Appeal decision

Appeal No. 2016-6542

Appellant Daewoo Shipbuilding & Marine Engineering Co., Ltd

Patent Attorney SEIGA Patent&Trademark Corporation

The case of appeal against the examiner's decision of refusal of Japanese Patent Application No. 2014-543440, entitled "SYSTEM AND METHOD FOR SUPPLYING HYBRID FUEL IN ENGINE FOR SHIP", [international publication on May 1, 2014: WO2014/065617, and national publication of the translated version on Jan. 8, 2015: National Publication of International Patent Application No. 2015-500759] has resulted in the following appeal decision:

Conclusion

The appeal of the case was groundless.

Reason

No. 1. History of the procedures and the Invention

The present application is an application that was originally filed on Oct. 24, 2013 as an International Patent Application (claim of priority under the Paris Convention was received by the foreign receiving office on Oct. 24, 2012 South Korea (KR), and May 23, 2013 South Korea (KR)), decision of refusal was made as of Dec. 22, 2015, appeal against the examiner's decision of refusal was requested on May 2, 2016, and, at the same time, a written amendment was submitted. After that, reasons for refusal (hereinafter, referred to as "the Reasons for Refusal by the Body") were notified as of Mar. 22, 2017 by the body, and, a written opinion and a written amendment were submitted on Jul. 25 of the same year.

Then, the inventions according to claims 1-4 of the present application are specified by the matters described in claims 1-4 of the scope of claims amended by the amendment dated Jul. 25, 2017, and thus the invention according to claim 1 thereof (hereinafter, referred to as "The Invention") is as follows.

"A fuel supply method for supplying fuel to a dual fuel engine capable of using at least natural gas as fuel and an engine for a vessel that uses high pressure gas compressed at 150 to 400 bar as fuel, in a fuel supply system comprising:

a compression device configured to compress boil-off gas (BOG) generated from liquefied natural gas (LNG) stored in an LNG cargo tank;

a high pressure pump configured to compress LNG stored in and supplied from the LNG cargo tank; and

a vaporizer configured to vaporize the LNG compressed by the high pressure pump, wherein

the compression device is a multistage compressor including a plurality of compressors and a plurality of intercoolers, and BOG can be compressed at 150 to 400 bar only by the multistage compressor,

the fuel supply method comprising:

supplying, to the dual fuel engine, the BOG compressed through a part of the plurality of compressors included in the multistage compressor; and

supplying fuel to the engine for the vessel by at least one of a first passage and a second passage of a dual fuel supply passage, the first passage being a passage to supply the BOG generated from the LNG cargo tank after having compressed the BOG at 150 to 400 bar by only one set of the multistage compressor to the engine for the vessel, and the second passage being a passage to supply the LNG stored in the LNG cargo tank after having pressurized the LNG at 150 to 400 bar by the high pressure pump to the engine for the vessel through the vaporizer, wherein,

when malfunction occurs in the multistage compressor, the high pressure pump satisfies redundancy for the multistage compressor by supplying the LNG stored in the LNG cargo tank to the engine for the vessel as fuel using the second passage."

