

[DESCRIPTION]

[TITLE OF INVENTION]

METHOD FOR TREATING GAS OF FLOATING BODY, AND FLOATING BODY

[Technical Field]

5 [0001]

The present disclosure relates to a method for treating a gas of a floating body, and a floating body.

Priority is claimed on Japanese Patent Application No. 2022-027396, filed February 25, 2022, the content of which is incorporated herein by reference.

10 [Background Art]

[0002]

In a marine vessel provided with a tank for storing a liquefied petroleum gas (LPG), a liquefied natural gas (LNG), ammonia, or the like, when the marine vessel enters a dock for a regular inspection or the like, it is necessary to make the inside of the tank gas-free. In this case, in order to prevent oxygen from coming into contact with the LPG, the LNG, the ammonia, or the like, an inerting step of replacing the inside of the tank with an inert gas such as an inert nitrogen gas to fill the tank with the inert gas is generally performed. This inerting step is also performed before the storage in the tank after the inspection or the like, and in this case, air in the tank is replaced with the inert gas. In Patent Document 1, there is described a marine vessel capable of supplying an inert gas into an oil tank of an oil transport ship.

[Citation List]

[Patent Document]

[0003]

25 [Patent Document 1]:

164999

[Summary of Invention]

[Technical Problem]

5 [0004]

In a floating body provided with the tank as in Patent Document 1, when an exhaust gas that is discharged from the tank due to the inerting step is directly released to the atmosphere, since there is a possibility that the exhaust gas may affect the surrounding environment, gas treatment equipment that performs detoxification treatment
10 such as combustion of the exhaust gas is provided on the floating body.

However, the gas treatment equipment requires a large-scale gas treatment device in accordance with the amount of the exhaust gas that is generated in the inerting step. In addition, the frequency of making the tank gas-free is low, such as once every two to three years.

15 Therefore, there is a problem in that it is difficult to secure a space on the floating body and it is difficult to lower the center of gravity to improve stability.

[0005]

The present disclosure has been made in view of the above circumstances, and an object of the present disclosure is to provide a method for treating a gas of a floating
20 body and a floating body, in which it is possible to effectively utilize an on-board space and to improve stability.

[Solution to Problem]

[0006]

The following configuration is adopted to solve the above problems.

25 According to a first aspect of the present disclosure, a method for treating a gas

of a floating body is a method for treating a gas of a floating body, which detoxifies an exhaust gas that is discharged when replacing an inside of a gas tank provided on the floating body with an inert gas, the method including: a treatment device preparation step of preparing a plurality of treatment devices configured to detoxify the exhaust gas; a
5 treatment device selection step of selecting at least one or more treatment devices in accordance with the amount of the exhaust gas that is discharged in one floating body, from among the plurality of treatment devices prepared in the treatment device preparation step; a treatment device installation step of installing the treatment devices corresponding to the number selected in the treatment device selection step on at least
10 one of the floating body and another floating body different from the floating body; and a treatment step of treating the exhaust gas of the floating body by using the treatment devices installed in the treatment device installation step.

[0007]

According to a second aspect of the present disclosure, a floating body includes:

15 a floating body main body; a gas tank provided on the floating body main body and configured to store a liquefied gas; and a plurality of treatment devices that are installed to be detachable with respect to the floating body main body and detoxify an exhaust gas that is discharged from the gas tank, in which the plurality of treatment devices are connected in parallel with respect to the gas tank.

20 [0008]

According to a third aspect of the present disclosure, a floating body includes: a floating body main body; and a plurality of treatment devices that are installed to be detachable with respect to the floating body main body and detoxify an exhaust gas that is discharged from a gas tank, configured to store a liquefied gas and provided on another
25 floating body, in which the plurality of treatment devices are connected in parallel with

respect to the gas tank.

[Advantageous Effects of Invention]

[0009]

According to the method for treating a gas of a floating body and the floating
5 body according to the present disclosure, it is possible to effectively utilize an on-board
space and to improve stability.

[Brief Description of Drawings]

[0010]

FIG. 1 is a configuration diagram showing a schematic configuration of a
10 floating body of a first embodiment.

FIG. 2 is a diagram showing a schematic configuration of a tank interior
inspection preparation related device of the floating body in the first embodiment of the
present disclosure.

FIG. 3 is a flowchart of the exhaust gas treatment work of the floating body in
15 the first embodiment of the present disclosure.

FIG. 4 is a flowchart of inert gas supply work in the first embodiment of the
present disclosure.

FIG. 5 is a diagram corresponding to FIG. 2 in a second embodiment of the
present disclosure.

20 FIG. 6 is a flowchart of the exhaust gas treatment work of the floating body in
the second embodiment of the present disclosure.

FIG. 7 is a flowchart of the inert gas supply work in the second embodiment of
the present disclosure.

FIG. 8 is a diagram corresponding to FIG. 2 in a modification example of the
25 first embodiment of the present disclosure.

FIG. 9 is a diagram corresponding to FIG. 5 in a modification example of the second embodiment of the present disclosure.

[Description of Embodiments]

[0011]

5 Next, a method for treating a gas of a floating body and a floating body in a first embodiment of the present disclosure will be described based on the drawings.

As the floating body in the present embodiment, a so-called ammonia-fueled ship which uses ammonia that is a liquefied gas as fuel will be described as an example.

[0012]

10 <First Embodiment>

FIG. 1 is a configuration diagram showing a schematic configuration of a floating body of a first embodiment. In FIG. 1, a fore and aft direction AF of the floating body is indicated by an arrow.

As shown in FIG. 1, a floating body 1 in the first embodiment includes a floating
15 body main body 2, a cargo tank 3, an engine 4, a superstructure 5, a gas fuel tank (gas tank) 6, an inert gas supply device 20, and a treatment device 21.

[0013]

The floating body main body 2 includes a pair of broadsides 7 (in FIG. 1, only a right broadside is shown), a bottom 8, and an upper deck 9. The upper deck 9 is a full
20 deck that is located on the uppermost side, and is an exposed deck in the floating body main body 2 of the present embodiment. In addition, the inside of the floating body main body 2 is partitioned into a cargo hold 10 and a main engine room 11. Further, the floating body main body 2 includes a screw 12 and a rudder 13 below a stern 2A.

[0014]

25 The cargo hold 10 is a space that accommodates the cargo tank 3. In the

floating body 1 provided as an exemplary example in the present embodiment, a plurality of (more specifically, three) cargo holds 10 are disposed side by side from a bow 2F toward the stern 2A. The cargo holds 10 are partitioned in the fore and aft direction AF by a partition wall 10a.

5 [0015]

The main engine room 11 is a compartment that accommodates the engine 4, and is disposed on a side closer to the stern 2A with respect to the cargo hold 10. In addition, the main engine room 11 is disposed below the superstructure 5. The main engine room 11 in this embodiment is partitioned into upper and lower parts by an inner
10 bottom plate 14 forming a double bottom and a deck 15 formed above the bottom plate 14.

[0016]

The cargo tank 3 is a tank capable of storing, for example, a liquefied gas (ammonia, LPG, LNG, or the like) as a load. One cargo tank 3 is accommodated in
15 each of the plurality of cargo holds 10 described above. That is, a plurality of cargo tanks 3 are also disposed side by side in the fore and aft direction AF, as with the cargo holds 10.

