

DESCRIPTION

FLOATING OFFSHORE FACILITY AND METHOD FOR SUPPLYING ELECTRIC POWER IN FLOATING OFFSHORE FACILITY

Technical Field

[0001]

The present invention relates to a floating offshore facility and a method for supplying electric power in the floating offshore facility, and, in more detail, relates to a floating offshore facility and a method for supplying electric power in the floating offshore facility, in which a space on the upper deck for arranging an electric generator can be significantly reduced and a space of a facility for production and storage as an offshore facility can be significantly increased.

Background Art

[0002]

A floating offshore facility such as an FPSO (Floating Production/Storage/Offloading system) which is provided with oil or gas production equipment and which is used while being located and held at a specific offshore site for installation for a long time, an FSO (Floating Storage/Offloading system) and an FSU (Floating Storage Unit) which do not include oil or gas production equipment, or an FLNG (liquefaction

storage/offloading system) which deals with LNG, performs production activity and temporary storage of a product in a floating state while being positioned and held on the ocean, by mooring or dynamic positioning system, or the like.

[0003]

While each of these floating offshore facilities is mainly constructed by modification of an existing VLCC (super tanker), recently, there appears a case where the floating offshore facility is newly constructed, and also in this new construction case, the floating offshore facility is designed and constructed on the basis of the VLCC design.

[0004]

In this construction of the floating offshore facility, when a newly built ship does not have its own transport means, it becomes necessary to tow the ship or transport the ship by a heavy cargo carrier to a production site. Accordingly, when long-distance navigation is necessary, an initial transport expense becomes very high in a case or the like where, for example, the floating offshore facility is constructed in Asia and is installed in Brazil.

[0005]

Accordingly, when a propulsion system is made similar to that of a VLCC, as shown in FIG. 7, while most of an engine room 5X is occupied by propulsion-engine-related devices such as a main engine 40 for which a diesel engine is frequently used and approximately two or three diesel electric generators 41 for generating electric power required at the time of navigation,

or the like, these electric generators 41 for the propulsion function and for navigation use are used only in the navigation from a construction site or a port to an oil field and are not necessary during the operation of a floating offshore facility 1X. Accordingly, there is a problem that the space for the engine room 5X (a part having diagonal hatching) is largely occupied by the propulsion-engine-related devices and the electric generators 41 which are not used during the operation of production equipment 30, and thus the space for a hold 6 for storing a product arranged under the upper deck becomes small, and the part under the upper deck 3 is not effectively utilized.

[0006]

Furthermore, in this floating offshore facility 1X, the production equipment 30 and an electric generator group including, for example, electric generators 31 for driving this production equipment 30 are arranged on the upper deck 3. This electric generator group is formed by the arrangement, on the upper deck 3, of approximately two to eight (in FIG. 7, six of three by two lateral columns) gas turbine electric generators which need an installation area smaller than that of a diesel electric generator. Accordingly, there is a problem that the space for arranging the production equipment 30 becomes small.

[0007]

Moreover, while the gas turbine electric generator which requires a comparatively small use space is used for generating electric power of the production equipment in order to reduce the space occupied by the electric generators on the upper deck,

the energy efficiency of this gas turbine electric generator is lower than the energy efficiency of the diesel electric generator which has a large height and requires a comparatively large use space, and thus there is also possibility to improve fuel consumption and energy saving of gas turbine.

[0008]

On the other hand, as described in, for example, Japanese Patent Laid-Open No. 2013-43485, there has been developed, as a ship propulsion system, an electrical propulsion ship in which electricity generated by electric generators is supplied to electric motors and these electric motors drive a propulsion propeller instead of the system in which an internal combustion engine rotationally drives a propeller of a propulsion device directly, and concerning this electric propulsion ship, there is proposed an electric propulsion ship which includes a plurality of electric generators, a low frequency circuit connecting the propulsion electric motors and the electric generators, and an ordinary circuit connected to the low frequency circuit via a frequency-and-voltage convertor, and performs control so that the frequency of AC current generated by the electric generator becomes smaller than 50 Hz to thereby enhance the capacity efficiency of the engine room and also to enhance the fuel consumption efficiency during navigation.

