treatment method for a vessel, which is performed by a liquefied gas treatment system for the vessel including a cargo tank storing liquefied natural gas (LNG), and a main engine and a sub engine using the LNG stored in the cargo tank as fuel, the liquefied gas treatment method system including a compressor line configured to compress BOG generated in the cargo tank by a compressor and supply the compressed BOG to the main engine and the sub engine as fuel, and a pump line configured to compress the LNG stored in the cargo tank by a pump and supply the compressed LNG to the main engine and the sub engine as fuel, the liquefied gas treatment method including: supplying the BOG generated in the cargo tank to at least one of the main engine and the sub engine as fuel through the compressor line in a laden condition in which an amount of the LNG stored in the cargo tank is larger than in a ballast condition, wherein the compressor line comprises the compressor compressing the BOG generated in the cargo tank at 150 to 400 bara, and the pump line comprises the pump compressing the BOG generated in the cargo tank at 150 to 400 bara, wherein the compressor and the pump are arranged in parallel between the cargo tank and the main engine, wherein the BOG which is not supplied to the main engine and the sub engine among the BOG compressed at 150 to 400 bara by the compressor, is cooled in a heat exchanger by exchanging heat with the BOG that is discharged from the cargo tank and then transferred to the compressor, and wherein the BOG cooled in the heat exchanger is decompressed by a decompressing means.

In the ballast condition, the LNG stored in the cargo tank may be supplied as fuel to the main engine and the sub engine through the pump line.

In the ballast condition, the BOG generated in the cargo tank may be supplied as fuel to one of the main engine and the sub engine through the compressor line.

In the ballast condition, the BOG generated in the cargo tank may be supplied as fuel to the sub engine through the compressor line, and the LNG stored in the cargo tank may be supplied as fuel to the main engine through the pump line.

In the ballast condition, the BOG generated in the cargo tank may be

intermittently supplied as fuel to at least one of the main engine and the sub engine through the compressor line, and when the BOG is not supplied to at least one of the main engine and the sub engine, the LNG stored in the cargo tank may be supplied as fuel to at least one of the main engine and the sub engine through the pump line.

In the ballast condition, the BOG generated in the cargo tank and the LNG stored in the cargo tank may be simultaneously supplied as fuel to the main engine and the sub engine.

The compressor may include a plurality of compression cylinders, and the BOG generated in the cargo tank may be compressed by a part of the plurality of compression

cylinders and is supplied as fuel to the sub engine.

The BOG generated in the cargo tank and forcibly vaporized LNG may be supplied to and compressed by the compressor and are supplied as fuel to at least one of the main engine and the sub engine.

When the LNG stored in the cargo tank is supplied to the sub engine, a heavy hydrocarbon component may be separated from the LNG so as to adjust a methane number of the LNG to a value necessary for the sub engine.

~~BOG, which is not supplied as fuel to the main engine and the sub engine among BOG compressed by the compressor, may be liquefied by exchanging heat with BOG that is discharged from the cargo tank and transferred to the compressor.~~

ADVANTAGEOUS EFFECTS

According to embodiments of the present invention, all BOG generated during the transportation of cargo (that is, LNG) in the LNG carrier can be used as the fuel of the engine, or may be reliquefied, be returned to the cargo tank and be stored therein. Therefore, an amount of BOG consumed in the GCU or the like can be reduced or removed. Furthermore, BOG can be treated by reliquefaction, without using separate refrigerants such as nitrogen.

Therefore, according to the liquefied gas treatment system and method in embodiments of the present invention, BOG generated from the cargo tank can be reliquefied without installing a reliquefaction apparatus consuming a large amount of energy and requiring excessive initial installation cost, thereby saving energy consumed in the reliquefaction apparatus.

In addition, according to the liquefied gas treatment system and method in embodiments of the present invention, a part of compressed BOG after pressurizing BOG discharged from a cargo tank can be supplied to a high pressure gas injection engine (that is, a propulsion system) as fuel. The remaining compressed BOG can be cooled with cold energy of BOG after discharge from the cargo and before compression, and returned to the cargo

WHAT IS CLAIMED IS:

1. A liquefied gas treatment method for a vessel, which is performed by a liquefied gas treatment system for the vessel including a cargo tank storing liquefied natural gas (LNG), and a main engine and a sub engine using the LNG stored in the cargo tank as fuel, the liquefied gas treatment method system including a compressor line configured to compress BOG generated in the cargo tank by a compressor and supply the compressed BOG to the main engine and the sub engine as fuel and a pump line configured to compress the LNG stored in the cargo tank by a pump and supply the compressed LNG to the main engine and the sub engine as fuel, the liquefied gas treatment method comprising:

supplying the BOG generated in the cargo tank to at least one of the main engine and the sub engine as fuel through the compressor line in a laden condition in which an amount of the LNG stored in the cargo tank is larger than in a ballast condition,

wherein the compressor line comprises the compressor compressing the BOG generated in the cargo tank at 150 to 400 bara, and the pump line comprises the pump compressing the BOG generated in the cargo tank at 150 to 400 bara,

wherein the compressor and the pump are arranged in parallel between the cargo tank and the main engine,

wherein the BOG which is not supplied to the main engine and the sub engine among the BOG compressed at 150 to 400 bara by the compressor, is cooled in a heat exchanger by exchanging heat with the BOG that is discharged from the cargo tank and then transferred to the compressor, and

wherein the BOG cooled in the heat exchanger is decompressed by a decompressing means.

2. The liquefied gas treatment method according to claim 1, wherein, in the ballast condition, the LNG stored in the cargo tank is supplied as fuel to the main engine

and the sub engine through the pump line.

3. The liquefied gas treatment method according to claim 1, wherein, in the ballast condition, the BOG generated in the cargo tank is supplied as fuel to one of the main engine and the sub engine through the compressor line.

4. The liquefied gas treatment method according to claim 1, wherein, in the ballast condition, the BOG generated in the cargo tank is supplied as fuel to the sub engine through the compressor line, and the LNG stored in the cargo tank is supplied as fuel to the main engine through the pump line.

5. The liquefied gas treatment method according to claim 1, wherein, in the ballast condition, the BOG generated in the cargo tank is intermittently supplied as fuel to at least one of the main engine and the sub engine through the compressor line, and when the BOG is not supplied to at least one of the main engine and the sub engine, the LNG stored in the cargo tank is supplied as fuel to at least one of the main engine and the sub engine through the pump line.

6. The liquefied gas treatment method according to claim 1, wherein, in the ballast condition, the BOG generated in the cargo tank and the LNG stored in the cargo tank are simultaneously supplied as fuel to the main engine and the sub engine.

7. The liquefied gas treatment method according to claim 1, wherein the compressor includes a plurality of compression cylinders, and the BOG generated in the cargo tank is compressed by a part of the plurality of compression cylinders and is supplied as fuel to the sub engine.

8. The liquefied gas treatment method according to claim 1, wherein the BOG generated in the cargo tank and forcibly vaporized LNG are supplied to and compressed by the compressor and are supplied as fuel to at least one of the main engine and the sub engine.

9. The liquefied gas treatment method according to claim 1, wherein, when the LNG stored in the cargo tank is supplied to the sub engine, a heavy hydrocarbon component is separated from the LNG so as to adjust a methane number of the LNG to a value necessary for the sub engine.

~~10. The liquefied gas treatment method according to claim 1, wherein BOG, which is not supplied as fuel to the main engine and the sub engine among BOG~~

~~compressed by the compressor, is liquefied by exchanging heat with BOG that is discharged from the cargo tank and transferred to the compressor.~~