

and sent to the generator (to the generator and/or the engine in the case of a low-pressure engine).

【Technical Solution】

[22] In accordance with one aspect of the present invention, there is provided a ship comprising an engine, further comprising: a first self-heat exchanger performing heat exchange with respect to boil-off gas (BOG) discharged from a storage tank; a multistage compressor compressing the BOG discharged from the storage tank and having passed through the first self-heat exchanger in multiple stages; a first decompressor expanding some of the BOG compressed by the multistage compressor; a second self-heat exchanger performing heat exchange with respect to the other BOG compressed by the multistage compressor with the BOG expanded by the first decompressor; and a second decompressor expanding the BOG precooled by the second self-heat exchanger and cooled by the first self-heat exchanger, wherein the first self-heat exchanger cools the BOG compressed by the multistage compressor and having passed through the second self-heat exchanger using the BOG discharged from the storage tank, and the BOG having passed through the first decompressor and the second self-heat exchanger is sent to at least one of a generator and a low-pressure engine.

[23] The BOG having passed through the second decompressor and having a gas/liquid mixed phase may be sent to the storage tank.

[24] The ship may further include a liquid/gas separator disposed downstream of the second decompressor and separating liquefied natural gas generated through reliquefaction of the BOG and gaseous BOG from each other, wherein the liquefied natural gas separated by the gas/liquid separator is sent to the storage tank and the gaseous BOG separated by the gas/liquid separator is sent to the first self-heat exchanger.

[25] Some of the BOG having passed through the multistage compressor may be sent to a high-pressure engine.

[26] The high-pressure engine may be an ME-GI engine.

[27] The high-pressure engine may use natural gas at a pressure of about 150 to 400 bar as fuel.

[28] The BOG having passed through the first decompressor and the second

the flow a expanded in step 2); 4) performing heat exchange with respect to the flow b subjected to heat exchange with the flow a in step 3) with the BOG discharged from the storage tank in a first self-heat exchanger; and 5) expanding the flow b subjected to heat exchange with the BOG discharged from the storage tank in step 4), wherein the flow a subjected to heat exchange with the flow b in step 3) is sent to at least one of a generator and a low-pressure engine.

[41] The method may further include: 6) separating the flow b partially reliquefied through expansion in step 5) into liquefied natural gas and gaseous BOG; and 7) sending the liquefied natural gas separated in step 6) to the storage tank and sending the gaseous BOG separated in step 6) to the first self-heat exchanger after joining the gaseous BOG to the BOG discharged from the storage tank.

[42] Some of the BOG subjected to multistage compression in step 1) may be sent to a high-pressure engine.

[43] The flow a subjected to heat exchange with the flow b in step 3) may be sent to a generator.

[44] The flow a subjected to heat exchange with the flow b in step 3) may be sent to a low-pressure engine.

[45] The flow a subjected to heat exchange with the flow b in step 3) may be sent to a generator and a low-pressure engine.

【Advantageous Effects】

[46] According to embodiments of the present invention, the ship including an engine uses BOG subjected to precooling and having a lower temperature for heat exchange in a self-heat exchanger, may thereby improving reliquefaction efficiency, and may allow easy maintenance and overhaul by providing one multistage compressor even in a structure wherein the ship includes a low-pressure engine.

【Description of Drawings】

[47] FIG. 1 is a schematic diagram of a partial reliquefaction system applied to a ship including a high-pressure engine in the related art.

[48] FIG. 2 is a schematic diagram of a partial reliquefaction system applied to a ship including a low-pressure engine in the related art.

[49] FIG. 3 is a schematic diagram of a partial reliquefaction system applied to a

【CLAIMS】**【Claim 1】**

A ship comprising an engine, the ship further comprising:

a first self-heat exchanger performing heat exchange with respect to boil-off gas (BOG) discharged from a storage tank;

a multistage compressor compressing the BOG discharged from the storage tank and having passed through the first self-heat exchanger in multiple stages;

a first decompressor expanding some of the BOG compressed by the multistage compressor;

a second self-heat exchanger performing heat exchange with respect to the other BOG compressed by the multistage compressor with the BOG expanded by the first decompressor; and

a second decompressor expanding the BOG precooled by the second self-heat exchanger and cooled by the first self-heat exchanger,

wherein the first self-heat exchanger cools the BOG compressed by the multistage compressor and having passed through the second self-heat exchanger using the BOG discharged from the storage tank, and

the BOG having passed through the first decompressor and the second self-heat exchanger is sent to at least one of a generator and a low-pressure engine.

