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**Datasheet for the decision
of 19 April 2021**

Case Number: T 1824/18 - 3.3.06

Application Number: 05014428.6

Publication Number: 1741768

IPC: C10G3/00, C10G45/02, C10G45/58

Language of the proceedings: EN

Title of invention:
Process for the manufacture of diesel range hydrocarbons

Patent Proprietor:
Neste Oyj

Opponents:
Aronova S.A.
UPM-Kymmene Corporation

Headword:
Dilution ratio/Neste Oyj

Relevant legal provisions:
RPBA Art. 12(4)
EPC Art. 56, 123(2), 83
EPC R. 80

Keyword:

Inventive step - (yes)

Amendments - allowable (yes)

Sufficiency of disclosure - (yes)

Late-filed request - admitted (yes)

Amendment occasioned by ground for opposition - (yes)

Decisions cited:

G 0003/14

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 1824/18 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 19 April 2021

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Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted on 28 May 2018
revoking European patent No. 1741768 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

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

Summary of Facts and Submissions

- I. The appeal from the patentee is directed against the decision of the opposition division to revoke European patent No. 1 741 768 for non-compliance with the requirements of Article 123(2), Rule 80 and Article 56 EPC in view of documents D1 (EP 1 396 531 A2) and D3 (CZ 283 575).
- II. With its grounds of appeal, the appellant requested to set aside the decision and to maintain the patent as granted, or, alternatively, on the basis of one of auxiliary requests 1 to 8 filed therewith.
- III. With their replies, opponents 1 and 2 (also respondents) requested to dismiss the appeal and not to admit auxiliary requests 3 to 8 into the proceedings.
- IV. In its preliminary opinion, the board informed the parties that the main, first and second auxiliary requests did not appear to meet the requirements of Article 123(2) EPC.
- V. At the oral proceedings, which took place on 19 April 2021, the appellant withdrew these three requests, and made auxiliary request 3 its main request, with claim 1 thereof reading as follows:

"1. Process for the manufacture of diesel range hydrocarbons wherein a feed is hydrotreated in a hydrotreating step and isomerised in an isomerisation step, characterized in that a feed comprising fresh feed, the fresh feed is of biological origin, selected from plant oils/fats, animal fats/oils, fish fats/oils, fats contained in plants bred by means of gene

manipulation, recycled fats of the food industry and mixtures thereof, and the fresh feed containing more than 5 wt% of free fatty acids and at least one diluting agent, selected from hydrocarbons and recycled products of the process or mixtures thereof, is hydrotreated at a reaction temperature of 200-400°C, in a hydrotreating reactor in the presence of a hydrogenation catalyst, the hydrogenation catalyst containing a metal from the Group VIII and/or VIB of the Periodic System, and wherein the hydrotreating step pressure varies in the range of 20-150 bar, and wherein the fresh feed content is less than 20 wt%, the ratio of the dilution agent/fresh feed is 5-30:1, and wherein the feed contains less than 10 w-ppm alkaline and alkaline earth metals, calculated as elemental alkaline and alkaline earth metals, less than 10 w-ppm other metals, calculated as elemental metals, and less than 30 w-ppm phosphorus, calculated as elemental phosphorus."

VI. The final 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 maintained on the basis of auxiliary request 3 filed with its grounds of appeal of 4 October 2018 (new main request) or, auxiliary, that the patent be maintained on the basis of one of auxiliary requests 4 to 8 also filed on 4 October 2018.

The respondents requested to dismiss the appeal.

