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(54) **Title:**
MARINE STRUCTURE HAVING AZIMUTH PROPULSION DEVICES

(57) **Abstract:**
MARINE STRUCTURE HAVING AZIMUTH PROPULSION DEVICES ABSTRACT OF THE DISCLOSURE The present invention relates to a marine structure in which a plurality of thrusters, which serve as azimuth propulsion devices for generating a propulsion force for moving a hull, are installed on a bow bottom of a bow of the hull and a stern bottom of a stern of the hull, and some regions of the bow and the stern have relatively light draft to enable the marine structure to be sailed over a shallow water area. According to the present invention, a marine structure comprising azimuth propulsion devices installed on a low portion of a hull to move the hull is characterized in that bow and stern portions of the hull are composed of bow-side and stern-side light draft portions, respectively, whose drafts are lighter than that of a central portion of the hull, and the azimuth propulsion devices are installed on the bow-side and stern-side light draft portions whose drafts are lighter than that of the central portion. Fig. 2

MARINE STRUCTURE HAVING AZIMUTH PROPULSION DEVICES

ABSTRACT OF THE DISCLOSURE

The present invention relates to a marine structure in which a plurality of thrusters, which serve as azimuth propulsion devices for generating a propulsion force for moving a hull, are installed on a bow bottom of a bow of the hull and a stern bottom of a stern of the hull, and some regions of the bow and the stern have relatively light draft to enable the marine structure to be sailed over a shallow water area. According to the present invention, a marine structure comprising azimuth propulsion devices installed on a low portion of a hull to move the hull is characterized in that bow and stern portions of the hull are composed of bow-side and stern-side light draft portions, respectively, whose drafts are lighter than that of a central portion of the hull, and the azimuth propulsion devices are installed on the bow-side and stern-side light draft portions whose drafts are lighter than that of the central portion.

Fig. 2

MARINE STRUCTURE HAVING AZIMUTH PROPULSION DEVICES

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a floating type structure provided with azimuth propulsion devices installed on a bottom of a hull, and more particularly, to a marine structure in which a plurality of thrusters, which serve as azimuth propulsion devices for generating propulsion force for moving a hull, are installed on a bow bottom of a bow of the hull and a stern bottom of a stern of the hull, wherein some regions of the bow and the stern have relatively light draft to enable the marine structure to be sailed over a shallow water area.

2. Description of the Related Art

In general, a dynamic position (DP) system in a vessel is a system for identifying a location of the vessel through a global positioning system (GPS) and for anchoring the location of the vessel by using a propulsion device without employing a conventional mooring apparatus.

Such a dynamic position system is mainly provided in a drillship or a semi-submersible drilling vessel, which may perform a drilling process while being sailed unlike a stationary platform dedicated to offshore oil drilling which may perform an offshore oil drilling process while being anchored at a certain location on the sea by means of the mooring device, an ice breaker which may be independently sailed while breaking ice in polar regions, and the like.

As the propulsion device employed in the dynamic position system, an azimuth propulsion device, such as an azimuth thruster, an Azipod and the like, has been utilized, wherein the azimuth propulsion device is an omnidirectional propulsion device provided with a propeller which can be pivoted as much as 360 degrees, so that the azimuth propulsion device allows the vessel to be freely propelled forward or rearward or turned.

Meanwhile, due to various advantages in the steering performance, etc, the azimuth propulsion device has been widely utilized for not only the drillship or the semi-submersible drilling vessel and the ice breaker but also various kinds of vessels including a shuttle tanker, an oil or liquefied natural gas (LNG) floating production storage offloading (FPSO), an oil or LNG floating storage and regasification unit (FSRU), a cargo or passenger ship sailed over the polar regions.

Examples of various marine structures, in which an azimuth propulsion device is installed on a lower portion of the hull of each marine structure, are disclosed in Japanese Utility Model Laid Open Publication No. S62-137799 and Korean Utility Model Laid Open Publication No. 20-2000-0002096.

