Claims

[Claim 1]

A fuel gas heating device for heating fuel gas supplied to a gas turbine, the fuel gas heating device comprising:

a first fuel supply line that supplies hydrocarbon gas as the fuel gas to the gas turbine;

a second fuel supply line that merges with the first fuel supply line and supplies hydrogen-containing gas as the fuel to the gas turbine;

a hydrocarbon gas heater provided upstream of a merging point with the second fuel supply line in the first fuel supply line for heating the hydrocarbon gas;

a hydrogen-containing gas heater provided upstream of the merging point in the second fuel supply line for heating the hydrogen-containing gas;

a first heat medium supply line that supplies a first heat medium for heat exchange with the hydrocarbon gas to the hydrocarbon gas heater; and

a second heat medium supply line that branches from the first heat medium supply line and supplies at least a portion of the first heat medium as a second heat medium for heat exchange with the hydrogen-containing gas to the hydrogen-containing gas heater.

[Claim 2]

The fuel gas heating device according to Claim 1,

wherein the hydrogen-containing gas heater and the second fuel supply line are each made of stainless steel.

[Claim 3]

The fuel gas heating device according to Claim 1 or 2,

wherein the first heat medium supply line includes

a high-pressure line that supplies the first heat medium having a first pressure, and

a medium-pressure line that supplies the first heat medium having a second pressure lower than the first pressure, and

the second heat medium supply line branches from the high-pressure line in the first heat medium supply line.

[Claim 4]

The fuel gas heating device according to Claim 3,

wherein the hydrocarbon gas heater includes

a first heater that heats the hydrocarbon gas by heat exchange with the first heat medium flowing through the high-pressure line, and

a second heater that heats the hydrocarbon gas by heat exchange with the first heat medium flowing through the medium-pressure line.

[Claim 5]

The fuel gas heating device according to any one of Claims 1 to 4,

wherein the first fuel supply line and the second fuel supply line branch off from a fuel supply line located on an upstream side, and

a switching valve that switches between the hydrocarbon gas and the hydrogen-containing gas as the fuel gas is provided in the fuel supply line.

[Claim 6]

The fuel gas heating device according to any one of Claims 1 to 5,

wherein the first heat medium and the second heat medium are heated water heated by exhaust heat recovered from the gas turbine.

[Claim 7]

The fuel gas heating device according to any one of Claims 1 to 6,

wherein the hydrocarbon gas is natural gas, and

the hydrogen-containing gas has a hydrogen content of 50 mol% or more.

[Claim 8]

A combined cycle plant comprising:

the gas turbine to which the fuel gas heated by the fuel gas heating device according to any one of Claims 1 to 7 is supplied.