

(19)



(11)

EP 3 546 335 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
02.10.2019 Bulletin 2019/40

(51) Int Cl.:
B63B 27/10 (2006.01) **B63B 35/00** (2006.01)
B66C 23/64 (2006.01) **B66C 23/52** (2006.01)
B63B 27/30 (2006.01) **B66C 23/84** (2006.01)

(21) Application number: **18165162.1**

(22) Date of filing: **29.03.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(54) A VESSEL WITH ON BOARD JIB CRANE

(57) A vessel (1) has a hull (2) including a deck (3) and a crane (4) of which the largest part extends above the deck (3). The crane (4) is provided with a support column (5) that is fixed to the hull (2) and a turntable (6) which is mounted to the support column (5) and rotatable with respect to the support column (5) about an upwardly directed axis of rotation, a boom (7) having a proximal end portion that is pivotally mounted to the turntable (6) through a heel pin (8) having a heel pin axis which extends transversely with respect to the axis of rotation,

and a hoisting cable (9) suspending from a lifting location (10) that is located at the boom (7) remote from said proximal end portion and a driving device for rotating the boom (7) with respect to the turntable (6) about the heel pin axis. The boom (7) is a non-articulated boom (7) which is rotatable between an upper position in which the lifting location (10) lies at a higher level than the heel pin axis and a lower position in which the lifting location (10) lies at a lower level than the heel pin axis.

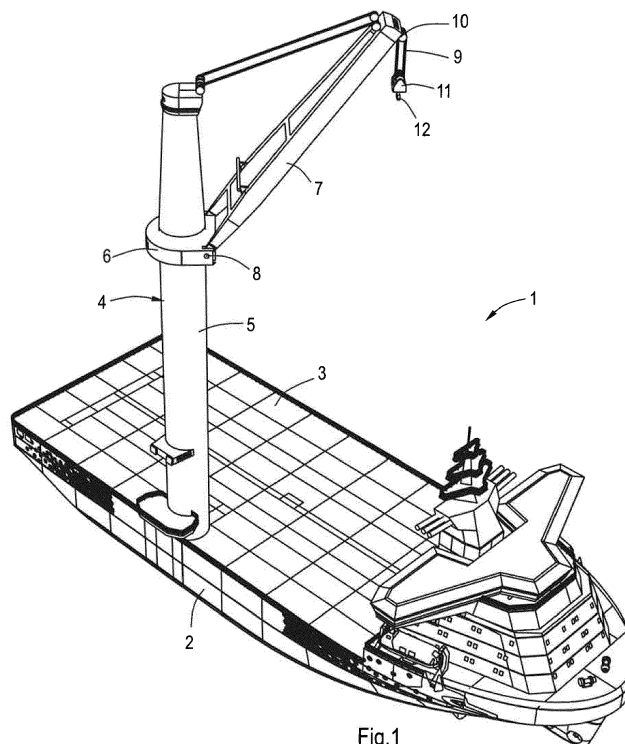


Fig.1

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Description

[0001] The present invention relates to a vessel having a hull including a deck and a crane of which the largest part extends above the deck, wherein the crane is provided with a support column that is fixed to the hull and a turntable which is mounted to the support column and rotatable with respect to the support column about an upwardly directed axis of rotation, a boom having a proximal end portion that is pivotally mounted to the turntable through a heel pin having a heel pin axis which extends transversely with respect to the axis of rotation, a hoisting cable suspending from a lifting location that is located at the boom remote from the proximal end portion and a driving device for rotating the boom with respect to the turntable about the heel pin axis.

[0002] Such a vessel is known from WO 2016/159777. The known vessel is provided with a marine knuckle boom crane which comprises a stationary pedestal that is mounted to the deck of the vessel. A crane housing is provided rotational relative to the pedestal about a vertical axis of rotation. A drawback of the known vessel is that it has a rather complex structure.

[0003] An object of the invention is to provide a vessel including a relatively simple and robust crane.

[0004] This object is accomplished with the vessel according to the invention which is characterized in that the boom is a non-articulated boom which is rotatable between an upper position in which the lifting location lies at a higher level than the heel pin axis and a lower position in which the lifting location lies at a lower level than the heel pin axis.