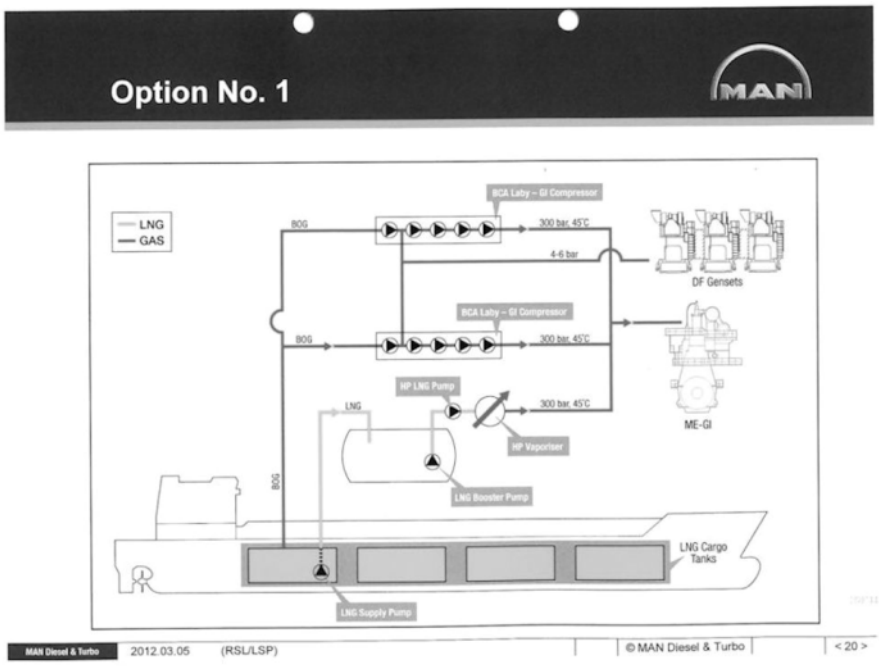
No. 2. Publication

1. Described matters in Publication

In "LNG as fuel for 2-stroke propulsion of Merchant ships. Sept. 2012 MAN Diesel & Turbo" that is a publication cited in the Reasons for Refusal by the Body, and was distributed before the priority date of the present application (distributed in the session on Tuesday 4th September at 12:30-15:45 in "Japanese Shipyards' Technical Seminar from 2nd September to 8th September 2012 in Copenhagen"), the following matters are described.

(1a) "LNG as fuel for 2-stroke propulsion of Merchant Ships" (page 1, the center column)

(1b) The following figure is shown in slide number <20>.




(1c) As the above (1b), it can be said that there is described in Cited Document 1 a

method for supplying fuel to a DF generator (DF Gensete) and an ME-GI engine (ME-GI), in a fuel supply system including: a BCA Laby-GI compressor (BCA Laby-GI compressor) to compress BOG generated from LNG stored in LNG cargo tanks; an HP LNG pump (HP LNG Pump) to pressurize LNG stored in and supplied from the LNG cargo tanks; and an HP vaporizer (HP Vaporizer) to vaporize the LNG pressurized by the HP LNG pump, is illustrated, and the following matters can be further recognized from the drawing.
A. That the BCA Laby-GI compressor (BCA Laby-GI compressor) is a multistage compressor including a plurality of compressors, and is capable of compressing BOG only by the multistage compressor at 300 bar.

B. That the DF generator (DF Gensete) capable of using BOG as fuel is capable of being supplied with BOG compressed through a part of the plurality of compressors included in each of two sets of BCA Laby-GI compressors arranged in parallel with each other.

C. That fuel is supplied to the ME-GI engine (ME-GI) by a BOG passage and an LNG passage of a dual fuel supply passage, in which the BOG passage is a passage capable of supplying BOG generated from the LNG cargo tanks (LNG Cargo Tanks) to the ME-GI engine after having compressed the BOG by two sets of multistage compressors arranged in parallel with each other at 300 bar, and the LNG passage is a passage to supply LNG stored in the LNG cargo tanks (LNG Cargo Tanks) to the ME-GI engine (ME-GI) after having pressurized the LNG at 300 bar through the HP LNG pump (HP LNG Pump) and the HP vaporizer (HP Vaporizer).

Therefore, it is recognized that, in Publication 1, the following invention (hereinafter, referred to as "Cited Invention") is described.

