<table>
<tr><td rowspan="2">Patent Right</td><td>Date</td><td>September 15, 2020</td><td rowspan="2">Court</td><td rowspan="2">Intellectual Property High Court, First Division</td></tr>
<tr><td>Case number</td><td>2019 (Gyo-Ke) 10150</td></tr>
<tr><td colspan="5">- A case in which, in a case where novelty of the invention titled "AIR SEPARATING METHOD" was disputed, since the Cited Document is equal to describing that lower purity oxygen is withdrawn not only as a liquid but also as a gas, the present JPO decision, which found that the invention described in the Cited Document withdraws the lower purity oxygen exclusively as a liquid and found this not as a common feature but as a difference, was considered to have an error.</td></tr>
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Case type: Rescission of Trial Decision to Maintain

Result: Granted

References: Article 29, paragraph (1), item (iii), Article 36, paragraph (4), item (i), and the same Article, paragraph (6), item (i) of the Patent Act

Related rights, etc.: Invalidation Trial No. 2019-800009. Patent No. 5997105

Summary of the Judgment

1. This case is a suit against trial decisions made by the JPO in which Plaintiff made a request for an invalidation trial of Defendant's patent of the invention titled "AIR SEPARATING METHOD" but a JPO decision dismissing the request for a trial was rendered and thus, Plaintiff sought rescission thereof.

The reasons for rescission are [i] errors in determination on novelty on the ground of Cited Invention 1 (Reason 1 for rescission); [ii] errors in determination on inventive step on the ground of Cited Invention 1 (Reason 2 for rescission); [iii] errors in determination on enablement requirement (Reason 3 for rescission); and [iv] errors in determination on support requirement (Reason 4 for rescission).

2. The judgment rescinded the JPO decision for the reason of an error in the novelty determination, by holding as follows in brief.

(1) Reason 1 for rescission (errors in determination on novelty on the ground of the Cited Invention 1)

a. The JPO decision found that Cited Invention 1 ... relates to production of lower purity oxygen and it is "withdrawn as a liquid from the side column at a position 15 to 25 equilibrium stages higher than the position where the higher purity oxygen is withdrawn from the side column, press-fed to a high pressure by passing through the liquid pump, and is vaporized by passing through the main heat-exchanger".

Plaintiff disputes the aforementioned finding, asserts that Cited Invention 1 does not withdraw the lower purity oxygen exclusively as a liquid, and points out Recitation A as a ground thereof.

b. Recitation A reads that "Either or both of the lower purity oxygen and the higher purity oxygen may be withdrawn from side column 11 as liquid or vapor for recovery." Since the term "recover" is used at another spot in Cited Document 1 (..) while having a meaning to obtain a final product, the term "recovery" at the end of Recitation A is interpreted to mean the recovery of the final product, while the term "withdrawn" in the sentence is interpreted to mean withdrawal of an intermediate product (..). Then, Recitation A is reasonably translated ... that either or both of the lower purity oxygen and higher purity oxygen may be withdrawn from the side column 11 as liquid or vapor for recovery.

If so, it is difficult to understand from Recitation A that Cited Invention 1 is to withdraw the lower purity oxygen exclusively as liquid, and withdrawal as gas is excluded.

Moreover, in view of the entire Cited Document 1, it is found that the problem to be solved by Cited Invention 1 is to provide an extremely-low temperature rectification system which can effectively refine both the lower purity oxygen and higher purity oxygen at high recovery rates, and the solution to the problem uses a difference in boiling points of air components; that is, such a tendency is used that the component with a low boiling point tends to be condensed to a vapor phase, while the component with a high boiling point tends to be condensed to a liquid phase, and the one illustrated in FIG. 1 is only a preferred embodiment. In the explanation of FIG. 1, even if the lower purity oxygen is withdrawn as liquid, whereby a large amount of higher purity oxygen is obtained, it only illustrates the most preferred embodiment, and it cannot be considered that the withdrawal of lower purity oxygen as gas from the side column 11 is not described in Cited Document 1.

c. Moreover, according to the evidences (..), at the time of filing of the Present Invention 1, in the air separating device or the method, it was found to be the common general technical knowledge that the lower purity oxygen can be recovered separately from the higher purity oxygen, and at that time, there were a method of withdrawing the lower purity oxygen as a gas and also a method of withdrawing it as a liquid from the rectification column. In view of the common general technical knowledge found as above, too, it should be considered that Cited Document 1 is equal to describing withdrawal of the lower purity oxygen not only as a liquid but also as a gas.

d. Then, it should be considered to be an error that the present JPO decision found that Cited Invention 1 is to withdraw the lower purity oxygen exclusively as a liquid and it is not a common feature but a Difference 1.

The present JPO decision does not judge the remaining differences and the differences between Present Inventions 2 to 4 and Cited Invention 1, and neither Plaintiff nor Defendant asserts that and thus, examination/determination should be exhausted by a re-trial for novelty and inventive step for those points.

(2) Reason 3 for rescission (errors in determination on enablement requirement)

In view of the case, reason 3 for rescission will also be determined. ... The recitation in the detailed description of the invention in the present description conforms to the enablement requirement.

(3) Reason 4 for rescission (errors in determination on support requirement)

In view of the case, the reason 4 for rescission will also be determined. ... The recitation in the scope of claims in ... each of the present inventions conforms to the support requirement.

Judgment rendered on September 15, 2020
2019 (Gyo-Ke) 10150 A case of seeking rescission of the JPO decision
Date of conclusion of oral argument: August 4, 2020

Judgment

Plaintiff: TAIYO NIPPON SANSO CORPORATION

Defendant: AIR WATER CRYOPLANT, LTD.
(old trade name: SAC, LTD)

Main text

1. The decision rendered by the Japan Patent Office on September 26, 2019 for the case of Invalidation Trial No. 2019-800009 shall be rescinded.
2. Defendant shall bear the court costs.

Facts and reasons

No. 1 Claim

The same gist as that in Main text, first clause.

No. 2 Outline of the case

1. History and the like of procedures at the JPO

(1) Defendant filed a patent application of the invention titled "AIR SEPARATING METHOD" on June 5, 2013 and had the establishment of the patent registered on September 2, 2016 (Patent No. 5997105. Number of claims: 4. Exhibit Ko 21. Hereinafter, this patent shall be referred to as the "Present Patent".).

(2) Plaintiff made a request for a trial for patent invalidation for the Present Patent on January 31, 2019, and the JPO judged this as the case of Invalidation Trial No. 2019-800009 (Exhibits Ko 10 and Ko 11).

(3) Defendant corrected the scope of claims by the request for correction as of June 3, 2019 (Exhibit Ko 15. Hereinafter, this correction shall be referred to as the "Present Correction".).

(4) The JPO approved the Present Correction on September 26, 2019 and rendered the JPO decision described in the attached JPO decision (copy) that "the present request for a trial is not dismissed." (hereinafter, referred to as the "Present JPO Decision") and

serviced the certified copy thereof to Plaintiff on October 4 of the same year.

(5) Plaintiff instituted the present lawsuit seeking rescission of the Present JPO Decision on November 1 of the same year.

2. Recitation in the scope of claims

The recitation in the scope of claims of the Present Patent after the Present Correction is as follows (Exhibits Ko 15 and Ko 21). The symbol "/" indicates a line break in the original document. Hereinafter, the invention according to each claim shall be referred to as "Present Invention 1" and the like and also referred to as "each of the Present Inventions". Moreover, the description (Exhibit Ko 21) shall be referred to as the "Present Description" including the drawings.

[Claim 1]

An air separating method for recovering oxygen from material air by using an air separating device having / an air compressor for compressing the material air, / a main heat-exchanger for performing heat-exchange by using the material air, / and a high-pressure rectification column and a low-pressure rectification column for separating the material air to oxygen and nitrogen, / the high-pressure rectification column provided in the air separating device being one column, / the air separating device / including a container into which liquid oxygen is introduced from the low-pressure rectification column and having a heat-exchange portion provided, / an air supply line for supplying boosted air to the heat-exchange portion in the container, and / a line for introducing the air heat-exchanged with the liquid oxygen in the heat-exchange portion into the high-pressure rectification column, wherein / the heat-exchange portion further includes a liquid oxygen supply line and a gas oxygen supply line for generating gas oxygen by performing heat-exchange by using the liquid oxygen and for supplying the liquid oxygen in the container and the gas oxygen to the main heat-exchanger, respectively, / a quantity ratio between the liquid oxygen and the gas oxygen taken out of the container is set such that a ratio of the liquid oxygen is 10% or more and 80% or less, and the ratio of the gas oxygen is 20% or more and 90% or less, / higher purity oxygen is recovered through the liquid oxygen supply line, and / lower purity oxygen with purity relatively lower than the higher purity oxygen is recovered through the gas oxygen supply line.

