CLAIMS

[Claim 1]

An electrical power generation system, comprising:

a heater;

a reactor;

an exhaust gas heat exchanger; and

a gas turbine, wherein

the heater is configured to supply heat to the reactor,

the reactor is configured to produce hydrogen by thermally decomposing a hydrocarbon gas into hydrogen and carbon,

the gas turbine is fueled by the hydrogen produced by the reactor, and

the exhaust gas heat exchanger is configured to transfer heat of exhaust gas discharged from the heater to a fuel gas in the electrical power generation system.

[Claim 2]

The electrical power generation system according to claim 1, wherein the exhaust gas heat exchanger is configured to transfer the heat of the exhaust gas discharged from the heater to the hydrocarbon gas supplied to the reactor.

[Claim 3]

The electrical power generation system according to claim 2, further comprising a produced gas heat exchanger, wherein:

the produced gas heat exchanger is configured to transfer heat of a gas mixture of the hydrogen and the hydrocarbon gas produced by the reactor to the hydrocarbon gas

supplied to the reactor; and

the exhaust gas heat exchanger is configured to transfer the heat of the exhaust gas discharged from the heater to the hydrocarbon gas supplied to the produced gas heat generator.

[Claim 4]

The electrical power generation system according to any one of claims 1 to 3, wherein the exhaust gas heat exchanger is configured to transfer the heat of the exhaust gas discharged from the heater to the hydrogen produced by the reactor in order to transfer heat to fuel gas supplied to the gas turbine.

[Claim 5]

The electrical power generation system according to any one of claims 1 to 4, wherein:

a fuel gas of the gas turbine is a gas mixture of hydrocarbon gas and hydrogen; and

the exhaust gas heat exchanger is configured to transfer the heat of the exhaust gas discharged from the heater to the hydrocarbon gas included in the gas mixture in order to transfer heat to the fuel gas supplied to the gas turbine.

[Claim 6]

The electrical power generation system according to claim 5, wherein:

the fuel gas of the gas turbine includes a gas mixture of the hydrocarbon gas and the hydrogen that are produced by thermally decomposing the hydrocarbon gas with the reactor, and hydrocarbon gas that is supplied to the gas turbine by bypassing the reactor; and

the exhaust gas heat exchanger is configured to transfer the heat of the exhaust gas

discharged from the heater to the hydrocarbon gas supplied to the gas turbine by bypassing the reactor in order to transfer heat to the fuel gas supplied to the gas turbine.

[Claim 7]

The electrical power generation system according to claim 6, wherein the hydrocarbon gas supplied to the gas turbine by bypassing the reactor is heated by heat of the gas turbine before the hydrocarbon gas supplied to the gas turbine by bypassing the reactor is supplied to the exhaust gas heat exchanger.

[Claim 8]

The electrical power generation system according to any one of claims 1 to 7, wherein:

the heater is configured to heat the reactor by burning fuel; and

the fuel includes at least one of hydrocarbon gas and hydrogen.

[Claim 9]

The electrical power generation system according to claim 8, wherein the heater is configured to heat the reactor with the fuel and with exhaust heat of the gas turbine.

[Claim 10]

The electrical power generation system according to any one of claims 1 to 9, wherein the hydrocarbon gas is methane.