

Internal distribution code:

- (A) [-] Publication in OJ
- (B) [-] To Chairmen and Members
- (C) [-] To Chairmen
- (D) [X] No distribution

**Datasheet for the decision
of 11 February 2022**

Case Number: T 0347/19 - 3.3.06

Application Number: 08861676.8

Publication Number: 2233549

IPC: C10G2/00, C10G47/00

Language of the proceedings: EN

Title of invention:

METHOD FOR MANAGEMENT OF WAX FRACTION STORAGE TANK

Patent Proprietor:

Japan Oil, Gas and Metals National Corporation
INPEX Corporation
JX Nippon Oil & Energy Corporation
Japan Petroleum Exploration Co., Ltd.
Cosmo Oil Co., Ltd.
Nippon Steel & Sumikin Engineering Co., Ltd.

Opponent:

Sasol South Africa (Proprietary) Limited

Headword:

Intermediate tank/JAPAN OIL

Relevant legal provisions:

RPBA Art. 12(4)

EPC Art. 84, 56

Keyword:

Inventive step - main request (no) - auxiliary request (yes) -

closest prior art unsuitable/unpromising starting point

Late-filed request - No legal basis to contest admittance

Claims - clarity - auxiliary request (yes)

Decisions cited:

T 2057/12

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 0347/19 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 11 February 2022

Appellant: Sasol South Africa (Proprietary) Limited
(Opponent) 50 Katherine Street
Sandton
2090 South Africa (ZA)

Representative: Hoffmann Eitle
Patent- und Rechtsanwälte PartmbB
Arabellastraße 30
81925 München (DE)

Respondent: Japan Oil, Gas and Metals National Corporation
(Patent Proprietor 1) 2-10-1, Toranomom
Minato-ku, Tokyo 105-0001 (JP)

Respondent: INPEX Corporation
(Patent Proprietor 2) Akasaka Biz Tower
5-3-1 Akasaka
Minato-ku
Tokyo 107-6332 (JP)

Respondent: JX Nippon Oil & Energy Corporation
(Patent Proprietor 3) 1-2, Otemachi, 1-chome,
Chiyoda-ku
Tokyo 100-8162 (JP)

Respondent: Japan Petroleum Exploration Co., Ltd.
(Patent Proprietor 4) 7-12, Marunouchi 1-chome
Chiyoda-ku
Tokyo 100-0005 (JP)

Respondent: Cosmo Oil Co., Ltd.
(Patent Proprietor 5) 1-1, Shibaura 1-chome
Minato-ku
Tokyo 105-8528 (JP)

Respondent: Nippon Steel & Sumikin Engineering Co., Ltd.
(Patent Proprietor 6) 5-1, Osaki 1-chome
Shinagawa-ku
Tokyo 141-8604 (JP)

Representative: Vossius & Partner
Patentanwälte Rechtsanwälte mbB
Siebertstrasse 3
81675 München (DE)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
30 November 2018 concerning maintenance of the
European Patent No. 2233549 in amended form.**

Composition of the Board:

Chairman J.-M. Schwaller
Members: S. Arrojo
C. Brandt

Summary of Facts and Submissions

I. The opponent filed an appeal contesting the decision of the Opposition Division to maintain European patent No. 2 233 549 on the basis of auxiliary request 1 filed with letter dated 28 September 2017, claim 1 thereof (main request) reading as follows:

*"1. A method comprising:
producing a wax fraction by Fischer-Tropsch synthesis;
then storing said wax fraction in a tank; maintaining the temperature inside the tank at 90°C to 130°C; and maintaining the atmosphere inside the tank to be an inert gas atmosphere, while said wax fraction is stored in the tank until hydrocracking the wax fraction; then hydrocracking said wax fraction using a hydrocracking catalyst to convert the wax fraction into diesel fuel oil."*

II. With its statement of grounds of appeal, the appellant requested to revoke the patent, arguing that the subject-matter of above claim 1 was not novel and/or not inventive in view of HE1 (US 7087804 B2). It also submitted document HE11 (M. Vadekar, "Oxygen contamination of hydrocarbon feedstocks", Chem. Tech. Consulting, 2002) and requested that document HE10 (D. Leckel, "Hydrocracking of Iron-Catalyzed Fischer-Tropsch Waxes", Energy & Fuels, 2005) filed during opposition proceedings be admitted into the appeal proceedings.