[Claim 2]

The air separating method according to Claim 1, wherein

the air separating device has a rectification packing or a rectification dish provided above the heat-exchange portion in the container.

[Claim 3]

The air separating method according to Claim 1 or 2, wherein

the air separating device includes a supply line for supplying liquid oxygen to the container from the low-pressure rectification column and a liquid oxygen transfer pump provided in the supply line and transferring the liquid oxygen to the container from the low-pressure rectification column.

[Claim 4]

The air separating method according to any one of Claims 1 to 3, wherein

the air separating device includes a return line for returning a part of oxygen evaporated in the container to the low-pressure rectification column and a valve provided in the middle of the return line.

3. Gist of the reasons given in the Present JPO Decision

(1) The reasons of the Present JPO Decision are as described in the attached JPO decision (copy). In short, [i] each of the Present Inventions cannot be considered to be the invention described in Cited Document 1 in the following A (hereinafter, referred to as "Cited Invention 1") and thus, it does not violate Article 29, paragraph (1) of the same Act; [ii] each of the Present Inventions cannot be considered to have been easily made by a person ordinarily skilled in the art on the basis of the matters described in Cited Invention 1 and Cited Documents 2 to 4 in the following B to D and thus, it does not violate the same Article, paragraph (2), either; [iii] the recitation in the Present Description conforms to the provisions in the Article 36, paragraph (4), item (i) of the Patent Act (enablement requirement); [iv] the recitation in the present scope of claims conforms to the provisions in the same Article, paragraph (6), item (i) (support requirement); and [v] also to the provisions in the same paragraph, item (ii) (clarity requirement).

A. Cited Document 1: U.S. Patent No. 5682766 Description (date of patent registration: November 4, 1997. Exhibit Ko 1-1)

B. Cited Document 2: Unexamined Patent Application Publication No. 1998-259989 (Exhibit Ko 2)

C. Cited Document 3: International Publication No. WO2012/127148 (Exhibit Ko 3-1)

D. Cited Document 4: U.S. Patent No. 5396773 Description (date of patent registration: March 14, 1995. Exhibit Ko 7-1)

(2) Cited Invention 1 found in the Present JPO Decision and the common features and differences between Present Invention 1 and Cited Invention 1 are as follows.

A. Cited Invention 1

(E)A method for generating lower purity oxygen and higher purity oxygen, in that:

(A) material air is partially condensed by indirect heat-exchange with higher purity oxygen so as to refine liquid material air and gas material air;
(B) the gas material air is turbo-expanded, and the turbo-expanded gas material air is introduced into a medium-pressure column;
(C) the material air in the medium-pressure column is separated by extremely-low temperature rectification so as to refine a nitrogen-enriched fluid and an oxygen-enriched fluid and to introduce the nitrogen-enriched fluid and the oxygen-enriched fluid into a low-pressure column;
(D) the nitrogen-enriched fluid and the oxygen-enriched fluid are refined by the extremely-low temperature rectification in the low-pressure column, and the oxygen-enriched fluid is introduced from the low-pressure column to the side column; and
(E) the oxygen enriched fluid is separated into lower purity oxygen and higher purity oxygen by extremely-low temperature rectification in the side column, the lower purity oxygen is recovered from the side column, and the higher purity oxygen is recovered from the side column, wherein

the material air from which high-boiling point impurities such as steam, carbon dioxide, and hydrocarbon are washed and compressed within a range from 50 to 60 pounds/square inches absolute pressure (psia) in general is cooled by passing through the main heat-exchanger, and the obtained cooled material air flow is introduced into a bottom-part reboiler in the side column, partially condensed by indirect heat-exchange with a bottom-part liquid containing the higher purity oxygen in the side column, the partial condensation of the material air in the bottom-part reboiler generates liquid material air and remaining gas material air and passes through a phase separator in a two-phase flow, the gas material air generated as the result of the partial condensation of the material air in the bottom-part reboiler is turbo-expanded and then introduced into a lower part of the medium-pressure column;

the supplied material is separated by the extremely-low temperature rectification into the nitrogen-enriched fluid and the oxygen-enriched fluid in the low-pressure column;

the oxygen-enriched fluid is withdrawn from the lower part of the low-pressure column, introduced into an upper part of the side column, separated by the extremely-low temperature rectification in the side column to the lower purity oxygen and the higher purity oxygen, and a top-part vaporized gas flow is introduced from the upper part of the side column to the lower part of the low-pressure column;

the higher purity oxygen collects as a liquid on the bottom part of the side column, the aforementioned partial condensation of the material air in the bottom-part reboiler is performed, a part of this liquid is vaporized and withdrawn as a liquid from the side column, a part thereof is recovered as a high purity liquid oxygen product, while another part is pressure-fed to a higher pressure by passing through a liquid pump, the obtained pressurized flow is vaporized by passing through the main heat-exchanger and recovered by the flow as a high-pressure higher purity oxygen gas product,

the lower purity oxygen is withdrawn as a liquid from the side column at a position 15 to 25 equilibrium stages higher than the position where the higher purity oxygen is withdrawn from the side column, press-fed to a higher pressure by passing through the liquid pump, vaporized by passing through the main heat-exchanger, and the high-pressure lower purity oxygen gas product is recovered by the flow; and

in addition to the lower purity oxygen, a large quantity of the higher purity oxygen can be recovered, and an amount of the higher purity oxygen recovered in a gas and/or liquid form is 0.5 to 1.0 times the amount of the lower purity oxygen recovered in the gas and/or liquid form.

B. Common feature with Present Invention 1

An air separating method for recovering oxygen from material air by using an air separating device having:

an air compressor for compressing the material air;

a main heat-exchanger for performing heat-exchange by using the material air; and

a high-pressure rectification column and a low-pressure rectification column for separating the material air to oxygen and nitrogen, wherein

the high-pressure rectification column provided in the air separating device is one column;

the air separating device includes:

a container into which the liquid oxygen is introduced from the low-pressure rectification column and having a heat-exchange portion provided;

an air supply line for supplying a boosted air to the heat-exchange portion in the container; and

a line for introducing the air heat-exchanged with the liquid oxygen in the heat-exchange portion to the high-pressure rectification column;

the heat-exchange portion further includes a liquid oxygen supply line for performing heat-exchange by using the liquid oxygen and supplying the liquid oxygen in the container to the main heat-exchanger;

the higher purity oxygen is recovered through the liquid oxygen supply line; and

the lower purity oxygen with purity relatively lower than the higher purity oxygen is recovered.

C. Differences from Present Invention 1

(A) Difference 1

In Present Invention 1, "the heat-exchange portion includes a gas oxygen supply line for generating gas oxygen by performing heat-exchange by using liquid oxygen and for supplying the gas oxygen in the container to the main heat-exchanger" and recovering the lower purity oxygen with purity relatively lower than the higher purity oxygen "through the gas oxygen supply line", while in Cited Invention 1, "a top-part vaporized gas flow is introduced from the upper part of the side column to the lower part of the low-pressure column, the lower purity oxygen is withdrawn as a liquid from the side column at a position 15 to 25 equilibrium stages higher than the position where the higher purity oxygen is withdrawn from the side column, press-fed to a high pressure by passing through the liquid pump, vaporized by passing through the main heat-exchanger" and the high-pressure lower purity oxygen gas product is recovered by the flow.

(B) Difference 2

In Present Invention 1, "a quantity ratio between the liquid oxygen and the gas oxygen taken out of the container is set such that a ratio of the liquid oxygen is 10% or more and 80% or less, and the ratio of the gas oxygen is 20% or more and 90% or less", while in Cited Invention 1, "in addition to the lower purity oxygen, a large quantity of the higher purity oxygen can be recovered, and an amount of the higher purity oxygen recovered in a gas and/or liquid form is 0.5 to 1.0 times the amount of the lower purity oxygen recovered in the gas and/or liquid form".

4. Reasons for rescission

(1) Errors in determination on novelty on the ground of Cited Invention 1 (Reason 1 for rescission)

(2) Errors in determination on inventive step on the ground of Cited Invention 1 (Reason 2 for rescission)

(3) Errors in determination on enablement requirement (Reason 3 for rescission)

(4) Errors in determination on support requirement (Reason 4 for rescission)

(omitted)

No. 4 Judgment of the court

1. Each of the Present Inventions

(1) Matters described in the Present Description

The Present Description (Exhibit Ko 21) has the following recitations (figures and tables are those described in Attachment 1).

