【CLAIMS】

【Claim 1】

A boil-off gas (BOG) reliquefaction system comprising:

a compressor compressing BOG;

a heat exchanger cooling the BOG compressed by the compressor through heat exchange using BOG not compressed by the compressor as a refrigerant;

a pressure reducer disposed downstream of the heat exchanger and reducing a pressure of fluid cooled by the heat exchanger;

a bypass line disposed upstream of the heat exchanger such that the BOG to be used as the refrigerant in the heat exchanger is supplied to the compressor along the bypass line bypassing the heat exchanger; and

a bypass valve disposed on the bypass line and regulating a flow rate of fluid and opening/closing of the bypass line,

wherein the bypass valve is partially or totally opened when a pressure of the BOG supplied to the compressor is lower than an intake pressure condition for the compressor.

【Claim 2】

The BOG reliquefaction system according to claim 1, further comprising:

a first valve disposed on a first supply line through which the BOG to be used as the refrigerant in the heat exchanger is supplied to the heat exchanger, the first valve regulating a flow rate of fluid and opening/closing of the first supply line,

wherein the bypass line is branched from the first supply line upstream of the first valve.

【Claim 3】

The BOG reliquefaction system according to claim 2, wherein the first valve is open when the bypass valve is closed;

a degree of opening of the first valve decreases with increasing degree of opening of the bypass valve; and

the first valve is completely closed when the bypass valve is completely open.

【Claim 4】

The BOG reliquefaction system according to claim 1, further comprising:

a second valve disposed on a second supply line through which the BOG used as the refrigerant in the heat exchanger is supplied to the compressor, the second valve regulating a flow rate of fluid and opening/closing of the second supply line,

wherein the bypass line is joined to the second supply line downstream of the second valve.

【Claim 5】

The BOG reliquefaction system according to claim 1, wherein a degree of opening of the bypass valve increases with decreasing pressure of the BOG supplied to the compressor below the intake pressure condition for the compressor.

【Claim 6】

The BOG reliquefaction system according to claim 5, wherein the heat exchanger comprises at least one recirculation line and at least one recirculation valve disposed on the at least one recirculation line,

the recirculation valve being open to allow the BOG to be recirculated through the recirculation line if the intake pressure condition for the compressor is not satisfied even when the bypass valve is completely open.

【Claim 7】

The BOG reliquefaction system according to claim 6, wherein a pressure condition allowing the bypass valve to be open is set to a higher value than a pressure condition allowing the recirculation valve to be open.

【Claim 8】

The BOG reliquefaction system according to claim 7, wherein the BOG used

as the refrigerant by the heat exchanger and sent to the compressor is BOG discharged from a storage tank, and the pressure condition allowing the recirculation valve to be open and the pressure condition allowing the bypass valve to be open are determined based on a pressure upstream of the compressor or an internal pressure of the storage tank.

【Claim 9】

The BOG reliquefaction system according to claim 8, wherein the pressure upstream of the compressor is measured by a third pressure sensor disposed upstream of the compressor.

【Claim 10】

The BOG reliquefaction system according to claim 8, wherein the internal pressure of the storage tank is measured by a fourth pressure sensor for measuring the internal pressure of the storage tank.

【Claim 11】

The BOG reliquefaction system according to any one of claims 1 to 10, wherein the heat exchanger comprises a micro-channel type fluid channel.

【Claim 12】

The BOG reliquefaction system according to of claim 11, wherein the heat exchanger is a printed circuit heat exchanger (PCHE).

【Claim 13】

The BOG reliquefaction system according to any one of claims 1 to 10, wherein the compressor compresses the BOG to a pressure of 150 bar to 350 bar.

【Claim 14】

The BOG reliquefaction system according to any one of claims 1 to 10, wherein the compressor compresses the BOG to a pressure of 80 bar to 250 bar.

【Claim 15】

The BOG reliquefaction system according to any one of claims 1 to 10, wherein some of the BOG compressed by the compressor is supplied to an engine and the remaining BOG not supplied to the engine is sent to the heat exchanger.

【Claim 16】

The BOG reliquefaction system according to any one of claims 1 to 10, wherein the bypass valve has a higher response than other valves provided to the BOG reliquefaction system.

【Claim 17】

A engine fuel supply method of a BOG reliquefaction system configured to reliquefy BOG by compressing the BOG from a storage tank by a compressor, cooling the compressed BOG through heat exchange with non-compressed BOG by a heat exchanger, and reducing a pressure of fluid cooled through heat exchange by a pressure reducer,

wherein part or all of the BOG to be supplied to the compressor is supplied to the compressor after bypassing the heat exchanger, when a pressure of the BOG supplied to the compressor is lower than an intake pressure condition for the compressor.

【Claim 18】

The method according to claim 17, wherein an amount of the BOG bypassing the heat exchanger increases with decreasing pressure of the BOG supplied to the compressor below the intake pressure condition for the compressor.

【Claim 19】

The method according to claim 18, wherein the BOG is recirculated along a recirculation line inside the heat exchanger if the intake pressure condition for the compressor is not satisfied even when all of the BOG discharged from the storage tank is supplied to the compressor after bypassing the heat exchanger.

【Claim 20】

The method according to any one of claims 17 to 19, wherein a degree of opening of the bypass valve is determined based on an internal pressure of the storage tank and a driving speed of a vessel provided with the compressor, the heat exchanger and the pressure reducer.

【Claim 21】

The method according to any one of claims 17 to 19, wherein the heat exchanger comprises a micro-channel type fluid channel.

【Claim 22】

The method according to claim 21, wherein the heat exchanger is a printed circuit heat exchanger (PCHE).

【Claim 23】

The method according to any one of claims 17 to 19, wherein the compressor compresses the BOG to a pressure of 150 bar to 350 bar.

【Claim 24】

The method according to any one of claims 17 to 19, wherein the compressor compresses the BOG to a pressure of 80 bar to 250 bar.