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D E C I S I O N
of 20 July 2004

Case Number: T 0522/02 - 3.3.3

Application Number: 96925540.5

Publication Number: 0843696

IPC: C08G 69/48

Language of the proceedings: EN

Title of invention:
Light stabilized polyamide substrate and process for making

Patentee:
BASF AKTIENGESELLSCHAFT

Opponent:
BASF Aktiengesellschaft Patente, Marken und Lizenzen
NYLSTAR SA
CLARIANT INTERNATIONAL LTD.

Headword:
-

Relevant legal provisions:
EPC Art. 56, 84, 113(1), 123(2), 123(3)
EPC R. 71(2)

Keyword:
"Main request - inventive step (no)"
"Reformulation of technical problem in less ambitious terms"
"First, second, third auxiliary requests - extension of content (yes)"
"Oral proceedings in appellant's absence"

Decisions cited:
G 0009/91, G 0004/92, T 0020/81, T 0561/94, T 0253/95

Catchword:-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0522/02 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 20 July 2004

Appellant: (Proprietor of the patent)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office dated 4 December 2001 and posted 11 March 2002 revoking European patent No. 0843696 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: R. Young
Members: C. Idez
A. Pignatelli

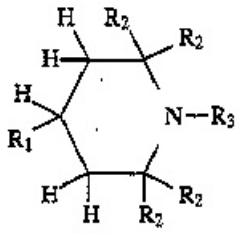
Summary of Facts and Submissions

I. The grant of the European patent No. 0 843 696 in the name of AlliedSignal Inc. (later BASF Aktiengesellschaft) in respect of European patent application No. 96 925 540 filed on 26 July 1996 and claiming priority of the US patent application No. 508194 filed on 27 July 1995 was announced on 21 April 1999 (Bulletin 1999/16) on the basis of 21 claims.

Independent Claims 1, 12, and 21 read as follows:

"1. A process for preparing a light stabilized polyamide substrate, comprising the steps of:

a. mixing an effective amount of a hindered amine with a polyamide precursor, said hindered amine comprising a functional group capable of reacting with an end group of said polyamide precursor and being represented by the formula:

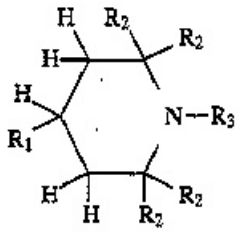


in which
R_1 comprises said functional group which is an amine or an amide-forming group;
R_2 is alkyl; and

R_3 is selected from the group consisting of hydrogen; alkyl of 1 to 3 carbons; and $-OR_4$ in which R_4 is selected from the group consisting of hydrogen, methyl, and alkyl of 1 to 7 carbons; followed by

b. reacting said functional group with the end group of said polyamide precursor at a temperature sufficient for polymerization to occur, to thereby bind the hindered amine to the polyamide.

12. A polyamide substrate comprising a light stabilizing amount of a hindered amine bound thereto by reaction of a functional group of the hindered amine with an end group of a precursor of said polyamide, said hindered amine being represented by the formula:



in which
R_1 comprises said functional group which is an amine or an amide-forming group;
R_2 is alkyl; and
R_3 is selected from the group consisting of hydrogen; alkyl of 1 to 3 carbons; and $-OR_4$ in which R_4 is selected from the group consisting of hydrogen, methyl, and alkyl of 1 to 7 carbons.

21. A flag, a decorative banner, or a personal flotation device made of the polyamide substrate of claim 12."

Claims 2 to 11, and 13 to 20 were dependent claims.

II. Three Notices of Opposition were filed against the patent, as follows:

(i) by BASF Aktiengesellschaft (Opponent I) on 18 May 1999, and

(ii) by Nylstar S.A (Opponent II), on 21 January 2000; and by,

(iii) Clariant International Ltd (Opponent III), on 22 January 2000.

With its letter dated 28 April 2000, Opponent I withdrew its opposition and further indicated that it had become the Proprietor of the patent. The registration of the change of the Patent Proprietor took effect on 27 April 2000.

Opponents II and III requested the revocation of the patent on the grounds of lack of novelty and lack of inventive step (Article 100(a) EPC).

These objections were supported, *inter alia*, by the following documents:

E1: WO-A-95/28443;

E2: WO-A-91/03511;

E3: EP-A-0 345 648;

E4: Norman S. Allen et al. "Thermal and Photo-chemical Degradation of Nylon 6,6 Polymer: Part II- Influence of Hindered Piperidine Light Stabilisers."; Polymer Degradation and Stability, Vol. 21, (1988), pages 251 to 262;

E5: EP-A-0 379 470;

E12: DE-A-3 932 912, and,

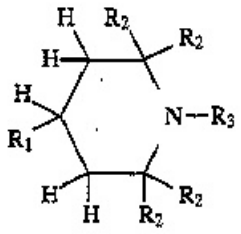
E14: DE-A-2 040 975.

III. By a decision announced orally on 4 December 2001 and issued in writing on 11 March 2002, the Opposition Division revoked the patent.
The decision of the Opposition Division was based on Claims 1 to 10 submitted as main request at the oral proceedings of 4 December 2001.

