【Technical Solution】

[14] In accordance with one aspect of the present invention, there is provided a liquefied-gas regasification system for vessels, including: a high-pressure pump pressurizing the liquefied gas to a pressure range required for the gas consumer; a vaporizer gasifying liquefied gas pressurized using the high-pressure pump into a regasified gas through heat exchange with a first heating medium; a trim heater heating the regasified gas to a temperature required for a gas consumer through heat exchange with a second heating medium when the regasified gas is delivered from the vaporizer to the gas consumer; a first heat exchanger gasifying the first heating medium condensed by heat exchanging with the liquefied gas in the vaporizer through heat exchange with a heat source; an expander-generator generating power through expansion of the first heating medium gasified by the first heat exchanger; a first heating medium line delivering the first heating medium expanded using the expander-generator to the vaporizer, and a second heat exchanger heating the second heating medium to be supplied to the trim heater through heat exchange with a heat source, wherein the first heating medium is undergoing phase change while circulating through the vaporizer and the first heat exchanger, and the second heating medium is not undergoing change while circulating through the trim heater and the second heat exchanger.

[15] The heat source may include one of seawater and steam.

[16] The liquefied-gas regasification system may further include a seawater pump suctioning and supplying seawater as the heat source to the first heat exchanger and the second heat exchanger, wherein the seawater pump, the first heat exchanger and the second heat exchanger are disposed under a deck of the vessel, and the vaporizer and the trim heater are disposed on an upper deck of the vessel.

[17] The first heating medium may be a refrigerant undergoing phase change while circulating in the first cycle and may be selected from among a natural refrigerant, an HFO-based refrigerant, an HFC-based refrigerant, and a mixture

thereof not providing fire and explosion risks.

[18] The second heating medium may be glycol water.

[19] The liquefied-gas regasification system may further include a first branch-off line branched off upstream of the expander-generator from a first heating medium line connected to the expander-generator to deliver the first heating medium gasified by the first heat exchanger to the expander-generator, wherein the first branch-off line is connected to the vaporizer such that the first heating medium supplied to the expander-generator is supplied to the vaporizer after bypassing the

vaporizer such that the first heating medium is supplied to the receiver after bypassing the vaporizer along the second branch-off line; a second valve disposed on the second branch-off line and allowing regulation of an opening degree thereof; a second pressure measurement unit measuring a pressure of the receiver; a third temperature controller measuring a temperature of the regasified gas supplied from the vaporizer to the trim heater; and a second controller regulating an opening degree of the second valve based on a smaller value selected from among an opening degree of the second valve for maintaining the pressure measured by the second pressure measurement unit within a predetermined range and an opening degree of the second valve for maintaining the temperature measured by the third temperature controller within a predetermined range.

[27] In accordance with another aspect of the present invention, there is provided a liquefied-gas regasification method for vessels, including: pressurizing the liquefied-gas to a pressure range required for the gas consumer; gasifying the pressurized liquefied gas through heat exchange with a first heating medium; and heating the regasified gas by heat exchanging with the first heating medium to a temperature required for a gas consumer through heat exchange with a second heating medium, gasifying the first heating medium condensed by heat exchanging with the liquefied gas through heat exchange with a heat source expanding the gasified first heating medium using an expander-generator to generate power and subjected to heat exchange with the liquefied gas, wherein the first heating medium circulates in a closed cycle while heat exchanging with the liquefied gas and the heat source and undergoes phase change while circulating the closed cycle, and the second heating medium circulates in a closed cycle while heat exchanging with the regasified gas and the heat source and does not undergo change while circulating through the closed cycle.

[28] A heat source for heating the first heating medium and the second heating

medium may be seawater, steam, or a combination of seawater and steam; the first heating medium may be a refrigerant undergoing phase change while circulating in the first cycle and may be selected from among a natural refrigerant, an HFO-based refrigerant, an HFC-based refrigerant, or a mixture thereof not providing fire and explosion risks; and the second heating medium may be glycol water.