[0009]

Furthermore, as described in, for example, Japanese Patent Laid-Open (Translation of PCT Application) No. 2007-504045, there is also proposed a propulsion system of a

ship and a movable ocean structure in which an electric generator and a propulsion electric motor are formed with a permanent-magnet-type synchronous machines having substantially the same operation characteristics and these synchronous machines are directly connected with each other by a fixed electrical connection, and thus the rotational speed of a propeller can be changed without using power electronics and be reduced without a gear, thereby being able to reduce the requirement of investment and a space.

[0010]

However, in the propulsion system of these electric propulsion ship or ship and movable ocean structure, there is no mention of the space problem of the electric generator group arranged on the upper deck in the floating offshore facility.

Citation List

Patent literature

[0011]

PTL 1: Japanese Patent Laid-Open No. 2013-43485

PTL 2: Japanese Patent Laid-Open (Translation of PCT Application) No. 2007-504045

Summary of Invention

Technical Problem

[0012]

In view of the above situation, the present inventors have found that, concerning a floating offshore facility in which

a propulsion function becomes unnecessary during the operation of production equipment, an engine room is made smaller and a hold is made larger by the combination of an electric propulsion system capable of making an engine room smaller than a conventional propulsion system in which a propeller is driven by a main engine such as a diesel engine, and an electric generator group for operating the production equipment; and the space for the electric generator group arranged on the upper deck can be reduced and the space for the production equipment can be increased by concurrently using a part of the electric generator group arranged on the upper deck and the electric propulsion system and also by arranging, inside the engine room, the electric generators concurrently used.

[0013]

An object of the present invention is to provide a floating offshore facility and a method for supplying electric power in the floating offshore facility, in which it is possible to greatly reduce the space for the engine room where there is arranged a propulsion system which is used in the navigation from a construction site or a port to an offshore site for installation, but which becomes unnecessary during the operation on the sea, and also it is possible to significantly increase a space of the production equipment as an offshore facility and a space of the hold for storage.

Solution to Problem

[0014]

For achieving the object as described above, a floating offshore facility is provided with production equipment which receives electric power supply from a plurality of electric generators and is used while being positioned and held on the sea, wherein a propulsion system for moving the floating offshore facility is configured with an electric propulsion system in which an electric motor drives a propeller, and a first group of the electric generators is arranged on an upper deck and a second group of the electric generators is arranged inside an engine room, and also electric power that runs the production equipment provided for the floating offshore facility is supplied from both of the first group and second group of the electric generators, and electric power that drives the electric motor is supplied by the second group of the electric generators.

[0015]

According to this configuration, even when the second group of the electric generators is provided inside the engine room, the propulsion system for moving the floating offshore facility is configured with the electric propulsion system in which an electric motor drives the propeller, with the result that the space for the whole engine room can be made smaller than in a case where a propulsion system in which an internal combustion engine directly drives the propeller is adopted, and the space for a hold arranged under the upper deck can be made larger.

[0016]

Furthermore, by provision, inside the engine room, of the second group of the electric generators that supply electric power to the production equipment, the number of electric generators in the first group of the electric generators on the upper deck can be reduced, and thus the space occupied by the electric generators on the upper deck can be greatly reduced and the space for the production equipment can be increased.

[0017]

Moreover, since there is provided, for navigation, devices for initial navigation such as an electric propulsion device, a propulsion control device, and navigation equipment which are temporarily required for the navigation from the construction site to the installation site of the floating production facility, it becomes possible to suppress initial navigation expense. In addition, since electric power temporarily required for this navigation is generated by the second group of the electric generators in the electric generators to be used at the time of the operation of the production equipment, it becomes unnecessary to provide an electric generator to be used only at the time of the navigation. In particular, when the floating production facility is provided with a large-scale electric power generation system of a 100 MW class, it is possible to sufficiently provide electric power used in the electric propulsion system during the navigation.

[0018]

Therefore, since a part of the large-scale electric power

generation system equipped on the upper deck in the conventional technique is equipped inside the engine room, it is possible to more widely utilize the space on the upper deck where the production equipment is installed. In addition, it is possible to suppress the investment expense for the device for initial navigation and to reduce the self-navigation expense.

[0019]

Note that, when considered from the viewpoint of electric power supply control, preferably, the electric generators are generators of the same machine type and the same capacity, and preferably, the numbers of arranged electric generators are four in the first group and two in the second group from the viewpoint of electric power consumption during the navigation.

