CLAIMS:

1. A gas treatment system for treating liquefied gas as heavier hydrocarbons or ammonia, the gas treatment system comprising:

a fuel tank storing liquefied gas as a fuel to be supplied to a propulsion engine of a ship;

a liquefied gas supply line supplying the liquefied gas of the fuel tank in a liquid phase to the propulsion engine, the liquefied gas supply line having a high pressure pump provided thereon;

a reliquefaction apparatus liquefying boil-off gas generated in a cargo tank storing liquefied gas; and

a liquefied gas collection line collecting the liquid liquefied gas discharged from the propulsion engine upstream of the high pressure pump,

wherein the reliquefaction apparatus transfers the liquefied boil-off gas to the fuel tank, thereby allowing the liquefied boil-off gas to be supplied to the propulsion engine by the high pressure pump.

2. The gas treatment system of claim 1, wherein the liquefied gas collection line is provided with a decompression valve decompressing surplus liquid liquefied gas which is discharged from the propulsion engine and is mixed with a lubricant, and transfers the surplus liquid liquefied gas mixed with the lubricant, which is used in the propulsion engine, to the liquefied gas supply line upstream of the high pressure pump while passing through the inside of the propulsion engine such that the surplus liquid liquefied gas mixed with the lubricant is reintroduced into the propulsion engine.

3. The gas treatment system of claim 2, wherein the liquefied gas collection line is provided with a cooler cooling the liquefied gas decompressed by the decompression valve to be introduced in a liquid phase into the high pressure pump.

4. The gas treatment system of claim 1, wherein the reliquefaction apparatus includes:

a compressor compressing in multiple stages the boil-off gas discharged from the cargo tank;

a condenser cooling an liquefying the compressed boil-off gas by using a refrigerant; and

an intercooler heat-exchanging a portion and the other portion of the boil-off gas liquefied in the condenser with each other, the intercooler transferring the boil-off gas generated by the heat exchange to the compressor.

5. The gas treatment system of claim 4, wherein the reliquefaction apparatus further includes a gas-liquid separator separating the boil-off gas liquefied in the condenser into a gaseous phase and a liquid phase, and

wherein the reliquefaction apparatus is operated in at least one of a reliquefaction mode in which the liquid phase separated in the gas-liquid separator is transferred to the cargo tank via the intercooler and a fuel supply mode in which the liquid phase separated in the gas-liquid separator is transferred to the fuel tank to be supplied to the propulsion engine.

6. The gas treatment system of claim 1, wherein the reliquefaction apparatus includes:

a compressor compressing in multiple stages the boil-off gas discharged from the cargo tank;

a condenser cooling and liquefying the compressed boil-off gas; and

a boil-off gas heat exchanger heat-exchanging boil-off gas transferred from the cargo tank to the compressor and the boil-off gas

liquefied in the condenser.

7. The gas treatment system of claim 6, wherein the reliquefaction apparatus further includes a gas-liquid separator separating the boil-off gas liquefied in the condenser into a gaseous phase and a liquid phase, and

wherein the reliquefaction apparatus is operated in at least one of a reliquefaction mode in which the liquid phase separated in the gas-liquid separator is transferred to the cargo tank via the boil-off gas heat exchanger and a fuel supply mode in which the liquid phase separated in the gas-liquid separator is transferred to the fuel tank to be supplied to the propulsion engine.

8. A gas treatment system for treating liquefied gas as heavier hydrocarbons or ammonia, the gas treatment system comprising:

a liquefied gas supply line supplying liquefied gas stored in a cargo tank in a liquid phase to the propulsion engine, the liquefied gas supply line being provided with a high pressure pump;

a reliquefaction apparatus liquefying boil-off gas generated in the cargo tank such that the liquefied boil-off gas is transferred to the high pressure pump; and

a liquefied gas collection line collecting the liquid liquefied gas discharged from the propulsion engine upstream of the high pressure pump,

wherein the reliquefaction apparatus includes:

a condenser cooling and liquefying boil-off gas by using a refrigerant; and

a buffer temporarily storing the boil-off gas liquefied in the condenser, and

wherein the reliquefaction apparatus has a bypass line allows at

least a portion of the boil-off gas to be supplied to the buffer while bypassing the condenser so as to prepare for fluctuation of the pressure of boil-off gas transferred from the buffer to the high pressure pump according to a temperature of the refrigerant.

9. The gas treatment system of claim 8, wherein the liquefied gas collection line is provided with a decompression valve decompressing surplus liquid liquefied gas which is discharged from the propulsion engine and is mixed with a lubricant, and transfers the surplus liquid liquefied gas mixed with the lubricant, which is used in the propulsion engine, to the liquefied gas supply line upstream of the high pressure pump while passing through the inside of the propulsion engine such that the surplus liquid liquefied gas mixed with the lubricant is reintroduced into the propulsion engine.

