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Datasheet for the decision of 31 July 2017

Case Number: T 1341/12 - 3.3.01

Application Number: 05853776.2

Publication Number: 1828359

IPC: C10M141/12, C10N10/12

Language of the proceedings: EN

Title of invention:
METHOD OF FRICTION CONTROL

Applicant:
The Lubrizol Corporation

Headword:
Lubricant for engine with wet-clutch/LUBRIZOL

Relevant legal provisions:
EPC Art. 84, 56
RPBA Art. 13(1)

Keyword:

Decisions cited:

Catchword:

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Case Number: T 1341/12 - 3.3.01

D E C I S I O N
of Technical Board of Appeal 3.3.01
of 31 July 2017

Appellant: (Applicant)	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092 (US)
Representatives:	D Young & Co LLP 120 Holborn London EC1N 2DY (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 19 December 2011 refusing European patent application No. 05853776.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	A. Lindner
Members:	J. Molina de Alba
	M. Blasi

Summary of Facts and Submissions

I. The present appeal lies from the decision of the examining division, posted on 19 December 2011, refusing European patent application No. 05 853 776.2.

II. The following document, cited during the examination and appeal proceedings, is referred to below:

(2) US 2003/0220206 A1

III. The decision under appeal was based on the main and sole request filed with letter dated 15 October 2008, claims 1 and 7 of which read as follows:

"1. A method of lubricating an internal combustion engine comprising a crankcase and at least one of a gear and a wet-clutch, said method comprising supplying to said crankcase and at least one of the gear and wet-clutch a lubricating composition comprising:

(a) an oil of lubricating viscosity;

(b) a boron containing compound; and

(c) a long chain fatty acid ester friction modifier; wherein the long chain contains 12 to 24 carbon atoms.

...

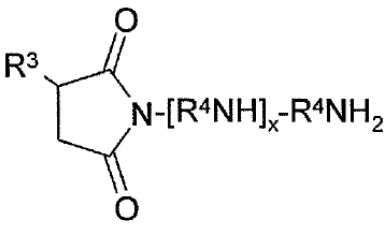
7. The method of claim 1, wherein the boron containing compound is an N-substituted long chain alkenyl succinimide."

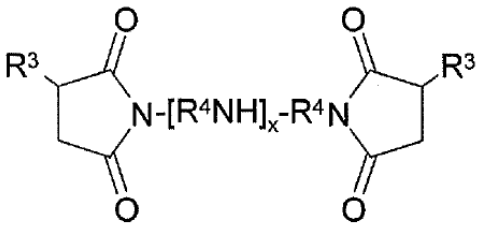
IV. In its decision, the examining division found that claims 1 and 7 lacked clarity because claim 1 did not specify the amounts of components (a) and (b), held by the division to be essential to the definition of the invention, and because claim 7 contained the relative term "long". In addition, the division considered that

the method of claim 1 lacked inventive step over document (2). This document taught a lubricating oil composition for a wet-clutch which comprised a lubricant base oil, a borated succinimide and a friction modifier. The technical problem underlying the invention was seen as lying in the provision of an alternative lubricating oil composition. This problem was solved in an obvious manner by the lubricating composition proposed in claim 1 because document (2) suggested the use of fatty acid esters as friction modifiers.

V. The appellant (applicant) lodged an appeal against this decision. With the statement of grounds of appeal, it filed three sets of claims as its main request and auxiliary requests 1 and 2, together with comparative examples intended to demonstrate an improvement over the lubricant compositions of document (2).

Claim 1 of the main request is identical to that of the request refused by the examining division (see above point III). Claim 7 has been amended to specify that the boron-containing compound is a compound represented by one of the following formulae:





wherein each R^3 is independently an alkyl group, each R^4 is an alkylene group, and each repeat unit x is an integer from 1 to 20.

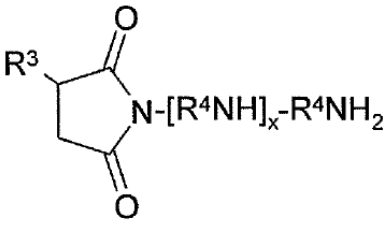
Claim 1 of auxiliary request 1 corresponds to claim 1 of the main request, with the additional limitations that the oil of lubricating viscosity is present at 40 to 99.98 wt.% of the lubricating composition and the boron containing compound is present at 0.01 to 20 wt.% of the lubricating composition. Claim 7 is identical to that of the main request.