[0017]

The engine 4 can be driven using ammonia as fuel. The engine 4 rotates the
20 screw 12 to generate a thrust force. The engine 4 is accommodated in the main engine room 11 described above. Here, the fuel of the engine 4 is not limited to only ammonia, and may be a combined use (bi-fuel) or a mixture (dual fuel) of ammonia and other fuel (light oil or the like), or the like. Further, the engine 4 is not limited to driving the screw 12. For example, the engine 4 may drive a generator. The engine 4 is usually
25 driven by using the ammonia stored in the gas fuel tank 6.

[0018]

The superstructure 5 is formed on the upper deck 9 and includes a bridge, living quarters, and the like. The superstructure 5 is disposed at a position on a side closer to the stern 2A with respect to the cargo hold 10 in the fore and aft direction and at a position above the main engine room 11.

[0019]

The gas fuel tank 6 stores liquefied ammonia which is the fuel of the engine 4 described above. A case where the gas fuel tank 6 in this embodiment is installed on the upper deck 9 is an exemplary example. In addition, in the floating body 1 of this embodiment, a case in which the gas fuel tank 6 is a so-called type-C tank, which is a cylindrical pressure tank, and is disposed in a posture in which a longitudinal direction thereof coincides with the fore and aft direction AF is an exemplary example. The shape, the number, and the disposition of the gas fuel tank 6 are not limited to the above.

[0020]

The inert gas supply device 20 is installed to be detachable with respect to the floating body main body 2. The inert gas supply device 20 is configured to be able to supply an inert gas to the gas fuel tank 6 when preparing for a tank interior inspection to make the gas fuel tank 6 gas-free. As the inert gas, nitrogen is an exemplary example. In addition, the inert gas supply device 20 may be configured to be able to supply air in order to replace the inert gas in the gas fuel tank 6 with air.

[0021]

A case where the inert gas supply device 20 of the present embodiment is detachably installed on the upper deck 9 is an exemplary example. In addition, a case where the inert gas supply device 20 of the present embodiment is accommodated in an ISO standard marine container is an exemplary example. However, there is no

limitation to being accommodated in the ISO standard marine container.

[0022]

The treatment device 21 is installed to be detachable with respect to the floating body main body 2. The treatment device 21 is configured to be able to detoxify the exhaust gas that is discharged from the gas fuel tank 6 when performing inerting to make the gas fuel tank 6 gas-free. Here, as a method for detoxifying the exhaust gas, combustion detoxification of combusting the exhaust gas introduced into the treatment device 21 is an exemplary example.

[0023]

A case where the treatment device 21 of the present embodiment is detachably installed on the upper deck 9 is an exemplary example. More specifically, the treatment device 21 of the present embodiment is accommodated in an ISO standard marine container, as with the inert gas supply device 20 described above. In a case where the treatment device 21 is accommodated in the marine container, a set of devices for detoxifying the exhaust gas, such as a combustion detoxification device (not shown) and a fuel tank (not shown) that stores fuel for the combustion detoxification device, is accommodated in the marine container.

[0024]

The treatment device 21 of the present embodiment is installed (stacked) on the inert gas supply device 20. The inert gas supply device 20 and the treatment device 21 can be installed and removed with respect to the floating body main body 2 by using a crane for container handling provided on a quay or the like. Although a case where the container size of the treatment device 21 and the container size of the inert gas supply device 20 are the same is shown, the container sizes are not limited to the same size.

[0025]

A dedicated space 16 for loading the treatment device 21 and the inert gas supply device 20 is secured in advance on the upper deck 9 of the floating body main body 2 of the present embodiment. The upper deck 9 is reinforced to be able to support the treatment device 21 and the inert gas supply device 20. Although not shown in the drawings, a connection end portion (not shown) of each of a pipe (not shown) for allowing the treatment device 21 and the gas fuel tank 6 to communicate with each other and a pipe for allowing the inert gas supply device 20 and the gas fuel tank 6 to communicate with each other may be provided around the dedicated space 16.

[0026]

FIG. 2 is a diagram showing a schematic configuration of a tank interior inspection preparation related device of the floating body in the first embodiment of the present disclosure.

As shown in FIG. 2, the floating body 1 of the present embodiment includes a plurality of gas fuel tanks 6, an exhaust gas pipe 25 that leads the exhaust gases from the gas fuel tanks 6, and an inert gas supply pipe 26 that leads an inert gas to the plurality of gas fuel tanks 6.

[0027]

The exhaust gas pipe 25 includes an exhaust gas branch pipe 27 and an exhaust gas main pipe 28. The exhaust gas branch pipe 27 extends from each of the plurality of gas fuel tanks 6. The exhaust gas branch pipes 27 are connected to the exhaust gas main pipe 28 in a merging manner. The exhaust gas main pipe 28 includes, at an end portion thereof, a distribution connection part 30 that distributes the exhaust gas to the plurality of treatment devices 21.

[0028]

On the other hand, each of the treatment devices 21 includes an introduction line

31 for introducing the exhaust gas. An inlet end 31s of the introduction line 31 can be attached to and detached from the distribution connection part 30. In FIG. 2, a case is exemplary in which a small-sized treatment device 33 that treats a fluid discharged by pipe purging other than the gas fuel tank 6, a vaporized gas discharged from the cargo tank 3, or the like is separately provided. Although a case where the floating body 1 includes two gas fuel tanks 6 has been described as an example, one gas fuel tank 6 may be provided, or three or more gas fuel tanks 6 may be provided. In FIG 2, only one inlet end 31s for the introduction lines 31 is shown. However, each of the three introduction lines 31 has the inlet end 31s, and each of the three inlet ends 31s is connected to the distribution connection part 30 (the same applies to a second embodiment).

[0029]

One or more treatment devices 21 in accordance with the amount of the exhaust gas that is discharged from the gas fuel tank 6 are installed on the floating body main body 2. The amount of the exhaust gas that is discharged from the gas fuel tank 6 increases as the capacity of the gas fuel tank 6 increases, and decreases as the capacity of the gas fuel tank 6 decreases. In the floating body 1 of the present embodiment, a plurality of (specifically, three) treatment devices 21 are installed, and the plurality of treatment devices 21 are connected in parallel with respect to the gas fuel tank 6. The total treatment capacity (volume flow rate) of the plurality of treatment devices 21 exceeds the amount (volume flow rate) of the exhaust gas that is discharged in one floating body 1. In addition, in the present embodiment, a difference between the total treatment capacity (volume flow rate) of the plurality of treatment devices 21 installed on one floating body 1 and the amount of the exhaust gas that is discharged in one floating body 1 is smaller than the treatment capacity of one treatment device 21.

[0030]

The inert gas supply pipe 26 includes a supply main pipe 36 and a supply branch pipe 37. The supply main pipe 36 includes a merging connection part 32 at an inlet end 36s thereof. The supply branch pipe 37 is branched and connected to the supply main pipe 36, and allows the supply main pipe 36 and the gas fuel tank 6 to communicate with
5 each other.