As shown in FIG. 1, The azimuth propulsion device (i.e. the thruster) for generating the propulsion force for moving the hull is installed on a lower surface of the hull to reduce noises and/or vibrations in a passenger ship or to enhance the efficiency in the drillship or the semi-submersible drilling vessel. Due to the height of the thruster, however, the vessels as described above are highly restricted to be sailed over a shallow water area. In order to solve the above problem, a method for using retractable type thrusters to sail over a restricted depth of water area has been proposed, in which the retractable type thrusters can be retracted within the hull as occasion demands, so that when the hull is sailed over a harbor or a canal, some of the retractable thrusters are retracted within the hull while only other thrusters installed over a baseline of the hull are utilized to allow the hull to be sailed over the restricted depth of water area.

However, since the retractable type thrusters have low application frequency, frequent failure in use and difficulty in maintenance, the majority of the ship owners do not prefer such retractable type thrusters.

Meanwhile, in a case where the azimuth propulsion device is installed below the baseline of the hull, the best efficiency of the azimuth propulsion device can be obtained. However, since the azimuth propulsion device itself generally has a height of approximately 6.0 meters or more, the azimuth propulsion device as described above serves as considerable obstacles when the hull is sailed over a shallow sea area.

In addition, since the draft should be maintained to be light in order to allow the hull to be sailed on a shallow sea area, a large quantity of cargos, passengers and consumable goods could not be loaded within the hull. In some cases, the hull happens to be passed over a shallow sea area without loading any cargos, passengers and consumable goods.

SUMMARY OF THE INVENTION

The present invention is conceived to solve the aforementioned problems in the prior art. An object of the present invention is to provide a marine structure in which a plurality of thrusters, which serve as azimuth propulsion devices for generating a propulsion force for moving a hull, are installed on a bow bottom of a bow of the hull and a stern bottom of a stern of the hull, and some regions of the bow and the stern have relatively light draft to enable the marine structure to be sailed over a shallow water area.

According to an aspect of the present invention for achieving the object, there is provided a marine structure having azimuth propulsion devices installed on a low portion of a hull to move the hull, wherein bow and stern portions of the hull are composed of a bow-side light draft portion and a stern-side light draft portion, respectively, whose draft are lighter than that of a central portion of the hull, and the azimuth propulsion devices are installed on the bow-side and stern-side light draft portions whose draft are lighter than that of the central portion.

Preferably, the azimuth propulsion device is installed so that the height of lower end of the azimuth propulsion device is equal to or higher than that of a baseline of the central portion.

The azimuth propulsion device is preferably installed so that the height of a propeller axis of a propeller of the azimuth propulsion device is equal to or higher than that the baseline of the central portion.

Preferably, the marine structure further comprises an install platform sandwiched between the azimuth propulsion device and the bow-side or stern-side light draft portion so that the propeller axis of the propeller of the azimuth propulsion device is horizontal.

Preferably, the azimuth propulsion devices are installed on the bow-side and stern-side light draft portions so that the propeller axis of the propeller of the azimuth propulsion device is parallel with the slanting hull portion on which the azimuth propulsion device is installed and which is inclined with respect to a surface of the sea. If the azimuth propulsion device is installed to be parallel with the slanting hull portion which is inclined with respect to the surface of the sea, it is advantageous in that the flow field generated by the propeller of the azimuth propulsion device can be stably formed, thereby reducing the corrosion or resistance of the bottom of the hull which may be caused due to cavitation.

Preferably, the marine structure is a drillship or a semi-submersible drilling vessel.

According to another aspect of the present invention, a marine structure comprising a plurality of azimuth propulsion devices installed on a low portion of a hull to move the hull, wherein all the azimuth propulsion devices are installed on a light draft portion whose draft is lighter than that of the rest portion of the hull, thereby enabling the marine structure to be sailed over a shallow sea area.

