[CLAIMS]

[Claim 1]

A gasification apparatus configured to heat and pressurize a gasification feedstock to bring the gasification feedstock into a supercritical state, and perform decomposition-treatment on the gasification feedstock to obtain fuel gas, the gasification apparatus comprising:

a heat exchanger configured to include: a high-temperature-side section in which the gasification feedstock is introduced into a low-temperature-side flow channel and also treated fluid in a supercritical state after the decomposition-treatment is introduced into a high-temperature-side flow channel, so that heat exchange is performed between the gasification feedstock and the treated fluid; and a low-temperature-side section in which the gasification feedstock is introduced into a low-temperature-side flow channel and also treated fluid that has been gas-liquid separated is introduced into a high-temperature-side flow channel, so that heat exchange is performed between the gasification feedstock and the treated fluid;

a gas-liquid separator configured to extract, from the high-temperature-side section of the high-temperature-side flow channel, the treated fluid that has been in a subcritical state which is a gas-liquid two-phase flow due to temperature decrease by the heat exchange, perform gas-liquid separation on the treated fluid, and return a separated liquid to the low-temperature-side section of the high-temperature-side flow channel; and

a synthesis device configured to synthesize a liquid fuel from fuel gas separated by the gas-liquid separator.

[Claim 2]

The gasification apparatus according to claim 1, wherein the synthesis device is configured to cause carbon monoxide and hydrogen contained in the fuel gas to catalytically react

with each other under a high pressure to produce methanol.

[Claim 3]

The gasification apparatus according to claim 1 or claim 2, wherein

the fuel gas that has not been used in production of the liquid fuel is used to heat the gasification feedstock that has exchanged heat in the heat exchanger.