III. In their reply dated 9 August 2019, the proprietors and respondents requested not to admit HE10 and HE11 into the appeal proceedings and to dismiss the appeal or, as an auxiliary measure, to maintain the patent on the

basis of the claims according to one of auxiliary requests 1 to 17 filed with this reply, wherein **claim 1** of **auxiliary request 1** reads (the amendments versus claim 1 of the main request highlighted by the board):

*"1. A method comprising:
producing a wax fraction by Fischer-Tropsch synthesis;
then storing said wax fraction in a tank, wherein the tank is an intermediate tank provided in a general plant between a Fischer-Tropsch reactor and a hydrocracking reactor; maintaining the temperature inside the tank at 90°C to 130°C; and maintaining the atmosphere inside the tank to be an inert gas atmosphere, while said wax fraction is stored in the tank until hydrocracking the wax fraction; then hydrocracking said wax fraction using a hydrocracking catalyst to convert the wax fraction into diesel fuel oil."*

- IV. In reply to the board's preliminary opinion that the main request appeared to comply with the requirements of the EPC, the proprietors announced that they would not attend the oral proceedings and withdrew their request to hold an oral proceedings.
- V. At the oral proceedings the discussion with the appellant focused on the compliance of the main request with Article 56 EPC, and on the questions of admittance, clarity and inventive step of auxiliary request 1. The inventive step argumentations were essentially based on HE1, which was the only document cited as closest prior art.
- VI. By the closure of the debate, the requests of the parties were established to be as follows:

The appellant requested that the decision under appeal be set aside and that the patent be revoked in its entirety.

The respondents requested in writing that the appeal be dismissed or, as an auxiliary measure, that the patent be maintained on the basis of one of auxiliary requests 1 to 17 filed on 9 August 2019.

Reasons for the Decision

1. Main request - Inventive Step

The subject-matter of claim 1 as upheld by the opposition division does not comply with the requirements of Article 56 EPC for the following reasons:

1.1 Closest prior art

- 1.1.1 Document HE1 discloses (abstract) the transportation of Fischer-Tropsch products (including waxy substances) in a vessel using a cargo tank with nitrogen-containing blanketing agents to prevent degradation of the waxes and the corrosion of the tank. This document further teaches (col. 3, lines 5-8) that the waxes are shipped at elevated (unspecified) temperatures, that excessive temperatures might lead to undesired oxidation reactions and that (col. 8, lines 59-62) the waxy products from the Fischer-Tropsch process may be further treated in a hydrocracking reactor to produce fuel. While document HE1 does not explicitly specify that the hydrocracking process involves the use of a catalyst and that the fuel produced includes diesel fuel, the board concurs with the opponent in that both of these aspects are implicitly disclosed in this

document, because it is well-known in the art that hydrocracking processes invariably use catalysts and give rise to different distillates including gasoline, kerosene and diesel fractions.

In the board's view, HE1 represents a suitable starting point for assessing inventiveness of the method defined in claim 1 of the main request because, similarly to the underlying invention, it addresses the problem of maintaining stable storage conditions for Fischer-Tropsch wax fractions intended to be hydrocracked.

- 1.1.2 The Board considers that claim 1 differs from the disclosure in document HE1 in that:
- i) the wax fraction is maintained within a temperature range of 90-130°C; and
 - ii) the temperature and inert gas conditions in the tank are maintained until the waxes are introduced into the hydrocracking reactor.

1.2 Problem solved

- 1.2.1 According to par. [0007] of the patent in suit, an object of the invention is to provide a management method for a wax fraction that can suppress the production of a substance causing the reduction in activity of the hydrocracking catalyst.

In view of the examples in the patent ([0028]-[0035]), the formation of peroxides increases significantly when the waxes are stored at temperatures higher than 130°C or in the presence of air (see table 2). The presence of peroxides, in turn, decreases the efficiency of the catalyst in the hydrocracking process to produce diesel fuel (see table 3).

- 1.2.2 The opponent contested the results of the examples in the patent (tables 2 and 3), arguing that the comparative examples were carried out using unrealistically elevated temperatures (i.e. 150°C). Furthermore, there was no way to determine whether the observed effects were associated with the temperature or with the gas. The problem solved was therefore simply to provide a process with appropriate storage conditions for the Fischer-Tropsch waxes.
- 1.2.3 The board first notes that the experiments in the patent simply intend to support the idea that waxes degrade under excessive temperature and/or when exposed to air atmosphere, an effect which is coherent with the teachings in HE1 and that has been relied upon by the opponent itself when discussing the contents of the prior art. In the absence of evidence to the contrary, the board considers that the effects observed in tables 2 and 3 are due to both the temperature differences and the use of an inert gas, as it is plausible that both factors have an effect on preventing undesirable reactions and there is no reason to assume that different inert gases (e.g. nitrogen and helium) would have different effects in this respect.

