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Datasheet for the decision of 11 September 2014

Case Number: T 0677/13 - 3.3.03

Application Number: 07712469.1

Publication Number: 1999166

IPC: C08F8/30

Language of the proceedings: EN

Title of invention:
Modified Waxes, A Process For Their Preparation, And Their Use

Patent Proprietor:
Clariant Finance (BVI) Limited

Opponent:
BASF Schweiz AG

Relevant legal provisions:
EPC Art. 123(2), 123(3), 56

Keyword:
Amendments - allowable (yes)
Inventive step - main request (yes)

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Case Number: T 0677/13 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 11 September 2014

Appellant: (Patent Proprietor)	Clariant Finance (BVI) Limited Citco Building Wickhams Cay P.O. Box 662 Road Town, Tortola (VG)
Representative:	Hütter, Klaus c/o Clariant Produkte (Deutschland) GmbH Patent Management Am Unisys-Park 1 65843 Sulzbach
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 10 January 2013 revoking European patent No. 1999166 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

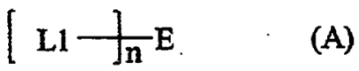
Chairman	B. ter Laan
Members:	D. Marquis
	C. Brandt

Summary of Facts and Submissions

I. The appeal by the Patent Proprietor lies from the decision of the opposition division posted on 10 January 2013, revoking European Patent No. 1 999 166 in respect of European patent application No. 07 712 469.1, which is based on international application PCT/EP2007/052149 and published as WO 2007/104689.

II. The patent was granted with a set of 11 claims of which independent claim 1 read as follows:

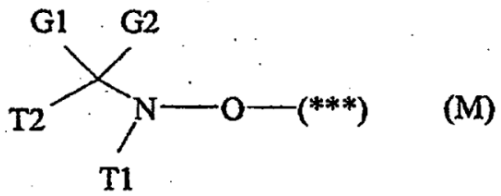
"1. Compounds of the formula (A),



(A)

in which

L1 is alike or different and is a group of the formula (M),



(M)

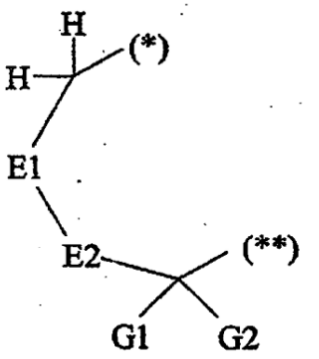
in which

(***) marks the bond of the group of the formula (M) to the group E in the formula (A);
Gl and G2 can be alike or different and are independently of one another hydrogen, halogen, NO_2, cyano, $CONR_5R_6$, $(R_9)COOR_4$, $C(O)-R_7$, OR_8, SR_8, NHR_8, $N(R_{18})_2$, carbamoyl, $di(C_1-C_{18}-alkyl)carbamoyl$, $C(=NR_5)$

(NHR_6), C_1-C_{18}-alkyl, C_3-C_{18}-alkenyl; C_3-C_{18}-alkynyl, C_7-C_9-phenylalkyl, C_3-C_{12}-cycloalkyl or C_2-C_{12}-heterocycloalkyl;
C_1-C_{18}-alkyl or C_3-C_{18}-alkenyl or C_3-C_{18}-alkynyl or C_7-C_9-phenylalkyl, C_3-C_{12}-cycloalkyl or C_2-C_{12}-heterocycloalkyl, in each case substituted by OH, halogen, NO_2, amino, cyano, carboxyl, $COOR_{21}$, $C(O)$-R_{22}, C_1-C_4-alkoxy, C_1-C_4-alkylthio, C_1-C_4-alkylamino, di(C_1-C_4-alkyl)amino or O-$C(O)$-R_7; C_2-C_{18}-alkyl interrupted by at least one O atom and/or by -NR_5-;
C_6-C_{10}-aryl;

phenyl or naphthyl, in each case substituted by C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-alkythio, halogen, cyano, hydroxyl, carboxyl, $COOR_{21}$, $C(O)$-R_{22}, C_1-C_4-alkylamino or di(C_1-C_4-alkyl)amino; or

