

DESCRIPTION

FLOATING STRUCTURE PROVIDED WITH LIQUEFIED GAS STORAGE FACILITY TECHNICAL FIELD

[0001]

The present invention relates to a floating structure provided with a liquefied gas storage facility, and more particularly to a floating structure provided with a liquefied gas storage facility, such as a liquefied gas carrier ship, a ship with a liquefied gas fuel tank, a floating structure with a liquefied gas fuel tank, or a floating structure with a liquefied gas storage facility, those of which include a facility temporarily storing liquefied gas and a cargo equipment room.

BACKGROUND ART

[0002]

Among liquefied gas carrier ships, a liquefied natural gas carrier ship (LNG ship) uses boil-off gas generated by natural evaporation of liquefied natural gas, which is a cargo, as fuel. For this reason, a fuel gas pipe is laid from a cargo equipment room to the rear of an engine room passing through the side of an accommodation space. This fuel gas pipe leads the boil-off gas to a main engine in the engine room arranged rearward of a cargo area.

[0003]

Recently, with regard to utilization of the boil-off gas as fuel, a technique using a dual-fuel low-speed diesel engine is attracting attention as a main engine of an LNG ship. In this case, the pressure of natural gas to be used as fuel needs to be increased up to about 300 bar to 400 bar before supplied for the main engine. Consequently, in the conventional ship

arrangement, a high-pressure pipe needs to be laid from a fuel gas supply apparatus, installed in a cargo equipment room far from the engine room, to the engine room.

[0004]

In the case where a steam turbine is used as a main engine as in a conventional ship, even though natural gas is used as fuel, the pressure of the natural gas supplied to the boiler can be low. Hence, even if the fuel gas pipe was broken, only the risk of gas explosion would need to be taken care of as a hazard caused by natural gas leakage. However, considering leakage of high-pressure natural gas, injuries to crews caused by gushing high-pressure gas will also be a concern in addition to the risk of gas explosion.

[0005]

As countermeasures against this gas leakage, the fuel gas pipe is covered, or a more severe anti-corrosion measure is required in the case where the fuel gas pipe is installed in an exposed condition as before. As a result, these countermeasures not only make it difficult to achieve a fundamental risk avoidance but also increase the cost of the ship.

[0006]

In addition, it is necessary to use large electric equipment as equipment for increasing the pressure of liquefied gas such as natural gas, and this necessitates adding electric wiring for power supply for the large electric equipment. This wiring is difficult to set up and increases the cost.

[0007]

In addition, installing the large electric equipment for increasing the pressure of the liquefied gas requires an

installation space in the cargo equipment room, which requires making the cargo equipment room larger. Further, to be capable of entering and leaving multiple ports, it is becoming necessary to add a new cargo loading and unloading facility, a new superstructure for another purpose, and a new large-scale fitting in addition to conventional equipment for the ship.

[0008]

However, in a MOSS-type LNG ship, since the upper sides of spherical cargo tanks protrude greatly above the upper deck, there are not many places on the upper deck where equipment can be installed without restraint. Accordingly, the place available to install a cargo equipment room, cargo loading and unloading facilities such as a cargo manifold, and other large-scale fittings is limited on the upper deck, and thus the installation place is limited.

[0009]

Regarding a conventional liquefied gas carrier ship, in some rare cases for small ships, a cargo equipment room is arranged forward of a hold space, which is a foremost liquefied gas storage facility at the fore part. However, in general, as illustrated in Figs. 11 and 12, a cargo equipment room 12 is arranged between cargo tanks 11 in a liquefied gas carrier ship 1X in order not to unnecessarily enlarge a cargo area R1, which requires explosion proof measures and the like. In addition, a cargo manifold 13 is arranged between the cargo tanks 11 in the cargo area R1, and an accommodation space 8 and an engine room 5 are arranged rearward of the cargo area R1.

[0010]

As an example of this structure, for example, Japanese patent Laid-open No. H07-301372 (paragraphs [0002] and [0025],

and Fig. 5) illustrates an LNG ship having MOSS-type spherical cargo tanks mounted thereon, in which a cargo machinery room (cargo equipment room) is arranged between the rearmost cargo tank and the second rearmost cargo tank in front of it, and a loading manifold (cargo manifold) is arranged between this second rearmost cargo tank and the cargo tank in front of it, on the upper deck of the cargo area.

[0011]

Therefore, if a cargo equipment room larger than that in a conventional ship is arranged forward or rearward of the cargo area on the upper deck while keeping the arrangement of a conventional ship in which the accommodation space is arranged over the engine room, the LNG ship needs to be longer by at least the length of the cargo equipment room. This largely increases the price of the LNG ship.