[0020]

Furthermore, although it is possible to consider the supply of the electric power used in the electric propulsion system during the navigation by the use of some or all of the first group of the electric generators arranged on the upper deck, there is a case where the first group of electric generators is arranged on the upper deck after the electric propulsion system and the second group of electric generators is arranged inside the engine room in consideration of the construction process of the floating production facility, and the first group of electric generators cannot be always installed and operated at the time of the navigation, and thus, preferably, the second group of electric generators supplies the electric power to the electric propulsion system.

[0021]

Moreover, in other words, in the present invention, since it is preferable to reduce as much as possible the space for the electric generator group arranged on the upper deck to secure the space for the production equipment arranged on the same upper deck, after deep deliberation, the present inventors divide the electric generators into two groups, relocate the second group of electric generators on one side to the engine room, then reduce the space for the engine room by the combination with the electric propulsion system since the space for the hold under the upper deck is reduced when the space for the engine room is increased along with this relocation of the electric generators to the engine room, simplify the device configuration inside the engine room by replacing a part of the electric generators for the electric propulsion system by the second group of the electric generators, and further reduce the space for the engine room to thereby increase the space for the hold.

[0022]

In the above floating offshore facility, when at least some or all of the electric generators are configured with diesel electric generators, it is necessary to secure a space for arranging a propeller shaft, electric motors, electric generators, a propulsion control device, and the like inside the engine room even when adopting the electric propulsion system, and the space for this electric propulsion system becomes smaller than the space required for adopting a

propulsion system in which an internal combustion engine directly drives the propeller rotationally, and thus it is possible to easily secure a space for being able to arrange the diesel electric generators, with the result that it is possible to reduce fuel consumption compared with the case of adopting the gas turbine electric generators.

[0023]

In the above floating offshore facility, when the rotational speed control of the propeller in the electric propulsion system is performed by an inverter and the inverter is configured to be used also for transfer rate control of the cargo pump, the expensive inverter can be utilized for the initial navigation and product transfer, and thus it is possible to efficiently use the inverter and to thereby reduce equipment cost as a whole. Namely, although the cargo pump is formed so as to be driven by steam generated in a boiler in the conventional technique, in a case where the inverter to be used in the initial navigation exists, it is possible to switch the cargo pump to electric drive while keeping low cost through the use of the inverter for both of the initial navigation and the operation of the production equipment, by the concurrent use of the inverter or the rearrangement of the inverter. It is possible to contribute to the lowering of fuel expense compared with a cargo pump using steam turbine drive in the conventional technique, by adopting this electric motorization of the cargo pump.

[0024]

In addition, in a method for supplying electric power in a floating offshore facility that is provided with production equipment which receives electric power supply from a plurality of electric generators and that is used while being positioned and held on the sea, the method for supplying electric power in the floating offshore facility for achieving the above purpose includes: supplying electric power that runs production equipment provided for the floating offshore facility from a first group of the electric generators arranged on an upper deck and a second group of the electric generators arranged inside an engine room; and supplying electric power that drives an electric motor of an electric propulsion system for moving the floating offshore facility from the second group of the electric generators.

[0025]

According to this method, since the electric power supply to the production equipment on the upper deck is performed by the first group of the electric generators on the upper deck and the second group of the electric generators equipped inside the engine room, it is possible to reduce the number of electric generators arranged on the upper deck and it is possible to more widely utilize the upper deck on which the production equipment is installed. In addition, since the second group of the electric generators supplies electric power to the electric motors of the electric propulsion system at the time of the initial navigation, it is possible to suppress the investment expense for the device for initial navigation and to reduce the

self-navigation expense.

Advantageous Effects of Invention

[0026]

According to the floating offshore facility and the method for supplying electric power in the floating offshore facility, there is configured the propulsion system which is used in the navigation from a construction site or a port to an offshore site for installation through the use of the electric propulsion system, with the result that it is possible to greatly reduce the space for the engine room where the propulsion system is arranged, and it becomes possible to increase the space for the hold arranged under the upper deck.

[0027]

Furthermore, by provision of the second group of the electric generators inside the engine room, the number of electric generators in the first group arranged on the upper deck can be reduced, it is possible to greatly reduce the space occupied by the electric generators on the upper deck, and it is possible to increase the space for the production equipment.

[0028]

Moreover, since electric power temporarily required for the navigation from the construction site to the installation site of the floating production facility is generated using the second group of the electric generators, which is a part of electric generators to be used at the time of the operation of the production equipment, it becomes unnecessary to specially

provide electric generators to be used only at the time of the navigation.

