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(71) Applicant: **XEMC Darwind BV**
3526 KL Utrecht (NL)

(72) Inventor: **Pasteuning, Jan Willem Nicolaas**
5076 CB Haaren (NL)

(74) Representative: **Zonneveld, Hendrik Jan et al**
De Vries & Metman
Overschiestraat 180
1062 XK Amsterdam (NL)

(54) **Systems for transferring a person or a load between a vessel and an offshore structure**

(57) Method of transferring a person or a load between a vessel and an offshore structure, comprising the step of establishing a connection by at least one line between the vessel and the offshore structure, which line is stretched, and subsequently a transport member is guided along the stretched line to move between the vessel and the offshore structure. The line can for example be stretched by driving the vessel to move away from the offshore structure, e.g. astern, e.g., in part load.

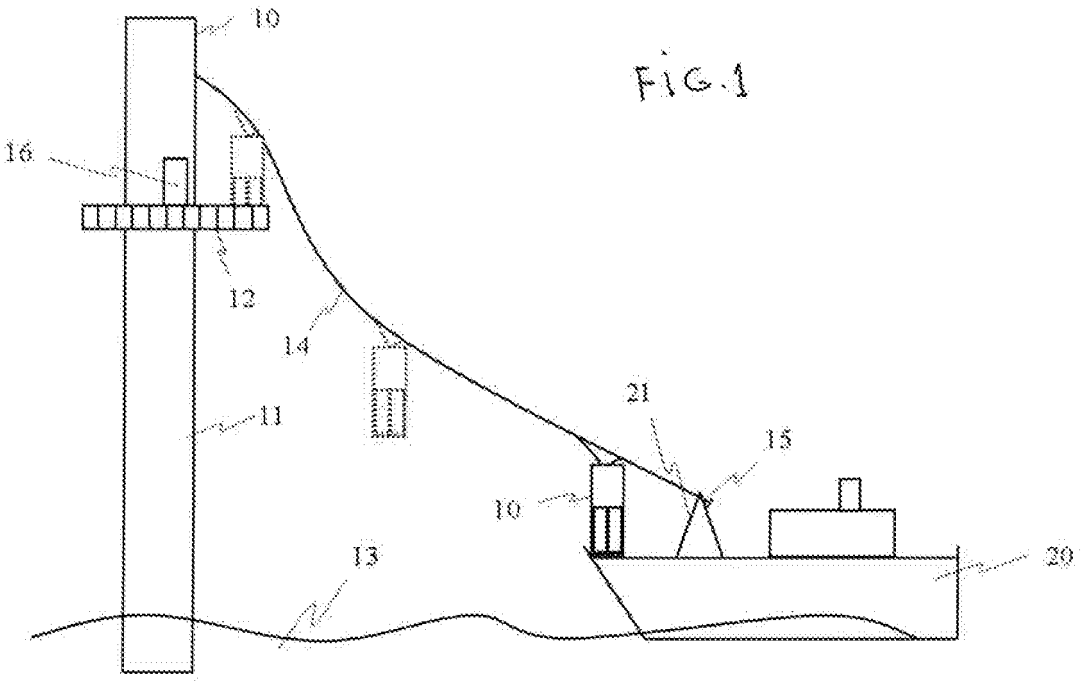

FIG. 1

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Description

[0001] The invention relates to a system for transferring objects or people between a vessel, and an offshore structure, e.g., an oil platform or offshore wind turbine.

[0002] Offshore installations, such as offshore wind turbines require regular maintenance and repair operations. Maintenance personnel with their equipment are transported to the wind turbine by ship. The personnel and their equipment have to move from the deck of the ship to the entrance of the wind turbine which is well above sea level, typically at a height of up to about 20 meters. When the wind is too hard or the waves are too high safety requirements do not allow entry of the wind turbine and maintenance or repair cannot be carried out. As a result, maintenance and repair can only be carried out during a limited range of weather conditions or weather window. Consequently, the availability of the wind turbine is reduced resulting in an increase of costs.

[0003] In WO 2007/120039 it has been proposed to use a ship comprising a motion compensation platform, or Stewart platform, using flight simulator technology to actively compensate wave movements. Such systems are expensive, fragile and require adapted ships.