[0012]

Regarding the location of the cargo manifold, in the case where the ports the ship enters are limited to a certain extent, the installation place is often limited to one place, and the cargo equipment room, the cargo manifold, and an accommodation ladder can be provided between cargo tanks. However, in the case where the ports cannot be limited, multiple cargo manifolds need to be installed, and finding the installation places is important. In addition, in the case where the number of cargo tanks is smaller, the number of possible installation places is small in the first place, which makes it more important issue to find the installation places.

PRIOR ART DOCUMENT

PATENT DOCUMENT

[0013]

Patent Document 1: Japanese patent laid-open No. H07-301372
(paragraphs [0002] and [0025], and Fig. 5)

SUMMARY OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0014]

The present invention has been made in view of the above situation, and an object thereof is to provide a floating structure provided with a liquefied gas storage facility, in which a space can be allocated for additionally arranging a new cargo loading and unloading facility, a new superstructure, or a new large-scale fitting, while mitigating risk due to a high-pressure gas leakage from a high-pressure fuel gas pipe.

MEANS FOR SOLVING THE PROBLEM

[0015]

To achieve the above object, a floating structure provided with a liquefied gas storage facility according to the present invention is one having a cargo area and an engine room in a rear of the cargo area, and having a portion or all of an accommodation space which is arranged on an upper deck, in which a cargo equipment room is arranged rearward of the cargo area and over a portion or the entirety of an upper side of the engine room. Note that the expression "arranged over a portion or the entirety of an upper side of the engine room" means the case where a portion of the ceiling of the engine room serves as the floor of the cargo equipment room, and the case where the entirety of the ceiling of the engine room serves as the floor of the cargo equipment room.

[0015a]

According to a first aspect of the present invention, there is provided a floating structure provided with a liquefied

gas storage facility, having a cargo area and an engine room in a rear of the cargo area, and having a portion or all of an accommodation space which is arranged on an upper deck, characterized in that a cargo equipment room is arranged rearward of the cargo area and over a portion or the entirety of an upper side of the engine room, and the accommodation space is arranged rearward of the cargo equipment room, and a compartment in which one or more of a cofferdam, a void space, a fuel oil tank, and a water tank are disposed is arranged rearward of the cargo equipment room, and the accommodation space is arranged rearward of this compartment.

[0015b]

According to a second aspect of the present invention, there is provided a floating structure provided with a liquefied gas storage facility, having a cargo area and an engine room in a rear of the cargo area, and having a portion or all of an accommodation space which is arranged on an upper deck, characterized in that a cargo equipment room is arranged rearward of the cargo area and over a portion or the entirety of an upper side of the engine room, and the accommodation space is arranged rearward of the cargo equipment room, and an engine room protruding portion formed by a portion of the engine room protruding above the upper deck is arranged rearward of the cargo equipment room, and the accommodation space is arranged rearward of this engine room protruding portion.

[0015c]

According to a third aspect of the present invention, there is provided a floating structure provided with a liquefied gas storage facility, having a cargo area and an engine room in a rear of the cargo area, and having a portion or all of an

accommodation space which is arranged on an upper deck, characterized in that a cargo equipment room is arranged rearward of the cargo area and over a portion or the entirety of an upper side of the engine room, and the accommodation space is arranged rearward of the cargo equipment room, and a compartment in which one or both of a machinery room and a storeroom are arranged, the former is another compartment separated from the engine room, is arranged rearward of the cargo equipment room, and the accommodation space is arranged rearward of this compartment.

[0015d]

According to a fourth aspect of the present invention, there is provided a floating structure provided with a liquefied gas storage facility, having a cargo area and an engine room in a rear of the cargo area, and having a portion or all of an accommodation space which is arranged on an upper deck, characterized in that a cargo equipment room is arranged rearward of the cargo area and over a portion or the entirety of an upper side of the engine room, and an engine room upper compartment in which one or more of a cofferdam, a void space, a fuel oil tank, and a water tank are disposed is arranged below the cargo equipment room and at an upper portion of the engine room.

[0016]

According to this structure, the cargo equipment room storing equipment for conveying fuel gas is moved from between

cargo tanks to directly over the engine room storing a main engine and power-generation equipment that use the fuel gas. This makes it possible to employ not only the structure in which the fuel gas pipe, provided to use the liquefied gas such as natural gas as fuel, goes out once from the cargo equipment room then is led to the engine room directly thereunder, but also the structure in which the fuel gas pipe is led from the cargo equipment room directly to the engine room directly thereunder.