Independent Claims 1, 6, and 10 read as follows:

"1. A process for preparing a light stabilized polyamide substrate, comprising the steps of:

a. mixing an effective amount of a hindered amine with a polyamide precursor, said hindered amine comprising a functional group capable of reacting with an end group of said polyamide precursor and being represented by the formula:



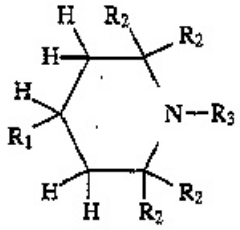
in which
R_1 comprises said functional group and is selected from the group consisting of -(NH)R_5 where R_5 is alkyl of 1 to 8 carbons; -COOH; -COOH acid derivative; -$(CH_2)_X$(NH)R_5, in which X is an integer of from 1 to about 6 and R_5 is hydrogen or alkyl of 1 to 8 carbons; -$(CH_2)_Y$ COOH, in which Y is an integer of from 1 to about 6; and -$(CH_2)_Y$ COOH acid derivative in which Y is an integer of from 1 to about 6,
R_2 is alkyl; and
R_3 is selected from the group consisting of hydrogen; alkyl of 1 to 3 carbons; and -OR_4 in which R_4 is selected from the group consisting of hydrogen, methyl, and alkyl of 1 to 7 carbons; followed by

b. reacting said functional group with the end group of said polyamide precursor at a temperature sufficient for polymerization to occur, to thereby bind the hindered amine to the polyamide,

or comprising the steps of:

a. mixing an effective amount of a hindered amine with a polyamide precursor, said hindered amine comprising a functional group capable of reacting

with an end group of said polyamide precursor and being represented by the formula:

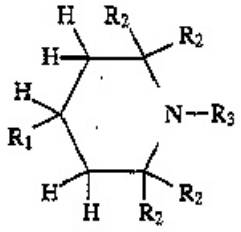


in which
R_1 comprises said functional group and is selected from the group consisting of -(NH)R_5 where R_5 is hydrogen or alkyl of 1 to 8 carbons; -COOH; -COOH acid derivative; -$(CH_2)_X$(NH)R_5, in which X is an integer of from 1 to about 6 and R_5 is hydrogen or alkyl of 1 to 8 carbons; -$(CH_2)_Y$ COOH, in which Y is an integer of from 1 to about 6; and -$(CH_2)_Y$ COOH acid derivative in which Y is an integer of from 1 to about 6,
R_2 is alkyl; and
R_3 is selected from the group consisting of hydrogen; alkyl of 1 to 3 carbons; and -OR_4 in which R_4 is selected from the group consisting of hydrogen, methyl, and alkyl of 1 to 7 carbons; followed by

b. reacting said functional group with the end group of said polyamide precursor at a temperature sufficient for polymerization to occur, to thereby bind the hindered amine to the polyamide,
wherein said polyamide precursor is selected from the group consisting of monomers and oligomers of a C_6 to C_{24} aryl diamine with a C_8 to C_{24} aryl diacid or aryl diacid derivative; monomers and

oligomers of a C_6 to C_{24} aryl diamine with a C_2 to C_{18} alkyl diacid alkyl or diacid derivative [sic]; monomers and oligomers of a C_8 to C_{14} aralkyl diamine with a C_{10} to C_{14} aralkyl diacid or diacid derivative.

6. A polyamide substrate comprising a light stabilizing amount of a hindered amine bound thereto by reaction of a functional group of the hindered amine with an end group of a precursor of said polyamide, said hindered amine being represented by the formula:



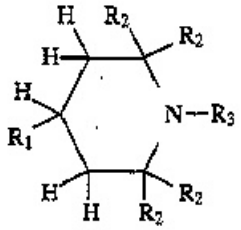
in which

R_1 comprises said functional group and is selected from the group consisting of -(NH)R_5 where R_5 is alkyl of 1 to 8 carbons; -COOH; -COOH acid derivative; -$(CH_2)_X$(NH)R_5, in which X is an integer of from 1 to about 6 and R_5 is hydrogen or alkyl of 1 to 8 carbons; -$(CH_2)_Y$ COOH, in which Y is an integer of from 1 to about 6; and -$(CH_2)_Y$ COOH acid derivative in which Y is an integer of from 1 to about 6,

R_2 is alkyl; and

R_3 is selected from the group consisting of hydrogen; alkyl of 1 to 3 carbons; and -OR_4 in which R_4 is selected from the group consisting of hydrogen, methyl, and alkyl of 1 to 7 carbons;

or said hindered amine being represented by the formula:



in which
R_1 comprises said functional group and is selected from the group consisting of -(NH)R_5 where R_5 is hydrogen or alkyl of 1 to 8 carbons; -COOH; -COOH acid derivative; -$(CH_2)_X$(NH)R_5, in which X is an integer of from 1 to about 6 and R_5 is hydrogen or alkyl of 1 to 8 carbons; -$(CH_2)_Y$ COOH, in which Y is an integer of from 1 to about 6; and -$(CH_2)_Y$ COOH acid derivative in which Y is an integer of from 1 to about 6,
R_2 is alkyl; and
R_3 is selected from the group consisting of hydrogen; alkyl of 1 to 3 carbons; and -OR_4 in which R_4 is selected from the group consisting of hydrogen, methyl, and alkyl of 1 to 7 carbons;

wherein said polyamide is selected from the group consisting of monomers and oligomers of a C_6 to C_{24} aryl diamine with a C_8 to C_{24} aryl diacid or aryl diacid derivative; monomers and oligomers of a C_6 to C_{24} aryl diamine with a C_2 to C_{18} alkyl diacid or alkyl diacid derivative; monomers and oligomers of a C_8 to C_{14} aralkyl diamine with a C_{10} to C_{14} aralkyl diacid or diacid derivative.

10. A flag, a decorative banner, or a personal flotation device made of the polyamide substrate of claim 6."

Claims 2 to 5, and 7 to 9 were dependent claims.

The Opposition Division held that Claims 1 to 10 of the main request fulfilled the requirements of Article 123(2), 123(3) and 84 EPC.
The Opposition Division further held that the subject-matter of Claims 1 to 10 was novel over documents E1 and E3.