A. Technical Field

[0001] The present invention relates to an air separating device for rectifying/separating oxygen and nitrogen from material air.

B. Background Art

[0002] In a plant where a large quantity of oxygen is consumed such as power generation facilities, steel plants, and the like, in many cases oxygen manufacturing facilities are also installed for self-support of oxygen. Conventionally, the most generally-used oxygen manufacturing facilities have been an air separating device capable of obtaining oxygen with air as a material and moreover, capable of obtaining nitrogen as a by-product.

[0003] The air separating device is used also in chemical industries, semiconductor industries, and the like other than the steel industry, and the taken-out oxygen is used for applications such as oxidization and oxygen-enriched combustion. Usually, oxygen is used with purity when in many cases it was taken out of the air separating device, and in the oxygen-enriched combustion, in many cases oxygen is mixed with air and introduced into a furnace.

[0004] Patent Document 1, for example, describes a method in which a part (...) of higher purity oxygen separated in a rectification column is taken out in liquid oxygen and the pressure thereof is raised by a pump and then vaporized by a main heat-exchanger without using a booster compressor, whereby gas oxygen is taken out.

[0005] Moreover, Patent Document 2 describes that, by setting a height of a condenser disposed at a bottom part in a multi-stage main condenser to 1200 mm or less, a boiling-point rise is reduced, and power consumption is reduced. It also describes that the lower the purity of the oxygen, the better the effect. Furthermore, in Claim 3 of the same document, it is described that, regarding the condenser disposed on the bottom part, air is introduced at the beginning, and the liquid oxygen is vaporized.

[0006] Moreover, there are air separating devices as illustrated in FIG. 6 and FIG. 7. The air separating device in FIG. 6 mainly includes an air compressor 2, an adsorber 3, a main heat-exchanger 4, a high-pressure rectification column 5, a low-pressure rectification column 6, a main condenser 6a, and an oxygen compressor 7. In the air separating device in FIG. 6, gas oxygen generated in the low-pressure rectification column 6 is separated into those supplied to an outside in that state and those mixed with air and supplied to the outside through the main heat-exchanger 4 and the oxygen compressor 7.

[0007] Moreover, the air separating device in FIG. 7 mainly includes the air compressor

2, the adsorber 3, the main heat-exchanger 4, the high-pressure rectification column 5, the low-pressure rectification column 6, the main condenser 6a, a booster compressor 8, and a liquid oxygen pump 9. In the air separating device in FIG. 7, the liquid oxygen generated in the low-pressure rectification column 6 has it boosted in the liquid oxygen pump 9 and passed through the main heat-exchanger 4 and then, is separated into those supplied to the outside in that state and those mixed with air and supplied to the outside.

C. Technical Problem

[0009] Since a ratio of an operating cost of the material air compressor holds most of the operating costs of the entire air separating device, further reduction in the operating costs by reducing power consumption of the material air compressor is in strong demand ... . In the air separating device ... in the aforementioned Patent Document 1, not only the gas oxygen in an upper column is taken out but also the liquid oxygen is taken out and used, whereby reduction in a flowrate of the oxygen compressor is promoted, and the power consumption is decreased. However, there is still room for further reduction of the power consumption for the material air compressor.

[0010] Moreover, in the air separating device having a structure in which the liquid oxygen from a low-pressure distillation column is evaporated in a condenser container installed outside the column so as to obtain the gas oxygen (..) and the air separating devices in FIG. 6 and FIG. 7, there is also room for further reduction in the power consumption of the material air compressor.

[0011] The present invention was made in view of such conventional circumstances and has an object to provide an air separating device which can make the power consumption of the air compressor smaller than before and can reduce the operating costs.

D. Solution to Problem

[0012] A gist of an air separating device according to the present invention is an air separating device having an air compressor for compressing material air, a main heat-exchanger for performing heat-exchange by using the material air, and a high-pressure rectification column and a low-pressure rectification column for separating the material air to oxygen and nitrogen, in which there is included a container into which liquid oxygen is introduced from the low-pressure rectification column and having a heat-exchange portion provided, the heat-exchange portion generates gas oxygen by performing heat-exchange by using the liquid oxygen, and a liquid oxygen supply line and a gas oxygen supply line for supplying the liquid oxygen and the gas oxygen in the container to the main heat-exchanger, respectively, are further provided.

[0013] In the aforementioned air separating device, the liquid oxygen and the gas oxygen supplied to the main heat-exchanger by the liquid oxygen supply line and the gas oxygen supply line, respectively, are supplied to an outside as higher purity oxygen and lower purity oxygen by being heat-exchanged in the main heat-exchanger. In the present invention, the liquid oxygen in the container is called relatively higher purity oxygen with the gas oxygen in the container as a reference, and the gas oxygen in the container is called relatively lower purity oxygen with the liquid oxygen in the container as a reference in some cases.

[0014] In the quantity ratio of the liquid oxygen and the gas oxygen to be taken out of the container, the ratio of the liquid oxygen can be set to 10% or more and 80% or less, and the ratio of the gas oxygen to 20% or more and 90% or less.

[0015] A rectification packing or a rectification dish is preferably provided above the air condenser in the air condenser container.

[0016] Such an aspect can be provided that an air supply line for supplying air or boosted air is included in the container. Moreover, there can be provided such an aspect including a supply line for supplying liquid oxygen from the low-pressure rectification column to the container and a liquid oxygen transfer pump provided in the supply line and transferring the liquid oxygen from the low-pressure rectification column to the container.

[0017] Such an aspect including a return line for returning a part of the oxygen evaporated in the container to the low-pressure rectification column and a valve provided in the middle of the return line can be provided.

E. Advantageous Effect of the Invention

[0018] According to the air separating device according to the present invention, oxygen with two or more types of purity can be taken out, and by taking out one type of them as the lower purity oxygen (gas oxygen), purity of the oxygen required for the main condenser in the low-pressure rectification column can be reduced. As a result, an ejection pressure of the air compressor can be reduced, and the power consumption of the compressor can be reduced. Therefore, the operating costs of the air separating device can be made lower than before.

F. Description of Embodiments

[0022] 1. First embodiment

FIG. 1 is a block diagram illustrating an entire structure of an air separating device 1 according to a first embodiment of the present invention.

[0023] In FIG. 1, the air separating device 1 according to this embodiment mainly includes an air compressor 2, an adsorber 3, a main heat-exchanger 4, a high-pressure rectification column 5, a low-pressure rectification column 6, a main condenser 6a provided in the low-pressure rectification column 6, a booster compressor 8, a liquid oxygen pump 9, an air condenser container 10, and an air condenser 10a provided in the air condenser container 10. The main heat-exchanger 4, the high-pressure rectification column 5, the low-pressure rectification column 6, the main condenser 6a, the liquid oxygen pump 9, the air condenser container (container) 10, and the air condenser (heat-exchange portion) 10a are disposed in a cold box 7.

[0024] The material air is boosted/compressed by the air compressor 2 to a pressure (approximately 0.3 to 0.5 MPa) required for the high-pressure rectification. Impurities such as carbon dioxide, moisture, hydrocarbon, and the like are removed by the adsorber 3. After the material air has gone through the adsorber 3, a part thereof is supplied to the main heat-exchanger 4 in the cool box 7, while the remainder is sent to the booster compressor 8 and boosted and then supplied to the main heat-exchanger 4.

[0025] The material air supplied to the main heat-exchanger 4 via the adsorber 3 is cooled in this main heat-exchanger 4 and then introduced to a bottom part in the high-pressure rectification column 5 by a supply line L1. Moreover, the material air supplied to the main heat-exchanger 4 via the adsorber 3 and the booster compressor 8 is cooled in this main heat-exchanger 4 and then introduced to the bottom part in the high-pressure rectification column 5 by a supply line L2. The material air having been introduced into the high-pressure rectification column 5 is brought into countercurrent contact with a descending liquid during a rise in this high-pressure rectification column 5 and is rectified/separated to liquid nitrogen and oxygen-enriched liquid air by an increase in a low boiling point component by distillation.