[0017]

As a result, the laying length of the high-pressure fuel gas pipe passing from the cargo equipment room to the main engine in the engine room can be reduced. This lowers the possibility of fuel gas leakage, and mitigates the risk of explosion and injuries to a human body due to the high-pressure fuel gas leakage. Moreover, the area for anti-corrosion measures is also reduced, and it facilitates installing electric wires such as power supply lines.

[0018]

In addition, since the high-pressure fuel gas pipe does not pass at a side of the accommodation space, it is possible to reduce greatly the possibility of dangerous gas entering the accommodation space and exploding, and the possibility of the high-pressure gas directly hurting crews, in case of gas leakage.

[0019]

At the same time, this structure eliminates the need to prepare the space between cargo tanks for arranging the cargo equipment room, making it possible to install other equipment between cargo tanks. As a result, it is possible to prepare the place for installing an additional cargo loading and

unloading facility such as an additional cargo manifold, an additional superstructure for another purpose, and an additional large-scale fitting.

[0020]

In the floating structure provided with a liquefied gas storage facility described above, in the case where the accommodation space is arranged forward of the cargo area, this structure makes it possible to arrange the navigation bridge over the accommodation space. In the case where the navigation bridge is arranged on the accommodation space located forward of the cargo area, it is easy to secure the field of front vision, which is sometimes a problem for a floating structure having large-sized objects protruding above the upper deck as in the case where the cargo tanks are spherical MOSS-type tanks.

[0021]

In addition, in the floating structure provided with a liquefied gas storage facility described above, in the case where the accommodation space is arranged rearward of the cargo equipment room, this structure can be achieved by a relatively easy layout change of moving and arranging the accommodation space rearward of the cargo equipment room, because of the movement of the cargo equipment room. In particular, even if there is no place for arranging the accommodation space at the fore part, it is possible to arrange the accommodation space without increasing the length of the ship. If a place for arranging the cargo equipment room cannot be prepared over the upper deck of the cargo area, and if a place for arranging the accommodation space cannot be prepared at the fore part, this arrangement is effective.

[0022]

Moreover, in the floating structure provided with a liquefied gas storage facility described above, in the case where a compartment in which one or more of a cofferdam, a void space, a fuel oil tank, and a water tank are disposed is arranged rearward of the cargo equipment room, and the accommodation space is arranged rearward of this compartment, the existence of this compartment in between enables the cargo equipment room and the accommodation space not to adjoin each other. Accordingly, even in the case where gas leakage occurs in the cargo equipment room, the risk of the leaking gas entering the accommodation space is reduced.

[0023]

Or alternatively, in the floating structure provided with a liquefied gas storage facility described above, in the case where an engine room protruding portion formed by a portion of the engine room protruding above the upper deck is arranged rearward of the cargo equipment room, and the accommodation space is arranged rearward of this engine room protruding portion, the existence of the engine room protruding portion in between enables the cargo equipment room and the accommodation space not to adjoin each other. Accordingly, even in the case where gas leakage occurs in the cargo equipment room, the risk of the leaking gas entering the accommodation space is reduced.

[0024]

Or alternatively, in the floating structure provided with a liquefied gas storage facility described above, in the case where a compartment in which one or both of a machinery room and a storeroom are arranged, the former is another compartment separated from the engine room, is arranged rearward of the

cargo equipment room, and the accommodation space is arranged rearward of this compartment, the existence of the compartment in between enables the cargo equipment room and the accommodation space not to adjoin each other. Accordingly, even in the case where gas leakage occurs in the cargo equipment room, the risk of the leaking gas entering the accommodation space is reduced. Note that an air conditioner, a hydraulic machine, and the like are arranged in this machinery room.

[0025]

In the floating structure provided with a liquefied gas storage facility described above, in the case where an engine room front compartment is arranged forward of the engine room located below the cargo equipment room, the engine room front compartment including one or more of a cofferdam, a void space, a fuel oil tank, a water tank, a fuel oil transfer pump, a ballast pump, and a ballast water treatment apparatus, this structure makes a vacant space between the engine room and the cargo area. Accordingly, by arranging a fuel gas pipe, extending from the cargo equipment room, in this engine room front compartment, even in the case where gas leakage occurs in the cargo equipment room, the risk of the leaking gas entering the engine room is reduced.

[0026]

Or alternatively, in the floating structure provided with a liquefied gas storage facility described above, in the case where an engine room upper compartment in which one or more of a cofferdam, a void space, a fuel oil tank, and a water tank are disposed is arranged below the cargo equipment room and at an upper portion of the engine room, this structure makes a vacant space between the cargo equipment room and the engine

room. Accordingly, even in the case where gas leakage occurs in the cargo equipment room, the risk of the leaking gas entering the engine room is reduced.