Concerning inventive step, document E14 was regarded as the closest state of the art, since it related to the problem of the preparation of light stabilized polymers, in particular polyamides.
According to E14 a hindered amine was added to the polyamide to be stabilized, the mixture was melted and formed into a film.
The subject-matter of the main request differed mainly from E14 in that the hindered amine was copolymerized with the polyamide precursor and introduced in the chain as a chain control instead of being added to the melted polyamide.
Starting from E14, the technical problem to be solved by the patent in suit was seen as providing a further process for making light stabilized polyamides.
Document E4 disclosed that the incorporation of a hindered piperidine at the end of the polymer chain was an effective method of stabilizing nylon 6,6. Although it indicated that the practicality of such a procedure on a commercial scale remained to be seen, this last

concern was however removed by document E3 (cf. Examples 9 to 20), which disclosed the copolymerization of aminoacids or caprolactam in the presence of hindered amine on a semi industrial scale.

Since the increase of light stability of polyamides was predictable from E3 and E4, and since no unexpected effect, related either to use of specific hindered amine or to the use of aromatic polyamide precursors, had been demonstrated, the subject matter of independent Claims 1 and 6 was considered as lacking inventive step.

IV. A Notice of Appeal was filed on 21 May 2002 by the Appellant (Patent Proprietor) with simultaneous payment of the prescribed fee. In the Statement of Grounds of Appeal filed on 22 July 2002, the Appellant argued essentially as follows:

(i) Concerning the decision of the Opposition Division:

(i.1) During the opposition period, the opposition had not been substantiated in view of document E4. This document should have been disregarded.

(i.2) The passage of E3 (i.e. Examples 9 to 20) relied on in the decision under appeal did not refer to hindered piperidines, contrary to the statements made in the decision.

(ii) Concerning inventive step:

(ii.1) E14 related to the stabilization of polymers against light and thermal degradation by incorporation of 4-amino piperidine derivatives.

(ii.2) While amino-2,2,6,6-tetramethyl piperidine (TAD) was disclosed in E14 as piperidine derivative, there was no example with TAD.

(ii.3) According to E14, the stabilizer was mixed with the molten polymer.

(ii.4) Starting from E14, the technical problem was to obtain polyamide with an improved light stabilization.

(ii.5) This problem was solved by polymerizing the polyamide precursors in presence of TAD and incorporating TAD in the polymer chain.

(ii.6) The comparison made with document E1 and the tests of the experimental report of 28 November 2001 showed that the incorporation of TAD in the polymer chain led to a better light and heat stabilization of the polyamide.

(ii.7) Document E3 was not pertinent for the assessment of inventive step, since it related only to branched polyamides with improved dying properties in respect of acid dyes.

(ii.8) It could not have been expected that polyamides with improved light stability and sufficient molecular weight could be obtained when using TAD as chain

regulator in the starting monomers. Furthermore, it was not usual in the art to use monoamines as chain regulator in polyamide.

(ii.9) Even if E4 would be considered it would not be pertinent for the following reasons:

(ii.9.1) This document referred to tetramethylpiperidin-4-ol (TMP) instead of TAD.

(ii.9.2) Hydroxyl groups would not be involved in the obtaining of a polyamide chain.

(ii.9.3) According to E4, the final polymer was surface treated with TMP.

(ii.9.4) TMP was only one of the eight stabilizers disclosed in E4.

(ii.9.5) According to E4 a vapour extraction of the polyamide should be carried out. From the examples of E4 it was evident that the vapour extraction was more effective than the stabilizer in order to improve the light stability.

(ii.10) Thus, the combination of E14 with E4 and E3, as done by the Opposition Division, could not be made.

V. With its letter dated 7 February 2003, Respondent I submitted a new document referred to as

E18: US-A-4 981 915.

It also argued essentially as follows:

(i) Concerning document E4:

This document should be taken into consideration for the following reasons:

(i.1) The opposition had been considered as admissible by the Opposition Division.

(i.2) E4 was a relatively short document and the relevant passage of E4 was clearly identified in the conclusions of the document.

(i.3) According to Article 114(1) EPC, the Opposition Division was entitled to take this document into consideration.

(ii) Concerning novelty:

(ii.1) The subject-matter of Claims 1 and 6 was not novel over E14 or E3.

(ii.2) E14 disclosed the use of TAD as stabilizer.

(ii.3) E14 further disclosed that the stabilizer might be added at any stage before the processing of the polymer and the polymer might be a polyamide.

(ii.4) E3 disclosed the use of TAD and of derivatives thereof during the polymerization of polyamide precursors.

(iii) Concerning inventive step:

(iii.1) E14 should be considered as the closest state of the art.

(iii.2) The patent in suit differed from E14 by the method of incorporation of the stabilizer into the polyamide.

(iii.3) Since E14 taught that the stabilizer might be incorporated at any stage before processing, the subject-matter of the patent in suit lacked inventive step.

(iii.4) E3 taught the use of TAD as chain regulator. There was no difference between the use of TAD in E3 and its use in the patent in suit. Furthermore TAD was known as light and heat stabilizer. Thus the combination of E14 and E3 rendered the claimed subject-matter obvious.

(iii.5) It was known in the art that TAD or derivatives thereof could be incorporated in a polymer chain through an amide bond (cf. E12, E4, and E18).

(iii.6) The tests submitted by the Appellant (cf. E1, Examples 4 and 4c; cf. Experimental Report of 28 November 2001 were not pertinent for demonstrating the presence of inventive step since they did not fall under the scope of the claims.

(iii.7) One would come to the same conclusion of lack of inventive step when starting from E3 and combining it with E14.