On the other hand, the inert gas supply device 20 includes a supply line 38 for supplying the inert gas. An outlet end 38o of the supply line 38 is detachably connected to the merging connection part 32 of the inert gas supply pipe 26. In FIG. 2, only one outlet end 38o for the supply line 38 is shown. However, each of three supply lines 38
10 has the outlet end 38o, and each of the three outlet ends 38o is connected to the merging connection part 32 (the same applies to the second embodiment).

[0031]

At least one or more inert gas supply devices 20 in accordance with the amount (volume flow rate) of the inert gas required for the tank interior inspection preparation to
15 be performed in one floating body 1 are installed on the floating body main body 2. The amount of the inert gas required for the tank interior inspection preparation described above increases as the capacity of the gas fuel tank 6 increases, and decreases as the capacity of the gas fuel tank 6 decreases. In the floating body 1 of the present embodiment, a plurality of (specifically, three) inert gas supply devices 20 are installed,
20 and the plurality of inert gas supply devices 20 are connected in parallel with respect to the gas fuel tank 6.

[0032]

(Method for Treating Gas of Floating Body)

Next, a method for treating a gas of the floating body 1 according to the present
25 embodiment will be described with reference to the drawings. In the method for

treating a gas of a floating body according to the present embodiment, exhaust gas treatment work by the treatment device 21 and inert gas supply work by the inert gas supply device 20 are performed in parallel.

(Exhaust Gas Treatment Work)

5 FIG. 3 is a flowchart of the exhaust gas treatment work of the floating body in the first embodiment of the present disclosure.

As shown in FIG. 3, the exhaust gas treatment work in the method for treating a gas of a floating body according to the present embodiment includes at least a treatment device preparation step (step S11), a treatment device selection step (step S12), a
10 treatment device installation step (step S13), and a treatment step (step S14). The method for treating a gas of a floating body according to the present embodiment further includes a treatment device removal step (step S15) and a treatment device storage step (step S16).

[0033]

15 First, in the treatment device preparation step (step S11), the plurality of treatment devices 21 capable of detoxifying the exhaust gas are prepared. More specifically, a large number of treatment devices 21 capable of detoxifying an ammonia gas included in the exhaust gas that is discharged from the gas fuel tank 6 are prepared by performing warming up and tank interior inspection preparation. These prepared
20 treatment devices 21 are operated to be stored in a predetermined storage location, taken out from the predetermined storage location when used, and returned to the predetermined storage location after use. Then, when the floating body 1 enters the dock for regular inspection or the like to make the gas fuel tank 6 gas-free, the process proceeds to the treatment device selection step (step S12).

25 [0034]

In the treatment device selection step (step S12), at least one or more treatment devices 21 in accordance with the amount of the exhaust gas that is discharged in one floating body are selected from among the plurality of treatment devices 21 prepared in the treatment device preparation step (step S11). That is, the number of the treatment devices 21 to be used in one floating body in which the warming up and the tank interior inspection preparation are performed is determined, and the determined number of treatment devices 21 are selected from among a large number of treatment devices 21 stored. These selected treatment devices 21 are transported to the floating body 1 on which the warming up and the tank interior inspection preparation are performed.

10 [0035]

In the treatment device installation step (step S13), the treatment devices 21 corresponding to the number selected in the treatment device selection step (step S12) are installed on the floating body 1. In the present embodiment, the treatment device 21 is installed in the dedicated space 16 on the upper deck 9 of the floating body 1. In addition, in a case where a plurality of treatment devices 21 are installed, other treatment devices 21 are installed to be stacked on the treatment devices 21 installed on the upper deck 9. In addition, in a case where a plurality of treatment devices 21 are installed, the plurality of treatment devices 21 are connected in parallel with respect to the gas fuel tank 6.

20 [0036]

In the treatment step (step S14), the exhaust gas of the floating body 1 is treated using the treatment device 21 installed in the treatment device installation step (step S13) described above. That is, the exhaust gas discharged from the gas fuel tank 6 by the warming up and the tank interior inspection preparation is led to the treatment device 21, is subjected to detoxification treatment such as combustion detoxification by the

25

treatment device 21, and then released to the atmosphere. In the present embodiment, the inert gas supply device 20 permanently installed on the floating body 1 is not used, but, as with the treatment device 21, the inert gas supply device 20 stored in a predetermined storage location is used. Therefore, the treatment step (step S14) is carried out in accordance with a timing at which a supply step (step S24) (described later) by the inert gas supply device 20 is carried out.

[0037]

In the treatment device removal step (step S15), the treatment device 21 is removed from the floating body 1 after the treatment step (step S14) is completed.

Here, the treatment step (step S14) is completed at a point in time at which a gas in the gas fuel tank 6 is replaced with the inert gas before the floating body enters the dock for the regular inspection or the like and the inert gas is further replaced with air.

[0038]

Thereafter, in the treatment device storage step (step S16), the treatment device 21 removed in the treatment device removal step (step S15) is stored. That is, the treatment device 21 removed from the floating body 1 is transported and stored in the predetermined storage location described above together with a large number of other treatment devices 21.

[0039]

(Inert Gas Supply Work)

FIG. 4 is a flowchart of the inert gas supply work in the first embodiment of the present disclosure.

As shown in FIG. 4, in the method for treating a gas of a floating body according to the present embodiment, inert gas supply work is performed in addition to the exhaust gas treatment work described above. The inert gas supply work includes an

inert gas supply device preparation step (step S21), an inert gas supply device selection step (step S22), an inert gas supply device installation step (step S23), and a supply step (step S24). Further, the inert gas supply work of the present embodiment includes an inert gas supply device removal step (step S25) and an inert gas supply device storage
5 step (step S26).

[0040]

First, in the inert gas supply device preparation step (step S21), a plurality of inert gas supply devices 20 capable of supplying an inert gas to the inside of the gas fuel tank 6 are prepared. The prepared inert gas supply device 20 is operated to be stored in
10 a predetermined storage location, taken out from the predetermined storage location when used, and returned to the predetermined storage location after use. Then, when the floating body 1 enters the dock for a regular inspection or the like to make the gas fuel tank 6 gas-free, the process proceeds to the inert gas supply device selection step (step S22).

15 [0041]

In the inert gas supply device selection step (step S22), at least one or more inert gas supply devices 20 in accordance with the amount of the inert gas required for one floating body 1 are selected from among the plurality of inert gas supply devices 20 prepared in the inert gas supply device preparation step (step S21). That is, the number
20 of the inert gas supply devices 20 to be used in one floating body 1 in which the tank interior inspection preparation is performed is determined, and the inert gas supply devices 20 corresponding to the determined number are selected from among a large number of inert gas supply devices 20 stored. The selected inert gas supply devices 20 are transported to the floating body 1 in which the tank interior inspection preparation
25 described above is performed. The storage location of the inert gas supply device 20

may be the same storage location as the storage location of the treatment device 21 described above.