10. The gas treatment system of claim 9, wherein the liquefied gas collection line is provided with a cooler cooling the liquefied gas decompressed by the decompression valve to be introduced in a liquid phase into the high pressure pump.

11. The gas treatment system of claim 8, wherein the buffer is a gas-liquid separator separating the boil-off gas liquefied in the condenser into a gaseous phase and a liquid phase.

12. The gas treatment system of claim 11, wherein the reliquefaction apparatus transfers the liquefied boil-off gas to the liquefied gas supply line between the cargo tank and the high pressure pump.

13. The gas treatment system of claim 12, wherein the reliquefaction apparatus includes:

a compressor compressing in multiple stages the boil-off gas discharged from the cargo tank; and

an intercooler heat-exchanging a portion and the other portion of the boil-off gas liquefied in the condenser with each other, the intercooler transferring the boil-off gas generated by the heat exchange to the compressor.

14. The gas treatment system of claim 13, wherein the reliquefaction apparatus is operated in at least one of a reliquefaction mode in which the liquid phase separated in the gas-liquid separator is transferred to the cargo tank via the intercooler and a fuel supply mode in which the liquid phase separated in the gas-liquid separator is transferred to the liquefied gas supply line upstream of the high pressure pump to be supplied to the propulsion engine.

15. A liquefied gas carrier comprising the gas treatment system of any one of claims 1 to 14.

CLAIMS:

1. A gas treatment system for treating liquefied gas as heavier hydrocarbons or ammonia, the gas treatment system comprising:

a fuel tank storing liquefied gas as a fuel to be supplied to a propulsion engine of a ship;

a liquefied gas supply line supplying the liquefied gas of the fuel tank in a liquid phase to the propulsion engine, the liquefied gas supply line having a high pressure pump provided thereon;

a reliquefaction apparatus liquefying boil-off gas generated in at least two cargo tanks storing liquefied gas; and

a liquefied gas collection line collecting the liquid liquefied gas discharged from the propulsion engine upstream of the high pressure pump,

wherein the reliquefaction apparatus transfers liquefied boil-off gas to the fuel tank, thereby allowing the liquefied boil-off gas to be supplied to the propulsion engine by the high pressure pump, and

wherein the reliquefaction apparatus includes a boil-off gas transfer line for transferring the liquefied boil-off gas to the fuel tank.

2. The gas treatment system of claim 1, wherein the liquefied gas collection line is provided with a decompression valve decompressing surplus liquid liquefied gas which is discharged from the propulsion engine and is mixed with a lubricant, and transfers the surplus liquid liquefied gas mixed with the lubricant, which is used in the propulsion engine, to the liquefied gas supply line upstream of the high pressure pump while passing through the inside of the propulsion engine such that the surplus liquid liquefied gas mixed with the lubricant is reintroduced into the propulsion engine.

3. The gas treatment system of claim 2, wherein the liquefied gas

collection line is provided with a cooler cooling the liquefied gas decompressed by the decompression valve to be introduced in a liquid phase into the high pressure pump.

4. The gas treatment system of claim 1, wherein the reliquefaction apparatus includes:

a compressor compressing in multiple stages the boil-off gas discharged from the cargo tank;

a condenser cooling an liquefying the compressed boil-off gas by using a refrigerant; and

an intercooler heat-exchanging a portion and the other portion of the boil-off gas liquefied in the condenser with each other, the intercooler transferring the boil-off gas generated by the heat exchange to the compressor.

5. The gas treatment system of claim 4, wherein the reliquefaction apparatus further includes a gas-liquid separator separating the boil-off gas liquefied in the condenser into a gaseous phase and a liquid phase, and

wherein the reliquefaction apparatus is operated in at least one of a reliquefaction mode in which the liquid phase separated in the gas-liquid separator is transferred to the cargo tank via the intercooler and a fuel supply mode in which the liquid phase separated in the gas-liquid separator is transferred to the fuel tank to be supplied to the propulsion engine.

6. The gas treatment system of claim 1, wherein the reliquefaction apparatus includes:

a compressor compressing in multiple stages the boil-off gas discharged from the cargo tank;

a condenser cooling and liquefying the compressed boil-off gas; and

a boil-off gas heat exchanger heat-exchanging boil-off gas transferred from the cargo tank to the compressor and the boil-off gas liquefied in the condenser.

7. The gas treatment system of claim 6, wherein the reliquefaction apparatus further includes a gas-liquid separator separating the boil-off gas liquefied in the condenser into a gaseous phase and a liquid phase, and

wherein the reliquefaction apparatus is operated in at least one of a reliquefaction mode in which the liquid phase separated in the gas-liquid separator is transferred to the cargo tank via the boil-off gas heat exchanger and a fuel supply mode in which the liquid phase separated in the gas-liquid separator is transferred to the fuel tank to be supplied to the propulsion engine.

8. A liquefied gas carrier comprising the gas treatment system of any one of claims 1 to 7.