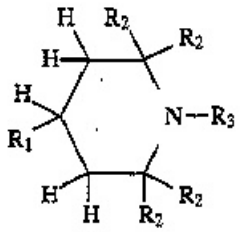
(iii.8) The subject-matter of the remaining claims 2 to 5 and 7 to 9 lacked inventive step in view of E14 and E3. Claim 10 was not inventive in view of E5 and E12.

VI. With its letter dated 14 July 2003, the Appellant submitted 4 sets of 10 claims representing a new main request and three auxiliary requests.

Independent Claims 1, 6, and 10 of the main request read as follows:

"1. A process for preparing a light stabilized polyamide substrate, comprising the steps of:

a. mixing an effective amount of a hindered amine with a polyamide precursor, said hindered amine comprising a functional group capable of reacting with an end group of said polyamide precursor and being represented by the formula:



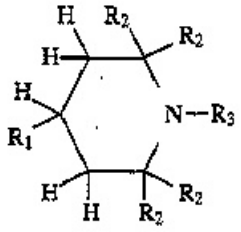
in which
R_1 comprises said functional group and is selected from the group consisting of $-(NH)R_5$ where R_5 is alkyl of 1 to 8 carbons; -COOH; -COOH acid derivative; $-(CH_2)_X(NH)R$, in which X is an integer of from 1 to about 6 and R is alkyl of 1 to 8 carbons; $-(CH_2)_Y$ COOH, in which Y is an integer of

from 1 to about 6; and -$(CH_2)_Y$ COOH acid derivative in which Y is an integer of from 1 to about 6,
R_2 is alkyl; and
R_3 is selected from the group consisting of hydrogen; alkyl of 1 to 3 carbons; and -OR_4 in which R_4 is selected from the group consisting of hydrogen, methyl, and alkyl of 1 to 7 carbons; followed by

b. reacting said functional group with the end group of said polyamide precursor at a temperature sufficient for polymerization to occur,
to thereby bind the hindered amine to the polyamide,

or comprising the steps of:

a. mixing an effective amount of a hindered amine with a polyamide precursor, said hindered amine comprising a functional group capable of reacting with an end group of said polyamide precursor and being represented by the formula:

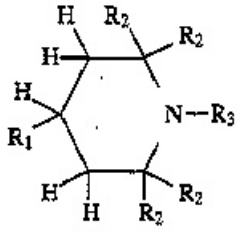


in which
R_1 comprises said functional group and is selected from the group consisting of -$(NH)R_5$ where R_5 is hydrogen or alkyl of 1 to 8 carbons; -COOH; -COOH acid derivative; -$(CH_2)_X(NH)R_5$, in which X is an

integer of from 1 to about 6 and R_5 is hydrogen or alkyl of 1 to 8 carbons; $-(CH_2)_Y COOH$, in which Y is an integer of from 1 to about 6; and $-(CH_2)_Y$ COOH acid derivative in which Y is an integer of from 1 to about 6,
R_2 is alkyl; and
R_3 is selected from the group consisting of hydrogen; alkyl of 1 to 3 carbons; and $-OR_4$ in which R_4 is selected from the group consisting of hydrogen, methyl, and alkyl of 1 to 7 carbons; followed by

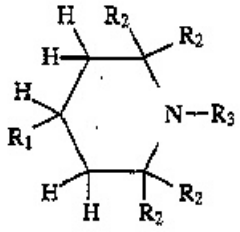
b. reacting said functional group with the end group of said polyamide precursor at a temperature sufficient for polymerization to occur,
to thereby bind the hindered amine to the polyamide,
wherein said polyamide precursor is selected from the group consisting of monomers and oligomers of a C_6 to C_{24} aryl diamine with a C_8 to C_{24} aryl diacid or aryl diacid derivative; monomers and oligomers of a C_6 to C_{24} aryl diamine with a C_2 to C_{18} alkyl diacid or alkyl diacid derivative; monomers and oligomers of a C_8 to C_{14} aralkyl diamine with a C_{10} to C_{14} aralkyl diacid or diacid derivative.

6. A polyamide substrate comprising a light stabilizing amount of a hindered amine bound thereto by reaction of a functional group of the hindered amine with an end group of a precursor of said polyamide, said hindered amine being represented by the formula:



in which
R_1 comprises said functional group and is selected from the group consisting of -(NH)R_5 where R_5 is alkyl of 1 to 8 carbons; -COOH; -COOH acid derivative; -$(CH_2)_X$(NH)R, in which X is an integer of from 1 to about 6 and R is alkyl of 1 to 8 carbons; -$(CH_2)_Y$ COOH, in which Y is an integer of from 1 to about 6; and -$(CH_2)_Y$ COOH acid derivative in which Y is an integer of from 1 to about 6,
R_2 is alkyl; and
R_3 is selected from the group consisting of hydrogen; alkyl of 1 to 3 carbons; and -OR_4 in which R_4 is selected from the group consisting of hydrogen, methyl, and alkyl of 1 to 7 carbons;

or said hindered amine being represented by the formula:



in which
R_1 comprises said functional group and is selected from the group consisting of -(NH)R_5 where R_5 is hydrogen or alkyl of 1 to 8 carbons; -COOH; -COOH

acid derivative; $-(CH_2)_X(NH)R_5$, in which X is an integer of from 1 to about 6 and R_5 is hydrogen or alkyl of 1 to 8 carbons; $-(CH_2)_Y COOH$, in which Y is an integer of from 1 to about 6; and $-(CH_2)_Y$ COOH acid derivative in which Y is an integer of from 1 to about 6,
R_2 is alkyl; and
R_3 is selected from the group consisting of hydrogen; alkyl of 1 to 3 carbons; and $-OR_4$ in which R_4 is selected from the group consisting of hydrogen, methyl, and alkyl of 1 to 7 carbons,

wherein said polyamid precursor is selected from the group consisting of monomers and oligomers of a C_6 to C_{24} aryl diamine with a C_8 to C_{24} aryl diacid or aryl diacid derivative; monomers and oligomers of a C_6 to C_{24} aryl diamine with a C_2 to C_{18} alkyl diacid or alkyl diacid derivative; monomers and oligomers of a C_8 to C_{14} aralkyl diamine with a C_{10} to C_{14} aralkyl diacid or diacid derivative.