[0004] The same holds for the system proposed in WO 98/57845 disclosing an access system for acceding an offshore oil platform using a variable length gangway with an articulate connection to the vessel. This prior art system requires the use of a large ship. In practice, the gangway cannot be made long enough to be able to reach the platform of the wind turbine. The system is not suitable for evacuation of injured personnel in a horizontal or sitting position.

[0005] It is an object of the invention to enable safe access to an offshore structure from a vessel, such as a service boat, even under difficult weather conditions. It should be possible to realize the system by a simple construction in a cost-effective way.

[0006] The object of the invention is achieved by a method of transferring a person or load between a vessel and an offshore structure, comprising the step of establishing a connection by at least one line between the vessel and the offshore structure, which line is stretched and subsequently a transport member is guided along the stretched line to move between the vessel, and the offshore structure.

[0007] This way, a robust connection is obtained between the vessel and the offshore structure. Direct contact between the moving vessel and the static offshore structure is avoided. The method of the invention can be realized with small and fast boats without associated equipment, e.g., the usual service boats for offshore activities. Moreover, the method according to the invention makes evacuation of injured personnel possible from the offshore structure to the vessel, e.g., in a horizontal or sitting position.

[0008] The line can be stretched by driving the vessel to move away from the offshore structure, e.g., by moving the vessel backward with the motor in reverse, for example half or minimum speed astern. The vessel does not need to be steered in a particular direction, which makes the system self stabilizing. The line will sag under its own weight. As a result, sudden shock loads and impact loads by sea induced motion are damped. The line forms a gradual transition from the movements of the ship to the static condition of the offshore structure to be entered. The driving force should be sufficient to prevent that opposite impact forces induced by wave action or weather conditions cause a temporary loss of tension in the line. The vessel can be provided with means blocking full force operation of the motor during the stretching of the line, allowing part load operation only. The vessel can also be provided with a safety block for preventing unintentional deactivation of the motor during the time that the transport member is guided along the stretched line. Since the ship is continuously kept at a distance from the structure to be entered, there is no risk that persons are clamped between the two structures.

[0009] If the offshore structure comprises an entrance platform, as is generally the case with offshore wind turbines, the line can attached to the offshore structure at a point higher than the entrance platform. This way, the transport member can be guided to land on the right place on the entrance platform. However, it is also possible to attach the line to a lower point. A ladder or similar means can then lead the transported personnel to entrance platform or another entrance.

[0010] The line can for example have a length of about 1,5 - 2,5 times the height of its point attachment relative to sea level, although the line can also be longer or shorter if so desired. A length of about twice the height of its point of attachment relative to sea level results in an angle of about 30 degrees with the horizon. It has been found that with such an angle shock loads induced by movement of the ship are effectively reduced.

[0011] The line can comprise a cable or a set of cables, e.g. tree or more parallel cables and/or interconnected cables, e.g., interconnected by cross cables or the like. Alternatively, or additionally, the line can comprise one or more bands or similar provisions.

[0012] Optionally, the line or cable can be attached permanently to the offshore structure to be acceded, with its free end hanging down, e.g., attached to a buoy and being in reach of an approaching ship. Alternatively, the flexible line can be stored within the offshore structure in a storage comprising a release mechanism. This way, the line is effectively protected against the salty environment. The release mechanism can for example be activated by a control unit on the vessel.

[0013] To facilitate easier picking up of the flexible line, the free end of the flexible line can comprise a thin extension line, optionally comprising a floatable member such as a buoy.

[0014] Optionally, the line can comprise an end-stop block while the vessel comprises a gripper for gripping the end-stop block.

[0015] The cable can be made of any suitable material, e.g. of shock absorbing materials. Suitable materials are for example fiber materials, e.g. polyethylene fibers, such as cables made of Dyneema® fibers, available from DSM. Alternatively, steel cables can be used.

[0016] The transport member can for example be a gangway, a lift cage or cabin or conveyor cage or the like. Such a cage or cabin can for example be provided with a set of rollers frictionally engaging the stretched line and with a motor for driving the set of rollers. The motor can for instance be an electrical motor which can be powdered by a battery in the cage or by a battery on the vessel using a power cable.

[0017] Optionally, the cage is lifted via the stretched line by a lifting cable operatively attached to a winch on the offshore structure. Before use, such a lifting cable can be stored in a protected storage location, such as a locker. After connecting the flexible line to the vessel, the outer end of the lifting cable is moved to the vessel along the flexible line.