[29] The liquefied gas to be regasified may be compressed to a pressure required for the gas consumer and subjected to heat exchange with the first heating medium; and a flow rate of the liquefied gas to be subjected to heat exchange with the first

【CLAIMS】

【Claim 1】

A liquefied-gas regasification system for vessels, comprising:

a high-pressure pump pressurizing the liquefied gas to a pressure range required for the gas consumer;

a vaporizer gasifying liquefied gas pressurized using the high-pressure pump into a regasified gas through heat exchange with a first heating medium;

a trim heater heating the regasified gas to a temperature required for a gas consumer through heat exchange with a second heating medium when the regasified gas is delivered from the vaporizer to the gas consumer;

a first heat exchanger gasifying the first heating medium condensed by heat exchanging with the liquefied gas in the vaporizer through heat exchange with a heat source;

an expander-generator generating power through expansion of the first heating medium gasified by the first heat exchanger;

a first heating medium line delivering the first heating medium expanded using the expander-generator to the vaporizer, and

a second heat exchanger heating the second heating medium to be supplied to the trim heater through heat exchange with a heat source,

wherein the first heating medium is undergoing phase change while circulating through the vaporizer and the first heat exchanger, and the second heating medium is not undergoing change while circulating through the trim heater and the second heat exchanger.

【Claim 2】

The liquefied gas regasification system according to claim 1, wherein the heat source comprises one of seawater and steam.

【Claim 3】

The liquefied gas regasification system according to claim 1, wherein the first heating medium is a refrigerant undergoing phase change while circulating in a first cycle and is selected from among a natural refrigerant, an HFO-based refrigerant, an HFC-based refrigerant, and a mixture thereof.

【Claim 4】

The liquefied gas regasification system according to claim 1, further comprising:

a first branch-off line branched off upstream of the expander-generator from a first heating medium line connected to the expander-generator to deliver the first heating medium gasified by the first heat exchanger to the expander-generator,

the first branch-off line being connected to the vaporizer such that the first heating medium supplied to the expander-generator is supplied to the vaporizer after bypassing the expander-generator along the first branch-off line.

【Claim 5】

The liquefied gas regasification system according to claim 1, further comprising:

a first valve controlling a flow rate of the liquefied gas supplied from the high-pressure pump to the vaporizer.

【Claim 6】

The liquefied gas regasification system according to claim 1, further comprising:

a receiver receiving the first heating medium condensed in the course of gasifying the liquefied gas in the vaporizer;

a second branch-off line branched off upstream of the vaporizer from the first heating medium line delivering the first heating medium to the vaporizer such that the

first heating medium is supplied to the receiver after bypassing the vaporizer along the second branch-off line;

a second valve disposed on the second branch-off line; and

a second controller regulating an opening degree of the second valve to maintain the internal pressure of the receiver.

【Claim 7】

A liquefied-gas regasification method for vessels, comprising:

pressurizing the liquefied-gas to a pressure range required for the gas consumer;

gasifying the pressurized liquefied gas through heat exchange with a first heating medium; and

heating the regasified gas by heat exchanging with the first heating medium to a temperature required for a gas consumer through heat exchange with a second heating medium,

gasifying the first heating medium condensed by heat exchanging with the liquefied gas through heat exchange with a heat source,

expanding the gasified first heating medium using an expander-generator to generate power and subjected to heat exchange with the liquefied gas,

wherein the first heating medium circulates in a closed cycle while heat exchanging with the liquefied gas and the heat source and undergoes phase change while circulating the closed cycle, and the second heating medium circulates in a closed cycle while heat exchanging with the regasified gas and the heat source and does not undergo change while circulating through the closed cycle.

【Claim 8】

The liquefied-gas regasification method for vessels according to claim 7, wherein:

a heat source for heating the first heating medium and the second heating medium is seawater or steam.

【Claim 9】

The liquefied-gas regasification method for vessels according to claim 7, wherein:

controlling a flow rate of the first heating medium gasified by heat exchanging with the heat source to divide a flow rate supplying to the expander-generator and a flow rate bypassing the expander-generator;

wherein the flow rate bypassing the expander-generator is heat exchanging with the liquefied gas without expand.

【Claim 10】

The liquefied-gas regasification method for vessels according to claim 7, wherein:

controlling a flow rate of the expanded first heating medium to divide a flow rate to heat exchanging with the liquefied gas and a flow rate to heat exchanging with the heat source without heat exchanging with the liquefied gas,

wherein a pressure of the closed cycle circulated the first heating medium is maintaining by the controlling the flow rate of the expanded first heating medium.