The board therefore concludes that the experiments in the patent successfully demonstrate that the proposed conditions prevent degradation of waxes, which in turn improves the operation of the hydrocracking process. The objective technical problem solved by the invention is therefore (in-line with that proposed by the proprietor) the provision of a stable/efficient process for producing, storing and hydrocracking a Fischer-Tropsch wax fraction.

1.3 Obviousness

1.3.1 The proprietor argued that the solution proposed in the patent was not obvious, because HE1 did not disclose a specific storage temperature and, in fact, did not even indicate that the waxes had to be stored in a liquid state. Document HE1 furthermore taught away from the temperature range of the invention, because it explicitly indicated that high temperatures led to undesired oxidation reactions.

Moreover, it pointed out that document HE1 was concerned with the requirements on a ship-board tank and did not deal with the question of providing a stable operation of a hydrocracking process of the wax fraction. The underlying problematic in HE1 related to other issues such as providing a safe transport and avoiding deterioration of the product, so there was no incentive to explore solutions to the problems of the catalytic reactor, let alone to consider in particular the features proposed in the claims at issue. The subject-matter of claim 1 was therefore not obvious in view of HE1.

1.3.2 The board interprets the subject-matter of claim 1 at issue as a chronological process, wherein the waxes are first produced in a Fischer-Tropsch reactor and subsequently stored under conditions maintained up to the (time) point in which they are exposed to a step of catalytic hydrocracking to produce diesel fuel. The process in HE1 includes analogous steps, because the transportation in the cargo tank corresponds to the storage stage between the initial formation of the waxes in the Fischer-Tropsch reactor and the final hydrocracking process. Furthermore, as indicated above, the use of a catalyst and the production of diesel fuel

are implicit aspects of this process, because they are inextricably linked to the hydrocracking process disclosed in HE1. Since the steps followed in the processes of claim 1 at issue and HE1 are qualitatively the same, it follows that a skilled person would, contrary to the arguments of the proprietor, have clear incentives to explore solutions to ensure an efficient/stable storage and catalytic hydrocracking of the waxes.

In the board's view, the temperature range defined in claim 1 at issue (namely 90 to 130°C) represents a compromise between a temperature high enough to ensure that the waxes are in a liquid state but not so high that the waxes are degraded. An analogous teaching (without specific temperatures) can be found in HE1, which indicates (col. 3, lines 4-8) that the waxes are transported at elevated temperatures but that excessive temperatures might lead to undesired oxidation reactions. While the proprietor is right in that there is no explicit indication in HE1 that the waxes are kept at a temperature over the melting point, this is a trivial consideration because it is apparent that the purpose of storing the waxes at elevated temperatures is precisely to ensure that they can be pumped into and out of the cargo tank/vessel (i.e. that the waxes are flowable and thus in a liquid state), so it would be technically absurd to use temperatures which could give rise to a total or a partial wax solidification.

While, as indicated in the preliminary opinion, it cannot be discarded that temperatures slightly higher or lower than the defined range of 90 to 130°C are reached in the process of HE1, the board considers that this range is the result of a trivial experimental optimisation. In particular, the board has concluded

that a skilled person trying to reproduce the process in HE1 would arrive at the claimed temperature range of 90 to 130°C in an obvious manner by carrying out conventional experiments to determine the most appropriate storage temperatures to ensure that the waxes are flowable while preventing undesired oxidation reactions (as taught in HE1). The board therefore concludes that the temperature range defined in claim 1 at issue does not provide an inventive contribution.

- 1.3.3 It remains to be assessed whether or not the idea of maintaining the waxes within the temperature range and under inert atmosphere until they are introduced into the hydrocracking reactor represents an obvious consideration.

In its preliminary opinion, the board indicated that, once discharged from the vessel, the waxes would only be kept under the conditions used in the cargo tank if they were intended to be hydrocracked shortly thereafter. The board concluded that, since HE1 did not provide any information in this respect, it could not be inferred that these conditions would necessarily be maintained until the hydrocracking process.