"A method for supplying fuel to a DF generator capable of using BOG as fuel, and an ME-GI engine using high pressure gas compressed at 300 bar as fuel, in a fuel supply system comprising:
a BCA Laby-GI compressor to compress BOG generated from LNG stored in an LNG cargo tank;
an HP LNG pump to pressurize LNG stored in and supplied from the LNG cargo tank; and
an HP vaporizer to vaporize the LNG pressurized by the HP LNG pump, wherein
the BCA Laby-GI compressor is a multistage compressor including a plurality of compressors, and BOG is capable of being compressed at 300 bar only by the multistage compressor,
the fuel supply method comprising:
being capable of supplying the DF generator with the BOG compressed through a part of the plurality of compressors included in each of two sets of the BCA Laby-GI compressors arranged in parallel with each other; and
supplying fuel to the ME-GI engine by a BOG passage and an LNG passage of a dual fuel supply passage, the BOG passage being a passage capable of supplying the BOG generated from the LNG cargo tanks to the ME-GI engine after having

compressed the BOG by each of two sets of the BCA Laby-GI compressors arranged in parallel with each other at 300 bar, and the LNG passage being a passage to supply the LNG stored in the LNG cargo tanks to the ME-GI engine after having pressurized the LNG at 300 bar through the HP LNG pump and the HP vaporizer."

No. 3. Comparison / judgment

When the Invention and Cited Invention are compared, the following matters can be said as viewed from their meanings, functions, or structures.

1. "LNG cargo tank" of the latter corresponds to "LNG cargo tank" of the former, and, in a similar fashion, "BCA Laby-GI compressor" to "compression device", "HP LNG pump" to "high pressure pump", "HP vaporizer" to "vaporizer", "fuel supply system" to "fuel supply system", and "ME-GI engine" to "an engine for a vessel".

2. Since "300 bar" of the latter satisfies the numerical value range of "150 to 400 bar" of the former, "the BCA Laby-GI compressor is a multistage compressor including a plurality of compressors, and BOG is capable of being compressed at 300 bar only by the multistage compressor" of the latter and "the compression device is a multistage compressor including a plurality of compressors and a plurality of intercoolers, and BOG can be compressed at 150 to 400 bar only by the multistage compressor" of the former are common within the limitation that "the compression device is a multistage compressor including a plurality of compressors, and BOG can be compressed at 150 to 400 bar only by the multistage compressor".

3. Since it is a matter of common general technical knowledge in the field of an engine for a vessel that "BOG" of the latter is natural gas and "DF" of "DF generator" is an abbreviated name of "Duel Fuel"(dual fuel), "DF generator capable of using BOG as fuel" of the latter corresponds to "dual fuel engine capable of using at least natural gas as fuel" of the former, and "being capable of supplying the DF generator with the BOG compressed through a part of the plurality of compressors included in each of two sets of the BCA Laby-GI compressors arranged in parallel with each other" of the latter corresponds to "supplying, to the dual fuel engine, the BOG compressed through a part of the plurality of compressors included in the multi-stage compressor" of the former.

4. "The BOG passage being a passage capable of supplying the BOG generated from the LNG cargo tanks to the ME-GI engine after having compressed the BOG by each of two sets of the BCA Laby-GI compressors arranged in parallel with each other at 300 bar" of the latter and "the first passage being a passage to supply the BOG generated from the LNG cargo tank after having compressed the BOG at 150 to 400 bar only by one set of the multistage compressor to the engine for the vessel" of the former are common within the limitation of "the first passage being a passage to supply the BOG generated from the LNG cargo tank after having compressed the BOG at 150 to 400 bar by the multistage compressor to the engine for the vessel".

In addition, according to the statement of "High pressure gas compressed at a high pressure of 150 to 400 bar is used as the fuel of the high pressure gas injection engine 100" in paragraph [0044] of the description of the present application, it is understood that "to supply the LNG after having pressurized the LNG at 150 to 400 bar by the high pressure pump to the engine for the vessel through the vaporizer" of the

former means that the pressure of LNG after interposition of the vaporizer is 150 to 400 bar, and, therefore, "the LNG passage being a passage to supply the LNG stored in the LNG cargo tanks to the ME-GI engine after having pressurized the LNG at 300 bar through the HP LNG pump and the HP vaporizer" of the latter corresponds to "the second passage being a passage to supply the LNG stored in the LNG cargo tank after having pressurized the LNG at 150 to 400 bar by the high pressure pump to the engine for the vessel through the vaporizer" of the former.