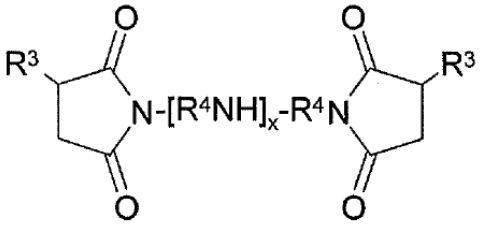
Claim 1 of auxiliary request 2 corresponds to claim 1 of auxiliary request 1, with the additional limitation that the friction modifier is present at 0.01 to 10 wt.% of the lubricating composition. Claim 7 is identical to that of the main request and auxiliary request 1.

VI. In a communication sent as annex to the summons for oral proceedings, the board gave its preliminary opinion that claim 7 was unclear because it referred to a boron-containing compound represented by one of two formulae, neither of which contained boron. In addition, the board considered the subject-matter of claim 1 of all three requests on file to lack inventive step over document (2).

VII. With letters dated 12 May 2017 and 24 July 2017, the appellant filed two sets of claims as auxiliary requests 3 and 4 respectively.

Claim 1 of auxiliary request 3 corresponds to claim 1 of auxiliary request 2, with the additional limitations that the boron-containing compound is a borated compound represented by the following formula:





wherein each R^3 is independently an alkyl group, each R^4 is an alkylene group, and each repeat unit x is an integer from 1 to 20,
and the friction modifier is glycerol monooleate.

Claim 1 of auxiliary request 4 corresponds to claim 1 of auxiliary request 3, wherein the substituents R^3 and R^4 have been further limited to R^3 being a polyisobutyl group with a number average molecular weight of 350 to 5000 and R^4 being an ethylene group.

VIII. Oral proceedings were held before the board on 31 July 2017.

IX. The appellant's arguments, insofar as they are relevant to the present decision, may be summarised as follows:

Concerning the clarity of claim 7 of the main request and auxiliary requests 1 and 2, the appellant did not contest the board's objection that the boron-containing compound was represented by formulae that did not contain any boron atom.

In its submissions on the inventive step of the method of claim 1 of auxiliary requests 3 and 4, the appellant started from document (2) as the closest prior art and defined the problem to be solved as the provision of an improved lubricating composition for an internal combustion engine comprising a crankcase and at least one of a gear and a wet-clutch.

According to the appellant, the comparative tests filed with the statement of grounds of appeal showed that the solution proposed in claim 1 of auxiliary requests 3 and 4 solved this problem by the use of glycerol monooleate as the friction modifier. In particular, those tests proved that the use of glycerol monooleate in a lubricant containing a borated succinimide provided higher static friction and equally low dynamic friction as compared to analogous lubricants having the friction modifiers A and B defined in table 1 of document (2). As a consequence, the lubricant according to claim 1 of auxiliary requests 3 and 4 provided better grip when changing gear (higher static friction) without detriment to fuel economy (low dynamic friction). In addition, the appellant contended that this effect was expected to occur across the whole scope of claim 1, because borated succinimides constituted a well-known class of additives in the field of lubricants and they could all be expected to produce an equivalent effect within the given concentration range. Lastly, as document (2) did not suggest that the selection of glycerol monooleate as friction modifier would result in the improvement shown, the method of claim 1 was inventive.

The appellant also provided arguments in case the board concluded that the improvement displayed in the comparative tests had not been plausibly shown across the whole scope of claim 1 of auxiliary requests 3 and 4, and the problem to be solved had to be reformulated in a less ambitious manner. For that eventuality, the appellant noted that document (2) was directed to the provision of lubricants with anti-shudder durability rather than lubricants with a balance of properties between fuel economy and friction control, as required for engines comprising a wet-clutch. In addition,

document (2) mainly focused on the use of succinimides, the addition of friction modifiers being optional, and the comparative tests filed with the statement of grounds of appeal proved that glycerol monooleate imparted better friction control than the preferred friction modifiers illustrated in the examples of document (2).

X. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims of the main request or, alternatively, of auxiliary requests 1 or 2, all as filed with the statement of grounds of appeal or, as a further alternative, on the basis of the claims of auxiliary request 3 filed with letter of 12 May 2017 or of auxiliary request 4 filed with letter of 24 July 2017.

XI. At the end of the oral proceedings, the decision of the board was announced.

Reasons for the Decision

1. The appeal is admissible.

2. Clarity of claim 7 of the main request and auxiliary requests 1 and 2 - Article 84 EPC

Claim 7 is identical in the main request and auxiliary requests 1 and 2, and refers to a boron-containing compound represented by one of two given formulae (see point V above). However, neither of these two formulae contains a boron atom. This inconsistency renders the scope of claim 7 of the main request and auxiliary requests 1 and 2 unclear.

This was not contested by the appellant.

3. Admission of auxiliary requests 3 and 4 - Article 13(1) RPBA

Auxiliary requests 3 and 4 were filed in reaction to the board's communication, annexed to the summons to oral proceedings, in which the board had raised a new issue under Article 84 EPC. These claim requests constitute a proper reaction to the board's preliminary opinion and do not introduce further complexity into the appeal proceedings. Therefore, the board decided to admit them.

4. Inventive step of the method of claim 1 of auxiliary request 3 - Article 56 EPC

4.1 The present application is directed to a method of lubricating an internal combustion engine comprising a crankcase and at least one of a gear and a wet-clutch. In particular, claim 1 of auxiliary request 3 proposes supplying to said crankcase a lubricating composition comprising, at defined concentration ranges: (a) an oil of lubricating viscosity; (b) a given borated succinimide; and (c) glycerol monooleate as friction modifier. According to the application, such a method is useful for lubricating the engine whilst imparting friction control (see paragraphs [0004] and [0067]) which, as submitted by the appellant in its statement of grounds of appeal (see page 2, paragraph 2), implies an improvement of wet-clutch grip without detriment to fuel economy. In order to achieve this effect, the lubricating composition must exhibit a higher static friction while maintaining its low dynamic friction.

4.2 The board, in agreement with the appellant and the examining division, considers that document (2) represents the closest prior art.

Document (2) concerns (see abstract and paragraph [0003]) lubricating compositions having long-lasting anti-shudder and excellent shifting properties and enhanced transmission capacity for a wet-clutch (also called "torque converter clutch", see paragraph [0005]). In this context, excellent shifting requires good clutch grip (see paragraph [0010]), a property that needs to be balanced with the friction reduction required for long-lasting anti-shudder properties (see paragraphs [0011] and [0012]). Hence, document (2) aims at providing a lubricant which meets the same balance of properties as that sought in the present application, namely a trade-off between higher static friction and low dynamic friction.

The composition taught in document (2) to have the required friction profile was a lubricant containing 0.01 to 6 wt.% of a modified succinimide such as the borated succinimides defined in claim 1 of auxiliary request 3 (see document (2), claims 10 and 18, paragraphs [0015], [0019] and [0041], and example 2 in table 1). Optionally, the lubricant could also contain 0.01 to 5 wt.% of a friction modifier such as fatty acid esters (see claims 13 and 17, and paragraphs [0048], [0049] and [0052]), for instance glycerol monooleate (see page 5, column 1, line 2).

4.3 The appellant defined the problem to be solved as being to provide an improved lubricant in the sense that it imparts better wet-clutch grip without detriment to fuel economy.

To show that this problem had been solved, the appellant relied on the comparative examples filed with the statement of grounds of appeal. These examples assessed the friction properties of three lubricating compositions comprising 1.5 wt.% borated succinimide and 0.1 wt.% friction modifier, where the specific borated succinimide used was not disclosed and the friction modifiers were respectively compounds A and B defined in table 1 of document (2) and glycerol monooleate. The tests revealed that the three compositions exhibited equivalent dynamic friction but the composition containing glycerol monooleate displayed higher static friction than the other two. The appellant asserted that this improvement could be extended to the whole scope of claim 1 because the borated succinimides defined in claim 1 represented a well-known class of additives and they all imparted the same properties to the lubricant.