- 1.3.4 After hearing the opponent's arguments at the oral proceedings, the board changed its view in this respect, as it became apparent that the relevant question is not whether a certain course of action (in this case, maintaining the temperature and inert conditions until the hydrocracking process) would necessarily be chosen under all circumstances, but whether it would be an obvious consideration or alternative for the skilled person (according to the circumstances) when solving the underlying technical problem. In the present case, the board has concluded

that there are (at least) two obvious solutions for the underlying technical problem when starting from HE1 as closest prior art, and that either one or the other would be selected depending on the underlying circumstances. On the one hand, if the waxes were intended to be stored for a period of time before being hydrocracked, then the obvious solution would be to store them at lower temperatures, as this would reduce costs and prevent product degradation. On the other hand, if the waxes were intended to be hydrocracked shortly after being discharged from the vessel, then the obvious solution would be to maintain the same temperature and inert conditions used during transportation until the waxes were introduced into the hydrocracking reactor, because in such case, the waxes would need to maintain their flowability and it would not make technical sense to expose them to conditions which are known to cause degradation of the product. The board therefore concludes that maintaining the temperature and inert conditions used in the cargo tank until hydrocracking the wax fraction represents an alternative which the skilled person would consider (according to the circumstances) without exercising inventive skill.

The subject-matter of claim 1 at issue is thus considered to be obvious in view of HE1 combined with common general knowledge.

2. Auxiliary request 1 - Clarity and admittance

2.1 The opponent argued that the concept "general plant" in claim 1 at issue was unclear because the patent did not specify how this feature should be interpreted. Furthermore, in view of this clarity issue, the request should not be admitted into the appeal proceedings.

2.2 The board disagrees with this argumentation and considers that the feature "general plant" is clear. In particular, a skilled person would readily understand that this feature refers to an integrated factory or a system including different processing devices in a single location. The term "general" is also not unclear, as it simply intends to emphasise that the plant is not restricted to a specific type or function beyond those explicitly or implicitly indicated in the claim. The subject-matter of claim 1 is therefore considered to meet the requirements of Article 84 EPC.

2.3 Since the admittance of this request was objected to solely on the basis of the alleged lack of clarity, the board sees no reason not to admit auxiliary request 1 into the appeal proceedings.

In any case, the board also notes that the admittance of this request, which was filed with the proprietor's reply on 9 August 2019, is governed by Article 12(4) RPBA 2007. Since this request however corresponds to auxiliary request 2 filed in reply to the notice of opposition on 28 September 2017, it was thus timely filed during first instance proceedings. It is therefore apparent that auxiliary request 1 does not fall under any of the cases set out in Article 12(4) RPBA 2007 (i.e. requests which were not presented or not admitted during the first instance), so in the board's view there is no legal basis to contest its admittance.

3. Auxiliary request 1 - Inventive step

For the board, the requirements of Article 56 EPC are met for the following reasons:

3.1 Interpretation of claim 1

The invention according to claim 1 has been amended to specify that *"the tank is an intermediate tank provided in a general plant between a Fischer-Tropsch reactor and a hydrocracking reactor"*.

For the board, this amendment implies that the process of claim 1 is carried out in an integrated plant, wherein the waxes are formed in a Fischer-Tropsch reactor, subsequently flow to the intermediate tank (where they are stored for an undetermined period of time under the specified conditions) and eventually flow into the hydrocracking reactor to produce diesel fuel. The process is therefore not limited to a chronological set of steps (as was the case in the main request), but is also restricted in terms of a structural configuration with an intermediate tank fluidly connected to the Fischer-Tropsch reactor and the hydrocracking reactor.

3.2 Closest prior art

3.2.1 The opponent considered that HE1 still represented the closest prior art and argued that the amendment did not provide any further differentiating feature. Document HE1 indicated (col. 15, lines 23-25) that the waxes were transported from a first site (with a Fischer-Tropsch reactor) to a second site (with a hydrocracking reactor), so the cargo tank could also be regarded as an intermediate tank in the sense of claim 1, because the newly added feature did not clearly imply that the reactors and the tank were located in the same place.

3.2.2 The board however considers that a skilled person would not regard the storage/transportation cargo in HE1 as

an intermediate tank in the sense of claim 1 at issue. As indicated above, the devices defined in claim 1 at issue are considered to be part of an integrated plant in which the sequential steps of synthesis, storage and hydrocracking of the Fischer-Tropsch waxes are carried out. By contrast, HE1 explicitly discloses (col. 15, lines 23-25) that the reactors are located in two separate sites, and that a vessel with a cargo tank is used to transport the waxes between those sites, so it is apparent that HE1 does not disclose an integrated plant including the two reactors and the intermediate tank. Furthermore, the cargo tank in HE1 cannot be considered to be an intermediate tank in the sense of claim 1, because it is not physically located in an integrated plant between the reactors, let alone connected to these reactors to allow the waxes to flow from one to the other via the tank. The fact that a cargo tank shipped from one site to the other would somehow be (on a kilometric scale) physically arranged between the two sites/reactors does also not imply that the tank is an intermediate tank in the sense of claim 1, because while such interpretation would be linguistically conceivable, it would be technically unreasonable and would therefore not be seriously contemplated by a person skilled in the art.

