explosion due to excessive pressure increase in the LNG storage tank. Thus, various methods have been studied to process BOG generated in an LNG storage tank.

[5] Recently, in order to process BOG, there have been proposed a method in which BOG is reliquefied and returned to a storage tank, a method in which BOG is used as an energy source for a vessel engine, and the like. In addition, there has been proposed a method in which surplus BOG is burned in a gas combustion unit (GCU).

【Disclosure】

【Technical Problem】

[6] It is an aspect of the present invention to provide a system and method for processing boil-off gas, which can process BOG generated in a storage tank of a vessel or a marine structure such as LNG-RVs and LNG-FSRUs in an effective and safe manner.

【Technical Solution】

[7] In accordance with one aspect of the present invention, there is provided a BOG processing system for processing BOG generated in an LNG storage tank of a vessel or a marine structure, including:

[8] a regasification line for regasifying LNG stored in the LNG storage tank and supplying natural gas; and

[9] a high-pressure compressor for compressing boil-off gas generated in the LNG storage tank to high pressure and supplying the compressed boil-off gas downstream of the regasification line; and a low-pressure compressor for compressing boil-off gas generated in the LNG storage tank to low pressure and supplying the compressed boil-off gas upstream of the regasification line; wherein the high pressure compressor and the low-pressure compressor are directly connected with the LNG storage tank.

[10] The BOG processing system may further include: a recondenser provided to the regasification line and receiving supercooled LNG from the LNG storage tank; and a low-pressure condensation line for compressing BOG generated in the LNG storage tank to low

pressure and supplying the compressed BOG to the recondenser such that the BOG is recondensed through heat exchange with the supercooled LNG.

[11] The BOG processing system may further include: a high-pressure pump provided to the regasification line and compressing LNG supplied from the recondenser; a vaporizer provided to the regasification line and vaporizing LNG compressed by the high-pressure pump; and a high-pressure compressor provided to the high-pressure compression line and compressing BOG supplied from the LNG storage tank to high pressure.

[12] The BOG compressed to high pressure by the compressor may be supplied downstream of the vaporizer on the regasification line.

[13] The BOG processing system may further include: a low-pressure compressor provided to the low-pressure condensation line and compressing BOG supplied from the LNG storage tank to low pressure and supplying the compressed BOG to the recondenser; and an LNG supply pump provided to the LNG storage tank and pumping supercooled LNG to the recondenser.

[14] The BOG processing system may further include: a fuel supply line for supplying the compressed BOG from the high-pressure compression line and the low-pressure condensation line to gas consumption units including gas engines, gas combustion units (GCUs), and boilers of the vessel or the marine structure.

[15] The vessel or the marine structure may include an LNG-regasification vessel and an LNG-floating storage regasification unit regasifying LNG and supplying natural gas to land.

[16] In accordance with another aspect of the present invention, there is provided a BOG processing method for processing BOG generated in an LNG storage tank of a vessel or a marine structure, including:

[17] compressing boil-off gas generated in the LNG storage tank to low pressure and recondensing the compressed boil-off gas and regasifying the recondensed boil-off gas; and

compressing BOG remaining after compressing to the low compressor to high pressure and supplying the compressed to high pressure BOG to land along with regasified natural gas while regasifying LNG stored

【CLAIMS】

【Claim 1】

A boil-off gas processing system for processing boil-off gas generated in an LNG storage tank of a vessel or a marine structure, comprising:

a regasification line for regasifying LNG stored in the LNG storage tank and supplying natural gas;

a high-pressure compressor for compressing boil-off gas generated in the LNG storage tank to high pressure and supplying the compressed boil-off gas downstream of the regasification line; and

a low-pressure compressor for compressing boil-off gas generated in the LNG storage tank to low pressure and supplying the compressed boil-off gas upstream of the regasification line;

wherein the high pressure compressor and the low-pressure compressor are directly connected with the LNG storage tank .

【Claim 2】

The boil-off gas processing system according to claim 1, further comprising:

a recondenser provided to the regasification line and receiving supercooled LNG from the LNG storage tank; and

the boil-off gas compressed by the low-pressure compressor supplied to the

recondenser such that the boil-off gas is recondensed through heat exchange with the supercooled LNG.

【Claim 3】

The boil-off gas processing system according to claim 2, further comprising:

a high-pressure pump provided to the regasification line and compressing LNG supplied from the recondenser;

a vaporizer provided to the regasification line and vaporizing LNG compressed by the high-pressure pump; and

a high pressure compressor provided to the high-pressure compression line and compressing boil-off gas supplied from the LNG storage tank to high pressure.

【Claim 4】

The boil-off gas processing system according to claim 3, wherein the boil-off gas compressed to high pressure by the compressor is supplied downstream of the vaporizer on the regasification line.

【Claim 5】

The boil-off gas processing system according to claim 2, further comprising:

an LNG supply pump provided to the LNG storage tank and pumping supercooled LNG to the recondenser.

【Claim 6】

The boil-off gas processing system according to claim 2, further comprising:

a fuel supply line for supplying the compressed boil-off gas from the high-pressure compression line and the low-pressure condensation line to gas consumption units comprising gas engines, gas combustion units (GCUs), and boilers of the vessel or the marine structure.

【Claim 7】

The boil-off gas processing system according to claim 1, wherein the vessel or the

marine structure comprises an LNG-regasification vessel (LNG-RV) and an LNG-floating storage regasification unit (LNG-FSRU) regasifying LNG and supplying natural gas to land.

【Claim 8】

A boil-off gas processing method for processing boil-off gas generated in an LNG storage tank of a vessel or a marine structure, comprising:

compressing boil-off gas generated in the LNG storage tank to low pressure and recondensing the compressed boil-off gas and regasifying the recondensed boil-off gas; and

compressing boil-off gas remaining after compressing to the low compressor to high pressure and supplying the compressed to high pressure boil-off gas to land along with regasified natural gas while regasifying LNG stored in the LNG storage tank to supply natural gas to land.

【Claim 9】

The boil-off gas processing method according to claim 8, further comprising:

compressing the boil-off gas generated in the LNG storage tank to low pressure and mixing the compressed boil-off gas with the LNG to be regasified such that the compressed boil-off gas is recondensed.