[0027]

In the floating structure provided with a liquefied gas storage facility described above, in the case where a deck tank or a liquefied gas fuel tank is arranged above the cargo equipment room, the structure enables a space over the cargo equipment room to be used effectively. If a liquefied gas fuel tank is provided there, the fuel gas pipe between the liquefied gas fuel tank and equipment in the cargo equipment room can be short.

[0028]

In the floating structure provided with a liquefied gas storage facility described above, in the case where a flange or a valve of a fuel gas pipe led to a main engine is arranged inside the cargo equipment room, this structure enables the cargo equipment room to house the flange portion and the valve portion therein, which have possibility of causing fuel gas leakage, and reduces the risk of fuel gas leakage in the engine room and the risk of fuel gas leakage from an exposed pipe extending from the cargo equipment room to the engine room.

[0029]

The floating structure provided with a liquefied gas storage facility described above is assumed to be a liquefied gas carrier ship with a liquefied gas storage facility, a ship with a liquefied gas fuel tank, a floating structure with a liquefied gas fuel tank, or a floating structure with a liquefied gas storage facility.

EFFECTS OF THE INVENTION

[0030]

In the floating structure provided with liquefied gas storage facility according to the present invention, by arranging the cargo equipment room over the engine room, the cargo equipment room moves from between cargo tanks to rearward of the rearmost cargo tank. This makes short the laying length of a high-pressure fuel gas pipe used for utilizing liquefied gas such as natural gas as fuel, and arranged from the cargo equipment room to a main engine in the engine room, thereby mitigating risk of a high-pressure gas leak.

[0031]

Along with the above effect, by moving the cargo equipment room from between cargo tanks, which is the arrangement of the cargo equipment room in a conventional technique, to rearward of the cargo area, the structure of the present invention eliminates the constraint of putting the cargo equipment room into a space between cargo tanks. This allows for a larger cargo equipment room and makes a space between cargo tanks where the cargo equipment room had been located. Thus, this makes it possible to find the place for installing an additional cargo loading and unloading facility such as an additional cargo manifold, an additional superstructure, and an additional large-scale fitting.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032]

[Fig. 1] Fig. 1 is a side view schematically illustrating a structure of a liquefied gas carrier ship of a first embodiment according to the present invention.

[Fig. 2] Fig. 2 is a plan view schematically illustrating a structure of the liquefied gas carrier ship in Fig. 1.

[Fig. 3] Fig. 3 is a side view schematically illustrating a structure of a liquefied gas carrier ship of a second embodiment according to the present invention.

[Fig. 4] Fig. 4 is a plan view schematically illustrating a structure of the liquefied gas carrier ship in Fig. 3.

[Fig. 5] Fig. 5 is a side view schematically illustrating a structure of a liquefied gas carrier ship of a third embodiment according to the present invention.

[Fig. 6] Fig. 6 is a plan view schematically illustrating a structure of the liquefied gas carrier ship in Fig. 5.

[Fig. 7] Fig. 7 is a side view schematically illustrating a structure of a liquefied gas carrier ship of a fourth embodiment according to the present invention.

[Fig. 8] Fig. 8 is a plan view schematically illustrating a structure of the liquefied gas carrier ship in Fig. 7.

[Fig. 9] Fig. 9 is a side view schematically illustrating a structure of a liquefied gas carrier ship of a fifth embodiment according to the present invention.

[Fig. 10] Fig. 10 is a plan view schematically illustrating a structure of the liquefied gas carrier ship in Fig. 9.

[Fig. 11] Fig. 11 is a side view schematically illustrating a structure of a liquefied gas carrier ship of a conventional technique.

[Fig. 12] Fig. 12 is a plan view schematically illustrating a structure of the liquefied gas carrier ship in Fig. 11.

MODES FOR CARRYING OUT THE INVENTION

[0033]

Hereinafter, descriptions will be provided for floating structures provided with a liquefied gas storage facility of embodiments according to the present invention with reference

to the drawings. Examples of the floating structures provided with a liquefied gas storage facility include a liquefied gas carrier ship, a ship with liquefied gas fuel tanks, a floating structure with liquefied gas fuel tanks, or a floating structure with a liquefied gas storage facility. Here, descriptions will be provided for an example of a liquefied gas carrier ship with MOSS-type spherical gas tanks as a floating structure provided with a liquefied gas storage facility.