[0026] The liquid nitrogen and oxygen-enriched liquid air rectified/separated in the high-pressure rectification column 5 are introduced into the low-pressure rectification column 6 by a supply line L8 and a supply line L9, respectively. The liquid nitrogen and oxygen-enriched liquid air having been introduced into the low-pressure rectification column 6 are brought into countercurrent contact with a rising gas and are separated to high purity gas nitrogen and liquid oxygen in the low-pressure rectification column 6 by distillation. Moreover, gas nitrogen in the high-pressure rectification column 5 is also introduced to the main condenser 6a of the low-pressure rectification column 6 by a supply line, not shown. The main condenser 6a performs heat exchange between the introduced gas nitrogen and the liquid oxygen collecting on the bottom part in the low-pressure rectification column 6 and liquefies the gas nitrogen by condensing while vaporizing the liquid oxygen. In order to ensure a temperature difference between the gas nitrogen and the liquid oxygen required for this heat exchange, the operation pressure is set for each of the high-pressure rectification column 5 and the low-pressure rectification column 6. The gas oxygen vaporized in the low-pressure rectification column 6 becomes a rising gas in the low-pressure rectification column 6 and is used for rectification/separation. The separated high purity gas nitrogen is led out from a top part of the low-pressure rectification column 6 as product nitrogen and is supplied to the outside by a supply line L10.

[0027] The liquid oxygen rectified/separated in the low-pressure rectification column 6 is supplied by a supply line L3 into the air condenser container 10.

[0028] Here, a supply line (air supply line) L4 branching from the supply line L1 is connected to the air condenser container 10. By means of this supply line L4, the material air via the main heat-exchanger 4 is sent into the air condenser container 10.

[0029] Subsequently, the air condenser 10a provided in the air condenser container 10 performs heat-exchange between the liquid oxygen sent by the aforementioned supply line L3 and the air sent by the supply line L4. The gas oxygen (lower purity oxygen) vaporized by the heat-exchange is sent to the main heat-exchanger 4 by a supply line (gas oxygen supply line) L5 and returned to a normal temperature, and then supplied to the outside (oxygen-enriched furnace) as oxygen for oxygen-enriched combustion with air mixed, as necessary. The oxygen purity required for oxygen-enriched combustion is extremely low, and purity of approximately 30% is usually sufficient.

[0030] On the other hand, a supply line (liquid oxygen supply line) L6 is connected to the bottom part of the air condenser container 10, and the liquid oxygen pump 9 is provided in the middle of the supply line L6. In such a structure, the liquid oxygen in the air condenser container 10 is sent by the supply line L6 to the liquid oxygen pump 9 and boosted to a required pressure and then, evaporated and temperature-raised in the main heat-exchanger 4 so as to become the gas oxygen (higher purity oxygen) and is supplied to the outside (oxidation furnace) as oxygen for oxidation.

[0032] According to the air separating device 1 according to this embodiment, when the lower purity oxygen for oxygen-enriched combustion and the higher purity oxygen for oxidation are required; that is, when the required higher purity oxygen is a part of the entire oxygen, the purity of the liquid oxygen in the low-pressure rectification column 6 can be lowered while purity of the required higher purity oxygen is ensured.

[0034] In Table 1, when the purity of the higher purity oxygen (liquid oxygen) taken out of the air condenser container 10 is 92.5%, the amount thereof is 20% of the entire oxygen amount, and the oxygen of 80% in the remaining amount is taken out as the lower purity oxygen (purity 80%) for oxygen enriching, it is known that the purity of the liquid oxygen in the main condenser 6a required for obtaining the purity of 92.5% of the higher purity oxygen is 82.2%.

[0035] When the liquid oxygen in the low-pressure rectification column 6 is introduced into the air condenser container 10, the liquid oxygen is heated and vaporized by heat-exchange with the material air in the container. In this case, since nitrogen with a relatively low boiling point is vaporized more easily, nitrogen in the liquid is reduced by the vaporization, and the purity of the liquid oxygen in the air condenser container 10 rises to 92.5%, for example. The purity of the gas oxygen taken out of the air condenser container 10 is 80%, since it contains the aforementioned vaporized nitrogen in a slightly larger amount.

[0036] As described above, since the required purity of the liquid oxygen to be taken out of the main condenser 6a can be reduced by approximately 10%, the boiling point of oxygen can be lowered by the 10%. Therefore, a temperature difference of the heat-exchange performed between the liquid oxygen and the gas nitrogen in the low-pressure rectification column 6 can be made larger, and the required pressure in the high-pressure rectification column 5 can be lowered. As a result, the ejection pressure of the air compressor 2 can be reduced, along with the power consumption of the compressor. Thus, the operating costs of the air separating device 1 can be kept lower than before.

G. Example

[0053] 1. Example 1

... in the air separating device 1, the ratio of taken-out liquid oxygen (pure oxygen) in the entire oxygen amount (pure oxygen) taken out of the air condenser container 10 was fixed to 20%, and the purity and the like of the liquid oxygen in the air condenser container 10 were determined when the purity of the gas oxygen was changed (see Table 1).

[0054] In Table 1, as the required purity of the gas oxygen was lowered, the purity required for the liquid oxygen in the main condenser was also lowered, and it was able to be confirmed that the pressure required for the air compressor could be reduced in accordance with that. Picking up one example in Table 1, by obtaining the oxygen with the purity of 92.5% intrinsically required as the oxygen for oxidation to be supplied to an oxidation furnace in the air condenser 10a, the liquid oxygen in the low-pressure rectification column 6 did not require purity as high as 92.5%, but the purity of 82.2%, which is lower than that, was sufficient, which led to reduction in the ejection pressure of the air compressor.

[0055] Conventionally, the ejection pressure of the air compressor when the purity of 95% or more (95.5%, for example) is to be obtained in the main condenser of the low-pressure rectification column was 445 kPaG, and intensity of the air compressor was 0.072 kWh/Nm^3. However, according to the air separating device 1 of the present invention, it was able to be confirmed that, when the purity of the liquid oxygen in the air condenser container 10 was 95.8%, the purity of the liquid oxygen in the main condenser 6a was 91.1%, the ejection pressure of the air compressor 2 was 399 kPaG, the intensity of the air compressor was 0.068 kWh/Nm^3, and the air compressor intensity could be reduced by approximately 5.6%. The lower the required purity of the gas oxygen, the better the effect (reduction effect of the air compressor intensity).

[0056] 2. Example 2

In an air separating device 1b in FIG. 3, the ratio of the taken-out liquid oxygen (pure oxygen) in the entire oxygen amount (pure oxygen) taken out of the air condenser container 10 was fixed to 20%, and the purity and the like of the liquid oxygen in the air condenser container 10 were determined when the purity of the gas oxygen was changed to 99.6%, 95.0%, 90.0%, 80.0%, and 70.0%. The determination results are shown in Table 2.

[0058] In Table 2, too, it was able to be confirmed that, as the required purity of the gas oxygen was lowered while the purity of the liquid oxygen in the air condenser container 10 was maintained at 99.6% (partially excluding 99.8%), the purity required for the liquid oxygen in the main condenser was also lowered, and the pressure required for the air compressor could be also reduced in accordance with that.

[0059] 3. Example 3

In the air separating device 1 in FIG. 1, by setting the gas oxygen purity to 70%, 80%, and 90%, the ejection pressure of the air compressor was calculated when a withdrawn amount (taken-out ratio) of the liquid oxygen from the air condenser container 10 was changed. The calculation results are shown in Table 3 to Table 5. Table 3 shows the result when the gas oxygen purity is 70%, Table 4 for the gas oxygen purity at 80%, and Table 5 for the gas oxygen purity at 90%. Moreover, the liquid oxygen withdrawn amount in each Table is a ratio to the entire oxygen (pure oxygen), and the liquid oxygen withdrawn amounts at 0% and 100% correspond to conventional examples (comparative examples) (hereinafter, the same applies to the following).

[0063] In Table 3 to Table 5, it was able to be confirmed that the ejection pressure of the air compressor could be made the lowest regardless of the gas oxygen purity when the withdrawn amount of the liquid oxygen was 10%. Among them, it was able to be confirmed that the ejection pressure of the air compressor could be reduced as the gas oxygen purity was lowered to 90%, 80%, and 70%.

(2) Features of each of the Present Inventions

A. Each of the Present Inventions relates to an air separating device for rectifying/separating oxygen and nitrogen from material air ([0001]).

B. Conventional air separating devices include the structure in which, the liquid oxygen is taken out together with the gas oxygen in the upper column for use, whereby reduction in the flowrate of the oxygen compressor is promoted, and the power consumption is lowered, and also include the structure in which the liquid oxygen from the low-pressure distillation column is evaporated in the condenser container installed outside the column so as to obtain the gas oxygen, but they both have room for further reduction in the power consumption of the material air compressor ([0009], [0010]).

Each of the Present Inventions has an object to provide an air separating device which can make the power consumption of the air compressor lower than before and can reduce the operating costs ([0011]).