Reasons for the Decision

1. Main request - Admittance
 - 1.1 The Board has decided not to exercise its discretion under Article 12(4) RPBA 2007 not to admit this request into the proceedings, despite the fact that the opposition division did not admit it (as the then called auxiliary request 4a) into the proceedings, because at least one of the amendments (namely the deletion of claim 10 as granted) was not motivated by a ground for opposition and so infringed Rule 80 EPC.
 - 1.2 The patentee argued that said deletion was intended to prevent a contradiction between the definition of the "fresh feed" in claim 8 as granted ("*...the fresh feed is of biological origin, selected from plant oils/fats, animal fats/oils, fish fats/oils, fats contained in plants bred by means of gene manipulation, recycled fats of the food industry and mixtures thereof*"), which had been added to claim 1 of auxiliary request 4a, and that in claim 10 as granted ("*...a mixture of feed of biological origin and a hydrocarbon/hydrocarbons is used as the fresh feed.*").
 - 1.3 According to the opposition division and the respondents, this contradiction only represented a problem of clarity under Article 84 EPC and not one of sufficiency of disclosure under Articles 83 and 100(b) EPC. The respondents also argued that, even if the deletion of claim 10 as granted were considered to be justified under Rule 80 EPC, the request should still not be admitted because it was late filed and changed the subject of the proceedings.

1.4 The board does not contest that a contradiction exists between the definition of the fresh feed in claim 8 as granted ("*...of biological origin...*") and in claim 10 as granted ("*...a mixture of feed of biological origin and a hydrocarbon/hydrocarbons...*"), and that this leads to a problem of lack of clarity under Article 84 EPC, because a skilled person would be in doubt as to how the feature "fresh feed" should be interpreted.

1.5 However, the contradictory definitions also give rise to a problem of sufficiency of disclosure, because an invention according to the explicitly defined combination of claims 1, 8 and 10 as granted would be impossible to carry out throughout its entire scope (i.e. there would be no way to reproduce a fresh feed which is both of biological origin and, at the same time, a mixture of biological origin and hydrocarbons).

Thus the deletion of claim 10 as granted is clearly motivated by the ground for opposition under Article 100(b) EPC. The request therefore complies with the requirements of Rule 80 EPC.

1.6 The Board is also not convinced that the admission of said request would change the subject of the proceedings because the proposed amendments, namely deleting dependent claims 7 and 10 as granted, merely involve deleting the optionality of two features to overcome or prevent formal objections under Articles 123 and 83 EPC. This deletion cannot take the opponents by surprise as it merely restores the scope of these features to its original form as requested by the opponents. The deletion of said claims also does not modify any aspect concerning the discussion on patentability and prevents formal objections, so it effectively simplifies the proceedings.

The Board therefore considers that the request is to be admitted into the proceedings.

2. Sufficiency of disclosure (Article 83 EPC)

The requirement of sufficiency of disclosure under Article 83 EPC is met for the following reasons.

2.1 The respondents argued that:

- Example 5 of the patent provided the only detailed description of how the invention should be carried out but information in this single example was insufficient to reproduce the invention throughout the broad scope of protection defined by the claims.
- No clear distinction was established between the dilution agent, the fresh feed and the hydrocarbons, so these substances could in practice be very similar or even the same. Thus, at least in some embodiments, the skilled person would be unable to determine the respective amounts of each substance in order to reproduce the dilution agent/fresh feed ratio of 5-30:1 as defined in claim 1.
- The patent did also not explain how a process with no fresh feed, which would be encompassed by claim 1, could be carried out.
- The invention could also not be carried out in the absence of certain essential features such as a step of purification.
- Since the invention was not limited to specific oils, it encompassed embodiments in which the fresh feed itself included high molecular weight compounds such as

carinata oil. There was however no explanation on how the invention should be carried out for such embodiments.

2.2 The Board disagrees with these arguments for the following reasons:

- The information in example 5 and in the patent as a whole clearly suffices to reproduce the process according to the claims. In particular, the skilled person has technical engineering competences and he would find no technical difficulty in identifying a fresh feed of biological origin and a diluting agent as defined in claim 1, in adjusting the flow-rates of the fresh feed and the dilution agent so as to obtain a ratio of dilution agent/fresh feed falling within the range of 5-30:1, in further adjusting the additional operating conditions and in purifying the feed (for instance by a pre-hydrotreating process) so as to reduce the amount of metals and phosphorous to the levels required in claim 1.

