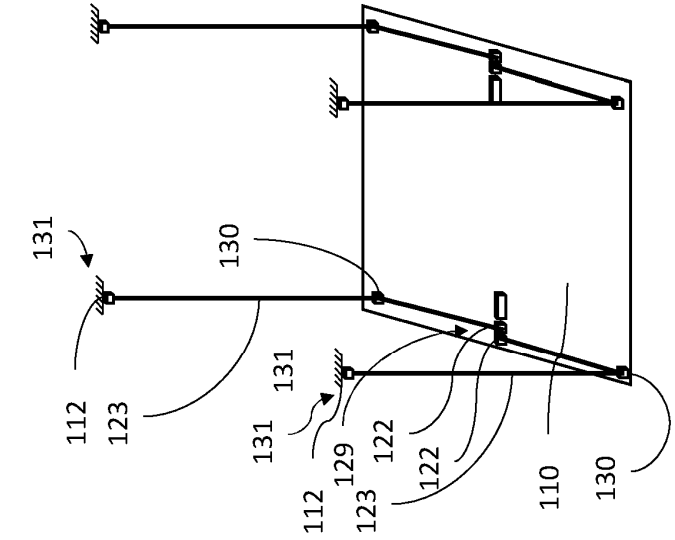


FIG. 3a

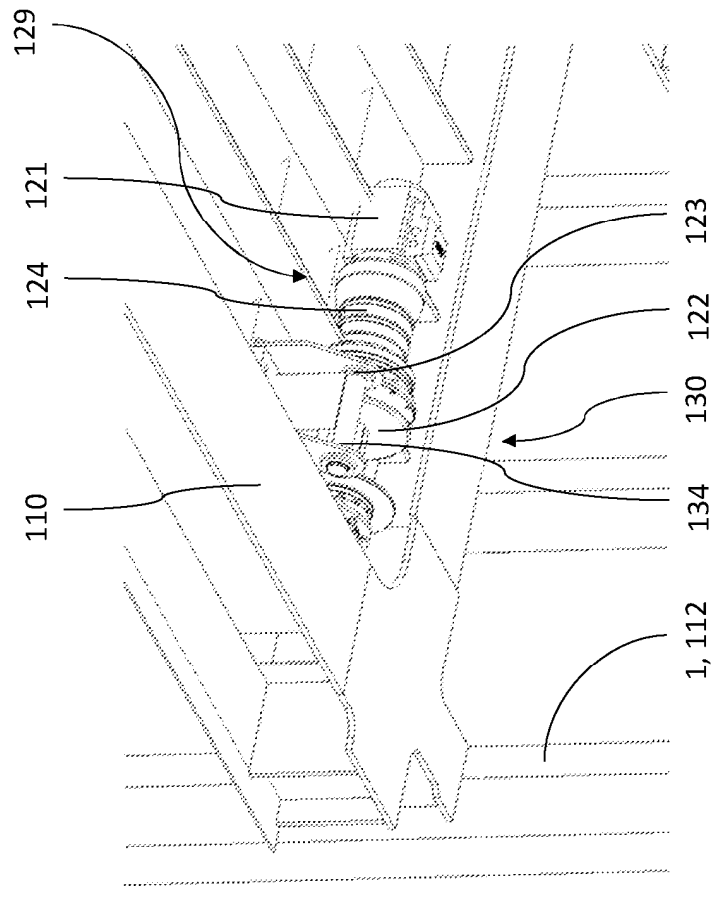


FIG. 5a

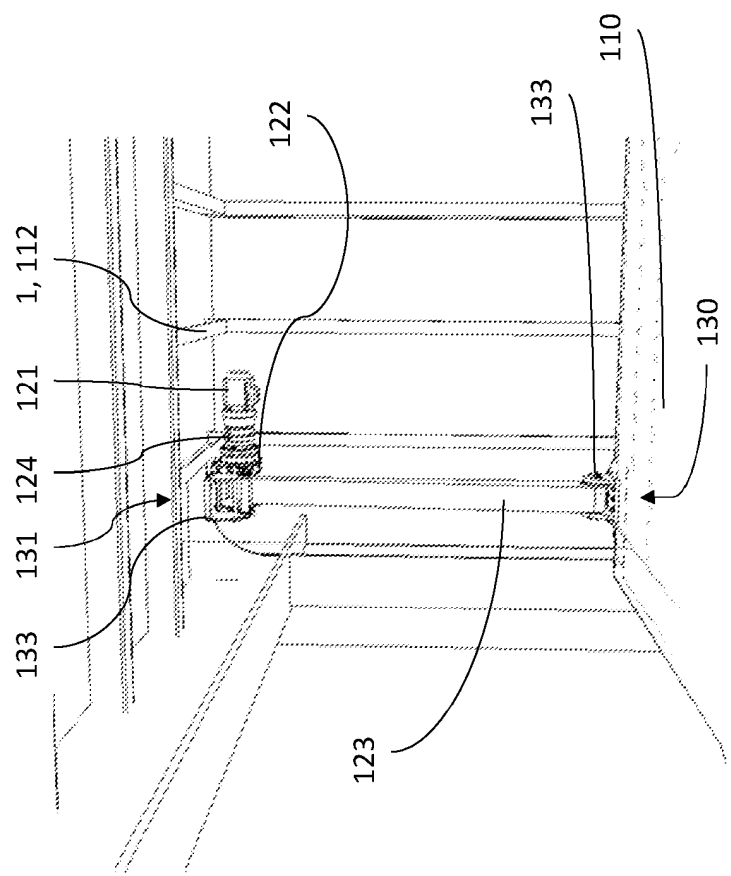


FIG. 5b

REFERENCES CITED IN THE DESCRIPTION

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