[0042]

In the inert gas supply device installation step (step S23), the inert gas supply
5 devices 20 corresponding to the number selected in the inert gas supply device selection
step (step S22) are installed on the floating body 1. In the present embodiment, the inert
gas supply device 20 is installed in the dedicated space 16 on the upper deck 9 of the
floating body 1. In addition, in a case where a plurality of inert gas supply devices 20
are installed, other treatment devices 21 may be installed to be stacked on the inert gas
10 supply devices 20 installed on the upper deck 9. Further, the inert gas supply device 20
may be stacked on the treatment device 21, or the treatment device 21 may be stacked on
the inert gas supply device 20. In addition, in a case where a plurality of inert gas
supply devices 20 are installed, the plurality of inert gas supply devices 20 are connected
in parallel with respect to the gas fuel tank 6.

15 [0043]

In the supply step (step S24), the inert gas is supplied to the gas fuel tank 6 of
the floating body 1 by using the inert gas supply device 20 installed in the supply step
(step S24). Since the exhaust gas is discharged from the gas fuel tank 6 after the start of
the inert gas supply work by the supply step (step S24), this exhaust gas is treated in the
20 treatment step (step S14) described above.

[0044]

In the inert gas supply device removal step (step S25), the inert gas supply
device 20 is removed from the floating body 1 after the supply step (step S24) is
completed. Here, the supply step (step S24) is completed at a point in time at which the
25 floating body in which the regular inspection or the like has been completed replaces air

in the gas fuel tank 6 with the inert gas. However, in a case where the work of replacing the air after the regular inspection with the inert gas is performed at a fuel gas intake base or the like, the supply step is completed at a point in time at which the inert gas in the gas fuel tank 6 is replaced with air.

5 [0045]

Thereafter, in the inert gas supply device storage step (step S26), the inert gas supply device 20 removed in the inert gas supply device removal step (step S25) is stored. That is, the inert gas supply device 20 removed from the floating body 1 is transported and stored in the predetermined storage location described above together

10 with a large number of other inert gas supply devices 20.

[0046]

(Operation and Effect)

According to the first embodiment, for example, only when it is necessary to make the gas fuel tank 6 gas-free during a regular inspection or the like, the treatment

15 devices 21 corresponding to the number in accordance with the amount of the exhaust gas that is discharged from the gas fuel tank 6 are installed on the floating body 1 and the exhaust gas of the floating body 1 can be treated. Therefore, since it is not necessary to always provide the floating body 1 with a large-sized treatment device for treating the exhaust gas that is discharged from the gas fuel tank 6, initial equipment investment,

20 installation space, and rising of the center of gravity can be suppressed. In addition, it is not necessary to occupy onshore equipment provided with treatment equipment for treating the exhaust gas or a bunker ship provided with the treatment equipment.

[0047]

In the first embodiment, further, since the plurality of treatment devices 21 are

25 connected in parallel to the gas fuel tank 6, it is possible to quickly treat the exhaust gas

that is discharged from the gas fuel tank 6 by using a small-sized treatment device 21.

In addition, since the plurality of treatment devices 21 are connected in parallel and used, the size of each treatment device 21 can be reduced while ensuring the same treatment performance as in a case of using a single large-sized treatment device 21. Therefore, it is possible to reduce the burden on a worker who performs the work of mounting and
5 dismounting the treatment device 21.

[0048]

In the first embodiment, further, after the treatment of the exhaust gas is completed, since the treatment device 21 may be removed from the floating body 1 and
10 stored, the stored treatment device 21 can be used in a case where it is necessary to make the gas fuel tank 6 gas-free in another floating body. Therefore, the operation rate of the treatment device 21 can be improved.

[0049]

In the first embodiment, further, only when it is necessary to make the gas fuel
15 tank 6 gas-free during the regular inspection or the like, the inert gas supply devices 20 corresponding to the number in accordance with the amount of the inert gas required are installed on the floating body 1 and the inert gas can be supplied to the inside of the gas fuel tank 6 of the floating body 1. Therefore, it is not necessary to always provide the floating body 1 with the inert gas supply device 20 having an excessive capacity. In
20 addition, it is not necessary to occupy onshore equipment provided with the inert gas supply device or a bunker ship provided with the inert gas supply device.

[0050]

In the first embodiment, further, after the supply of the inert gas is completed, since the inert gas supply device 20 may be removed from the floating body 1 and stored,
25 the stored inert gas supply device 20 can be used in a case where it is necessary to make

the gas fuel tank 6 gas-free in another floating body. Therefore, the operation rate of the inert gas supply device 20 can be improved.

[0051]

In the first embodiment, further, the treatment device 21 is accommodated in a marine container that can be stacked and loaded on the floating body main body 2, so that the treatment device 21 can be installed or removed by using a crane for container handling provided on a quay or the like. Therefore, it becomes possible to easily perform the installation work or the removal work on the floating body 1.

[0052]

10 (Modification Example of First Embodiment)

In the first embodiment, a case where the inert gas supply device 20 is detachably installed has been described. However, in a case where the floating body 1 has a permanently installed inert gas supply device, this permanently installed inert gas supply device (not shown) may be used instead of the inert gas supply device 20 (hereinafter, the same applies to the second embodiment).

[0053]

<Second Embodiment>

Next, a method for treating a gas of a floating body and a floating body in a second embodiment of the present disclosure will be described with reference to the drawings. In the method for treating a gas of a floating body in the second embodiment, only the installation location of the treatment device 21 is different from that in the first embodiment described above. Therefore, in the description of the second embodiment, the same parts as those in the first embodiment described above will be denoted by the same reference numerals, and an overlapping description will be omitted.

25 A floating body 101 of the second embodiment includes the floating body main

body 2, the cargo tank 3, the engine 4, the superstructure 5, and the gas fuel tank (gas tank) 6.

[0054]

FIG. 5 is a diagram corresponding to FIG. 2 in a second embodiment of the
5 present disclosure.

As shown in FIG. 5, the floating body 101 of the second embodiment includes the plurality of gas fuel tanks 6, the exhaust gas pipe 25 that leads the exhaust gases from the gas fuel tanks 6, and the inert gas supply pipe 26 that leads the inert gas to the plurality of gas fuel tanks 6.

10 [0055]

The exhaust gas pipe 25 includes the exhaust gas branch pipe 27 and the exhaust gas main pipe 28. The exhaust gas branch pipe 27 extends from each of the plurality of gas fuel tanks 6. The exhaust gas branch pipes 27 are connected to the exhaust gas main pipe 28 in a merging manner. The exhaust gas main pipe 28 is connected to a first
15 external pipe connection part 40 provided on the floating body 101. The first external pipe connection part 40 is for connecting an external pipe of the floating body main body 2, and is installed in, for example, a bunker station or the like of the floating body main body 2.

[0056]

20 The inert gas supply pipe 26 includes the supply main pipe 36 and the supply branch pipe 37. The inlet end 36s of the supply main pipe 36 is connected to a second external pipe connection part 41. The supply branch pipe 37 is branched and connected to the supply main pipe 36, and allows the supply main pipe 36 and the gas fuel tank 6 to communicate with each other. The second external pipe connection part 41 is also
25 installed in, for example, the bunker station or the like of the floating body main body 2.

[0057]

The treatment device 21 of the second embodiment is detachably installed on the outside of the floating body main body 2. Further, the inert gas supply device 20 of the second embodiment is also detachably installed on the outside of the floating body main body 2 of the floating body 101, as with the treatment device 21. The treatment device 21 and the inert gas supply device 20 of the second embodiment are detachably installed on another floating body 200 different from the floating body 101. As the other floating body 200, a barge, a cargo ship, a treatment ship, or the like are exemplary examples.