[0005] Due to this feature the number of joints at the crane are minimized. Besides, the crane can be used both for hoisting parts from the deck to an off-shore structure next to the vessel and for subsea hoisting operations in which it is desired to direct the boom downwardly from the heel pin axis.

[0006] Preferably, in the lower position the boom extends substantially along the support column, which provides the opportunity to store the boom in a downwardly directed or substantially vertical position during a period in which the crane is out of operation, for example when sailing from a harbour to an off-shore location. This has several advantages: a conventional boom rest on the deck can be omitted, occupied space on the deck is minimized and the weight of the boom is kept close to the support column, which improves stability during sailing and makes the crane less susceptible to wind loads.

[0007] In a specific embodiment the vertical distance between the deck and the heel pin axis is larger than the distance between the heel pin axis and a distal end of the boom lying remote from the proximal end portion. In order to have a lifting location at sufficient height above the deck the turntable lies at a relatively high level. An advantage of a turntable at a large height is that the crane is suitable for hoisting a tall payload item such as a foundation structure of a wind turbine from the deck to a lo-

cation next to the vessel with minimum risk of collision between the boom and the payload item. Hence, there is no need for an articulated jib, for example. Furthermore, a larger ratio between the height of the support column and the boom length is advantageous in terms of costs since a support column is a relatively low-cost part.

[0008] The distance between the deck and the heel pin axis may be larger than twice the distance between the deck and a bottom of the hull. Preferably, the distance between the deck and the heel pin axis is larger than three times the distance between the deck and a bottom of the hull.

[0009] The distance between the deck and the turntable may be larger than the distance between the turntable and a top of the support column. For example, the location of the turntable lies at a distance between 2/3 and 4/5 of the height of the support column from the deck.

[0010] In a particular embodiment the lifting location is a fixed location along the boom. In this case a complex carriage for moving the lifting location along the boom can be omitted. If the lifting location has to be moved in radial direction of the axis of rotation the boom has to be rotated about the heel pin axis. It is noted that a sheave may be located at the lifting location and that the lifting location may be at the distal end of the boom.

[0011] In an alternative embodiment the vertical distance between the deck and the heel pin axis is shorter than the distance between the heel pin axis and a distal end of the boom lying remote from the proximal end portion, wherein in the lower position the distal end of the boom is located next to the hull at a level below the deck. If the support column is located at an edge of the deck the boom may extend substantially along the support column in the lower position.

[0012] The invention will hereafter be elucidated with reference to very schematic drawings showing an embodiment of the invention by way of example.

Fig. 1 is a perspective view of an embodiment of a vessel according to the invention.

Fig. 2 is a similar view as Fig. 1, but showing the vessel in a different condition.

Fig. 3 is a front view of the vessel of Fig. 1, but shows the vessel in a different condition.

[0013] Fig. 1 shows an embodiment of a vessel 1 according to the invention. The vessel 1 is provided with a hull 2 and a deck 3. In the embodiment as shown in Fig. 1 the deck 3 has a flat upper surface on which jackets for supporting wind turbines can be placed, for example. The vessel 1 sails to an off-shore location where the jackets must be lifted from the deck 3 and transported to a location next to the vessel 1. The vessel is also suitable for decommissioning work such as lifting and removing heavy off-shore structures and transporting back to shore.

[0014] The vessel 1 comprises a crane 4 of which the

largest part extends above the deck 3. The crane 4 is provided with a tubular support column or pedestal 5 that is fixed to the hull 2 through a structural grid in a known manner. In this embodiment the pedestal 5 has a circular cross-section and its diameter slightly increases from the deck 3 in upward direction. The pedestal 5 is located at a side edge of the vessel 1 in order to provide a relatively large free space on the deck 3.