C. The air separating device according to each of the Present Inventions is the air separating method for recovering oxygen from material air by using an air separating device having an air compressor for compressing the material air, a main heat-exchanger for performing heat-exchange by using the material air, and a high-pressure rectification column and a low-pressure rectification column for separating the material air to oxygen and nitrogen, in which a container into which liquid oxygen is introduced from the low-pressure rectification column and having a heat-exchange portion provided is included, the heat-exchange portion generates gas oxygen by performing heat-exchange by using the liquid oxygen, and a liquid oxygen supply line and a gas oxygen supply line for supplying the liquid oxygen and the gas oxygen in the container to the main heat-exchanger, respectively, are further included ([0012]).

In the aforementioned air separating device, the liquid oxygen and the gas oxygen supplied to the main heat-exchanger by the liquid oxygen supply line and the gas oxygen supply line, respectively, are heat-exchanged in the main heat-exchanger and supplied to the outside as the higher purity oxygen and the lower purity oxygen. In the quantity ratio of the liquid oxygen and the gas oxygen to be taken out of the container, the ratio of the liquid oxygen can be set to 10% or more and 80% or less, and the ratio of the gas oxygen to 20% or more and 90% or less ([0013], [0014]).

D. According to the air separating device according to each of the Present Inventions, oxygen with two or more types of purity can be taken out, and by taking out one type of them as the lower purity oxygen (gas oxygen), purity of the oxygen required for the main condenser in the low-pressure rectification column can be reduced. As a result, the ejection pressure of the air compressor can be reduced, and the power consumption of the compressor can be reduced. Therefore, the operating costs of the air separating device can be made lower than before ([0018]).

2. Reason 1 for rescission (errors in determination on novelty on the ground of the Cited Invention 1)

(1) Cited Invention 1

A. Recitation in Cited Document 1 (Figures are as described in Attachment 2. The translation is mainly as in Exhibit Ko 1-2.)

(A) Technical field

The present invention generally relates to extremely-low temperature rectification of material air, and in more detail, relates to extremely-low temperature rectification of the material air for refining lower purity oxygen and higher purity oxygen. (first column, lines 5 to 8)

(B) Background Art

Lower purity oxygen is generally refined in a large quantity by extremely-low temperature rectification of the material air in two columns such that a bottom-part liquid in a low-pressure column is re-boiled by using the material air by a pressure in a high-pressure column, and then it is introduced into the high-pressure column. (first column, lines 12 to 17)

Conventionally, some higher purity oxygen could be refined with the lower purity oxygen, but with the conventional system, a large amount of the higher purity oxygen cannot be refined effectively with the lower purity oxygen. (first column, lines 20 to 24)

(C) Technical Problem

An object of the present invention is to provide an extremely-low temperature rectification system which can effectively refine both the lower purity oxygen and the higher purity oxygen with high recovery rates. (first column, lines 25 to 28)

(D) Solution to the Problem

a. The aforementioned and other objects which will be made obvious to a person ordinarily skilled in the art by reading this disclosure are achieved by the present invention, and one of aspects thereof is:

A method of refining lower purity oxygen and higher purity oxygen, in which

(A) liquid material air and gas material air are refined by partially condensing the material air by indirect heat-exchange with higher purity oxygen;

(B) the gas material air is turbo-expanded, and the turbo-expanded gas material air is introduced into a medium-pressure column;

(C) the material air in the medium-pressure column is separated by extremely-low temperature rectification so as to refine a nitrogen-enriched fluid and an oxygen-

enriched fluid, and the nitrogen-enriched fluid and the oxygen-enriched fluid are introduced into the low-pressure column;
(D) the nitrogen-enriched fluid and the oxygen-enriched fluid are refined by the extremely-low temperature rectification in the low-pressure column, and the oxygen enriched fluid is introduced from the low-pressure column to a side column; and
(E) the oxygen-enriched fluid is separated into the lower purity oxygen and the higher purity oxygen by the extremely-low temperature rectification in the side column, the lower purity oxygen is recovered from the side column, and the higher purity oxygen is recovered from the side column. (first column, line 41 to second column, line 3)
b. A contact separation process of a vapor and a liquid depends on a difference in boiling points of the components. A component with a low boiling point tends to be condensed to a vapor phase, while a component with a high boiling point tends to be condensed to a liquid phase. (second column, lines 38 to 43)
c. The term "reboiler" used in this description means a heat-exchanger for refining a column-rising vapor from a column liquid. The reboiler can be disposed inside or outside the column. A bottom-part reboiler is a reboiler for vaporizing a liquid from a bottom part of the column; that is, below a substance moving element. (second column, line 64 to third column, line 2)
(E) Description of Embodiment
a. FIG. 1 is a schematic diagram of a preferred embodiment of the present invention.

As illustrated in FIG. 1, material air 60 from which high-boiling point impurities such as steam, carbon dioxide, and hydrocarbon are washed and which is compressed within a range from 50 to 60 pounds/square inches absolute pressure (psia) in general is cooled by indirect heat-exchange with a return flow by passing through the main heat-exchanger 1. An obtained cooled material air flow 61 is introduced into a bottom-part reboiler 20 in a side column 11 and partially condensed by indirect heat-exchange with a bottom-part liquid containing the higher purity oxygen in the side column 11. The partial condensation of the material air in the bottom-part reboiler 20 generates liquid material air and remaining gas material air and passes through a phase separator 40 in a two-phase flow 62. (third column, lines 41 to 54)
b. The gas material air generated as the result of the partial condensation of the material air in the bottom-part reboiler 20 is turbo-expanded and then introduced to a lower part of a first column or the medium-pressure column 10. The embodiment of the present invention illustrated in FIG. 1 is a preferred embodiment in which this gas material air is at least partially overheated before the turbo-expansion. As illustrated in FIG. 1, the gas material air generated as the result of the partial condensation of the material

air in the bottom-part reboiler 20 is ejected as a flow 63 from the phase separator 40. A first part 64 of the flow 63 is heated by partial crossing of the main heat-exchanger 1 and forms a heated flow 65. A second part 66 of the flow 63 passes through a valve 67, and an obtained flow 68 is merged with the flow 65 so as to form a flow 69, which passes through a turbo expander 30 so as to be turbo-expanded to a neighborhood of an operation pressure of the medium-pressure column 10 and generates coldness. An obtained turbo-expanded material air flow 70 is introduced into a lower part of the medium-pressure column 10 from the turbo expander 30. The high-boiling point impurities are cleaned, and a second material air flow 80 which was compressed to a pressure within a range from 120 to 500 psia is cooled by passing through the main heat-exchanger 1, and an obtained cooled material air flow 81 is introduced into the medium-pressure column 10. (third column, line 55 to fourth column, line 13)

c. The medium-pressure column 10 is operated with a pressure within a range from 30 to 40 psia in general and is operated with a pressure lower than an operation pressure of the conventional high-pressure column in the two-column system. The material air in the medium-pressure column 10 is separated by the extremely-low temperature rectification into the nitrogen-enriched vapor and the oxygen-enriched liquid. The nitrogen-enriched vapor is introduced into a bottom-part reboiler 21 of the low-pressure column 12 by a flow 92 from an upper part of the medium-pressure column 10 and is condensed by indirect heat-exchange with the bottom-part liquid in the low-pressure column 12. An obtained nitrogen-enriched liquid 93 is divided into a first part 94 to flow into an upper part of the medium-pressure column 10 as a reflux and a second part 95 to be over-cooled by passing through an over-cooler or the heat-exchanger 2. An overcooled flow 96 passes through the valve 97 and then flows into the upper part of the low-pressure column 12 as a reflux by a flow 98. (fourth column, lines 14 to 30)

d. The liquid material air generated by the partial condensation of the material air in the bottom-part reboiler 20 is introduced into the low-pressure column 12. The oxygen-enriched liquid is introduced into the low-pressure column 12 from the lower part of the medium-pressure column 10. The embodiment of the present invention illustrated in FIG. 1 is a preferred embodiment in which these two liquids are combined and passed to the low-pressure column. As illustrated in FIG. 1, the liquid material air generated by the partial condensation of the material air in the bottom-part reboiler 20 is withdrawn from the phase separator 40 as a flow 71 and passes through the valve 72. The oxygen-enriched liquid is withdrawn as a flow 73 from the lower part of the medium-pressure column 10 and is merged with the flow 71 so as to form a flow 74. The flow 74 is over-cooled by passing through the over-cooler 3, an obtained flow 75 passes through the valve 76 and is then introduced into the low-pressure column 12 as a flow 77. A third material air flow 82 from which the high-boiling point impurities were removed and which was compressed to a pressure within a range from 50 to 60 psia is cooled by passing through the main heat-exchanger 1. An obtained flow 83 is further cooled by passing through the heat-exchanger 4, and an obtained flow 84 passes through a valve 85 and then flows into the upper part of the low-pressure column 12 as a flow 86. (fourth column, lines 31 to 53)

