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D E C I S I O N
of 16 June 2005

Case Number: T 0073/03 - 3.3.6

Application Number: 95923299.2

Publication Number: 0764198

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Language of the proceedings: EN

Title of invention:
Fuel oil compositions

Patentee:
ExxonMobil Chemical Patents Inc.

Opponent:
Clariant GmbH
BP Oil International Ltd.

Headword:
Diesel fuel lubricity/EXXONMOBIL

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no): obvious to try known commercial additive for diesel fuels, one component of which being known to have the desired effect"

Decisions cited:
T 0800/98

Catchword:
-



Case Number: T 0073/03 - 3.3.6

D E C I S I O N
of the Technical Board of Appeal 3.3.6
of 16 June 2005

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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
15 November 2002 concerning maintenance of
European patent No. 0764198 in amended form.

Composition of the Board:

Chairman: P. Krasa
Members: L. Li Voti
J. H. Van Moer

Summary of Facts and Submissions

- I. The present appeal is from the decision of the Opposition Division concerning the maintenance of the European patent No. 0 764 198 in amended form.

The patent in suit, relating to the use of cold flow improvers to enhance the lubricity of fuel oil compositions, was granted with a set of 45 claims, independent claims 1, 2 and 24 of which reading, respectively, as follows:

"1. The use of a cold flow improver comprising an oil-soluble polar nitrogen compound carrying one or more substituents of the formula $>NR^{13}$, where R^{13} represents a hydrocarbyl group containing 8 to 40 carbon atoms, which substituents may be in the form of a cation derived therefrom, in combination with an ethylene-unsaturated ester copolymer flow improver to enhance the lubricity of a fuel oil composition having a sulphur content of at most 0.05% by weight, such that the composition has a lubricity such as to give a wear scar diameter, as measured by the HFRR test at 60°C, of at most 450µm."

"2. A process for the manufacture of a petroleum-based fuel oil of enhanced lubricity, which comprises refining a crude oil to produce a fuel oil of low sulphur content, and blending a cold flow improver comprising an oil-soluble polar nitrogen compound carrying one or more substituents of the formula $>NR^{13}$, where R^{13} represents a hydrocarbyl group containing 8 to 40 carbon atoms, which substituents may be in the form of a cation derived therefrom, in combination with an

ethylene-unsaturated ester copolymer flow improver with the refined product to provide a fuel oil composition, said composition having a sulphur content of at most 0.05% by weight and having a lubricity such as to give a wear scar diameter, as measured by the HFRR test at 60°C, of at most 450µm."

"24. A composition comprising a major proportion of a petroleum-based fuel oil and a minor proportion of a cold flow improver comprising an oil-soluble polar nitrogen compound carrying one or more substituents of the formula >NR¹³, where R¹³ represents a hydrocarbyl group containing 8 to 40 carbon atoms, which substituents may be in the form of a cation derived therefrom, in combination with an ethylene-unsaturated ester copolymer flow improver, the composition having a sulphur content of at most 0.05% by weight and a lubricity such as to give a wear scar diameter, as measured by the HFRR test at 60°C of at most 450µm."

II. In their notices of opposition the Opponents 01 and 02 sought revocation of the patent *inter alia* on the grounds of Article 100(a), because of lack of novelty and inventive step of the claimed subject-matter.

The following documents were referred to *inter alia* in support of the oppositions:

- (1): DE-A-2921330;
- (1A): US-A-4211534;
- (4): DD-A-126090;
- (6): SAE 950252;
- (7): WO-A-9417159;
- (8): WO-A-9417160;

(13): CEC Paper/93/EF13, 5-7 May 1993;

(20): Technische Akademie Esslingen Colloquium 11-13 January 1994, Paper 3.11.

III. In its decision the Opposition Division found *inter alia* that

- document (6) had to be disregarded since it was not clear if it belonged to the prior art;

- the subject-matter of claim 24 according to the main request (claims as granted) lacked an inventive step in the light of the teaching of document (7);

- the subject-matter of claim 24 according to the then pending first or second auxiliary requests (sets of claims A or B) lacked an inventive step in the light of the teaching of documents (1) or (1A) in combination with document (20);

- the subject-matter of the claims according to the then pending third auxiliary request (claims 1 to 23 of set A) complied with the requirements of the EPC.