[0015] The crane 4 is provided with a turntable 6 which is mounted to the pedestal 5 and rotatable thereto about a vertical axis of rotation. The turntable 6 lies at a distance of about 75% of the height of the pedestal 5 from the deck 3, but different dimensions are conceivable. The turntable 6 supports a non-articulated boom 7 which has a planar triangular framework structure. The boom 7 has a proximal end portion that is pivotally mounted to the turntable 6 through heel pins 8 and narrows from the proximal end portion to a distal end of the boom 7 remote from the heel pins 8. The heel pins 8 have a common horizontal heel pin axis which extends transversely with respect to the vertical axis of rotation. The crane 4 is also provided with a hoisting cable 9 which suspends from a lifting location or sheave 10. The sheave 10 has a fixed location at the distal end of the boom 7. The hoisting cable 9 is provided with a main block 11 including a cargo hook 12. The hoisting cable 9 is fixed to a winch (not shown) in a known manner.

[0016] The crane 4 is also provided with a driving device in the form of a luffing system using wire cables extending between the top of the pedestal 5 and the distal end of the boom 7 in order to raise and lower the boom 7, but alternative driving devices are conceivable, for example hydraulic actuators.

[0017] Fig. 1 shows that the turntable 6 is located at a relatively high level, for example 60 m above the deck 3, whereas the length of the boom 7 may be 50 m, for example. In this embodiment the vertical distance between the deck 3 and the heel pin axis is larger than the distance between the heel pin axis and the distal end of the boom 7. The relatively high level of the turntable 6 provides the opportunity to lift relatively tall items like jackets for wind turbines, while minimizing the risk of a collision between a lifted item and the boom 7.

[0018] Furthermore, the boom 7 is rotatable between an upper position as shown in Fig. 1 in which the sheave 10 lies at a higher level than the heel pin 8 and a lower position in which the sheave 10 lies at a lower level than the heel pin 8. The latter condition is illustrated in Fig. 2, in which the boom 7 extends substantially vertical along the pedestal 5. Fig. 2 shows that the crane 4 in a folded condition occupies a minimum of space on the deck 3. The main block 11 can be stored at the deck near the pedestal 5, which facilitates maintenance.

[0019] The boom 7 can also be positioned in an inclined downward orientation at an acute angle with respect to the axis of rotation such that the sheave 10 is located next to the vessel 1, which is illustrated in Fig. 3. This is a desired position in case of subsea hoisting operations.

[0020] In an alternative embodiment (not shown) the vertical distance between the deck 3 and the heel pin axis is shorter than the distance between the heel pin axis and a distal end of the boom 7. In that case the boom 7 can be folded such that in the lower position the distal end of the boom 7 is located next to the hull 2 at a level below the deck 3.

[0021] The invention is not limited to the embodiment shown in the drawings and described hereinbefore, which may be varied in different manners within the scope of the claims and their technical equivalents.

Claims

1. A vessel (1) having a hull (2) including a deck (3) and a crane (4) of which the largest part extends above the deck (3), wherein the crane (4) is provided with a support column (5) that is fixed to the hull (2) and a turntable (6) which is mounted to the support column (5) and rotatable with respect to the support column (5) about an upwardly directed axis of rotation, a boom (7) having a proximal end portion that is pivotally mounted to the turntable (6) through a heel pin (8) having a heel pin axis which extends transversely with respect to the axis of rotation, a hoisting cable (9) suspending from a lifting location (10) that is located at the boom (7) remote from said proximal end portion and a driving device for rotating the boom (7) with respect to the turntable (6) about the heel pin axis, **characterized in that** the boom (7) is a non-articulated boom (7) which is rotatable between an upper position in which the lifting location (10) lies at a higher level than the heel pin axis and a lower position in which the lifting location (10) lies at a lower level than the heel pin axis.
2. A vessel (1) according to claim 1, wherein in the lower position the boom (7) extends substantially along the support column (5).
3. A vessel (1) according to claim 1 or 2, wherein the vertical distance between the deck (3) and the heel pin axis is larger than the distance between the heel pin axis and a distal end of the boom (7) lying remote from the proximal end portion.
4. A vessel (1) according to any one of the preceding claims, wherein the lifting location (10) is a fixed location along the boom (7).
5. A vessel (1) according to any one of the preceding claims, wherein the distance between the deck (3) and the heel pin axis is larger than twice the distance between the deck (3) and a bottom of the hull (2), and preferably larger than three times the distance between the deck (3) and a bottom of the hull (2).