Furthermore, "supplying fuel to the ME-GI engine by a BOG passage and an LNG passage of a dual fuel supply passage" of the latter and "supplying fuel to the engine for the vessel by at least one of a first passage and a second passage of a dual fuel supply passage" of the former are common within the limitation of being "supplying fuel to the engine for the vessel by a first passage and a second passage of a dual fuel supply passage".

Then, the both are identical in the following points when expressed using terms of the Invention.

[Corresponding features]

"A method for supplying fuel to a dual fuel engine capable of using at least natural gas as fuel and an engine for a vessel that uses high pressure gas compressed at 150 to 400 bar as fuel, in a fuel supply system comprising:

a compression device configured to compress boil-off gas (BOG) generated from liquefied natural gas (LNG) stored in an LNG cargo tank;

a high pressure pump configured to compress LNG stored in and supplied from the LNG cargo tank; and

a vaporizer configured to vaporize the LNG compressed by the high pressure pump, wherein

the compression device is a multistage compressor including a plurality of compressors, and BOG can be compressed at 150 to 400 bar only by the multistage compressor,

the fuel supply method comprising:

supplying, to the dual fuel engine, the BOG compressed through a part of the plurality of compressors included in the multi-stage compressor; and

supplying fuel to the engine for the vessel by a first passage and a second passage of a dual fuel supply passage, the first passage being a passage to supply the BOG generated from the LNG cargo tank after having compressed the BOG at 150 to 400 bar by the multistage compressor to the engine for the vessel, and the second passage being a passage to supply the LNG stored in the LNG cargo tank after having pressurized the LNG at 150 to 400 bar by the high pressure pump to the engine for the vessel through the vaporizer."

Then, the both are different in the following points.

[Different feature 1]

A point that, regarding "multistage compressor",

in the Invention, it includes "a plurality of intercoolers" and is provided "only one set", whereas,

in Cited Invention, it is not clear whether or not it is a compressor including an intercooler, and, in addition, "two sets" are "arranged in parallel with each other" and

fuel can be supplied to the DF generator and the ME-GI engine by each of the BCA Laby-GI compressors.

[Different feature 2]

A point that the Invention has a constitution of "supplying fuel to the engine for the vessel by at least one of a first passage and a second passage of a dual fuel supply passage", and "when malfunction occurs in the multistage compressor, the high pressure pump satisfies redundancy for the multistage compressor by supplying the LNG stored in the LNG cargo tank to the engine for the vessel as fuel using the second passage", whereas,

in Cited Invention such matters are not specified.

Examination on "Different feature 1"

It is a conventionally well-known technology to make a multistage compressor for compressing BOG generated from an LNG tank include a plurality of intercoolers, as described, for example, in paragraph [84] (refer to paragraph [0062] of National Publication of International Patent Application No. 2014-515072 as temporary translation) and [FIG. 3a] of International Publication No. WO 2012/128447, which is Cited Document 3 cited in the Reasons for Refusal by the Body and became available to the public through electric communication lines before the priority date of the present application.

In addition, it is a matter of a degree that can be selected by a user according to needs for such as an alternative compressor at the time of checking the BCA Laby-GI compressor and fail-safe functions, and conditions such as costs and installation spaces, whether to make a BCA Laby-GI compressor (this corresponds to "multistage compressor" of the Invention): be of only one set; or be of two sets arranged in parallel with each other in order to enable to supply fuel to a DF generator and an ME-GI engine by each of the BCA Laby-GI compressors.

From the above, it is a matter that could be achieved by a person skilled in the art accordingly to, in "BCA Laby-GI compressor" of Cited Invention: include a plurality of intercoolers; and change the compressor to a constitution including only one set in view of the above-mentioned needs, and conditions such as costs and installation spaces.

Therefore, it would have been easily conceived of by a person skilled in the art to make, in Cited Invention, Cited Invention have the matter specifying the invention of the Invention concerning the above Different feature 1.