IV. Appeals were filed against this decision by the Patent Proprietor and by both Opponents 01 and 02.

During the oral proceedings held before the Board on 16 June 2005 the Patent Proprietor filed amended sets of claims to be considered, respectively, as main and first and second auxiliary requests.

The set of claims according to the main request (set I'), consisting of 45 claims, differs essentially from

the set of claims as granted insofar as the used fuel is specified to be a diesel fuel, the cold flow improver combination consists only of the two specified components and the claimed composition consists only of the diesel fuel oil and of the cold flow improver additive combination. Claims 1, 2 and 24 read then as follows:

"1. The use of a cold flow improver **consisting of** an oil-soluble polar nitrogen compound carrying one or more substituents of the formula $>NR^{13}$, where R^{13} represents a hydrocarbyl group containing 8 to 40 carbon atoms, which substituents may be in the form of a cation derived therefrom, in combination with an ethylene-unsaturated ester copolymer flow improver to enhance the lubricity, **as measured by the HFRR test at 60°C**, of a **diesel** fuel oil composition having a sulphur content of at most 0.05% by weight, such that the composition has a lubricity such as to give a wear scar diameter, as measured by the HFRR test at 60°C, of at most 450 μ m."

"2. A process for the manufacture of a petroleum-based **diesel** fuel oil of enhanced lubricity, which **consists of** refining a crude oil to produce a fuel oil of low sulphur content, and blending a cold flow improver **consisting of** an oil-soluble polar nitrogen compound carrying one or more substituents of the formula $>NR^{13}$, where R^{13} represents a hydrocarbyl group containing 8 to 40 carbon atoms, which substituents may be in the form of a cation derived therefrom, in combination with an ethylene-unsaturated ester copolymer flow improver with the refined product to provide a fuel oil composition, said composition having a sulphur content of at most

0.05% by weight and having a lubricity such as to give a wear scar diameter, as measured by the HFRR test at 60°C, of at most 450µm."

"24. A composition **consisting of** a major proportion of a petroleum-based **diesel** fuel oil and a minor proportion of a cold flow improver **consisting of** an oil-soluble polar nitrogen compound carrying one or more substituents of the formula >NR¹³, where R¹³ represents a hydrocarbyl group containing 8 to 40 carbon atoms, which substituents may be in the form of a cation derived therefrom, in combination with an ethylene-unsaturated ester copolymer flow improver, the composition having a sulphur content of at most 0.05% by weight and a lubricity such as to give a wear scar diameter, as measured by the HFRR test at 60°C, of at most 450µm."

Dependent claims 3 to 23 and 25 to 45, respectively, relate to particular embodiments of the claimed use or process and of the claimed composition.

The set of claims according to the first auxiliary request (set of claims I'') differs from that according to the main request only insofar it consists only of claims 1 to 23.

The set of claims according to the second auxiliary request (set of claims J), consisting of 22 claims, differs from that according to the first auxiliary request insofar as it comprises only use claims and claim 1 further specifies that the used oil-soluble polar nitrogen compound **carries two or more** of the specified substituents (instead of one or more).

V. The Patent Proprietor submitted in writing and orally *inter alia* that

- the claimed subject-matter was novel over the cited prior art;

- documents (7) and (1) or (1A) did not deal with the technical problem underlying the invention claimed in the patent in suit and were unsuitable starting points for the evaluation of inventive step;

- using document (4) or (8) as starting point for the evaluation of inventive step, the technical problem underlying the claimed invention had to be seen as the provision of an alternative additive which enhanced the lubricity of hydrotreated fuel compositions in relation to a particular type of wear occurring in the fuel pumps of diesel engines;

- in the light of the teaching of the prior art the notional skilled person would have disregarded the teaching of document (4) since it related to a different type of improvement of the lubricity occurring in diesel pumps which were not comparable with those available at the priority date of the patent in suit;

- furthermore, the skilled person would not have expected that the use of a combination of the copolymers of document (4) with specific oil-soluble polar nitrogen compounds leads to an improvement of the lubricity of low sulphur fuels thereby solving the specific wear problems occurring in the fuel pumps of

diesel engines used at the priority date of the patent in suit;

- this effect was supported by the tests contained in the patent in suit and by the further experimental evidence filed during the written proceedings.

