BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS | BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE | CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen

D E C I S I O N
of 1 March 1999

Case Number: T 0730/93 - 3.3.1

Application Number: 90303536.8

Publication Number: 0450208

IPC: C10M 159/12

Language of the proceedings: EN

Title of invention:
Lubricant compositions and additives therefor

Applicant:
Ethyl Petroleum Additives Limited

Opponent:
-

Headword:
Lubricant additive/ETHYL PETROLEUM

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
"Novelty (yes)"
"Inventive step (yes) - non obvious solution"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0730/93 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 1 March 1999

Appellant: Ethyl Petroleum Additives Limited
London Road
Bracknell
Berkshire RG12 2UW (GB)

Representative: Woods, Geoffrey Corlett
J.A. Kemp & Co.
14 South Square
Gray's Inn
London WC1R 5LX (GB)

Decision under appeal: Decision of the Examining Division of the European Patent Office posted 25 February 1993 refusing European patent application No. 90 303 536.8 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: A. J. Nuss
Members: J. Jonk
W. Moser

Summary of Facts and Submissions

I. This appeal lies from the decision of the Examining Division refusing the European patent application No. 90 303 536.8 (publication No. 0 450 208), filed on 2 April 1990, relating to lubricant compositions and additives therefor.

Claim 1 as filed read:

"A product formed by interacting at a temperature above 30°C either concurrently or in any sequence

(i) one or more active sulphur-containing extreme pressure or anti-wear agents,

(ii) one or more amines, and

(iii) one or more weak acids,

the proportions of components (i) and (ii) being such that the mole percentages of sulphur in (i) to amino nitrogen in (ii) used in forming the product is in the range of 100:1 to 5:1, and the proportion of component (iii) used in forming the product being such that there are from 0.2 to 2 chemical equivalents of acid per equivalent of amino nitrogen in component (ii)."

II. The Examination Division held that the subject-matter of this product claim lacked novelty in view of documents:

(1) US-A-4 317 739

(2) WO-A-8 605 508

(3) US-A-3 398 095

(6) US-A-3 389 083

(7) US-A-4 263 155

(8) EP-A-0 391 653.

III. The Appellant, with his statement of grounds for appeal, submitted, inter alia, a set of 22 claims as his main request.

IV. Furthermore, in reply to a communication from the Board, the Appellant replaced his main request by submitting Claims 1 to 18 on 1 December 1995. This new main request differed from the former main request only by the deletion of the former Claims 18 to 21 and appropriate renumbering of the former Claim 22. Claims 1 to 17 remained unchanged. He also submitted an amended page 3 of the description.

Claim 1 of the present main request differed from Claim 1 of the application as filed in that the introductory part

"A product formed by interacting at a temperature above 30°C either concurrently or in any sequence ..."

was replaced by

"A process for forming a lubricant additive, said process comprising: interacting at a temperature above 30°C **prior to use as a lubricant** either concurrently or in any sequence ..." (bolds added).

Furthermore, independent **Claim 16** of the present main request read as follows:

"A process for forming a lubricant composition comprising the process of any one of claims 1 to 15 and the further step of adding a minor amount of the resultant lubricant additive to a major amount of a lubricant base stock.";

and independent **Claim 18** of the present main request had the following wording:

"The use of a lubricant additive obtainable by the process of any one of claims 1 to 15 in the production of a lubricant."

V. The Appellant essentially argued that none of the cited documents disclosed a process according to present Claim 1 which, therefore, was novel. He further submitted that, whereas the subject-matter disclosed in document (8) was state of the art under Article 54(3) EPC only and, therefore, irrelevant in respect to inventive step, the technical problems addressed in documents (2), (3), and (7) were not related to that underlying the invention at stake and in respect to the subject-matter disclosed in documents (1) and (6) the products obtainable according to the claimed process showed an improved lubricating performance. The Appellant concluded that, therefore, the subject-matter of Claim 1 was also inventive.

VI. The Appellant requested that a patent be granted on the basis of Claims 1 to 18, submitted on 1 December 1995 as his main request, and the description, pages 1 and 4 to 31 of the application as filed; page 2 as submitted on 29 October 1992; and page 3 as submitted on 1 December 1995.

VII. In the examination of the appeal, the Board, on its own motion, also considered the documents

(4) WO-A-8 503 709

(5) US-A-2 475 410.

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

2.1 The amended Claim 1 differs in the first place from Claim 1 of the application as filed in being directed to a process and not to a product formed by this process and secondly in the clarification that the interaction of the respective components at temperatures above 30°C is accomplished prior to their use as a lubricant. These amendments find ample support in the application as filed, e.g. on page 3, lines 10 to 16 and in the examples as far as the process is concerned and on page 15, lines 3 to 6, page 16, lines 1 to 4, and also in the examples as far as the feature "prior to use as a lubricant is concerned".

The dependent Claims 2 to 6 are supported by the sentence bridging pages 4 and 5 of the application as filed; dependent Claim 10 is supported by the last paragraph on page 16 of the application as filed; and dependent Claims 7 to 9 and 11 to 15 correspond to and find their support in Claims 2 to 8 of the application as filed, respectively.