6. A vessel (1) according to any one of the preceding claims, wherein the distance between the deck (3) and the turntable (6) is larger than the distance between the turntable (6) and a top of the support column (5).

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7. A vessel (1) according to claim 1 or 2, wherein the vertical distance between the deck (3) and the heel pin axis is shorter than the distance between the heel pin axis and a distal end of the boom (7) lying remote from the proximal end portion, wherein in the lower position the distal end of the boom (7) is located next to the hull (2) at a level below the deck (3).

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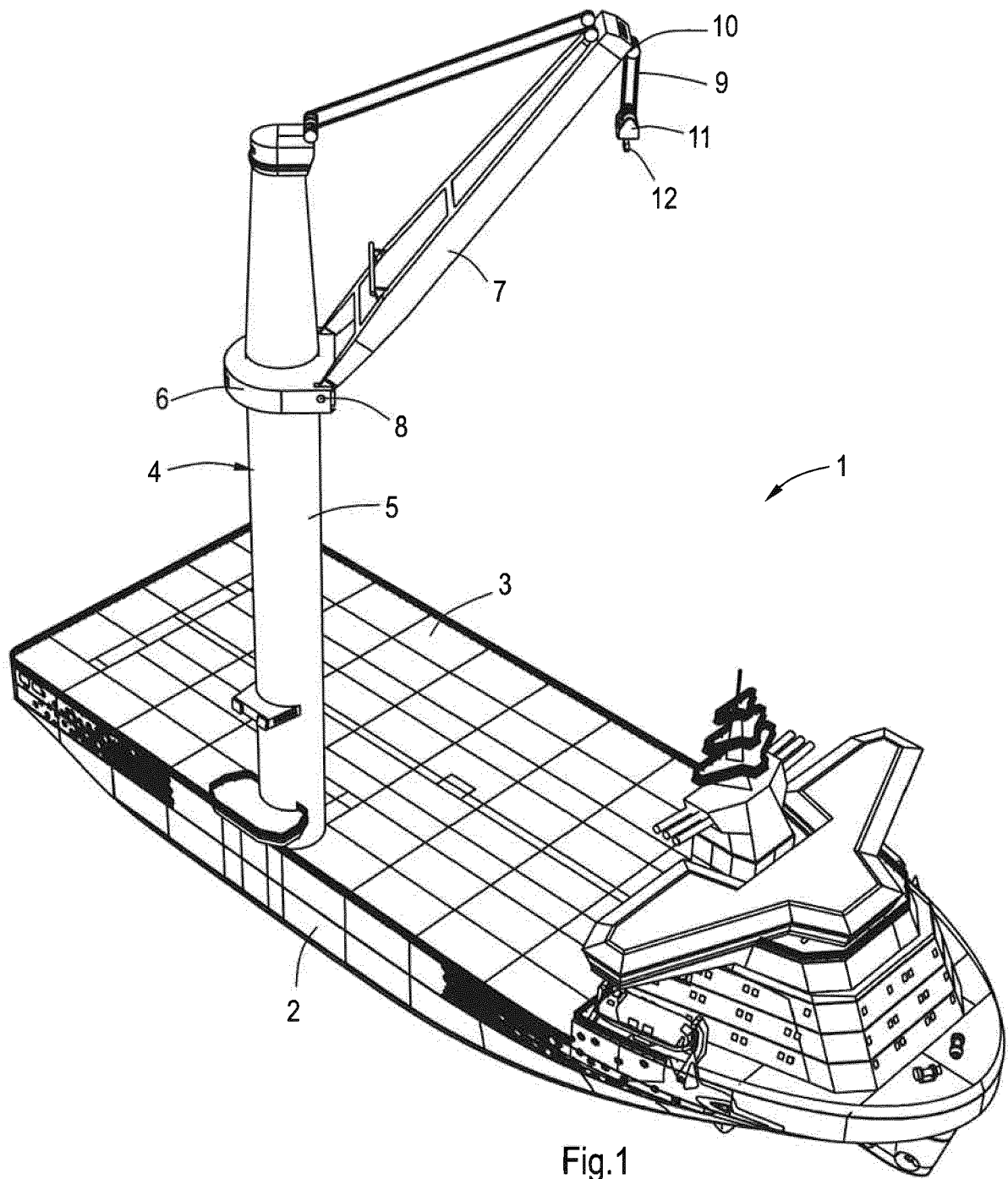
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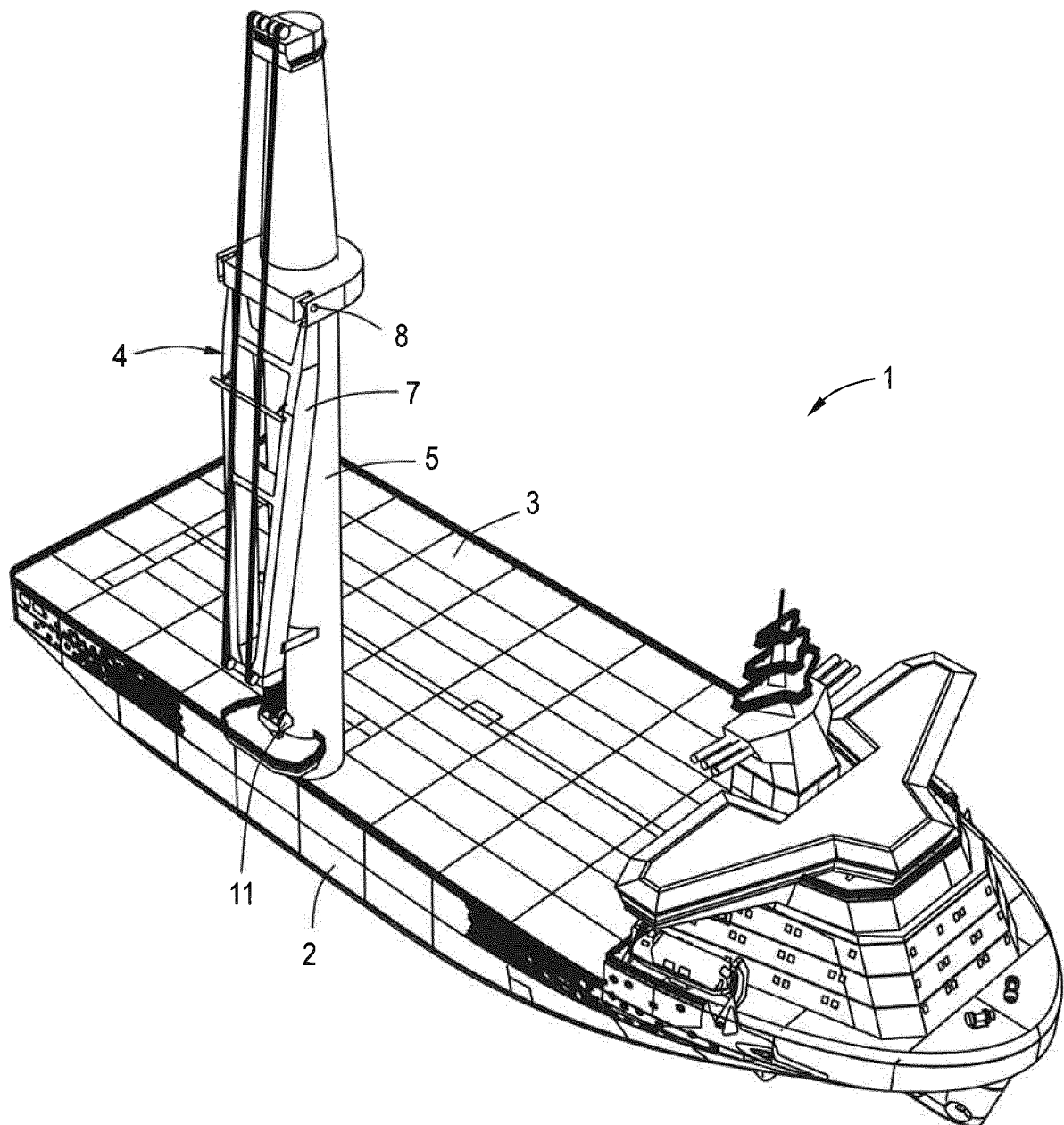