[0058]

Each of the treatment devices 21 installed on the other floating body 200 includes the introduction line 31 for introducing the exhaust gas. The inlet end 31s of the introduction line 31 is detachably connected to the distribution connection part 30 installed on the other floating body 200. The distribution connection part 30 is detachably connected to the first external pipe connection part 40 of the floating body 101 described above through a first connection pipe 42 such as a hose. The introduction line 31 of the other floating body 200 can be connected to the exhaust gas pipe 25 of the floating body 101 by the distribution connection part 30, the first connection pipe 42, and the first external pipe connection part 40, and as a result, the treatment device 21 of the other floating body 200 can be connected to the gas fuel tank 6 of the floating body 101.

[0059]

One or more treatment devices 21 in accordance with the amount of the exhaust gas that is discharged from the gas fuel tank 6 are installed on the other floating body 200. In the other floating body 200 of the second embodiment, as with the floating body 1 of the first embodiment, a case is exemplary where a plurality of (specifically, three) treatment devices 21 are installed and these plurality of treatment devices 21 are

connected in parallel with respect to the gas fuel tank 6. The treatment capacities (volume flow rates) of the plurality of treatment devices 21 are the same as those in the first embodiment described above, and are treatment capacities capable of treating the exhaust gas that is discharged in one floating body 1.

5 [0060]

Each of the inert gas supply devices 20 installed on the other floating body 200 includes the supply line 38 for supplying the inert gas. The outlet end 38o of the supply line 38 is detachably connected to the merging connection part 32 installed on the other floating body 200. The merging connection part 32 can be connected to the second
10 external pipe connection part 41 through a second connection pipe 43 such as a hose. The supply line 38 of the other floating body 200 can be connected to the inert gas supply pipe 26 of the floating body 101 by the merging connection part 32, the second connection pipe 43, and the second external pipe connection part 41, and as a result, the inert gas supply device 20 installed on the other floating body 200 can be connected to
15 the gas fuel tank 6 of the floating body 101.

[0061]

(Method for Treating Gas of Floating Body)

Next, a method for treating a gas of the floating body 101 in the second embodiment will be described with reference to the drawings. The method for treating
20 a gas of the floating body 101 in the second embodiment is different from the method for treating a gas of the floating body 1 in the first embodiment only in that the treatment device 21 and the inert gas supply device 20 are installed on the other floating body 200. Therefore, the same steps as those in the first embodiment will be denoted by the same reference numerals, and overlapping description will be omitted. As with the first
25 embodiment, the exhaust gas treatment work by the following treatment device 21 and

the inert gas supply work by the inert gas supply device 20 are performed in parallel.

[0062]

(Exhaust Gas Treatment Work)

FIG. 6 is a flowchart of the exhaust gas treatment work of the floating body in
5 the second embodiment of the present disclosure.

As shown in FIG. 6, the exhaust gas treatment work in the method for treating a
gas of a floating body in the second embodiment includes at least the treatment device
preparation step (step S11), the treatment device selection step (step S12), a treatment
device installation step (step S113), and the treatment step (step S14). The method for
10 treating a gas of a floating body in the present embodiment further includes a treatment
device removal step (step S115) and the treatment device storage step (step S16).

[0063]

First, as with the first embodiment, the treatment device preparation step (step
S11) and the treatment device selection step (step S12) are carried out. That is, a
15 plurality of treatment devices 21 capable of detoxifying the exhaust gas are prepared, and
at least one or more treatment devices 21 in accordance with the amount of the exhaust
gas that is discharged in one floating body 101 are selected from among the prepared
plurality of treatment devices 21.

[0064]

20 In the treatment device installation step (step S113), the treatment devices 21
corresponding to the number selected in the treatment device selection step (step S12) are
installed on the other floating body 200 different from the floating body 101. In the
second embodiment, for example, the treatment device 21 is installed in a cargo space
(not shown) or the like of the other floating body 200. When the other floating body
25 200 is a container transport ship or the like, the treatment device 21 may be installed to

be stacked on another container or the like. In addition, as with the first embodiment, in a case where a plurality of treatment devices 21 are installed, the treatment devices 21 may be installed to be stacked on each other.

[0065]

5 In the treatment device installation step (step S113), the treatment device 21 installed on the other floating body 200 is further connected to the gas fuel tank 6 of the floating body 101. Specifically, for example, the other floating body 200 is moved by towing or self-propelled sailing to a position close to the floating body 101, the introduction line 31 is connected to the distribution connection part 30, and the
10 distribution connection part 30 and the first external pipe connection part 40 are connected to each other by the first connection pipe 42. In a case where a plurality of the treatment devices 21 are installed on the other floating body 200, a plurality of introduction lines 31 are connected to the distribution connection part 30. In this way, the plurality of treatment devices 21 are connected in parallel with respect to the gas fuel
15 tank 6.

[0066]

 In the treatment step (step S14), as with the first embodiment, the exhaust gas of the floating body 101 is treated by using the treatment device 21 installed in the treatment device installation step (step S113). That is, the exhaust gas discharged from the gas
20 fuel tank 6 by the warm-up and the tank interior inspection preparation is led to the treatment device 21 installed on the other floating body 200, is subjected to detoxification treatment such as combustion detoxification by the treatment device 21, and then released to the atmosphere.

[0067]

25 In the treatment device removal step (step S115), the treatment device 21 is

removed from the other floating body 200 after the treatment step (step S14) is completed. Specifically, the first connection pipe 42 is removed from the distribution connection part 30 and the first external pipe connection part 40, and the treatment device 21 is removed from the other floating body 200. The work of removing the treatment device 21 from the other floating body 200 may be performed, for example, by moving the other floating body 200 from the vicinity of the floating body 101 by towing or self-propelled sailing and docking the other floating body 200. However, the work may be performed, for example, by transporting the treatment device 21 removed from the other floating body 200 to be transferred on another small-sized marine vessel or the like.

10 [0068]

Thereafter, in the treatment device storage step (step S16), as with the first embodiment, the treatment device 21 removed in the treatment device removal step (step S115) is stored. That is, the treatment device 21 removed from the other floating body 200 is transported and stored in the predetermined storage location described above together with a large number of other treatment devices 21.

15 [0069]

(Inert Gas Supply Work)

FIG. 7 is a flowchart of the inert gas supply work in the second embodiment of the present disclosure.

20 As shown in FIG. 7, in the method for treating a gas of a floating body according to the second embodiment, the inert gas supply work is performed in addition to the exhaust gas treatment work described above. The inert gas supply work includes the inert gas supply device preparation step (step S21), the inert gas supply device selection step (step S22), an inert gas supply device installation step (step S123), and the
25 supply step (step S24). Further, the inert gas supply work of the present embodiment

includes an inert gas supply device removal step (step S125) and the inert gas supply device storage step (step S26).

[0070]

First, as with the first embodiment, the inert gas supply device preparation step (step S21) and the inert gas supply device selection step (step S22) are carried out. That is, a plurality of inert gas supply devices 20 capable of supplying an inert gas to the inside of the gas fuel tank 6 are prepared, and at least one or more inert gas supply devices 20 in accordance with the amount of the inert gas required in one floating body 101 are selected from among the prepared plurality of inert gas supply devices 20.