According to a further aspect of the invention, a marine structure comprising an azimuth propulsion device installed on a low portion of a hull to move the hull, wherein a portion of the hull on which no cargo is loaded has a bottom which is modified to form a light draft having a relatively light draft and the azimuth propulsion device is installed on the light draft portion to prevent the load capacity of the cargo from being reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view illustrating schematically a marine structure having a conventional azimuth propulsion device;

FIG. 2 is a side view illustrating schematically a marine structure having an azimuth propulsion device according to a preferred embodiment of the present invention; and

FIG. 3 is a side view illustrating schematically a marine structure having an azimuth propulsion device according to a modified embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings.

A marine structure mentioned herein is a concept including structures and/or vessels used to be floated on the sea and provided with an azimuth propulsion device by which a propulsion force utilized for moving a hull can be generated. For example, the marine structure comprises all the structures and/or vessels such as a drillship or a semi-submersible drilling vessel, an ice breaker, a FPSO (floating, production, storage and offloading), a FSRU (floating storage and regasification unit) and the like.

According to the present invention, as shown in FIG. 2, a hull 1 is manufactured to be shaped so that some region (a bow-side light draft portion 2) in a bow side of the hull 1 and some region (a stern-side light draft portion 3) in a stern side of the hull 1 have drafts which are lighter than that of a central portion 4 of the hull 1. Herein, the term "light draft" means that a portion of the hull referred to as light draft is lightly submerged under the water, that is, the distance between the surface of the water and a lower end of the portion of the hull referred to as light draft is short while the term "deep draft" means that another portion of the hull referred to as deep draft is deeply submerged under the water, that is, the distance between the surface of the water and the lower end of the portion of the hull referred to as deep draft is long.

Since it is required that the hull 1 basically has a streamline shape, it is preferable that a bow-side transition portion 5 is formed to slantingly connect the bow-side light draft portion 2 and the central portion 4 so that a stepped portion cannot be formed between the bow-side light draft portion 2 having relatively light draft and the central portion 4 having relatively deep draft. Likewise, it is preferable that a stern-side transition portion 6 is formed to slantingly connect the stern-side light draft portion 3 and the central portion 4 so that a stepped portion cannot be formed between the stern-side light draft portion 3 having relatively light draft and the central portion 4 having relatively deep draft.

FIG. 2 shows that the central portion 4 has an approximately horizontal bottom surface, the bow-side light draft portion 2 has a bottom surface which is gradually descended and then steeply ascended towards the bow side of the hull 1 to form a bow portion of the hull, and the stern-side light draft portion 3 has a bottom surface which is inclined to be gradually ascended towards the stern side of the hull 1. However, the present invention is not limited to the shape of the hull as described above. It will be apparent that the present invention can be applied to a shape of the hull in which the bow-side light draft portion 2 and the stern-side light draft portion 3 have approximately horizontal bottom surfaces or another shape of the hull in which the bow-side light draft portion 2 and the stern-side light draft portion 3 have slanting bottom surfaces which are gradually ascended toward the bow side and the stern side, respectively.

The height of the bow-side light draft portion 2 may be equal to that of the stern-side light draft portion 3. Although FIG. 2 illustrates that two azimuth propulsion devices 10 are installed on the bow-side light draft portion 2 and two azimuth propulsion devices 10 are installed on the stern-side light draft portion 3, the present invention is not limited to the number of the azimuth propulsion devices. If two azimuth propulsion devices are installed on each of the bow-side light draft portion 2 and the stern-side light draft portion 3, it is preferable that the two azimuth propulsion devices are not arranged in a line in the lengthwise direction of the hull 1 but diagonally arranged to prevent the two azimuth propulsion devices from being interfered with each other. In addition, three azimuth propulsion devices arranged in a triangular shape may be installed on each of the bow-side light draft portion 2 and the stern-side light draft portion 3.

Although the difference in height between the bow-side light draft portion 2 and stern-side light draft portion 3 and the central portion 4 can be varied depending on the dimension of the azimuth propulsion device 10 to be used, the difference in height between the bow-side light draft portion 2 and stern-side light draft portion 3 and the central portion 4 can be determined such that the height of a propeller axis of a propeller of the azimuth propulsion device 10 is approximately equal to or higher than that of a baseline of the central portion 4. Alternatively, the difference in height between the bow-side light draft portion 2 and stern-side light draft portion 3 and the central portion 4 can be determined such that the height of a lower end of the azimuth propulsion device 10 is equal to or higher than that of the baseline of the central portion 4.