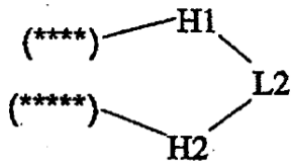
Gl and G2, together with C atom to which they are attached, form a C_3-C_{12} ring;
T1 is hydrogen, a primary C_1-C_{18}-alkyl, a secondary C_3-C_{18}-alkyl, a tertiary C_4-C_{18}-alkyl or a phenyl group, each of them unsubstituted or substituted by halogen, OH, $COOR_{21}$ or $C(O)$-R_{22}; or
T1 is C_5-C_{12}-cycloalkyl, the C_5-C_{12}-cycloalkyl interrupted by at least one O or -$N(R_{18})$-
T1 is a polycyclic alkyl radical having 7 to 18 C atoms, or the same radical interrupted by at least one -O- or -$N(R_{18})$-;
T2 is hydrogen, halogen, NO_2, cyano or a monovalent organic radical having 1 to 50 C atoms; or
T2 and Tl together form a group of the formula (F),



(F)

in which

(*) marks the bond to the quaternary C atom, substituted by Gl and G2, in the formula (M), and (**) marks the bond to the nitrogen N in the formula (M),
E2 is -CO- or $-(CH_2)_b-$, b being 0, 1 or 2; E1 is -CO-, $-(C=NR_{23})-$, $-(NR_{23})-$, $-(CR_{24}R_{25})-$, or -O-, where R_{24} and R_{25} are alike or different and independently of one another are H, OH, OR_{26} or $NR_{27}R_{28}$; or
R_{24} and R_{25} together form a group of the formula (H),



(H)

in which

(****) and (*****) represent the bond to the quaternary carbon atom of $-(CR_{24}R_{25})-$ in E1 from the formula (F),
H1 is $-CH_2-$, -CO- or $-NR_{29}-$; H2 is -O-, $-CH_2-$, -CO- or $-NR_{29}-$;
R_{23}, R_{26}, R_{27}, R_{28} and R_{29} are alike or different and independently of one another are hydrogen or an organic radical having in total 1 to 500 carbon atoms and 0 to 200 heteroatoms, the heteroatoms being oxygen, nitrogen, sulphur, phosphorus, silicon or halogens,

L2 is a divalent organic radical having 1 to 500 C atoms and 0 to 200 heteroatoms, the heteroatoms being oxygen, nitrogen, sulphur, phosphorus, silicon or halogens, and which together with H1 and H2 from the formula (H) and with the quaternary carbon atom from -($CR_{24}R_{25}$)- in E1 from the formula (F) forms an optionally substituted 4, 5, 6 or 7 membered ring, preferably a 5 or 6 membered ring;

and

R_4 is hydrogen, C_1-C_{18}-alkyl, phenyl, an alkali metal ion or a tetraalkylammonium cation; R_5 and R_6 are independently of one another hydrogen, C_1-C_{18}-alkyl, C_2-C_{18}-alkyl substituted by hydroxyl or, taken together, form a C_2-C_{12}-alkylene bridge or a C_2-C_{12}-alkylene bridge interrupted by -O- or/and -N(R_{18})-;
R7 is hydrogen, C_1-C_{18}-alkyl or C_6-C_{10}-aryl;
Rs is hydrogen, C_1-C_{18}-alkyl or C_2-C_{18}-hydroxyalkyl;
R9 is C_1-C_{12}-alkylene or a bond;
R18 is C_1-C_{12}-alkyl or phenyl, unsubstituted or substituted by halogen, OH, $COOR_{21}$ or C(O)-R_{22}; R_{21} is hydrogen, an alkali metal atom or C_1-C_{18}-alkyl; R_{22} is C_1-C_{18}-alkyl;
E is a C_{80}-C_{800}-alkyl group, it being possible for the alkyl chain of the alkyl group to contain alkyl substituents, aromatic substituents and polar groups as substituents and to be interrupted by alkene units and heteroatoms; and n is an integer from 1 to 1000."