- To carry out a process with the defined dilution agent/fresh feed ratio, a skilled person would simply need to perform the trivial steps of measuring and adjusting the flow-rates of the fresh feed, the dilution agent and/or the recycled stream in their respective pipelines. Whether or not these substances can be identified in the resulting blend is irrelevant for the question of sufficiency of disclosure, because the claims define a process and not a composition.

- The Board disagrees that claim 1 encompasses embodiments with no fresh feed, as this would go directly against the subject-matter of the claim, which defines the hydrotreatment and isomerisation of a fresh

feed to manufacture diesel range hydrocarbons. It is thus apparent that the indication that the fresh feed content is less than 20 wt% does not encompass embodiments with a fresh feed content of 0 wt%.

- The question of whether the claims define all the essential features of the invention concerns Article 84 EPC in combination with Rule 43(3) EPC but not Article 83 EPC. Sufficiency of disclosure would only be compromised if the alleged essential features were associated with a technical effect defined in the claims at issue, which is not the case here (see CLB 9th edition, II-C.3.2).

- It is also irrelevant for the question of sufficiency of disclosure that some of the oils which could be used as fresh feed might comprise high amounts of heavy hydrocarbons, because the claimed invention does not include any requirement in terms of the concentration of heavy hydrocarbons either in the feed or in the resulting products.

2.3 At the oral proceedings, opponent 1 also argued that it was incompatible to consider that the contradictory definitions of the fresh feed in claims 10 and 8 as granted represented a problem under Article 83 EPC (see above discussion on admittance of the main request) while also concluding that the lack of definition of the fresh feed and the dilution agent did not lead to a problem of insufficiency of disclosure.

2.4 The Board disagrees with this view, because the two situations cited by the opponent are not comparable. While it is impossible to carry out an invention including openly contradictory definitions of the same feature (i.e. the fresh feed according to claims 8 and

10 as granted), a skilled person would not be prevented from reproducing an invention simply because the fresh feed and the dilution agent are defined in such broad terms that they effectively encompass similar or even the same substances. Unlike the former case, the latter does not involve any contradiction, and, as explained in point 2.2 above, would not prevent the skilled person from carrying out the invention.

3. Main request - Article 123(2) EPC

The requirements of Article 123(2) EPC are met for the following reasons:

- Claim 1 at issue is based on a combination of claims 1, 4, 5, 8, 12 (with the most preferred optional alternative being omitted) and 14 as filed.
- Claims 2 to 13 at issue are respectively based on claims 2, 3, 6, 9, 11, 12 (the most preferred alternative), 13, 15, 16, 17, 18 and 19 as filed.

All claims at issue are therefore supported by the content of the application as filed.

4. Main request - Article 56 EPC

The requirements of Article 56 EPC are complied with for the following reasons:

4.1 There is agreement among the parties that document D1 represents the closest prior art.

In particular, in its example 1, this document describes the production of hydrocarbons from TOFA (a

fatty acid fraction), wherein the TOFA is first hydrogenated at a temperature of 200-500°C and a pressure between 20 and 150 bar in the presence of hydrogenation catalysts containing Group VII and/or VIB metal(s) (in particular Ni-Mo/Al₂O₃ or CoMo/Al₂O₃) (paragraph [0020]). The isomerisation step of D1 is performed at a temperature of 200 to 500°C, a pressure of 20-150 bar and in the presence of a catalyst containing a molecular sieve and a Group VIII metal (paragraphs [0030] and [0031]). Furthermore, D1 discloses (paragraphs [0019] and [0025]) that the hydrocarbon obtained as product or another suitable hydrocarbon can be recycled back or added to the feed in order to control the exothermal character of the reactions or to dilute the feed.

4.2 Claim 1 of the main request thus differs from this prior art process in that:

i) the feed contains less than 10 w-ppm of alkaline or alkaline earth metals, less than 10 w-ppm of other metals, and less than 30 w-ppm phosphorous, all calculated as elemental metals and phosphorous respectively; and

ii) The amount of fresh feed is below 20 wt% and the ratio of dilution agent/fresh feed is 5-30:1.