According to the marine structure shown in FIG. 2, if the baseline of the hull is not horizontal, in order to enable the propeller axis of the propeller of the azimuth propulsion device 10 to be horizontally installed, an install platform 11 may be sandwiched between the azimuth propulsion device 10 and the baseline of the hull, so that the azimuth propulsion device 10 may be installed on the install platform 11. If the propeller axis of the propeller is horizontal, a stable flow field may be formed around the propeller to prevent the propulsive force from being lost.

Referring to FIG. 3 showing a modified example of the present invention, unlike the configuration shown in FIG. 2, the azimuth propulsion device 10 may be installed without an additional install platform even if the baseline of the hull is not horizontal. Accordingly, the azimuth propulsion device 10 may be installed so that the propeller axis of the propeller is not horizontal but slanted depending on the slanting degree of the hull in a portion on which the azimuth propulsion device 10 is installed. In this case, it is possible to utilize the shape of the hull in order to install the azimuth propulsion device 10, so that the flow field around the azimuth propulsion device 10 may be stably obtained. FIG. 3 also shows an enlarged view of only the second azimuth propulsion device from the bow side in which the slanting angle of the second azimuth propulsion device is indicated as "θ ." However, this structure is only exemplarily illustrated.

If the azimuth propulsion device 10 is installed to be parallel with a slating hull portion 12 which is inclined with respect to a surface of the sea, the present invention may be advantageous in that the flow field generated by the propeller of the azimuth propulsion device can be stably formed, thereby reducing the corrosion or resistance of the bottom of the hull which may be caused due to cavitation. Although FIG. 3 shows that only the second azimuth propulsion device from the bow side is installed on the slanting hull portion 12 in the bow-side light draft portion 2 which is inclined with respect to the surface of the sea, this structure is only exemplarily illustrated.

According to the present invention as described above, without manufacturing the bottom surface of the hull with the same draft from the bow side to the stern side, the bow-side light draft portion 2 having light draft and the stern-side light draft portion 3 having light draft are formed on some regions of the bow side and the stern side on which the azimuth propulsion devices are installed. As such, on a canal in which it is difficult to secure the draft or on a shallow harbor in which the depth of water is shallow, it is possible to enhance the mobility of the hull and to secure the load capacity in the hull in proportion to the secured draft.

As compared with the retractable type thruster, the inventive azimuth propulsion device is advantageous in view of low failure frequency in use, inexpensive maintenance cost, and easiness in maintenance.

In addition, even if the marine structure to which the present invention is applied is a cargo ship, the central portion of the hull which has been mainly utilized as a loading space is not volumetrically reduced while some regions in the bow side and the stern side are configured to have light draft, so that the load capacity for cargo is not adversely influenced.

According to the present invention as described above, the marine structure is provided in which a plurality of thrusters, which serve as the azimuth propulsion device for generating a propulsion force for moving the hull, are installed on a bow bottom of the bow and a stern bottom of the stern, wherein some regions of the bow and the stern have relatively light draft to enable the marine structure to be sailed over a shallow water area.

Although the present invention have been described with a specified embodiment, it will be apparent to those skilled in the art that various modifications, changes and variations can be made thereto within the scope of the present invention and the appended claims. Therefore, the aforementioned descriptions and the accompanying drawings should be construed as not limiting the technical spirit of the present invention but illustrating the present invention.

WHAT IS CLAIMED IS:

1. A marine structure having azimuth propulsion devices installed on a low portion of a hull to move the hull,

wherein bow and stern portions of the hull are composed of bow-side and stern-side light draft portions, respectively, whose drafts are lighter than that of a central portion of the hull, and azimuth propulsion devices are installed on the bow-side and stern-side light draft portions whose drafts are lighter than that of the central portion.