[0034]

However, the present invention is not limited to this liquefied gas carrier ship, and is applicable to other floating structures provided with a liquefied gas storage facility, such as a liquefied gas carrier ship, a ship with liquefied gas fuel tanks, a floating structure with liquefied gas fuel tanks, or a floating structure with a liquefied gas storage facility.

[0035]

Note that in the case where the floating structure provided with a liquefied gas storage facility is a liquefied gas carrier ship or a ship with liquefied fuel tanks, the floating structure is usually underway. However, in the case where the floating structure provided with a liquefied gas storage facility is a floating structure with liquefied fuel tanks or a floating structure with a liquefied gas storage facility, the floating structure is underway by itself only when it goes to an offshore installation site.

[0036]

In addition, in the present invention, a liquefied gas tank and a liquefied gas fuel tank may be not only a MOSS-type spherical cargo tank but also another type such as a self-standing square tank or a tank integrated with the ship

hull structure.

[0037]

As illustrated in Figs. 1 and 2, in a liquefied gas carrier ship 1A of a first embodiment according to the present invention, a ship bottom 2, ship sides 3, and an upper deck 4 form the perimeter of the ship hull, and a cargo area R1 including cargo tanks 11 is provided. An engine room 5 is arranged rearward of the cargo area R1, in other words, on the aft side of the ship hull. A propeller 6 is arranged on a propeller shaft extending rearward from the engine room 5. A rudder 7 is arranged behind the propeller 6.

[0038]

In addition, a portion or the entirety of an accommodation space 8 with a navigation bridge 8a (the entirety, in the structure in Figs. 1 and 2) is arranged over the upper deck 4 of the fore part. Over the engine room 5 at the aft part, a funnel 9 is arranged for discharging exhaust gas generated by an engine in the engine room 5 to atmosphere.

[0039]

In the cargo area R1, the cargo tanks 11 are arranged for storing liquefied gas. Here, the cargo tanks 11 are several number of spherical liquefied gas tanks called MOSS-type tanks, arranged side by side in a row (four in this case) in the front-to-rear direction of the ship hull, with a portion of each cargo tank 11 protruding above the upper deck 4.

[0040]

Moreover, a passage 17 is arranged over the upper deck 4 for connecting a cargo equipment room 12 on the aft side and the engine room 5 on the aft side and the navigation bridge 8a on the fore side, as an exposed passage or an enclosed passage.

Specifically, by connecting the navigation bridge 8a at the fore part (front of the ship) and the cargo equipment room 12 and the engine room 5 at the aft side (back of the ship) using the passage 17, which is, for example, an all-weather-type sky path formed as an enclosed section, crews can always come and go between the navigation bridge 8a and the cargo equipment room 12 and the like. Note that although here the passage 17 is arranged at the center of the ship hull and at upper portions of the cargo tanks 11, the passage 17 may be arranged at a side of the cargo tanks 11 on the starboard side or the port side of the ship hull.

[0041]

Further, in the liquefied gas carrier ship 1A of the first embodiment, the accommodation space 8 is arranged forward of the cargo area R1, in other words, forward of the foremost cargo tank 11. In this structure, arranging the navigation bridge 8a over the accommodation space 8 means that the navigation bridge 8a is arranged forward of the foremost cargo tank 11. As a result, the cargo tanks 11 do not disturb the front sight from the navigation bridge 8a, and the field of front vision is well secured. Accordingly, maneuverability of the ship is improved. In particular, in the case where large-sized structural objects protrude above the upper deck 4, as in the case where the cargo tanks 11 are spherical MOSS-type tanks, these tall large-sized structural objects make it difficult to secure the field of vision. Accordingly, the advantage effect of employing this structure increases. In addition, dodgers 8b are arranged to the navigation bridge 8a to facilitate monitoring the sides of the ship hull when entering and leaving a port.

[0042]

In addition, in view of the field of front vision, compared to the case where the navigation bridge is arranged on the aft side, in the case on the fore side, the height of the navigation bridge 8a can be reduced. Accordingly, since there is no need to make the superstructure tall on the aft side, the overall ship height can be reduced. As a result, the air draft becomes small, which increases the range where the liquefied gas carrier ship 1A can sail and improves the versatility of the liquefied gas carrier ship 1A. For example, a small air draft allows the ship to enter two or more of important ports (for example, Port of Montoir in France, Port of Everett in the USA, and other ports).