10 [0071]

In the inert gas supply device installation step (step S123), the inert gas supply devices 20 corresponding to the number selected in the inert gas supply device selection step (step S22) are installed on the other floating body 200. In the second embodiment, the inert gas supply device 20 is installed in a cargo space or the like of the other floating body 200. When the other floating body 200 is a container transport ship or the like, the inert gas supply device 20 may be installed to be stacked on another container or the like. In addition, as with the first embodiment, the inert gas supply device 20 may be stacked on the treatment device 21, and in a case where a plurality of inert gas supply devices 20 are installed, the inert gas supply devices 20 may be installed to be stacked on each other.

20 [0072]

In the inert gas supply device installation step (step S123), the inert gas supply device 20 installed on the other floating body 200 is further connected to the gas fuel tank 6 of the floating body 101. Specifically, for example, the other floating body 200 is moved by towing or self-propelled sailing to a position close to the floating body 101, the supply line 38 is connected to the merging connection part 32, and the merging

connection part 32 and the second external pipe connection part 41 are connected to each other by the second connection pipe 43. In a case where a plurality of the inert gas supply devices 20 are installed on the other floating body 200, the plurality of supply lines 38 are connected to the merging connection part 32. In this way, the plurality of inert gas supply devices 20 are connected in parallel with respect to the gas fuel tank 6.

[0073]

In the supply step (step S24), as with the first embodiment, the inert gas is supplied to the gas fuel tank 6 of the floating body 101 by using the inert gas supply device 20 installed on the other floating body 200 in the supply step (step S24). That is, the gas inside the gas fuel tank 6 is replaced with the inert gas that is supplied from the inert gas supply device 20.

[0074]

In the inert gas supply device removal step (step S125), the inert gas supply device 20 is removed from the other floating body 200 after the supply step (step S24) is completed. Here, the supply step (step S24) is completed, for example, at a point in time at which the floating body 101 leaves the dock in a regular inspection or the like and the air in the gas fuel tank 6 is replaced with the inert gas.

[0075]

Thereafter, in the inert gas supply device storage step (step S26), as with the first embodiment, the inert gas supply device 20 removed in the inert gas supply device removal step (step S125) is stored. That is, the inert gas supply device 20 removed from the floating body is transported and stored in the predetermined storage location described above together with a large number of other inert gas supply devices 20. In the transportation from the other floating body 200 to the storage location, the inert gas supply device 20 and the treatment device 21 may be transported together.

[0076]

(Operation and Effect)

According to the second embodiment, in addition to the operation and effect of the first embodiment described above, it is possible to make the gas fuel tank 6 gas-free
5 even in a state where the floating body 101 is not docked.

[0077]

In the second embodiment, after the treatment of the exhaust gas is completed, the treatment device 21 may be removed from the other floating body 200 and stored, so that the stored treatment device 21 can be used in a case where it is necessary to make the
10 gas fuel tank 6 gas-free in another floating body. In addition, the other floating body 200 from which the treatment device 21 is removed can also be used for other applications, such as transporting a treatment device other than the treatment device 21. Therefore, the operation rates of the treatment device 21 and the other floating body 200 can be improved.

15 [0078]

In the second embodiment, it is further possible to supply the inert gas to the gas fuel tank 6 even in a state where the floating body 101 is not docked.

[0079]

In the second embodiment, further, after the supply of the inert gas is completed,
20 the inert gas supply device 20 may be removed from the other floating body 200 and stored, so that the stored inert gas supply device 20 can be used in a case where it is necessary to supply the inert gas to the gas fuel tank 6 in another floating body. In addition, the other floating body 200 from which the inert gas supply device 20 is removed can also be used for other applications, such as transporting an inert gas supply
25 device other than the inert gas supply device 20. Therefore, the operation rate of the

inert gas supply device 20 and the other floating body 200 can be improved.

[0080]

<Other Embodiments>

The embodiments of the present disclosure have been described in detail above
5 with reference to the drawings. However, the specific configuration is not limited to
these embodiments, and design changes and the like within a scope which does not
depart from the gist of the present disclosure are also included.

For example, in the embodiments described above, a case where the floating
body 1 or 101 is a marine vessel that can be navigated by a main engine or the like has
10 been described. However, as long as it is a floating body, there is no limitation to a
marine vessel.

[0081]

In the second embodiment, a case where a plurality of treatment devices 21 are
installed on a single another floating body 200 has been described. However, a plurality
15 of other floating bodies 200 may be prepared, and the treatment devices 21 may be
installed on each of the plurality of other floating bodies 200, or the inert gas supply
devices 20 may be installed on each of the plurality of other floating bodies 200.

[0082]

In addition, in the first embodiment, a case where the treatment device 21 is
20 installed on the floating body 1 has been described, and in the second embodiment, a case
where the treatment device 21 is installed on the other floating body 200 has been
described. However, there is no limitation to the above-described configurations, and
for example, the configuration of the first embodiment and the configuration of the
second embodiment may be combined. That is, in a case where a plurality of treatment
25 devices 21 are provided, the treatment devices 21 may be provided at each of the floating

body 1 and the other floating body 200, and the treatment devices 21 may be connected in parallel to the gas fuel tank 6.

[0083]

Further, in the first and second embodiments, a case where the treatment device 21 and the inert gas supply device 20 are accommodated in stackable containers has been described. However, the treatment device 21 and the inert gas supply device 20 are not limited to an aspect in which the treatment device 21 and the inert gas supply device 20 are accommodated in the container or an aspect in which the treatment device 21 and the inert gas supply device 20 are stackable.

10 [0084]

In addition, in the first and second embodiments, a case where the gas tank is the gas fuel tank 6 that stores a fuel gas has been described as an example. However, the gas tank is not limited to the gas fuel tank 6. For example, the gas tank may be the cargo tank 3 or may be another tank.

15 [0085]

Further, in the first and second embodiments, a case where the inert gas is supplied from the inert gas supply device 20 when making the gas fuel tank 6 gas-free has been described. However, in a case where it does not matter that the stored substance stored in the gas fuel tank 6 comes into contact with oxygen, the outside air may be taken in instead of the inert gas.

20

[0086]

In addition, in the first and second embodiments, a case where the treatment device 21 and the inert gas supply device 20 are accommodated in separate containers has been described. However, the treatment device 21 and the inert gas supply device 20 may be accommodated in the same container.

25

[0087]

Further, the inert gas supply device 20 is not limited to a form in which the inert gas supply device 20 is accommodated in a marine container. The inert gas supply device 20 may have, for example, a configuration in which an ISO standard tank container capable of storing liquid nitrogen and a vaporizer for vaporizing the liquid nitrogen are combined.

In addition, as for the treatment device 21, a case has been described where a set of devices for combustion-detoxifying an exhaust gas, such as a combustion detoxification device and a fuel tank that stores fuel for the combustion detoxification device, is accommodated in the marine container. However, the treatment device 21 is not limited to the combustion method. For example, an ISO standard tank container that can store a liquefied gas or an ISO standard tank container that can store a liquid capable of absorbing a liquefied gas may be adopted. In addition, the treatment device 21 may have a configuration in which an ISO standard tank container that can store a liquefied gas and an ISO standard tank container that can store a liquid capable of absorbing a liquefied gas are combined.