Claims 2 to 6 were directed to preferred embodiments of claim 1. Claim 7 was an independent claim relating to a process for preparing compounds of the formula (A) and claims 8 to 10 were directed to preferred embodiments

of claim 7. Claim 11 was an independent claim relating to a mixture containing compounds of the formula (A).

III. A notice of opposition against the patent was filed in which the revocation of the patent was requested on the grounds according to Article 100(a) EPC (lack of novelty and lack of inventive step) and Article 100(b) EPC. The documents submitted before the opposition division included:

D3: WO99/00450
D4d: JP2000336118 (English translation)
D5d: JP2003286412 (English translation)
Experimental report filed on 9 October 2012

IV. The decision was based on the claims as granted (main request) and an auxiliary request submitted by the patent proprietor with letter of 6 October 2011.

In the contested decision it was held that the main request (claims as granted) was sufficiently disclosed and was novel over D4. The main request was however found to an lack inventive step in view of D5 as the closest prior art in combination with D3. In particular, the patent did not include any evidence for a technical effect that could be attributed to the difference between the subject-matter of claim 1 and D5, Example 1. The problem underlying the patent-in-suit was therefore seen as providing further compounds of the formula $[L_1]$-E which acted as polymer additives. The skilled person, faced with the problem of finding an alternative polymeric additive, would consider D3, which relates to the same technical field: hindered amine compounds linked to an alkoxy chain used as light stabilizers and flame retardants. D3 hinted at a replacement of compounds of D5 in such a way as to

obtain the compounds of claim 1 of both the main request and the auxiliary request. Therefore, the claimed subject-matter of both requests lacked an inventive step.

V. On 8 March 2013 the patent proprietor lodged an appeal against the decision of the opposition division, requesting the maintenance of the patent as granted, and paid the prescribed appeal fee on the same day. The statement setting out the grounds of the appeal was filed on 10 Mai 2013. With it, auxiliary requests 2 and 3 were submitted as well as four further documents and an experimental report.

VI. By letter dated 12 November 2013, the respondent withdrew its opposition.

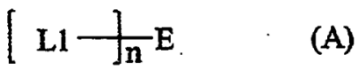
VII. On 11 June 2014, the appellant was summoned to oral proceedings to be held on 11 September 2014. On 10 July 2014, a communication of the Board providing a preliminary opinion on the issues to be addressed during the oral proceedings was sent.

VIII. By letter of 22 July 2014 the appellant stated his requests and submitted further arguments.

IX. Oral proceedings were held on 11 September 2014. After discussion of the inventive step, all previous requests were withdrawn except for the request that had been attached to the statement of grounds of the appeal as the third auxiliary request, which now became the main request. Also, two auxiliary requests were filed.

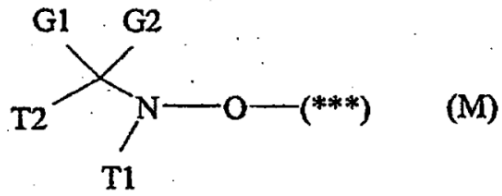
Claim 1 of the main request reads as follows:

"1. Compounds of the formula (A),



(A)

in which
L1 is alike or different and is a group of the formula (M),



(M)

in which

(***) marks the bond of the group of the formula (M) to the group E in the formula (A);
Gl and G2 can be alike or different and are independently of one another hydrogen,
E is a C_{80}-C_{800}-alkyl group, it being possible for the alkyl chain of the alkyl group to contain alkyl substituents, aromatic substituents and polar groups as substituents and to be interrupted by alkene units and heteroatoms; and n is an integer from 1 to 1000 wherein Tl and T2, together with the nitrogen atom N in the formula (M) and with the quaternary C atom, substituted by Gl and G2, in the formula (M) are a tetramethylpiperidyl group the tetramethylpiperidyl group being one of the groups
2,2,6,6-tetramethylpiperidine,
2,2,6,6-tetramethylpiperidin-4-one,
2,2,6,6-tetramethylpiperidin-4-ol, 4-amino-2,2,6,6-tetramethylpiperidine,
2,2,4,4-tetramethyl-7-oxa-3,20-diazadispiro-[5.1.11.2]heneicosan-21-one,

2,2,4,4-tetramethyl-20-lauryloxycarbonylethyl-7-oxa-3 , 20-diazadispiro[5.1.11.2]- heneicosan-21-one, 2,2,4,4-tetramethyl-20-myristyloxycarbonylethyl-7-oxa-3,20-diazadispiro[5.1.11.2]- heneicosan-21-one, bis(2,2,6,6-tetramethyl-4-piperidinyl) sebacate, esters of 2,2,6,6-tetramethyl-4-piperidinol with higher fatty acids, especially stearic or palmitic acid and mixtures thereof, N,N'-bis-2,2,6,6-tetramethyl-4-piperidinyl-l,3-benzenedicarboxamide, 2,2,4,4-tetramethyl-20-([beta]-myristyloxycarbonyl)ethyl-7-oxa-3,20-diazadispiro-[5.1.11.2]heneicosan-21-one, 2,2,4,4-tetramethyl-20-([beta]-lauryloxycarbonyl)ethyl-7-oxa-3 ,20-diazadispiro-[5.1.11.2]- heneicosan-21-one, 3-dodecyl-l-(2,2,6,6-tetramethyl-4-piperidyl)pyrrolidine-2,5-dione, 2,2,6,6-tetramethyl-4N-([beta]-lauryloxycarbonyl)ethylaminopiperidine, 2,2,6,6-tetramethyl-4N-([beta]-myristyloxycarbonyl)ethylaminopiperidine, N,N'-l,6-hexanediylbis(N-(2,2,6,6-tetramethylpiperidin-4-yl)formamide), 2,6-bis(2,2,6,6-tetramethylpiperidin-4-yl)-lH,4H,5H, 8H-2,3a,4a,6,7a,8a-hexaazaper-hydrocyclopentafluorene-4,8-dione or 3-dodecyl-7,7,9,9-tetramethyl-l,3,8-triazaspiro[4.5]decane-2,4-dione."

Claim 2 corresponded to original claim 3 and claims 3 to 7 corresponded to original claims 10, 17 to 19 and 23.

X. The patent proprietor's arguments may be summarised as follows:

- Modifications

The claims of the main request corresponded to a combination of claims 1, 4, 5 and 6 as originally filed leaving out claim 2, and were therefore allowable.

- Inventive step

Both D5 and D3 could be seen as closest prior art documents. The problem that had been solved over D5 was to improve the weather resistance as defined in that document. Over D3, the problem could be seen as the improvement of the flame retardancy and migration of components in the polymer compositions.

The experimental report provided with the statement of the grounds of the appeal demonstrated that those problems were solved. The solution to those problems as defined in the claims of the main request was not obvious in view of the prior art because none of the cited documents hinted at the combination of specific flame retardants with a wax component now being claimed. As a result the claimed subject-matter of the main request was inventive.

XI. The appellant requested that the decision under appeal be set aside and the patent be maintained on the basis of the main request, submitted as third auxiliary request with the statement setting out the grounds of the appeal of 10 May 2013.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Modifications

2.1 Compared with claim 1 as originally filed, in claim 1 of the main request L1 of formula (A) $[L1-]_n$-E was limited to the tetramethylpiperidyl groups of original claims 8 and 9 and E was limited to the wax with a C_{80}-C_{800}-alkyl group of original claims 6 and 7. Therefore, the subject-matter of claim 1 corresponds to that of originally filed claims 8 and 9 which were dependent on original claims 1 to 7. The subject-matter of claim 1 of the main request therefore finds a support in the set of claims as originally filed. The wording of dependent claims 2 to 7 corresponds to that of claims 3, 10, 17, 18, 19 and 23 as originally filed and, by reference to claim 1, dependent claims 2 to 7 contain the same restriction as indicated above.