[0018] In a specific embodiment, the cage can for example be a flexible tube which can be guided over the flexible line. Such a tube can be stored on the vessel, e.g, in a rolled arrangement.

[0019] The invention is further explained with reference to the accompanying drawing, in which:

Fig. 1 shows schematically an offshore access system according to the present invention;
Fig. 2 shows schematically in detail the cage of the system shown in Figure 1;
Fig. 3A shows schematically a connection line for an offshore access system according to the present invention;
Fig. 3B shows the line of Fig. 3A with a locking unit;
Fig. 3C shows the locking unit of Fig. 3B when locking the connection line of Figure 3A.

[0020] Figure 1. shows a schematic representation of an offshore construction 10, e.g., an offshore wind turbine, comprising a tower 11 carrying a platform 12 with a door 16 for access to the interior of the tower 11, e.g. for maintenance or repair purposes. In this embodiment, the platform 12 is about 20 meters above sea level 13. A line 14 is permanently attached to the platform 12, having a length substantially more than the height of the platform 12. When not in use, the line 14 hangs down, with its free end 15 in reach of a passing ship.

[0021] In Figure 1, the free end 15 of the line 14 is attached to a mast 21 on deck on the front side of a service boat 20. The service boat 20 is driven to move away from the wind turbine 10, thus stretching the line 14 which sags under its own weight. The service boat 20 contains a conveyor cage 22 for transporting personnel and/or equipment between the service boat 20 and the wind turbine 10. The cage 22 is moved along the stretched line 14.

[0022] Figure 2 shows the cage 22 schematically in more detail. The cage 22 has an entrance 23. On its top end, the cage 22 comprises a set of rollers or gear wheels 24 arrange in two parallel rows gripping the stretched line 14. By rolling the rollers or gear wheels 24, the cage can move up and down via the line 14, The two rows of rollers 24 can be moved apart for disengagement from the line 14.

[0023] Figure 3A shows a line 14 having at its free end an end-stop block 17, an extension line 18 and a floating buoy 19. This way, the free end of line 14 can be picked up easily by a passing ship. The end-stop block 17 can be locked by a gripper or locking unit 25, which can be opened to receive the end-stop block 17, as shown in Figure 3B, and closed to lock it firmly, as shown in Figure 3C.

Claims

1. Method of transferring a person or a load between a vessel and an offshore structure, comprising the step of establishing a connection by at least one line between the vessel and the offshore structure, which line is stretched, and subsequently a transport member is guided along the stretched line to move between the vessel and the offshore structure.

2. Method according to claim 1 **characterized in that** the line is stretched by driving the vessel to move away from the offshore structure.

3. Method according to claim 2 **characterized in that** the line is stretched by the vessel in part load.

4. Method according to claim 1, 2 or 3 **characterized in that** the transport member comprise a gangway.

5. Method according to claim 1, 2 or 3 **characterized in that** the transport member comprises a conveyer cage.

6. Method according to claim 5 **characterized in that** the cage is provided with a set of rollers frictionally engaging the stretched line and with a motor for driving the set of rollers.

7. Method according to claim 5 wherein the cage is lifted via the stretched line by a lifting cable operatively attached to a winch on the offshore structure.

8. Method according to claim 7 **characterized in that** before use the lifting cable is stored in a protected location and after connecting the flexible line to the vessel, the outer end of the lifting cable is moved to the vessel along the flexible line.

9. Method according to any one of the preceding claims 4 - 8 **characterized in that** the cage is a flexible

tube which can be guided along the flexible line.

10. Method according to any one of the preceding claims **characterized in that** the flexible line hangs down from a platform of the offshore structure when the flexible line is not in use.

11. Method according to any one of the preceding claims 1 - 8 **characterized in that** the flexible line is stored within the offshore structure in a storage comprising a release mechanism.

12. Method according to any one of the preceding claims **characterized in that** the line comprises an extension line.

13. Method according to claim 12 **characterized in that** the extension line comprises a buoy.

14. Method according to anyone of the preceding claims **characterized in that** the line comprises an end-stop block and the vessel comprises a gripper for gripping the end-stop block.