2.2 Independent Claim 16, which relates to a process for forming a lubricant composition comprising the process of any one of Claims 1 to 15 and the further step of adding a minor amount of the lubricant additive obtained thereby to a major amount of a lubricant base stock, is supported by the sentence bridging pages 12 and 13 of the application as filed.

Claim 17, which depends on Claim 16, is supported by page 14, lines 2 to 4 of the application as filed.

2.3 Independent Claim 18, which is directed to the use of a lubricant additive obtainable according to present Claim 1 in the production of a lubricant, is supported, e.g. by page 15, lines 3 to 6 of the application as filed.

2.4 Page 2 of the description as submitted on 29 October 1992 corresponds to page 2 of the application as filed except that a reference to document (8) EP-A-0 391 653 has been included.

Page 3 of the description as submitted on 1 December 1995 corresponds to page 3 of the application as filed, except that it comprises the amendments as indicated above with respect to Claim 1. This amended page is therefore supported by the passages of the application as filed as indicated above under point 2.1.

2.5 Therefore, the Board concludes that the amended claims comply with the requirements of Article 123(2) EPC.

3. *Novelty*

3.1 The decision under appeal related to a Claim 1 covering **compositions**, whereas the subject-matter of the present Claim 1 is a **process** for the manufacture of

compositions. Therefore, the Examining Division's argument that the lubricant **compositions** of the then pending Claim 1 were known from each of the documents (1), (2), (3), (6), (7), and (8), since they were in situ formed **during the use of the lubricants**, is no longer applicable.

3.2 Moreover, in the Board's judgment, none of the documents (2), (3), (6), (7), and (8) discloses a process in accordance with present Claim 1, in which the respective components are interacted at temperatures of above 30°C **prior to the use as a lubricant**. In this context, the Board notes that there is no indication in the decision under appeal that the Examining Division had a different opinion in this respect.

3.3 Furthermore, document (1) discloses mixed organic-inorganic compositions providing a variety of beneficial properties to lubricating oils. These lubricating oil additives are obtained by reacting 1 mole sulphurised olefin with about 0.1 to 20 moles amine, preferably with about 0.1 to 2 moles amine, at temperatures of about 50°C to 400°C, preferably 150°C to 200°C, and by reacting 1 mole of the aminated sulphurised olefin product with about 0.1 to 10 moles of boric acid at temperatures of 50°C to 300°C, preferably 100°C to 150°C (see document (1), column 1, lines 6 to 12, in combination with column 3, lines 52 to 58, and column 4, lines 24 to 48).

3.3.1 Thus, document (1) discloses a process for the preparation of lubricating oil additives in which components corresponding to the components (i), (ii), and (iii) according to present Claim 1 are reacted prior to use as a lubricant at a temperature above 30°C. In this context, the Board observes that the fact

that the obtained product is further reacted with formaldehyde or a formaldehyde-yielding compound is without relevance to the issue of novelty.

3.3.2 However, the respective amounts of the components prepared according to document (1) differ from those of the present Claim 1 as defined by the molar amounts of sulphur and of amino nitrogen. According to document (1), about 0.1 to 20 moles, preferably about 2 to 6 moles, of sulphur or of a sulphur-yielding compound are reacted with 1 mole of an olefinic compound to provide essentially complete sulphurisation; one mole of the sulphurised olefin is then in turn reacted with about 0.1 to 20 moles, preferably about 0.1 to 2 moles of an amine (column 3, lines 6 to 10, in combination with column 3, lines 52 to 56).

It follows that in the compositions manufactured according to document (1), the molar ratio of S : N is generally from about 1 : 0.005 to 1 : 200, the range of from about 1 : 0.017 to 1 : 1 (provided that the amines concerned are mono-amines) being preferred, whereas the corresponding ratio according to present Claim 1 of the application in suit is in the range of 100 : 1 to 5 : 1.

3.3.3 Furthermore, according to document (1) about 0.1 to about 10 moles of boric acid are reacted with one mole of the obtained aminated sulphurised olefin which may contain of from about 0.1 to 20 moles of amino nitrogen (see point 3.3.2 above) or more, if the amine was a polyfunctional one.

Therefore, in the products obtained according to the process disclosed in document (1) the ratio of boric acid **equivalents** to amino nitrogen **equivalents** is about from 1 : 0.003 to 1 : 66 (or more, if the amine was a

polyfunctional one), whereas the corresponding ratio of the components (iii) : (ii) for the process of the present Claim 1 is only from 1 : 0.2 to 1 : 2, which range is encompassed, but not disclosed by the technical teaching of document (1).

3.3.4 Therefore, in the Board's judgement, the subject-matter of present Claim 1 is also novel over the teaching of document (1), because it comprises two specific selections of process features, i.e. of the sulphur/amino nitrogen ratio and of the acid/amino nitrogen ratio as indicated above.