10. A flag, a decorative banner, or a personal flotation device made of the polyamide substrate of claim 6."

Independent Claims 1 and 6 of the first auxiliary request differ from Claims 1 and 6 of the main request, respectively, only in that the expression "for making fibers" has been added after the wording "polyamide substrate" in the first line of the respective claims.

Independent Claims 1 and 6 of the second auxiliary request differ from independent Claims 1 and 6 of the

first auxiliary request, respectively, in that the polyamide precursors have been restricted to the group consisting of monomers and oligomers of a C_6 to C_{24} aryl diamine with a C_8 to C_{24} aryl diacid or aryl diacid derivative; monomers and oligomers of a C_6 to C_{24} aryl diamine with a C_2 to C_{18} alkyl diacid or alkyl diacid derivative; monomers and oligomers of a C_8 to C_{14} aralkyl diamine with a C_{10} to C_{14} aralkyl diacid or diacid derivative.

Independent Claims 1 and 6 of the third auxiliary request differ from independent Claims 1 and 6 of the second auxiliary request in that the polyamide substrate has been restricted to a fiber. Furthermore, independent Claim 10 reads as follows: "A flag, a decorative banner, or a personal flotation device made of the polyamide fiber of claim 6."

The Appellant also argued essentially as follows:

(i) Document E18 was a late filed document. It was not pertinent and should not be admitted into the proceedings.

(ii) Novelty:

(ii.1) E14 did not disclose that the stabilizer should be mixed with the polyamide precursors and polymerized.

(ii.2) Since the possibilities for the radicals R_5 and R to be hydrogen had been deleted from the formula set out for the hindered amine, the subject-matter of Claims 1 of the main request and the first auxiliary request was novel over E3. Furthermore E3 did not

disclose the use of aromatic polyamide precursors, and the polyamides disclosed in E3 could not be used as fibers since they were branched.

(iii) Inventive step:

(iii.1) The skilled person would not combine E14 and E3 since E3 was not concerned at all with the stabilization of polyamides against light.

(iii.2) E12 would not lead to the solution proposed in the patent in suit, since the hindered amines used according to E12 were bifunctional monomers and did not work as chain regulators.

(iii.3) The experimental report submitted with letter of 28 November 2001 was pertinent, since it showed the effect of the addition of the stabilizer to the precursors in comparison to the mixing of the stabilizer with the obtained polyamide. This effect would also be obtained for the claimed polyamides.

VII. In a letter dated 23 April 2004, the Appellant informed the Board that it did not intend to attend the oral proceedings scheduled on 20 July 2004.

VIII. With its letter dated 13 May 2004, Respondent I submitted a further document:

E19: "Dictionnaire des fibres textiles & technologies textiles", Centre des technologies textiles, 1994; pages 28 to 29.

It also argued essentially as follows:

(i) Concerning the main request:

(i.1) E3 could be taken as the closest state of the art. The main request differed from E3 only in that derivatives of TAD were used.

(i.2) TAD was well known as light stabilizer. Thus, the polyamides of E3 were inherently light stabilized.

(i.3) It was obvious to the skilled person to replace the TAD used in E3 by TAD derivatives having other functional groups being reactive with the functional groups of the polyamide.

(i.4) The subject-matter of the main request would also be obvious in view of the combination of E14 with E3. In that respect, the fact that TAD compounds might be used in the polymerization of polyamides for stabilizing them was suggested by documents E2, E5, E18, and E4.

(i.5) It was further obvious to the skilled person to use TAD or TAD derivatives for the stabilization of aromatic polyamides.

(i.6) Document E2 could also be taken as closest state of the art, since it disclosed light stabilized aromatic polyamides which could be used as fibers.

(i.7) It differed from the patent in suit in that the use of TAD was not disclosed in E2.

(i.8) The combination of E2 with E3 or E14 would render the claimed subject-matter obvious.

(ii) Concerning the auxiliary requests:

The subject-matter of these requests would lack inventive step, since E2, E14 and E3 were concerned with the manufacture of polyamide fibers.

IX. In a telephone consultation dated 16 June 2004 with the Registrar of the Board, Respondent II (Opponent III) indicated that it would not attend the oral proceedings scheduled on 20 July 2004.

X. Oral proceedings were held on 20 July 2004 in the absence of the Appellant and of Respondent II).

At the oral proceedings Respondent I, while essentially relying on the arguments presented in its letter dated 13 May 2004, and after having stated that it had no objections under Article 123(2), 123(3) and 84 EPC in respect to the main request of the Appellant, made further submissions concerning inventive step, which may be summarized as follows:

(i) Claims 1 and 6 contained two alternatives, i.e.

alternative (a) applicable to all polyamides in which the possibility for the piperidine compound to be a primary amine had been deleted; and

alternative (b) applicable only to aromatic polyamides and specific semi-aromatic polyamides in which the

possibility for the piperidine compound to be a primary amine had been maintained.

(ii) Document E14 related to polyamide compositions which were stabilized against light and heat by incorporation of sterically hindered piperidine compounds.