VI. The Opponents argued *inter alia* that

- document (6) belonged to the prior art as shown by the evidence submitted with Opponents 02' statement of the grounds of appeal;

- the general goal of the invention disclosed in documents (4), (7) and (1) or (1A) was similar to that of the patent in suit; therefore, any of these documents was a suitable starting point for the evaluation of inventive step;

- using document (8) as the starting point for the evaluation of inventive step, it was obvious for the skilled person to try, instead of the additives used in that document, alternative compounds known to be effective for improving lubricity, e.g. the polymers used in document (4) and commercially available diesel fuel additives containing such polymers, such as Keroflux 3243 which had been used in one example of the patent in suit;

- the tests of the patent in suit and those filed by the Patent Proprietor did not support the presence of any synergistic effect of the claimed additive combination;

- furthermore, the cold flow improvers combination of the patent in suit (e.g. Keroflux 3243) had already been used in the prior art for reducing the cloud point and preventing the precipitation of wax at low temperature; therefore it was obvious to use it also in a diesel fuel composition having a very low sulphur content; the additional enhancement of the lubricity amounted thus just to a bonus effect;

- the claimed subject-matter thus lacked an inventive step in the light of the teaching of the cited prior art.

VII. The Patent Proprietor requests that the decision under appeal be set aside and that the patent be maintained on the basis of claims 1 to 45 filed as set I' at the oral proceedings as main request or, in the alternative, on the basis of set I'' filed at the oral proceedings as first auxiliary request or of set J, filed at the oral proceedings as second auxiliary request.

Both Opponents request that the decision under appeal be set aside and the patent be revoked.

Reasons for the Decision

1. Main Request

1.1 *Document (6) as prior art*

The Opponent 02 filed in the statement of the grounds of appeal evidence that document (6) belonged to the prior art.

This fact was not contested by the Patent Proprietor.

The Board is thus convinced that document (6) belongs to the prior art and should be taken into consideration for the evaluation of novelty and inventive step.

1.2 *Articles 123(2) and (3), 84 and 54 EPC*

1.2.1 The Board is satisfied that the claims according to the main request satisfy the requirements of Articles 123(2) and (3) and 84 EPC.

1.2.2 Moreover, the Board is convinced that the claimed subject-matter is novel since the cited prior art does not disclose a composition having all the features of the subject-matter of claim 24 or a use or process having all the features of the subject-matters of claims 1 and 2, respectively.

1.2.3 Since this request fails on other grounds no further details are necessary.

1.3 Inventive step

1.3.1 The patent in suit and in particular the subject-matter of Claim 1 according to the main request relates to the use of selected cold flow improvers for improving the lubricity of diesel fuels having a low sulphur content of at most 0.05 wt% (see page 2, lines 3 to 4 and 20 to 27).

As explained in the description of the patent in suit environmental concerns have led to the need for diesel

fuels having a reduced amount of sulphur. The produced low sulphur diesel fuels show, however, a worse lubricity because of the reduced amounts of polar and aromatic polycyclic compounds and of the sulphur compounds themselves. This reduced lubricity causes an increased wear and failure in fuel pumps of diesel engines (page 2, lines 5 to 15).

- 1.3.2 Documents (7) and (1) or (1A) relate to the use of cold flow improvers for improving the characteristics of diesel fuels or heating oils at low temperature but do not deal with the technical problem mentioned above (see (7), page 2, lines 7 to 15; (1), handwritten numbered page 9, line 3 to handwritten numbered page 11, line 12 and (1A), column 1, lines 51 to 61). Therefore, they cannot qualify as a useful starting point for the evaluation of inventive step.

Documents (4) and (8) deal both with the improvement of lubricity of diesel fuels having a low sulphur content as in the patent in suit, which fuels bring about an excessive wear of diesel fuel injection pumps and cause their failure ((8) page 1, lines 3 to 36; (4), page 1, line 1 to page 2, line 9).

However, document (8), a document published just before the priority date of the patent in suit, not only identifies this technical problem as arising from the use of diesel fuels having a sulphur content of at most 0.05wt%, as does the 17 years older document (4), but also recognises its cause in the reduced content of sulphur, polyaromatic components and polar components in the diesel fuel and addresses the challenge arising from the regulations introduced or to be introduced by

the authorities of many countries for keeping the sulphur content in diesel fuels so low as possible.