2.2 Claim 1 of the main request corresponds to claims 5 and 6 as granted (tetramethylpiperidyl groups) and claims 2 to 7 corresponds to claims 3 and 7 to 11 as granted.

2.3 Thus, claims 1 to 7 of the main request satisfy the requirements of Article 123(2) and (3) EPC.

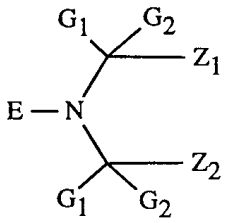
2.4 In its decision, the opposition division concluded that the subject matter of claim 1 then on file was sufficiently disclosed and was novel over D4. That claim 1 was of a broader scope than present claim 1. The respondent did not challenge the decision of the opposition division, nor does the Board see any reason to deviate from that decision. Article 83 EPC is complied with.

3. Inventive step

3.1 The patent in suit concerns modified waxes, a process for their preparation and their use, in particular waxes modified with sterically hindered amines for use as stabilizers for organic material (paragraph [0001]). The patent in suit aims in particular at additives having flame retardant as well as light stabilizing and environmental resistance properties (paragraphs [0014] to [0016] and [0085]).

3.2 Sterically hindered amines are disclosed in D5 as well as in D3.

3.2.1 D3 discloses the use of a hindered amine compound containing a group of the formula

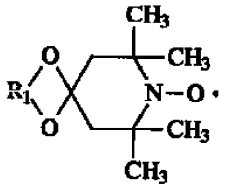


where
G_1 and G_2 are independently alkyl of 1 to 4 carbon atoms or are together pentamethylene, Z_1 and Z_2 are each methyl, or Z_1 and Z_2 together form a linking moiety which may additionally be substituted by an ester, ether, amide, amino, carboxy or urethane group, and E is C_1-C_{18} alkoxy, C_5-C_{12} cycloalkoxy, C_7-C_{25} aralkoxy, C_6-C_{12} aryloxy, as a flame retardant for a polymeric substrate (claim 1).

Those NOR-hindered amine compounds, when incorporated into a wide variety of polymeric substrates, bestow to the polymeric composition sufficient flame retardancy for passing the tests (D3, page 3, second paragraph).

According to claim 10 of D3, the compounds are used in amounts between 5,1 and 9% by weight. D3 is also mentioned in paragraphs [0012] and [0014] of the patent in suit.

3.2.2 D5, which was seen by the opposition division as the closest prior art, discloses synthetic resin compositions containing a stabilizer obtained by reacting the piperidine ketal derivative of formula (1)



with a polymer having a molecular weight of more than 300 (D5, paragraphs [0008] to [0010]). The resulting long chain modified piperidine ketal provides improved long term weather resistance under sulfur fumigation and acid rain conditions to polymeric substrates (paragraph [0008]). D5 does not mention if these compounds possess flame retardant properties in polymeric compositions. As a result, the aim of D5 is not the improvement of the flame retardancy of polymeric compositions. D5 is therefore more remote than D3.

3.2.3 Therefore, D3 is considered to be the closest prior art.

3.3 The object of the patent in suit is to provide flame-retardant and multi-functional additives that can be readily incorporated in polymers, that do not migrate and also impart light stabilization and resistance to environmental influences to the polymeric compositions they are added to (paragraphs [0014] and [0085]) and

are superior to the known sterically hindered amines substituted by alkoxy radicals and to obtain products that are superior to their existing counterparts in terms of volatility at high temperatures, compatibility with plastics, stability when the compounds are melted, and by a neutral odour during and after incorporation into plastics (paragraphs [0015] and [0016]).