Examination on "Different feature 2"

As a measure for malfunction of important components (high pressure gas compressors and heat exchangers) of a fuel gas adjustment plant in an LNG carrier, it is a matter of common general technical knowledge to make the plant be of a system configuration in which no trouble is posed on a usual voyage by backup with an alternative supply system. (For example, refer to Kadobari Syosuke, "Safety Standards for High Pressure Injection Dual Fuel Diesel Engine", Journal of Marine Engineering Soc. in Japan, vol. 23, No. 8, 1988 August issue, page (15), the left column, line 26 to the last line, in particular)

Then, as examined in the above Different feature 1, when a change to make the BCA Laby-GI compressor be of only one set is applied in Cited Invention, if the

BCA Laby-GI compressor causes a failure, gas supply from the BOG passage to the ME-GI engine will be stopped, and, therefore, it can be said that it is a natural idea to establish an alternative fuel supply method for the ME-GI engine in order to continue navigation of the LNG carrier in light of the above-mentioned common general technical knowledge.

Then, on the occasion of establishing an alternative fuel supply method for the ME-GI engine, it is a matter of common general technical knowledge that the quantity of BOG varies according to the quantity of LNG in the LNG cargo tank, the temperature, and the like, and thus, it can be understood with ease by a person skilled in the art that, in Cited Invention, when the quantity of BOG is short, fuel is supplied to the ME-GI engine from the LNG passage. In addition, as an alternative fuel supply method for the ME-GI engine, fuel supply using "the LNG passage being a passage to supply the LNG stored in the LNG cargo tanks to the ME-GI engine after having pressurized the LNG at 300 bar through the HP LNG pump and the HP vaporizer" has already been established. Furthermore, as described in paragraph [153] of the above-mentioned Cited Document 3 (refer to paragraph [0123] of National Publication of International Patent Application No. 2014-515072 as temporary translation) that "when a boil off gas re-liquefaction device does not operate, or a quantity of boil off gas generated in the storage tank 11 is small, fuel can be supplied by supplying LNG stored in the storage tank 11 to the buffer tank 31 through the LNG supply pump 57 installed in the storage tank 11 and the LNG supply line L7", it can be understood that it is a conventionally well-known technology to supply fuel from the LNG passage when there is a failure in the system constituting the BOG passage. In view of these, it is a matter that could be achieved by a person skilled in the art accordingly in Cited Invention to make Cited Invention be of a constitution to supply fuel to the engine for the vessel by at least one of the BOG passage and the LNG passage of the dual fuel supply passage, and, in addition, to make, when malfunction occurs in the BCA Laby-GI compressor, the HP LNG pump satisfy redundancy for the BCA Laby-GI compressor by supplying LNG stored in the LNG cargo tank to the ME-GI engine as fuel using the LNG passage.

Therefore, it would have been easily conceived of by a person skilled in the art to make, in Cited Invention, Cited Invention have the matter specifying the invention of the Invention concerning the above-mentioned Different feature 2.

Even when the effect of the Invention is examined, it is within a scope predictable from Cited Invention, each of the well-known arts, and the common general technical knowledge, and thus it is not a particular one.

Accordingly, it can be said that the Invention could have been invented by a person skilled in the art with ease based on Cited Invention, each of the well-known arts, and the common general technical knowledge.

No. 4. Closing

As above, since the Invention could have been invented by a person skilled in the art with ease based on Cited Invention, each of the well-known arts, and the common general technical knowledge, the appellant should not be granted a patent for that under the provisions of Article 29(2) of the Patent Act.

Therefore, the present application should be rejected without examining the

inventions according to the other claims of the present application.

Accordingly, the appeal decision shall be made as described in the conclusion.

Nov. 27, 2017

Chief administrative judge: UJIHARA, Yasuhiro
Administrative judge: WADA, Yuji
Administrative judge: SHIMADA, Shinichi