4.3 Problem solved

4.3.1 According to the patent (paragraphs [0023] and [0038]-[0039]), the purpose of the invention is to reduce the side reactions and the formation of high molecular weight hydrocarbons, as well as to increase the catalyst stability when a fresh feed containing free fatty acids is used.

4.3.2 The opposition division and the respondents argued that the patent did not provide any evidence in the form of a comparative example to demonstrate that the defined dilution ratios (i.e. 5-30:1) were associated with any special contribution with respect to ratios falling outside the defined range.

4.3.3 On the one hand, the Board agrees with the opposition division and the respondents in that, in the absence of a comparative example showing a dilution ratio falling outside the claimed range, the patent in suit does not contain enough evidence to conclude that the invention necessarily provides an improvement in terms of reduced formation of high molecular weight hydrocarbons with respect to the process in example 1 of D1 (having an undetermined dilution ratio).

On the other hand, example 5 of the patent in suit at least demonstrates that the bottom end of the dilution ratio defined in claim 1 (i.e. 5:1) represents an alternative in which the side reactions and the formation of high molecular weight hydrocarbons are significantly low despite the presence of free fatty acids. Since, in the absence of evidence to the contrary, the reduction of side reactions is arguably related to the lower concentration of free fatty acids caused by the dilution of the fresh feed (see par. [0065] of the patent), it is credible that working with higher dilution rates than 5:1 would also have the effect of preventing formation of high molecular weight hydrocarbons from the free fatty acids. The defined range is thus not an arbitrarily selected sub-range, but one in which the side reactions and the formation of high molecular weight hydrocarbons are kept low.

The problem solved by the invention is therefore to propose an alternative process which limits the side reactions and the formation of high molecular weight hydrocarbons in a fresh feed containing free fatty acids.

4.4 Obviousness

4.4.1 The opposition division and the respondents essentially argued that, when starting from D1 and in the absence of a special technical effect associated with the dilution ratio range defined in claim 1, it would be obvious for the skilled person to consider working within that range, because it would be a matter of customary optimisation. Additionally, the defined range of dilution ratios was known from document D3, which related to a similar process and explicitly contemplated to mix a fresh feed (rapeseed oil) with petroleum fractions in a volume ratio of 1:5-1:200 (see page 2, last paragraph of D3a (EN translation of D3)).

4.4.2 At the oral proceedings, the above arguments were further developed and complemented as follows:

- Since metals and phosphorus were known catalyst poisons (see also par. [0006] of D1), it would be obvious for the skilled person to reduce the concentration of these substances in the feed. Document D1 also indicated in [0007] that the feed was normally pretreated to purify it in order to remove catalyst poisons. Including feature 4.2 i) above would therefore represent a trivial consideration for the skilled person.

- The indication in D1 (par. [0019]) that recycled flows could be used to control "the exothermal

character of the reactions" and that (D1, par. [0021]) a pre-hydrogenation step was used to avoid side reactions, implied that this document was not only concerned with the provision of a cooling effect but also with the limitation of undesired reactions. In this respect, D1 did not only disclose recycled flows with an intermediate cooling device, but also referred to (par. [0025] and [0042] and ref. 83 in figure 2) a recycling of the isomerisation product for the sole purpose of diluting the feed, a configuration which was analogous to that shown in figure 1 of the patent. It was therefore clear that D1 contemplated the use of dilution flows and that preventing side reactions was one of the purposes in this document.

- Document D1, like the invention, was concerned with the production of high quality diesel fuels. The patent at issue indicated (par. [0007], [0009] and [0010]) that the formation of heavy hydrocarbons (i.e. outside of the diesel range) from substances with double bonds such as free fatty acids was a known problem in the technical field. It would therefore be obvious for a skilled person to optimise the operating conditions of the process in D1, such as the dilution ratio of the feed, to minimise the formation of these substances in order to obtain a high quality diesel fuel. In performing this optimisation, the skilled person would arrive at the subject-matter of claim 1 in an obvious manner.