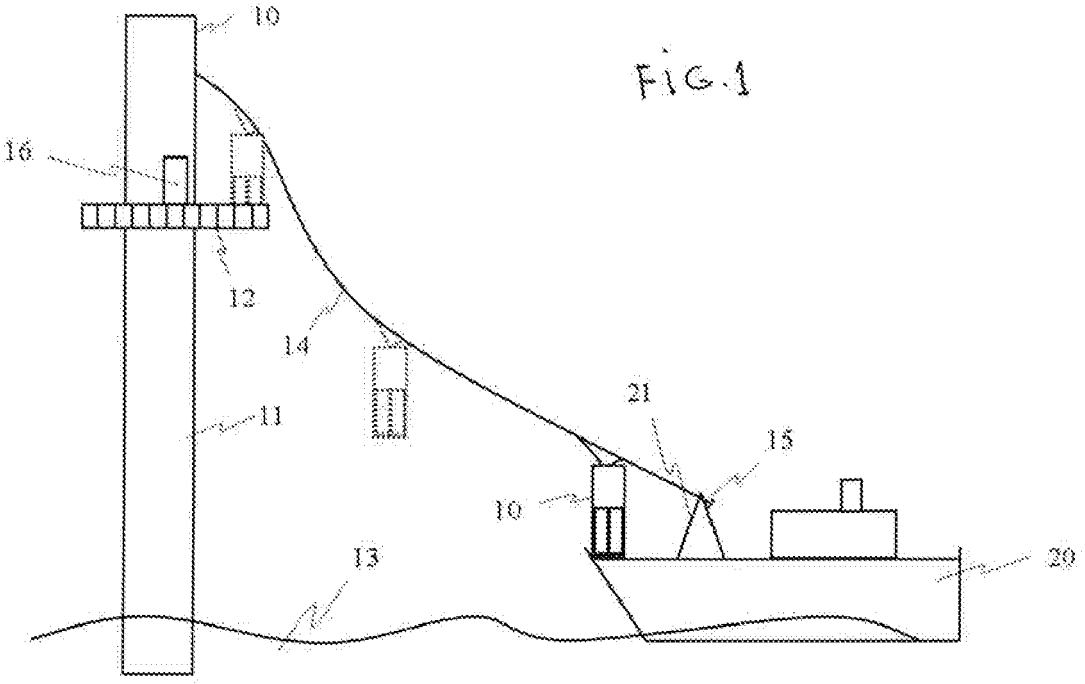

FIG. 1

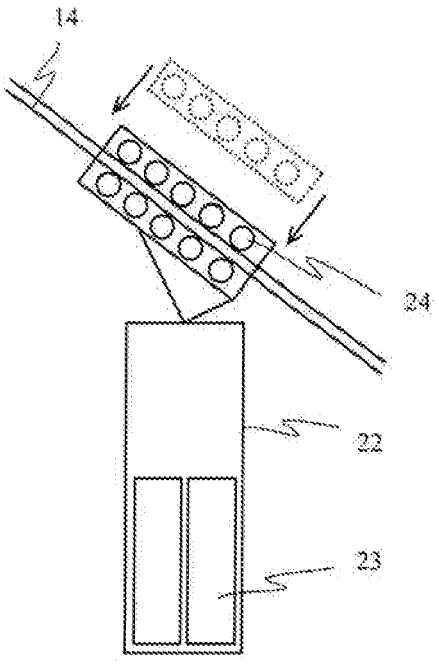

Fig. 2

FIG. 3A

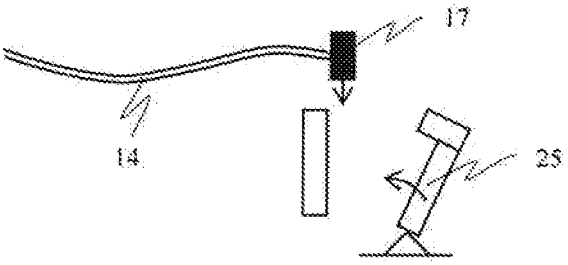

FIG. 3B

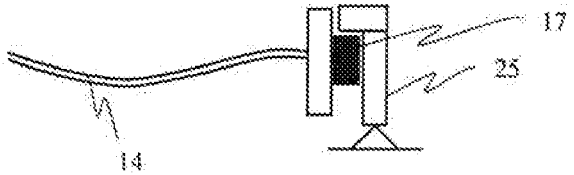

FIG. 3C

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EUROPEAN SEARCH REPORT

Application Number
EP 08 16 1674

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 December 2008	Raffaelli, Leonardo

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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