[0029]

Therefore, since a part of the large-scale electric power generation system equipped on the upper deck in the conventional technique is equipped inside the engine room, it is possible to more widely utilize the space on the upper deck where the production equipment is installed. In addition, it is possible to suppress the investment expense for the device for initial navigation and to reduce the self-navigation expense.

Brief Description of Drawings

[0030]

[FIG. 1] FIG. 1 is a side cross-sectional view schematically illustrating a configuration of a floating offshore facility according to an embodiment of the present invention.

[FIG. 2] FIG. 2 is a plan view of a stern part schematically illustrating electric generators on the upper deck in a floating offshore facility according to an embodiment of the present invention.

[FIG. 3] FIG. 3 is a side cross-sectional view of an engine room schematically illustrating a configuration inside an engine room in a floating offshore facility according to an embodiment of the present invention.

[FIG. 4] FIG. 4 is a plan view of an engine room schematically illustrating an arrangement of second group of

electric generators inside an engine room in a floating offshore facility according to an embodiment of the present invention.

[FIG. 5] FIG. 5 is a plan view of an engine room schematically illustrating arrangements of electric motors of an electric propulsion system, a propeller rotation shaft, a propeller, and the like inside an engine room in a floating offshore facility according to an embodiment of the present invention.

[FIG. 6] FIG. 6 is an electrical one-line diagram of an electric power supply system in a floating offshore facility according to an embodiment of the present invention.

[FIG. 7] FIG. 7 is a side cross-sectional view schematically illustrating a configuration of a floating offshore facility in a conventional technique.

Description of Embodiments

[0031]

Hereinafter, a floating offshore facility and a method for supplying electric power in the floating offshore facility according to the present invention will be explained with reference to the drawings. While the floating offshore facility of this embodiment will be explained by the use of an FPSO (Floating Production Storage Offloading system) as an example, the present invention is not required to be limited to such an FPSO and can be applied to any floating offshore facility which needs a propulsion device during navigation on the sea but does not need the propulsion device during operation

on the sea.

[0032]

The present invention can also be applied to, for example, an FSO (Floating Storage Offloading system) and an FSU (Floating Storage Unit) which do not include oil or gas production equipment, an FLNG (liquefaction storage offloading system: LNG-FSPO) that deals with LNG, an FLPG (LPG-FPSO) that deals with LPG, an FSRU (Floating Storage Re-gasification Unit), and the like.

[0033]

Note that, generally, the floating offshore facility 1 such as the FPSO frequently has a shape similar to that of a ship such as a VLCC, and thus explanation here will be made using names such as "hull", "stern", "upper deck" also as respective part names in accordance with the names of a ship such as the VLCC.

[0034]

As shown in FIG. 1 to FIG. 5, the floating offshore facility 1 of this embodiment has substantially the similar shape to that of a ship such as the VLCC, navigates by self-propulsion from a construction site or a port to an offshore site for installation where an oil field or the like exists, and is used in a state of being positioned and held on the sea at this offshore site for installation by using a mooring system or a dynamic positioning system.

[0035]

As shown in FIG. 1, this floating offshore facility 1

includes a hull 2, an upper deck 3 and a stern part 4, and is provided, respectively, with an engine room 5 under the upper deck 3 in front of this stern part 4, holds 6 in front of this engine room 5, and a superstructure 7 which is configured with a part serving as an accommodation space and a bridge during navigation, above the engine room 5. Furthermore, a funnel 5a is provided at the upper part of the engine room 5. Note that the floating offshore facility 1 is equipped with navigation equipment on the bridge of the superstructure 7 and the equipment is utilized for initial navigation, in a case where the floating offshore facility 1 performs self-navigation even temporarily.

[0036]

Furthermore, as shown in FIG. 2, production equipment 30 that processes, for example, crude oil or natural gas, and first group of electric generators 11a, 11b, 12a, and 12b of electric generators that supply electric power to the production equipment 30 are arranged on the upper deck 3 in front of this superstructure 7. Ordinarily, the first group of electric generators 11a, 11b, 12a, and 12b is arranged on the superstructure 7 side of the production equipment 30, namely, on the aft side of the production equipment 30, and is provided in two lateral rows.