The features differentiating the subject-matter of claim 1 from document HE1 are therefore the following:

- those in points 1.1.2 i) and ii) above; and
- the newly added feature that *"the tank is an intermediate tank provided in a general plant between a Fischer-Tropsch reactor and a hydrocracking reactor"*.

3.2.3 It is also noted that, in the board's view, document HE1 does not represent a promising springboard or even

a suitable starting point for the inventive step argumentation, because the structural and functional differences between the invention in claim 1 at issue (defining a process carried out in an integrated plant) and this document (defining a process for transporting waxes between remote plants) are so significant, that a skilled person would only consider starting from HE1 with the benefit of hindsight (i.e. with the knowledge of the solution proposed in claim 1). However, since this is the only document that has been cited as closest prior art, the board will anyway formulate the problem-solution approach using HE1 as starting point.

3.3 Problem underlying the invention

According to paragraph [0018] of the patent, the use of an intermediate tank in a general plant serves the purpose of accumulating a certain amount of the wax fraction before the hydrocracking process is started and of providing a buffering effect to alleviate fluctuations.

In the board's view, the above technical effects of the intermediate tank further contribute to solve the problem of providing a stable/efficient process for producing, storing and hydrocracking a Fischer-Tropsch wax fraction. The objective technical problem solved by the invention is therefore the same proposed in the main request, namely the provision of a stable/efficient process for producing, storing and hydrocracking a Fischer-Tropsch wax fraction.

3.4 Obviousness

3.4.1 The opponent argued that the underlying problematic did not change with respect to the main request, because

both claim 1 and HE1 where concerned with preventing degradation of the waxes. Consequently, proposing to arrange the reactors and the tank in a single integrated plant could not provide an inventive contribution.

3.4.2 The board does not agree with these conclusions, because there is no reason or incentive for a skilled person to transform a process for transporting waxes in a vessel between two reactors located in different sites (as disclosed in HE1) into a process carried out in a single integrated plant including the two reactors and an intermediate storage tank fluidly arranged between them. This would entail renouncing to most of the essential features and functions of HE1 (e.g. the vessel, the transportation, the reactors located in remote sites, etc.) to build something entirely different. In the board's view, a skilled person would only consider such far-reaching, comprehensive modifications of the technical context of the closest prior art with the benefit of hindsight. The fact that part of the underlying problematic and of the proposed solution in HE1 and in claim 1 might be similar is irrelevant for the underlying question, because this does not justify changing the entire context in which this solution is applied. In fact, this is also why document HE1 is considered to be an inappropriate closest prior art to begin with.

3.4.3 The board further notes that the specific situation described above illustrates the broader problematic resulting from the selection as closest prior art of a document disclosing the same or a similar technical solution as that proposed in the invention, but implementing that solution in a technical context which is conceptually, functionally and/or structurally very

different from that of the invention. Such a document may be regarded as an unsuitable starting point (as argued above), because a skilled person would only consider it as closest prior art with the benefit of hindsight i.e. with knowledge of the solution proposed in the invention, but without regard to the technical context in which it is applied. From a different perspective (yet for analogous reasons), such a document may also be considered to be an unpromising springboard because it would be unrealistic and artificial (as argued in point 3.4.2 above) to contemplate modifications which imply a significant departure from the underlying structural and/or functional context of this document (see also T 2057/12, reason 3.1.4). The teachings of such a document could (if applicable) be more realistically/appropriately taken into account in combination with a closest prior art whose underlying structural and technical context is more closely related to that of the invention.

- 3.4.4 The board therefore concludes that the subject-matter of claim 1 (and by the same token that of claims 2 to 6, which depend thereon) is not obvious in view of the disclosure of document HE1 alone or combined with common general knowledge. The requirements of Article 56 are thus complied with.
4. As neither the opponent nor the board had any further objection against auxiliary request 1, the board concludes that the patent should be maintained on the basis of the claims of this request.
5. Since the board's argumentation and conclusions would not be affected by the content of documents HE10 and HE11, and these documents have anyway not been relied

upon by the opponent in the discussion at the oral proceedings, there is no need to address the question of their admittance.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent on the basis of claims 1 to 6 of auxiliary request 1 as filed with letter dated 9 August 2019 and a description to be adapted where appropriate.

The Registrar:

The Chairman:



A. Pinna

J.-M. Schwaller

Decision electronically authenticated