(iii) These stabilizers belonged to same family as the stabilizers used according to the patent in suit.

(iv) The formula indicated for the stabilizer in E14 encompassed compounds having primary or secondary amine groups corresponding to the group R_1 in the formula set out in Claim 1 of the patent in suit.

(v) Furthermore the specific stabilizer 35 (cf. page 8 of E14) fell under the scope of the both alternatives of Claim 1. Stabilizer 32 (page 8) would fall under the scope of the second alternative of that claim.

(vi) According to E14 the stabilizer might be incorporated in the polyamide at any stage.

(vii) Document E4 disclosed that the incorporation of a hindered piperidine molecule on the end of the polymer chain was effective to photostabilizing polyamides.

(viii) The hindered piperidines of E4 belonged to the same family as those of E14.

(ix) It was further known from E3 that hindered piperidines (e.g. TAD) might be used as chain regulator in the manufacture of polyamides.

(x) There were no examples illustrating the alternative (a) and the only examples (i.e. Examples 16 and 18 of the patent in suit) dealing with alternative (b) gave no information concerning the light stabilization actually achieved.

(xi) Alleged but unsupported advantages (i.e. in the present case an improved light stability) could not be taken into consideration when assessing inventive step. Reference was made to the decisions T 561/94 of 6 December 1996 (not published in OJ EPO) and to decision T 20/81 (OJ EPO, 1982, 217).

(xii) Document E3 belonged to the same technical field as the patent in suit. Furthermore, the polyamides disclosed in E3 could be used in the manufacture of fibers, as evidenced by the reference made in E3 to their dying properties with acid dyes (cf. page 6, lines 53 to 54).

(xiii) Thus, in the absence of a specific effect related either to the use of the specific piperidines compounds (alternative (a)) or to the use of the specific polyamides (alternative (b)), the subject-matter of Claim 1 would lack inventive step in view of the combination of E14, with E4 and E3.

(xiv) Claim 6 only required that the stabilizer be bound to the end of the polyamide chain. Its subject-matter would be obvious in view of the combination of E14 and E4.

Following observations of the Board concerning the formal admissibility of the auxiliary requests, the Respondent submitted that Claim 10 of the third auxiliary request would appear to contravene Article 123(2) EPC, since personal flotation devices made of a fiber had not been disclosed in the application as originally filed.

XI. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request submitted with letter dated 14 July 2003, or in the alternative on the basis of one of the 3 auxiliary requests submitted with letter of 14 July 2003.

The Respondents requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible

2. *Procedural matters*

2.1 As mentioned above in paragraphs VII and IX, the Appellant and the Respondent II indicated that they would not be represented at the oral proceedings. In accordance with Rule 71(2)EPC, the proceedings continued without them. It further follows, that, in accordance with Article 11(3) of the Rules of procedure of the Boards of Appeal, the Board considers that the absent parties rely only on their written submissions.

2.2 As indicated in paragraph VI above, the Appellant has submitted with its letter dated 14 July 2003 four sets of claims representing a new main request and three auxiliary requests, respectively.

2.2.1 According to established jurisprudence of the boards of appeal of the EPO, amendments made in the claims of a patent in the course of appeal proceedings are to be fully examined by the Board of its own motion as to their compatibility with the requirements of the EPC, in particular the formal requirements with regard to Article 123(2) EPC (cf. G 9/91, OJ EPO 1993, 408, point 19 of the Reasons for the Decision).

2.2.2 It was therefore to be expected that a check of the amended claims for the purposes of Article 123(2) EPC would form part of the discussions at the oral proceedings, and the patent proprietor had reason and the opportunity to prepare himself for this eventuality. If he nevertheless preferred not to attend the oral proceedings, he failed to take up an opportunity to comment on this ground for the present decision.

2.2.3 Checking during the oral proceedings whether the subject-matter of the amended claims extended beyond the content of the application as filed, implies solely a comparison between the wording of the amended claims and the content of the application as filed and it is thus not based on facts introduced into the case for the first time during oral proceedings.

2.2.4 As can be inferred from the Opinion G 4/92 of the Enlarged Board of Appeal (OJ EPO 1994, 149), a decision may be based on a ground discussed for the first time

during oral proceedings which would prevent the patent being maintained as amended, if the absent patent proprietor could have expected the question to be discussed and was aware from the proceedings to date of the actual bases on which it would be judged.

2.2.5 Consequently, a decision concerning the formal allowability of the present amended claims under Article 123(2) EPC can be taken in the absence of the Appellant (Patent Proprietor) without infringing Article 113(1) EPC.

2.3 The Appellant has further contested the introduction of document E4 into the proceedings by the Opposition Division, on the ground that the opposition has not been substantiated in view of that document.

2.3.1 In that respect, the Board notes that document E4 has been submitted with the Notice of Opposition filed by Opponent II (Respondent I) on 20 January 2000. This Notice of opposition has been considered as admissible *in toto* by the Opposition Division, and this has not been contested by the Appellant. It thus follows that document E4 belonged to evidence submitted by Opponent II in support of its Notice of Opposition and that it was *ab initio* in the proceedings, so that the Opposition Division was not only entitled to consider this document, but, moreover, had the obligation to take it into consideration when assessing novelty and/or inventive step.

2.3.2 Since furthermore document E4 has been amply discussed at the oral proceedings before the Opposition Division

and during the written phase of the appeal proceedings, the Board sees no reason to disregard this document.