[0088]

In addition, in the first and second embodiments, a case has been described where a pipe system that is used in the treatment device 21 and a pipe system that is used in the inert gas supply device 20 are separately provided. However, in a case where the supply of the inert gas by the inert gas supply device 20 and the discharge of the exhaust gas from the gas tank are not performed at the same time, a single pipe system may be provided and the pipe system may be shared by the treatment device 21 and the inert gas supply device 20.

25 [0089]

Further, a case where the treatment device 21 and the inert gas supply device 20 are installed on the upper deck 9, which is an exposed portion, has been described.

However, the location where the treatment device 21 and the inert gas supply device 20 are installed may be a semi-exposed portion or an indoor.

5 [0090]

FIG. 8 is a diagram corresponding to FIG. 2 in a modification example of the first embodiment of the present disclosure. FIG. 9 is a diagram corresponding to FIG. 5 in a modification example of the second embodiment of the present disclosure.

As shown in FIGS. 8 and 9, a temperature raising system 50 that raises the
10 temperature in the gas fuel tank 6 by using waste heat of the treatment device 21, or the like may be provided. Here, a gas that is supplied to the gas fuel tank 6 by the inert gas supply device 20 can be heated by the temperature raising system 50. In this way, it becomes possible to perform a step such as treating a residual liquid in the gas fuel tank 6 or increasing a wall surface temperature in the gas fuel tank 6.

15 [0091]

<Additional Remark>

The method for treating a gas of a floating body and the floating body according to the embodiment are understood, for example, as follows.

[0092]

20 (1) According to a first aspect, a method for treating a gas of a floating body is a method for treating a gas of the floating body 1 or 101, which detoxifies an exhaust gas that is discharged when replacing an inside of the gas tank 6 provided on the floating body 1 or 101 with an inert gas, the method including: a treatment device preparation step (step S11) of preparing a plurality of treatment devices 21 capable of detoxifying the
25 exhaust gas; a treatment device selection step (step S12) of selecting at least one or more

treatment devices 21 in accordance with the amount of the exhaust gas that is discharged in one floating body 1 or 101, from among the plurality of treatment devices 21 prepared in the treatment device preparation step (step S11); a treatment device installation step (step S13) of installing the treatment devices 21 corresponding to the number selected in the treatment device selection step (step S12) on at least one of the floating body 1 or 101 and another floating body 200 different from the floating body 1 or 101; and a treatment step (step S14) of treating the exhaust gas of the floating body 1 or 101 by using the treatment devices 21 installed in the treatment device installation step.

As an example of the floating body 1 or 101, a marine vessel such as a liquefied gas transport ship, a ferry, a RORO ship, an automobile transport ship, and a passenger ship, a floating storage unit (FSU), a floating storage and regasification unit (FSRU), or the like are exemplary examples.

[0093]

In this way, for example, only when it is necessary to make the gas tank 6 gas-free during a regular inspection or the like, the treatment devices 21 corresponding to the number in accordance with the amount of the exhaust gas that is discharged from the gas tank 6 are installed on the floating body 1 or 101 or the other floating body 200 different from the floating body 1 or 101 and the exhaust gas of the floating body 1 or 101 can be treated. Therefore, it is not necessary to always provide the floating body 1 or 101 with a large-sized treatment device for treating the exhaust gas that is discharged from the gas tank 6. In addition, it is not necessary to occupy onshore equipment provided with treatment equipment or a bunker ship provided with treatment equipment. In addition, since the treatment device 21 may be installed only when used, the weight of the floating body 1 or 101 and the other floating body 200 can be reduced, and for example, the fuel consumption when moving the floating body 1 or 101 and the other floating body 200

can be reduced.

Therefore, it becomes possible to effectively utilize an on-board space and to improve stability.

[0094]

5 (2) According to a second aspect, a method for treating a gas of a floating body is the method for treating a gas of a floating body according to the above (1), in which in the treatment device installation step (step S13), in a case where the plurality of treatment devices 21 are selected in the treatment device selection step (step S12), the plurality of treatment devices 21 are connected in parallel to the gas tank 6.

10 In this way, the exhaust gas that is discharged from the gas tank 6 can be quickly treated.

[0095]

 (3) According to a third aspect, a method for treating a gas of a floating body is the method for treating a gas of a floating body according to the above (1) or (2) further including: a treatment device removal step (step S15) of removing the treatment device 15 21 from the floating body 1 or 101 after the treatment step (step S14) is completed; and a treatment device storage step (step S16) of storing the treatment device 21 removed in the treatment device removal step (step S15).

 In this way, after the treatment of the exhaust gas is completed, the treatment 20 device 21 may be removed from the floating body 1 or 101 and stored, so that the stored treatment device 21 can be used in a case where it is necessary to make the gas tank 6 gas-free in another floating body.

[0096]

 (4) According to a fourth aspect, a method for treating a gas of a floating body is 25 the method for treating a gas of a floating body according to any one of the above (1) to

(3) further including: an inert gas supply device preparation step (step S21) of preparing a plurality of inert gas supply devices 20 capable of supplying an inert gas into the gas tank 6; an inert gas supply device selection step (step S22) of selecting at least one or more inert gas supply devices 20 in accordance with the amount of the inert gas required
5 in one floating body 1 or 101, from among the plurality of inert gas supply devices 20 prepared in the inert gas supply device preparation step (step S21); an inert gas supply device installation step (step S23) of installing the inert gas supply devices 20 corresponding to the number selected in the inert gas supply device selection step (step S22) on at least one of the floating body 1 or 101 and another floating body 200 different
10 from the floating body 1 or 101; and a supply step (step S24) of supplying the inert gas to the gas tank 6 by using the inert gas supply devices 20 installed in the inert gas supply device installation step (step S23).

In this way, for example, only when it is necessary to make the gas tank 6 gas-free during a regular inspection or the like and to supply an inert gas, the inert gas supply
15 devices 20 corresponding to the number in accordance with the amount of the inert gas required are installed on the floating body 1 or 101 or the other floating body 200 different from the floating body 1 or 101 and the inert gas can be supplied to the inside of the gas tank 6 of the floating body 1 or 101. Therefore, it is not necessary to always provide the floating body 1 or 101 with the inert gas supply device 20. In addition, it is
20 not necessary to occupy onshore equipment provided with the inert gas supply device 20 or a bunker ship provided with the inert gas supply device 20. In addition, since the weight of the floating body 1 or 101 and the other floating body 200 can be reduced, for example, the fuel consumption when moving the floating body 1 or 101 and the other floating body 200 can be reduced.

25 [0097]

(5) According to a fifth aspect, a method for treating a gas of a floating body is the method for treating a gas of a floating body according to the above (4) further including: an inert gas supply device removal step (step S25) of removing the inert gas supply device 20 from the floating body 1 or 101 after the supply step (step S24) is completed; and an inert gas supply device storage step (step S26) of storing the inert gas supply device 20 removed in the inert gas supply device removal step (step S25).