Fig.2

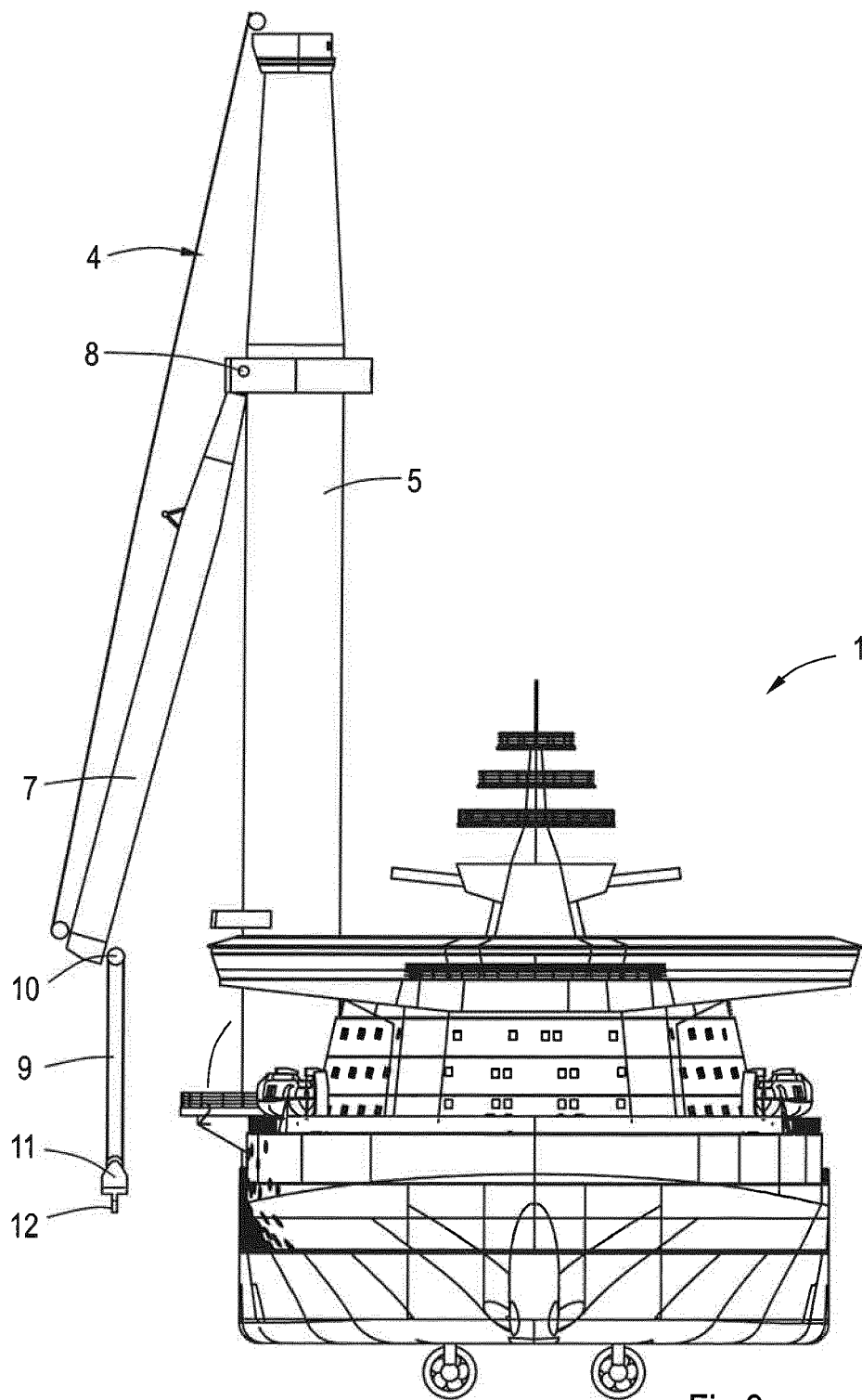


Fig.3



EUROPEAN SEARCH REPORT

Application Number
EP 18 16 5162

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Place of search The Hague		Date of completion of the search 29 August 2018	Examiner Schmitter, Thierry
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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