Main request

3. *Wording of the claims*

3.1 Independent Claims 1 and 6 of the main request differ from Claims 1 and 6 of the set of claims on which the decision of the Opposition Division has been based only in that the possibility for the radical R_5 to be hydrogen has been deleted from the first alternative covered by these claims.
The remaining Claims 2 to 5, and 7 to 10 correspond to Claims 2 to 5 and 7 to 10 of the set of claims on which the decision of the Opposition Division was based.

3.2 This set of Claims 1 to 10 has been considered as meeting the requirements of Articles 123(2), 123(3) and 84 EPC by the Opposition Division, and this has not been contested by the Opponents.

3.3 Taking into account that Respondent I has raised no objection under Article 123(2), 123(3) and 84 EPC against the main request, and since it is evident, in the Board's view, that the amendments made in independent Claims 1 and 6 in comparison to Claims 1 and 6 of the set of Claims on which the decision of the Opposition Division was based, cannot give rise to objections under these Articles, the Board sees no reason not to consider that the requirements of Articles 123(2), 123(3) and 84 EPC are met by all the claims.

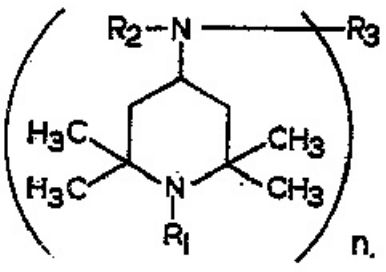
4. *Novelty*

4.1 Although lack of novelty has been alleged by Respondent I in respect to the subject-matter of the claims on which the decision of the opposition was based in view of documents E3 and E14, novelty of the subject-matter of the main request has not been challenged by the Respondents in the written phase of the appeal proceedings and it was not an issue at the oral proceedings before the Board. Thus, the Board sees no reason to raise the matter either.

5. *Closest state of the art*

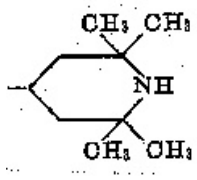
5.1 The patent in suit is concerned with light stabilized polyamide substrates. Such polyamide substrates are known in particular from document E14 which the Board in common with the Parties and the Opposition Division regards as the closest state of the art.

5.2 E14 relates, in particular to the stabilization of polyamides against photo- and thermal-deterioration thereof by having incorporated therein, in a sufficient amount to inhibit such deterioration, a 4-aminopiperidine derivative having the formula (I):

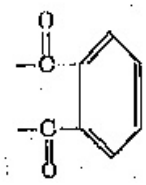


or a salt thereof.

In formula (I), R1 represents hydrogen atom or an acyl group; R2 represents hydrogen atom, an unsubstituted or substituted alkyl group, a cycloalkyl group, an unsubstituted or substituted aryl group, an unsubstituted or substituted aralkyl group or the group of the formula



n is an integer of 1 to 3 inclusive; and, when n is 1, R3 represents hydrogen atom, an acyl group, an alkoxycarbonyl group, carbamoyl group, thiocarbamoyl group, a N-substituted carbamoyl group, a N-substituted thiocarbamoyl group or a monovalent group obtained by removing one hydroxyl group from an oxoacid or it may form, together with R2, the group of the formula



and, when n is 2,

R3 represents a diacyl group, a N-substituted dicarbamoyl group, a N-substituted bisthiocarbamoyl group, carbonyl group or a divalent group derived by removing two hydroxyl groups from an oxoacid, and, when n is 3,

R3 represents a triacyl group, a N-substituted tricarbamoyl group, a N-substituted tristhiocarbamoyl group or a trivalent group obtained by removing three hydroxyl groups from an oxoacid (cf. Claims 1 and 6).

5.3 These polyamide compositions can be used in the manufacture of substrates such as fibers, films or molded articles (page 17, lines 19 to 23). As indicated in E14, the stabilizer can be incorporated into the polymer at any stage before the processing of the composition into formed articles (page 17, line 24 to page 18, line 2). In general, the 4-aminopiperidine derivatives of the formula (I) or salts thereof may be added in an amount ranging preferably 0.02 to 2.0 percent by weight for polyamides (page 18, lines 7 to 24). Although E14 exemplifies (Example 3) the incorporation by mixing in the melt of specific piperidine compounds (Table 3; and compounds No. 3, 6, 7, 10, 38, 51, 56, 59, and 62 on pages 7, 8, 9, 10) into an aliphatic polyamide (Nylon 6), none of the piperidine compounds used in this example comprises a functional group capable of reacting with the end groups of the polyamide.

5.4 On the basis of the introductory section of the patent in suit (paragraph [0001]), the technical problem underlying the patent in suit has been defined in the provision of polyamide substrates having an enhanced light stability.

5.5 The solution proposed by the patent in suit is to prepare the polyamide in presence of a specific piperidine light stabilizer which comprises a functional group capable of reacting with an end group of the polyamide precursors (Claim 1) or more generally to provide a polyamide substrate having a specific piperidine light stabilizer bound to the end of the polyamide chain (Claim 6).

5.6 In that context, the Board, however, firstly notes that neither the Examples 2, 3, 5, 7, 8, 9, 12, 13, 20, and 22 of the patent in suit nor the examples submitted with letter of 28 November 2001 of the Patentee fall under the scope of Claims 1 and 6 (alternative (a); cf. Section X(i), above). Secondly, although Examples 16 and 18 of the patent in suit would fall under the scope of Claims 1 and 6 (alternative (b)), these examples do not provide any information on the actual light stability obtained. The same is also true for the comparative data submitted in document E17 (Comparative data concerning "TAD Derivatives Reacting with Amine End Groups of the Polymer") filed by the Patent Proprietor at the oral proceedings before the Opposition Division, since, although the examples of Tables 8, 9 and 10 of E17 dealing with the use of TADCOOH would fall under the scope of Claims 1 and 6 (alternative(a)), this document is totally silent on the light stabilization obtained and merely states that "samples regulated by TADCOOH show in some aspects slightly better properties".