e. The second column or low-pressure column 12 is operated by a pressure lower than the pressure of the medium-pressure column 10, which is within a range of 18 to 22 psia in general. In the low-pressure column 12, various supply materials to the column are separated by the extremely-low temperature rectification to the nitrogen-enriched fluid and the oxygen-enriched fluid. The nitrogen-enriched fluid is withdrawn as a flow 100 from the upper part of the low-pressure column 12, heated by passing through the heat-exchangers 2, 3, 4 and 1, removed as a flow 102, and the whole or a part thereof becomes a product nitrogen gas having nitrogen concentration of 99 mol% or more. The oxygen-enriched fluid is withdrawn from the lower part of the low-pressure column 12 by a liquid flow 91 and is introduced into the upper part of the side column 11. (fourth column, lines 54 to 67)

f. The side column 11 is operated by a pressure within a range of 18 to 22 psia in general. The oxygen-enriched fluid is separated by the extremely-low temperature rectification in the side column 11 to the lower purity oxygen and the higher purity oxygen. A top-part vapor flow 90 is introduced into the lower part of the low-pressure column 12 from the upper part of the side column 11. (fifth column, lines 1 to 7)

g. Either or both of the lower purity oxygen and the higher purity oxygen may be withdrawn from the side column 11 as liquid or vapor for recovery. (fifth column, lines 8 to 10. Recitation A)

h. The higher purity oxygen collects as liquid on the bottom part of the side column 11, the partial condensation of the material air in the aforementioned bottom-part reboiler 20 is performed, and a part of this liquid is vaporized. As illustrated in FIG. 1, the higher purity oxygen is withdrawn as liquid by a flow 106 from the side column 11, and one part 107 of the flow 106 is recovered as a product high purity liquid oxygen. Another part 108 of the flow 106 is press-fed to a higher pressure by passing through the liquid pump 34, and an obtained pressurized flow 109 is vaporized by passing through the main heat-exchanger 1 and is recovered as a product high-pressure higher purity oxygen gas by a flow 110 as a product high-pressure. (fifth column, lines 11 to 22)

i. The lower purity oxygen is withdrawn from the side column 11 at a position 15 to 25 equilibrium stages higher than the position where the higher purity oxygen is withdrawn from the side column 11. As illustrated in FIG. 1, the lower purity oxygen is withdrawn from the side column 11 as liquid by a flow 103 and is press-fed to a higher pressure by passing through the liquid pump 35. A pressurized flow 104 is vaporized by passing through the main heat-exchanger 1, and a product high-pressure lower purity oxygen gas is recovered by a flow 105 (fifth column, lines 23 to 32)

j. By working the present invention, a large quantity of the higher purity oxygen can be recovered in addition to the lower purity oxygen. In general, an amount of the higher purity oxygen recovered in a gas and/or liquid form is 0.5 to 1.0 times the amount of the lower purity oxygen recovered in the gas and/or liquid form by working the present invention. (fifth column, lines 33 to 39)

k. Refining of the large amount of the higher purity oxygen is made possible by withdrawing the low purity liquid oxygen from the bottom part of the side column 11 from above. This withdrawal of the oxygen reduces a liquid amount (L) lowering below the point as compared with a vapor amount (V) rising in the side column from the reboiler 20 located on the bottom part thereof. The purity that can be achieved for the liquid oxygen flow 106 taken out of the bottom part of the side column 11 is limited by a ratio of L to V in the side column 11 below the point where the flow 103 is removed. The higher this ratio, the greater the impure flow 106. By withdrawing the flow 103, the ratio L to V is reduced as a result, whereby refining of the higher purity oxygen from the bottom part of the side column 11 is promoted. (fifth column, lines 40 to 53)

B. The Present JPO Decision found, regarding generation of the lower purity oxygen in Cited Invention 1, that it is "withdrawn as liquid from the side column at a position 15 to 25 equilibrium stages higher than the position where the higher purity oxygen is withdrawn from the side column, press-fed to a higher pressure by passing through the liquid pump, and vaporized by passing through the main heat-exchanger", as in the aforementioned No. 2, 3(2)A.

Plaintiff disputed over the aforementioned finding and asserts that Cited Invention 1 is not to withdraw the lower purity oxygen exclusively as liquid and points out Recitation A as a ground therefor.

C. Recitation A reads that "Either or both of the lower purity oxygen and the higher purity oxygen may be withdrawn from side column 11 as liquid or vapor for recovery." (Exhibit Ko 1-1. Fifth column, lines 8 to 10). Since the term "recovery" is used having a meaning to obtain a final product at another spot in Cited Document 1 (fifth column, lines 11 to 22, lines 23 to 32, and lines 33 to 39, for example), the term "recovery" at the end of the recitation A is interpreted to mean the recovery of the final product, while "withdrawn" in the sentence is interpreted to mean withdrawal of an intermediate product (the same applies to "withdrawn" in the fourth column, line 40 and "withdrawal" in the fifth column, line 43). Then, Recitation A is reasonably translated as in the aforementioned A(E)g, that either or both of the lower purity oxygen and the higher purity oxygen may be withdrawn from the side column 11 as liquid or vapor for recovery.

If so, it is difficult to understand from Recitation A that Cited Invention 1 is to withdraw the lower purity oxygen exclusively as liquid and excludes withdrawal as gas.

Moreover, in view of the entire Cited Document 1, it is found that the problem to be solved by Cited Invention 1 is to provide an extremely-low temperature rectification system which can effectively refine both the lower purity oxygen and the higher purity oxygen at high recovery rates (aforementioned A(C)), and the solution to the problem uses a difference in boiling points of air components; that is, the component with a low boiling point tends to be condensed to a vapor phase, while the component with a high boiling point tends to be condensed to a liquid phase (the same (D)), and the one illustrated in FIG. 1 is only a preferred embodiment (the same (E)a). In the explanation of FIG. 1, even if the lower purity oxygen is withdrawn as liquid, whereby a large amount of higher purity oxygen is obtained, it only illustrates the most preferred embodiment, and it cannot be considered that the withdrawal of the lower purity oxygen as gas from the side column 11 is not described in Cited Document 1.

D. Moreover, according to the evidences (Exhibits Ko 2, Ko 3-1, Ko 4, Ko 7-1, Ko 8), at the time of filing of Present Invention 1, in the air separating device or the method, it was found to be the common general technical knowledge that the lower purity oxygen can be recovered separately from the higher purity oxygen, and at that time, there were a method of withdrawing the lower purity oxygen as a gas and a method of withdrawal as a liquid from the rectification column. In view of the common general technical knowledge found as above, too, it should be considered that Cited Document 1 is equal to describing withdrawal of the lower purity oxygen not only as a liquid but also withdrawal as a gas.

E. Then, it should be considered to be an error that the Present JPO Decision found that Cited Invention 1 is to withdraw the lower purity oxygen exclusively as a liquid, and it is not a common feature but a Difference 1.

The Present JPO Decision does not judge the remaining differences and the differences between Present Inventions 2 to 4 and Cited Invention 1 and neither Plaintiff nor Defendant asserts that and thus, examination/determination should be exhausted by a re-trial for novelty and inventive step for those points.

(2) Therefore, Reason 1 for rescission has grounds.

3. Reason 3 for rescission (errors in determination on enablement requirement)

In view of the case, Reason 3 for rescission will be determined, too.

(1) Conformity to enablement requirement

A. The "air separating device" for the "air separating method" according to each of the Present Inventions is to withdraw oxygen with two or more types of purity and can reduce the purity of oxygen required for the main condenser in the low-pressure rectification column by withdrawing one type of them as gas oxygen with low purity and as a result, reduction in the ejection pressure of an air compressor can be promoted, power consumption of the compressor can be reduced, and operating costs of the "air separating device" can be made lower than before.

B. The device used in each of the Present Inventions is the "air separating device" mainly including the "air compressor", the "adsorber", the "main heat-exchanger", the "high-pressure rectification column", the "low-pressure rectification column", the "main condenser" provided in the "low-pressure rectification column", the "booster compressor", the "liquid oxygen pump", the "air condenser container", and the "air condenser" provided in the "air condenser container", and what each of them means is specifically illustrated in the drawings ([0023], FIG. 1)

Regarding the processes, too, the following are specifically illustrated that [i] the liquid oxygen rectified/separated in the "low-pressure rectification column" is supplied into the "air condenser container", while the gas oxygen (lower purity oxygen) vaporized in the "air condenser container" is sent to the "main heat-exchanger" by the supply line (gas oxygen supply line) and returned to a normal temperature and then the air is mixed as necessary and supplied to the outside (oxygen-enriched furnace) as oxygen for oxygen-enriched combustion ([0027] to [0029]); [ii] the liquid oxygen in the "air condenser container" is sent to the "liquid oxygen pump" by the supply line and boosted to a required pressure and then, it becomes gaseous oxygen (higher purity oxygen) by being vaporized and temperature-raised in the "main heat-exchanger" and supplied to the outside (oxidation furnace) as the oxygen for oxidation ([0030]), and [iii] a withdrawal amount of the liquid oxygen (higher purity oxygen) in the "air condenser container" is set to between 10 to 80%, for example ([0059], [Table 3 to Table 5]).