[0037]

Then, as shown in FIG. 3 to FIG. 5, this floating offshore facility 1 is configured to be provided with an electric propulsion system 20 on the stern part 4 side of the hull 2,

and this electric propulsion system 20 is provided with: a propeller 21 (propelling device) attached to the aft end of a propeller rotation shaft (propeller shaft) 21a protruding toward the stern part 4 side of the engine room 5; and electric motors (propulsion electric motors) 22a and 22b and the second group of electric generators 13a and 13b each arranged in two lateral rows inside the engine room 5.

[0038]

Namely, this floating offshore facility 1 is provided with the production equipment 30 to which electric power is supplied from the plurality of (in this embodiment, six) electric generators 11a, 11b, 12a, 12b, 13a, and 13b, is used while being positioned and held on the sea, and a propulsion system for moving this floating offshore facility 1 is configured with the electric propulsion system 20 in which the electric motors 22a and 22b drive the propeller 21. In addition, the first group of electric generators 11a, 11b, 12a, and 12b is configured to be arranged on the upper deck 3 and the second group of electric generators 13a and 13b is configured to be arranged inside the engine room 5.

[0039]

Furthermore, this floating offshore facility 1 is configured wherein electric power that runs the production equipment 30 provided on this floating offshore facility 1 is supplied by both of the first group and the second group of the electric generators 11a, 11b, 12a, 12b, 13a, and 13b, and also electric power that drives the electric motors 22a and 22b is supplied

by the second group of electric generators 13a and 13b.

[0040]

In this case, from the viewpoint of electric power supply control, preferably, the electric generators 11a, 11b, 12a, 12b, 13a, and 13b are the same machine type and have the same capacity. As to the arrangement of the numbers of the electric generators 11a, 11b, 12a, 12b, 13a, and 13b, it is preferable that the first group includes four electric generators 11a, 11b, 12a, and 12b, and the second group includes two electric generators 13a and 13b, from the viewpoint of electric power consumption during navigation.

[0041]

Furthermore, when at least some or all of the electric generators 11a, 11b, 12a, 12b, 13a, and 13b are configured with diesel electric generators, it is necessary to secure a space for arranging the propeller rotation shaft 21a, the electric motors 22a and 22b, the electric generators 13a and 13b, the propulsion control device (not illustrated), and the like inside the engine room 5 even when adopting the electric propulsion system 20, and the space for this electric propulsion system 20 becomes smaller than the space required for adopting a propulsion system in which an internal combustion engine directly drives the propeller rotationally, and thus it is possible to easily secure a space for being able to arrange the diesel electric generators, with the result that it is possible to reduce fuel consumption compared with the case of adopting the gas turbine electric generators.

[0042]

According to the above configuration, since the propulsion system for moving the floating offshore facility 1 is configured with the electric propulsion system 20 in which the propeller 21 is driven by the electric motors 22a and 22b, the space for the whole engine room 5 can be made smaller and the space for the hold 6 under the upper deck 3 can be made larger than in the case of adopting the propulsion system in which the propeller 21 is directly driven by a main engine 40 configured with the internal combustion engine as in the conventional technique shown in FIG. 7, even when the second group of the electric generators 13a and 13b in the electric generators is provided inside the engine room 5.

[0043]

Moreover, by provision, inside the engine room 5, of the second group of the electric generators 13a and 13b in the electric generators that supply electric power to the production equipment 30, the number of electric generators 11a, 11b, 12a, and 12b in the first group of the electric generators on the upper deck 3 can be reduced from six to four in this embodiment, and thus the space occupied by the electric generators on the upper deck 3 can be significantly reduced and the space for the production equipment 30 can be increased.

[0044]

Furthermore, since there is provided, for navigation, devices for initial navigation such as an electric propulsion device, a propulsion control device, and navigation equipment

which are temporarily required for the navigation from the construction site to the installation site of the floating production facility 1, it becomes possible to suppress initial navigation expense. In addition, since electric power temporarily required for this navigation is generated by the second group of the electric generators 13a and 13b in the electric generators to be used at the time of the operation of the production equipment 30, it becomes unnecessary to provide an electric generator to be used only at the time of the navigation. In particular, when the floating production facility 1 is provided with a large-scale electric power generation system of a 100 MW class, it is possible to sufficiently provide electric power used in the electric propulsion system 20 during the navigation.