[0043]

Further, the cargo equipment room 12 is arranged rearward of the cargo area R1, in other words, rearward of the rearmost cargo tank 11, and over a portion or the entirety of the engine room 5 (a portion, in Figs. 1 and 2). Specifically, the cargo equipment room 12 is arranged directly over the engine room 5. In other words, all the bottom surface of the cargo equipment room 12 faces the engine room 5. Note that this cargo equipment room 12 is arranged forward of the funnel 9.

[0044]

By doing this, the cargo equipment room 12 storing equipment for conveying fuel gas is moved from between cargo tanks 11, which is the arrangement in a conventional technique, to directly over the engine room 5 storing a main engine and power-generation equipment that use the fuel gas, in the present invention. This allows not only for the structure in which the fuel gas pipe extended from the cargo equipment room 12 goes

out once from the cargo equipment room and then is led to the engine room directly thereunder, but also for the structure in which the fuel gas pipe is directly led to the engine room 5 directly thereunder.

[0045]

This structure reduces the laying length of the high-pressure fuel gas pipe passing from the cargo equipment room 12 that uses the liquefied gas as fuel to the main engine in the engine room 5. The reduction of the length of the fuel gas pipe lowers the possibility of high-pressure gas leakage correspondingly, mitigating the risk due to the high-pressure gas leakage. Moreover, the area for anti-corrosion measures is also reduced, and it facilitates installing electric wires such as power supply lines.

[0046]

In addition, also in case of gas leakage, since the high-pressure fuel gas pipe does not pass at a side of the accommodation space 8, the possibility of dangerous gas entering the accommodation space 8 and the possibility of the high-pressure gas directly hurting crews are greatly reduced.

[0047]

At the same time, this structure eliminates the need to prepare the space between cargo tanks 11 for arranging the cargo equipment room 12, making it possible to install other equipment between cargo tanks 11. As a result, it is possible to prepare the place for installing an additional cargo loading and unloading facility, an additional superstructure, and an additional large-scale fitting.

[0048]

This widens potential places between cargo tanks 11 for

installing a fitting, such as a cargo manifold 13 and an accommodation ladder. Specifically, the cargo manifold 13 can be arranged at any places, not only one location at each broadside but two or more locations up to the all locations between the cargo tanks 11.

[0049]

Moreover, the height of the cargo equipment room 12 arranged over the engine room 5 on the aft side can be low. This eliminates the need for steel material for vibration insulation measures of the cargo equipment room 12, and accordingly the deadweight can be increased. Further, the height of this superstructure at the aft part decreases, which decreases the influence of wind pressure force during mooring. Hence the mooring equipment can be made smaller and correspondingly the deadweight can be increased. In addition, the height of the funnel can be made small, and this reduces the material for the funnel 9. Correspondingly, the deadweight can be increased.

[0050]

In addition, a deck tank (not illustrated) or a liquefied gas fuel tank 11a is arranged over the cargo equipment room 12. This structure enables a space over the cargo equipment room 12 to be used effectively, and shortens the fuel gas pipe between the liquefied gas fuel tank 11a and equipment in the cargo equipment room 12.

[0051]

In addition, if a flange or a valve of the fuel gas pipe led to the main engine is provided inside the cargo equipment room 12, the high-pressure gas pipe is not exposed outside where crews pass by, which reduces a risk of injuries caused by gas leakage from the fuel gas pipe and increases the safety.

[0052]

Next, referring to Figs. 3 and 4, descriptions will be provided for a liquefied gas carrier ship 1B of a second embodiment according to the present invention. This liquefied gas carrier ship 1B is different from the liquefied gas carrier ship 1A according to the first embodiment in that an accommodation space 8 is arranged rearward of a cargo equipment room 12. Due to the movement of the cargo equipment room 12, the structure of the liquefied gas carrier ship 1B is achieved by a relatively easy layout change of moving and arranging the accommodation space 8 rearward of the cargo equipment room 12. In particular, even if there is no place for arranging the accommodation space at the fore part, it is possible to arrange the accommodation space without increasing the length of the ship. If a place for arranging the cargo equipment room cannot be prepared over the upper deck 4 of the cargo area, and if a place for arranging the accommodation space cannot be prepared at the fore part, this arrangement is effective.

[0053]

Next, referring to Figs. 5 and 6, descriptions will be provided for a liquefied gas carrier ship 1C of a third embodiment according to the present invention. This liquefied gas carrier ship 1C is different from the liquefied gas carrier ship 1B according to the second embodiment in that a compartment 14 is arranged between a cargo equipment room 12 and an accommodation space 8.