【Claim 2】

The ship comprising an engine according to claim 1, wherein the BOG having passed through the second decompressor and having a gas/liquid mixed phase is sent to the storage tank.

【Claim 3】

The ship comprising an engine according to claim 1, further comprising:

a liquid/gas separator disposed downstream of the second decompressor and separating liquefied natural gas generated through reliquefaction of the BOG and gaseous BOG from each other,

wherein the liquefied natural gas separated by the gas/liquid separator is sent to the storage tank and the gaseous BOG separated by the gas/liquid separator is

sent to the first self-heat exchanger.

【Claim 4】

The ship comprising an engine according to claim 1, wherein some of the BOG having passed through the multistage compressor is sent to a high-pressure engine.

【Claim 5】

The ship comprising an engine according to claim 4, wherein the high-pressure engine is an ME-GI engine.

【Claim 6】

The ship comprising an engine according to claim 4, wherein the high-pressure engine uses natural gas at a pressure of about 150 to 400 bar as fuel.

【Claim 7】

The ship comprising an engine according to claim 1, wherein the low-pressure engine is at least one of a DF engine, an X-DF engine and a gas turbine.

【Claim 8】

The ship comprising an engine according to claim 1, wherein the low-pressure engine uses natural gas at a pressure of about 6 to 20 bar as fuel.

【Claim 9】

The ship comprising an engine according to claim 1, wherein the low-pressure engine uses natural gas at a pressure of 55 bar as fuel.

【Claim 10】

The ship comprising an engine according to claim 1, wherein the generator uses natural gas at a pressure of about 6 to 10 bar as fuel.

【Claim 11】

The ship comprising an engine according to claim 1, wherein the multistage compressor compresses the BOG to a critical pressure or more.

【Claim 12】

The ship comprising an engine according to claim 11, wherein the multistage compressor compresses the BOG to a pressure of about 100 bar or more.

【Claim 13】

The ship comprising an engine according to claim 3, further comprising:
a valve controlling a flow amount of the gaseous BOG separated by the gas/liquid separator and sent to the first self-heat exchanger.

【Claim 14】

The ship comprising an engine according to claim 1, further comprising:
a heater disposed on a line along which the BOG having passed through the first decompressor and the second self-heat exchanger is sent to the generator.

【Claim 15】

A method comprising:

- 1) performing multistage compression with respect to boil-off gas (BOG) discharged from a storage tank;
- 2) dividing some of the BOG subjected to multistage compression (hereinafter referred to as 'flow a'), followed by expanding the divided BOG;
- 3) performing heat exchange with respect to the other BOG subjected to multistage compression (hereinafter referred to as 'flow b') with the flow a expanded

in step 2);

4) performing heat exchange with respect to the flow b subjected to heat exchange with the flow a in step 3) with the BOG discharged from the storage tank in a first self-heat exchanger; and

5) expanding the flow b subjected to heat exchange with the BOG discharged from the storage tank in step 4),

wherein the flow a subjected to heat exchange with the flow b in step 3) is sent to at least one of a generator and a low-pressure engine.

【Claim 16】

The method according to claim 15, further comprising:

6) separating the BOG partially reliquefied through expansion in step 5) into liquefied natural gas and gaseous BOG; and

7) sending the liquefied natural gas separated in step 6) to the storage tank and sending the gaseous BOG separated in step 6) to the first self-heat exchanger after joining the gaseous BOG to the BOG discharged from the storage tank.

【Claim 17】

The method according to claim 15, wherein some of the BOG subjected to multistage compression in step 1) is sent to a high-pressure engine.