[0045]

Moreover, as shown in FIG. 6, if the rotational speed control of the propeller 21 in the electric propulsion system 20 is performed by inverters 25a and 25b and these inverters 25a and 25b are configured to be used also for transfer rate control of the cargo pump (not illustrated), the expensive inverters 25a and 25b can be utilized for the initial navigation of the floating production facility 1 and product transfer, and thus it is possible to efficiently use the inverters 25a and 25b and to thereby reduce equipment cost as a whole. Namely, although the cargo pump is formed so as to be driven by steam in the conventional technique, in a case where the inverters 25a and 25b to be used in the initial navigation exist, it is

possible to switch the cargo pump to electric drive while keeping low cost, through the use of the inverters 25a and 25b for both of the initial navigation and the operation of the production equipment 30, by the concurrent use or the rearrangement of these inverters 25a and 25b. It is possible to contribute to the lowering of fuel expense compared with a cargo pump using steam turbine drive in the conventional technique, by adopting this electric motorization of the cargo pump.

[0046]

Therefore, since a part of the large-scale electric power generation system equipped on the upper deck 3 in the conventional technique is equipped inside the engine room 5, it is possible to more widely utilize the space on the upper deck 3 where the production equipment 30 is installed. In addition, it is possible to suppress an investment expense of the device for initial navigation and to reduce a self-navigation expense.

[0047]

In addition, a method for supplying electric power in a floating offshore facility according to an embodiment of the present invention is a method for supplying electric power in the floating offshore facility 1 that is provided with the production equipment 30 which receives electric power supply from the plurality of electric generators 11a, 11b, 12a, 12b, 13a, and 13b as shown in FIG. 6 and that is used while being positioned and held on the sea, and is a method for supplying

electric power that runs the production equipment 30 provided on this floating offshore facility 1, from the first group of electric generators 11a, 11b, 12a, and 12b arranged on the upper deck 3 and the second group of electric generators 13a and 13b arranged inside the engine room 5, and also for supplying electric power that drives the electric motors 22a and 22b of the electric propulsion system 20 for moving this floating offshore facility 1, from the second group of electric generators 13a and 13b.

[0048]

More specifically, as shown in the upper part of FIG. 6, in the operation of the floating offshore facility 1, electric power generated in the first group of electric generators 11a, 11b, 12a, and 12b on the upper deck 3 is collected by a 13.8 kV or 11 kV switchboard 23a on the upper deck 3 side, enters a transformer 26a to be transformed from 13.8 kV or 11 kV to 6.6 kV/440 V, is supplied to a 6.6 kV/440 V switchboard 27a, and is supplied to an electric power consumption part of the production equipment 30 from this 6.6 kV/440 V switchboard 27a.

[0049]

In addition, as shown in the lower part of FIG. 6, electric power generated in the second group of electric generators 13a and 13b inside the engine room 5 is converted into a working voltage for the electric motors 22a and 22b by transformers 24a and 24b at the time of the self-navigation of the floating offshore facility 1 to thereby be supplied to the electric motors 22a and 22b through the inverters 25a and 25b, then the

rotation of the electric motors 22a and 22b is converted into the rotation of the propeller rotation shaft 21a by a gear device 28 and thereby into the rotation of the propeller 21, and thus the floating offshore facility 1 can perform self-navigation by obtaining propulsion force from this rotation of the propeller 21. Note that the rotational speed control of the propeller 21 is performed by the inverters 25a and 25b.

[0050]

Furthermore, at the time of the operation of the floating offshore facility 1, the electric power generated in the second group of electric generators 13a and 13b inside the engine room 5 is collected by the 13.8 kV or 11 kV switchboard 23b on the engine room 5 side, enters a transformer 26b to be transformed from 13.8 kV or 11 kV into 6.6 kV/440 V, and is supplied to a 6.6 kV/440 V switchboard 27b, and is supplied from this 6.6 kV/440 V switchboard 27b to the electric power consumption part of the production equipment 30.

[0051]

Note that, although the propeller rotational speed control is performed by the inverters 25a and 25b for changing the propulsion force of the propeller 21 in this embodiment of FIG. 6, it is possible to change the propulsion force of the propeller 21 by changing the pitch (attack angle) of the propeller 21, in a case where the propeller 21 is configured with a controllable pitch propeller (CPP) and the electric motors 22a and 22b are configured with induction-type motors. Although this configuration dose not require to use the

expensive inverters 25a and 25b, in a case where the inverters are used for motorizing the cargo pump, it is preferable that these inverters are used as the inverters 25a and 25b for the rotational speed control of the propeller 21.