[0054]

The compartment 14 is provided as a compartment in which one or more of a cofferdam, a void space, a fuel oil tank, and a water tank are arranged. Or alternatively, the compartment

14 can be an engine room protruding portion formed by a portion of the engine room protruding above the upper deck 4, or a compartment in which one or both of a machinery room and a storeroom are arranged, the former is another compartment separated from the engine room 5. Note that in this machinery room, an air conditioner, a hydraulic machine, and the like are arranged.

[0055]

This arrangement enables the cargo equipment room 12 and the accommodation space 8 not to adjoin each other by the compartment 14. Accordingly, even in the case where gas leakage occurs in the cargo equipment room 12, the risk of the leaking gas entering the accommodation space 8 is reduced.

[0056]

Next, referring to Figs. 7 and 8, descriptions will be provided for a liquefied gas carrier ship 1D of a fourth embodiment according to the present invention. This liquefied gas carrier ship 1D is different from the liquefied gas carrier ship 1B according to the second embodiment in that an engine room front compartment 15 is arranged forward of an engine room 5 located below a cargo equipment room 12, the engine room front compartment 15 including one or more of a cofferdam, a void space, a fuel oil tank, a water tank, a fuel oil transfer pump, a ballast pump, and a ballast water treatment apparatus.

[0057]

This structure makes a vacant space between an engine room 5 and a cargo area R1. By arranging a fuel gas pipe, extending from the cargo equipment room 12, in this engine room front compartment 15, even in the case where gas leakage occurs in the cargo equipment room 12, the risk of the leaking gas entering

the engine room 5 is reduced.

[0058]

Next, referring to Figs. 9 and 10, descriptions will be provided for a liquefied gas carrier ship 1E of a fifth embodiment according to the present invention. This liquefied gas carrier ship 1E is different from the liquefied gas carrier ship 1B according to the second embodiment in that an engine room upper compartment 16 is arranged under a cargo equipment room 12 and at an upper portion of an engine room 5, the engine room upper compartment 16 including one or more of a cofferdam, a void space, a fuel oil tank, and a water tank.

[0059]

This structure makes a vacant space between the cargo equipment room 12 and the engine room 5. Hence, even in the case where gas leakage occurs in the cargo equipment room 12, the risk of the leaking gas entering the engine room 5 is reduced.

[0060]

According to the liquefied gas carrier ships 1A to 1E having the above structures, by arranging the cargo equipment room 12 over the engine room 5, the cargo equipment room 12 moves from between cargo tanks 11 to rearward of the rearmost cargo tank 11. This makes short the laying length of the high-pressure fuel gas pipe used for utilizing liquefied gas such as natural gas as fuel, and arranged from the cargo equipment room 12 to the main engine in the engine room 5, thereby mitigating risk of high-pressure fuel gas leakage.

[0061]

Along with the above effect, moving the cargo equipment room 12 eliminates the constraint of putting the cargo equipment room 12 into a space between the cargo tanks 11, makes it possible

to enlarge the cargo equipment room 12, and makes available the space between the cargo tanks 11 where the cargo equipment room 12 had been located. Accordingly, this makes it possible to prepare the place for installing an additional cargo loading and unloading facility such as an additional cargo manifold, an additional superstructure for another purpose, and an additional large-scale fitting.

INDUSTRIAL APPLICABILITY

[0062]

A floating structure provided with a liquefied gas storage facility according to the present invention makes short the laying length of a high-pressure fuel gas pipe used for utilizing liquefied gas as fuel and laid from a cargo equipment room to an engine in an engine room. This mitigates the risk of high-pressure gas leakage, and at the same time eliminates the constraint of putting a cargo equipment room into a space between cargo tanks. Accordingly, this makes it possible to enlarge the cargo equipment room and makes available the space between the cargo tanks where the cargo equipment room had been located. As a result, the installing place can be prepared for an additional cargo loading and unloading facility, an additional superstructure, and an additional large-scale fitting. Hence, the present invention is applicable to a floating structure with a liquefied gas storage facility, such as a liquefied gas carrier ship with a liquefied gas storage facility, a ship with liquefied gas fuel tanks, a floating structure with liquefied gas fuel tanks, or a floating structure with a liquefied gas storage facility.