3.4 The subject-matter of present independent Claims 16 and 18 comprises the use of lubricating oil additives obtained or obtainable according to the process of present Claim 1.

In the Board's judgment, the additives used in accordance of these claims are novel, since sufficient evidence has been provided by the Applicant that the present modification of the process parameters results in products having distinct different properties. In this context, the Board notes that examples 2 to 7 of the application in suit show that the process of Claim 1 leads to products which exhibit trouble-free performance in the planetary spur gear test for from 60 hours to more than 100 hours, whereas a lubricating fluid into which the components (i), (ii) and (iii) were incorporated **without preheating** gave only for about 40 hours a satisfactory running performance in this test and resulted in excessive gear damage after about 44 hours (Part 1 of Annex 1 to the Appellant's submission of 28 June 1993).

Thus, the Board concludes that the subject-matter of these two claims involving the use of novel additives is novel too.

4. *Inventive Step*

4.1 Claim 1 is directed to a process for the manufacture of a lubricating additive in which the components (i), (ii), and (iii) are interacted at a temperature above 30°C prior to use as a lubricant.

4.1.1 Document (2), discloses that a sulphurised olefin, a tertiary alkyl amine and a carboxylic acid can be mixed or blended together at **ambient temperature** to form a lubricating additive (page 18, lines 1 to 7, in combination with page 14, lines 14 to 32, and with page 5, lines 22 to 28). This citation is, therefore, representative for the state of the art to which the application in suit refers when defining the objective of the application in suit, and the Board takes it as starting point for evaluating inventive step.

4.1.2 In this context, the Board notes that, according to document (1), the aminated sulphurised product obtained by the interaction olefin, sulphur, amine and an acidic boron compound is further reacted with formaldehyde or a formaldehyde-yielding compound (column 1, lines 43 to 61). Therefore, the process leading to the desired lubricant additive as disclosed in document (1) differs from that of Claim 1 of the application in suit not only by the different amounts used of the components (i), (ii), and (iii) (see points 3.3.2 and 3.3.3, above), but also by the incorporation of formaldehyde into the product aimed at. For these reasons, the Board concludes that the state of the art disclosed in document (1) is a less appropriate starting point for evaluating inventive step than document (2).

4.2 In the light of the closest state of the art as represented by document (2), the Board sees the technical problem underlying the present patent application - as formulated in the application in suit - in the provision of an additive for a lubricating oil giving rise to improved gear protection as compared with the state of the art (see the application in suit as published, page 2, lines 17 to 20).

4.3 As already pointed out under point 3.4 above, the examples 2 to 7 of the application in suit indeed show that the process of Claim 1 leads to products having improved gear protection properties. Therefore, the Board is satisfied that the available data render plausible that the process of Claim 1 solves the technical problem as defined above.

4.4 It remains to be decided whether or not the claimed solution of the existing technical problem involves an inventive step.

4.4.1 As already indicated above (see under point 4.1.2), document (1) comprises no hint that the omission of the formaldehyde addition step - which is mandatory for the process of this citation - would lead to a satisfactory lubricating performance and, thus, contains no pointer for the skilled person to the process of Claim 1.

4.4.2 Document (2) comprises no hint for a skilled person to the possibility of interacting the three components concerned at a temperature of above 30°C prior to use as a lubricant, let alone that this process feature would result in a beneficial effect. The same holds for documents (3), (6), and (7).

4.4.3 Documents (4) and (5) are not concerned with the existing technical problem as defined, but rather with the provision of relatively non-toxic load carrying and/or anti-wear agents in water based functional fluids (document(4), page 3, first paragraph) and with rust- and corrosion inhibition (document (5), column 1, lines 17 to 30). A person skilled in the art would not have found any hint in these documents how to solve the technical problem underlying the invention of the application in suit.

4.5 Document (8) is state of the art only according to Article 54(3) EPC and, therefore, of no relevance in the context of inventive step considerations.

4.6 For the above reasons, the Board concludes that the solution of the existing technical problem as claimed in Claim 1 was not obvious for a person skilled in the art from any of the documents (1) to (7), either alone or in combination. Therefore, the subject-matter of Claim 1 involves an inventive step in the sense of Article 56 EPC. This conclusion is equally valid for the subject-matter of independent Claim 16, since this requires, as an additional feature, the addition of a minor amount of the lubricating additive obtained according to any of the Claims 1 to 15 to a major amount of a lubricant base stock. The same considerations hold also for Claim 18, which is directed to the use of a lubricant additive obtainable by the process of any one of claims 1 to 15 in the production of a lubricant. Dependent Claims 2 to 15 and 17 are directed to specific embodiments of the processes of Claim 1 and Claim 16, respectively, and derive their patentability from that of the respective independent claims.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to grant a patent in the following version:

Claims: 1 to 18 submitted on 1 December 1995 as main request;

Description: pages 1 and 4 to 31 of the application as filed;
page 2 as submitted on 29 October 1992; and
page 3 as submitted on 1 December 1995.

The Registrar: The Chairman:

E. Görgmaier A. Nuss