3.4 The patent in suit proposes as the solution to those problems the introduction of the functionality of the sterically hindered amines as specified in claim 1 directly onto long-chain alkanes, such as waxes.

3.5 The question to be answered is whether the technical problem has been effectively solved vis-à-vis the closest prior art document D3.

3.5.1 The experimental report (part IV, examples) filed with the statement of the grounds of the appeal describes the preparation of a number of wax modified sterically hindered amines having a piperidine structure, as now claimed. Foils prepared from LDPE containing 2% by weight of those compounds were submitted to a flame retardancy test according to DIN 4102.

Examples A and B of part IV of the experimental report disclose the flame retardancy of LDPE foils obtained from compositions comprising C_6 or C_8 alkyl modified piperidine type flame retardants. These compositions are representative of the short chain modified sterically hindered amine flame retardants of D3.

The data presented in part IV of the experimental report show that the foils incorporating sterically hindered amines having a piperidine structure modified by a wax component according to present claim 1 display

a total burning time of 6,6s and 3,4s resp. and achieve the flame retardant classification B2 according to DIN 4102, whereas foils containing the same sterically hindered amines having a piperidine structure but modified with C6 and C8 alkyl radicals (according to D3) display a significantly longer total burning time of 11s and 4,6s. In the case of example A the classification B2 is not achieved. The experimental report therefore shows that the claimed compositions provide LDPE foils with an overall improved flame retardancy as compared to the compositions of D3.

The patent in suit and the experimental report do not provide any comparative data regarding the migration of and the light stabilizing properties of the claimed compounds in comparison to those of D3. On the basis of the effects demonstrated in the documents provided by the appellant, it is therefore concluded that the problem effectively solved by the subject-matter of claim 1 over D3 is to provide compounds imparting polymers with improved flame retardancy.

3.6 It remains to be decided whether the solution to that problem, as defined in claim 1, is obvious in view of the prior art. Starting from the closest prior art D3, the question to be answered is whether a skilled person had an incentive to replace the C_1-C_{18} alkoxy, C_5-C_{12} cycloalkoxy, C_7-C_{25} aralkoxy, C_6-C_{12} aryloxy short chain of the flame retardants of D3 by a wax with a C_{80}- to C_{800}- alkyl group according to claim 1 of the main request in order to provide compositions with improved flame retardancy.

3.6.1 While the hindered amines of D3 in general possess desirable flame retarding efficacy, D3 discloses that preferred hindered amines are those where E is alkoxy,

cycloalkoxy or aralkoxy; most preferably where E is methoxy, propoxy, octyloxy or cyclohexyloxy, especially cyclohexyloxy (page 25, last paragraph). The teaching of D3 therefore points to the use of the short C_1- to C_8- alkyl radicals which would not motivate the skilled person to extend these radicals to the claimed C_{80}- to C_{800}- wax radicals.

3.6.2 D5 discloses that long chain modified piperidine ketals provide improved long term weather resistance under sulfur fumigation and acid rain conditions to polymeric substrates and the preparation of a low density polyethylene wax modified piperidine ketal derivative is described in synthesis example 1 (paragraph [0048]). However, D5 is silent about flame retardant properties of any of the compositions it discloses. D5 therefore does not hint at the use of the claimed long chain waxes in order to solve the above-defined technical problem.

3.7 For those reasons, the subject matter of claim 1 of the main request is inventive. Claims 2 to 7 which refer to the compounds of claim 1, are also inventive.

4. Therefore, the main request fulfils the requirements of Article 56 EPC.

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 maintain the patent on the basis of the set of claims now representing the main request, filed as third auxiliary request with the statement setting out the grounds of appeal dated 10 May 2013 and after any necessary amendment of the description.

The Registrar: The Chairman:

E. Goergmaier B. ter Laan

Decision electronically authenticated