EXPLANATION OF REFERENCE NUMERALS

[0063]

1A to 1E, 1X liquefied gas carrier ship (floating
structure provided with a liquefied gas storage facility)

2 ship bottom

3 ship side

4 upper deck

5 engine room

6 propeller

7 rudder

8 accommodation space

8a navigation bridge

9 funnel

11 cargo tank

11a liquefied gas fuel tank

12 cargo equipment room

13 cargo manifold

14 compartment

15 engine room front compartment

16 engine room upper compartment

17 passage

R1 cargo area

CLAIMS

[Claim 1]

A floating structure provided with a liquefied gas storage facility, having a cargo area and an engine room in a rear of the cargo area, and having a portion or all of an accommodation space which is arranged on an upper deck, characterized in that

a cargo equipment room is arranged rearward of the cargo area and over a portion or the entirety of an upper side of the engine room, and the accommodation space is arranged rearward of the cargo equipment room, and

a compartment in which one or more of a cofferdam, a void space, a fuel oil tank, and a water tank are disposed is arranged rearward of the cargo equipment room, and the accommodation space is arranged rearward of this compartment.

[Claim 2]

A floating structure provided with a liquefied gas storage facility, having a cargo area and an engine room in a rear of the cargo area, and having a portion or all of an accommodation space which is arranged on an upper deck, characterized in that

a cargo equipment room is arranged rearward of the cargo area and over a portion or the entirety of an upper side of the engine room, and the accommodation space is arranged rearward of the cargo equipment room, and

an engine room protruding portion formed by a portion of the engine room protruding above the upper deck is arranged rearward of the cargo equipment room, and the accommodation space is arranged rearward of this engine room protruding portion.

[Claim 3]

A floating structure provided with a liquefied gas storage facility, having a cargo area and an engine room in a rear of the cargo area, and having a portion or all of an accommodation space which is arranged on an upper deck, characterized in that

a cargo equipment room is arranged rearward of the cargo area and over a portion or the entirety of an upper side of the engine room, and the accommodation space is arranged rearward of the cargo equipment room, and

a compartment in which one or both of a machinery room and a storeroom are arranged, the former is another compartment separated from the engine room, is arranged rearward of the cargo equipment room, and the accommodation space is arranged rearward of this compartment.

[Claim 4]

A floating structure provided with a liquefied gas storage facility, having a cargo area and an engine room in a rear of the cargo area, and having a portion or all of an accommodation space which is arranged on an upper deck, characterized in that

a cargo equipment room is arranged rearward of the cargo area and over a portion or the entirety of an upper side of the engine room, and

an engine room upper compartment in which one or more of a cofferdam, a void space, a fuel oil tank, and a water tank are disposed is arranged below the cargo equipment room and at an upper portion of the engine room.

[Claim 5]

The floating structure provided with a liquefied gas

storage facility, according to claim 4, characterized in that the accommodation space is arranged forward of the cargo area.

[Claim 6]

The floating structure provided with a liquefied gas storage facility, according to claim 4, characterized in that the accommodation space is arranged rearward of the cargo equipment room.

[Claim 7]

The floating structure provided with a liquefied gas storage facility, according to claim 6, characterized in that a compartment in which one or more of a cofferdam, a void space, a fuel oil tank, and a water tank are disposed is arranged rearward of the cargo equipment room, and the accommodation space is arranged rearward of this compartment.

[Claim 8]

The floating structure provided with a liquefied gas storage facility, according to claim 6, characterized in that an engine room protruding portion formed by a portion of the engine room protruding above the upper deck is arranged rearward of the cargo equipment room, and the accommodation space is arranged rearward of this engine room protruding portion.

[Claim 9]

The floating structure provided with a liquefied gas storage facility, according to claim 6, characterized in that a compartment in which one or both of a machinery room and a storeroom are arranged, the former is another compartment separated from the engine room, is arranged rearward of the cargo equipment room, and the accommodation space is arranged rearward of this compartment.

[Claim 10]

The floating structure provided with a liquefied gas storage facility, according to any one of claims 1 to 9, characterized in that an engine room front compartment is arranged forward of the engine room located below the cargo equipment room, the engine room front compartment including one or more of a cofferdam, a void space, a fuel oil tank, a water tank, a fuel oil transfer pump, a ballast pump, and a ballast water treatment apparatus.

[Claim 11]

The floating structure provided with a liquefied gas storage facility, according to any one of claims 1 to 10, characterized in that a deck tank or a liquefied gas fuel tank is arranged above the cargo equipment room.

[Claim 12]

The floating structure provided with a liquefied gas storage facility, according to any one of claims 1 to 11, characterized in that a flange or a valve of a fuel gas pipe led to a main engine is arranged inside the cargo equipment room.

[Claim 13]

The floating structure provided with a liquefied gas storage facility, according to any one of claims 1 to 12, characterized in that the floating structure is one of a liquefied gas carrier ship with a liquefied gas storage facility, a ship with a liquefied gas fuel tank, a floating structure with a liquefied gas fuel tank, and a floating structure with a liquefied gas storage facility.