5.7 Consequently, there is no convincing evidence available to the Board, that the claimed measures provide an effective solution of the stated problem.

5.8 It is therefore necessary to reformulate the problem in less ambitious terms, namely, to provide further light stabilized polyamide substrates, but regardless of whether these polyamide substrates achieved the same, a lower or a better performance in terms of light stabilization than those disclosed in E14 (cf. also

T 253/95 of 17 December 1997, not published in OJ EPO; Reasons point 7.3).

5.9 The solutions of the reformulated problem are in any case the same (section 5.5, above). In that respect, the Board does not have any reason to doubt that the claimed measures provide an effective solution for the following reasons:
(i) firstly, since the stabilizers used in the patent in suit not only belong to the same family of stabilizers (i.e. hindered piperidines) but, moreover, they furthermore clearly overlap with those defined by the general formula (I) in E14, and, secondly,
(ii) since it is in any case evident, in the Board's view, that the stabilizing effect is related to the presence of a hindered piperidine backbone.

6. *Inventive step*

6.1 This issue turns, in particular, on the question whether the solution proposed in Claim 6 was obvious to the skilled person starting from the disclosure of E14, particularly its Example 3, having regard to the relevant prior art.

6.2 In other words, the question with regard to obviousness is whether the difference between the polyamide substrate according to Example 3 of E14 (cf. Section 5.3 above) and the polyamide substrates according to Claim 6, i.e. the use of a hindered piperidine compound having a functional group as defined in that claim and susceptible to react with the end group of the polyamide chain during the mixing in the melt involves an inventive step.

6.3 In that respect, document E4 which relates to the thermal and photochemical stabilization of polyamide 6,6 by hindered piperidine light stabilizers, discloses the use of a hindered piperidine stabilizer having a reactive functional group (i.e. 2,2,6,6-tetramethylpiperidin-4-ol (TMP)). According to E4, several hindered piperidine stabilizers, were tested (cf. Table 1 on page 254) for their efficiency in polyamide 6,6 substrates. In view of the results obtained in terms of decrease of the viscosity number after light exposure (Figure 3, page 259), it is clear that TMP indisputably provides a very effective stabilization against light. Thus, E4 concludes that the incorporation of a hindered piperidine molecule on the end of the polymer chains is an effective method for stabilizing nylon 6,6 against light (page 261, Conclusions).

6.4 While it is true as submitted by the Appellant that TMP as such does not fall under the definition of the hindered piperidines stabilizers used according to the patent in suit, since it possesses a hydroxyl group as functional group instead of a carboxylic group or an amino group as required by the patent in suit, it is evident, as stated above in Section 5.9, that the stabilizing effect is related to the presence of the hindered piperidine backbone and not to its binding group to the polyamide chain. It thus follows that the teaching of E4 cannot be limited to hindered piperidines having a hydroxyl group as functional group, but that it clearly extends to a general principle of binding the hindered piperidine stabilizer to the aliphatic polyamide chain.

6.5 Thus, starting from Example 3 of E14, it would not have required any inventive skill for the skilled person looking for further light stabilized polyamide substrates to select a hindered piperidine compound having a functional group susceptible to react with an end group of the polyamide chain during the mixing process in the melt among the stabilizers encompassed by the general formula indicated in Claim 1 of E14, such as the cyclic alkyl secondary amino tetramethylpiperidine compound 35 (page 8) or its linear alkyl homologues (methyl, ethyl; Claim 1, page 3, lines 17 to 19), or at least to try this in order to obtain further light stabilized polyamide substrates.

6.6 Consequently, the subject-matter of Claim 6 (alternative (a)) must be regarded as obvious in view of the combination of E14 with E4.

6.7 Since Claim 6 lacks inventive step, the main request as whole must be refused.

First and second auxiliary requests

7. Claim 1 of both the first and the second auxiliary requests refers to a process for preparing a light stabilized **polyamide substrate for making fibers**.

7.1 While it is disclosed in the application as originally filed (WO-A-97/05189) that the polyamide substrate as such might be a fiber, a film, fabrics, or a molded article (page 3, lines 1 to 3), the expression "polyamide substrate for making fibers" results, in the Board's view, in a further characterization of the

polyamide substrate, i.e. inherently attributing it properties such as, *inter alia*, shape, structure, mechanical or chemical characteristics, which render it suitable for being further transformed into polyamide fibers.

7.2 This further characterization of the polyamide substrate is however not supported by the application as originally filed. It thus follows that Claim 1 of both the first and the second auxiliary requests the first and the second auxiliary request contravenes Article 123(2) EPC. Consequently, these requests must be refused.

Third auxiliary request

8. Claim 6 of the third auxiliary request related to a polyamide fiber made from hindered piperidines stabilized aromatic or arylalkyl polyamides and Claim 10 refers to flag, a decorative banner or a personal flotation device made of the polyamide fiber of Claim 6.

8.1 While according to the application as originally filed (page 3, lines 1 to 5) the polyamide substrate might be used as **fabric covers for** personal flotation devices, and the products made therefrom might be used as personal flotation devices (page 8, line 29 to page 9, line 3), it is evident that there is no support in the application as filed for a personal flotation device made of an aromatic or alkyl aromatic polyamide fiber as defined in Claim 6.

8.2 Thus, the Board comes to the conclusion that Claim 10 contravenes Article 123(2) EPC. Consequently the third auxiliary request as a whole must be refused.

9. Since none of the requests submitted by the Appellant is allowable, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

E. Görgmaier R. Young