Thus, the Board considers document (8) as the most reasonable starting point for the evaluation of inventive step.

- 1.3.3 The above mentioned technical problem had already been observed in the prior art as shown, e.g., in documents (8), page 1, lines 21 to 36; (6) paragraph "Lubricity performance" on page 11; (20) paragraphs 1 "Introduction" and 2 "Background" on pages 3.11-1 and 3.11-2; (13), paragraph 3 "The Problem" on pages 3 and 4.

Since document (8) had already disclosed a solution to this problem by using specific esters as lubricity additives, which additives were able to bring the HFFR wear scar diameter down to a value in accordance with that of the patent in suit (see page 2, lines 11 to 19 and tables on page 10), the technical problem underlying the claimed invention has to be defined in the light of the teaching of document (8) as the provision of an alternative class of additives capable of improving the lubricity of low sulphur diesel fuels.

The Board is convinced, in the light of the tests provided in the patent in suit and during the written proceedings, that the claimed invention successfully solved this technical problem.

- 1.3.4 Document (4) already taught that copolymers of olefin, e.g. ethylene, and unsaturated fatty acid esters, e.g.

EVA, were able to enhance the lubricity of low sulphur fuels (page 3, lines 1 to 17).

These copolymers were moreover known cold-flow improvers which had already been used alone or in combination with further additives for reducing the cloud point of diesel fuels and preventing the precipitation of wax at low temperature (see e.g. documents (4), page 4, last six lines to page 5, line 7; (7), page 1, lines 16 to 23; (6), page 10, left hand column, lines 14 to 23 and the commercially available product Keroflux 3243, a cold flow additive used in example 2 of the patent in suit comprising both an ethylene-unsaturated ester copolymer and an oil-soluble polar nitrogen compound).

Document (4) thus suggests using such polymers for their known properties and for their capability of improving lubricity.

The Patent Proprietor filed experimental evidence under cover of the letter dated 21 December 2004 in the attempt of showing that the polymers used in document (4) do not bring about any lubricity effect which reduces the wear in the fuel pumps of diesel engines. However, this finding is in contradiction with the teaching of the patent in suit itself that such polymers improve lubricity as shown in the tables of the patent in suit and of the original application from which the patent in suit was granted in regard to additives 4 to 9 without any explanation of such discrepancy given by the Patent Proprietor.

Therefore, these tests cannot be accepted by the Board as convincing evidence that the disclosure of

document (4) of a lubricity improvement caused by the respective polymers as experimentally verified in that document was based on a wrong finding.

- 1.3.5 The Patent Proprietor argued that the skilled person would have disregarded the teaching of document (4) since it related to a different type of improvement of the lubricity occurring in diesel pumps which were not comparable with those used in diesel engines at the priority date of the patent in suit.

This was specified in the claim in the Patent Proprietor's view by the reference to the HFFR wear test, a well known laboratory test which was found to most closely reproduce field wear mechanisms observed in injection pumps of diesel engines at the priority date of the patent in suit (see e.g. document (13), abstract and page 11, left hand column, lines 12 to right hand column, line 1).

The Board finds that the mention in claim 1 of a parameter measured by a particular method which very well relates to the type of wear occurring in fuel injection pumps of diesel engines used at the priority date of the patent in suit does not limit the claimed use to the use of this type of diesel fuel pumps. In fact, the use of such pumps is not part of the claim and the disclosed method of measurement only characterizes the used fuel in the same manner as any other parameter such as viscosity or pour point but does not limit its application to any particular use.

Moreover, even if the diesel pumps used at the time of document (4) were different from those used at the priority date of the patent in suit the technical

problem identified in document (4), i.e. a lack of lubricity of the fuel arising from the use of diesel fuel treated for reducing its sulphur content to a level of at most 0.05 wt%, has the same cause as that described in the patent in suit and in document (8), i.e. the chemical composition of such a treated low sulphur diesel fuel which is responsible for the lack of lubricity and, consequently, for the pump failures.

