CLAIMS

1. A natural gas production apparatus which extracts natural gas liquid from liquefied natural gas to produce natural gas, said apparatus comprising:

a starting material supply flow path for introducing a liquefied natural gas starting material into a first liquefied natural gas heater; wherein operating temperature of the first liquefied natural gas heater is equal to or greater than a boiling point of methane and equal to or less than a boiling point of ethane;

a separator for separating, into a liquid phase and a gas phase, a gas/liquid mixed fluid drawn from the first liquefied natural gas heater;

a low-boiling-point component supply flow path for delivering, as the natural gas, a vapor component in the gas phase drawn from the separator;

a high-boiling-point component supply flow path for introducing a liquid component in the liquid phase drawn from the separator into a distillation column in a gaseous and/or liquid state;

a first reflux flow path for introducing at least a portion of a methane-rich vapor component drawn from a column top portion of the distillation column into the distillation column as a first reflux liquid;

a first natural gas delivery flow path for delivering, as the natural gas, at least a portion of the methane-rich vapor component drawn from the column top portion of the distillation column which is not introduced into the first reflux flow path; and

a natural gas liquid delivery flow path for delivering, as the natural gas liquid, a liquid component drawn from ~~the~~a column bottom portion of the distillation column.

2. The natural gas production apparatus as claimed in claim 1, comprising:

a first vaporizer for vaporizing the liquid component in the liquid phase drawn from the separator;

a first expansion turbine for expanding the gas drawn from the first vaporizer;

a first heat exchanger for performing heat exchange between the liquefied natural gas starting material and the methane-rich vapor component;

a second heat exchanger for performing heat exchange between a gas drawn from the first expansion turbine and liquefied natural gas drawn from the first heat exchanger; and

a first compressor disposed in the first natural gas delivery flow path,

wherein the gas drawn from the first vaporizer is introduced into an intermediate portion of the distillation column via the first expansion turbine and the second heat exchanger,

at least a portion of the methane-rich vapor component is introduced into an upper portion of the distillation column via the first heat exchanger, and

at least a portion of the methane-rich vapor component which is not introduced into the distillation column is delivered from the first natural gas delivery flow path as the natural gas, via the first compressor.

3. The natural gas production apparatus as claimed in claim 2, characterized in that the methane-rich vapor component is cooled in the first heat exchanger ~~1~~.

4. The natural gas production apparatus as claimed in claim 2 or 3, characterized in that an axial end of the first compressor is connected to an axial end of the first expansion turbine.

5. The natural gas production apparatus as claimed in any one of claims 2 to 4, characterized in that the liquefied natural gas introduced into the first heat exchanger is pressurized in a supercooled state.

6. The natural gas production apparatus as claimed in any one of claims 2 to 5, comprising a second compressor which is disposed at a stage after the first compressor and serves to further boost the pressure of the natural gas drawn from the first compressor.

~~7. The natural gas production apparatus as claimed in any one of claims 1 to 6, further comprising an expansion mechanism which is disposed in the starting material supply path and serves to expand the liquefied natural gas.~~

~~8. The natural gas production apparatus as claimed in claim 7, wherein an expansion valve or a second expander is provided as the expansion mechanism.~~

~~9. The natural gas production apparatus as claimed in claim 7 or 8, further comprising:~~
~~a third heat exchanger for heating the liquefied natural gas in a gaseous and/or liquid state drawn from the expansion mechanism and introducing same into the first liquefied natural gas heater;~~
~~a pump for boosting the pressure of the vapor component drawn from a gas phase portion of the separator, after said vapor component has been condensed in the third heat exchanger; and~~
~~a second vaporizer for vaporizing the natural gas in a liquid state drawn from the pump.~~

~~10. The natural gas production apparatus as claimed in claim 8 or 9, characterized in that, when the second expander is provided as the expansion mechanism, an axial end of the second expander is connected to an axial end of the second compressor.~~

~~11.~~7. A natural gas production method in which natural gas liquid is extracted from liquefied natural gas to produce natural gas, said method comprising:
(1) a gas/liquid separation step in which a portion of the cold of the liquefied natural gas ~~starting material~~ is released, after which the liquefied natural gas is separated into a gas phase and a liquid phase after having been heated to a temperature equal to or greater than a boiling point of methane and equal to or less than a boiling point of ethane;
(2) a first natural gas extraction step in which a vapor component separated in the gas/liquid separation step is extracted as product natural gas;
(3) a distillation step in which a liquid component separated in the gas/liquid separation step is distilled;
(4) a second natural gas extraction step in which at least a portion of the vapor component drawn from a column top portion of a distillation column in the distillation step is extracted as product natural gas; and

(5) a natural gas liquid extraction step in which a liquid component drawn from a column bottom portion of the distillation column is extracted as the natural gas liquid.

~~12.~~8. The natural gas production method as claimed in claim ~~11~~7, wherein at least a portion of the vapor component drawn from the column top portion of the distillation column is introduced into the distillation column as a reflux liquid after having been cooled by means of heat exchange with the liquefied natural gas starting material.

~~13.~~9. The natural gas production method as claimed in claim ~~11~~7 or ~~12~~, 8wherein the second natural gas extraction step further comprises a step in which the pressure of the natural gas is boosted.

~~14. The natural gas production method as claimed in any one of claims 11 to 13, wherein, in the gas/liquid separation step, the liquefied natural gas is separated into a gas phase and a liquid phase after having been heated to a temperature equal to or greater than the boiling point of methane and equal to or less than the boiling point of ethane.~~

~~15. The natural gas production method as claimed in any one of claims 11 to 14, further comprising a starting material expansion step in which the pressure of the liquefied natural gas starting material supplied to the gas/liquid separation step is reduced to a pressure no greater than the critical pressure of liquefied natural gas.~~