

Catamaran type LNG floater

BACKGROUND OF THE INVENTION

Field of the Invention

[01] The present invention relates to a catamaran type LNG floater, and more particularly, to a catamaran type LNG floater, which includes an LNG ship's hull, a float arranged laterally adjacent to the LNG ship's hull, a liquefaction unit connected onto the LNG ship's hull and the float in such a way as to be supported by the LNG ship's hull and the float, and water level controlling means for controlling the water level of the float so that the liquefaction unit can be stably supported while keeping the balance by the water level controlling means, thereby enhancing stability of the LNG floater and allowing an easy and rapid installation of the liquefaction unit without renovation of the existing LNG ship.

Background Art

[02] In general, an LNG floater (LNG floating storage and production facility) is a marine facility equipped with a unit to produce LNG (Liquefied Natural Gas) or natural gas on a barge-type float.

[03] Such an LNG floater has different configurations of upper units or components according to types of cargo tanks for

storing LNG. For instance, in case of a cargo tank of a MOSS type, it is recognized that the MOSS-type cargo tank is safe because it does not cause sloshing of LNG. However, the LNG floater having the MOSS-type cargo tank has a problem in that it requires an excessive area because there are spatial constraints in manufacturing an FPSO (Floating Production, Storage and Offloading) unit for producing LNG or renovating the existing LNG ship into an LNG FPSO ship.

[04] Moreover, in case of a cargo tank of a membrane type, because the membrane-type cargo tank causes sloshing, there are many limitations on that the membrane-type cargo tank is used as a cargo tank for the LNG floater. Furthermore, in order to use the membrane-type cargo tank in the LNG floater, strength of insulation parts must be largely increased, and in case where the LNG ship is renovated into an LNG FPSO ship, materials of a part of the cargo tank must be substituted with a reinforced insulation material.

[05] Additionally, in case of an SPB (Self Supporting Prismatic Type-B) cargo tank, because it is expected that it does not cause sloshing, the SPB cargo tank has been used as a cargo tank for the LNG floater, but it is more expensive in manufacturing costs than the membrane-type cargo tank.

[06] In the meantime, in case where the existing LNG ship is renovated into an LNG floater or a new LNG floater is built,

there are many problems according to the types of the cargo tank as follows.

[07] First, in case of the membrane-type cargo tank, it must have a bulkhead at the center thereof due to sloshing and use a special insulation box with increased insulation strength. Moreover, in case where the existing LNG ship is renovated into an LNG floater, the renovation must be made not using an LNG ship but using an LNG RV because the insulation box mounted inside the cargo tank must be replaced with a new one with a reinforced insulation. In this instance, because the LNG RV is divided into two and a liquefaction unit is installed between the two LNG RVs, the insulation box of the cargo tank may be damaged while cutting the LNG RV into two and welding the divided LNG RVs to be joined with each other, and hence, it is necessary to rework the cargo tank.

[08] Furthermore, in case of the MOSS-type cargo tank, without regard to renovation or new building of the LNG floater, it does not have an enough space for liquefaction unit and is too small to install a heat exchanger and a column because the heat exchanger and the column are too high.

[09] Now, the LNG market requires LNG floaters, each of which is equipped with a medium-sized liquefaction unit to develop small and medium-sized gas reserves.

[10] Therefore, there are attempts to renovate LNG ship, which are not in service, in the market because new-building of LNG floaters comes expensive.

SUMMARY OF THE INVENTION

[11] Accordingly, the present invention has been made to solve the above-mentioned problems occurring in the prior arts, and it is an object of the present invention to provide a catamaran type LNG floater, which includes an LNG ship's hull, a float arranged laterally adjacent to the LNG ship's hull, a liquefaction unit connected onto the LNG ship's hull and the float in such a way as to be supported by the LNG ship's hull and the float, and water level controlling means for controlling the water level of the float so that the liquefaction unit can be stably supported while keeping the balance by the water level controlling means, thereby enhancing stability of the LNG floater and allowing an easy and rapid installation of the liquefaction unit without renovation of the existing LNG ship.

[12] To accomplish the above object, according to the present invention, there is provided a catamaran type LNG floater including: an LNG ship's hull having a first ballast tank for storing ballast water; a float spaced apart from the LNG ship's hull at a predetermined interval and floating on the surface of the sea, which is laterally adjacent to the LNG ship's hull, the

float having a second ballast tank for storing ballast water; and a liquefaction unit having an end portion connected to the LNG ship's hull and the other end portion connected to the float so as to be supported by the LNG ship's hull and the float.