And according to the "air separating device" as above, when the required higher purity oxygen is a part of the entire oxygen, the purity of the liquid oxygen taken out of the "main condenser" of the "low-pressure rectification column" can be reduced while the purity of the required higher purity oxygen is ensured, and the boiling point of the oxygen for the reduced portion can be lowered. Moreover, by increasing the temperature difference of the heat-exchange performed between the liquid nitrogen and the gas oxygen in the "low-pressure rectification column", the required pressure in the "high-pressure rectification column" can be lowered, whereby the ejection pressure of the "air compressor" can be reduced and then, reduction in the power consumption of the compressor is made possible and thus, the operating costs of the "air separating device" can be kept lower than before, which is explanation of the effect and mechanism thereof ([0018], [0035], [0036]).

C. In the detailed description of the invention in the Present Description, the aforementioned A and B are described including their specific embodiments, and a person ordinarily skilled in the art could have worked each of the Present Inventions without requiring excessive trial and errors by referring to them.

Thus, the recitation in the detailed description of the invention in the Present Description conforms to the enablement requirement.

(2) Plaintiff's assertion

Plaintiff asserts that each of the Present Inventions is nothing but a conventional art in view of its actions and mechanisms, and suppression on the operating costs of the air separating device is not enabled by installation of the container and thus, disputes the conformity to the enablement requirement of the recitation in the Present Description.

However, the recitation in the detailed description of the invention in the Present Description conforms to the enablement requirement as described in the aforementioned (1). Moreover, conformity or nonconformity to the enablement requirement should be determined on whether each of the Present Inventions could be worked such as manufacture/use and the like by the recitation in the description and the common general technical knowledge of a person ordinarily skilled in the art, but Plaintiff's assertion is not appropriate in disputing the conformity to the enablement requirement.

Therefore, Plaintiff's assertion has no grounds.

(3) Summary

According to the above, the recitation in the Present Description conforms to the enablement requirement and thus, Reason 3 for rescission has no grounds.

4. Reason 4 for rescission (errors in determination on support requirement)

In view of the case, Reason 4 for rescission will also be determined.

(1) Framework of determination of support requirement

Whether or not the recitation in the scope of claims conforms to the support requirement should be determined by comparing the recitation in the scope of claims with the recitation in the detailed description of the invention and by examining whether or not the invention described in the scope of claims is the invention described in the detailed description of the invention and within a range that can be recognized such that a person ordinarily skilled in the art could have solved the problem of the invention by the detailed description of the invention and whether or not it is within a range that a person ordinarily skilled in the art could have solved the problem of the invention in view of the common general technical knowledge at the time of filing without the recitation or suggestion.

(2) Recitation in the Present Description

A. The Present Description describes that, since there was room for reduction in the power consumption of the air compressor in the conventional air separating device, the problem of each of the Present Inventions is to provide an air separating device which can further promote that and lower the operating costs ([0009] to [0011]).

B. As means for solving the problem, it is described that the work configured by each of the processes is performed by using the device made of each structure in the aforementioned 3(1)B ([0023], FIG. 1, [0027] to [0030], [0059], [Table 3 to Table 5]).

C. According to the method of each of the present inventions, it is described that the advantageous effect of each of the Present Inventions is that oxygen with two or more types of purity can be taken out, the purity of the oxygen required for the main condenser in the low-pressure rectification column can be made low by taking out one type of them as the lower purity oxygen (gas oxygen) and as a result, there can be realized reduction in the ejection pressure of the air compressor and thus, reduction in the power consumption of the compressor, and as a result, the operating costs of the air separating device can be made lower than before ([0018]).

(3) Conformity to support requirement

A. Since the Present Description specifically explains the method that can make the operating costs of the air separating device lower than before and the structure of the device to be used and the operation thereof are described in the aforementioned (2), a person ordinarily skilled in the art who produces oxygen and the like by using the air separating device could have recognized from the recitation in the Present Description the invention which can solve the problem by including the solution in B and by exerting the effect in C in order to solve the problem in the aforementioned (2)A.

B. The recitation in the scope of claims according to each of the Present Inventions is as in the aforementioned No. 2, 2, and the Present Description describes the invention, and a person ordinarily skilled in the art can recognize that the problem of each of the Present Inventions could have been solved by the recitation in the Present Description.

C. According to the above, it can be considered that each of the Present Inventions is the invention described in the detailed description of the invention and within a range that can be recognized such that a person ordinarily skilled in the art could have solved the problem of the invention by the detailed description of the invention and thus, the recitation in the scope of claims conforms to the support requirement.

(4) Plaintiff's assertion

A. Plaintiff asserts that there has been an art with the problem of reduction in the operating costs related to the air separating device and the solution of making the power consumption of the air compressor lower than before, and a problem cannot be found in each of the Present Inventions in relation with the conventional art, and disputes the conformity to the support requirement of the recitation in the scope of claims thereof.

However, conformity to the support requirement should be compared between the recitation in the scope of claims and the recitation in the description, but a point that Plaintiff's assertion requires comparison with the effect that can be exerted by the conventional art is not appropriate in the dispute over the conformity to the support requirement and makes the solution to the problem a superordinate concept, which is not reasonable.

B. Moreover, Plaintiff also asserts that, regarding the finding of the Present JPO Decision that the power of the air compressor can be reduced by setting the withdrawal amount of the liquid oxygen within a range from 10% to 80%, the power of the air compressor is reduced in each of the Present Inventions because the liquid oxygen concentration in the main condenser in the low-pressure rectification column is lowered by installation of the air condensing container and has no relation with the withdrawal amount of the liquid oxygen and thus, finding of the method of solving the problem has an error.

However, the problem of each of the Present Inventions is as described in the aforementioned (2)A, and the solution to the problem is as in the aforementioned (2)B and thus, each of the Present Inventions is within the range that can be recognized that a person ordinarily skilled in the art could have solved the problem of the invention by the detailed description of the invention as described in the aforementioned (3). Plaintiff's assertion limits the solution to the problem only to a part of each of the Present Inventions, which is not reasonable.

C. Therefore, Plaintiff's assertion has no grounds.

(5) Summary

According to the above, the recitation in the scope of claims according to each of the Present Inventions conforms to the support requirement and thus, Reason 4 for rescission have no grounds.

5. Conclusion

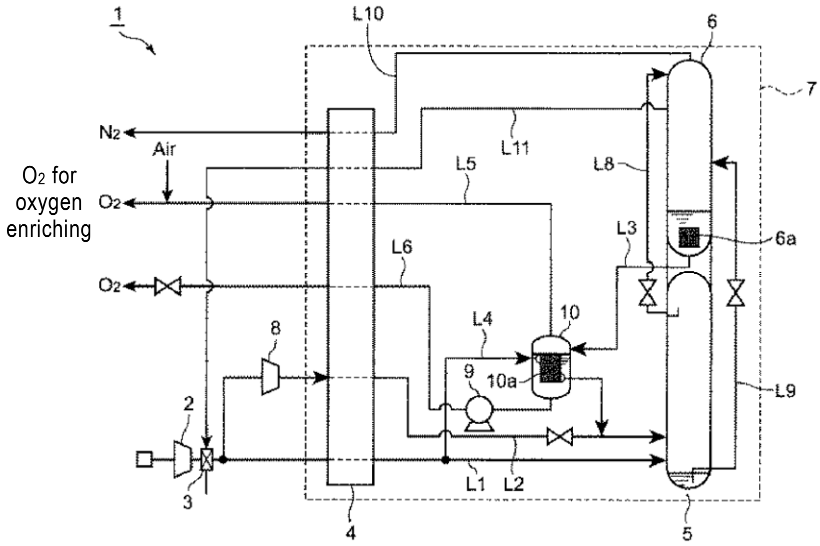
According to the above, Reason 1 for rescission asserted by Plaintiff have grounds.

Therefore, the Present JPO Decision shall be rescinded, and the judgment shall be rendered as in the main text.