2. The marine structure as claimed in claim 1, wherein the azimuth propulsion device is installed so that the height of a lower end of the azimuth propulsion device is equal to or higher than that of a baseline of the central portion.

3. The marine structure as claimed in claim 1 or 2, wherein the azimuth propulsion device is installed so that the height of a propeller axis of a propeller of the azimuth propulsion device is equal to or height than that of a baseline of the central portion.

4. The marine structure as claimed in any of the preceding claims, further comprising an install platform sandwiched between the azimuth propulsion device and the bow-side or stern-side light draft portion so that a propeller axis of a propeller of the azimuth propulsion device is horizontal.

5. The marine structure as claimed in any of the preceding claims, wherein the azimuth propulsion devices are installed on the bow-side and stern-side light draft portions so that a propeller axis of a propeller of the azimuth propulsion device is parallel with a slanting hull portion on which the azimuth propulsion device is installed and which is inclined with respect to a surface of the sea.

6. The marine structure as claimed in any of the preceding claims, wherein the marine structure is a drillship or a semi-submersible drilling vessel.

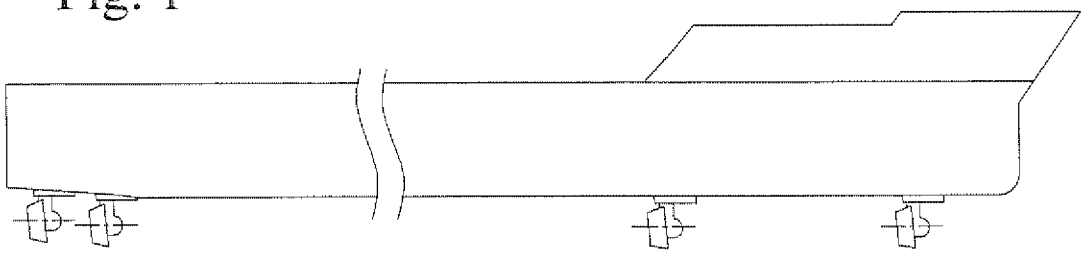
7. A marine structure comprising a plurality of azimuth propulsion devices installed on a low portion of a hull to move the hull,

wherein all the azimuth propulsion devices are installed on a light draft portion whose draft is lighter than that of the rest portion of the hull, thereby enabling the marine structure to be sailed over a shallow sea area.

8. A marine structure comprising an azimuth propulsion device installed on a low portion of a hull to move the hull,

wherein a portion of the hull on which no cargo is loaded has a bottom which is modified to form a light draft portion having a relatively light draft and the azimuth propulsion device is installed on the light draft portion to prevent the load capacity of the cargo from being reduced.

Fig. 1



Prior Art

Fig. 2

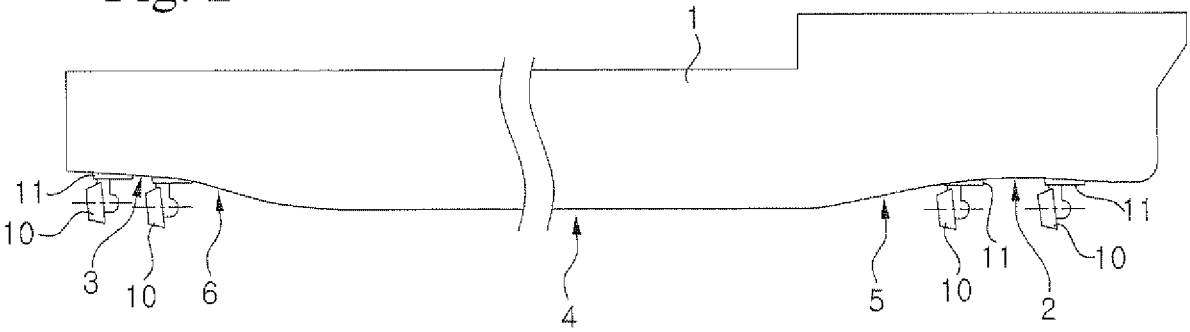


Fig. 3