[13] Moreover, the first ballast tank of the LNG ship's hull and the second ballast tank of the float communicate with each other via a communication pipe to thereby share the ballast water with each other.

[14] Furthermore, the catamaran type LNG floater further includes water level controlling means for controlling a water level of the ballast water contained in the second ballast tank of the float.

[15] Additionally, the water level controlling means includes: an air compressor for supplying compressed air into the float and forcedly introducing the ballast water contained into the second ballast tank of the float into the first ballast tank of the LNG ship's hull; a feed pipe having an end portion connected with the air compressor and the other end portion communicating with a portion of an upper end part of the float to thereby supply the compressed air of the air compressor into the float; and a discharge pipe arranged adjacent to the feed pipe for discharging the inside air of the float to the outside.

[16] In addition, the feed pipe comprises a feed control valve for controlling a feed amount of the compressed air supplied from the air compressor.

[17] Moreover, the discharge pipe comprises a discharge control valve for controlling a discharge amount of the compressed air of the float discharged to the outside.

[18] As described above, the catamaran type LNG floater according to the present invention includes the LNG ship's hull, the float arranged laterally adjacent to the LNG ship's hull, the liquefaction unit connected onto the LNG ship's hull and the float in such a way as to be supported by the LNG ship's hull and the float, and the water level controlling means for controlling the water level of the float so that the liquefaction unit can be stably supported while keeping the balance by the water level controlling means, thereby enhancing stability of the LNG floater and allowing an easy and rapid installation of the liquefaction unit without renovation of the existing LNG ship.

BRIEF DESCRIPTION OF THE DRAWINGS

[19] The above and other objects, features and advantages of the present invention will be apparent from the following detailed description of the preferred embodiments of the invention in conjunction with the accompanying drawings, in which:

[20] FIG. 1 is a schematic diagram of a catamaran type LNG floater according to a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[21] Reference will be now made in detail to the preferred embodiment of the present invention with reference to the attached drawings.

[22] As shown in FIG. 1, a catamaran type LNG floater according to a preferred embodiment of the present invention includes: an LNG ship's hull 10 having a first ballast tank 11 for storing ballast water; a float 20 spaced apart from the LNG ship's hull 10 at a predetermined interval and floating on the surface of the sea, which is laterally adjacent to the LNG ship's hull 10, the float 20 having a second ballast tank 21 for storing ballast water; and a liquefaction unit 30 having an end portion connected to the LNG ship's hull 10 and the other end portion connected to the float 20 so as to be supported by the LNG ship's hull 10 and the float 20.

[23] The first ballast tank 11 of the LNG ship's hull 10 and the second ballast tank 21 of the float 20 communicate with each other via a communication pipe 40 to thereby share the ballast water with each other.

[24] Moreover, the LNG floater according to the present invention further includes water level controlling means for controlling a water level of the ballast water contained in the second ballast tank 21 of the float 20.

[25] Here, the water level controlling means includes: an air compressor 50 for supplying compressed air into the float 20 and forcedly introducing the ballast water contained into the second ballast tank 21 of the float 20 into the first ballast tank 11 of the LNG ship's hull 10; a feed pipe 60 having an end portion connected with the air compressor 50 and the other end portion communicating with a portion of an upper end part of the float 20 to thereby supply the compressed air of the air compressor 50 into the float 20; and a discharge pipe 70 arranged adjacent to the feed pipe 60 for discharging the inside air of the float 20 to the outside.

[26] Additionally, the feed pipe 60 includes a feed control valve 61 for controlling a feed amount of the compressed air supplied from the air compressor 50, and the discharge pipe 70 includes a discharge control valve 71 for controlling a discharge amount of the compressed air of the float 20 discharged to the outside.

[27] Here, it is preferable that the air compressor 50 can control the water level of the ballast water contained in the float 20 by repeatedly increasing and decreasing pressure of air

using a pumping system, which is used in the conventional LNG ship's hull 10.

[28] Furthermore, when the water level is controlled, it is preferable that the air compressor 50 is used in link with an inclination monitoring system (not shown) so as to control the water level in consideration of an inclination of the LNG ship's hull 10.

[29] In the catamaran type LNG floater according to the present invention, the float 20 floats on the surface of the sea, which is laterally adjacent to the LNG ship's hull 10, and then, the first ballast tank 11 of the LNG ship's hull 10 and the second ballast tank 21 of the float 20 are communicated with each other via the communication pipe 40, so that the ballast tanks 11 and 21 can share their ballast water with each other.