In this way, after the supply of the inert gas is completed, the inert gas supply device 20 may be removed from the floating body 1 or 101 and stored, so that the stored inert gas supply device 20 can be used when it is necessary to supply the inert gas to the gas tank 6 in another floating body.

[0098]

(6) According to a sixth aspect, a floating body includes: the floating body main body 2; the gas tank 6 provided on the floating body main body 2 and capable of storing a liquefied gas; and a plurality of treatment devices 21 that are installed to be detachable with respect to the floating body main body 2 and detoxify an exhaust gas that is discharged from the gas tank 6, in which the plurality of treatment devices 21 are connected in parallel with respect to the gas tank 6.

In this way, in a case where the treatment device 21 is not used, the treatment device 21 can be removed from the floating body main body 2. Therefore, the treatment device 21 can also be installed and used in the floating body main body of another floating body. Further, since the plurality of treatment devices 21 are connected in parallel and used, the size of one treatment device 21 can be reduced while ensuring the same treatment performance as in a case of using a single large-sized treatment device 21, so that the burden on a worker who performs the work of mounting and dismounting the treatment device 21 can be reduced.

[0099]

(7) According to a seventh aspect, a floating body includes: the floating body main body 2; and a plurality of treatment devices 21 that are installed to be detachable with respect to the floating body main body 2 and detoxify an exhaust gas that is
5 discharged from the gas tank 6 capable of storing a liquefied gas provided on another floating body 200, in which the plurality of treatment devices 21 are connected in parallel with respect to the gas tank 6.

In this way, the exhaust gas that is discharged from the gas tank 6 provided on the other floating body 200 can be quickly treated by using the plurality of treatment
10 devices 21 provided on the floating body 1 or 101. In addition, since the plurality of treatment devices 21 are connected in parallel and used, the size of one treatment device 21 can be reduced while ensuring the same treatment performance as in a case of using a single large-sized treatment device, so that the burden on a worker who performs the work of mounting and dismounting the treatment device 21 can be reduced.

15 [0100]

(8) According to an eighth aspect, a floating body is the floating body according to the above (6) or (7) further including the inert gas supply device 20 installed to be detachable with respect to the floating body main body 2 and capable of supplying the inert gas to the gas tank 6.

20 In this way, in a case where the inert gas supply device 20 is not used, the inert gas supply device 20 can be removed from the floating body main body 2. Therefore, the inert gas supply device 20 can also be installed and used in the floating body main body 2 of another floating body.

[0101]

25 (9) According to a ninth aspect, a floating body is the floating body according to

any one of the above (6) to (8), in which the treatment device 21 is accommodated in a container capable of being stacked and loaded on the floating body main body 2.

In this way, since the treatment device 21 can be installed or removed by using a crane for container handling provided on a quay or the like, it becomes possible to easily
 5 perform the installation work or the removal work on the floating body 1 or 101.

[Industrial Applicability]

[0102]

According to the method for treating a gas of a floating body and the floating
 body according to the present disclosure, it is possible to effectively utilize an on-board
 10 space and to improve stability.

[Reference Signs List]

[0103]

- 1, 101: Floating body
- 2: Floating body main body
- 15 2A: Stern
- 2F: Bow
- 3: Cargo tank
- 4: Engine
- 5: Superstructure
- 20 6: Gas fuel tank
- 7: Broadside
- 8: Bottom
- 9: Upper deck
- 10: Cargo hold
- 25 10a: Partition wall

	11: Main engine room
	12: Screw
	13: Rudder
	14: Bottom plate
5	15: Deck
	16: Dedicated space
	20: Inert gas supply device
	21: Treatment device
	25: Exhaust gas pipe
10	26: Inert gas supply pipe
	27: Exhaust gas branch pipe
	28: Exhaust gas main pipe
	29: End portion
	30: Distribution connection part
15	31: Introduction line
	31s: Inlet end
	32: Merging connection part
	33: Small-sized treatment device
	36: Supply main pipe
20	37: Supply branch pipe
	38: Supply line
	40: First external pipe connection part
	41: Second external pipe connection part
	42: First connection pipe
25	43: Second connection pipe

200: Another floating body

[CLAIMS]

What is claimed is:

[Claim 1]

5 A method for treating a gas of a floating body, which detoxifies an exhaust gas that is discharged when replacing an inside of a gas tank provided on the floating body with an inert gas, the method comprising:

a treatment device preparation step of preparing a plurality of treatment devices configured to detoxify the exhaust gas;

10 a treatment device selection step of selecting at least one or more treatment devices in accordance with an amount of the exhaust gas that is discharged in one floating body, from among the plurality of treatment devices prepared in the treatment device preparation step;

a treatment device installation step of installing the treatment devices corresponding to the number selected in the treatment device selection step on at least 15 one of the floating body and another floating body different from the floating body; and

a treatment step of treating the exhaust gas of the floating body by using the treatment devices installed in the treatment device installation step.

[Claim 2]

20 The method for treating a gas of a floating body according to Claim 1, wherein in the treatment device installation step, in a case where the plurality of treatment devices are selected in the treatment device selection step, the plurality of treatment devices are connected in parallel to the gas tank.

[Claim 3]

25 The method for treating a gas of a floating body according to Claim 1 or 2, further comprising:

a treatment device removal step of removing the treatment device from the floating body after the treatment step is completed; and

a treatment device storage step of storing the treatment device removed in the treatment device removal step.

5 [Claim 4]

The method for treating a gas of a floating body according to Claim 1 or 2, further comprising:

an inert gas supply device preparation step of preparing a plurality of inert gas supply devices configured to supply an inert gas into the gas tank;

10 an inert gas supply device selection step of selecting at least one or more inert gas supply devices in accordance with an amount of inert gas required in one floating body, from among the plurality of inert gas supply devices prepared in the inert gas supply device preparation step;

an inert gas supply device installation step of installing the inert gas supply
15 devices corresponding to the number selected in the inert gas supply device selection step on at least one of the floating body and the other floating body different from the floating body; and

a supply step of supplying the inert gas to the gas tank by using the inert gas supply devices installed in the inert gas supply device installation step.

20 [Claim 5]

The method for treating a gas of a floating body according to Claim 4, further comprising:

an inert gas supply device removal step of removing the inert gas supply device from the floating body after the supply step is completed; and

25 an inert gas supply device storage step of storing the inert gas supply device

removed in the inert gas supply device removal step.

[Claim 6]

A floating body comprising:

a floating body main body;

5 a gas tank provided on the floating body main body and configured to store a liquefied gas; and

a plurality of treatment devices that are installed to be detachable with respect to the floating body main body and detoxify an exhaust gas that is discharged from the gas tank,

10 wherein the plurality of treatment devices are connected in parallel with respect to the gas tank.

[Claim 7]

A floating body comprising:

a floating body main body; and

15 a plurality of treatment devices that are installed to be detachable with respect to the floating body main body and detoxify an exhaust gas that is discharged from a gas tank configured to store a liquefied gas and provided on another floating body,

wherein the plurality of treatment devices are connected in parallel with respect to the gas tank.

20 [Claim 8]

The floating body according to Claim 6 or 7, wherein the treatment device is accommodated in a container configured to be stacked and loaded on the floating body main body.