The cause of the pump failure is thus the same independently from the fact which mechanical part of the pump is more subject to corrosion or friction, which particular wear depends not only on the used fuel but also on the condition of use and on the mechanical particularities of the pump itself. The exact explanation of the type of wear leading to the pump failure is thus just an additional and more precise **explanation** of the mechanisms involved in the arising of the drawbacks (pump failure) but is not the **cause** of them.

Thus the teaching of document (4) has to be considered as being relevant for the evaluation of inventive step.

The Board concludes that it would have been obvious for the skilled person **to try** the additives of document (4), already known to counteract the cause of such drawback as alternative to those of document (8) in the attempt to improve the lubricity of low sulphur diesel fuels.

Moreover it would have been obvious for the skilled person to use for this purpose whichever commercially available diesel fuel additive containing such polymers

(see e.g. T 800/98, point 1.5.1 of the reasons for the decision).

- 1.3.6 It remains thus to be evaluated if the skilled person would have used the copolymers of document (4) in combination with other additives and specifically with the oil-soluble nitrogen compounds of the patent in suit.

Document (4) recognises that polar compounds, e.g. nitrogen containing compounds, have a positive effect on lubricity but that some of them cannot be desirable because of their high nitrogen content or of their cost (page 2, lines 17 to 28).

However, at the priority date of the patent in suit polar nitrogen compounds of the type used in the patent in suit were used in diesel fuels, e.g. as cold-flow improvers in combination with copolymers of the type used in the patent in suit (see documents (1) handwritten numbered page 31, line 5 to page 32, line 1; (7), page 1, lines 10 to 23 in combination with page 16, lines 14 to 20 and the above mentioned commercial product Keroflux 3243).

Therefore, the skilled person would not have found this remark in document (4) as establishing a prejudice against the use of nitrogen containing compounds as additives for diesel fuels at the priority date of the patent in suit.

It is undisputable that combinations of additives were currently used and had to be used at the priority date of the patent in suit in order to improve the characteristics of diesel fuels (see e.g. document (6) page 13 "Conclusions").

Such additives, being necessarily present as a mixture with the diesel fuel, were nevertheless not expected to behave differently because of a possible reciprocal negative influence. On the contrary they were expected to provide in the mixture the effect for which they were used.

As explained in point 1.3.5 it was obvious for the skilled person to try a commercially available diesel fuel additive containing the copolymers of the patent in suit in order to improve the lubricity of low sulphur diesel fuels.

Therefore, it was also obvious to try such a polymer, which was known by itself to have also additional effects, e.g. as cold-flow improver, in combination with further desirable additives for diesel fuels and thus to look for commercial products already containing such combinations.

In the light of the teaching of the prior art, the skilled person would thus have tried also the commercially available additive Keroflux 3243 and thus a combination of additive as used in the patent in suit with the expectation not only of improving the cold-flow properties of the diesel fuel, but also of improving its lubricity.

- 1.3.7 The fact that such a specific combination could provide a greater increase in lubricity than the copolymers when used alone amounts in the Board's judgement only to the discovery of further properties of a known product which would have been obviously used, as explained above, for its known characteristics.

Therefore, the Board concludes that the subject-matter of claim 1 does not amount to an inventive step.

1.3.8 Since the main request fails on these grounds there is no need to discuss all the other objections raised by the Opponents.

2. First auxiliary request

Since claim 1 according to this request is identical to claim 1 according to the main request, the same arguments put forward above apply to this claim.

The first auxiliary request has thus to be dismissed for the same reasons.

3. Second auxiliary request

Since claim 1 according to this request differs from claim 1 according to the main request only insofar as it further specifies that the used oil-soluble polar nitrogen compound **carries two or more** of the specified substituents of the formula $>NR^{13}$, where R^{13} represents a hydrocarbyl group containing 8 to 40 carbon atoms, which substituents may be in the form of a cation derived therefrom, and the nitrogen compound contained in the commercially available product Keroflux 3243, i.e. the reaction product of ethylene diamine tetraacetic acid and di(hydrogenated tallow) amine in a mole ratio of 1 to 4, contains two or more of these specific substituents, the same arguments put forward above apply *mutatis mutandis* to this claim.

The second auxiliary request has thus to be dismissed for the same reasons.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

G. Rauh

P. Krasa