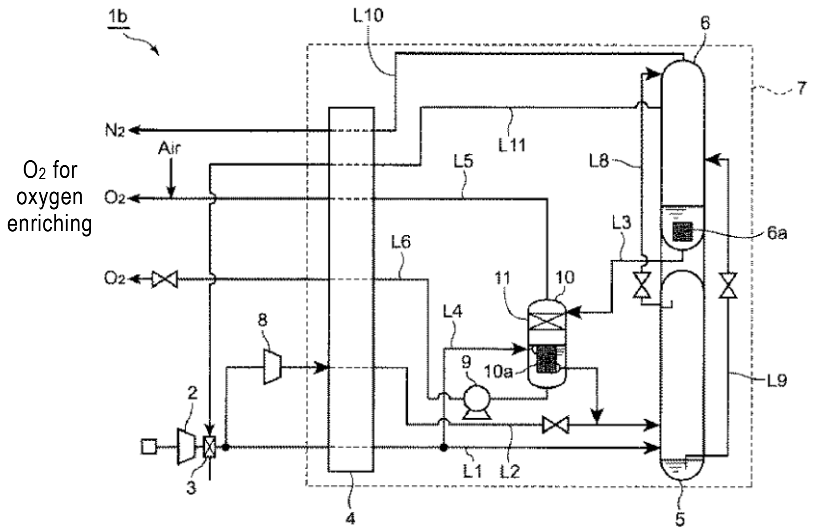
Intellectual Property High Court, First Division
Presiding Judge: TAKABE Makiko
Judge: KOBAYASHI Yasuhiko
Judge: TAKAHASHI Aya

(Attachment 1 Present Description)

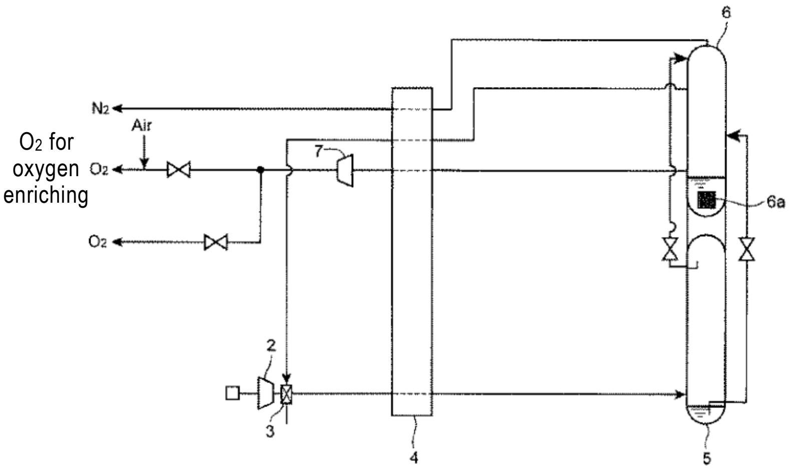
[FIG. 1]



[FIG. 3]

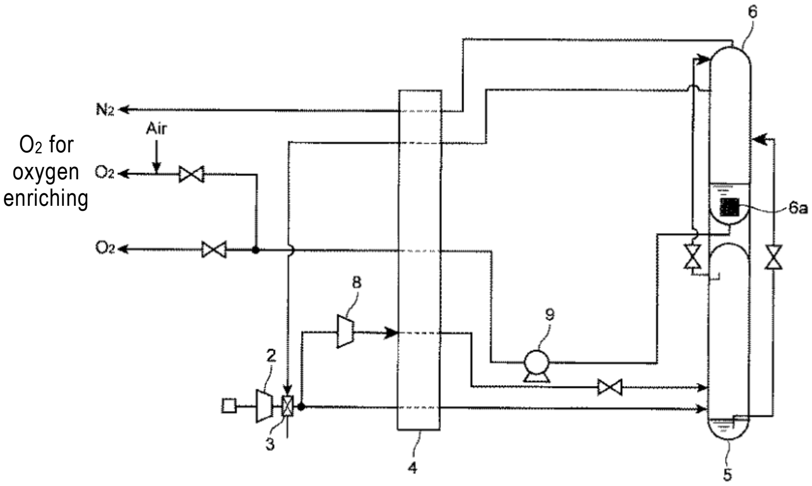


[FIG. 6]



N2
Air
O2 for
oxygen
enriching
O2
O2
7
6
6a
2
3
4
5

[FIG. 7]



N2
Air
O2 for
oxygen
enriching
O2
O2
8
9
6
6a
2
3
4
5

[TABLE 1]

Gas oxygen purity	-	99.6 %	95.0 %	90.0 %	80.0 %	70.0 %
Liquid oxygen purity	-	99.8 %	97.7 %	95.8 %	92.5 %	88.6 %
Main condenser liquid oxygen purity	-	99.6 %	95.5 %	91.1 %	82.2 %	73.1 %
Air compressor pressure	Unit: kPaG	461	445	399	330	278
Air compressor intensity	Unit: kWh/Nm^3	0.073	0.072	0.068	0.062	0.057
Air compressor intensity rate	-	100%	98%	93%	85%	77%

[TABLE 2]

Gas oxygen purity	-	99.6 %	95.0 %	90.0 %	80.0 %	70.0 %
Liquid oxygen purity	-	99.8 %	99.6 %	99.6 %	99.6 %	99.6 %
Main condenser liquid oxygen purity	-	99.6 %	95.9 %	91.8 %	83.3 %	74.4 %
Air compressor pressure	Unit: kPaG	461	449	407	337	284
Air compressor intensity	Unit: kWh/Nm^3	0.073	0.073	0.069	0.063	0.057
Air compressor intensity rate	-	100%	99%	94%	86%	78%

[TABLE 3]

Liquid oxygen withdrawal amount	-	0%	10%	20%	40%	60%	80%	100 %
Gas oxygen purity	-	89%	70%	70%	70%	70%	70%	-
Liquid oxygen purity	-	-	89%	89%	89%	89%	89%	89%
Main condenser liquid oxygen purity	-	-	72%	73%	76%	80%	84%	89%
Air compressor pressure	Unit: kPaG	381	269	278	296	317	343	381

[TABLE 4]

Liquid oxygen withdrawal amount	-	0%	10%	20%	40%	60%	80%	100 %
Gas oxygen purity	-	93%	80%	80%	80%	80%	80%	-
Liquid oxygen purity	-	-	93%	93%	93%	93%	93%	93%
Main condenser liquid oxygen purity	-	-	81%	82%	85%	87%	90%	93%
Air compressor pressure	Unit: kPaG	414	324	330	347	364	385	414

[TABLE 5]

Liquid oxygen withdrawal amount	-	0%	10%	20%	40%	60%	80%	100 %
Gas oxygen purity	-	96%	90%	90%	90%	90%	90%	-
Liquid oxygen purity	-	-	96%	96%	96%	96%	96%	96%
Main condenser liquid oxygen purity	-	-	91%	91%	92%	93%	95%	96%
Air compressor pressure	Unit: kPaG	449	392	399	410	422	433	449

(Attachment 2 Cited document 1)

[FIG. 1]

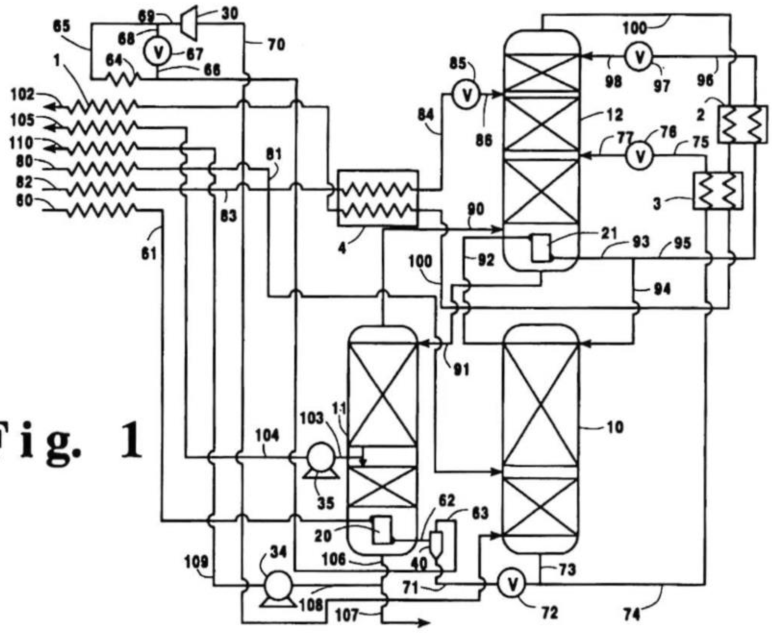


Fig. 1