Contrary to the appellant's assertion, the board is of the opinion that the specific example filed with the statement of grounds of appeal does not make it credible that improved friction control is obtained with each of the lubricating compositions defined in claim 1. Indeed, it is clear that the broad range of succinimides encompassed by the formulae in claim 1, which contain alkyl and alkylene groups without further limitation, alkyleneamino units repeating from 1 to 20 times and boron-containing groups of an unspecified nature, cannot be expected to impart the same friction properties as the single borated succinimide tested, whichever it is. Consequently, the comparative data relied on by the appellant do not lend plausibility to the asserted improvement.

4.4 The problem to be solved must therefore be reformulated in a less ambitious manner, namely as being to provide an alternative method of lubricating an internal combustion engine comprising a crankcase and at least one of a gear and a wet-clutch.

The solution proposed in claim 1 relates to lubricating compositions characterised by the presence of glycerol monooleate as the friction modifier.

Having regard to the experimental results reported in the examples of the application and the comparative tests filed with the statement of grounds of appeal, the board is satisfied that the problem has been solved.

4.5 It remains to be investigated whether the proposed solution would have been obvious to the skilled person in the light of the prior art.

In this respect, document (2) teaches lubricants containing borated succinimides at concentrations of 0.01 to 6 wt.% and suggests the addition of friction modifiers as customary additives at exemplary concentrations of from 0.01 to 5 wt.% (see claims 13 and 17, and paragraphs [0048] and [0049]). Glycerol monooleate is cited as a suitable friction modifier (see page 5, column 1, line 2). Consequently, it would have been obvious for the skilled person to consider adding glycerol monooleate to the lubricating oil compositions in document (2) which contain a borated succinimide, in order to obtain alternative lubricants with a suitable balance of properties for good wet-clutch grip and fuel economy. He would thus have arrived at the subject-matter of claim 1 without the exercise of inventive skills.

4.6 The appellant argued that document (2) was directed to the provision of lubricants with anti-shudder durability rather than with a balance of properties between fuel economy and friction control, as required for engines comprising a wet-clutch. In addition, it argued that document (2) mainly focused on the use of succinimides, the addition of friction modifiers being optional.

In the board's view, these arguments do not hold. Not only because document (2) does indeed deal with a lubricant for an internal combustion engine that comprises a wet-clutch and sets the invention in the context of fuel-efficient automobiles (see paragraphs [0005] and [0006]), but also because, as set out in point 4.2 above, the balance of properties between high static friction and low dynamic friction sought in the present application is exactly the same as that required by document (2). In this context, that document (2) focuses on the aspect of long anti-shudder does not change the fact that it requires a lubricant with improved wet-clutch grip and good fuel economy, and that implicitly it also deals with the problem underlying the present application.

4.7 In view of the above analysis, it is concluded that the method of claim 1 of auxiliary request 3 represents an obvious solution to the problem posed and does not involve an inventive step.

5. Inventive step of the method of claim 1 of auxiliary request 4 - Article 56 EPC

Claim 1 of auxiliary request 4 differs from that of auxiliary request 3 in the narrower definition of the substituents R^3 and R^4 in the boron-containing compound as a polyisobutyl group with a number average molecular weight of 350 to 5000 and an ethylene group respectively. This narrower definition of the boron compound overlaps with that in document (2) as defined in claim 16, wherein the substituent corresponding to R^3 in auxiliary request 4 is a hydrocarbon group having 8 to 30 carbon atoms and the substituent corresponding to R^4 is a hydrocarbon group having 1 to 4 carbon atoms. An example falling within that overlapping area would be for instance a succinimide according to auxiliary request 4, with R^3 being heptaisobutyl, i.e. a hydrocarbon group having 28 carbon atoms and a molecular weight of 393.

The appellant did not submit any additional arguments or evidence for this request, so it is concluded that no effect is associated with the particular selection disclosed in claim 1 of auxiliary request 4. Accordingly, the reasoning and the conclusions set out above for auxiliary request 3 apply *mutatis mutandis* to auxiliary request 4.

Hence, auxiliary request 4 is also rejected for lack of inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Schalow A. Lindner

Decision electronically authenticated