[30] After that, the liquefaction unit 30 is installed on upper portions of the LNG ship's hull 10 and the float 20 in such a way that they are connected with each other and supported by the liquefaction unit 30.

[31] In addition, the feed pipe 60 and the discharge pipe 70, which are the means for controlling the water level of the ballast water, are connected to the float 20, and then, the air compressor 50 is mounted on the feed pipe 60, whereby the catamaran type LNG floater according to the present invention is completely manufactured.

[32] The completed LNG floater can produce LNG or natural gas through the liquefaction unit 30 in a state where the LNG floater floats on the sea.

[33] Moreover, if a bad inclination of the liquefaction unit 30 causes an unstable condition during the production of LNG or natural gas, the water level of the ballast water contained in the float 20 is controlled so as to make the liquefaction unit 30 in a stable condition.

[34] That is, in case where the float 20 is located higher than the LNG ship's hull 10 and the liquefaction unit 30 is inclined toward the LNG ship's hull 10, the float 20 is in a floating state because atmospheric pressure inside the second ballast tank 21 of the float 20 is high and the ballast water is small in quantity, and hence, the atmospheric pressure is discharged to the outside by the discharge control valve 71 of the discharge pipe 70, so that the float 20 and the LNG ship's hull 10 can be in the right balance.

[35] In this instance, the feed control valve 61 of the feed pipe 60 must be in a closed condition.

[36] On the contrary, in case where the float 20 is located lower than the LNG ship's hull 10 and the liquefaction unit 30 is inclined toward the float 20, the float 20 is in a sunken state because atmospheric pressure inside the second ballast tank 21 of the float 20 is low and the ballast water is large in quantity.

And hence, in this instance, the air compressor 50 is actuated and the feed control valve 61 of the feed pipe 60 is operated to inject high pressure into the second ballast tank 21 and to introduce some of the ballast water into the first ballast tank 11 till the float 20 becomes lighter, so that the float 20 and the LNG ship's hull 10 can be in the right balance.

[37] In this instance, the discharge control valve 71 of the discharge pipe 70 must be in a closed condition.

[38] As described above, the water level controlling means is operated in real time so that the LNG floater can carry out gas production work while keeping the stable condition of the liquefaction unit 30.

[39] While the present invention has been described with reference to the particular illustrative embodiment, it is not to be restricted by the embodiment but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiment without departing from the scope and spirit of the present invention.

What is claimed is:

1. A catamaran type LNG floater comprising:

an LNG ship's hull (10) having a first ballast tank (11) for
5 storing ballast water;

a float (20) spaced apart from the LNG ship's hull (10) at a
predetermined interval and floating on the surface of the sea,
which is laterally adjacent to the LNG ship's hull (10), the
float (20) having a second ballast tank (21) for storing ballast
10 water; and

a liquefaction unit (30) having an end portion connected to
the LNG ship's hull (10) and the other end portion connected to
the float (20) so as to be supported by the LNG ship's hull (10)
and the float (20).

15 2. The catamaran type LNG floater according to claim 1,
wherein the first ballast tank (11) of the LNG ship's hull (10)
and the second ballast tank (21) of the float (20) communicate
with each other via a communication pipe (40) to thereby share
20 the ballast water with each other.

3. The catamaran type LNG floater according to claim 2,
further comprising water level controlling means for controlling

a water level of the ballast water contained in the second ballast tank (21) of the float (20).

4. The catamaran type LNG floater according to claim 3,
5 wherein the water level controlling means comprises:

an air compressor (50) for supplying compressed air into the float (20) and forcedly introducing the ballast water contained into the second ballast tank (21) of the float (20) into the first ballast tank (11) of the LNG ship's hull (10);

10 a feed pipe (60) having an end portion connected with the air compressor (50) and the other end portion communicating with a portion of an upper end part of the float (20) to thereby supply the compressed air of the air compressor (50) into the float (20); and

15 a discharge pipe (70) arranged adjacent to the feed pipe (60) for discharging the inside air of the float (20) to the outside.

5. The catamaran type LNG floater according to claim 4,
20 wherein the feed pipe (60) comprises a feed control valve (61) for controlling a feed amount of the compressed air supplied from the air compressor (50).

6. The catamaran type LNG floater according to claim 4, wherein the discharge pipe (70) comprises a discharge control valve (71) for controlling a discharge amount of the compressed air of the float (20) discharged to the outside.