[0052]

According to this method, since the electric power supply to the production equipment on the upper deck is performed by the first group of electric generators on the upper deck and the second group of electric generators equipped inside the engine room, it is possible to reduce the number of electric generators arranged on the upper deck, and to more widely utilize the upper deck where the production equipment is installed. In addition since the second group of electric generators supplies electric power to the electric motors of the electric propulsion system at the time of the initial navigation, it is possible to suppress the investment expense for the device for initial navigation and to reduce the self-navigation expense.

[0053]

Therefore, according to the floating offshore facility 1 having the above configuration and the method for supplying electric power in the floating offshore facility, a propulsion system to be used in the navigation from a construction site or a port to an offshore site for installation is configured with the electric propulsion system 20, with the result that the space for the engine room where the propulsion system is arranged can be significantly reduced, and the space for the

hold 6 arranged under the upper deck 3 can be increased. For example, the hatching (diagonal line) part shown in FIG. 1 can be used as a space for the hold 6.

[0054]

Furthermore, by provision of the second group of electric generators 13a and 13b inside the engine room 5, it is possible to reduce the number of electric generators 11a, 11b, 12a, and 12b in the first group to be arranged on the upper deck 3, and thus it is possible to significantly reduce the space occupied by the electric generators on the upper deck 3 and to increase the space for the production equipment 30.

[0055]

Moreover, the electric power temporarily required for the navigation from the construction site to the installation site of the floating production facility 1 is generated by the second group of electric generators 13a and 13b which is a part of the electric generators to be used at the time of the operation of the production equipment 30, and thus it becomes unnecessary to specially provide an electric generator to be used only at the time of the navigation.

[0056]

Therefore, since a part of the large-scale electric power generation system equipped on the upper deck 3 in the conventional technique is equipped inside the engine room 5, it is possible to more widely utilize the upper deck 3 where the production equipment 30 is installed. Furthermore, it is possible to suppress the investment expense for the device for

initial navigation and to reduce the self-navigation expense.

Industrial Applicability

[0057]

According to the floating offshore facility and the method for supplying electric power in the floating offshore facility, it is possible to greatly reduce the space for the engine room where there is arranged the propulsion system which is used in the navigation from a construction site or a port to an offshore site for installaion, but which becomes unnecessary during the operation on the sea, in the floating offshore facility, and also it is possible to significantly increase the space of the production equipment as an offshore facility and the space of the hold for storage. Accordingly, the present invention can be utilized for many floating offshore facilities.

Reference Signs List

[0058]

- 1, 1X Floating offshore facility
- 2 Hull
- 3 Upper deck
- 4 Stern part
- 5, 5X Engine room
- 5a Funnel
- 6 Hold
- 7 Superstructure

11a, 11b, 12a, 12b First group of electric
generators

13a, 13b Second group of electric generators

20 Electric propulsion system

21 Propeller (Propelling device)

21a Propeller rotation shaft (Propeller shaft)

22a, 22b Electric motor

23a, 23b 13.8 kV or 11 kV switchboard

24a, 24b Transformer

25a, 25b Inverter

26a, 26b Transformer

27a, 27b 6.6 kV/440 V switchboard

30 Production equipment

40 Main engine

41 Electric generator

CLAIMS

1. A floating offshore facility that is provided with production equipment which receives electric power supply from a plurality of electric generators and that is used while being positioned and held on the sea, wherein

a propulsion system for moving the floating offshore facility is configured with an electric propulsion system in which an electric motor drives a propeller, and a first group of the electric generators is arranged on an upper deck and a second group of the electric generators is arranged inside an engine room, and also

electric power that runs the production equipment provided for the floating offshore facility is supplied from both of the first group and second group of the electric generators, and electric power that drives the electric motor is supplied by the second group of the electric generators.

2. The floating offshore facility according to claim 1, wherein

at least some or all of the electric generators are configured with diesel electric generators.

3. The floating offshore facility according to claim 1 or 2, wherein

rotational speed control of the propeller in the electric propulsion system is performed by an inverter, and the inverter is also used for transfer rate control of a cargo pump.

4. A method for supplying electric power in a floating offshore facility that is provided with production equipment which receives electric power supply from a plurality of electric generators and that is used while being positioned and held on the sea, the method comprising:

supplying electric power that runs production equipment provided for the floating offshore facility from a first group of the electric generators arranged on an upper deck and a second group of the electric generators arranged inside an engine room; and

supplying electric power that drives an electric motor of an electric propulsion system for moving the floating offshore facility from the second group of the electric generators.