- The process in document D3 also concerned the formation of a high quality diesel fuel (see last par. of page 4 of D3a). Therefore, when looking for alternatives, it would also be obvious to consider the operating conditions in this document, in particular the proposed dilution ratio of 5:1 to 200:1 (claim 1),

which anticipated the ratio defined in claim 1.

Therefore, by combining the teachings of documents D1 and D3 the skilled person would arrive at the subject-matter of claim 1 without exercising inventive skill.

4.4.3 The Board does not follow this argumentation for the following reasons:

Document D1 discloses recycling cooled flows (paragraphs [0024],[0037]; figure 1) for the purpose of limiting the reaction temperature. While it also contemplates the use of a dilution flow, there is no indication of the underlying purpose of this feature. There is furthermore no reference in D1 to the problem of heavy molecular weight hydrocarbons formed from free fatty acids. Thus, the proposed dilution of the fresh feed could be associated with any plausible technical effect such as providing an evaporative cooling (as argued by the appellant), improving the quality of the product or simply increasing the flexibility of the process.

According to D1 (par. [0021]-[0022]), the problem of side reactions is dealt with using a pre-hydrogenation step under milder conditions and/or controlling the reaction temperature in order to saturate the double bonds of the triglycerides, thereby reducing the iodine number of the mixture (i.e. the presence of double bonds). Analogously, the opposed patent proposes (par. [0054]) an optional pre-hydrogenation process to hydrogenate the double bonds of triglyceride structures. This is however not a substitute or an alternative solution for preventing side reactions of the free fatty acids, an issue which the invention addresses by adjusting the dilution ratio.

Consequently, a skilled person starting from example 1 of D1 and looking for alternatives to limit the side reactions would most likely attempt to adjust the pre-hydrogenation conditions and/or control the reaction temperature as explicitly taught in D1. There is no implicit or explicit teaching in this document, which could (let alone would)) lead the skilled person to consider adjusting the dilution ratio of the fresh feed in the search for alternatives to limit the side reactions. In other words, to arrive at the subject-matter of claim 1 at issue through an optimisation process, the skilled person would first need to recognise the role of the dilution ratio in reducing the side reactions of the free fatty acids, for which he would require inventive skill.

There is also no reason for the skilled person to consult D3 for the purpose of solving the problem of proposing alternatives which limit the formation of high molecular weight hydrocarbons in the presence of free fatty acids, because the flow in this document does not contain a significant amount of free fatty acids and, in any case, D3 does also not provide any information which could link the dilution ratio to the above-cited effect of limiting side reactions. Finally, even if the skilled person considered the dilution ratio in D3, there would be no particular incentive to select points at the bottom end of the disclosed dilution range of 5:1 to 200:1 rather than intermediate values (only the bottom 12% of this broad range anticipates the range of 5:1-30:1 defined in claim 1 at issue).

- 4.4.4 In summary, the invention is based on the recognition that the dilution ratio proposed in claim 1 represent an alternative to prevent the formation of undesired

heavy molecular weight hydrocarbons when the fresh feed includes free fatty acids. While document D1 proposes a recycled flow for controlling the reaction temperature and/or a dilution flow, there is no hint in this document or in any of the other cited prior art to adjust the dilution ratio in order to limit the amount of heavy molecular weight hydrocarbons produced in the reaction, let alone to do it in a way which would lead to the specific range proposed in claim 1.

- 4.5 The Board therefore concludes that the subject-matter of claim 1 of the main request is not obvious for the skilled person in view of the cited prior art. The same conclusion applies to claims 2-13 which are directly or indirectly dependent on claim 1, and so the claimed subject-matter of this request involves an inventive step and meets the requirements of Article 56 EPC.
5. As the appellant has not succeeded in establishing that the set of claims of this request does not meet the requirements of the EPC, the patent is to be maintained in amended form.

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 auxiliary request 3 (new main request) as filed with the grounds of appeal dated 4 October 2018 and a description to be adapted.

The Registrar:

The Chairman:



A. Pinna

J.-M. Schwaller

Decision electronically authenticated